ISHAMASIA 2021 VIRTUAL

ASIA FUNGAL WORKING GROUP
an ISHAM working group

ISHAM
INTERNATIONAL SOCIETY FOR HUMAN AND ANIMAL MYCOLOGY

ISHAM Asia 2021

Congress of ISHAM Asia Fungal Working Group

August 6–8, 2021

www.ISHAMAsia.com

CONGRESS BOOK

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ISHAMASIA 2021 VIRTUAL

Pfizer-sponsored Symposium

Overcoming Invasive Mold Disease in an Era of Complex Epidemiology and Patient Needs

7 August 2021 (Saturday)

11:00–12:00 India (+5:30 UTC)
12:30–13:30 Indonesia, Thailand, (+7 UTC)
13:30–14:30 Hong Kong, Malaysia, Singapore, Taiwan (+8 UTC)

Join **Dr Methee Chayakulkeeree** and **Dr Johan Maertens** as they share about the evolving landscape and challenges when dealing with invasive mold disease (IMD), and the latest management strategies. There will also be case-based discussions on how to optimize patient outcomes.

ADD TO CALENDAR

You will be able to interact with the speakers via a live Q&A session.

SPEAKERS

Methee Chayakulkeeree
Associate Professor
Division of Infectious Diseases and Tropical Medicine
Department of Medicine
Faculty of Medicine Siriraj Hospital Mahidol University
Bangkok, Thailand

Johan Maertens
Associate Professor of Hematology
University Hospitals Leuven
Campus Gasthuisberg
Leuven, Belgium

AGENDA

DURATION	TOPIC	SPEAKER/MODERATOR
3 min	**Opening remarks**	Methee Chayakulkeeree, *Thailand*
22 min	**Think broadly and act swiftly: Challenges in managing IMD in an increasingly complex world**	Methee Chayakulkeeree, *Thailand*
25 min	**IMD treatment strategy: The value of a patient-tailored, early treatment approach**	Johan Maertens, *Belgium*
10 min	**Q&A**	All, moderated by Methee Chayakulkeeree, *Thailand*

Visit the **Pfizer booth** to learn more about current treatment options in IMD.

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WELCOME MESSAGE

Dear friends and peers,

In these challenging times, we are grateful and excited to welcome you to the first ISHAM Asia Congress. Hosted jointly by ISHAM and its Asia Fungal Working Group, this seminal event provides updates and developments in medical mycology to you in Asia and around the world.

With colleagues from more than 40 countries and 6 continents, ISHAM Asia 2021 is a truly global assembly of healthcare professionals, researchers and leaders working with fungal diseases and pathogenic fungi. The Congress puts state-of-the-art updates into geographical context and provides an unprecedented arena for scientific exchange. The 2.5-day world-class scientific program is jam-packed with the latest information and science in a variety of sessions delivered in a safe environment that fosters learning and connections with peers and faculty.

As we are not able to meet in person, we have gone to great lengths to provide ample opportunity for you to interact with your peers and colleagues from around the world – check out our meet-the-expert sessions and networking areas. Also, don't forget to visit our vibrant poster session and engaging virtual exhibitions with our sponsors.

We look forward to meeting and learning from you over this exciting weekend!

Yours sincerely,

Arunaloke Chakrabarti, MD, Dip NB, FAMS, FNASc, FIDSA
Congress Co-chair, ISHAM Asia 2021
Co-chair, Asia Fungal Working Group

Ruoyu Li, MD
Congress Co-chair, ISHAM Asia 2021
Co-chair, Asia Fungal Working Group

ORGANIZING COMMITTEE

Arunaloke Chakrabarti, India
Congress Co-chair

Ruoyu Li, China
Congress Co-chair

Methee Chayakulkeeree, Thailand
Chair, Scientific Committee

Ariya Chindamporn, Thailand
Chair, Scientific Committee

COMMITTEE MEMBERS

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Taiwan

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Lee Lee Low
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Atul Patel
India

Pei-Lun Sun
Taiwan

Ban Hock Tan
Singapore

Retno Wahyuningsih
Indonesia

GENERAL INFORMATION

DATE, TIME & VENUE

Date & time: August 6, 2021 16.00–20.00 (UTC+8)
August 7, 2021 12.00–20.00 (UTC+8)
August 8, 2021 12.00–20.00 (UTC+8)
Venue: Virtual congress

CONGRESS LANGUAGE

The official language of the congress is English.

EXHIBITION DAYS AND HOURS

Exhibitions are available on the platform throughout the 3 days of the Congress.

ON DEMAND

All sessions in the scientific program are recorded and available on demand on the virtual congress platform for 1 month from August 12 until September 12, 2021.

Scientific e-posters and oral presentations will be available on the platform throughout the 3 days of the Congress and available on demand for 1 month from August 12 till September 12, 2021.

NETWORKING

ISHAM Asia 2021 has dedicated a networking area on the virtual platform under the page "Networking". You will be able to chat with other delegates and potential collaborators based on the topics specified for each chat room.

CME/CPD ACCREDITATION

ISHAM Asia 2021 has been accredited by the following associations and societies. Delegates should only claim the hours of credit that they spent in the educational activity.

<table>
<tr><th>Region</th><th>Societies</th><th>Credits</th><th>Instructions/Details</th></tr>
<tr><td>Hong Kong</td><td>Hong Kong Academy of Medicine</td><td>15 (maximum, different no. of credits for different colleges)</td><td>Delegates can claim points by submitting their certificate(s) of attendance to the respective colleges after the Congress. Details for the respective colleges:
<table>
<tr><th>College</th><th>Max.</th><th>Aug 6</th><th>Aug 7</th><th>Aug 8</th><th>Category</th></tr>
<tr><td>Anaesthesiologists</td><td>15</td><td>3.5</td><td>7</td><td>7</td><td>Non ANA Passive</td></tr>
<tr><td>Community Medicine</td><td>10</td><td>3</td><td>6</td><td>6</td><td>PP</td></tr>
<tr><td>Otorhinolaryngologists</td><td colspan="5">Pending</td></tr>
<tr><td>Paediatricians</td><td></td><td>3</td><td>3</td><td>3</td><td>Cat. A</td></tr>
<tr><td>Pathologists</td><td></td><td>3</td><td>7</td><td>7</td><td>PP</td></tr>
<tr><td>Physicians</td><td></td><td>3</td><td>6</td><td>6</td><td></td></tr>
</table></td></tr>
<tr><td>International</td><td>European Accreditation Council for Continuing Medical Education (EACCME®)</td><td>12* (maximum)</td><td>Aug 6 (Day 1) – 2 credits
Aug 7 (Day 2) – 5 credits
Aug 8 (Day 3) – 5 credits

Please contact the Congress Secretariat if you need EACCME-designated certificate(s) after August 8, 2021</td></tr>
<tr><td rowspan="2">Malaysia</td><td>Academy of Medicine of Malaysia</td><td>20 (maximum)</td><td>1-Day (Event ID: 16310) – 8 points
2-Day (Event ID: 16311) – 16 points
3-Day (Event ID: 16312) – 20 points

Delegates can claim points manually in the Academy's system by searching for the Event ID</td></tr>
<tr><td>Malaysia Medical Association</td><td>20</td><td>Delegates can apply for CPD points through the Association's mobile app by scanning the QR code and submitting the program and certificate(s) themselves, during August 6–8, 2021</td></tr>
</table>

Region	Societies	Credits	Instructions/Details
Taiwan	Taiwanese Dermatological Association	6 (maximum, 2 points per day)	Delegates can claim points by submitting their certificate(s) of attendance after the Congress (before your next license renewals)
Thailand	The Medical Council of Thailand (CME)	27 (maximum, 9 points per day)	The Congress Secretariat will submit the attendance record based on delegates' login duration
	The Medical Technology Council (CMTE)	17	Please scan the QR code on the right to register for CMTE points Event ID: 1-01-085-21-08-01

Other applications for CME/CPD accreditation are in progress. Delegates can visit our Congress website (**www.ISHAMAsia.com**) for more details post-meeting.

***The Congress of the International Society for Human and Animal Mycology Asia Fungal Working Group (Virtual), Virtual, Hong Kong SAR, 06/08/2021–08/08/2021 has been accredited by the European Accreditation Council for Continuing Medical Education (EACCME®)** with 12 European CME credits (ECMEC®s). Each medical specialist should claim only those hours of credit that he/she actually spent in the educational activity.

Through an agreement between the Union Européenne des Médecins Spécialistes and the American Medical Association, physicians may convert EACCME® credits to an equivalent number of AMA PRA Category 1 Credits™. Information on the process to convert EACCME® credits to AMA credits can be found at www.ama-assn.org/education/earn-credit-participation-international-activities.

Live educational activities, occurring outside of Canada, recognised by the UEMS-EACCME® for ECMEC®s are deemed to be Accredited Group Learning Activities (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada.

CERTIFICATE OF ATTENDANCE

All delegates can download their certificate(s) of attendance after the Congress on the virtual platform under the page "Certificates".

For delegates who would like to claim EACCME points, please contact our Congress Secretariat, Ms Gigi Wong, at **info@ishamasia.com**, for EACCME-designated certificates.

SOCIAL MEDIA

You can follow ISHAM on Twitter and the Asia Fungal Working Group on Facebook, Instagram, LinkedIn and YouTube.

ISHAM

@ISHAM_Mycology

*If you would like to share your tweets about ISHAM Asia 2021, please place #ISHAMAsia2021 in your tweet.

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ACKNOWLEDGEMENTS

The Organizing Committee, the Asia Fungal Working Group and the International Society for Human and Animal Mycology would like to extend their heartfelt thanks to the following companies/ organizations for their unfailing support and contribution to the ISHAM ASIA 2021.

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Related Meetings

10th RSMPD 2021 VIRTUAL EVENT
REGIONAL SCIENTIFIC MEETING OF PAEDIATRIC DERMATOLOGY
2021 SAHCS VIRTUAL CONFERENCE 20 - 23 OCTOBER
APCCMI SINGAPORE 2021
18TH ASIA PACIFIC CONGRESS OF CLINICAL MICROBIOLOGY AND INFECTION

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Every attempt will be made to ensure that all aspects of the Congress mentioned in the Congress Book will take place as scheduled. The Organizer and/or its agents reserves the right to alter or cancel the Congress or any of the arrangements, timetables, plans or other items relating directly or indirectly to the Congress without prior notice for any reason beyond their control. The Congress and/or its agents shall not be liable for any loss, damage, expenditure or inconvenience caused as a result of such alteration or cancellation.

PROGRAM-AT-A-GLANCE

All program timings are in UTC+8
August 6, 2021 • 16.00–20.00 | August 7, 2021 • 12.00–20.00 | August 8, 2021 • 12.00–20.00

FRIDAY, AUGUST 6

	Room A	Room B	Room C
16.00–16.15	W1 President's welcome remarks		
16.15–17.15	Plenary session 1		
Parallel symposia 1–3			
17.30–18.45	Symposium 1: Fungal infections in the ICU	Symposium 2: IFD in febrile neutropenic patients	Symposium 3: Endemic mycoses in Asian countries
Co-sponsored symposium			
19.00–20.00	New antifungal agents in the pipeline		*Co-sponsored by:* CIDARA THERAPEUTICS, F2G The Rare Fungal Disease Company

SATURDAY, AUGUST 7

	Room A	Room B	Room C
Parallel symposia 4–6			
12.00–13.15	Symposium 4: Mucormycosis	AFWG–TID Symposium 5: Solid organ transplantation	Symposium 6: Diagnosis and management of superficial fungal infections
Sponsored symposium			
13.30–14.30	Overcoming invasive mold disease in an era of complex epidemiology and patient needs		*Sponsored by:* Pfizer
Parallel symposia 7–9			
14.45–16.00	Symposium 7: Antifungal resistance	Symposium 8: HIV & fungal infections	Symposium 9: Rare fungal infections
Parallel symposia 10–12			
16.15–17.30	Symposium 10: Allergy & colonization	Symposium 11: Non-culture-based diagnosis	Symposium 12: Diversity of cutaneous fungal infections
Ask-the-expert sessions			
17.45–18.30	E1: How are considerations of antifungal PK/PD important in clinical care?	E2: How to optimize the management of fungal infections in HSCT recipients?	E3: How to address practical challenges in tinea capitis and cutaneous mucormycosis
Parallel symposia 13–15			
18.45–20.00	Symposium 13: *Candida auris*	Symposium 14: Fungal prophylaxis in the immunocompromised hosts	Symposium 15: Pathogenesis

SUNDAY, AUGUST 8

	Room A	Room B	Room C
12.00–13.20	Interactive case presentations: Clinical-mycological correlation		
13.30–14.30	Plenary session 2		
Sponsored symposium			
14.45–15.45	Invasive fungal infections (IFIs) in immunocompromised host		
Ask-the-expert sessions			
16.00–16.45	E4: Antifungal stewardship	E5: Next-generation sequencing and relevance in fungal infections	E6: Tropical fungal infections
Parallel symposia 16–18			
17.00–18.15	Symposium 16: Biofilms and vaccines	Symposium 17: Immune interactions	Symposium 18: Prevention of fungal infections
18.30–19.45	Plenary session 3		

FULL PROGRAM

All program timings are in UTC+8
August 6, 2021 • 16.00–20.00 | August 7, 2021 • 12.00–20.00 | August 8, 2021 • 12.00–20.00

FRIDAY, AUGUST 6

	Room A	Room B	Room C
16.00–16.15	W1 President's welcome remarks *Arunaloke Chakrabarti*		
Plenary session 1 *Moderator: Arunaloke Chakrabarti*			
16.15–16.40	P1.1 Fungal infections in Asia: How are they different? *Arunaloke Chakrabarti*		
16.40–17.05	P1.2 Fungal infections: Updates in diagnosis and management for 2021 *Matthew Cheng*		
17.05–17.15	P1.3 Live Q&A		
Parallel symposia 1–3			
17.30–18.45	**Symposium 1: Fungal infections in the ICU** ***Moderator: Methee Chayakulkeeree*** S1.1 Intra-abdominal candidiasis *Matteo Bassetti* S1.2 Post-influenza aspergillosis *Muhammad Irfan* S1.3 New risk groups of mold infections *Methee Chayakulkeeree* S1.4 Live Q&A	**Symposium 2: IFD in febrile neutropenic patients** ***Moderator: Lee Lee Low*** S2.1 Empirical vs pre-emptive debate *Oliver Cornely & Ban Hock Tan vs Johan Maertens & Yee-Chun Chen* S2.2 Differences in fungal infection management in pediatric vs adult patients *Wanatpreeya Phongsamart* S2.3 Live Q&A	**Symposium 3: Endemic mycoses in Asian countries** ***Moderator: Retno Wahyuningsih*** S3.1 Histoplasmosis *Retno Wahyuningsih* S3.2 Talaromycosis *Patrick Woo* S3.3 Sporotrichosis *Shivaprakash M Rudramurthy* S3.4 Live Q&A
Co-sponsored symposium			
	New antifungal agents in the pipeline ***Moderator: Arunaloke Chakrabarti***		
19.00–19.25	N1.1 Rezafungin: A novel, once-weekly echinocandin in phase 3 development for treatment and prevention of invasive fungal disease *Taylor Sandison, Chief Medical Officer, Cidara Therapeutics*		
19.25–19.50	N1.2 Olorofim: First of a novel class of antifungals, the orotomides *Emma Harvey, Global Head of Medical Affairs, F2G Ltd*		
19.50–20.00	N1.3 Live Q&A		

Co-sponsored by: CIDARA THERAPEUTICS, F2G The Rare Fungal Disease Company

SATURDAY, AUGUST 7

	Room A	Room B	Room C
Parallel symposia 4–6			
12.00–13.15	**Symposium 4: Mucormycosis** ***Moderator: Atul Patel*** S4.1 Epidemiology in Asian countries *Hariprasath Prakash* S4.2 Updates in COVID-19-associated mucormycosis *Ritesh Agarwal* S4.3 Management challenges in Asian countries *Atul Patel* S4.4 Live Q&A	**AFWG-TID Symposium 5: Solid organ transplantation** ***Moderator: Ban Hock Tan*** S5.1 Timeline of fungal infections after transplant *Ban Hock Tan* S5.2 Fungal prophylaxis in abdominal transplantation *John Baddley* S5.3 Non-culture diagnostics for fungal infections *Sharon Chen* S5.4 Live Q&A	**Symposium 6: Diagnosis and management of superficial fungal infections** ***Moderator: Ruoyu Li*** S6.1 New taxonomy of dermatophytes *Ping Zhan* S6.2 Tips and tricks in the diagnosis and management of dermatophyte infection *Rataporn Ungpakorn* S6.3 New antifungal agents for dermatophytosis *Ruoyu Li* S6.4 Malassezia infection – recent progress *Shivaprakash M Rudramurthy* S6.5 Live Q&A
Sponsored symposium			
	Overcoming invasive mold disease in an era of complex epidemiology and patient needs ***Moderator: Methee Chayakulkeeree*** *Sponsored by: Pfizer*		
13.30–13.35	N2.1 Opening remarks *Methee Chayakulkeeree*		
13.35–13.55	N2.2 Think broadly and act swiftly: Challenges in managing IMD in an increasingly complex world *Methee Chayakulkeeree*		
13.55–14.20	N2.3 IMD treatment strategy: The value of a patient-tailored, early treatment approach *Johan Maertens*		
14.20–14.30	N2.4 Live Q&A		
Parallel symposia 7–9			
14.45–16.00	**Symposium 7: Antifungal resistance** ***Moderator: Yee-Chun Chen*** S7.1 Resistance in dermatophytes *Pei-Lun Sun* S7.2 Resistance in *Candida* *Yee-Chun Chen* S7.3 Resistance in *Aspergillus* *Chi-Jung Wu* S7.4 Live Q&A	**Symposium 8: HIV & fungal infections** ***Moderator: Ban Hock Tan*** S8.1 Cryptococcosis management *Jackrapong Bruminhent* S8.2 Pneumocystosis management *Atul Patel* S8.3 Immune reconstitution syndrome *Louis Chai* S8.4 Live Q&A	**Symposium 9: Rare fungal infections** ***Moderator: Ruoyu Li*** S9.1 Pythiosis *Ariya Chindamporn* S9.2 Phaeohyphomycosis *Ruoyu Li* S9.3 *Fusarium* and *Scedosporium/Lomentospora* infections: Update *Sharon Chen* S9.4 Live Q&A

SATURDAY, AUGUST 7 (CONTINUED)

	Room A	Room B	Room C
Parallel symposia 10–12			
16.15–17.30	**Symposium 10: Allergy & colonization** ***Moderator: Arunaloke Chakrabarti*** S10.1 Chronic pulmonary aspergillosis *David Denning* S10.2 SAFS & ABPA *Ritesh Agarwal* S10.3 Fungal sinusitis *Arunaloke Chakrabarti* S10.4 Live Q&A	**Symposium 11: Non-culture-based diagnosis** ***Moderator: Retno Wahyuningsih*** S11.1 Genomic approaches *Patrick Woo* S11.2 Point-of-care testing & newer diagnostics *Catriona Halliday* S11.3 Molecular diagnosis of mucormycosis *Malcolm Richardson* S11.4 Live Q&A	**Symposium 12: Diversity of cutaneous fungal infections** ***Moderator: Pei-Lun Sun*** S12.1 Cutaneous manifestations of invasive fungal infections *Sandra Widaty* S12.2 Fungal infection in patients receiving anti-cancer target therapy *Chun-Wei Lu* S12.3 Cutaneous protothecosis *Michiaki Masuda* S12.4 Live Q&A
Ask-the-expert sessions			
17.45–18.30	**E1: How are considerations of antifungal PK/PD important in clinical care?** ***Moderator: Methee Chayakulkeeree*** *Monica Slavin* *Chonnamet Techasaensiri*	**E2: How to optimize the management of fungal infections in HSCT recipients** ***Moderator: Ban Hock Tan*** *Oliver Cornely* *Katrien Lagrou*	**E3: How to address practical challenges in tinea capitis and cutaneous mucormycosis** ***Moderator: Pei-Lun Sun*** Tinea capitis: An unsolved problem in Asia *Pei-Lun Sun* Cutaneous mucormycosis *Eliza Miranda*
Parallel symposia 13–15			
18.45–20.00	**Symposium 13: *Candida auris*** ***Moderator: Methee Chayakulkeeree*** S13.1 Present status in Asia *Methee Chayakulkeeree* S13.2 Epidemiology and antimicrobial resistance *Tom Chiller* S13.3 Methods of transmission and control *Tom Chiller* S13.4 Live Q&A	**Symposium 14: Fungal prophylaxis in the immunocompromised hosts** ***Moderators: Atul Patel & Ban Hock Tan*** S14.1 Is there a role for prophylaxis in hematology beyond AML and HSCT? *Monica Slavin* S14.2 Challenging clinical case 1: Breakthrough disseminated candidiasis in allogeneic hematologic bone marrow transplantation *Sureerat Watcharasuwanseree* S14.3 Challenging clinical case 2 *Kamonlawat Sutthipool* S14.4 Live Q&A & case discussion	**Symposium 15: Pathogenesis** ***Moderator: Lee Lee Low*** S15.1 New insights in the pathogenesis of fungal infections *Robert Cramer* S15.2 Genetic susceptibility to cutaneous and subcutaneous fungal infections *Xiaowen Wang* S15.3 The dynamics and clinical implications of intestinal mycobiota in allogeneic hematopoietic cell transplantation *Bing Zhai* S15.4 Live Q&A

SUNDAY, AUGUST 8

	Room A	Room B	Room C
Interactive case presentations: Clinical–mycological correlation *Moderators: Methee Chayakulkeeree & Ariya Chindamporn*			
12.00–12.40	C1.1 Case 1: Invasive candidiasis *Clinician: Lee Lee Low* *Microbiologist: Piriyaporn Chongtrakool*		
12.40–13.20	C1.2 Case 2: Mucormycosis *Clinician: Atul Patel* *Microbiologist: Ariya Chindamporn*		
Plenary session 2 *Moderator: Arunaloke Chakrabarti*			
13.30–13.55	P2.1 Ten best papers from clinical mycology *Atul Patel*		
13.55–14.20	P2.2 Ten best papers from basic mycology *Arunaloke Chakrabarti*		
14.20–14.30	P2.3 Live Q&A		
Sponsored symposium			
	Invasive fungal infections (IFIs) in immunocompromised host ***Moderator: Yee-Chun Chen***		
14.45–15.05	N3.1 Do we need unified standard of care of IFI in hematology (malignancies & HSCT) in Asia? *Yok Lam Kwong*		
15.05–15.25	N3.2 Common mycoses in Asia: Challenges & opportunities *Atul Patel*		
15.25–15.45	N3.3 Q&A		
Ask-the-expert sessions			
16.00–16.45	**E4: Antifungal stewardship** ***Moderator: Ariya Chindamporn*** *Anucha Apisarnthanarak* *Yee-Chun Chen*	**E5: Next-generation sequencing and relevance in fungal infections** ***Moderator: Ruoyu Li*** *Michail Lionakis* *Patrick Woo*	**E6: Tropical fungal infections** ***Moderator: Mitzi Chua*** *Mitzi Chua* *Retno Wahyuningsih*

SUNDAY, AUGUST 8 (CONTINUED)

	Room A	Room B	Room C
Parallel symposia 16–18			
17.00–18.15	**Symposium 16: Biofilms and vaccines** ***Moderator: Ariya Chindamporn*** S16.1 Fungal biofilms *Matteo Bassetti* S16.2 Fungal vaccines *Donald Sheppard* S16.3 Live Q&A	**Symposium 17: Immune interactions** ***Moderator: Ruoyu Li*** S17.1 Biologicals and fungal infections *Siriorn Watcharananan* S17.2 Fungal infections and host innate immunity *Xinming Jia* S17.3 Novel immune susceptibilities to invasive fungal and *Mycobacteria* infections in Asia *Louis Chai* S17.4 Live Q&A	**Symposium 18: Prevention of fungal infections** ***Moderator: Mitzi Chua*** S18.1 Source in the patients *Lee Lee Low* S18.2 Hospital air *Mitzi Chua* S18.3 Prevention of fungal infections/outbreaks during disaster: Lessons learnt *Anucha Apisarnthanarak* S18.4 Live Q&A
Plenary session 3 *Moderator: Ruoyu Li*			
18.30–18.55	P3.1 Natural disasters & outbreaks of fungal disease *Tom Chiller*		
18.55–19.20	P3.2 COVID-19-associated pulmonary aspergillosis *Nitipong Permpalung*		
19.20–19.45	P3.3 COVID-19-associated candidiasis *Arnaldo Colombo*		
19.45–20.00	P3.4 Live Q&A		

INVITED SPEAKERS AND PRESENTATIONS

Ritesh Agarwal

Postgraduate Institute of Medical Education and Research
India

Dr. Ritesh Agarwal was born and educated in Chennai (India). He completed his medical school (M.B.B.S) in 1998 from Stanley Medical College, Chennai and joined the Residency Program in Internal Medicine at Postgraduate Institute of Medical Education and Research, Chandigarh in 1998. Subsequently, he completed his Fellowship in Pulmonary and Critical Care Medicine from the same Institute in 2004.

He is currently working as a Professor in the Department of Pulmonary Medicine at the Postgraduate Institute of Medical Education and Research, Chandigarh, India.

His primary research area is allergic bronchopulmonary aspergillosis. He also maintains keen interest in interventional pulmonology and meta-analysis.

Dr. Agarwal has more than 500 publications to his credit. He has written several chapters in national and international books. He is also co-editor of two books (Oxygen Therapy, Textbook of Pulmonary and Critical Care Medicine). He was awarded the ICMR Kamal Satbir Award for the year 2009, the NASI-Scopus Young Scientist Award (Medicine category) for the year 2011, the ICMR Shakuntala Amir Chand Award for the year 2012, the ICMR Chaturvedi Ghanshyam Das Jaigopal Memorial Award for the year 2019, and the Shanti Swarup Bhatnagar Award for the year 2020, for his work in the field of allergic bronchopulmonary aspergillosis.

Dr. Agarwal is Fellow of the American College of Chest Physicians, Asian Pacific Society of Respirology, Indian Chest Society and Royal College of Physicians of Glasgow.

Presentations

1. Symposium 4: Mucormycosis

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room A

S4.2 Updates in COVID-19-associated mucormycosis (CAM)

The COVID-19 pandemic has caused significant worldwide and in India. While we were beginning to understand the pathogenesis of COVID-19, there were occasional case reports and then a series of CAM, mainly from India. In a multicentric epidemiology study of CAM from India conducted between September and December 2020, it was shown that there was a two-fold rise in cases attributable to CAM. The most common underlying risk factor for CAM was uncontrolled diabetes, and rhino-orbital was the most often involved site. Almost 60% of the patients had received an inappropriate dose or duration of glucocorticoids. From May to June 2021, there was a tremendous rise in mucormycosis cases in India, mostly CAM. India reported an unusual 42,000 cases of mucormycosis in mere three months. The precise reason for the increase in cases of CAM remains unknown. The 'epidemiologic triad' model (environment, host, and agent factors) helps explain the re-emergence of an existing disease.

There is a high environmental Mucorales spore burden in India. Mucorales may have acquired new virulence factors contributing to CAM. However, the host factors are most likely to explain the 'mucormycosis storm' in India. Patients with COVID-19 commonly have diabetes, and those with severe COVID receive glucocorticoids. In a setting of hyperglycemia, severe COVID-19 further worsens hyperglycemia due to the release of stress hormones. Further, SARS-CoV-2 infects human pancreatic β cells and elicits β cell impairment. Severe COVID-19 is also associated with hyperferritinemia and endothelial injury. All these factors have probably led to increased expression of receptors on the host and the agent leading to a widespread occurrence of CAM. Further research is required to investigate the role of SARS-CoV-2 in causing Mucorales-specific immune defects.

Presentations

2. Symposium 10: Allergy & colonization

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room A

S10.2 SAFS & ABPA

Aspergillus fumigatus can cause a variety of allergic pulmonary disorders depending on the degree of host Th2 immunity. The mildest form is Aspergillus-sensitized asthma with allergic bronchopulmonary aspergillosis (ABPA) at the most severe end of the spectrum. There is a high burden of ABPA in special asthma and chest clinics. All patients with asthma must be routinely screened for fungal (Aspergillus) sensitization. Patients with asthma and Aspergillus sensitization not only have impaired lung function (than patients without fungal sensitization), but Aspergillus sensitization is also the first step in the development of ABPA. The International Society for Human and Animal Mycology ABPA working group criteria are widely used for diagnosing ABPA. Recent evidence suggests that minor modifications to the ISHAM-ABPA working group criteria can improve the diagnostic performance. Severe asthma with fungal sensitization (SAFS), as the name indicates, is diagnosed in patients with severe asthma and fungal sensitization who do not fulfill the criteria for ABPA. The treatment of SAFS is like severe asthma. Itraconazole has been shown to improve the quality of life in patients with SAFS. The treatment of ABPA includes the use of glucocorticoids for controlling immune hyperactivity and antifungal triazoles to attenuate the fungal burden in the airways. A combination of glucocorticoids and antifungal azoles is also widely used for treating ABPA. More research is required for defining a particular form of therapy in a specific subgroup of patients with ABPA.

Anucha Apisarnthanarak

Infectious Diseases Division, Thammasat University Hospital
Thailand

Dr. Anucha Apisarnthanarak is current the Professor and Chief of Infectious Diseases Division at Thammasat University Hospital. He also serves as an Adjunct Visiting Professor at Division of Infectious Diseases, Washington University School of Medicine, USA.
Dr. Apisarnthanarak's research focus included infection prevention in resource-limited setting, infection control to prevent multi-drug resistant microorganisms as well as outbreak investigations. He published more than 250 peer-review articles and more than 20 peer-review book chapters. He has been a key committee member of many national and international societies including Thai National Nosocomial Infection Group, Society of Healthcare Epidemiology of America, and Asia Pacific Society of Infection Control.
Dr. Apisarnthanarak also serves as editorial board for key infectious diseases and infection control journals including Clinical Infectious Diseases, Infection Control and Hospital Epidemiology and American Journal of Infection Control.

Presentations

1. Ask-the-expert

Sunday, August 8, 2021
16.00–16.45 (UTC+8) Room A

E4: Antifungal stewardship

In this ask-the-expert session, Dr Anucha Apisarnthanarak and Professor Yee-Chun Chen will be addressing as many questions as possible attendees may have on antifungal stewardship.

2. Symposium 18: Prevention of fungal infections

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room C

S18.3 Prevention of fungal infections/outbreaks during disaster: Lessons learnt

There is evidence suggesting an increased incidence of HAIs and pseudo-outbreaks due to molds after extensive flooding in healthcare facilities. However, there is no strong evidence of an increased incidence of typical nosocomial infections (i.e., ventilator-associated pneumonia, healthcare-associated pneumonia, central line-associated bloodstream infection and catheter-associated urinary tract infections). Surveillance is an important initial step to detect potential outbreaks/pseudo-outbreaks of HAIs. Hospital preparedness policies before extensive flooding, particularly with environmental cleaning and mold remediation, are key to reducing the risk of flood-related HAIs. These policies are still lacking in most hospitals in countries that have experienced or are at risk for extensive flooding, which argues for nationwide policies to strengthen preparedness planning. In this session, I will present the experience of outbreak investigation and prevention for fungal outbreaks during black-water flood. This experience can be applied for other type of disasters (e.g., hurricane) for investigation and prevention of fungal outbreak/pseudo-outbreak after hospital encountered unanticipated disaster.

John Baddley

Division of Infectious Diseases, University of Maryland School of Medicine
USA

John W. Baddley, MD, MSPH is a Professor of Medicine in the Division of Infectious Diseases at the University of Maryland School of Medicine. He serves as Director, Immunocompromised Host ID Section and previously served as Director, Transplant Infectious Diseases at University of Alabama at Birmingham's Comprehensive Transplant Institute. His clinical work focuses on management of infections in the immunocompromised host and he also participates in clinical trials and outcomes research. Dr. Baddley currently serves on the editorial boards of Transplant Infectious Diseases and Open Forum Infectious Diseases and is on the American Board of Internal Medicine's Infectious Disease Exam Committee.

Presentation

1. AFWG-TID Symposium 5: Solid organ transplantation

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room B

S5.2 Fungal prophylaxis in abdominal transplantation

Post-transplant invasive fungal infections (IFIs) remain a significant cause of morbidity and mortality. The most frequent causative pathogens include *Candida* and *Aspergillus* species and the risk of infection greatest for small bowel and liver transplant patients. Many strategies for prevention of fungal infections have been investigated, including the use of antifungal prophylaxis with both systemic and topical nonabsorbable agents. Often, the strategy is to identify those patients at highest risk for IFIs who would be expected to derive the most benefit from antifungal prophylaxis. Currently, data support the use of antifungal prophylaxis in liver, lung, small bowel and pancreas transplant recipients. By understanding the epidemiology of post-transplant IFIs and the pharmacology of antifungal medications, providers may target antifungal prophylaxis more optimally. This lecture will give an overview of current practices of antifungal prophylaxis in abdominal transplantation.

Matteo Bassetti

Infectious Diseases Clinic, Policlinico San Martino University Hospital
Italy

Matteo Bassetti is Head of the Infectious Diseases Clinic of the Policlinico San Martino University Hospital in Genoa and Full Professor of Infectious Diseases of the University of Genoa, Italy. Dr Bassetti studied at the University of Genoa School of Medicine and continued his medical education at the Yale University School of Medicine, New Haven, USA with an Infectious Diseases fellowship.

Dr Bassetti is president of the Italian Society of Anti-infective Therapy (SITA) and member of executive committee for the battle against antimicrobial resistance of the Italian Minister of Health (PNCAR). He is co-chair of the Intra-abdominal Infections Study Group of the International Society of Chemotherapy (ISC). He is member-elected (2018-2022) of International Council of the Immunocompromised Host Society (ICHS). From 2019 he is member of the council of International Sepsis Forum (ISF). He serves on the editorial board of several prestigious international journals. Author or co-author of 660 papers (H index 70; 21000 citations) published in International peer-review journals and several chapter's book on antibiotic therapy, fungal infections, antimicrobial resistances, infections in immunocompromised patients and critically ill patients.

Presentations	
1. Symposium 1: Fungal infections in the ICU S1.1 Intra-abdominal candidiasis	Friday, August 6, 2021 17.30–18.45 (UTC+8) Room A
2. Symposium 16: Biofilms and vaccines S16.1 Fungal biofilms	Sunday, August 8, 2021 17.00–18.15 (UTC+8) Room A

Jackrapong Bruminhent

Faculty of Medicine Ramathibodi Hospital, Mahidol University
Thailand

Jackrapong Bruminhent, M.D., is an Assistant Professor of Medicine at the Division of Infectious Diseases, Department of Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University in Bangkok, Thailand. Dr. Bruminhent received his medical degree from the Faculty of Medicine Siriraj Hospital, Mahidol University in Bangkok, Thailand, in 2005. He then completed his internal medicine residency at St. Vincent's Medical Center, University of Connecticut in Bridgeport, CT, USA, in 2011, followed by an infectious diseases fellowship at Thomas Jefferson University Hospital in Philadelphia, PA, USA, in 2013. He later pursued a transplant infectious diseases fellowship at Mayo Clinic in Rochester, MN, USA, before joining the Division of Infectious Diseases, Department of Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University in Bangkok, Thailand, in 2016. He also serves as a transplant infectious disease consultant at the Excellence Center for Organ Transplantation at Ramathibodi Hospital. His clinical and research interests include infections in solid organ transplant recipients especially cytomegalovirus, adenovirus, BK polyomavirus, and fungal infections. His clinical and research interests include infections in immunocompromised hosts. Dr. Bruminhent is a speaker at national meetings and an editor of the *Journal of Infectious Diseases* and *Antimicrobial Agents*, an official publication of Infectious Diseases Association of Thailand.

Presentation

1. Symposium 8: HIV & fungal infections

Saturday, August 7, 2021
14.45–16.00 (UTC+8)
Room B

S8.1 Cryptococcosis management

Cryptococcus spp. has remained a leading pathogen causing opportunistic infections among patients living with human immunodeficiency virus (HIV), especially those with acquired immunodeficiency syndrome (AIDS). Although various signs and symptoms of cryptococcosis could be presented, Cryptococcal meningoencephalitis is by far the most frequently encountered in practice, leading to significant morbidity and mortality without appropriate management. Cerebrospinal fluid (CSF) or serum Cryptococcal polysaccharide antigen is more commonly utilized as a primary laboratory test to assist a diagnosis while waiting to be confirmed by CSF culture.[1]

The key management for treating cryptococcal meningoencephalitis is anti-fungal therapy, intracranial pressure control, and antiretroviral therapy (ART). Anti-fungal therapy can divide into three periods: induction, consolidation, and maintenance therapy.[2] Thus far, a 2-week course of amphotericin B combined with flucytosine is the most reliable regimen for induction therapy. Although liposomal amphotericin B is preferred to omit nephrotoxicity, amphotericin B deoxycholate has remained prescribed in resource-limited settings. Co-administration of flucytosine with amphotericin B has been shown to accelerate CSF sterilization; however, high-dose fluconazole (800 to 1200 mg/day) is also acceptable where accessibility to flucytosine is limited. A recent study revealed that a 1-week duration of amphotericin B and flucytosine induction therapy followed by high-dose fluconazole (1200 mg/day) for an additional week could be acceptable. Moreover, a dual oral anti-fungal regimen (fluconazole plus flucytosine) also revealed a favorable result as a candidate for outpatient therapy.[3]

Consolidation therapy usually relies on fluconazole (400 to 800 mg/day) for approximately eight weeks, followed by maintenance therapy with fluconazole 200 mg/day for 12 months while waiting for CD4 count recovery of greater than 100 cells/μL with undetectable HIV viral load of greater than three months. In addition, ART initiation is usually deferred up to 4 to 6 weeks to avoid unfavorable consequences such as immune reconstitution inflammatory syndrome (IRIS).[4]

Asymptomatic HIV-infected patients with CD4 counts less than 100 cells/μL are encouraged to be investigated for cryptococcosis before ART initiation. This could be performed by serum cryptococcal antigen screening followed by preemptive therapy. Anti-cryptococcal primary prophylaxis could be considered in certain circumstances, although a better survival has not been affirmed in a study.[5]

References:
1. Rajasingham R, Smith RM, Park BJ, et al. Global burden of disease of HIV-associated cryptococcal meningitis: an updated analysis. Lancet Infect Dis. 2017 Aug;17(8):873-881.
2. Perfect JR, Dismukes WE, Dromer F, et al. Clinical practice guidelines for the management of cryptococcal disease: 2010 update by the infectious diseases society of america. Clin Infect Dis. 2010 Feb 1;50(3):291-322.
3. Molloy SF, Kanyama C, Heyderman RS, et al. Antifungal Combinations for Treatment of Cryptococcal Meningitis in Africa. N Engl J Med. 2018 Mar 15;378(11):1004-1017.
4. Boulware DR, Meya DB, Muzoora C, et al. Timing of antiretroviral therapy after diagnosis of cryptococcal meningitis. N Engl J Med. 2014 Jun 26;370(26):2487-98.
5. Sungkanuparph S, Savetamornkul C, Pattanapongpaiboon W. Primary Prophylaxis for Cryptococcosis With Fluconazole in Human Immunodeficiency Virus-Infected Patients With CD4 T-Cell Counts <100 Cells/μL and Receiving Antiretroviral Therapy. Clin Infect Dis. 2017 Apr 1;64(7):967-970.

Louis Chai

University Medicine Cluster, National University Health System
Singapore

Louis Chai is Senior Consultant and Associate Professor in the University Medicine Cluster, National University Health System, Singapore, and Principal Investigator of the Opportunistic Infections Group, Division of Infectious Diseases, National University Health System. Dr Chai's interests lie in opportunistic and atypical infections in immunocompromised hosts, patients with altered immunity and host-pathogen interaction. These are also the themes of his research group. He remains deeply entrenched at the bedside in providing clinical service for general infectious diseases and internal medicine. Dr Chai is funded by the National Medical Research Council of Singapore and the National University Health System.

Presentations

1. Symposium 8: HIV & fungal infections

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room B

S8.3 Immune reconstitution syndrome

Immune reconstitution syndrome (IRS) is an increasingly observed phenomenon by the bedside. IRS has conventionally been associated with anti-retroviral therapeutics but is also seen with initiation of antimicrobial treatment, in particular against various fungi and *Mycobacteria*. However, there are no definitive diagnostics for IRS. In this symposium, we will explore the occurrence of IRIS in the context of invasive fungal diseases, retroviral infection and in immunocompromised hosts with consideration of the perceived pathophysiology and possible therapeutics.

2. Symposium 17: Immune interactions

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room B

S17.3 Novel immune susceptibilities to invasive fungal and *Mycobacteria* infections in Asia

Susceptibility to invasive fungal infections has traditionally been ascribed to (i) iatrogenic interventions like chemotherapy, transplant-related immunosuppressive manipulations or through breech of anatomical barriers and (ii) primary immunodeficiencies. More recently it is being recognized that immune dysregulation can also confer susceptibility to *Mycobacteria* and fungal pathogens in hosts whereby disease occurrence can be at the converse age spectrum of PID patients. In this symposium the occurrence of anti-cytokine autoantibody syndromes will be discussed with a view of their predilection in Asian patients.

Arunaloke Chakrabarti

Postgraduate Institute of Medical Education and Research
India

Arunaloke Chakrabarti is Head of the Department of Medical Microbiology of the Postgraduate Institute of Medical Education and Research (PGIMER) in Chandigarh, India, where he is also in charge of the Center of Advance Research in Medical Mycology, World Health Organization Collaborating Center for Reference and Research of Fungi of Medical Importance, and the National Culture Collection of Pathogenic Fungi. He is current President of the International Society for Human and Animal Mycology (ISHAM).

As an expert in medical mycology, Professor Chakrabarti is also Co-chair of the ISHAM Asia Fungal Working Group and international coordinator of ISHAM Working Group on Fungal Sinusitis and Allergic Bronchopulmonary Aspergillosis. He is Chairman of the Fungal Infection Study Forum and international adviser of the Leading International Fungal Education, an international nongovernmental organization. He has published 276 papers in the field of fungal diseases in prestigious journals and has recently edited the book, Fungal Infections in Asia: The Eastern Frontier of Mycology. In addition, he currently serves as section editor/editor/associate editor/deputy editor of five journals: *Medical Mycology, Mycoses, Medical Mycology Case Reports, Current Fungal Infections Report,* and the *Journal of Medical Microbiology*.

Presentations

1. Plenary 1

Friday, August 6, 2021
16.15–17.15 (UTC+8) Room A–C

P1.1 Fungal infections in Asia: how are they different?

Asia is the most populous continent in the world where a large proportion people live below poverty line. There is shortage of everything including awareness of fungal diseases, diagnostic mycology laboratories, trained manpower, availability and affordability of antifungal drugs. On the flip side of the story, fungi thrive easily in the tropical climate of Asian countries both outdoor and indoor environment of home and hospital, and the spectrum of fungi causing human infections are wide. The overcapacity of patient load in public-sector hospitals and high spore count in the air of hospital complicate the scenario further. We observe high magnitude of invasive fungal infections in Asian countries. Limited epidemiology data have also highlighted many unique features like talaromycosis is restricted to South-east Asia only; pythiosis, trichosporonosis, phaehyphomycosis due to *Cladophialophora bantiana* are common; young people with less morbidity acquire the invasive fungal infection earlier after hospitalization compared to developed countries. Emergence of terbinafine resistant dermatophytosis, high numbers of fungal keratitis among farmers, and recurrent vulvo-vaginitis among women are additional problems in this region. However, the present outbreaks of covid associated mucormycosis in India, *Candida auris* infection in many countries, and fungemia due to rare yeast like *Pichia anomala, Kodamaea ohmeri, Candida viswanathii* etc. are unprecedented in the history of fungal infections. Though Asian Fungal Working Group is taking sustained effort in training, education, research and networking, this effort may be miniscule to face the formidable challenge. We need involvement of government machinery of each country, funding support from financial organizations to improve diagnosis of management of fungal infections in Asia.

Presentations

2. Symposium 10: Allergy & colonization

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room A

S10.3 Fungal sinusitis

Fungal sinusitis or rhinosinusitis is the inflammation of nose and paranasal sinuses. The course of the disease may be acute (<4 weeks) or chronic (>12 weeks). The acute disease is commonly seen in viral or bacterial infections. In immunosuppressed patients fungi especially Mucorales or *Aspergillus* species may cause acute rhinosinusitis, which is also described as 'Fungal emergency' due to its acute and aggressive angio-invasive course. Confusion prevails regarding the etiology and classification of chronic rhinosinusitis (CRS). Fungi possibly play important role in this group of infection, as it has been demonstrated commonly in the inflammatory materials from patients with CRS. In Asian countries, CRS is a common disease in rural population. In a study in the villages of north India, fungal rhinosinusitis (FRS) was reported at a rate of 0.11% of population. FRS working group under International Society for Human and Animal Mycology (ISHAM) proposed a consensus classification of FRS, and the disease had been divided into invasive and non-invasive types depending on the invasion of fungi across the mucous membrane. Invasive disease is categorized into acute invasive (in immunosuppressed hosts), granulomatous invasive (restricted to the tropical region from Sudan to India), and chronic invasive (available worldwide). Non-invasive disease is categorized into fungal ball (commonly seen in elderly females of France, China, Korea, and Taiwan); and eosinophil-related FRS including allergic fungal rhinosinusitis (AFRS, common in Asian countries), eosinophilic FRS (EFRS, disease even in non-atopic individuals), and eosinophilic mucin rhinosinusitis (EMRS, eosinophilic mucin without presence of fungi, and associated with asthma, rise in aspirin sensitivity and IgG1 deficiency). Diagnosis of FRS includes imaging, endoscopy, biopsy and histopathology, direct microscopy and culture. To manage Acute invasive FRS, extensive surgery should be accompanied with amphotericin B therapy and control of immunosuppression. Chronic invasive and granulomatous FRS would require antifungal therapy besides surgery. Surgical removal is sufficient for fungal ball cases. In eosinophil-related FRS, local or systemic steroid therapy should follow surgical removal of inflammatory tissue.

3. Plenary 2

Sunday, August 8, 2021
13.30–14.30 (UTC+8)
Room A–C

P2.2 Ten best papers from basic mycology

Methee Chayakulkeeree

Faculty of Medicine Siriraj Hospital, Mahidol University
Thailand

Methee Chayakulkeeree is Associate Professor in the Division of Infectious Diseases and Tropical Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University in Bangkok, Thailand.

Dr Chayakulkeeree is a diplomate of the Thai Board of Internal Medicine and the Subspecialty Board of Infectious Diseases, and a fellow of The Royal College of Physicians of Thailand. He received further research training at Duke University Medical Center in the USA for infectious diseases and molecular mycology, and received his PhD in Microbiology and Immunology from the University of Sydney, Australia.

Dr Chayakulkeeree is affiliated with various local and international medical societies, including the the American Society for Microbiology (ASM), the Transplant Infectious Disease (TID) section of The Transplant Society (TTS). He is also a Fellow of the European Confederation of Medical Mycology (FECMM) and the country ambassador of the Global Action Fund for Fungal Infections (GAFFI). He has published more than 60 papers in peer-reviewed scientific journals, and has written several book chapters on infectious diseases.

Presentations

1. Symposium 1: Fungal infections in the ICU

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room A

S1.3 New risk groups of mold infections

Non-classical and novel risks factors of invasive mold infections (IMI) have been identified, particularly in patients with invasive aspergillosis. Most of the IMI patients with non-classical or novel risk factors are non-neutropenic. These risks included intensive care unit (ICU) admission, chronic obstructive pulmonary disease (COPD), receiving biologic agents or small molecule kinase inhibitors for cancer treatment. ICU patients with invasive aspergillosis had a high mortality of approximately 80%. Most of ICU patients with invasive aspergillosis did not have classical risk factor of IMI. In addition, Patients with severe viral pneumonia such as influenza pneumonia or COVID-19 pneumonia are associated with invasive aspergillosis. COVID-19-associated aspergillosis (CAPA) and COVID-19-associated mucormycosis (CAM) have been described. These particular fungal infections had a high mortality. Treatment of CAPA and CAM are similar to those without COVID-19. However, interaction between triazole and drug used for treatment of COVID-19 must be taken into consideration.

2. Symposium 13: Candida auris

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room A

S13.1 Present status in Asia

Candida auris is an emerging *Candida* species firstly report from Japan in 2009. *C. auris* has raised a global concern as it can cause an outbreak in healthcare settings. Most of *C. auris* strains are resistant to triazole or multidrug resistant (MDR). *C. auris* is difficult to identified and it can be misidentified to other *Candida* species if using conventional laboratory techniques. There are five clades of *C. auris* has been described so far and each clade shows different antifungal susceptibility profile and clinical manifestation. *C. auris* isolates from Japan were clade II (East Asia) and rarely cause invasive diseases. Most the Japanese *C. auris* isolates are still susceptible to triazoles. In contrast, 90% of those strains from India exhibited fluconazole resistance and/or MDR. The Indian *C. auris* isolates were clade I (South Asia). Recently, more data revealed that patients with critical COVID-19 were associated with a change in fecal fungal mycobiomes and *C. auris* is predominant in the fecal specimens of these patients. Furthermore, *C. auris* is the second common causative agent of COVID-19-associated candidiasis (CAC) in India.

Sharon Chen

Centre for Infectious Diseases and Microbiology Laboratory Services, Westmead Hospital Australia

Sharon Chen is the Director, Centre for Infectious Diseases and Microbiology Laboratory Services at Westmead Hospital, Sydney which incorporates reference laboratories in Bacteriology, Mycology, Virology and public health. She also heads the Infectious Diseases service for organ transplantation, and the Clinical Mycology service.

Her commitments outside the hospital have included: executive member of the Australia and New Zealand Mycoses Interest Group (ANZMIG), steering committee member of the National Antimicrobial Committee of Australia, co-convenor of the International Society for Human and Animal Mycology (ISHAM) working group on *Scedosporium* and scedosporiosis. She serves on the Board of Directors for the US Mycoses Study Group, and a site CI for the ISHAM European *fungal* PCR Initiative.

Dr. Chen has an active research interest in the surveillance and tracking of fungal and transplant-related infections using genomics, infection prevention in immunocompromised hosts, and on novel laboratory technologies, new antifungal agents and resistance to antifungal agents.

Presentations

1. AFWG–TID Symposium 5: Solid organ transplantation

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room B

S5.3 Non-culture diagnostics for fungal infections in solid organ transplantation

The clinical need for rapid, accurate methods for diagnosis of invasive fungal disease (IFD) in solid organ transplant (SOT) patients is clear, with a wide range of pathogens to consider. Recently the EORTC/MSG ERC has included the use of Aspergillus PCR and panfungal PCR methods (with DNA sequencing) as mycological criteria for IFD diagnosis in clinical trials. Notably culture based methods remain essential for many clinical scenarios and for providing an isolate for susceptibility testing.

Non-culture based methods broadly comprise of antigen detection techniques and PCR assays. Detection of fungal antigen can be rapid, quantitative and in a point-of-care format. The use of Aspergillus galactomannan, serum BDG and the Aspergillus lateral flow assay will be discussed. PCR assays can similarly be used in a 'screening' (to rule out IFD) or 'diagnostic' context. Whilst Aspergillus PCR, which now can be standardised, has greatest established utility in the haematology population, it is also useful in diagnosis of IFD in SOT patients but with varying positive predictive values. The T2 Candida Biosystems offers a rapid PCR method for the detection of common Candida species in blood. Quantitative PCR assays for Pneumocystis provide sensitive detection of *P. jirovecci* in respiratory samples.

Use of test type in combination provides optimal test sensitivity and specificity.

Presentations

2. Symposium 9: Rare fungal infections

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room C

S9.3 *Fusarium* and *Scedosporium/Lomentospora* infections: Update

Although *Candida* and *Aspergillus* fungi account for the majority of invasive fungal diseases (IFDs), non-*Aspergillus* mould infections are increasingly encountered. The epidemiology of different rare fungal infections varies with geography but is also partially influenced by differences in practice of antifungal drug use. In the Asia Pacific region including Australia, uncommon mould pathogens include *Fusarium*, *Scedosporium* and *Lomentospora* infections.

Traditional at risk patient groups include those with haematological malignancy and with organ and stem cell transplants. Newer patient risk groups for each of these genera, stem from the use of more intense immunosuppressive therapy, and in immunocompetent patients, from exposure to large fungal burdens. E.g after trauma and including outbreaks.

Improved diagnostics no doubt have no doubt impacted on species epidemiology, identification of new species, and have provided much-needed data of antifungal susceptibility patterns, which can help to inform antifungal therapy. Because these pathogens are “rare”, no randomised controlled clinical trials are evident to guide therapy. In contrast, data largely stems from small case series, open label studies and expert opinion. Novel antifungal agents in the pipeline, used as monotherapy or in combination with other antifungal agents, offer some insights in future therapeutic options, Among these are F-901318 (Olorofim; a dihydroorotate dehydrogenase [DHODH] inhibitor of the fungal pyrimidine biosynthesis pathway) and APX001A/AP001 which inhibits the glycophosphatidyl ionositol- mediated anchoring function of fungal cell wall mannoprotein. Their role in the treatment of rare mould infections will be discussed in the context of current antifungals.

Yee-Chun Chen

National Taiwan University Hospital and College of Medicine
Taipei

Yee-Chun Chen is Professor of Medicine at the National Taiwan University Hospital and College of Medicine in Taipei, Taiwan. She is also an investigator of the National Institute of Infectious Diseases and Vaccinology, National Health Research Institutes of Taiwan. Professor Chen also serves as Vice President of the International Society for Human and Animal Mycology.

Professor Chen started her clinical service professionally in 1992 at the National Taiwan University Hospital, and currently serves as a professorial lecturer in infectious diseases, infection control and travel medicine at the National Taiwan University College of Medicine.

One of Taiwan's leaders in medical mycology and infection control, Professor Chen's research focus includes clinical and molecular epidemiology of invasive fungal diseases, surveillance of healthcare-associated infection and informatics, the development of new diagnostic and therapeutic strategies for invasive fungal infections, and pathogenesis of Candida infections. Professor Chen has received several achievement awards (including the Asia Pacific Hand Hygiene Excellence Award in 2011), and has authored and co-authored more than 200 peer-reviewed journal articles published in prestigious journals, including *Clinical Infectious Diseases*, *Emerging Infectious Diseases*, the *Journal of Antimicrobial Chemotherapy*, *Clinical Microbiology and Infection*, the *Journal of Clinical Microbiology*, *Medical Mycology*, and many others.

Presentations

1. Symposium 2: IFD in febrile neutropenic patients

Friday, August 6, 2021
17.30–18.45 (UTC+8)
Room B

S2.1 Empirical vs pre-emptive debate

To date, the use of empirical or pre-emptive antifungal treatment strategies for patients with febrile neutropenia and suspected invasive fungal disease remains a subject of debate. In this lively and dynamic session, Professor Oliver Cornely and Dr Ban Hock Tan will put forward the viewpoints of using empirical antifungal treatment while Professors Johan Maertens and Yee-Chun Chen will take on the viewpoints of a pre-emptive antifungal approach. Join this session to hear the speaker panel debates the pros and cons of empirical and pre-emptive antifungal strategies in patients with febrile neutropenia.

2. Symposium 7: Antifungal resistance

Saturday,
August 7, 2021
14.45–16.00 (UTC+8)
Room A

S7.2 Resistance in *Candida*

Drug-resistant *Candida* infections have emerged as an important clinical problem and the burdens are very likely underestimated. Resistance in *Candida* may occur in various scenarios. The widespread use of azoles during the past two decades was coupled with an increase in infections caused by *C. glabrata* and other antifungal non-susceptible *Candida* species, such as *C. krusei*. Besides, *Candida auris* which was first reported in 2009 and has become a fungal pathogen of global concern. Some of these isolates become resistant to more than one category of antifungal agents. In addition, data generated from various hospitals located from different regions or countries showed that azole-non-susceptible rate of *C. tropicalis* have increased in the past decade and become the highest among four common *Candida* species. Cumulative evidence from several Asian countries showed that many of these patient isolates were genetically closely related and related to strains collected from the environment. In addition to resistance, trailing growth and other phenotypic characteristics of *Candida* may contribute suboptimal treatment response. In conclusion, detection and identification to *Candida* species are important to guide or modify antifungal agents. Ongoing surveillance of antifungal susceptibility is necessary to inform empirical therapy for optimal patient management and to guide antifungal stewardship. Furthermore, we need for a One Health, multidisciplinary strategy to tackle antifungal resistance in *Candida*

3. Ask-the-expert

Sunday,
August 8, 2021
16.00–16.45 (UTC+8)
Room A

E4: Antifungal stewardship

In this ask-the-expert session, Dr Anucha Apisarnthanarak and Professor Yee-Chun Chen will be addressing as many questions as possible attendees may have on antifungal stewardship.

Matthew Cheng

Divisions of Infectious Diseases and Medical Microbiology, McGill University Health Centre Canada

Dr. Cheng is an Assistant Professor in the Department of Medicine at McGill University, in Montreal. He leads the medical mycology laboratory and practices clinical infectious diseases at the McGill University Health Centre.

Dr. Cheng obtained his medical degree from McGill University, and then subsequently completed his residency in internal medicine, infectious diseases, and medical microbiology. He then completed a postdoctoral fellowship at the Harvard Medical School-affiliated Brigham and Women's Hospital and Dana-Farber Cancer Institute before establishing his clinical research program at the McGill University Health Centre.

Dr. Cheng's research focuses on patients with potentially lethal infections, including invasive fungal diseases and other opportunistic infections in immunocompromised hosts. His research program focuses on improving morbidity and mortality in these conditions by discovering original treatment strategies through avant-garde clinical trials. He also develops novel diagnostic assays to improve outcomes in these patients, such as using plasma cell-free DNA to monitor the host-response to infection and optimize treatment decisions.

His research program is funded by research operating grants from the US National Institutes of Health, the Canadian Institutes for Health Research, and the Australian National Health and Medical Research Council. He is also the recipient of numerous awards including fellowship grants from the Royal College of Physicians and Surgeons of Canada, the Association of Medical Microbiologists and Infectious Diseases Specialists of Canada, the Fonds de Recherche Santé Quebec.

Presentation

1. Plenary 1

Friday, August 6, 2021
16.15–17.15 (UTC+8) Room A–C

P1.2 Fungal infections: Updates in diagnosis and management for 2021

This session will discuss COVID-19 associated invasive aspergillosis and mucormycosis, and present emerging data regarding novel diagnostics for invasive fungal diseases, including the utility of cell-free DNA assays. Through direct damage of the respiratory epithelium caused by SARS-CoV-2, and the associated immunosuppressive treatments used to mitigate the host's inflammatory response to the virus, there have been increasing cases of COVID-19 associated pulmonary aspergillosis. It is defined in a similar manner to invasive pulmonary aspergillosis in temporal proximity to a diagnosis of SARS-CoV-2 infection. While voriconazole or isavuconazole are recommended as first-line treatments, there are emerging data to suggest that posaconazole could equally be considered.

The rates of mucormycosis have also been increasing in Asia, especially in India. This dramatic rise in the number of cases is explained at least in part by liberal steroid usage and a significant proportion of the population with poorly controlled diabetes. Urgent public health measures will be required to curb the spread of this epidemic, particularly as several regions are experience a shortage of available antifungal therapy.

There have been advances in the diagnosis of invasive aspergillosis in the past year, with emerging data regarding the use of lateral flow assays from bronchoalveolar lavage fluid and serum specimens. In combination with serum β-D-glucan testing, a negative lateral flow assay results in a high negative predictive value. Cell-free DNA assays have also emerged as a novel diagnostic tool to broadly monitor for infection and gauge the host response to microbial pathogens. These assays have shown variable operating parameters for the detection of fungal DNA, but can be used to probe for a large range of pathogens in a hypothesis-free manner. As these technologies improve and are further validated, they will likely become useful adjunctive diagnostic tools.

Tom Chiller

Division of Foodborne, Waterborne, and Environmental Diseases, Centers for Disease Control and Prevention
USA

At the Centers for Disease Control and Prevention, Tom Chiller provides leadership for fungal disease activities, including outbreak response and intervention, nationally and internationally, and is associate director for global programs in the Division of Foodborne, Waterborne, and Environmental Diseases. Dr Chiller has held numerous positions in DFWED including Associate Director for Epidemiologic Science and lead of the National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS). He still remains actively involved in antimicrobial resistance activities for fungal and enteric diseases. Dr Chiller is board certified in infectious diseases and is a faculty member in the Division of Infectious Diseases at the Emory School of Medicine. He practices infectious diseases at the Veterans Affairs Hospital in Atlanta. He has authored numerous articles and book chapters and given many lectures on public health surveillance and infectious diseases. During his past decade with the Mycotic Diseases Branch, Dr Chiller has fostered strong international collaborations and helped to drive forward fungal public health programs in sub-Saharan Africa, Latin America and Southeast Asia.

Presentations

1. Symposium 13: *Candida auris*

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room A

S13.2 Epidemiology and antimicrobial resistance

Candida auris is an emerging antimicrobial-resistant fungal disease that was recently identified by the US Centers for Disease Control and Prevention as a threat that requires urgent and aggressive action. In this presentation, CDC's Dr. Tom Chiller discusses the origins and current epidemiologic trends of *C. auris*. First identified in 2009 in Japan, *C. auris* is now a global disease, detected in every continent and able to spread across borders. It has rapidly begun to overtake other Candida species to become a preeminent cause of bloodstream infections and deadly outbreaks. *C. auris* is a highly persistent fungus that can live in the environment for many months with no current decolonization strategies, meaning it has a high propensity for invasive infection among very ill patients and transmission to others. At least four separate clades have been identified, each with unique characteristics and disposition to antifungal resistance. Dr. Chiller discusses the tendency of *C. auris* species to develop antifungal resistance, and the recent spread of infections that effectively resist all currently available antifungal drugs. *Candida auris* is an emerging threat that has quickly spread worldwide and drawn the attention of media and policymakers alike and will require continued efforts to control the spread and limit the continued development of antifungal resistance in this species.

2. Symposium 13: *Candida auris*

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room A

S13.3 Methods of transmission and control

Candida auris is a highly contagious and often drug-resistant invasive mold infection which poses a serious risk to those who contract it. In this presentation, Dr. Tom Chiller outlines how *C. auris* is transmitted, detected, and managed, with additional attention to common difficulties healthcare facilities face in controlling the spread of *C. auris*. Dr. Chiller uses recent case reports to demonstrate that *C. auris* is highly contagious, especially for patients with weakened immune systems who have long stays in healthcare facilities. This presentation emphasizes the difficult, but important, task of properly and quickly identifying *C. auris* through screening and diagnostic techniques. Once a case is detected, proper containment precautions and are critical. The presentation identifies the most effective prevention strategies, methods and products for disinfection, and coordination among healthcare facilities and departments of health to ensure a robust and timely response to identified outbreaks. While *C. auris* continues to be a dangerous and emerging public health threat, there are many simple steps providers and health departments can take to mitigate the impact of this deadly fungus.

Presentations

3. Plenary 3

Sunday, August 8, 2021
18.30–20.00 (UTC+8)
Room A–C

P3.1 Natural disasters & outbreaks of fungal disease

Natural disasters have huge consequences: economic difficulties, environmental destruction, and direct loss of life; but they also pose important risks to public health in the form of associated infections disease outbreaks. In this presentation, Dr. Chiller outlines the reasons that natural disasters may lead to outbreaks of fungal disease that amplify the difficulties faced by recovering populations, including displacement, overcrowding, and stressed health systems. Because fungal diseases are often acquired directly from the environment, there is a unique link between environment disruptions and exposure to disease-causing fungi that thrive in areas often affected by natural disaster. Using case studies, the presentation will identify characteristics and lessons learned from recent natural disasters. Dr. Chiller will also discuss the link between climate change, increasing incidences of natural disasters, and growing environmental ranges of disease-causing fungi. While fungal disease may not be at the top of mind in the wake of a natural disaster, responders and clinicians should be prepared for the potential of fungal disease outbreaks.

Ariya Chindamporn

Faculty of Medicine, Chulalongkorn University
Thailand

Ariya Chindamporn is a senior consultant and Associate Professor at the Mycology unit, Department of Microbiology of the Faculty of Medicine, Chulalongkorn University; King Chulalongkorn Memorial Hospital/Thai Red Cross, in Bangkok, Thailand.

Dr Chindamporn received her doctoral degree in basic sciences from Nagoya University, Japan, in 1995. Her research interests are in the molecular diagnosis and identification, epidemiology and pathogenesis of medically emerging fungi and parafungi in Thailand, including AIDS-related mycoses and pythiosis, which are some of the endemic diseases in the country.

Presentations

1. Symposium 9: Rare fungal infections

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room C

S9.1 Pythiosis

Infection in artery (vascular form) and in cornea (ocular form) are the most common clinical manifestations in human pythiosis followed by (sub)-cutaneous and disseminated form. Since the first human case was reported in Thailand in 1985, the highest incidence of human cases has been reported in Thailand so far. *Pythium insidiosum*, an oomycetes fungus-like organism, has been claimed as a major causative agent. Its habitat is in swampy area and soil related to the agricultural field, especially in tropical and subtropical region. In environment, both zoospores and hyphae form are found. Regarding in host, mimics non-septate hyphae with diameter 3-5 um, approximately is presented. The clinical suspicious index together with the patients' history and cross talk between medical personals is the main key for disease's diagnosis and management. Presently, several laboratory-based methods for *P. insidiosum* identification have been developed ie. zoospore induction, PCR, MALDI-TOF, etc. However, combination treatment (amputation, antifungal agents, and immunotherapy) remained clinical practice due to no standard treatment has been established. Even the adjunctive treatment protocol with antibacterial antibiotics has been performed in some cases since 2018, closed monitoring needs to be done by the infectious expertise. Monitoring process becomes another alternative practice for disease prognosis. Based on our research, the increasing and decreasing trend of *P. insidiosum* antibody and β(1-3)-d-glucan levels, respectively within 1 month after vaccination indicate the effective prognosis. To initiate the proper treatment as earliest, the POCT for diagnosis probable being another indispensable tool for the future.

2. Interactive case presentations: Clinical-mycological correlation

Sunday, August 8, 2021
12.00–13.20 (UTC+8)
Room A–C

C1.2 Case 2: Mucormycosis

In this session, Drs Atul Patel and Ariya Chindamporn will be talking about how clinicians and microbiologists work together to diagnosis, treat and manage patients with mucormycosis through case studies.

Piriyaporn Chongtrakool

Faculty of Medicine, Siriraj Hospital, Mahidol University
Thailand

Graduated as Medical technologist, and Master of Science in Microbiology from Mahidol University, Thailand and Doctor of Philosophy (Ph.D) in Medical science from Juntendo university, Japan.

Working as well as teaching in the area of diagnostic microbiology at Faculty of Medicine Siriraj Hospital, Mahidol University, focusing on bacterial, mycobacterial and fungal detection, identification and susceptibility testing.

Presentation

1. Interactive case presentations: Clinical-mycological correlation

C1.1 Case 1: Invasive candidiasis

In this session, Drs Lee Lee Low and Piriyaporn Chongtrakool will be talking about how clinicians and microbiologists work together to diagnosis, treat and manage patients with invasive candidiasis through case studies.

Sunday, August 8, 2021
12.00–13.20 (UTC+8)
Room A–C

Mitzi Chua

Cebu Institute of Medicine
Philippines

Mitzi Chua is Associate Professor and current Chair of the Department of Microbiology and Parasitology of the Cebu Institute of Medicine, and is affiliated as an infectious disease specialist in major hospitals of Cebu City, Philippines.

She obtained her medical degree from the Cebu Institute of Medicine and trained at the Cebu (Velez) General Hospital and the University of the Philippines – Philippine General Hospital in Manila, Philippines.

Dr Chua is a past President of the local/regional chapters of the Philippine Society for Microbiology and Infectious Diseases and the Philippine College of Physicians. She is also a fellow of the Infectious Diseases Society of America. She is a board member of the Asia Fungal Working Group.

Presentations	
1.Ask-the-expert E6: Tropical fungal infections In this ask-the-expert session, Drs Mitzi Chua and Retno Wahyuningsih will be addressing as many questions as possible attendees may have on tropical fungal infections.	Sunday, August 8, 2021 16.00–16.45 (UTC+8) Room C
2. Symposium 18: Prevention of fungal infections S18.2 Hospital air	Sunday, August 8, 2021 17.00–18.15 (UTC+8) Room C

Arnaldo Colombo

Division of Infectious Diseases, Federal University of São Paulo
Brazil

Dr. Colombo is a Professor of Medicine in the Federal University of São Paulo, Brazil and consultant on Medical Mycology for several institutions in Brazil and Latin America. He is a Senior Advisor for the Global Action Fund for Fungal Infections and International Council Member of the International Immunocompromised Host Society. Recently, he was nominated fellow of the European Confederation of Medical Mycology and Permanent Member of the Brazilian Academy of Science. He has authored and co-authored 240 publications, including several multicentre surveillance studies to characterize the epidemiology and clinical aspects of *Candida* spp, *Aspergillus* spp and *Trichosporon* invasive infections.

Presentation

1. Plenary 3

Sunday, August 8, 2021
18.30–20.00 (UTC+8)
Room A–C

P3.3 COVID-19-associated candidiasis

Hematogenous candidiasis is an alarming problem in tertiary care hospitals worldwide, especially in patients admitted in intensive care units (ICU). Incidence rates of candidemia vary considerably among geographic areas and medical centers. During the ongoing COVID-19 pandemic, the overwhelmed intensive care units provide a fertile ground for the increasing rates of episodes of candidemia, including the emergence and spread of invasive infections due to *C auris*. Critically ill COVID-19 patients usually present several comorbidities and require long periods of hospitalization with exposition to multiple risk factors for candidemia, including invasive medical procedures, hemodialysis, corticosteroids and treatment with broad spectrum antibiotics. The scenario of intense dysbiosis induced by antibiotics combined with hypoxia, hypotension and damage of enterocytes that may take place in patients with severe COVID-19 are all conditions that may promote gastrointestinal translocation of *Candida*. Otherwise, overwhelmed ICUs with critically ill COVID patients exposed to invasive life support procedures predispose them to hospital-acquired infections with a high potential of horizontal transmission, as documented with *C auris* and *C parapsilosis*. The present lecture will discuss the etiology, natural history, clinical aspects and the clinical management of invasive *Candida* infections in the scenario of patients with severe COVID-19.

Oliver Cornely

CECAD Institute, University of Cologne
Germany

Oliver Cornely is Director & Chair of Translational Research at the CECAD Institute of the University of Cologne, and Scientific Director of the Center for Clinical Trials. Clinically, he serves as Infectious Diseases Consultant at the University Hospital of Cologne, Germany.

He is board certified in internal medicine, infectious diseases, haematology, oncology, and emergency medicine, and holds degrees in medical mycology and travel medicine.

Originating from an HIV/AIDS clinical research group, Dr Cornelys research interest centres on infections in immunocompromised hosts, including invasive fungal diseases, antimicrobial resistance, *Clostridium difficile* infection, and vaccine preventable infections.

Oliver Cornely is immediate-past President of the European Confederation of Medical Mycology (ECMM), the roof organization of 25 national mycology societies, and did set up ECMM Guideline Program, ECMM Academy (Fellows program), and ECMM Excellence Center Initiative, designating clinical and microbiological excellence centres after an international audit procedure. He is currently on the Board of Directors of the US Mycoses Study Group Education & Research Consortium (MSGERC), is founder and chair of the Infectious Diseases Scientific Working Group of the European Hematology Association (EHA). Oliver Cornely is a member of the Council of the International Society for Human and Animal Mycology (ISHAM) and was recently elected as Chair of the Infectious Diseases Working Party (AGIHO), a working group of the German Society for Haematology and Oncology (DGHO).

Oliver Cornely coordinates guidelines on invasive fungal infections and currently collaborates with mycologists from more than 50 countries on tailoring management guidelines to health care settings throughout the world.

He runs for the ISHAM council since ISHAM is the globally active society in mycology, thus reflecting his global approach and outreach. He intends to intensify global networking, which he regards as paramount to improve management and care of these mostly rare diseases.

He published over 500 peer-reviewed articles, books, book chapters, and electronic media; runs the YouTube® channel *ID in Motion™*, and ranks among the Top 1% most cited researchers. He is a reviewer for numerous medical scientific journals, editorial board member for *Haematologica*, and *Infectious Disease*, and Editor-in-Chief of *Mycoses*.

Presentations

1. Symposium 2: IFD in febrile neutropenic patients

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room B

S2.1 Empirical vs pre-emptive debate

To date, the use of empirical or pre-emptive antifungal treatment strategies for patients with febrile neutropenia and suspected invasive fungal disease remains a subject of debate. In this lively and dynamic session, Professor Oliver Cornely and Dr Ban Hock Tan will put forward the viewpoints of using empirical antifungal treatment while Professors Johan Maertens and Yee-Chun Chen will take on the viewpoints of a pre-emptive antifungal approach. Join this session to hear the speaker panel debates the pros and cons of empirical and pre-emptive antifungal strategies in patients with febrile neutropenia.

2. Ask-the-expert

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room B

E2: How to optimize the management of fungal infections in HSCT recipients?

In this ask-the-expert session, Professors Oliver Cornely and Katrien Lagrou will be addressing as many questions as possible attendees may have on optimizing the management of fungal infections in HSCT recipients.

Robert Cramer

Dartmouth Geisel School of Medicine
USA

Dr. Cramer is a professor of microbiology and immunology at the Dartmouth Geisel School of Medicine. His research program has studied *Aspergillus fumigatus* molecular mechanisms of pathogenesis and drug susceptibility for ~14 years. Highlights of Dr. Cramer's scientific career include the discovery of the fungal hypoxia response as critical to disease progression and drug resistance in *Aspergillus* biofilms. His NIH, BWF, and CFF funded research has resulted in over 95 publications led by numerous outstanding trainees. He is a fellow of the American Academy of Microbiology and a current co-director of the Molecular Pathogenesis Mycology course at the MBL.

Presentation

1. Symposium 15: Pathogenesis

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room C

S15.1 New insights in the pathogenesis of fungal infections

Sterilizing contemporary antifungal therapies are critical to meet the growing incidence of invasive filamentous fungal infections. Yet, too often our current antifungal therapies fail to deliver clearance of the invading fungal pathogen. One potential reason for this lack of sterilizing therapy is that filamentous fungi form biofilms at the site of infection that are drug resistant. Understanding the molecular mechanisms that allow filamentous fungal cells to resist drug treatments at the site of infection is critical to improving existing antifungal therapies. Recent studies in our laboratory suggest that oxygen gradients that naturally occur in *Aspergillus fumigatus* biofilms contribute to drug resistance and disease progression. In this presentation, we will discuss these recent discoveries and associated mechanisms and discuss approaches to overcome biofilm, infection microenvironment mediated antifungal drug resistance.

David Denning

Global Action Fund for Fungal infections
UK

Dr Denning is an infectious diseases clinician with expertise in fungal diseases. He serves as the Chief Executive of the Global Action Fund for Fungal infections (GAFFI) and Professor of Infectious Diseases and Global Health at the University of Manchester, UK. Dr Denning managed the National Aspergillosis Centre, Manchester from 2009-2020 He has published extensively (>650 academic papers) and has a citation H-index of 123. He leads LIFE (Leading Internal Fungal Education (www.LIFE-Worldwide.org), which is focused on improving patient outcomes through online education. GAFFI (www.GAFFI.org) advocates for universal access to fungal diagnostics and antifungal therapies.

Presentation

1. Symposium 10: Allergy & colonization

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room A

S10.1 Chronic pulmonary aspergillosis

Chronic pulmonary aspergillosis requires a combination of characteristic radiological features and a positive *Asperglus* IgG, and is supported by finding *Aspergillus* in respiratory tract samples. Cut-offs for *Aspergillus* IgG have been validated for multiple assays and the performance of the only lateral flow IgG/IgM assay documented. Cut-offs for the Siemens Immuulite, Dynamiker, Bordier and ImmunoCap methods have been validated in different populations. *Aspergillus* IgG antibody detection is now a WHO recommended 'Essential Diagnostic'. High volume culture has a higher yield than conventional culture for CPA and ABPA. Many of these patients have subtle immunodeficiency, including poor pneumococcal antibody responses to polysaccharide vaccine, low T, B and/or NK cell numbers, low gamma IFN and IL-12 production. New data has emerged on the relative frequency of CPA – overall 15.4% co-infection with TB (meta-analysis), 8-13% at the end of TB therapy in Indonesia, >50% of post-TB patients with symptoms in Vietnam, but 2.1% in Taiwan, 3.6% after lobectomy for lung cancer in Japan, 3.5% after 10 years in South Korea, 7.2% after NTM disease in South Korea (range in different studies 3.9-16.7%) and 10% of COPD admissions to hospital with aspergillosis were CPA (90% invasive) in Spain and in Cuba 29% of CPA patients had no discernable underlying disease. Several meta-analyses on therapy have been published. Overall response to eamphotericin B or echinocandins was 61% with loss of long term renal function in 25% receiving liposomal amphotericin B. Discontinuation rates for voriconazole and itraconazole due to adverse events was 35% for both drugs given for CPA. Limited data on posaconazole and isavuconazole therapy. Gamma interferon supplementation (50ug 3x weekly) in patients with few options reduces hospital admissions. In CPA patients, undergoing surgical resection, antifungal therapy before and during surgery reduces relapse, but antifungal therapy only after surgery probably does not.

Catriona Halliday

Institute for Clinical Pathology and Medical Research – NSW Health Pathology, Westmead Hospital
Australia

Catriona Halliday is the Senior Scientist in charge of the Clinical Mycology Laboratory, at the Institute for Clinical Pathology and Medical Research (ICPMR), NSW Health Pathology based at Westmead Hospital in Sydney. She is actively involved in teaching both scientific and medical staff in medical mycology and her research interests have focused on the development and implementation of culture independent tests to aid in the rapid diagnosis of invasive fungal infections and antifungal drug susceptibility surveillance. She is lead of the Laboratory Working Group of the Australian and New Zealand Mycoses Interest Group (ANZMIG) and a member of the ISHAM working group for Fungal PCR (FPCRI).

Presentation

1. Symposium 11: Non-culture-based diagnosis

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room B

S11.2 Point-of-care testing & newer diagnostics

The incidence of invasive fungal disease (IFD) is on the rise and continues to be a serious threat, particularly to patients with severely impaired immunity. Early and reliable diagnosis of IFDs is challenging but paramount to decrease the associated morbidity, mortality and economic costs. Diagnostic mycology laboratories are no longer reliant on culture and microscopy alone with antigen testing and PCR-based assays becoming more widely used. However, these assays are limited by cost and varying turn-around times associated with duration of transport between the clinical setting and the laboratory where the test is performed as well as batch testing of samples at the laboratory. This has led to the development of point-of-care tests for the diagnosis of IFDs. These offer more rapid results, allow single sample testing and can be performed in facilities with limited infrastructure. The performance of lateral flow devices for the diagnosis of cryptococcosis and aspergillosis in particular will be discussed as well as novel approaches for fungal diagnostics including the detection of volatile organic compounds.

Muhammad Irfan

Department of Medicine, Aga Khan University
Pakistan

Muhammad Irfan is a Professor and consultant pulmonologist at Aga Khan University, Karachi Pakistan. Irfan's areas of clinical interest and research are chronic pulmonary infections including Tuberculosis and pulmonary fungal infections. He is a joint secretary and chairman guideline committee of Pakistan Chest Society and National delegate of European Respiratory Society for Pakistan.

Presentation

1. Symposium 1: Fungal infections in the ICU

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room A

S1.2 Post-influenza aspergillosis

Influenza associated pulmonary aspergillosis (IAPA) is a well-recognized problem occurring in notable proportions of severe influenza patients without immunosuppression or underlying diseases. IAPA typically occur in patients requiring ICU admission and mechanical ventilation. IAPA has been described not only following H1N1 infection, but also in all influenza seasons and subtypes including influenza B. The incidence of IPA is geographically variable from 7% to 40% due to multiple factors. IAPA usually occurs within a very short duration after ICU admission (median:3 days). Clinical presentations consists of tracheobronchitis (28% -30%) and tissue-proven aspergillosis (31-60%). Early bronchoscopy with BAL is very helpful for prompt diagnosis specially for identification of tracheobronchitis, fungal culture and detection of galactomannan (GM) level that is raised in almost all cases. The rate of positivity of serum GM is also high (>50%) in IAPA despite the absence of immunosuppression.

The proposed case definition by an expert group relies on an entry criterion based on an influenza-like illness and detection of influenza virus. The case definition distinguishes between invasive tracheobronchitis and other pulmonary forms of IAPA, with demonstration of invasive fungal hyphae with positive mycology qualifying as proven infection. Detection of GM or positive *Aspergillus* culture in BAL is the main mycological criteria in probable case definition.

The overall mortality in IAPA is high (40-60%) and is significantly greater than that of severe influenza without IAPA. Early administration of antifungal therapy in critically ill IAPA patients is crucial and has been associated with significant reduction in mortality and improved clinical outcomes. First-line treatment options for IAPA include voriconazole and isavuconazole. Other options include echinocandins in combination with mold active azoles, and liposomal amphotericin B in regions with high rates of azole-resistance.

Corticosteroids are a well-known risk factor and could also increase IAPA mortality and should be avoided in these cases. The role of antifungal prophylaxis and pre-emptive strategies should be assessed in prospective trials.

Xinming Jia

Tongji University School of Medicine
China

Professor Jia's research group is involved in the study of how host innate immune system uses C-type lectin receptors to recognize and respond to fungal infections. Up to now, he found that ① Dectin-3, a previously uncharacterized C-type lectin receptor, recognized a-mannans on the surfaces of *C. albicans* hyphae, and Dectin-3 and Dectin-2 form a heterodimeric pattern-recognition receptor for host defense against fungal infection (Immunity, 2013).② Dectin-3 recognizes glucuronoxylomannan of *Cryptococcus neoformans* serotype AD and *Cryptococcus gattii* serotype B to initiate host defense against cryptococcosis (Front Immunol 2018). ③ The adapter protein CARD9 mediates Dectin-1-induced ERK activation by linking Ras-GRF1 to H-Ras for anti-fungal immunity (J Exp Med, 2014). ④The S12N mutation of CARD9, prevalent in humans, facilitates the RelB-mediated production of IL-5 by alveolar macrophages for the induction of TH2 cell–mediated allergic responses to fungal pathogens (Nat Immunol, 2018). ⑤The E3 ligase Cbl-b facilitates the ubiquitination of the activated Dectin-2 and Dectin-3, and the ubiquitinated Dectin-2 and Dectin-3 are targeted for the lysosome-mediated degradation by the ESCRTs system (J Exp Med, 2016). His studies establish the theoretical basis of developing anti-fungal immunotherapy with CLR/CARD9 axis as target, and provide new targets for screening primary immunodeficiency of fungal patients.

Presentation

1. Symposium 17: Immune interactions

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room B

S17.2 Fungal infections and host innate immunity

Morphological switch between yeast and hyphae of *Candida albicans* is essential for its interaction with host defense system. However, the lack of understanding of host-pathogen interactions during *C. albicans* infection greatly hampers the development of effective immunotherapies. Here, we found that priming with *C. albicans FLO8*-deficient (*flo8*) mutant, locked in yeast form, protected mice from subsequent lethal *C. albicans* infection. Deficiency of Dectin-2, fungi-derived α-mannan recognition receptor, completely blocked *flo8* mutant-induced protections. Mechanistically, *flo8* mutant induced Dectin-2/CARD9-mediated IL-10 production in DCs and macrophages to block thymus atrophy through inhibiting *C. albicans*-induced apoptosis of thymic T cells, which facilitates the continuous output of naive T cells from thymus to spleen. Continuous recruitment of naive T cells to spleen enhanced Th1-biased antifungal immune responses. Consequently, depletion of CD4+T cells or blockade of the function of IL-10 receptor using their specific antibodies in mice completely blocked the protective roles of flo8 mutant priming against *C. albicans* infections. Moreover, we found that mannans exposed on the surface of *flo8* mutant were responsible for eliciting the protective immunity through inhibiting *C. albicans*-induced apoptosis of thymic T cells to sustain the number of naive T cells in the spleen. Importantly, priming with *flo8* mutant extensively protected mice from polymicrobial infection caused by cecal ligation and puncture (CLP) through enhancing Th1-biased immune responses. Together, our findings imply that targeting *FLO8* in *C. albicans* benefits to eliciting protective immune responses against polymicrobial infections and mannans extracted from *flo8* mutant might provide potential immunotherapeutic candidate(s) for controlling the infectious diseases.

Katrien Lagrou

Belgian National Reference Center for Mycoses, University Hospitals of Leuven Belgium

Katrien Lagrou is Head of the Microbiology Laboratory at the University Hospitals of Leuven, Chair of the Department of Microbiology, Immunology and Transplantation at the KU Leuven and coordinates the Belgian National Reference Center for Mycosis. She is full professor at the Faculty of Medicine of the University of Leuven (KU Leuven), Leuven, Belgium. Professor Lagrou obtained her Master's degree in Pharmaceutical Sciences from the University of Leuven in 1992, and remained there to specialise in Laboratory Medicine between 1992 and 1997. During this period, she received a degree in Mycology from the Institute of Tropical Medicine in Antwerp, Belgium and completed her PhD in 2002.

Professor Lagrou's main interest is the diagnosis and treatment of infections in severely immunocompromised patients, with a focus on invasive pulmonary aspergillosis. She is president of the Belgian Society of Human and Animal Mycology, Chair of the European Confederation of Medical Mycology (ECMM) Committee Academy and board member of the Belgian Society of Infectiology and Clinical Microbiology. Professor Lagrou published her research in more than 250 manuscripts in peer reviewed journals.

Presentation

1. Ask-the-expert

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room B

E2: How to optimize the management of fungal infections in HSCT recipients?

In this ask-the-expert session, Professors Oliver Cornely and Katrien Lagrou will be addressing as many questions as possible attendees may have on optimizing the management of fungal infections in HSCT recipients.

Ruoyu Li

Peking University
China

Ruoyu Li is Professor at the Department of Dermatology at Peking University First Hospital, Director of the Beijing Skin Disease Molecular Diagnostic Laboratory, Director of the Skin Disease Prevention and Control Center at Peking University, and Associate Director of the Research Center for Medical Mycology at Peking University in Beijing, China. She is Co-chair of the International Society for Human and Animal Mycology (ISHAM) Asia Fungal Working Group.

Professor Li is involved in numerous professional organizations: She is currently the President of the Chinese Society of Microbiology, Mycology Sub-society; Vice President of the Clinical Microbiology Sub-society; Emeritus President of the China Dermatologist Association; Standing Committee Member of the Chinese Society of Dermatology of the Chinese Medical Association; and Past Chair of the Dermatology Committee of the Beijing Medical Association, among others.

Professor Li has tremendously advanced China's progress in the field of mycology and has received recognitions from China's Ministry of Health and Ministry of Education for her contributions in medical research and education. Her research on non-culture diagnosis has improved diagnostic practices and standardized diagnosis of mycological infections in China. She has also helped to establish an in vitro monitoring system for antifungal therapy. Some resistance strains were isolated through the monitoring, and the mechanisms were further investigated. She is a committee member of clinical laboratory standard and clinical practice guidelines on both superficial and invasive fungal infections.

Presentations

1. Symposium 6: Diagnosis and management of superficial fungal infections

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room C

S6.3 New antifungal agents for dermatophytosis

Through the brief review on the treatment of dermatophytosis by systemic antifungal agents and new formulation; by topical antifungal agents and new targets. This presentation hopes to bring the following information: Newer tetrazole antifungals with less drug-drug interactions, will be a good selection of onychomycosis treatment; New azole agents approved for invasive fungal infection were less evaluated for their anti-dermatophytes activity; Newer formulation of itraconazole improved bioavailability; Newer topical antifungal agents are promising in the management of onychomycosis; Newer antifungal agents with new targets are in pipeline.

2. Symposium 9: Rare fungal infections

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room C

S9.2 Phaeohyphomycosis

Phaeohyphomycosis refers to a heterogeneous group of cutaneous, subcutaneous, and disseminated infections caused by a group of dematiaceous fungi with the melanin in their cell walls, which likely acts as a virulence factor. Phaeohyphomycosis should be distinguished with other black fungal infections such as chromoblastomycosis and mycetoma by histopathologically black mold and dematiaceous yeast are noted.

Diagnosis of the disease relies on clinical manifestation, histopathological observations, mycological findings, and molecular biology techniques to identify the pathogenic fungi. In otherwise healthy patients with recurrent fungal infections should be examined for possible CARD9 deficiency. Therapy is not standardized, and especially difficult in the immunosuppressed patients-new strategies such as immunologic method are needed.

Michail Lionakis

Laboratory of Clinical Immunology and Microbiology, National Institute of Allergy and Infectious Diseases (NIAID)
USA

Dr. Lionakis is a tenured physician-scientist and Head of the Fungal Pathogenesis Section in the Laboratory of Clinical Immunology and Microbiology, NIAID. Dr. Lionakis' laboratory research focuses on 1) better understanding the genetic and immune defects that underlie enhanced susceptibility to mucocutaneous and invasive fungal infections and autoimmunity in humans and on 2) cellular and molecular factors that regulate the immune response against mucosal and invasive fungal infections and autoimmunity in clinically relevant animal models. The laboratory's long-term goals are 1) to understand the pathogenesis of mucosal and invasive fungal disease and autoimmunity, 2) to use this knowledge to identify patients at risk for developing these diseases and to improve their outcomes, 3) to improve care for patients with inherited and acquired susceptibility to fungal disease and autoimmunity, and 4) to discover novel genetic and acquired predisposing factors for human fungal disease and autoimmunity.

Presentation

1. Ask-the-expert

Sunday, August 8, 2021
16.00–16.45 (UTC+8) Room B

E5: Next-generation sequencing and relevance in fungal infections

In this ask-the-expert session, Dr Michail Lionakis and Professor Patrick Woo will be addressing as many questions as possible attendees may have on next-generation sequencing and its relevance in fungal infections.

Lee Lee Low

Hospital Sultanah Bahiyah
Malaysia

Lee Lee Low is Head and coordinator of the Infection Control and Prevention program for the state of Kedah. She is also an Infectious Disease Physician in the Department of Medicine, Hospital Sultanah Bahiyah, Alor Setar, Kedah, Malaysia.

Dr Low graduated from the National University of Malaysia and obtained her MRCP (UK) in 2006. She has trained as an infectious disease fellow in Hospital Pulau Pinang and Hospital Sungai Buloh in Malaysia, as well as in St Vincent's Hospital in Sydney Australia.

At the Hospital Sultanah Bahiyah, Dr Low is also a committee member of the Antibiotic Stewardship Program. She has been a co-investigator of several major studies in the field of infectious diseases.

Presentations

1. Interactive case presentations: Clinical-mycological correlation

Sunday, August 8, 2021
12.00–13.20 (UTC+8) Room A–C

C1.1 Case 1: Invasive candidiasis

In this session, Drs Lee Lee Low and Piriyaporn Chongtrakool will be talking about how clinicians and microbiologists work together to diagnosis, treat and manage patients with invasive candidiasis through case studies.

2. Symposium 18: Prevention of fungal infections

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room C

S18.1 Source in the patients

A diversity of fungi are found on skin, mucosal surfaces, in the gastrointestinal tract and oral cavity . Candida , penicillium and aspergillus species comprise the gut mycobiome , whereas candida species may inhabit the upper respiratory tract and aspergillus in the lower respiratory tract . Study in pre-term babies show probiotics supplement is associated with reduction of enteric candida colonization but it does not prevent invasive fungal infection . Nystatin and chlorhexidine mouth wash although may reduce candida colonization in oral cavity ,but it does not prevent post-chemotherapy mucositis. Approximately 2 to 13% of catheter related blood stream infections (CRBSIs) are due to candida infection ; of which 60% of CRBSIs were extra-luminally acquired, 12% were intra-luminally acquired. Hence proper insertion technique and shortening the catheter dwell time may minimize the incidence of CRBSI . Use of alcohol- based povidone or chlorhexidine as skin disinfection before catheter placement helps to reduce catheter colonization. Although better result was obtained with alcohol based chlorhexidine (1 % and 17% respectively) comparing to alcohol-povidone , however it is not statistically significant (P = 0.18). A retrospective study in cancer patients with candidaemia reported a poorer survival if the catheter was left in situ for beyond 72 hours , and a prospective cohort study found the removal of a catheter at or within 5 days associated with decreased mortality . Half of the patients with indwelling urinary catheter will eventually develop candiduria. Worthy of note , 30% cases of candiduria will resolve by removal of urinary catheter.

Chun-Wei Lu

Department of Dermatology, Chang Gung Memorial Hospital
Taipei

Dr. Lu Chun-Wei is a board-certified dermatologist and a lecturer attending physician of Chang Gung Memorial Hospital Dermatology; Deputy Secretary General of Taiwan Evidence Base Medicine Association; Ph.D candidate, Institute of Clinical Medicine, Chang Gung University. He is actively involving in the clinical patient care, patient education and research on SCARs and dermatologic adverse events associated with cancer treatments at Drug Hypersensitivity Clinical and Research Center and Immune-Oncology Center of Excellence at Chang Gung Memorial Hospital. His main research interests are adverse drug reaction, cutaneous adverse effect of anti-cancer medication with the change of skin microbiome and wound healing.

Presentation

1. Symposium 12: Diversity of cutaneous fungal infections

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room C

S12.2 Fungal infection in patients receiving anti-cancer target therapy

As the evolution of anti-cancer strategies, more and more anti-cancer medications are under development. Most of the traditional anti-cancer such as chemotherapy and radiotherapy were proved to cause immune-insufficient status, thus, the opportunistic fungal infection plays an important role in clinical care.

Targets therapies, definite as a type of treatment that uses drugs or other substances to identify and attack specific types of cancer cells with less harm to normal cells, may have fewer side effects than other types of cancer treatment. Although there are many kinds of skin of different skin adverse effect such as papulopustular eruptions or paronychia for epidermal growth factor inhibitors (EGFRis), most of them were mentioned as more related to the toxicity of those drugs. However, in our clinical experience, during the treatment period of target therapies, there are still some opportunistic fungal infections could be noted such and tinea captis, fungal paronychia or deep fungal infection. The cause of above infections may relate to the damage of skin barrier due to target therapies use or the dysbiosis of skin microbiome due to systemic antibiotics use for managing adverse event caused by target therapies.

We will share our experience of different types of fungal infection in patients receiving anti-cancer target therapy and their possible mechanisms.

Johan Maertens

University Hospitals Leuven, Campus Gasthuisberg Leuven
Belgium

Johan Maertens is associate professor of Haematology at the University Hospitals Leuven, Campus Gasthuisberg Leuven, Belgium. He is a member of numerous professional societies, including the International Immunocompromised Host Society, the International Society of Human and Animal Mycology, the Multinational Association of Supportive Care in Cancer, the American Society of Hematology, the European Haematology Association, and a member of European Group for Blood and Marrow Transplantation (EBMT). He is a past-chair of the Infectious Diseases group of the European Organization for Research and Treatment of Cancer (EORTC) and a founding member and the current chair of the European Conference on Infections in Leukaemia (ECIL) group. He is a fellow of the European Confederation of Medical Mycology (ECMM).

His major professional interest is fungal and viral infections in patients with haematological disorders, development of new management approaches to invasive aspergillosis, non-invasive diagnosis of opportunistic respiratory infections, and non-myeloablative and haplo-identical allogeneic stem cell transplantation. Dr Maertens has published over 400 articles and book chapters on antifungal management and diagnosis in several prestigious journals. He is a co-editor of the book "*Diagnosis of Fungal Infections*." He served as a reviewer for many journals and is a member of numerous national and international advisory boards.

Presentation

1. Symposium 2: IFD in febrile neutropenic patients

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room B

S2.1 Empirical vs pre-emptive debate

To date, the use of empirical or pre-emptive antifungal treatment strategies for patients with febrile neutropenia and suspected invasive fungal disease remains a subject of debate. In this lively and dynamic session, Professor Oliver Cornely and Dr Ban Hock Tan will put forward the viewpoints of using empirical antifungal treatment while Professors Johan Maertens and Yee-Chun Chen will take on the viewpoints of a pre-emptive antifungal approach. Join this session to hear the speaker panel debates the pros and cons of empirical and pre-emptive antifungal strategies in patients with febrile neutropenia.

Michiaki Masuda

Department of Microbiology, Dokkyo Medical University
Japan

Dr. Michiaki Masuda obtained the M.D. and Ph.D. degrees at University of Tokyo. He originally started his research career as a virologist, and from 1990 to 1996, carried out retrovirus research at the Frederick Cancer Research and Development Center of NIH in U.S.A. Upon returning to Japan, Dr. Masuda was appointed as Associate Professor of the Department of Microbiology, Faculty of Medicine, University of Tokyo, and in 2001, he became Professor and Chairman of the Department of Microbiology, Dokkyo Medical University, School of Medicine. Since 2011, Dr. Masuda has been working on *Prototheca* research, which led to discovery of *P. miyajii* and other achievements.

Presentation

1. Symposium 12: Diversity of cutaneous fungal infections

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room C

S12.3 Cutaneous protothecosis

Prototheca spp. are achlorophyllous algae ubiquitous in nature. So far, six species, *P. wickerhamii, P. ciferrii, P. bovis, P. blaschkeae, P. cutis* and *P. miyajii*, are known to cause localized or systemic infection in humans and animals. Although protothecosis has been thought to be a rare disease, the number of the reported cases is rapidly increasing. Especially, cases of cutaneous protothecosis mostly caused by *P. wickerhamii* are reported from various countries and constitutes a large proportion of human protothecosis. Typical symptoms of cutaneous protothecosis include erythematous plaques, papules, pustules, nodules and superficial ulcers on the skin of the face or extremities, resembling those of cutaneous or deep tissue mycoses. Pathological findings are apparently similar to those of fungal infection, and culture tests often fail in isolation of *Prototheca*, making the correct diagnosis difficult. Recently, molecular techniques, such as PCR, DNA sequencing and MALDI-TOF MS, have been shown to be useful for diagnosis of protothecosis. Therefore, it would be important to consider the possibility of cutaneous protothecosis in case of skin lesions refractory to conventional treatment and utilize the proper diagnostic methods. For treatment of cutaneous protothecosis, azole drugs which inhibit fungal CYP51/ERG11 required for ergosterol biosynthesis are often used empirically. However, the efficacy is controversial. Although the cell membrane of *Prototheca* spp. was shown to contain ergosterol, our recent study showed that *Prototheca* CYP51/ERG11 is phylogenetically distant from the fungal orthologs. Therefore, further characterization of *Prototheca* CYP51/ERG11 and development of novel drugs may be necessary for effective treatment of protothecosis.

Eliza Miranda

Faculty of Medicine Universitas Indonesia – Dr. Cipto Mangunkusumo National General Hospital
Indonesia

Eliza Miranda, MD, is a consultant in dermatovenereology and academic staff at Faculty of Medicine Universitas Indonesia – Dr. Cipto Mangunkusumo National General Hospital since 2009 after completing her medical doctor in 1998 and dermatovenereology residency in 2008 at the same place. She received her consultant in Tropical Infectious Disease from the College of Dermatovenereologist – Indonesian Society of Dermatovenereologists in 2019. Her main area of interest is mycology. She has lectured nationally and internationally and has published numerous papers in national and international journals. She is the editor of the *Journal of General-Procedural Dermatology & Venereology Indonesia*. She is the secretary and treasurer of the Indonesian Dermatomycosis Study Group and a member of the International Society of Human and Animal Medical Mycology.

Presentation

1. Ask-the-expert

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room C

E3: How to address practical challenges in tinea capitis and cutaneous mucormycosis? – Cutaneous mucormycosis

In this ask-the-expert session, Drs Pei-Lun Sun and Eliza Miranda will be addressing as many questions as possible attendees may have on addressing practical challenges in tinea capitis and cutaneous mucormycosis.

Atul Patel

Infectious Diseases Clinic, Vedanta Institute of Medical Sciences
India

Atul Patel is Chief Consultant and Director of the Infectious Diseases Clinic of the Vedanta Institute of Medical Sciences and at the Department of Infectious Diseases of Sterling Hospital in Ahmedabad, India. He is also a Visiting Associate Professor at the Division of Infectious Diseases at the University of South Florida, Tampa, USA. He has been conferred a fellow of the Infectious Diseases Society of America (FIDSA) since 2014.

Dr Patel's major interest and expertise is in the management of HIV-positive patients, particularly the use of antiretroviral therapy and treatment of opportunistic infections apart from invasive fungal infections. He has been presenting his work at Indian and international meetings since 1996, and has published extensively in peer-reviewed journals, including the *Journal of Acquired Immune Deficiency Syndromes*, *Clinical Infectious Diseases, Clinical Microbiology and Infection, The Lancet Infectious Diseases, Journal of Antimicrobial Chemotherapy, Journal of Critical Care, International J of Infectious Diseases, Emerging Infectious Diseases, Intensive Care Medicine, Mycoses, Muscle & Nerve, Medical Mycology,* the *Journal of Postgraduate Medicine,* the *Journal of the Association of Physicians of India,* the *Journal of Global Infectious Diseases* and the *Journal of the International Association of Physicians in AIDS Care.*

Presentations

1. Symposium 4: Mucormycosis

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room A

S4.3 Management challenges in Asian countries

Multiple challenges are encountered from diagnosis to management of mucormycosis. Delay in diagnosis of mucormycosis is not uncommon because of nonspecific clinical features and invasive procedures is required to confirm diagnosis. Available fungal biomarkers like galactomannan and beta D glucan are typically negative. High index of clinical suspicion is required in a susceptible host, i.e. diabetic and immunocompromised to make early diagnosis. Diagnosis of patients with pulmonary mucormycosis is more challenging. CT scan may show characteristic features like reverse hallo sign but it's not specific and there is a risk of life-threatening bleeding following invasive procedures like CT guided biopsy or broncho-alveolar lavage. Coordinated efforts from a team of doctors, radiologist, microbiologist, histopathologist, surgical and medical doctor is important in management of mucormycosis. Liposomal amphotericin B is a drug of choice, prolonged administration in a dose of 5-10mg/kg/day is required, and it is expensive. Mucormycosis patients requires prolonged hospitalization, central line placement and frequent laboratory monitoring for treatment related adverse drug reactions. In India, many patients can't afford expensive treatment and they left the hospital against medical advice. India faced a unique challenge during Covid-19 pandemic; scarcity of anti-mucor antifungal agents. During peak of Covid-19 associated mucormycosis, amphotericin b (both D-AmB and L-AmB) were not available along with posaconazole or isavuconazole. Last challenge associated with mucormycosis is unclear treatment endpoint. We don't have well defined treatment endpoint for the mucormycosis and these patients requires treatment lasting from a few weeks to few months.

Presentations	
2. Symposium 8: HIV & fungal infections S8.2 Pneumocystosis management Pneumocystic pneumonia (PCP) was rare before 1980. HIV epidemic in 1980s lead to sudden surge in PCP cases. HIV associated PCP declined with progress in antiretroviral therapies and the use of TMP/SMX prophylaxis. In the last decade, PCP is increasingly diagnosed in non-HIV host; because of biologics, and immunomodulatory treatment. CD4 count <200/cmm is well defined risk factor in HIV host while risk assessment is complex and can't determined by CD4 counts in non-HIV hosts. Clinical manifestations are different in HIV and non-HIV host, PCP has acute presentation with rapid progression to respiratory failure in non-HIV host while it has subacute presentation over two weeks in HIV. Diagnosis is arrived by demonstration of cyst/trophic forms in respiratory specimen or by PCP PCR. Serum beta D glucan has good negative predictive value for PCP. TMP/SMX is preferred drug for the treatment and prophylaxis for PCP. Other alternative drugs are clindamycin, primaquine, atovaquone and pentamidine. Corticosteroids are lifesaving adjunctive therapy for hypoxic PCP patients. Hospital outbreaks of PCP has been described in a solid organ transplant setting, reminds to adhere to a good hospital infection control practice. PCP immune reconstitution inflammatory syndrome is uncommon, and early initiation of antiretroviral treatment is recommended in HIV associated PCP.	Saturday, August 7, 2021 14.45–16.00 (UTC+8) Room B
3. Interactive case presentations: Clinical-mycological correlation C1.2 Case 2: Mucormycosis In this session, Drs Atul Patel and Ariya Chindamporn will be talking about how clinicians and microbiologists work together to diagnosis, treat and manage patients with mucormycosis through case studies.	Sunday, August 8, 2021 12.00–13.20 (UTC+8) Room A–C
4. Plenary 2 P2.1 Ten best papers from clinical mycology	Sunday, August 8, 2021 13.30–14.30 (UTC+8) Room A–C

Nitipong Permpalung

Johns Hopkins University School of Medicine
USA

Dr.Nitipong Permpalung is an Assistant Professor of Medicine and a Transplant Infectious Diseases Faculty at the Johns Hopkins University School of Medicine. Dr.Permpalung received his Medical Degree from Chulalongkorn University, Thailand, and his Master of Public Health form Harvard T.H.Chan School of Public Health, Boston, USA. Dr. Permpalung completed a residency in Internal Medicine at Bassett Medical Center, then completed his Infectious Diseases and Transplant Infectious Diseases Fellowship at Beth Israel Deaconess Medical Center/Harvard Medical School and Duke University, respectively. Dr.Permpalung's research is currently focusing on respiratory viral infections in lung transplant recipients, fungal diagnostics in immunocompromised patients, and human pythiosis.

Presentation

1. Plenary 3

Sunday, August 8, 2021
18.30–20.00 (UTC+8)
Room A–C

P3.2 COVID-19-associated pulmonary aspergillosis

Coronavirus disease 2019 (COVID-19) is a global emergency. Similar to emerging evidence for influenza, studies have shown that there is excess morbidity associated with *Aspergillus* infections that develop in 5 – 30% of people with severe COVID-19, a syndrome known as COVID-19 associated pulmonary aspergillosis (CAPA). The disparity of CAPA incidence is depending on methods applied to diagnostic screening, incidence of COVID-19, geographic location, and definitions applied to report CAPA. It has been suggested that risks for both airway and invasive aspergillosis in this fungal-after-viral phenomenon occur due to airway clearance defect from viral infection and corticosteroid use in severe COVID-19. The study from Johns Hopkins revealed that underlying liver diseases, pulmonary disorders, solid tumors, and multiple myeloma were associated with CAPA occurrence.

People with CAPA, regardless of definitions, had uniformly worse outcomes with regards to severity of illness, ventilatory and hemodynamic support, and duration of hospitalization. CAPA was associated with higher mortality in some reports. The use of appropriate antifungal agents may improve clinical outcomes among fungal infections complicating severe COVID-19; however, studies to date were not designed to inform the efficacy of antifungal therapy in this setting. Given difficulties in diagnosis and poor clinical outcomes of this condition, further studies are needed to evaluate non-invasive diagnostics and prophylactic antifungal therapy.

Wanatpreeya Phongsamart

Siriraj Hospiatal, Mahidol University
Thailand

Dr. Wanatpreeya Phongsamart is currently a Chief of Division of Infectious Diseases, Department of Pediatrics, Faculty of Medicine, Siriraj Hospiatal, Mahidol University, Bangkok, Thailand. Dr. Wanatpreeya is also a committee of the Pediatric Infectious Diseases of Thailand.

Dr. Wanatpreeya obtained her medical degree from the Faculty of Medicine Siriraj Hospital, Mahidol University and went on to specialize in Pediatrics at Pramongkutklao College of Medicine, Royal Army Hospital both in Bangkok, Thailand. Furthermore, Dr Wanatpreeya has obtained both a diploma and a certificate in pediatric infectious diseases from the Department of Pediatrics, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok Thailand, and The Hospital for Sick Children, University of Toronto, Toronto, Canada, respectively.

Dr Wanatpreeya has been invited to present her work at both national and international conferences and published over 40 articles in peer-reviewed journals including *Vaccine, Pediatric Infectious Disease Journal* and *Human Vaccines and Immunotherapeutics*. Her areas of interest include vaccines and vaccine preventable diseases, antimicrobial-resistance organisms and infections in immunocompromised children.

Presentation	
1. Symposium 2: IFD in febrile neutropenic patients	Friday, August 6, 2021
S2.2 Differences in fungal infection management in pediatric vs adult patients	17.30–18.45 (UTC+8) Room B

Hariprasath Prakash

International Higher School of Medicine, Issyk-Kul Campus
Kyrgyzstan

I, Dr. Hariprasath Prakash, Presently, working as Assistant Professor (IHSM, Kyrgyzstan). I completed my PhD in Medical Mycology from Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India, under the professorship of Dr. Arunaloke Chakrabarti. My doctoral thesis was on epidemiology, taxonomy and genomics of Mucormycetes fungi. Presently, my research work majorly focus in the field of epidemiology of fungal infections, fungal biology, taxonomy, molecular genomics and antifungal drug resistance mechanism. My research work has been published in internationally reputed journals, till date I have published 12 research articles. Further, I am acting as a reviewer for international journals such as *Journal of public health and infection, Journal of King Saud University-Science, Saudi Journal of Biological sciences* and *Mycoses* hence forth. I am active member of "Indian Society of Medical Mycologists".

Presentation

1. Symposium 4: Mucormycosis

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room A

S4.1 Epidemiology in Asian countries

Mucormycosis is an angio-invasive disease caused by the fungi belonging to the order Mucorales. They are saprophytic; the high prevalence of Mucorales spores has been reported from the Asian countries. The patients acquire the infection either by inhalation, ingestion or traumatic inoculation of the spores. The estimated incidence of mucormycosis is much higher in Asian countries such as India and Iran (14 cases and 9.2 cases per 100000 persons respectively) than in developed countries (on average of 0.2 cases per 100000 persons). Due to the lack of population-based studies, the exact incidence of mucormycosis cannot be determined in Asian countries. Rhino-orbital-cerebral form of the disease is the most common clinical disease, followed by the pulmonary type. In Asian countries, isolated renal mucormycosis cases and gastrointestinal cases are reported in high numbers compared to developed countries, where pulmonary infections are more in numbers. Diabetes mellitus is the most common risk factor in Asian countries, followed by haematological malignancy and solid organ transplants. The emergence of COVID-19 associated mucormycosis has been reported in India; to date, >30000 cases have been reported. The reason for emergence has been attributed to the inappropriate high dosage of glucocorticoid use and many diabetic patients with COVID-19 infections. *Rhizopus arrhizus* is the most common causative agent of mucormycosis. In Asian countries, the emergence of newer pathogens such as *Rhizopus microsporus, Rhizopus homothallicus, Apophysomyces variabilis,* and *Mucor irregularis* has been observed. In conclusion, the epidemiology of mucormycosis is unique compared to western countries in terms of disease incidence, risk factors, the clinical spectrum of disease and causative agents of mucormycosis. The population-based studies could help us understand the exact disease burden in Asian countries. A high clinical suspicion will help us diagnose the mucormycosis cases at the earliest and help us initiate the appropriate treatment, which reduces morbidity and mortality.

Malcolm Richardson

Guangzhou Centre for Fungal Diagnostics and Research
UK

Malcolm Richardson is Professor of Medical Mycology, Manchester Fungal Infection Group, University of Manchester, and Honorary Professor of Medical Mycology, Guangzhou Medical University, China. His clinical and laboratory investigations over 45 years have focused on the diagnosis, pathogenicity, and epidemiology of superficial and systemic fungal infections. In 2019 he founded the Guangzhou Centre for Fungal Diagnostics and Research which has introduced a portfolio of molecular tests into the Greater Bay Area. He has published over 450 original articles, books, book chapters, guidelines and reviews. Malcolm Richardson was President of the International Society for Human and Animal Mycology (ISHAM) from 2015 to 2018. He was elected as a Fellow of the European Confederation of Medical Mycology Academy in 2017.

Presentation

1. Symposium 11: Non-culture-based diagnosis

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room B

S11.3 Molecular diagnosis of mucormycosis

Mucormycosis has significant associated morbidity and mortality. The dramatic explosion in cases of rhino-cerebral disease in Covid-19 patients in India over the past few months highlights the need for early, rapid and accurate diagnostics. Developing culture-independent methods is a major unmet need. Point-of-care lateral flow devices are being developed. Immunohistochemical techniques have proved to be valuable and assist histopathological diagnosis. PCR detection in respiratory secretions and blood is gaining traction. The design of primers and molecular beacons have been designed to provide a definitive identification of the common Mucorales. The role of quantitative PCR testing of blood for the early diagnosis of mucormycosis in high-risk patients has been pursued actively and shows promise. Even using high volume culture of BAL fluid, the recovery of Mucorales is suboptimal. Next generation sequencing is helping our understanding of the diversity of the Mucorales in clinical material. As the cost of this approach becomes more affordable and more widely available, these tests may help to establish the host mycobiome at baseline prior to antifungal treatment and define it after treatment at a patient level. The Guangzhou Centre for Fungal Diagnostics and Research has been evaluating the Pathonostics MucorGenius™ real time PCR which targets R*hizopus, Mucor, Lichtheimia, Cunninghamella* and *Rhizomucor* species, in addition to exploring the mycobiome of the respiratory tract next generation sequencing. Preliminary data suggests good accordance in the detection of *Cunninghamella* species, possibly reflecting the prevalence of this species in the Guangzhou City environment, as seen in similar climatic zones. Other developments and evaluations include exhaled breath profiles and lateral flow immunoassays.

Key reading: Dadwal SS, Kontoyiannis DP. Recent advances in the molecular diagnosis of mucormycosis. *Expert Review of Molecular Diagnostics*, 2018; 18: 845-854.

Shivaprakash M Rudramurthy

Postgraduate Institute of Medical Education and Research
India

Dr Shivaprakash Rudramurthy, MD PhD (Radboud University, Nijmegen, The Netherland)

Professor at PGIMER, Chandigarh, India. Working exclusively in the clinical mycology for 19 years. He was the President of Indian Society of Medical Mycologists from 2018 to 2020. Presently the Vice- President of International Society for Human and Animal Mycology. He is also the Fellow of European Confederation of Medical Mycology and core member of Fungal infection study forum (FISF). He is Associate Editor of *Journal of Medical Mycology* and Editorial board member of *Indian Journal of Medical Microbiology*. His area of interest is on Invasive fungal infections and subcutaneous fungal infections. He has >200 publications in peer reviewed journals and 10 chapters.

Presentations

1. Symposium 3: Endemic mycoses in Asian countries

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room C

S3.3 Sporotrichosis

Sporotrichosis is an endemic mycosis which is prevalent worldwide. Generally, it presents as chronic subcutaneous infection and rarely disseminated disease. Sporotrichosis is caused by pathogenic species of *Sporothrix brasiliensis, S. globosa, S. schenckii.* Rarely other species are involved. *S brasiliensis* is the most pathogenic species and infection is transmitted through cats. Whereas *S. globosa* and *S. schenckii* are generally found in vegetation and gets transmitted via cut injury or minor cutaneous trauma. The major clinical forms of sporotrichosis includes lymphocutaneous, fixed cutaneous, multiple inoculation and cutaneous disseminated. The distribution of *Sporothrix* species shows strict endemicity. In India, China and Japan and other Asian countries *S. globosa* is the only species reported. Whereas *S. brasiliensis* is seen only in Brazil and its adjoining countries. As *S. braziliensis* is highly virulent it can cause disseminated and deep infections. In contrast, *S. globosa* only causes cutaneous infection. *S. schenckii* can cause both disseminated and cutaneous manifestation. The presentation will cover the epidemiology of sporotrichosis in Asia, its diagnosis, and management.

2. Symposium 6: Diagnosis and management of superficial fungal infections

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room C

S6.4 Malassezia infection – recent progress

Malassezia is a common fungal skin commensal which represent 50-80% of total skin in humans. *Malassezia* is associated with skin dermatoses such as seborrhoeic dermatitis (SD) of the skin or scalp and pityriasis versicolor (PV). Though it is associated with other skin disorders such as atopic dermatitis and psoriasis its association is still not well established. All the species of *Malassezia* except, *M. pachydermatis* is lipophilic organism and requires lipid for invitro growth. The epidemiology of *Malassezia* associated diseases varies especially regarding association of species across the world. Of the 18 recognized species of *Malassezia*, 11 species are implicated with human disease and the rest 8 were isolated only in animals. *M. globosa, M. restricta* and *M. furfur* are the major species causing both SD and PV. Prevalence of SD in Asia varies between 2%-26%. Amongst Asian countries, *Malassezia* disease is mainly studied in India, Japan, and China. The recent progress on the epidemiology, species distribution, diagnosis, and management of *Malassezia* infections will be discussed in the presentation.

Donald Sheppard

Department Microbiology & Immunology, McGill University
Canada

Dr. Sheppard is a Professor and Chairman of the McGill University Department Microbiology & Immunology, and Founding Director of the McGill Interdisciplinary Initiative in Infection and Immunity (MI4). He leads the Medical Mycology laboratory and practices clinical infectious diseases at the McGill University Health Centre where his primary area of interest is human fungal disease. Dr. Sheppard's research interests focus on elucidating the mechanisms by which the fungal pathogen *Aspergillus fumigatus* causes human disease as a means to develop new therapeutics for these infections. He has published over 100 research papers and book chapters and has delivered over 150 invited lectures worldwide. Dr. Sheppard has been the recipient of numerous awards including a Clinician-Scientist award from the Canadian Institutes of Health Research and a Career Award in the Biomedical Sciences from the Burroughs Wellcome Fund. He is an elected fellow of the American Society of Clinical Investigation and the American Academy of Microbiology.

Presentation

1. Symposium 16: Biofilms and vaccines

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room A

S16.2 Fungal vaccines

Fallacy or the future?

The limited diagnostic and therapeutic armamentarium for invasive fungal infections, combined with the rise of antifungal resistance, have led to a resurgence in interest in the development of antifungal vaccines. Despite many decades of work in this area, only three candidate vaccines have been tested in humans to date. This lecture will review the challenges to fungal vaccine development, the types of vaccine approaches under study, and progress on the lead candidates for each of these vaccine platforms.

Monica Slavin

National Centre of Research Excellence in Infections in Cancer, University of Melbourne Australia

Monica Slavin MBBS, FRACP, MD leads a National Centre of Research Excellence in Infections in Cancer at University of Melbourne. She is Director of the Department of Infectious Diseases at Peter MacCallum Cancer Centre and of the Immunocompromised Host Infection Service at Royal Melbourne Hospital in Melbourne, Australia. She is Professor, Department of Medicine, University of Melbourne. She is past president of the International Immunocompromised Host Society and secretary of the Immunocompromised Host working group of ESCMID. Her research is in diagnosis, management of infections in the immunocompromised host with a particular interest in prophylaxis, treatment and diagnosis of fungal infection. She contributes to ECIL, TCT and ECCM guidelines for fungal infection. She is an associate editor for *TID, JAC* and *Current Opinion in ID*. She chairs the joint microbiology and infectious Diseases training committee for the Royal Australasian College of Physicians, has supervised over 20 ID trainees and mentors early and mid-career physicians and researchers.

Presentations

1. Ask-the-expert

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room A

E1: How are the considerations of antifungal PK/PD important in clinical care?

In this ask-the-expert session, Professor Monica Slavin and Dr Chonnamet Techasaensiri will be addressing as many questions as possible attendees may have on how the considerations of antifungal PK/PD are important in clinical care.

2. Symposium 14: Fungal prophylaxis in the immunocompromised hosts

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room B

S14.1 Is there a role for prophylaxis in hematology beyond AML and HSCT?

Antifungal prophylaxis has proved effective in preventing invasive fungal disease (IFD) patients with acute myeloid leukemia receiving intensive chemotherapy and in patients undergoing allogeneic haematopoietic stem cell transplantation. With the rapid development of new classes of drugs to treat haematological malignancy, the risk of IFD with these new treatments requires assessment. In assessing IFD risk not only mechanism of action of the new agent but also the patient's individual risks, stage of haematological malignancy and receipt of prior therapies should be taken into account. The risk of IFD in new treatments such as Bruton's tyrosine kinase inhibitors, BCL-2 inhibitors, CAR T-cell and bispecific antibody therapies will be discussed. Overall rates of IFD are <5% with these agents but higher risk for IFD occurs in patients who have received multiple lines of therapy, had a prior allogeneic HCT or are receiving concurrent immunosuppressive therapy for cytokine release syndrome or Immune effector cell-associated neurotoxicity syndrome (ICANS). In selected patients receiving these agents mould-active azole prophylaxis could be considered.

Pei-Lun Sun

Chang Gung Memorial Hospital, Linkou Branch
Taipei

Pei-Lun Sun is an attending physician and associate professor in the Department of Dermatology, Chang Gung Memorial Hospital, Linkou Branch, Taoyuan, Taiwan. Dr Sun completed his medical degree at Kaohsiung Medical College, a master's degree in clinical medicine at National Taiwan University and a PhD degree in ecology and evolutionary biology at the National Taiwan University.

Dr Sun has a broad interest in medical mycology, from diagnosis and treatment of mycoses, to isolation of pathogenic fungi from the environment. His long-term interest is in the study of dermatophyte infections, especially tinea capitis, zoonotic dermatophytosis and onychomycosis. He also constantly cooperates with veterinary physicians in the diagnosis of animal mycoses. He is now the Head of Research Laboratory of Medical Mycology at Chang Gung Memorial Hospital.

Dr Sun is a member of a number of scientific organizations, including the Taiwanese Dermatological Association, the Taiwanese Society for Investigative Dermatology, the American Academy of Dermatology, the International Society for Human and Animal Mycology and the Mycological Society of Taiwan.

Presentations

1. Ask-the-expert

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room A

E3: How to address practical challenges in tinea capitis and cutaneous mucormycosis? – Tinea capitis: An unsolved problem in Asia

In this ask-the-expert session, Drs Pei-Lun Sun and Eliza Miranda will be addressing as many questions as possible attendees may have on addressing practical challenges in tinea capitis and cutaneous mucormycosis.

2. Symposium 7: Antifungal Resistance in Dermatophytes

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room C

S7.1 Resistance in dermatophytes

The rising of antifungal resistance in dermatophytes has made tinea not an "easy disease" anymore. The lesions are extensive, bizarre, and refractory to conventional treatment with antifungals. This trend has been observed in several countries in the world, with India being the hot area. Currently, the most well-known mechanism for resistance to terbinafine is through the mutation of the squalene epoxidase gene (SQLE) of dermatophytes. This mutation link directly to the high minimum inhibitory concentration (MIC) value of terbinafine to dermatophytes and result in treatment failure. Global collaboration on the surveillance of this resistance and the consensus on the clinical breakpoints of antifungals for dermatophytosis is urgently needed.

Kamonlawat Sutthipool

Faculty of Medicine Siriraj Hospital, Mahidol University
Thailand

Dr. Kamonlawat Sutthipool is a second-year clinical infectious disease fellow at the Division of Infectious Disease and Tropical Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand, which is the largest university hospital in Thailand. Here, she also attends both her undergraduate studies and internal medicine residency. She has been fascinated by microbiology since medical school. Subsequently, she becomes passionate about caring for patients with HIV and other infectious diseases as a general practitioner and an internal medicine resident. Nowadays, as an ID fellow, she is interested in infectious diseases in immunocompromised and post-transplantation patients.

Presentation

1. Symposium 14: Fungal prophylaxis in the immunocompromised hosts

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room B

S14.3 Challenging clinical case 2

A 35-year-old woman with relapsed acute myeloid leukemia underwent haploidentical hematopoietic stem cell transplantation using peripheral blood from her mother as a stem cell source. Her prior medical history was unremarkable, except for a history of probable invasive pulmonary aspergillosis. The conditioning regimen consisted of fludarabine and busulfan. In addition, graft versus host disease prophylaxis consisted of cyclophosphamide, cyclosporine, and mycophenolate mofetil. She also received ciprofloxacin, fluconazole, trimethoprim/sulfamethoxazole, lamivudine, and acyclovir for antimicrobial prophylaxis.

Following stem cell infusion, the patient developed cytokine release syndrome, which resolved within five days. We empirically prescribed Piperacillin/tazobactam. Subsequently, there was no bacterial infection identified, but both stool and urine cultures grew the colonies of *Candida glabrata*. So, micafungin has commenced replacing fluconazole. The rationale was based on the low incidence of mold infections in our center, multiple colonization with *C. glabrata*, and lack of recommendations regarding secondary prophylaxis of invasive aspergillosis. Given the limited activity of micafungin against *Aspergillus* spp. and the high risk of recurrent mold infection, we also launched a mold-directed diagnostic approach using serum galactomannan and a chest computed tomography scan during the pre-engraftment phase. Febrile neutropenia inevitably occurs on day+9. Ultimately, she had neutrophil engraftment on day+16 and fever resolved on day+18 without any documented bacterial or fungal infection.

This case posts challenges of antifungal prophylaxis on patients with a prior history of mold infection and colonization with azole-resistant *Candida* spp. Of which, micafungin and a mold-directed diagnostic approach result in a favorable outcome.

Ban Hock Tan

Infectious Diseases and Internal Medicine, Singapore General Hospital Singapore

Dr Tan graduated from the National University of Singapore and obtained his MRCP (Edinburgh) in 1995. He went on to train in infectious diseases in Singapore and at the Massachusetts General Hospital in Boston, Massachusetts, USA. He has been Head of Infectious Diseases and of Internal Medicine at SGH. He is currently Infectious Diseases Lead with SingHealth Transplant. He is currently President-elect of the Transplant Infections Disease Section of The Transplantation Society, and sits on the editorial board of *Transplant Infectious Disease*. He served for 9 years as co-chair of the Asia Fungal Working Group.

Dr Tan has a keen interest in the study of infections in immunocompromised hosts, and is particularly interested in infections in transplant recipients and febrile neutropenic patients.

Presentations

1. Symposium 2: IFD in febrile neutropenic patients

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room B

S2.1 Empirical vs pre-emptive debate

To date, the use of empirical or pre-emptive antifungal treatment strategies for patients with febrile neutropenia and suspected invasive fungal disease remains a subject of debate. In this lively and dynamic session, Professor Oliver Cornely and Dr Ban Hock Tan will put forward the viewpoints of using empirical antifungal treatment while Professors Johan Maertens and Yee-Chun Chen will take on the viewpoints of a pre-emptive antifungal approach. Join this session to hear the speaker panel debates the pros and cons of empirical and pre-emptive antifungal strategies in patients with febrile neutropenia.

2. AFWG–TID Symposium 5: Solid organ transplantation

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room B

S5.1 Timeline of fungal infections after transplant

Infections after solid organ transplantation generally occur along a well-described timeline. This classical timeline has enabled the design of cost-effective prophylaxis, the generation of differential diagnosis and the detection of excess exposures. Several groups have tracked infections (including fungal infections) after solid organs transplantation and their findings appear to contradict the classical timeline. A case of aspergillosis diagnosed in a transplant recipient in the second week after transplant actually represents nosocomial transmission. These and other examples will be highlighted to show how employing the concepts enshrined in the classical timeline allows us to better understand the patient, and also the environment. The latter has public health implications.

Chonnamet Techasaensiri

Ramathibodi Hospital, Mahidol University
Thailand

Chonnamet Techasaensiri received his medical degree from Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand, and completed his Pediatric Residency Training and Pediatric Infectious Disease fellowship training there. He then earned another Certification of Pediatric Infectious Diseases from University of Texas Southwestern Medical Center at Dallas, Texas, USA where he started doing research in *Streptococcus pneumoniae* and *Mycoplasma pneumoniae*.

Dr. Techasaensiri's research interest is in immunization and infections in immunocompromised patients. His works have involved prevention, investigation, and treatment of invasive fungal infection and infections in patients with cancer, solid organ transplantation and hematopoietic stem cell transplantation. He currently is an Assistant Professor, Chief of Division of Infectious Diseases, Department of Pediatrics, Chairman of Hospital Infection Control Committee, and Deputy Director of Ramathibodi Hospital, Mahidol University.

Presentation

1. Ask-the-expert

Saturday, August 7, 2021
17.45–18.30 (UTC+8) Room A

E1: How are the considerations of antifungal PK/PD important in clinical care?

In this ask-the-expert session, Professor Monica Slavin and Dr Chonnamet Techasaensiri will be addressing as many questions as possible attendees may have on how the considerations of antifungal PK/PD are important in clinical care.

Rataporn Ungpakorn

VitalLife@BangKrachao
Thailand

Dr. Rataporn Ungpakorn started his career as a consultant at the Institute of Dermatology, Bangkok, since 1993 after his dermatology training from King Mongkutklao Medical College Hospital. He received scholarship to attend Fellowship in Medical Mycology at Guy's, King's and St. Thomas' Hospitals in London and became actively involved in many international societies.

He is an active and vibrant speaker with many interests on Mycology, Pigmentary diseases and Dermatology.

Presentation

1. Symposium 6: Diagnosis and management of superficial fungal infections

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room C

S6.2 Tips and tricks in the diagnosis and management of dermatophyte infection

Update on management of fungal infections relies on innovation of antifungal medications which has a long, steady but very slow process. Thus, reflects the development of cutaneous antifungal treatment protocols. Most effective management relies on clinical clues to diagnosis, laboratory confirmation when available, and choice of medical intervention.

Pityriasis versicolor (PV) is common in hot tropical countries. Diagnosis is mostly based on clinical presentation and a quick direct examination or Wood's lamp. Diagnostic laboratory confirmation is presence of yeasts and fragmented hyphae known as "spaghetti and meatballs". PV can be successfully treated with various agents. Effective topical agents include selenium sulfide, ciclopiroxolamine, as well as azole and allylamine antifungals. Selenium sulfide, ketoconazole shampoos are liberally use as body wash daily for 2 weeks; each application is allowed to remain on the skin for at least 10 minutes prior to being washed off. Weekly regimens for the following few months may help prevent recurrence. Some study had shown that a single wash was as effective as a 3 consecutive day wash. In patients with widespread disease, topical antifungal therapy can be expensive. Oral therapy does not prevent the high rate of recurrence, and treatment with an oral or topical agent may need to be repeated intermittently throughout the year.

Tinea capitis and onychomycosis may mimic other common skin conditions such as seborrheic dermatitis, alopecia, psoriasis and nail dystrophies. Useful clinical diagnostic clues to tinea capitis are hair fragility, scaly scalp and local lymphadenopathy in children. Subungual thickening of few nail plates associated with tinea pedis are useful clues to onychomycosis.

Treatment of dermatophytosis has been unchanged in the past years. New topical medication do not offer higher efficacy other than previous available formulation except for shorter treatment duration and convenience. Oral antifungals are recommended for infections on the hair and nails. Oral griseofulvin, itraconazole and terbinafine are mainstay of choice for tinea capitis. Recent developments are on topical antifungals for tinea unguium. Efinaconazole and Tavaborole nail solution has been launched in 2014 indicated for *Trichophyton rubrum* and *T. mentagrophytes* infections recommended once daily for 48 weeks. Combination of topical, oral antifungal and adjunctive removal of diseased nail plate increases cure rates.

Retno Wahyuningsih

Universitas Indonesia and Universitas Kristen Indonesia
Indonesia

Retno Wahyuningsih is Professor of Medical Mycology at the Division of Mycology, Department of Parasitology, Faculty of Medicine of the Universitas Indonesia in Jakarta, Indonesia. She is also affiliated with the Department of Parasitology, Faculty of Medicine of the Universitas Kristen Indonesia in Jakarta.

Besides being a lecturer and researcher, she is active as member of Asia Fungal Working Group. She is also the President of the Indonesian Society for Human and Animal Mycology (INSHAM) and the Indonesia Ambassador of the Global Action Fund for Fungal infection (Gaffi).

Presentations

1. Symposium 3: Endemic mycoses in Asian countries

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room C

S3.1 Histoplasmosis

Histoplasma capsulatum, the cause of endemic mycosis histoplasmosis, is a thermally dimorphic fungus that exists as mould in nature and yeast in the human body. America has been considered as an endemic area for histoplasmosis, and the endemic area was identified perfectly. In Asia cases of histoplasmosis were reported from China, India, and Southeast Asian countries such as Indonesia, Malaysia, Thailand, and Myanmar. The result of histoplasmin skin tests in various Asian countries strengthens our suspicion that some Asian countries are endemic of histoplasmosis. However, no region in Asia has been identified as an endemic area for histoplasmosis, despite the reported cases. What needs to be noticed is that in several Asian countries such as China, India and Indonesia, there are many cases of tuberculosis that have symptoms like histoplasmosis, especially chronic histoplasmosis. Steps need to be taken to map endemic areas in Asian countries that have reported cases of histoplasmosis.

Key words: histoplasmosis, endemic area, Asia, tuberculosis

2. Ask-the-expert

Sunday, August 8, 2021
16.00–16.45 (UTC+8) Room C

E6: Tropical fungal infections

In this ask-the-expert session, Drs Mitzi Chua and Retno Wahyuningsih will be addressing as many questions as possible attendees may have on tropical fungal infections.

Xiaowen Wang

Department of Dermatology, Peking University First Hospital
China

Dr. Wang received her medical doctor's degree from Peking University. She completed her research training in Radboud University in the Netherlands as a visiting scholar. Her research interests are fungal immunology and genetic susceptibility. She has been the principal investigator of a youth and a general program of NSFC, as well as "Young Talent Lifting Project" of China Association for science and technology. She received the Second Prize of Beijing Science and Technology Award. She has more than 15 publications in key academic journals, including *Lancet Infectious Diseases* and *Journal of Allergy and Clinical Immunology*, as first or corresponding author.

Presentation

1. Symposium 15: Pathogenesis

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room C

S15.2 Genetic susceptibility to cutaneous and subcutaneous fungal infections

Fungi are associated with a wide spectrum of diseases in humans, including superficial, subcutaneous, and invasive infections. With the development of diagnostic technology, a growing number of cutaneous and subcutaneous fungal infections caused by various fungi have been noted in clinic, some of which could be very severe and intractable, even life-threatening. Therefore, it is of great importance to elucidate the genetic and immunological mechanisms underlying the susceptibility to these infections.

In the past decade, using novel genetic tools, significant breakthroughs have been achieved in our understanding of the genetic and molecular mechanisms of chronic mucocutaneous candidiasis (CMC), which further contribute to the study of other subcutaneous fungal infections. A lot of monogenetic disorders that impair interleukin-17-mediated immunity were found to predispose cutaneous and subcutaneous fungal infections.

In this review, we cover recent insight in the genetic susceptibility to cutaneous and subcutaneous fungal infections, including *STAT1, IL-17F* and *IL-17R*, and *ACT1* mutations in isolated *CMC; CARD9* mutations in CMC, deep dermatophytosis and phaeohyphomycosis; STAT3, Dock8 and Tyk2 mutations in hyper IgE syndrome; *AIRE* mutations in the syndrome of autoimmune polyendocrinopathy-candidiasis-ectodermal dystrophy; and *IL-12RB1\IL-12B* and *RORC* mutations in *Candida* and *Mycobacterium* infections. Their genotypes and potential mechanisms were briefly discussed. We hope that personalized immunotherapeutic and gene therapy strategies using bioengineered technologies might improve the clinical outcomes of these patients in the future.

Siriorn Watcharananan

Ramathibodi Hospital, Mahidol University
Thailand

Dr. Watcharananan is a fellow of the Infectious Disease Society of America, and an associate professor of Medicine at the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, in Bangkok, Thailand. She is a diplomate of the American Board of Internal Medicine and Infectious Disease. After the internal medicine residency training at the University of Illinois/ Advocate Christ Medical Center, she underwent an Infectious Disease fellowship, and a Clinical Microbiology fellowship training at the Cleveland Clinic Foundation, Cleveland, Ohio, USA. She also served as a chief fellow of the Department of Infectious Disease at the Cleveland Clinic Foundation. Her main interest is transplant-related infection.

Presentation

1. Symposium 17: Immune interactions

Sunday, August 8, 2021
17.00–18.15 (UTC+8) Room B

S17.1 Biologicals and fungal infections

Despite the advantage of biological therapies directly targeting the cells or pathways involved in disease pathophysiology, the blockade of pathways controlling immune or inflammatory responses may result in an impaired immune function, resulting in a higher risk of infection. The assessment of the specific infection risk associated with the use of targeted therapies is challenging because this risk depends on multiple factors, such as the nature and stage of the underlying condition, the prior or concurrent receipt of other immunosuppressive agents, the duration of therapy or the accumulative exposure to the agent. This review has focused on the agents that have recently been recognized with increased IFI risk.

Anti-TNF-α therapy increases risk of granulomatous fungal infection (*Cryptococcus* spp., dimorphic fungi), candidiasis and invasive aspergillosis. IFIs with atypical/ advanced presentation (CNS aspergillosis, extrapulmonary *Pneumocystis jirovecii* (PJP) infection, and disseminated cryptococcosis) have been observed after the use of ibrutinib, the first Bruton's tyrosine kinase (BTK) inhibitor. Alemtuzumab (anti-CD52) is a profound lymphocyte depleting agent shown to increase risk of PJP infection while other agents such as rituximab (anti-CD20) might be associated with the infection if the therapy was co-administered with moderate dose of steroids, or there is a compatible host condition. For immune checkpoint inhibitors (cytotoxic T-lymphocyte-associated antigen 4 (CTLA-4) targeted agents and PD-1 and PD-L1-targeted agents), the risk of IFI is not driven by the use of these agents itself but by the subsequent requirement of additional immunosuppression therapy to manage the immune-related adverse effects from the up-regulation of immune response.

Sureerat Watcharasuwanseree

Faculty of Medicine Siriraj Hospital, Mahidol University
Thailand

Presently, Dr Sureerat Watcharasuwanseree is in the training fellowship program in clinical infectious diseases, Division of Infectious Diseases and Tropical Medicine, Department of Internal Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand.

She received MD from Faculty of Medicine Thammasat University, Thailand and received diploma of Thai board of Internal Medicine from Faculty of Medicine Srinagarind hospital, Khonkaen University, Khonkaen, Thailand.

She has many areas of interest such as infectious diseases in transplantation, tropical medicine, and drug-resistant bacteria.

She also had publication, research, and interesting case i.e. A case report and literature review published in journal of infectious diseases and antimicrobial agents publication of infectious disease association of Thailand, A speaker of First Annual Conference of Thai Medical Mycology Forum "Emerging Medical Mycology 2020".

For ISHAM 2021, she would like to present a case of Fungal prophylaxis in the immunocompromised hosts.

Presentation

1. Symposium 14: Fungal prophylaxis in the immunocompromised hosts

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room B

S14.2 Challenging clinical case 1

Breakthrough disseminated candidiasis in allogeneic hematologic bone marrow transplantation

Sureerat Watcharasuwanseree[1], Piriyaporn Chongtrakool,[2] Pornpan Koomanachai[1]

[1] Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

[2] Department of Microbiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

A case report of a 20-year-old man with disseminated candidiasis even he was receiving antifungal prophylaxis. The patient had severe aplastic anemia and received therapy with allogeneic hematologic stem cell transplantation. He was prescribed fluconazole for antifungal prophylaxis. However, he developed disseminated candidiasis. His symptoms and signs were prolonged febrile neutropenia and diffuse cutaneous nodules. Hemoculture and skin biopsy cultured grew fluconazole-resistant *Candida tropicalis*. He developed complications from *C. tropicalis* infection i.e. hepatosplenic candidiasis, pneumonia, renal abscesses, and vertebral osteomyelitis. All complications revealed by using CT imaging. The patient was improved after antifungal therapy, micafungin, for 6 months.

Keywords: breakthrough disseminated candidiasis, antifungal prophylaxis, allogeneic hematologic stem cell transplantation

Sandra Widaty

Faculty of Medicine Universitas Indonesia, dr. Cipto Mangunkusumo Hospital Indonesia

Sandra Widaty is a Dermato Venereologist consultant experienced in dermatology and venereology and (DV), specializing in tropic infections, hair and nail, wound healing and medical education. She has been actively involved in research about fungal infection, scabies infestation, hair management and medical education, especially in dermatology and venereology residency education. She has published various international and national publications and has several Intellectual Property Rights. She has currently ongoing research about skin microbiome and hair-related research. She is the chief editor of *Journal of General - Procedural Dermatology and Venereology Indonesia* and She is currently the peer reviewer of several well-accredited international journals as well as an editor and peer reviewer in national journals, books and guidelines in Indonesia. She is also active in community service focusing in education and disease management of children in boarding schools and dermatology and venereology disorders centers with specialty. Her current main activities involving medical doctor and dermatology and venereology specialists program at Faculty of Medicine Universitas Indonesia. She received her title as Dermato Venereologist and as Consultant at Universitas Indonesia and her PhD from Gadjah Mada University in Indonesia.

Presentation

1. Symposium 12: Diversity of cutaneous fungal infections

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room C

S12.1 Cutaneous manifestations of invasive fungal infections

The systemic mycoses are fungal infections that enter the body through an internal organ or a deep focus, such as the lungs, gastro intestinal tract, or paranasal sinuses. They can cause clinical disease both in immunocompetent and immunocompromised hosts, especially those with acquired immunodeficiency syndrome (AIDS) with CD4 cell count less than 100 cells/IL, systemic lupus erythematosus, corticosteroid or immunosuppressive agent use. Cutaneous manifestation of disseminated fungal infection can be seen in histoplasmosis, penicilliosis, cryptococcosis, candidosis and mucormycosis. Clinical presentations sometimes nonspecific, it can be locally or disseminated infections. Skin lesion can appear as papule resembling molluscum contagiosum, papule with central necrosis, ulcers, nodule, cold abscesses or black eschar. Clinical diagnosis needs laboratory examination confirmation, using histopathology examination, culture, molecular methods, serologic tests, and direct examination such as touch biopsy or smear with potassium hydroxides solution In this pandemic era, Covid-19 patients reported as more susceptible to mucormycosis, and refer as Covid-19 associated mucormycosis (CAM). Treatment divide in two phase, the induction and consolidation therapy and followed with maintenance therapy for 6 – 12 months. Treatment choice depends on the patient's immune status, location of the infection, and possibilities of drug interaction. Patients treated with amphotericine B in combination with co therapy flucytosine followed with itraconazole are the first line of treatment. Voriconazole can also be use as alternative treatment. Fluconazole therapy both high dose or low dose are given especially for primary or secondary cryptococossis. Prognosis depends on several factors such as early diagnosis, comorbidities, prompt treatment, and patient compliance.

Patrick Woo

Department of Microbiology, University of Hong Kong
HKSAR

Professor Woo obtained his medical degree from The University of Hong Kong in 1991. He joined the Department of Microbiology of The University of Hong Kong in 1997, became Professor of Microbiology in 2006 and then Head of Department from 2011 to 2018. He is a fellow of the Royal College of Pathologists and Royal College of Physicians in the UK.

Professor Woo is among the top 1% of researchers and has established himself as a leader in the field of emerging infectious diseases, novel microbe discovery and microbial genomics. His team has discovered more than 100 novel microbes, including more than 10 pathogenic fungi. He's a fellow of the European Confederation of Medical Mycology and a member of the Coronavirus Study Group and Picornavirus Study Group of the International Committee for Taxonomy of Viruses.

He has published more than 500 articles in journals, including *New England Journal of Medicine, Lancet, Lancet Infectious Diseases, Cell, Cell Host & Microbe, Nature Communications, Nature Microbiology, PNAS, British Medical Journal, PLoS Pathogens, PLoS Genetics, PLoS Biology, mBio*, etc.

Presentations

1. Symposium 3: Endemic mycoses in Asian countries

Friday, August 6, 2021
17.30–18.45 (UTC+8) Room C

S3.2 Talaromycosis

Talaromyces (Penicillium) marneffei is the most important pathogenic thermally dimorphic fungus causing systemic mycosis in Southeast Asia. *T. marneffei* infection is endemic in tropical regions, especially Thailand, Vietnam, northeastern India, Southern China, Hong Kong, Taiwan, Laos, Malaysia, Myanmar, Cambodia, and Laos. Bamboo rats (*Rhizomys* sp. and *Cannomys* sp.) and soil from their burrows are considered to be important enzootic and environmental reservoirs of *T. marneffei*, respectively. Historically, *T. marneffei* infection in human has been considered to be exclusively associated with HIV infection. In some regions such as Hong Kong and southern China, *T. marneffei* infection has long been considered as one of the top three AIDS-defining opportunistic infections, alongside tuberculosis and cryptococcosis. In recent years, a decline in the incidence of *T. marneffei* infection among HIV-infected patients was seen in regions with access to highly active antiretroviral therapy and other control measures for HIV. In contrast, *T. marneffei* infection has been increasingly reported among non-HIV-infected patients with impaired cell-mediated immunity since the 1990's. Their comorbidities included primary adult-onset immunodeficiency due to anti-interferon-gamma autoantibodies and secondary immunosuppressive conditions including other autoimmune diseases, solid organ and hematopoietic stem cell transplantations, T lymphocyte-depleting immunsuppressive drugs, and novel anti-cancer targeted therapies such as anti-CD20 monoclonal antibodies and kinase inhibitors. Moreover, improved immunological diagnostics identified more primary immunodeficiency syndromes associated with *T. marneffei* infection in children.

Presentations

2. Symposium 11: Non-culture-based diagnosis

Saturday, August 7, 2021
16.15–17.30 (UTC+8) Room B

S11.1 Genomic approaches

In recent few years, next-generation sequencing (NGS) technologies have developed beyond the research realm and started to mature into clinical applications. In this article, we review the current use of NGS for laboratory diagnosis of fungal infections. Since the report of the first case in 2014, a total of more than 300 cases of fungal infections diagnosed by NGS were described in the literature. *Pneumocystis jirovecii* is the predominant fungus reported, constituting ~25% of the fungi detected, followed by *Aspergillus species* (~22%), *Candida* species (~16%), *Cryptococcus* species (~7%), *Rhizopus* species (~6%), *Fusarium* species (~4%), *Alternaria* species, *Talaromyces marneffei* and other sordariomycetes (~3% each), *Histoplasma capsulatum*, *Mucor* species and other yeasts (~2% each), as well as some other rare mould species (collectively ~5%). In around 12.5% of the cases, more than one fungus was detected by NGS. For the *P. jirovecii* infections diagnosed by NGS, all the patients suffered from pneumonia. Although almost all patients were immunocompromised, only one out of the 91 patients were HIV-positive. This is very different from the general epidemiology of *P. jirovecii* infections, of which HIV infection is the most important risk factor. The common reasons for immunosuppression were haematological malignancies on chemotherapy and autoimmune diseases or renal transplant recipients on corticosteroid and/or other immunosuppressive treatment. The epidemiology of *T. marneffei* infections diagnosed by NGS is also different from its general epidemiology, in that only three of the 11 patients were HIV-positive. When the cost of NGS is further reduced, expertise more widely available and other obstacles overcome, NGS would be a useful tool in the armamentarium for laboratory diagnosis of fungal infections, particularly for difficult-to-grow fungi and cases with low fungal loads.

3. Ask-the-expert

Sunday, August 8, 2021
16.00–16.45 (UTC+8) Room B

E5: Next-generation sequencing and relevance in fungal infections

In this ask-the-expert session, Dr Michail Lionakis and Professor Patrick Woo will be addressing as many questions as possible attendees may have on next-generation sequencing and its relevance in fungal infections.

Chi-Jung Wu

National Institute of Infectious Diseases and Vaccinology, National Health Research Institutes
Taipei

Dr. Chi-Jung Wu is an attending physician and associate investigator at National Institute of Infectious Diseases and Vaccinology, National Health Research Institutes, Taiwan. Her research fields include the molecular epidemiology of infectious diseases and antimicrobial drug resistance in bacterial and fungal human pathogens. Her research interests focus on invasive mold diseases (IMDs), in particular aspergillosis and mucormycosis, molecular diagnosis of IMDs, and antifungal resistance mechanisms in *Aspergillus*. She is also involved in a nationwide surveillance program, ie. Taiwan Surveillance of Antimicrobial Resistance of Molds (TSARM), which aims to determine the local epidemiology of azole resistance in *Aspergillus* in Taiwan periodically.

Presentation

1. Symposium 7: Antifungal resistance

Saturday, August 7, 2021
14.45–16.00 (UTC+8) Room A

S7.3 Resistance in Aspergillus

Azoles are the first-line therapies for invasive aspergillosis (IA). However, acquired azole resistance in *A. fumigatus* has increasingly reported, which may develop during patient therapy or through exposure to azole fungicides in the environment. Point mutation in Cyp51A is more commonly seen in the former scenario, whereas TR34/L98H and TR46/Y121F/T289A mutation in Cyp51A are typically associated with the latter scenario. Cyp51A-independent resistance mechanisms, such as the upregulation of drug efflux transporters (Cdr1B) and Hmg1 mutations, have also been increasingly recognized. Azole resistance increases the IA mortality, in part due to delayed initiation of appropriate antifungal therapy. Therefore, the 2017 ESCMID-ECMM-ERS guideline emphasizes the knowledge of local epidemiology of azole resistance by testing of at least 100 *A. fumigatus* complex isolates periodically and discourages azole monotherapy in regions with a high resistance rate (>10%).

Acquired azole resistance was uncommon in *A. flavus* and *A. terreus*, and *in vivo* emergence of azole resistance in *A. flavus* (Y119F mutation in Cyp51A) and *A. terreus* (M217I mutation in Cyp51A) have been described. Cryptic *Aspergillus* species with intrinsic azole resistance also call attention, such as *A. lentulus* and *A. calidoustus*.

A. flavus and *A. terreus* were species with intrinsically higher amphotericin B MICs; *in vivo* emergence of echinocandin resistance in *A. fumigatus* (a point mutation in FKS1) has been identified. Overall, acquired resistance to amphotericin B and echinocandin is rare in *Aspergillus*.

In this presentation, azole, amphotericin B, and echinocandin resistance in *Aspergillus* will be reviewed.

Bing Zhai

Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences China

Bing Zhai received her Ph.D. from Texas A&M University, where she focused on novel antifungal drug development and the impact of yeast-hyphal transition during *Cryptococcus* infection. She then moved to Memorial Sloan Kettering Cancer Center, NYC, to pursue postdoctoral training. At MSKCC, she developed high-resolution sequencing analysis pipeline to characterize the fungal compartment of intestinal microbial flora and identified that the fungal blood stream infection originated from the intestinal colonized fungi. In the summer of 2021, Bing Zhai started her laboratory at Shenzhen, China. Her lab will keep focusing on intestinal mycobiota and fungal pathogenesis.

Presentation

1.Symposium 15: Pathogenesis

Saturday, August 7, 2021
18.45–20.00 (UTC+8) Room C

S15.3 The dynamics and clinical implications of intestinal mycobiota in allogeneic hematopoietic cell transplantation

The intestinal microbiota is a complex community of bacteria, archaea, viruses, protists and fungi. Although the composition of bacterial constituents has been linked to immune homeostasis and infectious susceptibility, the role of non-bacterial constituents and cross-kingdom microbial interactions in these processes is poorly understood. We have integrated high-resolution amplicon-based sequencing, comparative genomics and culturomics to characterize the dynamics of intestinal mycobiota in allogeneic hematopoietic cell transplantation (allo-HCT). We identified a subset of allo-HCT patients with fungal dysbiosis characterized by culture positivity, stable expansion of *Candida parapsilosis* complex species, and distinct trans-kingdom microbiota profiles. These patients had worse overall survival and higher transplant-related mortality independent of candidemia. Specifically, we found that patients who developed *Candida* bloodstream infections experienced a prior marked intestinal expansion of pathogenic *Candida* species. Taken together, our data suggest that the microbiota-driven approaches could identify patients at risk of both non-infectious and infectious outcomes in allo-HCT.

Ping Zhan

Jiangxi Provincial People's Hospital, Nanchang University
China

Director of the Institute of Clinical Medicine and Vice-Director of the Dermatology Department of Jiangxi Provincial People's Hospital Affiliated to Nanchang University. She graduated from Peking Union Medical College with the major of Dermatology in 2015 and is now working for more than 15 years on the epidemiology, taxonomy and genomics of dermatophytes. Totally, she published more than 40 scientific papers with 13 as the first author and correspondences.

Presentation

1. Symposium 6: Diagnosis and management of superficial fungal infections

Saturday, August 7, 2021
12.00–13.15 (UTC+8) Room C

S6.1 New taxonomy of dermatophytes

A new taxonomy of dermatophytes has been strongly suggested since 2017 based on multlilocus gene analysis. As mycological fields have widely accepted the new dermatophyte taxonomy system established by Sybren dehoog et al, however, many dermatologists and new students still do not understand the great adjustments in the dermatophyte nomenclature. Here we would like to review the recent literatures on this topic, including the DNA molecular study and the MALDI-TOF research involving important dermatophytes complex and new species.

SPONSORED SYMPOSIA

All program timings are in UTC+8

FRIDAY, AUGUST 6	
Co-sponsored symposium: New antifungal agents in the pipeline Time: 19.00–20.00 (UTC+8) Location: Room A–C Moderator: Arunaloke Chakrabarti	*Co-sponsored by:* CIDARA THERAPEUTICS, F2G The Rare Fungal Disease Company
19.00–19.25	N1.1 Rezafungin: A novel, once-weekly echinocandin in phase 3 development for treatment and prevention of invasive fungal disease *Taylor Sandison, Chief Medical Officer, Cidara Therapeutics*
19.25–19.50	N1.2 Olorofim: First of a novel class of antifungals, the orotomides *Emma Harvey, Global Head of Medical Affairs, F2G Ltd*
19.50–20.00	N1.3 Live Q&A

Symposium overview

N1.1 Rezafungin: A novel, once-weekly echinocandin in phase 3 development for treatment and prevention of invasive fungal disease

Since the approval of caspofungin over 20 years ago, echinocandins have become established as safe and efficacious agents in the antifungal armamentarium. Yet, unmet needs remain as mortality remains high, and other medical advancements have fundamentally altered the clinical landscape. Treatment of underlying primary disease has rapidly moved toward biologics, immunomodulatory agents, and advanced chemotherapeutics – many of which carry increased risk of drug-drug interactions and, in some cases, further increase the risk of fungal infection. New antifungal drug development is sorely needed to address the increasing gap between evolving needs and existing approaches in the treatment and prevention of systemic fungal infection.

Rezafungin is a novel next-generation echinocandin in Phase 3 development by Cidara Therapeutics. Rezafungin was designed for its distinctive properties, which include a long half-life and front-loaded plasma drug exposure, allowing for once-weekly dosing and potential pharmacometric advantages. The rezafungin clinical program also reflects advancements in the development and evaluation of new antimicrobial agents, such as extensive PK/PD analyses and Phase 1 safety data that support the overall potential of rezafungin. Following the successful completion of STRIVE, the Phase 2 treatment trial in patients with candidemia and/or candidiasis, rezafungin is currently in two ongoing Phase 3 development. ReSTORE (NCT03667690) is the Phase 3 trial of rezafungin in the treatment of candidemia and invasive candidiasis. ReSPECT (NCT04368559) is the Phase 3 trial of rezafungin for the prevention of invasive fungal disease caused by *Candida* and *Aspergillus* spp. and *Pneumocystis jirovecii* in allogeneic blood and marrow transplant patients.

N1.2 Olorofim: First of a novel class of antifungals, the orotomides

A new class of antifungal drugs is under clinical development. Olorofim is the first of the orotomides, a new class of antifungals which target pyrimidine synthesis through inhibition of dihydro-orotate dehydrogenase (DHODH) an enzyme in the de novo pyrimidine synthesis pathway. Olorofim is a mould-active agent which has shown consistently low MICs in in vitro studies against a wide range of moulds, including *Aspergillus* spp., *Lomentospora prolificans*, *Scedosporium* spp. and the endemic moulds. Many agents for which olorofim has shown in vitro activity have no current standard of care. A Phase 2 open label study is currently recruiting and data from the first 100 patients is

Speakers

Emma Harvey

F2G Ltd
UK

Emma Harvey is Global Head of Medical Affairs at F2G Ltd, a UK and Austria based biotech. She has 20 years' experience in the pharmaceutical industry and 10 years' experience in antifungals. Her background is in internal medicine, undertaking her medical training at University College and the Middlesex School of Medicine, London. Prior to joining F2G Emma consulted on antifungals, worked in rare diseases at Alexion and for 6 years managed the lifecycle of AmBisome, overseeing Phase 3b/4 clinical trials, developing innovative prophylaxis and cryptococcal meningitis studies with global thought leaders, as well as establishing the CARE CME programme.

Taylor Sandison

Cidara Therapeutics
USA

Dr. Sandison is an infectious diseases physician and epidemiologist. He received his MD and MPH from the University of Washington, and a Diploma in Tropical Medicine and Hygiene from the London School of Hygiene and Tropical Medicine. Prior to joining industry, Dr. Sandison was on faculty at the UW Division of Infectious Diseases where he studied interactions between HIV and malaria in Uganda. He has worked at Novartis, Trius, Cubist, Merck, and has been at Cidara since 2015.

SATURDAY, AUGUST 7	
Sponsored symposium: Overcoming invasive mold disease in an era of complex epidemiology and patient needs Time: 13.30–14.30 (UTC+8) Location: Room A–C Moderator: Methee Chayakulkeeree	Sponsored by: Pfizer
13.30–13.35	N2.1 Opening remarks *Methee Chayakulkeeree*
13.35–13.55	N2.2 Think broad and take action swiftly: Challenges in managing IMD in an increasingly complex world *Methee Chayakulkeeree*
13.55–14.20	N2.3 IMD treatment strategy: The value of a patient-tailored, early treatment approach *Johan Maertens*
14.20–14.30	N2.4 Live Q&A

Symposium overview

Overcoming invasive mold disease in an era of complex epidemiology and patient needs

The landscape of invasive mold (IMD) disease is evolving. On the one hand, IMD has been increasingly associated with non-classical and novel risk factors such as the use of biologics, small molecule kinase inhibitors or cellular therapy; intensive care unit admission; chronic obstructive pulmonary disease; and viral infection. Invasive aspergillosis in non-classical, non-neutropenic patients have atypical manifestations and different diagnostic criteria compared to patients with classical risk factors. Therefore, awareness of IMD in these patient subgroups is essential for timely diagnosis and treatment.

On the other hand, advancement in medicine and technology have enabled us to further optimize the management of IMD in both neutropenic and non-neutropenic groups of patients. Mold-active azoles with good tolerability, low side-effect profile, excellent bioavailability and reduced drug-drug interactions have been valuable additions to the antifungal armamentarium.

Speakers

Methee Chayakulkeeree

Faculty of Medicine Siriraj Hospital, Mahidol University
Thailand

Methee Chayakulkeeree is Associate Professor in the Division of Infectious Diseases and Tropical Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University in Bangkok, Thailand.

Dr Chayakulkeeree is a diplomate of the Thai Board of Internal Medicine and the Subspecialty Board of Infectious Diseases, and a fellow of The Royal College of Physicians of Thailand. He received further research training at Duke University Medical Center in the USA for infectious diseases and molecular mycology, and received his PhD in Microbiology and Immunology from the University of Sydney, Australia.

Dr Chayakulkeeree is affiliated with various local and international medical societies, including the the American Society for Microbiology (ASM), the Transplant Infectious Disease (TID) section of The Transplant Society (TTS). He is also a Fellow of the European Confederation of Medical Mycology (FECMM) and the country ambassador of the Global Action Fund for Fungal Infections (GAFFI). He has published more than 60 papers in peer-reviewed scientific journals, and has written several book chapters on infectious diseases.

Johan Maertens

University Hospitals Leuven, Campus Gasthuisberg Leuven
Belgium

Johan Maertens is associate professor of Haematology at the University Hospitals Leuven, Campus Gasthuisberg Leuven, Belgium. He is a member of numerous professional societies, including the International Immunocompromised Host Society, the International Society of Human and Animal Mycology, the Multinational Association of Supportive Care in Cancer, the American Society of Hematology, the European Haematology Association, and a member of European Group for Blood and Marrow Transplantation (EBMT). He is a past-chair of the Infectious Diseases group of the European Organization for Research and Treatment of Cancer (EORTC) and a founding member and the current chair of the European Conference on Infections in Leukaemia (ECIL) group. He is a fellow of the European Confederation of Medical Mycology (ECMM).

His major professional interest is fungal and viral infections in patients with haematological disorders, development of new management approaches to invasive aspergillosis, non-invasive diagnosis of opportunistic respiratory infections, and non-myeloablative and haplo-identical allogeneic stem cell transplantation. Dr Maertens has published over 400 articles and book chapters on antifungal management and diagnosis in several prestigious journals. He is a co-editor of the book "*Diagnosis of Fungal Infections*." He served as a reviewer for many journals and is a member of numerous national and international advisory boards.

SUNDAY, AUGUST 8

Sponsored symposium: Invasive fungal infections (IFIs) in immunocompromised host

Time: 14.45–15.45 (UTC+8)

Location: Room A–C

Moderator: Yee-Chun Chen

Sponsored by: GILEAD Creating Possible

14.45–15.05	N3.1 Do we need unified standard of care of IFI in hematology (malignancies & HSCT) in Asia? *Yok Lam Kwong*
15.05–15.25	N3.2 Common mycoses in Asia: Challenges & opportunities *Atul Patel*
15.25–15.45	N3.3 Q&A

Symposium overview

Objective: Educate HCPs on recent updates on management of IFI in immunocompromised hosts viz. hematological malignancies, HSCT and HIV to improve patient outcomes

Background: AmBisome is marketed in 7 Asian markets (Thailand, India, Korea, Singapore, HK, Malaysia and Taiwan).

In Asia, host factors like prolonged steroid use and chemotherapy induced neutropenia, and underlying conditions like DM, AML and Rheumatoid arthritis are the commonest cause of IFIs (Rotjanapan et al., 2018). There are equivocal reports on whether aspergillosis or candidiasis is more common in hematological disorders so the choice of anti-fungal in prophylaxis and empirical is unclear (Hsu LY et. Al., 2015 & Chayakulkeeree, 2017).

1. How to decide the "treatment period" of prophylaxis and how to evaluate the "breakthrough" after prophylaxis then switching to empirical AmBisome? For hematology patients, there may be more than one cycle of chemotherapy, which may also influence their white count level.
2. When to start anti-fungal combination therapy?
3. The consensus on the definition of renal dysfunction for using AmBisome between hematologists and ID specialists
4. The consensus on the diagnosis and laboratory tests for invasive fungal infections
5. How to evaluate the "stop timing" of anti-fungal treatment for CNS infection and mucormycosis?

We will need to reinforce AmBisome position in these conditions.

Speakers

Yok Lam Kwong

Department of Medicine, University of Hong Kong
HKSAR

Professor Kwong Yok-Lam is the Chief of the Division of Haematology, Oncology and Bone Marrow Transplantation at the Department of Medicine, University of Hong Kong.

He is specialized in haematology and haematopathology. His clinical work focuses on the management of haematological malignancies. His team has especial interests in the treatment of leukaemias and T-cell and natural killer cell malignancies. His research centres on the molecular pathogenetic pathways and novel treatment modalities in haematological neoplasms.

Together with the clinical pharmacology team in his department, Professor Kwong has pioneered the development and use of oral arsenic trioxide in the treatment of acute promyelocytic leukaemia and other blood cancers. His research team is also actively involved in defining the molecular defects and optimal treatment protocols for T-cell and natural killer cell lymphomas, which are neoplasms prevalent in Asian populations..

Atul Patel

Infectious Diseases Clinic, Vedanta Institute of Medical Sciences
India

Atul Patel is Chief Consultant and Director of the Infectious Diseases Clinic of the Vedanta Institute of Medical Sciences and at the Department of Infectious Diseases of Sterling Hospital in Ahmedabad, India. He is also a Visiting Associate Professor at the Division of Infectious Diseases at the University of South Florida, Tampa, USA. He has been conferred a fellow of the Infectious Diseases Society of America (FIDSA) since 2014.

Dr Patel's major interest and expertise is in the management of HIV-positive patients, particularly the use of antiretroviral therapy and treatment of opportunistic infections apart from invasive fungal infections. He has been presenting his work at Indian and international meetings since 1996, and has published extensively in peer-reviewed journals, including the *Journal of Acquired Immune Deficiency Syndromes, Clinical Infectious Diseases, Clinical Microbiology and Infection, The Lancet Infectious Diseases, Journal of Antimicrobial Chemotherapy, Journal of Critical Care, International Journal of Infectious Diseases, Emerging Infectious Diseases, Intensive Care Medicine, Mycoses, Muscle & Nerve, Medical Mycology,* the *Journal of Postgraduate Medicine,* the *Journal of the Association of Physicians of India,* the *Journal of Global Infectious Diseases* and the *Journal of the International Association of Physicians in AIDS Care.*

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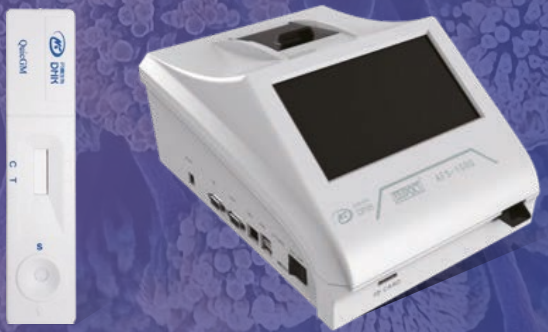

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Antifungal agents, including pharmacokinetics and pharmacodynamics

ABST#27

In-silico and in-vitro evaluation of anticandidal activity of cinnamaldehyde

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Objective: Candida albicans is a common commensal which resides in human body and causes invasive fungal infections especially in immunocompromised hosts. This study aims to evaluate the anticandidal activity of cinnamaldehyde through in-silico approach and in-vitro methods.
Methodology: Interactions between cinnamaldehyde and potential drug targets of C. albicans was elucidated using in-silico approach which was further validated by determination of minimum inhibitory concentration (MIC) and the minimum fungicidal concentration (MFC) of cinnamaldehyde using broth microdilution method recommended by CLSI 2009 for yeast (M27-A2). The effect of cinnamaldehyde on micromorphology of C. albicans was studied. Time-kill curve was conducted using cell viability testing. In-silico drug likeness properties were evaluated using molinspiration software and preADMET webserver.
Results: In-silico studies revealed that cinnamaldehyde showed good binding affinity with potential targets of C. albicans such as ergosterol, N-myristoyl transferase and Secreted aspartic proteinase 5. MIC and MFC of cinnamaldehyde were found to be 8.2 microgram/ml and 16.4 microgram/ml respectively. In the morphological interference assays, it was observed that the cinnamaldehyde inhibited pseudohyphae, blastospores and chlamydospores formation. The time-kill curve of cinnamaldehyde showed that it required only few hours of exposure to effectively kill greater than 90 % of the inoculum. Cinnamaldehyde showed favored range of drug likeness properties.
Conclusion: Cinnamaldehyde showed good in-vitro antifungal potential against C. albicans. However, evaluation of pharmacodynamics and pharmacokinetics studies is desirous for complete elucidation of its action as a therapeutic which will be helpful for mankind.

ABST#47

Extracts from Globba schomburgkii Hook.F. possess the antifungal activity against Aspergillus flavus

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Objectives: This study aims to investigate the antifungal activity of crude extracts from rhizomes, stalks, leaves, and flowers of Globba schomburgkii Hook.F. against Aspergillus flavus.

Methods: The sequential solvent extraction method was performed to obtain crude extracts from different parts of G. schomburgkii: hexane extracts of rhizomes (1-RH), stalks (2-SH), leaves (3-LH), and flowers (4-FH); dichloromethane extracts of rhizomes (5-RD), stalks (6-SD), leaves (7-LD), and flowers (8-FD); and methanol extracts of rhizomes (9-RM), stalks (10-SM), leaves (11-LM), and flowers (12-FM). The antifungal activity of these extracts against A. flavus ATCC204304 was performed using broth microdilution assays (CLSI M38, 2017). Briefly, a serial dilution of these extracts (range from 1-100 g/mL) was co-incubated with A. flavus ATCC204304 conidia (1x103 conidia) in 96-well plates at 37oC for 48 hours compared to amphotericin B (0.25 µg/mL), a fungicidal antifungal agent. Then, XTT assays were performed to observe fungal viability using OD at 490 nm. One-way ANOVA was calculated to observe a significant difference (p-value < 0.05).

Results: We observed that the extracts from 1-RH, 2-SH, 3-LH, 4-FH, 5-RD, and 6-SD demonstrated antifungal activity against A. flavus comparable to amphotericin B at concentrations more than > 25 µg/mL while the extracts from the rest did not show the antifungal activity. The extracts from 1-RH, 2-SH, 5-RD, 6-SD had a significant lowest concentration that inhibited the growth of A. flavus at 25 µg/mL. For 4-FH, at 3 µg/mL inhibited the growth of A. flavus significantly while 3-LH needed 100 µg/mL to inhibit A. flavus significantly.

Conclusion: In conclusion, the crude extracts from some parts possessed an antifungal activity against A. flavus. However, the concentrations of MIC of these crude extracts were high. Furthermore, the active compounds of these crude extracts need to be further investigated for the antifungal activity. The cytotoxic property of these crude extracts to humans and the antifungal activity against other fungi are under investigation including the combinative effect of these extracts with antifungal agents to decipher the application of these extracts in the future.

ABST#48

Trehalase inhibitor, validamycin A, inhibits the growth and possesses a combinative effect with amphotericin B against Aspergillus flavus

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Objectives: This study aims to investigate the effect of validamycin A, a trehalase inhibitor, on the growth of Aspergillus flavus and the combinative effect of validamycin A and amphotericin B.
Methods: Aspergillus flavus ATCC204304 was utilized initially to study the growth of Aspergillus flavus on different media, i.e., glucose peptone agar and trehalose peptone agar, to compare the radial growth. To study the effect of validamycin A on the trehalose level, the growth, and the germination rate of A. flavus, glucose oxidase assays, XTT (sodium 2,3, -bis (2-methoxy-4-nitro-5-sulfophenyl) -5- [(phenylamino) -carbonyl] -2H-tetrazolium) assays, and germination assays were performed. For MICs of validamycin A, broth microdilution assays were performed according

to CLSI M-38, 2017. For the combinative effect of validamycin A and amphotericin B, the checkerboard assays were performed, and the fractional inhibitory concentration index (FICI) was calculated. In addition, LDH assays were performed to observe the cytotoxicity of validamycin A to human bronchial epithelial cell lines, BEAS-2B. All data were performed in biological triplicates and analyzed using GraphPad Prism software version 8. Unpaired Student's t-test was used for determining the significant difference. P-value < 0.05 showed that the difference was statistically significant.
Results: Aspergillus flavus ATCC204304 was able to grow on trehalose peptone media similar to glucose peptone media. The MIC of validamycin A was at 1ug/mL using broth microdilution assays. Furthermore, 1ug/mL validamycin A inhibited the growth of A. flavus significantly compared to the control using XTT assays. In addition, spores grown on media with 1ug/mL validamycin A demonstrated significantly higher trehalose levels than the control media. To find the mechanism behind the inhibition of A. flavus growth, we performed the germination assay and found that the spores in media with 1ug/mL validamycin A germinated slower significantly at 10 and 12 hours compared to the control. To further investigate the combinative effect of validamycin A with amphotericin B, the checkerboard assay was performed and showed that validamycin A and amphotericin B had an additive effect with the FICI at 0.625. The cytotoxicity of validamycin A to human bronchial epithelial cell lines was not observed in this study.
Conclusion: Validamycin A, a trehalase inhibitor, was able to inhibit the growth of Aspergillus flavus. One of the mechanisms behind the effect of validamycin A was to delay the germination of A. flavus spores. In addition, validamycin A also possessed the additive effect with amphotericin B, which is a fungicidal antifungal agent. Furthermore, validamycin A had no cytotoxicity to human bronchial epithelial cells. The effect of validamycin A on A. flavus clinical isolates are in progress to decipher the effect and the application of validamycin A in the future.

ABST#52

Antifungal properties of antifungal proteins from Rhinacantus nasutus to a dimorphic fungus Talaromyces marneffei

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Antifungal proteins or peptides (AFPs) are the natural products produced by several life forms. They act as the first-line defense to infections to inhibit a wide spectrum of fungi without significant toxicity to the human host. The AFPs derived from medicinal plants can be used as new therapeutic agents in the world with growing resistance to conventional antifungals.

Objectives: To determine the antifungal activities and study of the mode of action of antifungal proteins/peptides (AFPs) from Rhinacantus nasutus against Talaromyces marneffei, an important opportunistic pathogen in Thailand.

Methods: The precipitated proteins from R. nasutus were initial screened for the antifungal activity to T. marneffei. Proteolytic digestion and determination of phenolic compound content in the precipitated protein were performed to confirm the antifungal activity. The precipitated protein was partially purified by size fractionation using centrifugal membrane column into 3 fractions with molecular weight ≥30 kDa (RN_A), 10-30 (RN_B), and ≤ 10 (RN_C). A colorimetric broth microdilution method was used to determine the minimal inhibitory concentration (MIC) and minimal fungicidal concentration (MFC) of anti-T. marneffei activities. The molecular mechanism underlying the antifungal activity was investigated in the antifungal assay using T. marneffei mutant strains that are related to G protein signaling (ΔgasA, ΔgasB, and ΔgasC) and cell wall integrity (ΔdrkA and ΔslnA) pathway as the tested strains. The RN_B and RN_C protein fractions were sequentially purified by cation exchange, reverse phase (RP), and anion exchange chromatography protein purification. The purified proteins were characterized their mode of action on T. marneffei including MIC, MFC, membrane permeabilization action, molecular mechanism through G-protein. Additionally, effect on human red blood cell and fibroblast cell line were determined to prove the safe applicability of AFPs.

Results: The precipitated protein displayed strong anti-T. marneffei activity with MIC and MFC values of 2 and 4 µg/ml, respectively. The antifungal activity was diminished after proteinase K and pepsin digestion indicating that the antifungal activity was assigned from the protein portion. All sized fractionated AFPs fractions (RN_A, RN_B, and RN_C) had inhibitory effect to T. marneffei with the MIC and MFC value range of 2 to 128 µg/ml and 16->128 µg/ml, respectively. Molecular mechanism of anti-T.marneffei activity in RN_B fraction was associated to the G-protein signaling via GasA and GasC alpha subunit. After sequential purification, the AFPs were found in the fraction containing proteins with negative charged and hydrophobic property. The F2/3_BQ purified protein from the RN_B fraction displayed anti-T. marneffei activity through the G-protein signaling. Additionally, the F5/2_BQ which was isolated from RN_C also showed the anti-T. marneffei activity with unidentified molecular mechanism. Interestingly, the F5/2_BQ contained no hemolysis effect on human red blood cell; it therefore can be used for further antifungals development.

Conclusion: R. nasutus was considered as a potent source of natural bioactive compounds. The isolated AFPs, especially those of F2/3_BQ and F5/2_BQ, demonstrated the potential for future study to develop a natural antifungal agents.

Keywords: Antifungal activity, Antifungal proteins/peptide, Talaromyces marneffei, Rhinacanthus nasutus

ABST#111

Susceptibility profiles of azole and non-azole antifungals against Talaromyces marneffei in Malaysia

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Introduction
Talaromyces marneffei is an etiologic agent that causes talaromycosis. The disease can cause infectious complication and death in immunocompromised patients, particularly AIDS patients. This disease is endemic in Southeast Asia including Malaysia. However, the report of the susceptibility profile of T. marneffei is very limited.
Objective
The objective of this study is to determine the minimum inhibitory concentration (MIC) of several antifungals against T. marneffei in Malaysia.

Methods
In 2020, 19 clinical strains of T. marneffei were received from various Malaysian hospitals. The identification was carried out using microscopic, macroscopic and molecular methods. Following that, the susceptibility of each strain to thirteen antifungals was performed using CLSI M27 -A3 method. The non-azole antifungals were anidulafungin, micafungin sodium, caspofungin diacetate, 5-fluorocytosine, amphotericin B and terbinafine HCl; whereas azole-antifungals were posaconazole, voriconazole, itraconazole, ketoconazole, ravuconazole, clotrimazole and isavuconazole.
Results
The MIC50/MIC90 of anidulafungin, micafungin sodium, caspofungin diacetate, 5-fluorocytosine, amphotericin B and terbinafine HCl were >16/>16 µg/ml, >16/>16 µg/ml, 4/16 µg/ml, 0.25/0.50 µg/ml, 0.50/1.00µg/ml and 0.125/0.25 µg/ml respectively. However, the MIC50/MIC90 of posaconazole, voriconazole, itraconazole, ketoconazole, ravuconazole, clotrimazole and isavuconazole were same, i.e <0.0313/ 0.0313µg/ml. Interestingly, one of the strains was found unable to be inhibited by any antifungals. However, most of the isolates can be inhibited by azoles antifungals compared with echinocandins. This is due to the MICs of all echinocandins were very high, while the MICs azole antifungals were comparatively low.

Conclusion
Our data suggests active activities of non-azole amphotericin B, terbinafine HCl, and azole groups of posaconazole, voriconazole, itraconazole, ketoconazole, ravuconazole, clotrimazole and isavuconazole in management of talaromycosis. However. larger sample size is required in the future study to verify the accuracy of these results.

ABST#150
A case of hypertension caused by triazole antifungal agent
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Objectives： Voriconazole is a triazole antifungal agent with a broad spectrum of antifungal activity. The most common side effects of voriconazole include dizziness, headache, diarrhea, and fatigue. Patients very rarely can develop thrombocytopenia and hepatic damage. Although other anti-infective drugs with activity against bacteria such as levofloxacin and piperacillin tazobactam have been associated with drug induced hypotension, the incidence rate of azole is very low.
Methods: we analysis the medical records of a young female with serological evidence of past candida tropicalis and candida krusei infection who developed severe hypertension after she had repeated received azole antifungal drug for few days.
Results: A 23-year-old female presented with a 20-day history of urinary tract infections (UTIs) including left flank pain, vomiting, malaise, dysuria, urinary frequency, urgency, cloudy urine and malodorous urine.The patient received voriconazole 200mg q12h and vancomycin 500mg q8h after admission without nausea, vomiting, diarrhea, rash and other performance. Although without history of hypertension, a significant increase in blood pressure (141/85 mmHg) was still observed in the next day. The patient then had blurred vision and further increased blood pressure (165 / 95 mmHg) after discontinuation of vancomycin. Furthermore, on the 8th day after voriconazole infusion, transient unconsciousness and syncope were found with blood pressure of 175 / 95 mmHg. The unconsciousness of the patient is regarded to be caused by neurovascular due to the sudden rise of blood pressure, after excluding craniocerebral, cardiogenic and hypovolemic. Then the patient's blood pressure returned to normal after stopping taking the drug. 4 months later, the patient still had unexplained blood pressure rise after using fluconazole, which was a triazole antifungal drug too. Furthermore, the blood pressure accordingly decreased to normal with the withdrawal of the drug.
Conclusion: In conclusion, it is the first time that the acute increased hypertension has been detected in a patient with the normal dosage of fluconazole and voriconazole. In this paper, the symptoms such as hypertension and blurred vision were observed during the three hospitalizations, but the mechanism of the medicine still need to be verified by further examination.

ABST#151
Functional nanocarriers for delivering therapeutic agents against intracellular infectious
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Introduction: Infectious diseases caused by intracellular microorganisms represent a significant challenge worldwide due to drug-resistant pathogens, the low specificity of available treatments and drug interaction during coinfections. Therefore, proper treatments are needed to cope with unspecific therapies. Drug encapsulation into functionalized nanoparticles (NPs) is a valuable alternative to improving drug solubility, preventing undesirable interactions and drug degradation, and reaching the specific therapeutic target with lower doses. Objective: To develop a a specific therapeutic alternative based on the rational use of itraconazole, a widely used antifungal drug encapsulated into functionalized NPs for their targeted and controlled release into macrophages to fight intracellular infections. Methods and results: ITZ was encapsulated into two types of NPs, i.e., poly(lactic-co-glycolic acid) copolymer (PLGA) with different molecular weights (24-38 and 4-15 kDa) and 50:50 and 75:25 lactic acid: glycolic acid ratios, respectively, self-assembled by the high-energy nanoemulsion method and characterized by several physicochemical techniques. We studied how the polymer: drug ratio, changes in the aqueous phase pH, and type and concentration of surfactant and other polymers affected the formation of NPs, drug loading capacity (DLC) and encapsulation efficiency (EE). The results showed that the DLC and EE with both polymers were up to 6.7 and 80 %, respectively, by lowering the pH to 5.0 and using a mix of surfactants. Transmission Electron Microscopy (TEM) images showed spherical nanoparticles, Fourier Transformed Infrared (FT-IR) and Differential Scanning Calorimetry (DSC) analysis demonstrated the ITZ-PLGA interaction in the NPs, and therefore, the encapsulation of ITZ. NPs showed a burst

release of ITZ initially, followed by a prolonged release phase, which fits well with the Fickian diffusion model, and thermo-stability at 4°C in water and cryopreserved conditions. In vitro assays showed the ITZ encapsulated into the NPs eliminated the Histoplasma capsulatum with a half-minimal inhibitory concentration (IC50) similar to free ITZ (0.031 µg/ml), being effective to eliminate the fungus in co-culture with human and mice macrophages, without any cytotoxic effect on both macrophage types. NPs were successfully PEGylated to improve their stealth properties without affecting the CC and EE. Functionalization was achieved by the adsorption and covalent coupling methods, being the carbodiimide approach more efficient, stable and reproducible, but the protein corona masking was similar in both methods. Conclusion: It was successfully encapsulated ITZ into core-shell-like NPs based on two types of PLGA, reaching stable and moderately polydisperse nanocarriers with adequate size and optimal DLC. Encapsulated ITZ efficiently eliminated H. capsulatum, with a similar IC50 with respect to free ITZ. Finally, we demonstrated for the first time that NPs functionalized with F4/80 improve macrophage-targeted therapy with similar efficiency to NP-coupled mannose, opening up new ways to design highly efficient nanocarriers for drug delivery against intracellular infections.

ABST#185

In vitro activity of DIA-T51 a new humanized monoclonal antibody against β 1,3-glucan of pathogenic fungi

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Objectives: DIA-T51 is the new humanized monoclonal antibody, derived from murine monoclonal antibody 2G8, able to bind the β-1,3-glucans of pathogenic fungi.
In this study we investigated the in vitro activity of DIA-T51 to inhibit the growth and the adherence of C. auris to mammalian cells. Moreover, we tested its activity against C. auris in co-administration with echinocandins and amphotericin B.
Methods: The binding of DIA-T51 to β-1,3-glucans was analyzed both in ELISA with laminarin and through immunofluorescence and flow cytometry on C. auris cells.
The growth inhibition assay on C. auris revealed its potential in infection treatment and through an adhesion inhibition assay of C. auris on HeLa cells it showed also its efficiency in prevention. MIC and time-kill curve assays against C. auris were performed to evaluate the activity of DIA-T51 in combination with echinocandins and amphotericin B.
Results: ELISA test and ROC curves showed that DIA-T51 is able to bind the antigen with an IC50 value of 0.06 µg/ml and an AUC of 0.85. Immunofluorescence and flow cytometry confirmed the binding also on C. auris with more than 97% of positive cells. DIA-T51 was able to reduce the 51.5 % of the fungal adhesion and to inhibit their growth in a dose dependent manner. The results obtained from MIC and time-kill assays against C. auris showed that the combinations with DIA-T51 enhanced and boosted the activity of caspofungin (IC50 24 h 0.046 µg/ml) and especially of amphotericin B (IC50 0.039 µg/ml). A fungicidal effect was evident in presence of inefficient doses of amphotericin B with more than 3 Logs reduction already at 6h.
Conclusions: In conclusion, DIA-T51 could be a new drug candidate in the treatment of fungal infections. These data, with the previous results in murine animal models, suggest that DIA-T51 could move to the clinic especially in combination with already available antifungal drugs. Studies on other pathogenic fungi are ongoing

Antifungal susceptibility and resistance

ABST#25

Anti-fungal effect of Pakistani Honey against Candida isolates isolated from Cancer patients and its comparison on the susceptibility profile with commonly used anti-fungal drugs

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Introduction: Opportunistic fungal infections caused by Candida species are an increasing threat for immune-compromised people especially in cancer and HIV patients worldwide. Resistance of Candida infections to antifungal drugs is increasing alarmingly. The need to find out alternative antifungal therapies which show no resistance to antifungals is warranted. Honey from the Bee (Apis melifera) has been used for centuries for medicinal benefits. It has shown to have anti-bacterial properties but insufficient data is available on its antifungal properties. Moreover, it is essential to perform susceptibility testing to understand the use of honey as an antifungal agent in therapy.
Objectives:
1. To assess in-vitro antifungal ability of honey collected from different botanical sources of Pakistan against common fungal pathogens isolated from cancer patients.
2. To find out the susceptibility and resistance profile of Candida spp isolates against honey and commonly used antifungal drugs.
Material and methods: Ten honey samples produced by bees fed on different floral sources (Ber, Citrus, Brassica, Acacia, Sunflower, Maple & Manuka) were analyzed for their antifungal ability using agar dilution method on 110 fungal isolates [Candida albicans (73) and non-albicans (22)] obtained from cancer patients. These results were confirmed by Broth micro-dilution method (CLSI M27-A3) at physiological and room temperatures. Honey samples were chemically analyzed and various pollen species were identified. Thirty isolates were randomly selected from the total 110 isolates and tested against Honey 40% and commonly used antifungals, Fluconazol(8 and 64µg/ml), Itraconazol(0.5µg/ml) and Amphotericin B(0.5µg/ml /ml)
Results: The minimum inhibitory concentration for honey ranged between 40 and 45% for all fungal strains. Honey samples obtained from different Pakistani floral sources had comparable results with medical grade Manuka honey. Citrus honey (lemon and orange) appeared to have better results with lower MIC values (<15%).
Eighteen out of 30 isolates were susceptible to Fluconazole (MIC≤ 8µg/ml), 11 were intermediate or Dose dependent (MIC≥32 µg/ml) and one strain was resistant (MIC ≥64µg/ml). Twenty isolates were susceptible to Amphotericin B (MIC≤0.5µg/ml) and 22 were susceptible to Itraconazole (MIC≤0.5µg/ml) while 10 isolates were resistant to Amphotericin B MIC≥0.5µg/ml) and 8 were resistant to Itraconazole (MIC≥0.5µg/ml). Trend of efficacy was Fluconazole >Itraconazole>Amphotericin B and trend of resistance was Amphotericin B>Itraconazol>Fluconazole. The rate of resistance for Fluconazole was 3%; Itraconazole 26% and Amphotericin B was 35%. No isolates showed resistance against honey (40%).
Conclusion: The results of this study show anti-candidal activity of honey and multiple factors are important in antifungal effect of honey including pH and floral origin etc. Future studies need to identify and extract active agents of honey responsible for antifungal activity to see its clinical application.

Key words: Anti-fungal activity, honey, Candida albicans and non-albicans

ABST#26

Triazole, Echinocandin and Amphotericin B antifungal susceptibility profiles for clinical isolates of Candida spp. from Songklanagarind hospital

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Objectives: Candida infections caused by Candida albicans and non-albicans Candida are of increasing importance and associated with significant mortality. We performed a prospective observational study to identify the species and antifungal susceptibilities of invasive isolates of Candida species over a two-year period at a university hospital in southern Thailand.
Methods: Identification of Candida species was performed by biochemical test, MALDI-TOF and sequencing. Susceptibility testing was performed using a commercial broth dilution panel (Sensititre YeastOne YST-010) with susceptibility interpretation using breakpoints from the Clinical Laboratory Standards Institute. One hundred and five Candida isolates were included in the study.
Results: The most common species were C. tropicalis (38.1%), C. albicans (25.7%), C. glabrata (12.4%) and C. parapsilosis (11.4%). All isolates were susceptible to amphotericin B. Fluconazole susceptibility was 100% susceptible for C. albicans, C. parapsilosis C. orthopsilosis and C. metapsilosis. Fluconazole susceptibility was lower for C. tropicalis (S = 85%, R = 15%) and C. glabrata (S= 38.5%, S-DD = 61.5%). Echinocandins demonstrated high rates of in vitro susceptibility (S= 100%) against C. albicans and C. tropicalis but lower for C. glabrata and C. parapsilosis.
Conclusion: As Candida species have become more resistant to azoles and less susceptible to echinocandin development shown in MICs, the need arose to observe the emergence of resistance to both antifungal classes in Candida clinical isolates, for a more effective infection control in the hospital.

ABST#30

Caspofungin therapy in Candida haemulonii/auris Candidemia amongst immunocompromised neonates

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Introduction:
Invasive candidiasis in extremely premature infants is the second most common cause of infectious disease-related death. The incidence of hematogenous infections due to Candida specially non-albicans species among immunocompromised neonates has increased significantly in recent decade. Candidemia frequently complicates the clinical course of hospitalized preterm immunocompromised neonates, especially those who have some underlying disease or congenital malformation. The emerging fungal pathogens comprising the Candida haemulonii complex are notable for their antifungal resistance with higher mortality and morbidity. Caspofungin is effective, safe and well-tolerated as an alternative therapy for persistent and progressive candidiasis in those neonates who are resistant, unresponsive to or intolerant of conventional antifungals.

Material and methods:
We here report our experience of caspofungin therapy in four cases of neonatal fungemia caused by C haemulonii. All these neonates were pre term, low birth weight with multiple invasive devices and had history of bacterial sepsis for which were on broad spectrum antibiotics. All the isolates were recovered in BACTEC Peds plus/F culture vials. Species identification was done in VITEK 2 yeast ID system. Confirmation of the species was done by PCR based molecular methods and MALDI-ToF mass spectrometry-based assay. All of these isolates of C.haemulonii were resistant to amphotericin B and azoles but sensitive to caspofungin. Caspofungin therapy started with serial blood culture. Caspofungin therapy was continued two weeks after last negative culture.
Result:
In all the 4 cases clinical and microbiological cure were possible. The dosage of caspofungin was 2 mg/kg/day, and the mean treatment duration was 14 days and the mean duration of antifungal therapy was 21 days. 2 out of the 4 patients had multifocal multidrug resistant (MDR) colonization and had history of azole exposure.
2 of the patients had adverse events are fever and rash. Increase of hepatic transaminases and hypokalemia was found in 1 patient.

Goals/ Conclusion:
The resistance of C. haemulonii represents a therapeutic challenge in the treatment of invasive candidiasis in immunocompromised neonatal patients. Caspofungin therapy is well tolerated , safe and effective in these resistant fungal infections. Caspofungin is FDA-approved for adults and children >3 months of age. These promising results suggest a potential role for caspofungin as an additional first-line treatment of systemic resistant candidiasis in immunocompromised neonates. This drug should be further investigated in this special patient population group.

ABST#33

A retrospective review of candida species distribution and antifungal susceptibility pattern in the University of Santo Tomas Hospital, Philippines from 2011 to 2018

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Background: Systemic candida infections occur less frequently than superficial infections, but were known to be associated with higher rates of morbidity and mortality. As to date, limited studies are available regarding the distribution and antifungal susceptibility pattern of Candida spp. in the Philippines.

Objective: To examine the Candida species distribution and antifungal susceptibility pattern among patients who underwent fungal culture and susceptibility testing at the University of Santo Tomas Hospital, Philippines from January 2011 up to December 2018.

Methodology: The study employed a descriptive, cross-sectional design. The researcher utilized both primary and secondary data sources. Primary data collection involved a retrospective review of fungal culture and susceptibility reports that yielded a positive Candida spp. isolate from any clinical specimen submitted from 2016 to 2018. Secondary data from Dr. Lenon's (2016) study included Candida spp. culture and susceptibility results from 2011 to 2015. Stata MP version 14 software was used for data analysis.

Results: A total of 1444 Candida spp. were recorded from 2011 to 2018. The isolates mostly came from the respiratory tract (RT) followed by the genitourinary tract (GUT). C. albicans (53%) comprise the majority of the isolates for the 8-year study period. Nonetheless, an increasing trend in non - albicans Candida species (NAC) has been observed over the years, particularly C. tropicalis. Majority of NAC were isolated from the GUT. C. albicans remains to be the predominant isolate across all specimen types except for blood. In the blood, C. parapsilosis (36%) and C. tropicalis (26%) were the most common species. Antifungal resistance patterns varies by Candida spp. but all isolates tested for echinocandins showed a susceptible pattern.

Conclusion: Although C. albicans remain to be the most common isolate among all Candida spp., an increasing trend in NAC such as C. tropicalis has been observed over the years. It became the second most common isolate since 2014. Among all antifungal drugs, higher resistance to fluconazole has been observed in most isolates. Meanwhile, all Candida spp. showed susceptibility to echinocandins; thus, the study supports the current guidelines on the use of this antifungal for invasive candidiasis. Most Candida isolates were from the elderly and patients admitted in the non-critical ward. There is no sexual predilection of the infection. No significant difference in the characteristics of patients who showed antifungal resistance was observed, regardless of the submitted specimen type. Further surveillance of antifungal-resistant Candida spp. is warranted to ensure appropriate treatment is given to patients with invasive candidiasis.

ABST#58

Susceptibility Of C. glabrata Clinical Isolates To A Novel Nanoherbal Formulation

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Introduction
The occurrence of highly morbid and potentially fatal fungal infections has increased at an alarming rate in the last several decades. Much of this occurs due to the rise in antimicrobial resistance, on top of the more prevalent usage of indwelling medical devices as well as medical procedures which induces immunosuppression in patients. As of the past two decades, there has been a steady rise in the isolation of non-Candida albicans Candida (NCAC) species from clinical settings. Out of all the NCAC species, the most frequently isolated species is Candida glabrata, making it the second most common Candida species to cause infection after C. albicans. Much of researchers' attention has deviated towards utilizing natural compounds for the synthesis of new antifungal agents to combat these prevailing infections.
Objectives
To evaluate the antifungal potential of a novel nanoherbal formulation derived from a combination of curcumin, Tualang honey and piperine against clinical isolates of C. glabrata.
Methods
Physicochemical properties of the formulation (size, PDI and zetapotential) ws evaluated using a zetasizer. Antifungal susceptibility assay for planktonic cells of C. glabrata clinical isolates was done following the CLSI guideline. Briefly, C. glabrata cells were adjusted to a density of 10^3 cells/mL per well and treated with a range of concentrations of the novel nanoherbal formulation for 24- and 48-hours at 37˚C. The plates are then measured at 530 nm to determine post-treatment cell density. Antifungal susceptibility assay for biofilms was done with biofilms grown at 24, 48 and 72 hours. The plates were treated for 48 hours at 37˚C against a range of nanoherbal formulation concentrations. Results were measured via XTT assay read at 490nm on a microplate reader.
Results
The size of the nanoemulsion was 15.53 nm with a PDI of 0.109. Its zetapotential was -16.0. In general, for the planktonic cells, the C. glabrata MIC90 values against the nanoherbal formulation were higher than C. albicans ATCC 90028 and C. glabrata ATCC 2001. The MIC90 values for planktonic cells treated for 24h and 48h were comparable especially with C. glabrata clinical isolates. MIC90 of C. glabrata biofilms against the nanoherbal emulsion were compared to those of C. albicans ATCC 90028. All C. glabrata biofilms exhibited higher MIC90 than C. albicans with biofilms grown for 24h exhibiting the highest MIC90 values for all the strains tested.
Conclusion
In essence, the nanoemulsion has an acceptable size, PDI and zetapotential value. C. glabrata clinical isolates exhibited higher MIC90 values for both planktonic cells and biofilms as compared to C. albicans ATCC 90028 and C. glabrata ATCC 2001 strains. While further works are still required to fully characterize the formulation, we remain positive it has the potential to become a good antifungal agent.

ABST#60

Activity of rezafungin against clinical Candida and Aspergillus spp. isolates collected in Asia-Pacific (AP) countries (2014-2018)

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Objectives
Rezafungin (RZF) is a novel echinocandin with an extended half-life and high, front-loaded drug exposure that allow for once-weekly dosing. RZF is undergoing clinical development for treatment of invasive candidiasis and candidemia as well as for the prevention of invasive fungal disease caused by Candida and Aspergillus spp. and Pneumocystis jirovecii in allogeneic bone marrow transplant patients. Here we analyzed the activity of RZF against Candida and Aspergillus spp. isolates collected in countries of the Asia-Pacific region between 2014 and 2018.
Methods
The in vitro activity of RZF was evaluated as part of the JMI Laboratories international SENTRY Antimicrobial Surveillance Program. CLSI broth microdilution MIC/MEC values were generated for RZF and comparators anidulafungin (ANF), caspofungin (CSF), micafungin (MCF), fluconazole (FLU; yeasts only), itraconazole (ITR, moulds only), posaconazole (POS), voriconazole (VOR), and amphotericin B (AMB). A total of 3,419 isolates of Candida spp. (C. albicans, C. glabrata, C. tropicalis, C. parapsilosis, C. krusei, and C. dubliniensis) and Aspergillus spp. (A. fumigatus and A. flavus) were collected globally during the 2014-2018 surveillance studies, 432 of which were from AP countries (Australia, Korea, New Zealand, Philippines, Singapore, and Thailand).
Results
RZF had potent activity against AP Candida spp. with MIC50 values of 0.015-0.03 µg/mL and MIC90 values of 0.03-0.12 µg/mL for non-C. parapsilosis spp. MIC50 and MIC90 values for C. parapsilosis were 1 and 2 µg/mL, respectively. RZF (MIC50/90, 0.03/0.06-0.12 µg/mL) and other echinocandins (MIC50/90, 0.015-0.06/0.03-0.12 µg/mL) were active against species with elevated fluconazole MIC values, such as C. glabrata and C. krusei. RZF had more potent activity against AP A. fumigatus and A. flavus isolates with MEC50/90 values all ≤0.015 µg/mL. These MIC and MEC values were similar to those derived for the comparator echinocandins. Compared with MIC50/90 values for isolates from all other geographic regions, RZF values were largely equivalent with a slight trend towards 2-fold greater potency against AP isolates.
Conclusion
RZF demonstrated potent antifungal activity against contemporary AP isolates of Candida and Aspergillus spp, in line with the three existing echinocandins. The activity of RZF was consistent with or trending towards slightly greater potency against AP isolates than against all other isolates collected globally.

ABST#76

Antifungal susceptibility pattern of Cryptococcus sp. among hospitalized patients in Malaysia, 2017-2020; a growing trend of flucytosine resistance.

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Objectives
Cryptococcus species are opportunistic fungal pathogens predominantly in immunocompromised patients. It is a frequent cause of meningitis in AIDS and associated with early mortality. Although flucytosine is one of the first line drug used for cryptococcal meningitis, its major side effect is bone marrow depression. The World Health Organization (WHO) recommends an optimal treatment for cryptococcal meningitis in HIV patients comprised of a 2-week course of amphotericin B in conjunction with flucytosine followed by fluconazole as consolidation therapy. In HIV negative patients, similar efficacy was observed following the same treatment regime. In fact a higher efficacy obtained by combination therapy rather than amphotericin B alone. Although very few studies reported the resistance of flucytosine, most of them reported in low percentage. In recent years, isolates of Cryptococcus neoformans and Cryptococcus gattii that were received by Institute for Medical Research, Malaysia from hospitalized patients observed a change of susceptibility pattern especially among flucytosine and fluconazole. Hence these findings are important for clinicians who treat cryptococcosis to ascertain the possibilities of future treatment plan.

Methods
A total of 53 isolates of C.neoformans and 11 isolates of C.gattii received from hospitals across the states in Malaysia by Institute for Medical Research from 2017 - 2020. Samples originated from cerebrospinal fluid and blood. Isolates were sub cultured on Sabouraud dextrose agar to obtain pure isolates. Then it was identified through series of biochemical tests and confirmed with polymerase chain reaction (PCR). Once confirmed through PCR, antifungal susceptibility testing was determined by E Test method. Isolates were streaked on RPMI and E-test strips (Liofilchem) consisting 6 antifungals strips, namely amphotericin B, caspofungin, fluconazole, itraconazole, voriconazole and flucytosine used according to manufacturer's protocols and incubated at 35 C. MIC level was read at 72 hours. The interpretation according to European Committee for Antibiotic Susceptibility Testing (AFST-EUCAST) was documented.

Results
About 44% (28/64) of Cryptococcus sp. isolates showed highest MIC level of flucytosine. Among Cryptococcus sp with MIC≥32 ug/ml towards flucytosine, Cryptococcus neoformans (C.neoformans) emerges as highest, 93% (26/28) followed by Cryptococcus gattii (C.gattii) 7 % (2/28). It is important to note that all C. neoformans isolates are susceptible to amphotericin B. It is already known that all Cryptococcus sp. are intrinsically resistant to echinochandin group such as caspofungin here. We elicited a higher MIC for fluconazole in C.neoformans (range: ≤0.03-≥32ug/ml; mean= 4 ug/ml), and C.gatti (range: ≤0.03-≥32ug/ml; mean= 4.8 ug/ml). MIC range of itraconazole ≤0.03-2ug/ml, mean=0.5ug/ml for C.neoformans and C.gattii, range: ≤0.03-1ug/ml; mean=0.48ug/ml. MIC range of voriconazole ≤0.03-0.25ug/ml, mean=0.04ug/ml for C.neoformans and C.gattii ; range: ≤0.03-0.25ug/ml, mean=0.07ug/ml.

Discussion
It is a concern to note the highest level of resistance towards flucytosine among many patients with cryptococcosis in Malaysia, yet very few studies have looked at the molecular mechanisms responsible for resistance in this pathogen. A higher MIC of fluconazole could be caused after prolonged treatment or prophylaxis with fluconazole. An alternative drug to these may probably aid in better treatment efficacy, minimizing side effects and avoid relapses. This can be further strengthened by clinical trials.

ABST#80

Antifungal susceptibility profiles of molecularly confirmed Aspergillus species from clinical samples

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Background: Invasive aspergillosis is the second most common human mycoses encountered in hospitals but susceptibility data of Aspergillus species is scarce. Objective: We aimed to determine susceptibility patterns of Aspergillus species at our centre, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia. Methods: We performed a prospective cross-sectional study of 28 isolates of Aspergillus species, which were recovered from various clinical samples from October 2016 through September 2017. All of the Aspergillus isolates were molecularly identified through sequencing of the ITS and β-tubulin genes. We also performed antifungal susceptibility testing on these isolates using Sensititre YeastOne assay, a commercially-prepared broth microdilution method. Results: The isolates were identified as Aspergillus niger (17/28, 60.7%), A. fumigatus (6/28, 21.4%), A. flavus (3/28, 10.7%), A. chevalieri (1/28, 3.6%) and A. tubingensis (1/28, 3.6%). Based on the European Committee on Antimicrobial Susceptibility Testing (EUCAST) Antifungal Clinical Breakpoint for Aspergillus spp. version 10.0 (2020), 16/17 (94.1%) A. niger isolates were susceptible to amphotericin B. One isolate (5.9%) of A. niger was noted to be resistant to amphotericin B, with an MIC of 2 µg/mL There are no breakpoints for other antifungal agents against A. niger established by the EUCAST. As for A. fumigatus, all six isolates were susceptible to amphotericin B, itraconazole and voriconazole, but only 5/6 (83.3%) were susceptible to posaconazole. The remaining isolate of A. fumigatus had a posaconazole MIC of 0.25 µg/mL, which according to the EUCAST breakpoints, falls between the susceptible and resistant categories. Meanwhile, all three (100%) A. flavus isolates were susceptible to itraconazole. No breakpoints are available for the other antifungal agents. Conclusions: Aspergillus niger remains the most commonly isolated species from clinical specimens. In general, Aspergillus isolates at our centre are still largely susceptible to amphotericin B and have low minimum inhibitory concentrations to echinocandins and most azoles. More similar studies are needed at our centre to build a robust antifungal susceptibility data on Aspergillus species.

ABST#103

Species distribution and antifungal susceptibility pattern of Candida causing fungemia in a Malaysian tertiary hospital

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Introduction
The management of candidemia has shown significant changes over the last decade. Extensive use of fluconazole and echinocandins has increased the resistant rate among several Candida species. These changes may impact the distribution of Candida spp. and the antifungal susceptibility pattern. Information on recent Candida spp. distribution and antifungal susceptibility pattern in local settings is essential for a better strategy in managing and preventing candidemia.

Objective
In our study, we determined species distribution and antifungal susceptibility pattern of Candida isolated from blood culture samples.

Material and methods
The study was a cross-sectional retrospective study using universal sampling from electronic Laboratory Informative System (eLIS) in a tertiary hospital in central part of Malaysia. We analysed microbiology data on Candida species distribution and the antifungal susceptibility pattern among candida isolated from patients who had positive fungal blood culture results from January 2014 until December 2018. Statical analysis of the data was performed using Standard Statistical Software Package, IBM SPSS Statistics for Windows, version 25.0.

Results
A total of 121 candidemia cases were collected during the study period. C. albicans was the most common species isolated, accounting for 36 (29.8%) of candidemia, followed by C. tropicalis, which was 34 (28.1%) and C. glabrata was 25 (20.7%). The least common species was C. krusei, contribute to 3 (2.5%). C. tropicalis accounted for the majority (40%) of isolates among non-albicans species. Fluconazole showed good susceptibility towards C. albicans (83.4%), C. parapsilosis (87%) and C. tropicalis (79.4%). However, C. glabrata was less susceptible to fluconazole accounting for only 40%. Two out of three of C. krusei isolates were resistant to fluconazole and itraconazole. C. albicans has good susceptibility pattern towards caspofungin (91.7%), micafungin (100%) and anidulafungin (94.4%). All five species of Candida showed 100% susceptible to amphotericin B. Overall, all Candida spp. isolates showed high susceptibility to amphotericin B, micafungin, and anidulafungin. C. glabrata showed the lowest susceptibility towards the azole group and caspofungin.

Conclusion
C. albicans and C.tropicalis were almost equally dominant species identified in causing candidemia followed by C. glabrata and C. parasilopsis making the non-Candida species contribute to more than 70% of all candidemia. . Although majority of isolates showed high susceptibility towards amphotericin B, micafungin, and anidulafungin, the emergence of C. krusei and fluconazole non-susceptible Candida especially C. glabrata warrant continues surveillance for better strategy in the management of candidemia.

ABST#107

Antifungal susceptibility pattern of Candida species isolated from Sri Lankan patients

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Objectives: The knowledge of species distribution and current susceptibility pattern of Candida spp. isolated from candidaemic Sri Lankan patients is beneficial in managing local patients with candidemia. Our study identified Candida species isolated from candidaemic Sri Lankan patients and compared their sensitivity profile of broth micro-dilution dilution method (MBD) and E-strip method.

Method: Candida spp. isolated from the blood samples received at the Department of Mycology, MRI for four months were included in the study. Germ tube test, chrome agar test, rice agar test, carbon assimilation test, sugar fermentation test, and API Candida kit were used for speciation. A single isolate which showed possible biochemical patterns of Candida auris was identified using PCR. In vitro susceptibility testing was determined by both broth microdilution method and E-test method. Correlation between quantitative assessment of micro-broth dilution (MBD) which is the gold standard and E-tests were performed using Pearson's correlation coefficient. Sensitivity and specificity figures were calculated for qualitative variables. A p value of < 0.05 was taken as significant.

Results: Total of 110 patient's specimens were included in the study. Non albicans Candida species were on the highest [Candida parapsilosis (35%), and C. tropicalis (34%)]. The rest of the isolates were, C. albicans (20%), C. glabrata (4%), C. guillermondii (4%), C.famata (1%), and C.auris (1%). Candida auris showed mismatched and misleading results with different biochemical tests and showed high antifungal resistance. Consequently, it was subjected to PCR for the identification. The MIC50 and MIC90 values obtained by E-test were within ± 2 two-fold dilutions of the MBD for fluconazole, voriconazole, posaconazole, amphotericin B and caspofungin. Candida auris, C. glabrata and C.parapsilosis showed high MIC values against fluconazole by both E-strip and MBD methods. Fluconazole and amphotericin B were associated with the highest rate of overall categorical agreement (CA) (100%) while voriconazole associated with the lowest rates of 91% with E-test. The overall essential agreement between E-test and MBD were high for fluconazole (99%), voriconazole (92%) and amphotericin (90%). There was a statistically significant correlation between MBD and E-strip method for fluconazole, voriconazole, amphotericine B and caspofungin.

Conclusion: Candidaemia due to non albicans Candida species including resistant Candida species are becoming common in our local settings. There was a good percentage of essential and categorical agreement (> 90%) between the E-test and MBD, similar to other studies found in literature. As a result of its simplicity, E-test method might be considered an alternative to MBD method.

ABST#114

Chromoblastomycosis in Sri Lanka; causative agents and in vitro susceptibility testing in a resource limited setting

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Introduction
Chromoblastomycosis is a chronic disfiguring infection of the subcutaneous tissue found mainly in the socio-economically marginalized population in the tropical and sub-tropical regions, characterized by the presence of sclerotic cells. The main causative agent of this chronic disease in many parts of the world as well as Sri Lanka is Fonsecaea pedrosoi. This study was done with the aim of identifying the antifungal sensitivity patterns and a trend analysis of antifungal sensitivity of the causative agents of chromoblastomycosis in Sri Lanka.

Methodology
Study was done on the stored isolates received from patients with chromoblastomycosis since 1992 to 2019, to the Mycology Reference Laboratory of Medical Research Institute, Colombo 8, Sri Lanka. Isolates were revived from -80°C freezer by subculture on Potato dextrose agar twice. Identification was done phenotypically by macroscopic and microscopic morphology on culture as well as slide culture. Antifungal sensitivity testing was performed by E-test method on RPMI agar using spore suspension equal to 0.5 McFarland turbidity. Testing was done for posaconazole, itraconazole, voriconazole, and amphotericin B. Quality control was done for each batch tested with Candida parapsilosis ATCC 22019. MIC 50 and 90 values were calculated for the total study sample. Available demographic and clinical data were analyzed.

Results
Of the 74 isolates, 71 (96%) were caused by Fonsecaea pedrosoi, while two Phialophora sp. and one Cladosporium sp. were also among the causative agents. Highest number of isolates were reported from the Sabaragamuwa province which was renowned for gem mining. Posaconazole exhibited the lowest MICs for the isolates tested where MIC 50 was 0.014 µg/ml and MIC 90 was 0.023 µg/ml while MIC range and mean MIC was 0.004 – 0.047 µg/ml, 0.015 µg/ml. Itraconazole demonstrated lower MIC values with MIC 50 of 0.125 µg/ml and MIC 90 of 0.47 µg/ml. MIC range of itraconazole was 0.016 – 2 µg/ml and mean MIC 0.225 µg/ml. Voriconazole demonstrated higher MIC values with MIC 50 - 0.125 µg/ml, MIC 90 - 0.5 µg/ml, MIC range 0.023 – 32 µg/ml and mean MIC 0.768 µg/ml. Complete resistance was noted for most isolates with amphotericin B with both MIC 50 and 90 values >32 µg/ml, and MIC range 4 – 32 µg/ml. No statistically significant differences were noted on the antifungal sensitivity testing of isolates from 1992 to 2004 and 2005 to 2019 time periods that were analyzed even though the MIC of voriconazole had a rising trend in the later period.

Conclusion
Fonsecaea pedrosoi was the commonest causative agent of chromoblastomycosis in this study sample. Posaconazole demonstrated the lowest MIC levels followed by itraconazole and voriconazole for the isolates that were tested. Amphotericin B had high MIC values in most of the isolates indicating possible clinical failure upon treatment with the drug. No statistically significant differences were noted in the two time periods in relation to average MIC variation with time.

ABST#116

A study of antifungal resistance in filamentous fungal isolates from mycotic keratitis patients

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Background and Objective: Mycotic keratitis accounts for 30-50% of all microbial keratitis, and is an important cause of ocular morbidity especially in developing countries. For Microbiologists and Ophthalmologists alike, it is a challenge to diagnose and treat these infections successfully. Also, recent decades have seen an increase in numbers of immune compromised hosts and dramatic augment in invasive management modalities, both of which come with consequence of an upsurge in fungal infections; and there has been an increase in resistance to antifungal agents which makes the task of timely management of mycotic keratitis all the more intricate.
Recent years have also seen introduction of a couple of new antifungal agents, and there is paucity of literature from North India on susceptibility pattern of corneal pathogenic fungi The study was designed to study the antifungal resistance in filamentous fungal isolates from mycotic keratitis patients.

Materials/methods: This was a prospective study in which 50 filamentous fungal isolates from fungal keratitis cases were included. Antifungal susceptibility testing was done using E-test method against antifungal agents Natamycin, Amphotericin B, Voriconazole, Fluconazole, Itraconazole, Posaconazole, Caspofungin & Micafungin.
Ophthalmological details of the patients were noted which included grade of keratitis, healing time, and success to medical management. Depending upon time taken for the keratitis to heal, three groups were identified (group A: healed, group B: delayed healing, group C: chronic keratitis).

Results:
The fungal isolates included in the study were Aspergillus spp (19, 38 %), Fusarium spp (15, 30%), Acremonium spp (10, 20%), Curvularia spp (3, 6%), Mucor spp (1, 2%), Alternaria spp (1, 2%) and Penicillium spp (1, 2%). All isolates were resistant to Fluconazole, Caspofungin and Micafungin. Mininmum Inhibitory Concentrations of different fungal isolates against antifungal agents showing in-vitro activity and their co-relation with different healing groups has been shown in Table -1.

Conclusion: The study has elucidated resistance profile of the most common filamentous fungal pathogens associated with mycotic keratitis. Good susceptibility to Posaconazole indicates its potential utility in refractory mycotic keratitis cases.

ABST#121

The Emergence of Multidrug-Resistant Candida auris : Using Whole-Genome Sequencing to Describe the Population Structure

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Objectives: The emergence of a multidrug-resistant yeast, Candida auris, has drawn attention to allover the world. The goal of this study was to investigate the genetic relationships and drug-resistance profiles among isolates of the Candida asuris from different counties and to examine possible evidence of transmission if it existed.
Materials/methods: The 6 Candida auris isolates causing invasive fungal diseases were collected from one tertiary hospitals through CHIF-NET. We used antifungal susceptibility testing and whole-genome sequencing (WGS) to investigate drug resistance and genetic diversity among isolates of Candida auris from different geographic areas of China.
Results: Between 2017~2018, 6 isolates of Candida auris from China; 5 (83%) of Candida auris was isolated from blood . Phylogenetic analysis using SNPs called against the Candida auris reference strain B8441. Genetic relationships among Candida auris isolates are shown in Figure 1. The average pairwise difference between the isolates was 1200 SNPs, and there was distinct phylogeographic population structure. Five isolates, F6410, F6412, F6414, F6416, F6418, F6420, were different from each other by fewer than 40 SNPs. These isolates These isolates were recovered from difference patients. In addition, one isolates, F6410 recovered from difference hospital different from each other by fewer than 40 SNPs. We observed high levels of susceptibility to amphotericin B among 6 tested Candida auris isolates: all had elevated MICs from 2μg/ml to 4μg/ml. All isolates had elevated MICs of fluconazole ranging from 256 to >256μg/ml .
Conclusions: Our results indicate that, we are observing the widespread of the Candida auris and these isolates had elevated MICs of fluconazole. We need to investigated the antifungal-resistance mechanism.

ABST#122

The emergence of multidrug-resistant Candida haemulonii: using whole genome sequencing to describe the population structure of Candida haemulonii

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Background: The emergence of a multidrug-resistant yeast, Candida auris, has drawn attention to the closely related species from the Candida haemulonii complex includeing C. haemulonii, Candida duobushaemulonii, Candida pseudohaemulonii, and Candida haemulonii var. vulnera. The goal of this study was to investigate the genetic relationships and drug-resistance profiles among isolates of the C. haemulonii from different cities and to examine possible evidence of transmission if it existed.
Methods: The 61 C. haemulonii isolates causing invasive fungal diseases were collected from twenty three tertiary hospitals through CHIF-NET. We used antifungal susceptibility testing and whole-genome sequencing (WGS) to investigate drug resistance and genetic diversity among isolates of C. haemulonii from different geographic areas of China.
Results: Between 2010 and 2017, 61 isolates of C. haemulonii from China; In the China, 69% of C. haemulonii was isolated from blood, and other invasive sites. Phylogenetic analysis using SNPs called against the C. haemulonii reference strain BMU05228. Genetic relationships among C. haemulonii isolates are shown in Figure1. The average pairwise difference between the isolates was 347 SNPs (range 6–581), and there was distinct phylogeographic population structure. Most isolates were different from each other by fewer than 57 SNPs and formed some small, well-supported cluster in the phylogenetic tree based on bootstrap analysis. Three isolates, F4450, F4454, and F4456, were different from each other by fewer than 10 SNPs. These three isolates were recovered from different patients treated at the same hospital in Shanghai. In addition, five isolates from Nanjing, F4474, F4486, F4500, F4516, F4518, differed by fewer than 45 SNPs recovered from same hospital. We observed variable levels of susceptibility to amphotericin B among 61 tested C. haemulonii isolates: 48 (79%) had elevated MICs from 2μg/mL to >8μg/ml, and the rest had MICs below 2μg/ml. All isolates had elevated MICs of fluconazole ranging from32 to 256μg/ml.
Conclusions: Our results indicate that, although we are not observing the widespread of the C. haemulonii, at least these isolates can be transmitted within a healthcare facility and may cause healthcare associated outbreaks.

ABST#123

The emergence of multidrug-resistant Candida duobushaemolnii: using whole-genome sequencing to describe the population structure

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Objectives: The emergence of a multidrug-resistant yeast, Candida auris, has drawn attention to the closely related species from the Candida haemulonii complex includeing C. haemulonii, Candida duobushaemulonii, Candida pseudohaemulonii, and Candida haemulonii var. vulnera. The goal of this study was to investigate the genetic relationships and drug-resistance profiles among isolates of the C. haemulonii from different cities and to examine possible evidence of transmission if it existed.
Methods: The12 Candida duobushaemulonii isolates causing invasive fungal diseases were collected from nine tertiary hospitals through CHIF-NET. We used antifungal susceptibility testing and whole-genome sequencing (WGS) to investigate drug resistance and genetic diversity among isolates of Candida duobushaemulonii from different geographic areas of China.
Results: Between 2010 and 2017, 12 isolates of Candida duobushaemulonii from China; In the China, 41.7% of Candida duobushaemulonii was isolated from blood, and other invasive sites. Phylogenetic analysis using SNPs called against the Candida duobushaemulonii reference strain B09383. Genetic relationships among Candida duobushaemulonii isolates are shown in Figure 1. The average pairwise difference between the isolates was 691 SNPs (range 15–1273), and there was distinct phylogeographic population structure. Three isolates, F4444, F4464 were different from each other by fewer than 15 SNPs. These two isolates were recovered from the same patients. In addition, two isolates, F4490, F4560, differed by fewer than 90 SNPs recovered from difference hospital. We observed high levels of susceptibility to amphotericin B among 12 tested Candida duobushaemulonii isolates: all had elevated MICs from 4μg/mL to >8μg/ ml. All isolates had elevated MICs of fluconazole ranging from 64 to 256μg/ml. Interesting, these isolates don't have the known mutation in ERG11, only with synonymous mutation.
Conclusions: Our results indicate that, although we are not observing the widespread of the Candida duobushaemulonii, at least these isolates had elevated MICs of fluconazole. We need to investigated the antifungal-resistance mechanism.

ABST#134
Effects of itraconazole and micafungin on Aspergillus fumigatus biofilms
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Objectives: Aspergillus fumigatus (A. fumigatus) is the most common airborne opportunistic fungal pathogen. Biofilm formation is one of the main pathogenic mechanisms of A. fumigatus. During the past decades, A. fumigatus azole resistance has become prevalent due to the medical and agricultural use of antifungal drugs and fungicides. The role of fungal biofilms is very important in azole resistance of A. fumigatus research.
Methods: In the present study, we compared biofilm drug susceptibility and biofilm formation under itraconazole of azole-resistant strains, sensitive strains, and standard strains, separately. The biofilm viability and matrix thickness at the early and the late stage were measured by XTT assay and Calcofluor white.
Results: Our results showed that the sessile minimum inhibitory concentration of itraconazole, which describing the inhibition of drugs on fungi sessile with biofilm, was much higher than the traditional minimal inhibitory concentration of itraconazole. Additionally, low concentrations of itraconazole inhibited biofilm formation of A. fumigatus strains. Notably, biofilm formation by azole-resistant strains could not be inhibited by high concentrations of itraconazole but could be effectively restrained by low concentrations of micafungin, revealing the efficacy of a cell-wall inhibitor to disrupt A. fumigatus biofilm formation. However, late-stage biofilms of both azole-resistant strains and standard strains were hard to disrupt using itraconazole.
Conclusion: We found that itraconazole were effective to prevent A. fumigatus biofilm formation at the early stage. For the treatment of A. fumigatus biofilm, our findings suggest that an early stage preventive strategy is preferred and micafungin is effective to control the azole-resistant strain infection.

ABST#144
The role of secreted aspartyl proteinase inhibitor ritonavir on azoles-resistant strains of Candida albicans as well as regulatory role of SAP2 and ERG11
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Objectives: To investigate the effects of ritonavir (RIT) combined with fluconazole on Candida albicans and the correlation between SAP2 as well as ERG11 and drug resistance.
Methods:Secreted aspartyl proteinases (Saps) activities and pathogenicity of Candida albicans with different drug resistance were measured. M27-A4 broth microdilution method was used to analyze the drug sensitivity of RIT combined with fluconazole (FCA) on Candida albicans. After that, SAP2 and ERG11 mutations were examined by PCR and sequencing, and RT-qPCR was utilized to determine the expression of the two genes.
Results:
1.SAP2 activity of Candida albicans at RIT concentration of 2μg / mL (0.697±0.093), 8μg / mL (0.800± 0.075), and 32μg / mL (0.856±0.08) were all lower than 0μg / mL(control group:0.631±0.083), the difference was statistically significant, F = 74.06, P <0.05.
2.In the free state, the median MIC50 of FCA after combined with RIT decreased from 4 μg / mL to 2 μg / mL, the difference was not statistically significant, z = 0.7997, P> 0.05, sensitization The rate was 0; under the condition of biofilm, the median MIC50 of FCA decreased from 32μg / mL to 16μg / mL after combined with RIT, the difference was not statistically significant, z = 0.7342, P> 0.05, and the sensitivity enhancement rate was 0.
3.SAP2 sequencing results and standard sequences were not found; SAP2 mRNA relative expression: 1.715±0.576 in the sensitive strains group, 5.380±1.39 in the cross-resistance strains group, The FCA resistant strains group was 3.879±1.125, the ITR resistant strains group was 4.385±1.02, and the VRC resistant strains group was 3.534±1.162. The difference was statistically significant, F = 15.23, P <0.001.
4.ERG11 sequencing results were compared with the standard sequence and found 23 base mutation sites, including 17 synonymous mutations and 6 missense mutations (D116E, T123I, K128T, Y132H, V488I, A516P).The missense mutation D116E was found in the sensitive group and the drug resistance group, and the remaining missense mutations were found in the drug resistance group, of which A516P was the newly

discovered mutation site in the experiment;]Relative expression of ERG11 mRNA: 1.019±0.305 in the sensitive strains group, cross tolerance the drug strains group was 5.117±1.372, the FCA-resistant strains group was 4.712±0.785, the ITR-resistant strains group was 4.498±1.092, and the VRC-resistant strains group was 4.102±0.611. The difference was statistically significant, F = 32.58, P <0.001;]The relative expression level of ERG11 mRNA (4.06±0.65) in the sense mutation group was lower than that in the non-sense mutation group (5.37±1.06), and Statistically,the difference was significant, t = 4.1842, P <0.05;
5.Correlation analysis between SAP2 mRNA expression and ERG11: correlation coefficient r = 0.6655, P <0.001.

Conclusion： RIT can reduce the virulence of C. albicans by inhibiting the activity of Candida albicans virulence factor Saps.In the liquid medium of RPMI 1640 in vitro, RIT may not increase the sensitivity of FCA to Candida albicans under different conditions.Overexpression of SAP2, mutation or overexpression of ERG11 may increase resistance of azoles, and there is a positive regulatory effect between SAP2 and ERG11.

ABST#145

Antifungal Susceptibility Profiles of Cryptococcus neoformans Strains in Clinical Settings

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Objectives
In both healthy and immunocompromised individuals, cryptococcosis poses significant life-threatening risks, especially in individuals with acquired immunodeficiency syndrome (AIDS). In this study, 14 clinical isolates of Cryptococcus neoformans were observed and their antifungal susceptibility profiles were analysed in order to establish our local epidemiological cutoff values (ECVs).
Methods
We collected 14 clinical samples from 11 patients admitted to our hospital from 2018 to 2020 for the purposes of this study. Eight samples were isolated from cerebrospinal fluid and six samples were isolated from blood. The isolates were cultured on Sabouraud dextrose agar and all were identified using the MALDITOF MS (MALDI Biotyper, Bruker Daltonics, Germany).. In this study, VITEK2® YST cards were used to measure the MICs of amphotericin B, fluconazole, voriconazole, and 5-flucytosine. For quality control, we used Candida parapsilosis ATCC 22019 and Candida krusei ATCC 6258.
Results
At the present, no clinical breakpoints for antifungal agents have been established against Cryptococcus neoformans. Amphotericin B MICs ranged from 0.06-1.0 mcg/ml, with MIC50 of 0.5 mcg/ml and MIC90 of 1.0 mcg/ml. MICs for fluconazole were 0.125-32 mcg/ml with MIC50 of 2 mcg/ml and MIC90 of 4 mcg/ml. All isolates showed MICs of voriconazole of 0.06 mcg/ml, while MIC50 and MIC90 were both 0.06 mcg/ml. 5-flucytosine has MICs of 1.0-8 mcg/ml, with MIC50 of 2 mcg/ml and MIC90 of 4 mcg/ml. There is one isolate with fluconazole MIC of 32 mcg/ml and another isolate with 5-flucytosine MIC of 8 mcg/ml. Based on these findings, we proposed our local ECV as follows : Amphotericin B 1.0 mcg/ml, Fluconazole 4 mcg/ml, Voriconazole 0.06 mcg/ml and 5-flucytosine 4 mcg/ml.
Conclusion
Treatment for cryptococcosis involves amphotericin B, 5-flucytosine, and fluconazole. The most active azole treatment was voriconazole and indicated for salvage therapy in patients who had treatment failure with amphotericin B or fluconazole. This study demonstrated that ECVs for Cryptococcus neoformans are useful for guiding treatment in the absence of clinical breakpoints and identifying isolates with possible resistance mechanisms.

ABST#148

Preliminary study of Hap43 regulating the formation of fluconazole resistance in Candida albicans

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Objective: To investigate the association of Candida albicans transcription factor Hap43 with fluconazole resistance and its possible mechanism.
Methods: Using gene knockout technology, Candida albicans SN152 was used as the parental strain to construct HAP43 single-arm mutant hap43Δ/HAP43 and double-arm mutant hap43Δ/Δ. In vitro drug susceptibility experiments were used to observe the MIC of fluconazole against Candida albicans SN152, hap43Δ/HAP43 and hap43Δ/Δ under different iron concentrations. The growth curve analyses were used to observe the effect of fluconazole on the growth of Candida albicans SN152 and hap43Δ/Δ under iron-replete and iron-deplete conditions. By constructing an oxidative stress model, we explored the possible mechanism of Hap43-mediated fluconazole resistance in Candida albicans.
Results: The single-arm mutant hap43Δ/HAP43 and the double-arm mutant hap43Δ/Δ were successfully constructed. The drug susceptibility assays found that the MIC of fluconazole against Candida albicans decreased after HAP43 was deleted. Growth curve analyses found that compared with strain SN152, fluconazole could significantly inhibit the growth of strain hap43Δ/Δ. The results of the oxidative stress model showed that Candida albicans Hap43 had an anti-oxidative stress effect.
Conclusion: The transcription factor Hap43 can regulate the formation of fluconazole resistance in Candida albicans, and its mechanism may be related to the anti-oxidative stress effect of Hap43.

ABST#156

Emergence of triazole-resistant isolate of Aspergillus luchuensis, harboring G441S substitution in Cyp51A, isolated from a patient with invasive pulmonary aspergillosis

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Objectives: Triazole-resistance of Aspergillus luchuensis, which is belonging to Aspergillus section Nigri, have been poorly reported or explored. Recently, we isolated a strain of A. luchuensis from an invasive pulmonary aspergillosis (IPA) patient who failed VRC therapy. The aim of this report was to investigate the relation between cyp51A mutation and triazole-resistance of A. luchuensis isolate.
Methods: Molecular identification was performed by sequencing of β-tubulin and calmodulin genes and aligning the sequences against the CBS database. Antifungal susceptibility was determined by broth microdilution method according to the Clinical and Laboratory Standards Institute (CLSI) M38-A3 document, E-test, and disk diffusion. The open reading frame as well as the promoter region of cyp51A gene was amplified and sequenced, and aligned with that of wide-type strain. The Cpy51A amino acid sequences of A. luchuensis and A. fumigatus were aligned and the homolog to the substitution site was detected.
Results: The isolate was identified as A. luchuensis. It was cross-resistant to voriconazole, itraconazole, isavuconazole, and showed decreased susceptibility to posaconazole. A G1378A mutation in cyp51A, resulting in the G441S amino acid substitution, which is the homolog to G448S conferring triazole-resistance in A. fumigatus, was detected in the isolate of A. luchuensis.
Conclusions: We report the first case of G441S substitution resulted from G1378A in cyp51A, which may confer triazole-resistance, in an isolate of A. luchuensis recovered from an IPA patient who failed VRC therapy. The triazole-resistant isolate of A. luchuensis, harboring G441S substitution in Cyp51A, was emerging in the clinical settings.

ABST#157

Species distribution and antifungal susceptibility trend of candida bloodstream isolates in a tertiary hospital in Kedah from year 2016 till 2020, in relation to antifungal usage

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Objectives :
Candidaemia is the commonest manifestation of invasive candidiasis which often results in prolonged hospitalization and even mortality. This study aimed to identify the species distribution of Candida blood stream isolates and to determine the antifungal susceptibility patterns from year 2016 till 2020 at a 1000-bedded tertiary hospital and its two district specialist hospitals under the healthcare clusters concept.

Methods:
Microbiological data on candida species isolated from blood cultures were retrospectively collected and analysed. Similarly, total fluconazole and echinocandins usage in defined daily dose (DDD) were tabulated based on pharmacy dispensing records. It is worthy of note that antifungal susceptibility results were obtained by Vitek-2 system from 2018 onwards, replacing YEAST ONE commercial system ; whereas API-20C system has become a history when MALTI-TOF was introduced in 2019 for candida species identification

Results:
A total of 581 candida isolates from blood stream were identified from year 2016 to 2020 . The commonest Candida species were Candida albicans (30.3%) , followed by Candida parapsilosis (19.4%), Candida tropicalis (18.7%), followed by Candida glabrata (15.8%), bearing similarities with the epidemiology of candidaemia in Asia .

Susceptibility data were available for 354 out of 581 patients. C albicans demonstrate 100% susceptibility to fluconazole , an exception in 2016 with 93.3% susceptibility rate . C tropicalis has recorded a significant reduction in susceptibility rate to fluconazole, from 100% susceptibility rate in 2019 to 82.4% in 2020, Interestingly, C glabrata maintained 100% susceptibility to micafungin throughout , however there was a discrepancy towards caspofungin susceptibility, of note 14.3% , 41.7%, 46.2% of C glabrata were non-susceptible to caspofungin in year 2018, 2019, 2020 respectively . Candida parapsilosis complex isolates remain 100% sensitive to fluconazole .
Fluconazole being the most commonly prescribed antifungal agent, with the DDD increasing from 2016 to 2020 . Through the DDD metrics, we observed that over time, there was an increase in the consumption of amphotericin B, micafungin, anidulafungin and voriconazole.

Conclusions:
Candida albicans is the leading cause of candidemia in our centers, whereas candidaemia secondary to non-albicans constitute 69.7% . Increasing resistance patterns of C albicans and C tropicalis towards fluconazole is alarming. The findings of C. glabrata resistant to caspofungin warrants further investigation to determine paradoxical reduced susceptibility or a true resistance . A similar phenomenon quoted by a study in Kuwait showed caspofungin-resistant isolate that was susceptible to micafungin contained wild-type FKS sequences . History of pre-exposure to echinocandins is relevant but not within the scope of this study. Antifungal susceptibility results predict treatment outcome however other factors such as host immunity status , severity of illness, source control, optimal dosing play vital roles in determining treatment success. It is high time to implement antifungal stewardship program to educate and monitor appropriate usage of antifungal agents , to safeguard options for future , to reduce and prevent incidence of azole and echinocandin- resistance among candida species.

ABST#160

A twenty-year antifungal susceptibility surveillance (from 1999 to 2019) for Aspergillus spp. and proposed epidemiological cutoff values for Aspergillus fumigatus and Aspergillus flavus: a study in a tertiary hospital in China

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Objectives The emergence of resistant Aspergillus spp. is increasing worldwide. Long-term susceptibility surveillance for clinically isolated Aspergillus spp. strains is warranted for understanding the dynamic change in susceptibility and monitoring the emergence of resistance. Additionally, neither clinical breakpoints (CBPs) nor epidemiological cutoff values (ECVs) for Aspergillus spp. in China have been established. In this study, we performed a 20-year antifungal susceptibility surveillance for 706 isolates of Aspergillus spp. in a clinical laboratory at Peking University First Hospital from 1999 to 2019. Proposed ECVs for Aspergillus fumigatus and Aspergillus flavus were also established.
Methods In vitro antifungal susceptibility testing of triazoles, caspofungin, and amphotericin B against Aspergillus spp. isolates was performed using the Clinical and Laboratory Standards Institute (CLSI) broth microdilution method. Furthermore, based on ECV establishment principles, proposed ECVs for A. fumigatus and A. flavus were established using gathered minimum inhibitory concentration (MIC)/minimal effective concentration (MEC) data.
Results A. fumigatus was the most common species, followed by A. flavus and Aspergillus terreus. Forty isolates (5.7%), including A. fumigatus, A. flavus, A. terreus, Aspergillus niger, and Aspergillus nidulans, were classified as non-wild-type (non-WT). Importantly, multidrug resistance was observed among A. flavus, A. terrus, and A. niger isolates. Cyp51A mutations were characterized for 19 non-WT A. fumigatus isolates and TR34/L98H/S297T/F495I was the most prevalent mutation during the 20-year surveillance period. The overall resistance trend of A. fumigatus increased over 20 years in China. Additionally, all the proposed ECVs were identical to the CLSI ECVs, with the exception of itraconazole against A. flavus, resulting in a decrease in the non-WT rate from 6.0% to 0.6%.
Conclusion This is the first 20-year retrospective surveillance study for clinically isolated Aspergillus spp. in China. Several species of Aspergillus spp. have developed drug resistance even multidrug resistance, and the resistance mechanisms of non-WT A. fumigatus strains have been also described. Moreover, the proposed ECVs were established for A. fumigatus and A. flavus, which will be an essential step in developing CBPs and be useful for resistance surveillance in China.

ABST#163

Genotype got and drug resistance profile of clinical isolates of Candida albicans from vulvovaginal candidiasis in the eastern china

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A total of 244 Candida albicans isolates recovered from VVC patients in Suzhou, eastern China, were investigated. According to CLSI documents M27-A4 and M59-3ed / M60-2ed, the geometric mean MICs of nine antifungals in increasing order were micafungin(0.048mg/L), anidulafungin (0.132mg/L), caspofungin (0.19mg/L), itraconazole(0.23mg/L), posaconazole(0.25mg/L), voriconazole(0.28mg/L), 5-flucytosine (0.44mg/L), amphotericin B (0.49mg/L) and fluconazole (2.01 mg/L) respectively. Of note, 6.5% (16/244) C. albicans isolates showed resistant mainly to anidulafungin (mono-echinocandin resistance), voriconazole had the lowest susceptibility rate of 34.8% (85/244), followed by fluconazole 59.4% (145/244), respectively. All isolates were genotyped by allelic combination based on the microsatellite marker analysis of CEF3, CAIII, LOC4 Loci, and 129 different allelic genotypes were identified in which nine different clades were recognizable with a discriminatory power of 0.96. Genotype A-D were present in 35% of the isolates. Antifungal susceptibility was not linked with the corresponding genotype of C. albicans isolates. In conclusion, decrease of antifungal drug susceptibility to C. albicans isolates from VVC is alarming. We emphasize the importance of antifungal susceptibility testing for high probability of successfully treating VVC as Candida albicans isolates show variable antifungal susceptibility profile in degrees of susceptibility, SDD/I and resistance patterns in China. However, we did not find any correlation between susceptibility to each antifungal drug and the different genotypes studied.
Keywords: Genetic diversity; genotype, antifungal susceptibility; resistance, Candida albicans; vulvovaginal candidiasis; eastern China

ABST#167

In vitro antifungal susceptibility surveillance of Candida glabrata isolates among Malaysian patients in 2018 to 2020

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Objective: The objective of this surveillance is to determine the in vitro antifungal susceptibility testing (AFST) of Candida glabrata (C. glabrata) isolates against anidulafungin, micafungin, caspofungin, posaconazole, voriconazole, fluconazole, itraconazole and amphotericin B from clinical samples of patients admitted to 31 hospitals from 2018 to 2020 in Malaysia.
Methods: The surveillance data was compiled and analysed using WHONET 2019 software. The analysis was based on mean inhibitory concentration (MIC) values (µg/mL) of 167 C. glabrata isolates from both sterile and non-sterile clinical samples of patients admitted in 31 hospitals including government and private hospitals in Malaysia for 3 years from January 2018 until December 2020. AFSTs were performed against anidulafungin, micafungin, caspofungin, posaconazole, voriconazole, fluconazole, itraconazole and amphotericin B. MIC values were determined by Etest method or automated AFST systems. The interpretive criteria for susceptibility or resistance were according to CLSI clinical breakpoints (CBP) and epidemiological cut-off values (ECV) for C. glabrata.
Results: The isolates were mainly from blood (141, 84.4%), followed by body fluid (5, 3.0%), tissue (3, 1.8%), perineum (2, 1.2%), pericardial fluid (2, 1.2%), and 1 each (0.6%) from urine, pus and pleural fluid samples. Overall, C. glabrata isolates showed 96.9% (156), 54.9% (90) and 97.7% (40) were susceptible to anidulafungin, caspofungin and micafungin respectively. Only, 5.4% (8) of C. glabrata isolates were fluconazole resistant. Applying the ECVs, 87.8% (129), 75.4% (126), 36.4% (4) and 99.4% (162) C. glabrata isolates had wild-type (WT) phenotype drug susceptibility to itraconazole, voriconazole, posaconazole and amphotericin B.
Conclusion: In summary, reduced susceptibility to caspofungin and reduced WT phenotype drug susceptibility to voriconazole and posaconazole were seen among C. glabrata isolates.

ABST#168

Antifungal susceptibility profiling of mucormycetes

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Introduction:
Mucormycosis is a life-threatening fungal infection caused by fungi belonging to the order Mucorales of subphylum Mucoromycotina. The disease is the second most common mold infection in hematologic malignancies and organ transplantation and is increasingly reported in patients with uncontrolled diabetes or ketoacidosis. Despite aggressive antifungal therapy and, in selected cases, extensive surgical debridement, the overall mortality due to mucormycosis remains unacceptably high. Primary antifungal therapies for mucormycosis are amphotericin B lipid formulations, whereas open-label salvage studies suggest posaconazole as an option for patients who are refractory to or intolerant of polyenes. The etiologic agents of mucormycosis include the genera Rhizopus, Mucor, Lichtheimia, Cunninghamella, Rhizomucor, and Apophysomyces among others.

Methods:
Total of 73 mucormycetes were revived from the repository of department of microbiology, LHMC. All the isolates were grown on various mycological media. Further they were processed for microscopic examination and species identification. Antifungal susceptibility profiling of the isolates was done using CLSI microbroth dilution method.

Results:
Out of 73 mucormycetes tested 50% of the isolates were identified as Rhizopus arrhizus (n = 37), followed by R. microsporus (n = 16), Syncephalastrum racemosum (n = 8), Mucor circinelloides (n = 7) and Lichtheimia ramosa (n = 5). The results of in vitro antifungal susceptibility profiles of mucormycetes are available for 65% (n=43) of the isolates. Among the azoles, POS was the most active drug against all the isolates (MIC Range 0.125-8 µg/ml) whereas, ITC showed high MICs (MIC range 2-16 µg/ml). VRC exhibited no activity against Mucorales (GM MICs of 9.89 µg/ml). Amphotericin B, was the most active drug against all the tested isolates, showing MIC's ranging from 0.03-0.5 µg/ml.

Conclusion:
The management of mucormycosis is multimodal including surgical intervention, administration of antifungal agents and reversal of underlying risk factors. Timely and adequately dosed antifungal therapy is necessary. Amphotericin B and posaconazole are the most often used medications.

ABST#172

Candidemia: changing dynamics from a tertiary care hospital in North India

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Objectives
The aim is to identify and speciate Candida isolates from bloodstream infections (BSIs) and to evaluate their epidemiological profile and antibiotic susceptibility pattern in a tertiary care hospital in North India.
Methods
Candida species isolated from blood samples, received in blood culture bottles at the department of Microbiology of a tertiary care hospital from January 2019 to May 2021 were included in this study. Candida isolates were characterized by conventional techniques and CHROMagar. Further identification and antifungal susceptibility testing were performed using VITEK 2 compact automated system.
Results
Candida sp was isolated from a total of 116 blood samples, out of which 60.92% belonged to males. Maximum isolates were from 0–6-month-old infants (69.79%) followed by children between 1-17 years of age (18.75%). 75% isolates were from patients admitted in wards followed by those admitted in various ICUs (19.83%) and nursery (4.31%). C. tropicalis (26.32%) was the most common species, followed by C. pelliculosa (19.83%), C. albicans (17.24%), C. parapsilosis (14.66%), C. famata (9.48%) and C. krusei (9.48%). Other species isolated were C. lusitaniae, C. sphaerica and C. inconspicua. Out of 116, 101 were subjected to VITEK 2 susceptibility testing. Overall, 20% isolates were found resistant. Among C. albicans isolates, resistant was seen only to voriconazole (20%) and fluconazole (5%). Whereas among non- albicans species, resistant was seen against flucytosine (12.87%) followed by fluconazole (10.89%) and caspofungin (4.95%). Least resistance was seen against voriconazole and amphotericin B. Highly resistant isolates included C.krusei and C. pelliculosa. All isolates were uniformly sensitive to micafungin.

Conclusions
Prevalence of candidemia has increased over past decade all over India. Non- albicans candida predominated over Candida albicans in causing BSIs and were found to be more resistant to antifungals. Routine identification of candida sp and knowledge of antibiotic susceptibility pattern can prevent diagnostic delays and help clinicians to choose appropriate empirical therapy. Continuous surveillance is necessary to monitor changes in epidemiological and resistance pattern.

ABST#177

The effects of secreted aspartyl proteinase inhibitor ritonavir on Itraconazole-resistant strains of Candida albicans

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Objectives:
1.To investigate the difference of different media (RPMI 1640 medium and YCB-BSA medium) in drug susceptibility of C. albicans in vitro.
2.To investigate the effect of ritonavir(RIT) combined with Itraconazole (ITR) on the antifungal activity of C. albicans in vitro.
Methods:
1.Thirty-two clinical isolates of suspected C. albicans were collected from the drug sensitivity laboratory of the Second Hospital of Shanxi Medical University . The isolates were identified by colorimetry medium and molecular biological methods.After identification, ITR drug sensitivity test was carried out according to M27-A4, and RPMI 1640 medium, YCB-BSA were used respectively.The MIC50 values of each were interpreted and recorded and statistically analyzed. If the numerical variables were normally distributed, the mean ± standard deviation (x±S) was used for the analysis; otherwise, the non-parametric test was used for the analysis and the median ± standard deviation (M±Q) was used for the analysis.In order to P<0.05 was considered statistically significant.
2.27 strains identified as C.albicans were selected, and the growth medium was YCB-BSA.In vitro drug sensitivity test of RIT combined with ITR was carried out using chessboard method, and MIC50 value was interpreted according to the experimental results of CLSI M27-A4.In the first part, the MIC of ITR single drug was recorded as ITR-MIC1, and the MIC after combining with RIT (i.e., when the minimum MIC measured by RIT single drug was the working concentration, the MIC50 value of ITR) was recorded as ITR-MIC2.The formula ITR-MIC1/ITR-MIC2 was used to calculate the synergistic multiple after the combination of ITR and RIT to explore the effect of ITR combined with Saps enzyme inhibitor ritonavir on the antifungal activity of C.albicans in vitro.
Results:
1.Through colorimetic culture and molecular biological identification of Candida, 27 of the 32 suspected clinical strains were C.albicans.Among them, 52% (14 isolates) were sensitive, 7% (2 isolates) were dose-dependent, and 41% (11 isolates) were drug-resistant.
2.Statistical analysis results of MIC50 values obtained from different media:The numerical variables did not conform to normal distribution and were expressed as median ± standard deviation (M±Q). The values of RPMI 1640 group and YCB-BSA group were 0.1250±15.9375 and 0.0625±0.0937, Z value was 2.196, P < 0.05, and the difference was statistically significant.
3.In the drug sensitivity test using YCB-BSA as growth medium, the MIC50 value of ITR single drug and the MIC50 value of ITR combined with RIT were statistically analyzed:The ITR single drug group was 0.0625±0.0937, the combination drug group was 0.0313±0.0000, Z value was -4.750, P value, < 0.05, the difference was statistically significant.
4.The combined treatment of RIT and ITR could reduce the MIC50 value of ITR, and the MIC value of 74% (20/27) strains was reduced by 2 to 8 times.

Conclusion：

1.The clinical strains collected in this study had a high resistance rate of 41% to ITR.
2.When replacing YCB-BSA medium for C.albicans drug susceptibility test in vitro, the MIC50 value obtained was different from that obtained by RPMI 1640 medium.
3.The combination of RIT and ITR can produce synergistic effect on ITR.

ABST#181

Research on the correlation between RCL1 gene mutation and the resistance to Itraconazole of Candida Albicans

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Objective:
Candida albicans (CA) is a conditional pathogenic fungus that lives on the surface of human body. It usually exists in the upper respiratory tract, gastrointestinal tract, reproductive tract and other parts of normal people. When the body's immunity decreases, it can reproduce in large quantities, causing shallow infection, deep infection and other diseases. Among them, invasive candida infection progresses rapidly, the condition is dangerous, the prognosis is not good, seriously endangers the patient's life and health . Currently, the clinical treatment of candida albicans infection is still dominated by azole antifungal drugs, such as fluconazole (FCA), voriconazole (VRC), itraconazole (ITR), etc. However, due to the long-term and non-standard use of antifungal drugs, the infection rate of Candida albicans is increasing year by year , and the phenomenon of cross-resistance and multidrug resistance has become one of the difficult problems for medical staff. Therefore, it is very important to clarify the drug resistance mechanism of Candida albicans and to find new antifungal drugs. Based on the results of previous studies, the role of RCL1 genes in the resistance mechanism of Candida albicans was studied. In order to reveal the mechanism of drug resistance of Candida albicans and provide theoretical basis for finding new drug targets.
Methods:
The strain was extracted strictly by column yeast genome DNA extraction kit, and then primers were designed for PCR amplification and detection. PCR product was purified and sequenced by Shanghai Bioengineering Company. The gene sequence of the amplified products was analyzed using Blast software and compared with the standard strain sequence,The nucleotide sequence was translated into amino acid sequence to determine the gene mutation site, so as to clarify the relationship between gene mutation and drug resistance.
Results:

Cloning sequencing and molecular biology analysis of RCL1 genes in 15 Candida leuka clinical strains， eight mutation sites were detected.One synonymous mutation was found,C1T.Seven missense mutations was found, C6A、G10A、A11T、C1T、A3T、A7G and T8G.

Conclusion：

Among clinical isolates of itraconazole-resistant strains, RCL1 genes of Candida albicans were mutated.And mumutations in the RCL1 gene may increase the resistance to iroconazole.

ABST#186

Evaluation of Antifungal activity of standard anti-fungal against Cryptococcus neoformans isolated from Eastern Uttar Pradesh.

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Objective: Cryptococcosis, a potentially fatal fungal disease is increasing due to an ever rising population of immunocompromised hosts. Despite several antifungal agents available for treatment, morbidity and mortality rates remain high with this fungal infection. This study is conducted to evaluate antifungal activity of amphotericin B, fluconazole, 5-fluorocytosine, itraconazole, voricanazole, micocanazole and ketocanzole against Cryptococcus neoformans isolated from Eastern Uttar Pradesh, India.
Method: The present study was performed on isolates of C. neoformans isolated from Eastern Uttar Pradesh, India. Antifungals tested against C neoformans were amphotericin B, fluconazole, 5-fluorocytosine, itraconazole, voricanazole, micocanazole and ketocanzole. Antifungal susceptibility determinations were done by Agar disk diffusion and minimum inhibitory concentrations (MICs). MIC was conducted according to the Clinical and Laboratory Standards Institute M27-A3 guidelines.
Result: Results of disk diffusion tests were observed after 24 hours. C. neoformans isolates were found to be resistant to fluconazole and 5-fluorocytosine as no inhibition zones were detected. The rest of the antifungals, amphotericin B, itraconazole, voricanazole, miconazole and ketocanzole showed significant zone of inhibition against C. neoformans isolates. MIC of miconazole was 3.91 µg/ml amphotericin B was 7.81µg/ml, itraconazole was 15.63 µg/ml, voricanazole was 62.5 µg/ml, and ketoconanzole was 62.5 µg/ml.
Conclusion:The isolates of C. neoformans were found highly susceptible for miconazole and susceptible for amphotericin B, itraconazole, voricanazole and ketoconanzole while resistant for fluconazole and flucytosine.

Keywords- Cryptococcus neoformans, antifungal, disk diffusion, minimum inhibitory concentrations

ABST#197

Emergence of W272C substitution in Hmg1 in a triazole- resistant isolate of Aspergillus fumigatus from a Chinese patient with chronic cavitary pulmonary aspergillosis

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Objectives: Recently, mutations in the predicted sterol-sensing domain region (SSD) of 3-hydroxy-3-methyl-glutaryl-coenzyme A (HMG-CoA) reductase gene (hmg1) have been identified to be associated with triazole resistance in Aspergillus fumigatus. Here, we describe the first case of the G929C mutation in hmg1 gene, leading to the W272C amino acid substitution in the predicted SSD of Hmg1, in a triazole-resistant isolate of A. fumigatus, named BMU09765, recovered from a chronic cavitary pulmonary aspergillosis (CCPA) patient who failed voriconazole therapy in China.
Methods: Antifungal susceptibility of the isolate of A. fumigatus BMU09765 was performed using the broth microdilution method (CLSI M38-A3), E-test and disk diffusion method. The promoter region and open reading frame of the cyp51A and the hmg1 gene were amplified and sequenced.
Results: The isolate of A. fumigatus BMU09765 was resistant to all the triazoles tested and more susceptible to amphotericin B, compared with A. fumigatus Af293. A G929C mutation, resulting in the W272C amino acid substitution in Hmg1, was detected in the A. fumigatus isolate BMU09765. There were no mutations in the cyp51A gene of this strain.
Conclusion: We reported the first case of a W272C substitution in Hmg1 in a triazole-resistant isolate of A. fumigatus recovered from a CCPA patient in China. This isolate is resistant to all the triazoles tested and more susceptible to amphotericin B, compared with A. fumigatus Af293. Given that the emergence of hmg1 gene mutations in triazole-resistant isolates of A. fumigatus has been reported in several countries, its clinical impact should also be taken seriously.

Clinical mycology and management of fungal diseases

ABST#28

A CROSS SECTIONAL STUDY OF INVASIVE FUNGAL INFECTIONS IN POST TRANSPLANTIOAN AND MALIGNANCIES PATIENTS.

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INTRODUCTION : India is a vast country with more than one billion people and spread over an Area of 3.3 thousand million square kilometers. The geographical and Environmental conditions vary in different places of the country. Located in the tropics With heavy annual monsoon, the climatic conditions are favorable for the fungi to grow In many parts of the country. Several reasons favoring ifis include usage of anti neoplastic and Immunosuppressive agents, broad-spectrum antibiotics, patients with uncontrolled Diabetes mellitus, burns, neutropenia, HIV infection, prolonged intensive care unit (ICU) admission and aggressive surgery. Solid organ transplantation are performed Increasingly in tertiary care centers. Systemic steroids, immunosuppressive agents and chemotherapeutic agents are available all over the country for prevention of transplant rejection and for treatment of malignancy. AIM OF THE STUDY : The present study was undertaken with the following aims and objectives. To isolate the fungi causing Invasive fungal infections. To identify and speciate the fungi isolated. To study the morbid risk factor of Invasive fungal infections. To assess the mortality rate among Invasive fungal infection patients. To study the susceptibility pattern of the fungal isolates to standard anti fungal drugs. To compare the different methods of antifungal susceptibility testing done for the fungal isolates. MATERIALS AND METHODS : This cross sectional study was conducted with Informed consent was obtained from the study population. All patients satisfying the inclusion criteria were documented. Patients were interviewed by structured questionnaire. Inclusion criteria : All adults more than 18 years of age with following clinical conditions were included: Acquired Immunodeficiency syndrome patients. Renal transplant patients on Immunosuppressive therapy for >30days. Diabetic mellitus patients. Carcinoma, Leukemia and Lymphoma patients on chemotherapy for >30 days. Exclusion criteria: Immunocompromised conditions due to various other reasons. Chronic diseases such as cirrhosis, tuberculosis, etc, CONCLUSION : The present study was done on 200 suspected invasive fungal infection(IFI) cases which showed that majority of patients were in the age group of 31 to 40 years and they were predominantly males. Most of them had urinary and respiratory tract infections following a prolonged period of immunosuppresion ranging from 1-10 years. On categorization 17.5% had proven IFI, which was identified in majority of the cases HPE and / or KOH. Uncontrolled diabetes mellitus was the comorbid risk factor for IFI. Etiological agent was identified in 39.5% of infected patients. Aspergillosis caused by Asp.fumigatus was the leading cause for IFI followed by Candidiasis caused by C.albicans. Antifungal susceptibility test by microbroth dilution, agar dilution, E test and disc diffusion methods to amphotericin B, itraconazole, fluconazole and voriconazole showed equally similar results for most of the isolates. Few discrepancies were seen among A.fumigatus and C.albicans mostly by disc diffusion method. Proven IFI was life threatening and mortality was seen 2.5% of cases. Due to the evolving nature of the epidemiology of invasive fungal infections in immunocompromised persons, continued research and surveillance are essential to optimize the prevention and therapy of IFI in them.

ABST#41

A rare case of pulmonary aspergillosis with non-tuberculous mycobacterium pulmonary disease(NTM-PD)

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Introduction:
Individuals with past history of pulmonary tuberculosis(PTB) and/or bronchiectasis are prone to opportunistic pulmonary infections. A 40-year-old female who weighed 42kg had recurrent pulmonary infections and hemoptysis in 2016-2017 due to left lower lobe postero-basal(LB10) ulcerative bronchitis and adjacent focal left lower lobe apical segment(LS6) chronic consolidation with corresponding LB6 bronchus occlusion. The diagnosis of pulmonary aspergillosis was subsequently established. She was treated with posaconazole 200mgOD for 11months.

She also had transient sputum acid-fast bacilli(AFB) smears positivity due to NTM. Numerous species of rapidly-growing NTM were isolated from 2017-2019. As the patient responded and remained fairly well since treatment cessation in December 2018, NTM-PD has been not treated. The patient had history of TB affecting the left main bronchus(LMB) and LS6 in 2005. These were successfully treated albeit complicated by LMB stenosis and mild focal bronchiectasis. TB relapse/recurrence were conclusively ruled out. HIV was negative.

Methods:
Sputum and bronchial lavage fluid repeatedly cultured fungi. The species were confirmed by Internal Transcribed Spacer(ITS) gene sequencing. The species of rapidly-growing NTM isolated were identified by Line-probe Assay Mycobacterium CM/AS Kit. Therapeutic drug monitoring(TDM) was performed using High-performance-liquid-chromatography(HPLC)method. Serum Galactomannan antigen and Aspergillus IgG assay were determined by using ELISA; Platelia AspergilusAg and Dynamiker respectively. Aspergillus Specific IgE was done using ThermoScientific ImmunoCAP System. Posaconazole MIC for isolated Aspergillus fumigatus was performed by EUCAST method. Serum IgA against core MAC glicopeptidolipid(Capilla MAC Ab ELISA)was also performed.

Results:
Aspergillus fumigatus were isolated on 2 occasions. Serum Galactomannan antigen prior to treatment(PTT) and at end of treatment(EOT) were OD1.32 and OD0.24 respectively(Normal<0.5). Aspergillus IgG PTT and at EOT were 151AU/ml and 55AU/ml respectively(Normal<60). Aspergillus-Specific IgE was 0.10kUA/L(Normal<0.35). Posaconazole EUCAST MIC for isolated Aspergillus fumigatus was 0.06mg/L. Therapeutic drug level was consistently achieved with Cmin:MIC>7(i.e. Cmin:MIC:2.3mg/L:0.06mg/L=38.3).

The NTM isolated comprised at least five isolates of Myocbacterium fortuitum in 2017-2018, two isolates of Mycobacterium abscessus complex in 2018 and an isolate of Mycobacterium chelonae in 2019. Serum IgA against core MAC glicopeptidolipid was 17.7 U/ml(Normal<0.7).

Discussions:
The patient was treated for pulmonary aspergillosis, a disease which was an immediate threat to life. NTM-PD, a relatively more indolent disease was not concurrently treated due to potentially serious drug-drug interactions and anticipated difficulties in managing potential adverse reactions. Felton reported that posaconazole is a safe and effective first-line treatment for chronic pulmonary aspergillosis. Therefore, posaconazole was chosen over voriconazole because of its favorable side-effects profile.

The patient chose not to be treated for NTM at present time. Her sputum AFB smears had been repeatedly negative for 2 years. Her chest radiology findings improved and had been stable over the past 2 years.

Conclusions:
Fungi and NTM have to be considered as possible respiratory pathogens for patients with bronchiectasis and/or past TB who have recurrent chest infections/hemoptysis. Posaconazole which can be used as an initial anti-fungal agent is an effective treatment for pulmonary aspergillosis. The dose of posaconazole should be weight-adjusted. Establishing anti-fungal MICs for isolated fungus and therapeutic drug monitoring(TDM) are crucial to guide and optimize treatment goals.

ABST#42
Carriage of Malassezia yeasts on healthy dogs in Malaysia
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Malassezia spp. yeasts are both commensal organisms and opportunistic pathogens of canine skin. Although canine Malassezia dermatitis is a common diagnosis in Malaysia, little is known about their presence on the skin of healthy dogs in Malaysia.
This study was performed to evaluate the prevalence of carriage and quantification of Malassezia spp. yeasts in healthy dogs in Malaysia.
38 clinically healthy dogs admitted for neutering in a small animal veterinary clinic were enrolled in the study. Swabs were collected from bilateral ear canals and tape-strip samples were obtained from interdigital skin of both forelimbs. Cytological examination was performed, and results were expressed as the mean number of yeasts per x1000 microscopic field per dog.
50% of the otic samples (n=74) and 68% of the samples from the interdigital skin (n=38) showed presence of Malassezia spp. yeasts on cytological examination. The mean number of Malassezia spp. yeasts was 1.86/oil immersion field (high-power field – HPF) and 1.19/HPF for the otic samples and interdigital skin respectively. There is no statistically significant difference in prevalence and number of Malassezia spp. yeasts between dogs of different ages, sex, breed and the area of sampling ($P > 0.05$).
These results are in accordance with previous literature findings which suggested that a clinical diagnosis of Malassezia dermatitis may be established if more than two Malassezia spp. yeasts per HPF are found on cytological analysis coupled with compatible skin lesions.

ABST#44
Cryptococcal Infection in an Immunocompetent Patient
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Pulmonary Cryptococcosis a potentially fatal lung infection caused by a type of fungus known as Cryptococcus. There is not much study done about immunocompetent patient being infected with cryptococcus. Across the world this type of fungi has limited distribution. Patients with compromised immunity were commonly at risk of this type of microorganism. Immunocompetent patients infected with cryptococcus are often asymptomatic, infection usually resolved on its own without fungal treatment.
Method
This is a retrospective case of an immunocompetent 40-year-old male presented with persistent cough with copious secretion and with no apparent weight loss and fever. His records were reviewed and verified.
Result
The patient was presented with a rare manifestation of fungal infection; it was when his laboratory results were out that cryptococcal infection was ruled out. Initial chest radiograph and Computed Tomography of his chest revealed several patchy opacities at both mid and both lower lung zones; probably bronchopneumonia Cryptococcus was detected both on his cryptococcal antigen test and biopsy. Viral molecular test and human immunodeficiency virus test revealed negative. While, Grocott's methenamine silver (GMS) revealed some yeast form in varying size 5-15 micron with few budding. His CBC result showed lower lymphocytes and monocytes.

Conclusion
This case report highlights how cryptococcal infection can plausibly affect healthy individuals and determine the efficacy of varied treatment options on proper clinical management.

ABST#45
Prevalence, risk factors, and outcome of invasive fungal infection following pediatric liver transplantation
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Objectives
Invasive fungal infection (IFI) remains problematic following liver transplantation (LT). Routine systemic antifungal prophylaxis has not yet been recommended due to lack of consensus guidelines. However, targeted antifungal prophylaxis in individual recipients may be beneficial in patients who are at high risk of IFI. Our study aimed to evaluate the prevalence and associated factors of IFI among pediatric LT recipients during the early post-transplantation period.
Methods
We performed a single centre retrospective study of 118 children undergoing LT between January 2010 and December 2018. Prevalence, clinical characteristics, types and sites of IFI, and outcomes were collected.
Results
Thirty-seven (31.4 %) patients developed 38 episodes of IFI within three months after LT. Thirty-five episodes (94.6%) were caused by Candida species, with a predominance of C. albicans (57.9%) and C. tropicalis (31.6%). The median time to IFI was 11 days (IQR 4, 16). The most common site of infection was intra-abdomen (84.2 %), followed by bloodstream (10.5 %). In univariate analysis, post-operative intra-abdominal bacterial infection (HR 3.40 [CI95% 1.73-6.69]), multiple sites of infection (HR 2.11 [CI95% 1.49-2.94]), and re-operation (HR 1.73 [CI95% 1.40-2.15]) were associated with IFI following LT. In multivariate analysis, re-operation (1.56 [CI95% 1.23-1.97], p = 0.034) and intra-abdominal bacterial infection (HR 2.21 [CI95% 1.72-7.21], p = 0.001), remained the significant predictors of IFI. The case-fatality rate was 13.5% (5 of 37).
Conclusion
IFI is a significant complication, particularly during early post-operation. We highlighted the high rate of IFI among pediatric LT recipients, with Candida species being the most common pathogen in our study. Post-operative intra-abdominal bacterial infection and re-operation were associated with a higher risk of IFI after LT. These risk factors would be taken into consideration for designation of rational antifungal prophylaxis and treatment strategies in high-risk recipients.

ABST#61

Prevalence, profile and predictors of invasive fungal infections in acute on chronic liver failure; Analysis of APASL ACLF Research Consortium Data Base

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Objectives: Acute on chronic liver failure (ACLF) causes immune dysregulation and increased susceptibility to fungal infections. We studied the epidemiology, risk factors associated with invasive fungal infections (IFI) in ACLF. We correlated the timing of occurrence, predictors of development, role of biomarkers in the diagnosis, antifungal prophylaxis with the outcome of IFI.
Methods: The demographic, clinical and laboratory characteristics of ACLF patients, admitted to our tertiary care hepatobiliary centre, developing IFI were studied retrospectively based on the Asia Pacific association for the study of the liver (APASL) ACLF Research Consortium (AARC) data base. The diagnosis of IFI was based on revised definitions of invasive fungal disease from the European organization for research and treatment of cancer/Invasive fungal infections cooperative group and the national institute of allergy and infectious diseases mycoses study group (EORTC/MSG) consensus group. We also measured the biomarkers bronchoalveolar lavage (BAL) and serum Galactomannan index (GMI).
Results: Amongst 1670 patient with ACLF analysed. 320 (19.16%) who had appropriate host factors including recent history of neutropenia, prolonged use of corticosteroids or immunosuppressive therapy, and sufficient clinical evidence consistent with IFD but no mycological evidence were classified as possible IFI.60 (3.6%) who had host factors, clinical features, and mycological evidence consisting of direct test (cytology, direct microscopy, or culture) and indirect test, positive Galactomannan assay, were classified as probable IFI. Amongst the probable IFI group, the most common site of infection was urinary tract (n = 42/60, 70%) followed by respiratory (n = 12/60, 20%) and blood (n=6/60, 10%). On univariate analysis, prior antibiotic use, high total leucocuyte count (TLC), acute renal failure, hemodialysis, diabetes mellitus, multiorgan failures, were predictors for development of IFI ($p< 0.05$). On multivariate analysis, total leucocyte count (TLC) >14.3× 103 /ml3, multiorgan failure, hemodialysis and prior antibiotics use predicted the development of IFI ($p< 0.05$). IFI occurrence was associated with significantly high 30 and 90 day mortality ($p<0.001$). 68.4% patients with IFI in first 7 days of enrolment died as compared to 47.9% in control group ($p=0.002$). BAL GMI (cut off > 1) was positive in 38/60 (63.33%) and serum GMI was positive in 11/60, (18.33%). BAL GMI above 3.25 was better predictor of IFI (sensitivity 72.7%, specificity 51.5%).
Conclusion: Invasive fungal infections cause high mortality in ACLF patients. High TLC at admission, multiorgan failure, hemodialysis, prior antibiotics use and BAL GMI predict the development of IFI. High vigilance, early diagnosis and initiation of therapy is essential to prevent mortality due to IFI in ACLF.

ABST#62

Invasive Candida auris Infections: Epidemiology, Risk Factor Analysis and Management of in Tertiary Care Hepatobiliary Centre

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Objectives: C.auris infections are associated with misidentification, intrahospital transmission, poor treatment outcomes and higher mortalities. Prompt detection, earlier initiation of therapy and effective surveillance can curtail C. auris in hospitals. We aimed to study the epidemiology, risk factors and therapeutic management of invasive infections caused by C. auris in patients with hepatobiliary diseases.
Methods: Single-center, prospective study of patients with suspected invasive fungal infections between January2017-December 2018. the patients with hepatobiliary diseases. Demographics, comorbidities, and laboratory variables were recorded. The positive yeast cultures were identified by Vitek 2(Biomerieux, India), antifungal sensitivity confirmed by Broth microdilution in accordance with CLSI guidelines. The final outcome considered were mortality within one month after diagnosis or discharge of the patient with stable parameters.
Results: Total of 109 isolates of C. auris from 55 patients, blood 14(12.8%), abdominal fluids 14(12.8%), urine 58(53.21%), respiratory 4(3.6%),

liver abscess 2 (1.83%), pancreatic abscess 1(0.9%) and wound infections 3 (2.75%). Underlying disease was chronic liver disease 37 (68%), 10 (20%) post liver transplant patients, acute on chronic liver failure 4 (7%), acute liver failure 2 (3%), acute pancreatitis 1 (1.8%) and pancreatic neuroendocrine tumor 1 (1.8%). 14 (25%) patients were discharged, mortality was 41(74.04%). Risk factors were MELD 40 (p0.04), Child C (p 0.05) and CTP score above 12. Prior use of steroids (p 0.02), neutropenia (p 0.03), prolonged hospital stay (0.029), use of broad spectrum antibiotics more than 7 days (p 0.05) were the risk factors significantly associated with development of Candida auris infections and higher mortality. Co-morbidities, acute renal failure, diabetes, hepatitis infection were not significantly associated with mortality. The antifungal resistance: fluconazole 68.42%, voriconazole 14.03%, flucytosine 59.64%, amphotericin B 28 % with no resistance to caspofungin and micafungin.
Conclusion: Our study depicts the spectrum of invasive infections caused by C. auris, its prevalence, risk factors and therapeutic options. The presence of risk factors,steroid use, neutropenia, broad spectrum antibiotic use and hospital stay of more than 7 days should prompt towards escalating diagnostic measures for rapid identification of C.auris for early initiation of therapy. Active screening of patients with risk factors can also reduce mortality. The study results also help to guide empiric therapy with echinocandins as azoles and amphotericin B show high resistance in these isolates.

ABST#79
Trichosporon asahii as a cause of invasive mycosis in a COVID 19 patient. Emerging fungal infections and impact in pandemical times. Case report.
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Introduction: The association between viral agents with pandemic potential and the predisposition due to over-infection by invasive fungal forms has been reported; such is the case of Pulmonary Aspergillosis (PA) in the H1N1 pandemic event. This phenomenon has its bases in the abuse in the prolonged use of antifungals and antibacterials in the food industry, agriculture and medicine; as antifungal and active prophylaxis against fungal forms affecting the balance and in general, altering the global microbiome. At the moment, It is presumed that the wide antimicrobial exposure and the inclusion of the use of systemic corticosteroids have generated the appearance and reports of serious and emerging fungal forms. Case presentation: We admitted a 71-year-old female carrying Systemic Lupus Erythematosus (SLE) in regular treatment with prednisolone 10 mg orally daily and mycophenolate 1 g po every 12 hours who presented 1 week of dry cough and progressive dyspnea and fever. The initial arterial gases revealed Ph 7.36, PCO2 31, PO2 45, HCO3 17, Lactate 2.0, FiO2 09% and saturating 64%, a with counts cells of 5300 (differential of lymphocytes of 5%). Unprotected contact with a confirmed case of COVID-19 was reported, his RT PCR COVID 19 was positive. Management was installed with invasive mechanical ventilation, dexamethasone 6 mg iv daily, ceftriaxone 1 g iv every 12, enoxaparin 40 mg po daily, clarithromycin 500 mg iv every 12 h. The chest radiograph on admission showed bilateral pulmonary infiltrates without pleural effusion. At 48 hours after admission presented clinical deterioration requiring empirical management with meropenem and linezolid, identifying tracheitis by Klebsiella pneumoniae after 72 hours of incubation. Blood and urine cultures were negatives and Trichosporon asahii was identified by MALDI-TOF in the urine tract specimen. Coverage was offered with amphotericin B liposomal daily plus itraconazole every 12 hours. The patient died 10 days after admission with persistence of the Trichosporon asahii identified previously in the urine tract. Discussion: The genus Trichosporon sp is a fungus that lives in fresh water and oil that colonizes the skin, respiratory tract, abdominal, genital and skin. It is a rare opportunistic fungal infection that generally occurs in patients of the male gender, immunosuppressed, and with cancer. Is an acute febrile infection with a fatal spread to multiple organs associated with high mortality. Pulmonary aspergillosis associated with COVID-19 (CAPA) has been reported worldwide. In our center, at the first quarter of 2021 63 fungal forms were isolated with a domain of Candida sp, 7 Trichosporon asahii isolates, and one Aspergillus sp was isolated. In a study by Guo Li-Na et al, the Minimum Inhibitory Concentration (MIC) under CLI standards was analyzed by geometric means (MG), among the agents tested; VRC was the most potent antifungal agent in vitro against Trichosporon isolates. For some authors, the mortality of patients with and without malignancy was 55% versus 25%. Conclusion: Trichosporon sp is a genus with an elevated percentage of mortality. Treatment may include one of these antifungal azoles. Currently, emerging mycoses should be included in hospital infection control programs.

ABST#81
Disseminated Fusariosis In An Immunocompromised Host
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A 70 year old male with myelodysplastic syndrome was electively admitted for a hematopoietic stem cell transplant. During conditioning, he developed a necrotic blister over his right ring finger where he used to wear his ring. He was initially treated as for cellulitis with cloxacillin.

However, he turned hypotensive following transplantation. Blood cultures were collected, and flagged positive three days later. Direct gram smear revealed hyphae suggestive of fusariosis. Given concerns of an invasive fungal infection, intravenous voriconazole and liposomal amphotericin B were started. The blister was also deroofed and sent for culture.

Microbiological investigations revealed a fast-growing, white, cottony mold. On microscopy, fusiform macroconidia and smaller microconidia suggestive of Fusarium species were seen. Internal transcribed spacer sequencing confirmed the organism as Fusarium solani complex. Antifungal susceptibility testing was also performed.

Despite being on voriconazole and liposomal amphotericin B, the patient continued to experience complications. He developed multiple cutaneous lesions, panophthalmitis, splenic and renal microabscesses. Thankfully, after a prolonged course of antifungals, he eventually improved and was discharged well for outpatient follow-up.

ABST#94
Case Report: Pulmonary Aspergilloma in Pregnancy
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Fungal infections rarely occur in pregnancy. Aspergillus fumigatus is a ubiquitous and opportunistic organism. Immunodeficient states and a previous history of a cavitary tuberculous lesion predispose to invasive Aspergillus infection. Thus, is important to understand the natural history and treatment options for fungal diseases in pregnancy.

This case report presents a 35-year-old, married, G4P3 (3003), unemployed, Roman Catholic, Filipino who manifested with on and off hemoptysis for 5 years.

History revealed that the patient suffered from cavitary pulmonary tuberculosis and was treated with a 6-month HRZE regimen. In addition, she was also diagnosed with Diabetes Mellitus type I and was poorly compliant to insulin injections.

Computed tomography scan of the chest revealed aspergilloma formation of the right lung. The patient was maintained on itraconazole, a pregnancy Class C drug, for two years to control hemoptysis. Due to her recent pregnancy, Itraconazole was initially discontinued which resulted to recurrence of hemoptysis. Upon consult with a perinatologist, Itraconazole was continued throughout pregnancy.

The patient was hospitalized twice in our institution. At 32 weeks, she was admitted due to preterm labor. Dexamethasone 6 mg IM for 4 doses was given and was on close monitoring of blood sugar. She was discharged improved. On her second admission, patient complained of hemoptysis at 36 weeks and 4 days age of gestation and was co-managed with Internal Medicine. A primary low segment transverse cesarean section with bilateral salpingectomy was performed for deteriorating maternal status.

She delivered a healthy, live, term baby girl with a birth weight of 2940 grams, an Apgar score of 8,10 with Ballard's score of 39 weeks with no gross abnormalities.

During the course of admission, the patient still manifested with episodes of hemoptysis. Lobectomy of the right lung was initially offered but was deferred until after delivery and was managed medically instead with resumption of itraconazole 200 mg at twice daily dosing, She and her newborn were then discharged well on the fifth hospital day.

Improved access to treatment options and continuous discussion of risks and benefits with the patient and her family influenced maternal and fetal outcomes.

Keywords: aspergilloma, itraconazole, pregnancy

ABST#95
The clinical significance of colonization of respiratory tract by Candida species in intubated patients – a single-centre pilot study in Sri Lanka
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Introduction
Candida infections are an important cause of morbidity, mortality and healthcare costs. Most patients get colonized with Candida after the first week of ICU stay. Studies suggest that those with upper respiratory tract colonization were more often sicker at admission and were at risk of worse clinical outcomes such as longer ICU and hospital stay, prolonged mechanical ventilation and increased 28-day mortality.

Objectives
To describe the clinical characteristics of septic patients with isolated respiratory tract colonization with Candida species, and compare them with the non-colonized patients, in terms of duration of mechanical ventilation, ICU and hospital stay, 7th day and 28th day mortality.

Methods
A descriptive cross-sectional study was conducted for three months, which included 50 adults who were admitted to the medical and surgical intensive care units of the National Hospital of Sri Lanka for more than 96 hours with sepsis, as identified by the Sequential (Sepsis-Related) Organ Failure Assessment (SOFA) score and was mechanically ventilated for more than 48 hours. An endotracheal aspirate for fungal studies was obtained from all patients who were enrolled in the study, within 12 hours of enrollment, with other samples (blood, urine, nasogastric fluid aspirate, surgical wound swab or drained abdominal fluids) taken to exclude Candida infection or colonization as indicated.
Those who had prior Candida colonization or infection in any site at the time of enrollment and immunocompromised patients were excluded.
Those with and without upper respiratory tract colonization on the enrollment endotracheal aspirate culture was compared with regards to

clinical characteristics (duration of mechanical ventilation and ICU stay, 7th & 28th day mortality).

Results
Male to female ratio was 1.3: 1. The ages ranged from 18 - 84 years, with mean age of 52.1 years (SD 16.7).
In both groups the most common reasons for admission were with bacterial pneumonias followed by leptospirosis and post-surgical sepsis following excision of solid organ tumours and oesophageal perforations.
In those with Candida colonization, patients had a median APACHE II score on admission of 10 while in those without Candida colonization, the median value was 12.
Those with colonization had a mean duration of ventilation of 6.4 days (SD 6.4), while those without had mean duration of ventilation of 7.1 days (SD 6.2).
The duration of ICU stay for those with colonization was 7.6 days (SD 6.6) and those with out was 9.2 days (SD 8.3).
The 7th day mortality for those with Candida colonization was 11.1%, while for those patients with no colonization was 26.1%.
The 28th day mortality for those with Candida colonization was 14.8%, while for those patients with no colonization, the 28th day mortality was higher at 26.1%.

Conclusions
There were no significant differences in the clinical characteristics between the two groups, although for reasons unknown, our cohort of non-colonized patients showed higher APACHE II score on ICU admission, longer ICU stay, longer length of mechanical ventilation and greater 7th and 28th day mortality as compared to the colonized group.

ABST#96
Neutrophil-Lymphocyte ratio helps to guide antifungal treatment in critical ill patient of developing country
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OBJECTIVES
In developing countries, reduced cost of drugs and treatment in critical ill patient yet still balanced with definite and precise care is the utmost achievement in every hospital. Antifungal treatment and its monitoring are already known for their difficulties to properly assess and evaluate especially in Asian low-middle income countries. By using neutrophil-lymphocyte ratio regularly, we could monitor progression of antifungal treatment efficiently.

METHODS
Woman, 70-years-old, immune-compromised status, diagnosed with hypoactive delirium, grade 2 decubitus ulcer and urinary tract infection was treated for 20 days in high care unit. She was treated early with empirical antibiotic Ceftriaxone for 6 days and changed with Ciprofloxacin after the wound culture received. Culture shown Klebsiella and Acinetobacter baumanni and also Candida albicans involved. Ciprofloxacin was given for 5 days but no further improvement in clinical conditions. Leucocyte, C Reactive Protein (CRP) and procalcitonin levels were not suggestive enough with clinical or wound care status. Mycafungin started on the eleventh day of care and continued for 9 days until patient discharged from hospital. Due to unavailability of standard monitor for antifungal treatment, Neutrophil-lymphocyte ratio (NLR) was used to evaluate it every 4-6 days.

RESULTS
After mycafungin treatment, the clinical status was gradually improved, no signs of mild fever, laboratory results progressed and patient was discharged to home care on the twentieth day of treatment. At the beginning of ceftriaxone, NLR was 6.98, after a week of treatment, it was only decreased into 5.23, and by adding antifungal, NLR was markedly reduced to 3.25 and stayed around 3 until patient was discharged with good clinical progression. Fungal infection is widely known to compromise bacterial infection in immune-compromised patient. In the other hand, its drug monitoring level could only be achieved with Therapeutic Drug Monitoring (TDM) technique, confirmed with cultures or at least ß-Galactomannan examination in which are rarely found in our country due to limited resources. Immune-compromised patients could not show any marked inflammatory levels in their clinical signs or laboratory results. Our patient did not show any distinct increase in leucocyte, CRP, and even in procalcitonin levels. Wound cultures had already sought but needed longer time to get results (approximately 1 week) and insensitive for fungal infection. Neutrophil-lymphocyte ratio (NLR) has been shown its use in diagnosing microbial or viral infection in pediatric and COVID-19 population. By checking it every 4-6 days, there was a significant decrease of NLR associated with improved clinical signs and inconclusive laboratory results.

CONCLUSION
Neutrophil-lymphocyte ratio (NLR) could help physicians to evaluate antifungal treatment in immune-compromised patient in developing countries such as Indonesia.

Keywords : neutrophil-lymphocyte ratio antifungal critical ill developing country

ABST#108
Subcutaneous Basidiobolomycosis – the commonest form
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Introduction
Chronic abscesses in children are usually rare. Recurrent subcutaneous infections occur due to virulent organisms like Staphylococcus aureus or in patients with dermatological disorders or in immune-deficiencies. Basidiobolus species is an occasional human pathogen which can cause subcutaneous infections involving the thigh, trunk, buttock and perineal areas.

Case report
A 3-year-old girl presented to a local hospital in August 2020 with a history of a gradually enlarging painless, non-tender lesion of one week in the posterior aspect of the right mid-thigh. No associated fever or history of any trauma. Local examination revealed a lump measuring 2x3 cm. Systemic and general examination revealed no abnormalities. Sample taken for bacterial culture during incision and drainage, had no growth. The child was discharged on syrup co-amoxiclav. Poor wound healing with discharges were noted during subsequent follow-ups and managed with cleaning and dressing and antibiotics. Six weeks later wound toilet was repeated and necrotic tissues were excised. Treatment with co-amoxiclav was continued.
At follow-up after four months, healing was noted but hyperpigmentation of a vast area of the posterior mid-thigh and a subcutaneous mass solid in consistency was noticed beneath the surgical scar which raised suspicion of a deep fungal infection. The child was referred to a tertiary care hospital for further management.
Ultra-sound scans revealed an irregular hypoechoic lesion beneath the surgical scar measuring 23mmx16mmx5mm, which raised suspicion of a superficial abscess with surrounding cellulitis. Incisional biopsy done on the 5th month since initial presentation and sent for histology and culture. Pure growth of fungal isolate on blood agar plate was identified as Basidiobolus ranarum at Medical Research Institute. Histology report suspected of fungal infection. Treatment with oral itraconazole started after liver function tests and was discharged on the same. Follow up in two weeks showed significant reduction of the swelling, pain, pigmentation and induration. Treatment continued till complete clinical recovery and for a further period of four weeks.

Discussion:
Subcutaneous infections with Basidiobolus ranarum have been reported in Asian & African countries, occasionally in Sri Lanka. Timely suspicion of fungal etiology could save children from treatable deformities.

ABST#109

Gastrointestinal basidiobolomycosis: First case from Sri Lanka

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Introduction
Basidiobolomycosis is caused by Basidiobolus ranarum, an environmental saprophytic fungus. Gastrointestinal Basidiobolomycosis (GIB) has a high mortality rate due to its rarity leading to diagnostic difficulties.

Case report
A 43-year-old immunocompetent male, who worked in Saudi Arabia for 10 years presented with progressive abdominal pain, loss of appetite and intermittent fever for 4 months. CT abdomen revealed diffusely thickened bowel wall with stricture formation at multiple sites. Colonoscopy failed due to ulceration & stricture at recto-sigmoid junction. Considering impending intestinal perforation and obstruction, total colectomy was performed. Specimen was a segmentally distended alternatively constricted total colon, and terminal ileum with a patchy ulcerated mucosa. Bowel wall was markedly thickened with multiple strictures and focally friable due to necrotic areas. Microscopy showed diffuse, mixed inflammatory cell infiltrate, necrotizing granulomata rich in eosinophils and eosinophilic micro-abscesses. Fungal elements with irregularly branched, broad thin walled, pauciseptate hyphae and spores surrounded by a cuff of radiating eosinophilic material exhibiting Splendore-Hoeppli phenomenon were identified within micro-abscesses. These fungi stained positively with fungal special stains and morphology was consistent with Basidiobolomycosis. Fungal studies were performed from the biopsy specimen showed wide, irregular hyphae or fragments with infrequent septa. Fungal culture was thin, flat, waxy, buff colour colony, which became radially folded greyish brown, & covered with white aerial hyphae. Microscopy of the culture had wide hyphae with occasional septa. Other sporophores had club-shaped spores having a knob-like tip, characteristic for Basidiobolos ranarum. He was treated with oral itraconazole for seven months, while monitoring liver function tests. He recovered completely after seven months of treatment.

Discussion
GIB can simulate Crohn's disease, tuberculosis, amoebiasis and mucormycosis in histopathological and direct microscopy appearances. Diagnostic histology includes necrotizing granuloma rich in eosinophils, Spendore-Hoeppli phenomenon surrounding the fungal hyphae with characteristic features in the fungal culture & morphological features in the microscopy.

Conclusion
Diagnosis of GIB is challenging because of its rarity, nonspecific clinical & radiological findings. Histological diagnosis is challenging in endoscopic biopsies as fungi involve mucosal layer and biopsies can be negative. When characteristic features are present in histopathology & fungal studies can diagnose GIB which paves way to proper patient management.

ABST#120

COVID-19-associated pulmonary aspergillosis (CAPA) in Malaysia; a single-center study on prevalence and diagnostic challenges.

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Introduction/objective
COVID-19-associated pulmonary aspergillosis (CAPA) is a recognized complication of severe COVID-19 pneumonia conferring high morbidity and mortality. However, difficulties frequently encountered during diagnosis due to indistinguishable clinical presentations, unspecified radiological findings, and limited laboratory modalities with both high specificity and sensitivity. The objective of the study is to determine the prevalence of CAPA among hospitalized COVID-19 patients and discusses the relevant diagnostic challenges encountered in the microbiology laboratory.

Methods
This is a cross-sectional study from 1st October 2020 to 31st May 2021 conducted at Hospital Sungai Buloh, Malaysia. The study included all patients hospitalized for COVID-19 pneumonia confirmed by SARS-CoV-2 PCR. Successively, the patients who were clinically suspected with pulmonary aspergillosis were screened for galactomannan (GM) antigen using Platelia Aspergillus enzyme immunoassay (EIA) and fungal culture of lower respiratory tract specimens. The clinical and laboratory data were analyzed retrospectively and all CAPA cases were defined using the 2020 European Confederation of Medical Mycology/The International Society for Human and Animal Mycology (ECMM/ISHAM) consensus criteria.

Results
Out of 51,141 hospitalized COVID-19 patients during the study period, 64 (0.13%) patients were clinically suspected with CAPA, and 24 (37%) of them were positive for GM antigen testing. However, only 6 (0.01%) patients fit the criteria for the diagnosis of probable CAPA defined by the 2020 ECMM/ISHAM consensus. Following the consensus, 12 GM positive samples were excluded due to the unvalidated tracheal aspirate sample, 5 bronchial-alveolar lavage (BAL) samples were excluded as the GM index were >0.5 but <1.0, and 1 patient was excluded due to not requiring intensive care although the serum GM index was >1.0. The 6 probable CAPA patients ranged from 62 to 74 years old with mean age of 66. All of them received systemic corticosteroid of less than 3 weeks and had features of organizing pneumonia on CT (thorax) scan. 83% (5/6) patients were treated with broad-spectrum systemic antifungal with different durations. 50% (3/6) had secondary bacteremia and were also covered with antibiotic. Nevertheless, 66.7% (4/6) CAPA patients succumbed to death during the same admission. The index value of GM antigen ranged from 1.1-7.6 with a mean value of 3.9. Only 3 patients had BAL for fungal culture and none of them were positive for Aspergillus spp. The small prevalence (0.01%) of CAPA cases in this study as compared to previous literature could be masked by the limited testing capability and exclusion of the many cases due to inappropriate sample types. BAL GM is the only validated sample with high sensitivity pertaining to CAPA but the test is often restricted by the aerosol-generating nature of the bronchoscopy. Tracheal aspirate on the other hand allows a safer and convenient sampling but was not validated by the current GM antigen assay.

Conclusion
Future development of testing methods that can provide rapid and accurate results with wider selection of sample types will be of great use as it may increase the case detection rate representing the true cases of CAPA, facilitate diagnosis and permit early intervention.

ABST#124

Disseminated Fusarium infection in an immunocompromised patient -Successful outcome with combined antifungal therapy

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Fusarium species are plant pathogens that exist ubiquitously in the environment. While they can cause superficial and subcutaneous infections in healthy individuals, they can give rise to deep and disseminated infections in immunocompromised patients, particularly in patients with haematological malignancies resulting in a high risk of mortality. This case describes a young male diagnosed with B Cell Acute Lymphoblastic Leukaemia who developed disseminated Fusarium infection with febrile neutropenia following induction chemotherapy. Necrotic skin lesions led to the diagnosis of this patient. Though the patient had a clinical recurrence of infection due to inadequate treatment initially, he was completely cured finally with combined antifungal therapy using amphotericin B and voriconazole.

ABST#126

Acute invasive Aspergillus rhinosinusitis presenting as multiple cranial nerve palsies: A case report

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Introduction
Aspergillus species are ubiquitous in the environment. They cause a spectrum of clinical diseases depending on the immunity of the host. Acute invasive Aspergillus rhinosinusitis is a rare clinical entity. Here we report a patient who presented with multiple cranial nerve involvement following acute invasive Aspergillus rhinosinusitis.

Case report
A 47-year-old female with uncontrolled diabetes mellitus presented with left-sided headache and nasal congestion for one week followed by left hemifacial numbness, deviation of the mouth, numbness inside the mouth, double vision and difficulty in speech for three days duration. On examination, she was afebrile, dilated left pupil, blackish palatal ulcer with II, III, IV, V and VI cranial palsies.
Her white cell count was 17.72 x 103 with a neutrophil predominance. The CRP and ESR were 61mg/dL and 137mm respectively. Her fasting blood sugar was 216mg/dL. The cerebrospinal fluid (CSF) full report showed 2 polymorphs, 14 lymphocytes and 67mg/dL of proteins while the culture yielded no growth.
As the clinical picture was suggestive of mucormycosis, intravenous liposomal amphotericin B 3mg/kg per day was started.
MRI brain revealed bilateral maxillary and sphenoidal sinusitis and lacunar infarcts in the left cerebral peduncle of the midbrain and left pons at the region of the trigeminal nerve. The functional endoscopic sinus surgery (FESS) revealed possible bilateral fungal sinusitis and necrosis of the left posterior part of the middle turbinate and the nasal septum. There was fungal debris in the maxillary sinus. The direct smear of the fungal debris showed fungal filaments suggestive of Aspergillus species and the culture yielded Aspergillus flavus. With the etiological identification of the antifungal treatment was switched to voriconazole after 18 days of IV liposomal amphotericin. Isolate was sensitive for both voriconazole and amphotericin B.
The patient clinically responded to the antifungal treatment together with the surgical debridement and her inflammatory markers gradually improved. We plan to continue her antifungal treatment until she achieves clinical, radiological and microbiological cure.

Conclusion
The presence of a necrotic palatal ulcer and cranial nerve palsies in the background of uncontrolled diabetes mellitus were in favour of the diagnosis of mucormycosis in this patient. Proper mycological diagnosis of the etiological agent is very important for the management of such cases as the drug of choice for Aspergillus flavus is voriconazole. The targeted therapy and the source control contributed to the treatment success.

ABST#129
First report of Rhinocerebral mucormycosis caused by Mortierella wolfii from Sri Lanka
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Introduction
Mucormycosis is a life threatening opportunistic fungal infection which frequently affect patients with compromised immune system. Rhinocerebral form is the most common clinical manifestation of the mucormycosis (39%) and Rhizopus, Rhizomucor, and Mucor species have been described as the most frequent causative agents. Although, Mortierella species are commonly recognized as causative agents of bovine mycotic abortion and systemic infections, they have very infrequently been identified as human pathogens. Here, we present a rare case of a patient with acute myeloid leukemia who had rhinocerebral mucormycosis caused by Mortierella species.

Case report
A 19-year-old male with CD10 positive B-ALL received induction therapy with daunorubicin (DNR), vincristine (VCR), peg-asperagine and dexamethazone. On day four of induction chemotherapy, his neutrophil count dropped to 70 / µL and he complained of right sided periorbital swelling which developed into periorbital cellulitis. His condition did not improve with broad-spectrum antibacterials and warranted temporary withholding of chemotherapy and further evaluation. CECT revealed right sided pre-septal and orbital cellulitis with inflammatory sinus disease involving maxillary and ethmoidal sinuses. The direct smear with 10% KOH of necrotic tissue biopsy from the affected site revealed infrequently septate, broad, ribbon like fungal filaments consistent with zygomycetes fungi and the patient was commenced on IV amphotericin B. After four days of incubation, white, flat floccose colony with zonated surface was observed yet lactophenol cotton blue mount of the colony showed only sterile, broad, hyaline, sparsely septate fungi suggestive of zygomycetes. It remained as a sterile or nonsporulating fungus in slide culture and on special media. Finally, it produced spores with the use of floating agar method which yielded characteristic morphological features suggestive of Moritierella species. The isolate was subsequently subjected to PCR based DNA sequencing targeting ITS region which identified it as M.wolfii.
With the continuation of IV amphotericin B and repeated debulking surgeries his clinical condition improved gradually. His fever settled and inflammatory markers improved. He recovered from neutropenia and the direct smear and culture of the debulked tissue became negative for Zygomycetes on day 59 of IV amphotericin B therapy . Unfortunately, the patient left against medical advice on day 63 of amphotericin B but later presented with more severe condition when he did not made recovery.

Conclusion
We report a case of rhinocerebral mucormycosis caused by Mortierella wolfii in a neutropenic patient with ALL. When nonsporulating Mucormycetes is isolated from a specimen, Mortierella species should be suspected and should be cultured in specific culture media to induce sporulation or forward for molecular diagnosis. Early diagnosis of mucormycosis is very crucial and deep tissue biopsy is the most appropriate specimen. Prompt treatment with appropriate antifungal therapy, correction of underline precipitating factor and thorough repeated debulking surgery are the cornerstones of the management.

ABST#131
Fungal pneumonia in immunocompromised pediatric patients
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Objectives
Our aim was to explore the epidemiology and clinical outcomes of immunocompromised children admitted with fungal pneumonia in our tertiary pediatric hospital.

Method
Medical records of immunocompromised pediatric patients age < 18 years diagnosed with pneumonia were retrieved from the Pediatric Infectious Diseases database between January 2008 to October 2017.

Results
Out of 101 records of pneumonia, 29 patients had fungal pneumonia. The median age was 9 years, and 55% (n=16) were male. Most patients (n=27, 93%) had secondary immunodeficiency, with majority (89%, n=26) having a hemato-oncological cause, including 7 stem cell transplant patients. 69% of the patients (n=20) had an absolute neutrophil count <0.5x109/L preceding the time of pneumonia diagnosis; and 95% (n=19) of the neutropenic patients had prolonged severe neutropenia > 7 days duration.

Microbiological diagnoses were obtained in 26 cases (90%), of which 20 cases were through cultures from bronchoalveolar lavage, endotracheal tube aspirate, lung biopsy or blood. The most common fungus identified was Aspergillus sp. (n=17), followed by Candida sp. (n=4). One case each of Fusarium and Culvularia infection was identified. Aspergillus was presumed in 8 cases, based on positive galactomannan antigen from blood (n=1), bronchoalveolar lavage (n=3), or both (n=4). Fungal pneumonia was presumed in 3 patients based on findings of computed tomography of the chest (n=3). Viral and/or bacterial co-infection occurred in 14 cases of fungal pneumonia (48%). In the cases where microbiological diagnoses were confirmed, 25 patients (96%) received appropriate targeted antifungal treatment during their hospitalization.

Severe disease was common, with 59% of patients (n=17) needing ICU admission, 13 patients requiring intubation and 8 patients requiring chest tube insertion. Mortality occurred in 38 % (n=11) of patients with fungal pneumonia as the direct cause of death in 5 patients and aspergillus pneumonia contributing to 91% (n=10) of deaths.

Conclusion
The most common fungal pneumonia in our institution was aspergillosis. Fungal pneumonia is associated with high morbidity and mortality, especially for aspergillosis, in immunocompromised children.

ABST#133

Covid -19 and Crptococcal meningitis in a patient with lepromatous leprosy: A case report

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Introduction
Cryptococcus neoformans is an encapsulated yeast that lives in the environment throughout the world. However, Cryptococcus spp. can produce opportunistic systemic life-threatening infections. Those infections can be found in immunocompromised patients. Here, we present a cryptococcal meningitis case, who was on prolonged high dose steroid therapy for lepromatous leprosy and co-infected with Covid-19.
Case report
A 35-year-old male presented with a one-day history of a severe headache and alteration of behavior. He was diagnosed patient with lepromatous leprosy and was on long term high dose prednisolone therapy. On admission, his GCS was 15/15, no neck stiffness and haemodynamically stable. His WBC count was 16810 (N 85%, M 10%, L 4%) and CRP was 3mg/dl. His CSF was colourless, protein 30mg/dl, 116 lymphocytes/field. CSF gram stain was negative. He developed generalized fits, reduced GCS level, and blurring vision and fever while in the ward. Initially, he was managed as meningoencephalitis with acyclovir and antibiotics. Later, his blood culture was positive for Cryptococcus neoformans. Hence, liposomal amphotericin was started. However, his GCS was further deteriorated and he was intubated. A lumbar puncture was performed. CSF direct smear showed capsulated yeast cells and his repeat non-contrast CT scan showed features of cavernous sinus thrombosis.
Before, he was admitted to ICU Covid 19 rapid test was performed and it was negative, but Covid 19 PCR test was positive with a CT value of 32. However, his medical history did not reveal signs & symptoms of symptomatic Covid 19 infection. Unfortunately, due to lack of availability and other reasons Covid 19 antibody test was not done. He was managed in a separate Covid 19 ICU.
He was treated with liposomal amphotericin B and antibiotics. Four days after admitting to Covid 19 ICU he developed electrolyte imbalance, multi-organ failure, and severe sepsis. He passed away on the same day.

Conclusion
In Sri Lanka, it is not rare to have cryptococcal meningitis and most of the cases are treated appropriately in a local setting with many limitations. This patient was predisposed to both infections as he was an immunocompromised patient due to prolonged use of steroids. Covid 19 patients can get concomitant severe fungal infections and vice versa when they are immunocompromised.

ABST#135

First Covid 19 associated mucormycosis case from Sri Lanka: A Case Report

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Introduction

Mucormycosis is an angioinvasive infection caused by fungi belonging to the order Mucorales. Common aetiological agents are Rhizopus oryzae, Rhizopus microsporus, Rhizomucor pusillus, Lichtheimia corymbifera, Cunninghamella bertholletiae. The disease is commonly seen in immunocompromised individuals. Mucormycosis is not uncommon among Sri Lankan immunocompromised patients and the commonest presentation is rhinocerebral mucormycosis. Up to date, no local cases of COVID 19 associated mucormycosis (CAM) have been reported from Sri Lanka. We report the first case of CAM from Sri Lanka.

Case report

A 60-year-old diabetic patient who was not on regular oral hypoglycaemic drugs was transferred from a local hospital for further management of left-sided periorbital swelling and pain. She was recently managed at a local hospital for diabetic ketoacidosis and has had a history of fever for one week prior to hospitalization. In addition to periorbital swelling, she also complained of an intermittent mild cough for the past two weeks.

On examination she was afebrile, pulse rate was 96bpm, blood pressure was 130/80 mmHg, GCS was 14/15 with bilateral crepitations in lungs. Left periorbital cellulitis along with ophthalmoplegia and proptosis were present. Furthermore, there was necrosis in the nasal cavity and upper left eyelid. On admission, her capillary blood sugar level was 190 mg/dl. She was started on IV liposomal amphotericin B, IV antibiotics and anti-hyperglycemic drugs on admission with the suspicion of mucormycosis. Chest X-ray showed bilateral consolidations and her COVID 19 real-time PCR Ct values were E-33.3 N-33.3 respectively. Computed tomography (CT) scan showed hyperdensity over the ethmoid sinus and bilateral frontal lobe infarctions. A biopsy was taken from necrotic material for fungal studies and direct microscopy of the specimen showed aseptate, broad, ribbon-like fungal filaments suggestive of Zygomycetes spp. As the patients' condition was progressively worsening, she was transferred to ICU and started ventilating. The patient expired two days after admitting to the ICU before any surgical interventions being done.

Conclusion

This patient was managed at the local hospital for diabetic ketoacidosis, a well-known risk factor for mucormycosis. In the meantime, the patient was co-infected with COVID 19 as well. Both these risk factors along with cytokine storm following COVID 19 and the steroid use to minimize the cytokine-induced reactions have been acted simultaneously to worsen the clinical condition which needed ICU care with ventilation. This has hindered the surgical intervention of de-bulking and debridement of necrotic tissues.

ABST#137

Eumycetoma by Madurella grisea – Case Report from Sri Lanka

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Case Report

A fifty-five-year-old male presented with a history of progressively spreading, multiple sinuses with a recurrent discharge from the right sole for seven years. Discharge contained purulent material mixed with blood. The onset was following a trauma injury to his right instep while working in the fields. Dermatological examination of the right foot revealed non-tender, hypertrophic cribriform scars over the instep, studded with nodules and sinuses discharging mucopurulent material. There was no regional lymphadenopathy, impairment of mobility of right foot or gait disturbance. X-ray of the right foot revealed no bony involvement. He was treated with different antibacterials (amoxicillin, cotrimoxazole and ciprofloxacin) for a long duration (5 years) and oral itraconazole 100mg daily and dapsone 100mg daily for a one-year duration.

The patient was referred to the microbiology clinic. All treatment was omitted in view of collecting a fresh sample for fungal & bacterial studies and histopathology. After three weeks' patient developed pain and sinus discharge. Punched biopsy was performed and specimens were sent for fungal and bacteriological studies.

Fungal direct microscopy revealed fungal filaments. Two weeks later a small conical, grey, folded growth with a white powdery surface was noticed on the surface of the medium. The reverse was brown with peripheral diffusion of the pigment. Based on the colony characteristics and typical microscopic picture, the fungus was identified as Madurella grisea. The patient has been started on oral itraconazole 200 mg twice daily and responded well. He is being followed up at the clinic and the plan is to continue antifungal treatment few more months after his clinical signs & symptoms resolve.

Conclusion

Re-emphasize proper sampling, correct diagnosis, and correct dosage of chemotherapeutic agents in order to achieve satisfactory results in a condition known to respond poorly to all known modalities of treatment.

ABST#141

Mucormycosis: A diagnostic and therapeutic challenge

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Introduction
Mucormycosis is a life-threatening fungal infection occurring in humans, which is caused by the saprophytic fungi, belonging to order Mucorales. As it is a medical emergency, a high level of suspicion and prompt diagnosis is very important in reducing mortality and morbidity. We report a patient with atypical manifestation of mucormycosis involving maxillary sinus.

Case Report
A 57-year-old uncontrolled, diabetic farmer presented with pain around the left molar tooth for three days duration. He also had a diff iculty in wearing his upper removable denture due to a projection on his left upper buccal sulcus for one week. On examination, he didn't have facial swelling, but mild tenderness over the left maxillary region, intraoral mucosal swelling on the left upper b uccal sulcus with mild tenderness was noted. Intraoral periapical radiograph and CT scan were normal but occipitomental radiograph revealed a significant opacity in the left maxillary sinus.
Although clinically the presentation was of a closed abscess, left maxillary sinus exploration was performed. Bone necrosis extending from the left palate to the pterygoid plate and zygomatic bone was noted. Specimens were sent for histopathology and fungal studies.
The direct examination revealed wide, ribbon-like, non-septate hyaline hyphae with 90° branching and fungal culture yielded Rhizopus arrhizus. Histopathology also revealed the possibility of mucormycosis.
IV liposomal amphotericin B (3 mg/kg/day) was started. After achieving good glycaemic control extensive surgical debridement was done several times while administering amphotericin B (continued for 31 days). The patient achieved a profound clinical, radiologi cal & microbiological recovery. At a later review, an oro-antral fistula was noted and waiting to follow up with a CT scan.

Conclusion
Atypical manifestations of mucormycosis need a high level of intuition and clinical suspicion to make a timely diagnosis. Com prehensive management includes precise identification of the fungal infection, correction of predisposing factors, adequate repeated extensive surgical debridement, appropriate prompt systemic antifungal therapy and methodical approach through patient education and increase aw areness of the medical teams associated in the treatment process to overcome the anticipated complications with regard to the administration of amphotericin B.

ABST#142

Mucormycosis infection in apparently immunocompetent adult ICU patients: Clinical spectrum and outcome

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ABSTRACT

OBJECTIVE
Mucormycosis is an uncommon fungal infection, mainly described in malignancy and immunosuppressed population. There is scarci ty of literature on Mucormycosis infection in apparently immunocompetent adults having acute illn ess. In present study, we describe clinical spectrum and outcome of adult ICU patients who had Mucormycosis infection.

METHODS
This study was conducted at a 20 bed ICU of the Department of Critical Care Medicine of a university hospital from north India. In this retrospective study, patient's medical record were searched through hospital information system for the diagnosis of Mucormy cosis among adult patients who required admission in the ICU during July 2018 – June 2021. The diagnosis of Mucormycosis was confirmed either microbiologically or histopathological in the appropriate clinical samples. Demographic, clinical characteristics, site of Mu cormycosis infection, its specific management including surgical intervention and survival status at ICU discharge were collected for all included patients.

RESULTS
During 3 years study period, 580 adult patients were admitted in the ICU. Eight patients with confirmed diagnosis of Mucormyc osis were included in the analysis, with median age 45.5 year (range 26- 58 years) and four (50%) were male. Six patients had co-morbid condition; hypothyroidism (37.5%), diabetes mellitus (25%), hypertension (12.5%) and obstructed sleep apnea (12.5%). At ICU admission, m edian Sequential Organ Failure Assessment (SOFA) score was 5.5 (range 4-16); primary diagnosis was surgical in 2 patients, while medical in 6 patients (including 3 patients with post Covid pneumonia).
The site of Mucormycosis infection were gastrointestinal in 3 patients (37.5%), rhino-orbito-cerebral in 3 (37.5%), renal in 1 (12.5%), and nasal involvement in 1 (12.5%). The diagnosis of Mucormycosis was made microbiological in 4 (50%) patients and histopathological ti ssue diagnosis in remaining 50%. The median duration from the day of onset of acute illness to diagn osis of Mucormycosis was 26 days (range 12-100 days); while the median duration from ICU admission to Mucormycosis diagnosis was 7 days (range 4-70 days). All patients received first line drug therapy of Amphotericin. Additionally, 6 patients (75%) receive d surgical intervention. The median length of ICU stay after Mucormycosis diagnosis was 8.5 days (range 7-27 days). All but one patient died.

CONCLUSION
In our study, Mucormycosis had varied clinical site infection in acutely ill adult patients who were apparently immunocompetent. These patients had very high mortality (88%) at ICU discharge, despite medical therapy and surgical intervention.

ABST#146

Mucormycosis and NK/T cell lymphoma: A case series and literature review

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Background: Invasive fungal rhinosinusitis is a rare disease characterized by an aggressive and fatal angioinvasive infection. Invasive fungal rhinosinusitis usually occurs in immunocompromised patients. Limited studies describing invasive fungal rhinosinusitis concomitant with NK / T cell lymphoma. Objective: To describe an invasive fungal rhinosinusitis with NK / T cell lymphoma through a case series and review the current literature. Methods: Case series of 2 patients Invasive fungal rhinosinusitis with NK-T cell lymphoma. Systemmatic literature searching was done based on clinical questions, inclusion criteria and exclusion criteria in Pubmed, Proquest, Ebsco databases as well as hand searching. Results: We present 2 cases of invasive fungal rhinosinusitis with NK / T cell lymphoma within 2020-2021, one of these cases died. There were 3 studies that was appraised according to clinical questions. Conclusion: Although a temporal relations of invasive fungal rhinosinusitis and NK / T cell lymphoma was hard to establish, these cases all demonstrated similar symptoms. Therefore, we would like to acknowledge that awareness of knowing pathological and mycological findings in suspected invasive fungal infection patient is mandatory.

ABST#159

First paediatric patient with gastric basidiobolomycosis in Sri Lanka: A case report

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Introduction
Basidiobolomycosis is a rare fungal infection caused by the saphrophytic fungus Basidiobolus ranarum. They are found in decaying vegetation, skin of insects and dung of reptiles and amphibians. This fungus typically affects immunocompetent hosts and causes firm non-tender subcutaneous swellings in limbs, buttocks and perineum. Rarely basidiobolomycosis affects the gastrointestinal tract. Though most cases have been from Middle Eastern countries, Iran and USA, a single case (adult patient) has been reported from Sri Lanka. We present the first paediatric patient with gastric basidiobolomycosis masquerading as a gastric malignancy.

Case report
A 10-year-old previously healthy boy presented with a two-months history of abdominal pain, weight loss and diarrhoea. He had no history of overseas travel.
On examination he had an abdominal mass which was confirmed on ultrasound scan of the abdomen. The initial full blood count was WBC 18.3 10^9/L, with 80% neutrophils and 3% eosinophils. His ESR was 57mm/1st hr and CRP was 91mg/L. His liver and renal function were normal. Contrast enhanced computed tomography (CECT) scan of the abdomen showed significant diffuse thickening in the fundus and greater curvature of the stomach with some thickening extending to the pylorus and duodenum and enlarged para-aortic lymph nodes. Upper gastrointestinal endoscopy showed a poorly distending stomach with few nodules and a mildly elevated area. Histology of specimens obtained during endoscopy revealed mild chronic gastritis and no evidence of dysplasia or signet cells. His colonoscopy was normal.
Histology of stomach specimens obtained during the mini laparotomy revealed numerous necrotic eosinophilic granulomata with adjacent reactive spindle cells which were presumed to be fibroblasts. Immunohistochemistry was performed to exclude an inflammatory myofibroblastic tumour, gastrointestinal stromal tumour or a lymphoma.
Negative mantoux test excluded the possibility of tuberculosis. During the laparotomy increased thickness of the lesion and infiltration to the body and tail of the pancreas was noted. Further sampling was done and resection was abandoned due to widespread nature of the lesion. Histopathology revealed cellular granulation tissue rich in eosinophils and few giant cells with broad aseptate fungal hyphae with thin walls. Splendore-Hoeppli phenomenon was noted. Direct microscopy with KOH revealed broad, aseptate fungal hyphae while fungal culture was negative. From the above clinical & laboratory evidence, diagnosis of gastric basidiobolomycosis was confirmed.
He was treated withn intravenous liposomal amphotericin B for two months and oral itraconazole which he is being on for the last seven months. Repeat CT showed therapeutic response with reduced gastric wall thickening and size of lymph nodes. The child is clinically well and has gained weight. We are planning to continue oral itraconazole until all the symptoms subside and further three months.

Conclusion
As rare things do happen, it is very important to diagnose the infective pathogen before starting antimicrobial chemotherapy.

ABST#166

First Sri Lankan child with Conidiobolomycosis – A rare incidence

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Introduction
Conidiobolomycosis is a chronic sub cutaneous fungal infection of the rhino-facial region. It is an uncommon condition that usually affect immunocompetent adults in tropical and subtropical countries. Lesions originate in the nasal mucosa and spread to adjacent sub cutaneous tissues of face causing severe disfigurement. Cases have been reported from West Africa, Madagascar, India, China, South & Central America and Sri Lanka has reported few adult patients with the disease. The causative fungi belong to genus Conidiobolus are found in soil, decaying

wood and in decomposing vegetation in tropical rain forests. We report the first Sri Lankan child with conidiobolomycosis.

Case report
A 10-year-old boy presented with a history of nasal obstruction and progressive nasal swelling for three months duration. No history of sinusitis, allergic rhinitis, minor trauma or insect bite. Examination revealed a swollen, disfigured nose. The rest of the general and systemic examination was normal. Computerized tomography (CT) of head revealed sino-nasal polyposis with chronic inflammatory sinus disease. Two days later external open rhinoplasty was performed and a growth arising from right lateral wall of the nose spreading to both sides up to the nasal bridge was observed. Biopsy samples were collected for laboratory diagnosis and those were sent for histopathology and fungal studies. Specimens sent for fungal studies revealed broad, thin-walled, irregularly branched fungal hyphae with infrequent septa, in the direct microscopy and the culture was positive for Conidiobolus coronatus. Fungal filaments were seen in the histopathological slides also.
Oral itraconazole was started and the patient was discharged. Follow up after two weeks of treatment showed significant reduction of the swelling, and improvement in nasal obstruction. Treatment was planned to continue until four weeks after the complete clinical recovery while monitoring liver functions.

Conclusion
Conidiobolomycosis is uncommon in children. Awareness about its existence in the country will enable the clinicians to have a high degree of suspicion and timely diagnosis that would lead to appropriate treatment and prevention of deformities.

ABST#169
Ocular infections by an emerging fungal pathogen: A case series from a tertiary eye care centre in India
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Ocular fungal infections represent a significant cause of loss of vision due to involvement of different segments of eye. Aspergillus species have been implicated in a wide variety of primary ocular conditions, characterized by either slow and asymptomatic infection, or rapid, uncontrollable progression. While Aspergillus flavus, Aspergillus niger and Aspergillus fumigatus are the most common species of Aspergillus implicated in ocular infections; there are some saprophytic species also which can on occasion lead to serious ocular infections, more so with the advent and burgeoning of invasive ocular procedures. We report a case series including two cases of keratitis and one of recurrent endophthalmitis caused by Aspergillus nidulans- a mold very rarely associated with human infections. All the cases were postoperative and developed complicated ocular infections 1 week-4 years post surgery. Diminution of vision was the most common presenting feature. One of the cases was immunosuppressed having diabetes mellitus. The microbiological diagnosis was done by conventional microscopy, culture and slide culture techniques. Potassium hydroxide microscopy revealed fungal hyphae in two cases and culture grew Aspergillus nidulans in all the three cases. These cases illustrate the potential of uncommon fungal pathogens like A.nidulans to cause devastating ocular infections and also emphasize the importance of timely microbiological diagnosis to aid the management of such cases.

ABST#173
Characterization, Virulence and AFST patterns of Candidemia isolates from COVID-19 positive vs COVID-19 negative patients over the 1st wave and 2nd wave period of the COVID-19 pandemic from a tertiary health care hospital in South India
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Objectives

To isolate and speciate Candida species from blood
To demonstrate the virulence factors and to perform AFST
To compare the results among COVID-19 positive and negative patients.

Methods

Candida isolates from consecutive non-repetitive blood cultures over a 1 year period were included after obtaining IHEC clearance.

Speciation was done using phenotypic methods(colony morphology, germ tube, Gram's stain, chrome agar, dalmau technique), biochemical tests(sugar fermentation and assimilation) and physiological tests(temperature differentiation, growth in presence of 6.5%NaCl and 0.1%actidione, urease production) and was confirmed by VITEK, PCR-RFLP and MALDI-TOF.

Virulence factors like production of Hemolysin(7% sheep blood agar), Phospholipase(egg yolk agar) and Esterase(agar with 0.1% tween-80) were demonstrated.
Biofilm production was demonstrated by both test-tube method and micro-titre plate method in triplicates and the mean OD value was recorded.

Antifungal-susceptibility testing was performed according to CLSI guidelines using suitable controls.

The results were compared.

Results

A total of 27(n=27) Candidemia isolates isolated from 3632 samples(0.74%) were included in this observational study over a 1 year period. It covered both the first and second wave of the COVID-19 pandemic. July 2020-December 2020 had 14 isolates from 1727 samples(0.81%) and January 2021-June 2021 had 13 isolates from 1905 samples(0.68%).

The study population comprised mostly of adults(23) and newborn(4), 20 were male and 7 female. Mean age-group was 44.26 years. RT-PCR for COVID-19 was positive in 16 and negative in 11 patients.

The common risk factors were presence of in-situ lines(100%), ICU stay(77.77%), broad spectrum antibiotics(66.66%), COVID-19(59.26%), steroids(51.85%), diabetes(48.15%), CKD(40.74%), haemodialysis(18.52%) and transplantation(11.11%).

History of previous antifungal use was elicited in 3 patients.

The phenotypic speciation of the 12 isolates during 1st wave was in concordance with VITEK,MALDI-TOF and PCR-RFLP ID's. C.auris(2), C.albicans(5), C.parapsilosis(1) and C.tropicalis(4). VITEK ID of the remaining 2 isolates: C.famata(2). MALDI-TOF and PCR results-awaited.

The phenotypic and VITEK identification of the 2nd wave isolates were C.famata(3), C.auris(3), C.parapsilosis(3) and C.tropicalis(4). MALDI-TOF and PCR results–awaited.

M/C isolate of the 1st wave: C.albicans(35.71%), whereas during 2nd wave it was C.tropicalis(30.77%).

M/C isolate among COVID-19 patients was C.tropicalis(37.5%) and among COVID-19 negative patients it was C.albicans(36.36%).

Overall profile: C.tropicalis(29.63%) followed by C.famata, C.albicans, C.auris(each 18.52%) and C.parapsilosis(14.81%).

The overall sensitivity% of the isolates to antifungal agents: Fluconazole(33.33%), Ketaconazole(48.15%), Itraconazole(33.33%) and Amphotericin-B(100%).

The most sensitive species was C.tropicalis-Fluconazole(75%), Ketaconazole(75%), Itraconazole(50%) and Amphotericin-B(100%).

The most resistant species was C.auris-Fluconazole(0%), Ketaconazole(50%), Itraconazole(50%) and Amphotericin-B(100%).

Virulence testing of the 12 isolates during 1st wave showed biofilm production(7), hemolysin(12), esterase(12) and phospholipase(7). 2nd wave virulence testing-ongoing.

The therapeutic outcome of 19 patients(70.37%) was good while 8(29.63%) succumbed to the disease.

Conclusion

This study throws light on Candidemia during the COVID-19 pandemic over a 1 year period in our institution along with their virulence and susceptibility patterns.

The risk factors of COVID-19, ICU stay, diabetes and CKD proved to be fatal among our study group.

A high index of clinical suspicion among the at-risk patients (with sepsis not responding to antimicrobials), early detection of Candidemia, speciation and its susceptibility patterns contributes to better therapeutic outcomes.

ABST#178

Candidaemia in an immunocompetent patient – A diagnostic blind spot

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Introduction: Candida species is a common commensal fungus inhabiting human skin and gastrointestinal tract. Risk factors for bloodstream infection with candida includes immunocompromised states like prolonged broad-spectrum antibiotic use, chronic glucocorticoid use, diabetes mellitus, chronic renal failure, haematological disease, solid tumours, HIV infection and previous history of catheter related bloodstream infection with candida. It is said 50% of invasive disseminated candidiasis presents with CNS manifestations although most are asymptomatic. CNS manifestations of Candida sp. includes micro abscesses, strokes, ring enhancing and nodular lesions etc. Mortality rates with invasive candidiasis and candida sepsis is still very high in spite of effective treatment with echinocandins and amphotericin and revolves around 70% in hospitalised patients. It is the fourth highest cause of death in the US. However invasive candidiasis would not be among the top differential diagnosis in a case of fever in a young immunocompetent patient. Here we describe such a case of a young patient with fungal sepsis.

Clinical Case details: This was a 33 year old female without any comorbidities who presented with low grade fever, dyspnoea and cough with scanty expectoration for 15 days. On examination she was pale, with pedal oedema, raised jugular pressure and coarse crepitations in right

apical and mammary area. CT scan showed right upper lobar pneumonia. Blood investigations only revealed mild leukopenia initially which concerted to leucocytosis in course of hospitalisation with normal to raised neutrophil counts. In spite of antibiotic therapy, she continued to deteriorate and developed altered sensorium. No signs of meningeal irritation were present. Sputum for Acid fast bacilli was negative. MRI Brain revealed multiple ring enhancing lesions with the differentials of fungal infection, toxoplasmosis or tuberculoma.
Subsequently, blood and sputum fungal culture detected candida sepsis. Urine culture also revealed growth of candida species. HIV was negative. Immediate management started with echinocandins and azoles but unfortunately the patient succumbed to her illness

Conclusion: Though in chronically ill and debilitated hospitalised patients candidemia is a serious health concern with high mortality, however this case report highlights that in immunocompetent adults also it is of paramount importance to have a low threshold for clinical suspicion of candida fungaemia for early diagnosis and appropriate management.

ABST#183
Initial therapy of combination antifungals versus amphotericin B monotherapy in reducing mortality of mucormycosis: An evidence-based case report
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Objectives: Mucormycosis is a life-threatening infection caused by fungi belonging to the order Mucorales. Immunosuppressed individuals are at increased risk of developing mucormycosis. Although mucormycosis is rare, but often significantly fatal with high morbidity and mortality. Amphotericin B remains the first-line choice of drug for initial treatment, with lipid formulation as the preferable option compared to deoxycholate preparation due to better safety issues. However, recent advances of antifungal agents have established clinicians to access wide-ranging treatment choices. Initial combination antifungal therapy employing amphotericin B, echinocandin, posaconazole, or itraconazole has been reported in the literature. This evidence-based case report (EBCR) was established to gather and appraise studies regarding the initial combination of any form of antifungal therapy compared to amphotericin B monotherapy to reduce mortality among patients with mucormycosis.

Methods: A literature searching strategy was conducted in Pubmed-NCBI and ScienceDirect to address the clinical problem. Specific keywords used were “antifungal” AND “combination” AND “monotherapy” AND “amphotericin B” AND “mortality” AND “mucormycosis”. The selected studies were critically appraised for validity, importance, and applicability as per the Centre for Evidence-based Medicine (CEBM) appraisal tools.

Results: Forty-four articles were obtained from the search strategy. Based on the inclusion and exclusion criteria of this EBCR, one relevant article was obtained. Jeong et al. established a systematic review of published case reports and series comprising proven and probable mucormycosis according to the European Organization for Research and Treatment of Cancer/Mycoses Study Group criteria. One of the outcomes from the study demonstrated 90-day mortality of patients receiving initial monotherapy of amphotericin B compared to combination antifungals incorporating amphotericin B with echinocandin or posaconazole or itraconazole. In addition, amphotericin B was also concurrently administered with posaconazole and echinocandin. According to the study, initial therapy with combination of any form antifungals did not significantly reduce the 90-day mortality compared to monotherapy with conventional or lipid amphotericin B (relative risk = 1.02 and 0.91, respectively).

Conclusion: Initial therapy of combination antifungals comprising amphotericin B with echinocandin or posaconazole or itraconazole did not significantly reduce mortality compared to amphotericin B monotherapy. However, further investigations are essential to establish more convincing studies regarding the recommendation of combination antifungals in the management of mucormycosis.

ABST#184
Fungal keratitis due to a rare fungus Fusarium lichenicola: A case report
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Introduction:
Fungal keratitis (FK) is a leading cause of monocular blindness in the tropics. India has witnessed an alarming rise in cases of FK in the past few decades. Fusarium lichenicola, a rarely isolated fungus, is a cause of relatively aggressive keratitis following ocular trauma. We describe a rare case of keratitis by Fusarium lichenicola from a patient in North India.

Case:
A 28 years old male presented with complaints of severe pain, redness, and watering from the right eye for 20 days. The patient gave a history of foreign body in the right eye a month ago. On ophthalmological examination, he was found to have features of fungal keratitis such as decreased visual acuity, greyish-white infiltrates, multiple pin-head sized satellite lesions, and, circumciliary congestion with hypopyon. A 10% KOH mount of the corneal scraping showed hyaline, septate branching fungal hyphae. Culture on Sabouraud’s Dextrose Agar (SDA) revealed velvety to floccose, white growth with a pinkish-brown rim on SDA. A diffusible chestnut red-brown pigment was also produced. Microscopic examination showed numerous ellipsoid to cylindrical macroconidia with 2-4 septae. The apex was blunt while the base was truncated with an offset pedicel. No distinctive foot cells and no microconidia were appreciated. Numerous thick-walled, globose, chlamydospores originating from short lateral branches on the hyphae were also observed. The identity was confirmed by sequencing the Internal Transcribed Spacer (ITS) regions, ITS1, and ITS 4. The isolate was finally identified as F. lichenicola, based on nucleotide homology of 100% with F. lichenicola culture-

collection NCCPF:570003 (Accession number: KM921661.1). The patient had been started on topical (hourly natamycin 5%) and systemic (ketoconazole 200 mg BD) antifungals on initial presentation because of fungal keratitis. Though the patient was called to evaluate progress at 2 weeks, he was lost to follow up.

Conclusion:
Currently, fungal cultures remain the gold standard to diagnose keratitis caused by F. lichenicola. Microscopic findings though specific, may lack sensitivity especially in the hands of inexperienced microbiologists. The authors postulate that F. lichenicola is, perhaps, misdiagnosed as F. solani or reported as Fusarium species in the absence of diagnostic tools to help confirm the species. A microbiologist must be able to correctly identify F. lichenicola based on macroscopic and microscopic features alone, as sequencing and other molecular diagnostics may not be feasible especially in resource-limited settings.

ABST#191
Delayed diagnosis of mycetoma: when is the appropriate time to initiate therapy?
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Mycetoma is a chronic granulomatous suppurative disease of the skin and subcutaneous tissue which manifests as painless subcutaneous nodules, multiple sinuses, and discharge that contains grains. Mycetoma can be caused by saprophytic fungus (eumycetoma) or actinomycetes (actinomycetoma) which can be found in soil, water, or plants. Since the therapeutic options for each diseases vary, thorough diagnostic approach is necessary before initiating therapy. Although associated with low mortality, early diagnosis and proper treatment is imperative to prevent morbidities such as deformity and disability due to destruction of skin and adjacent tissue.

We report a case of a 55-year-old male with multiple subcutaneous nodules on the left foot since one and a half years ago. The lesion started as solitary nodule on the sole of the left foot which multiplied and expanded all over the foot. The nodules hardened, eroded, and formed sinuses, with malodorous discharge. The patient was not aware of any grains originating from the sinuses. Physical examination revealed multiple solid erythematous nodules with tumefaction on the left foot. There is also erosion, excoriations, with formations of yellow-to-black crust on top of the nodules. The adjacent skin was hyperpigmented and swollen. Radiological examination of the left foot showed osteomyelitis. The patient has been biopsied several times during the past by surgeons and dermatologists, yet the results were inconclusive. No granules were found from the previous histopathological examinations.

Samples of exudate and tissue was taken for direct examination and histopathological examination. Subsequent culture and resistance examination for bacterial and fungal organism were performed. The last histopathological examination shows numerous polymorphonuclear cells, lymphocytes, histiocytes, plasma cells with fine granules on the centre. Basophilic structure surrounded by eosinophilic material known as the Splendore-Hoeppli phenomenon was also found. As additional staining such as Periodic acid Schiff and Ziehl-Neelsen weren't covered by the national health insurance, therefore they were not performed. Fungal culture examinations showed no growth of microorganisms. Considering the clinical progression and the fine granules observed on the histopathological examination, we decided to initiate the regimen for actinomycetoma immediately.

The patient presented with bone complications, thus intravenous aminoglycoside and cotrimoxazole for 5 weeks should be the treatment of choice. The patient was given 600 mg of rifampicin and 1600/320 mg of cotrimoxazole in divided dose instead which is indicated for uncomplicated actinomycetoma. The oral rifampicin and cotrimoxazole was considered more appropriate for the patient to reduce the need for hospitalization in the COVID pandemic era.

This case demonstrates the importance of experience in performing deep skin biopsy and choosing the precise lesion in cases of mycetoma. Performing biopsy on infiltrative skin lesion rather than fibrotic ones is recommended. In toto biopsy should be performed if possible.

ABST#193
Successful fluconazole treatment in treating tinea unguium patient with human immunodeficiency virus infection
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Introduction: Fungal infections of the feet including tinea unguium are very common in the general population, and Trichophyton rubrum is the most common aetiology. Dermatophytosis often occurs in Human Immunodeficiency Virus (HIV) infection. Treatment of tinea ungium in HIV patients is still challenging because they have a chronic clinical course that requires longer therapy, higher costs, and a high rate of treatment failure. Fluconazole is not a first-line treatment for tinea unguium but used because of drug availability, lower interaction with Highly Active Antiretroviral Therapy (HAART), activity against dermatophytes and some candida, and still detectable in nails up to 6 months after the last dose. Case: A 47-year-old male patient complained of damaged toenails since three months ago, both toenails appear brittle, dull, thickened and the nail color changes to yellowish white. Patient diagnosed with HIV since 2007 with CD4 count 480 cells/mL, received HAART treatment (lamivudine 150mg, zidovudine 300mg and nevirapine 200mg). On the toenail there was a yellowish-white dyschromia on almost the entire nail surface accompanied by onychodystrophy, onycholysis and subungual hyperkeratosis. Onychomycosis Severity Index (OSI) for right and left toenail 35 and 22 respectively. Potassium hydroxide 20% showing the presence of long branching hyphae with septate. On Sabouraud Dextrose Agar showed a thick white cottony colony with a velvety surface and purplish red on backside. Microscopic examination showed the presence

of long septate hyphae and microconidia in clusters at the periphery of the hyphae in the form of teardrops and birds-on-wire image that specific to Trichophyton rubrum. The treatment is 12 month of fluconazole, 150 mg/week intraoral. Discussion: Risk factors of tinea unguium infection include immunocompromised such as HIV infection. In HIV, immune dysregulation which causes reduced production of interferon gamma, decreased phagocytic activity of macrophages and neutrophil chemotaxis. The most common type of onychomycosis in HIV patients with high CD4 cell counts is Onychomcosis Subungual Distal Lateral caused by T. mentagrophytes. In HIV, The infection is more chronic course, rapid clinical deterioration and more refractory disease. Fluconazole is a triazole antifungal is second-line therapy in tinea ungium, it has lower effectiveness for tinea ungium than terbinafine and itraconazole. However, fluconazole has lower drug interactions with nevirapine. Administration of fluconazole has not been reported to cause an increase in plasma nevirapine concentrations. Clinical cure is achieved when 80-100% of nails appear healthy, whereas mycologically is no longer found. At the 12th month observation, there was a decrease in the OSI decreased to 2. Some of the poor prognostic factors found in the patient were large nail affected, nail matrix involvement, subungual hyperkeratosis and HIV infection. Conclusion: Although fluconazole is second-line therapy, but in this case of immunosuppressed patient, complete cure of tinea unguium occurred. No side effects were found in this case despite being taken together with nevirapine for twelve months. However, because the patient has immunosuppression, the recurrence rate in this case is high, and continuous follow-up should be done.

Keywords : fluconazole, tricophyton rubrum, tinea unguium, HIV, dermatophytosis

ABST#196

Mycotic keratitis – Our experience during the COVID 19 Pandemic.

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Methods
This study was conducted over a 8 month period in the Mycology section, Department of Microbiology. A total of 12 Patients attending the Ophthalmology out patient depatment with history and examination findings suggestive of Mycotic etiology were included in this study. A detailed history and examination was carried out at the OPD and the corneal scrapings were collected and sent inoculated into 5% sheep blood agar, chocolate agar and Sabouraud's Dextrose Agar (SDA) and a KOH mount was sent for screening for the presence of fungal elements. When growth occurred, yeasts were subject to Gram stain, Chrome agar, urease test, temperature differentiation, growth in the presence of actidione, salt tolerance and Dalmau's technique. Species confirmation and antifungal susceptibility (for Candida) was done using Vitek 2 compact automated ID system. Confirmation was also done using MALDI TOF Mass Spectrometry or colony PCR.
Molds were subjected to LPCB and slide culture. Temperature differentiation and growth in the presence of actidione was also checked. For non sporulating molds, water culture, banana peel culture, and an indigenous in house wood agar was done . The isolates were confirmed by these conventional methods and submitted to PGIMER for molecular confirmation.
Results
A total of 12 pts of fungal keratitis are described in our study,10 males aged between 18 and 56 and 2 women in their late 20s.All the patients presented early (2 days – 1 week) and they had significant risk factors like h/o trauma. One of the patients had no h/o trauma, his occupational history was significant. Two of the patients were on topical steroids prior to the OPD visit. All the patients were on antibiotic therapy. Three of the patients were on topical antifungals. These patients had progressed rapidly and needed a therapeutic keratoplasty, while the others were managed conservatively. Candida species was the commonest isolate followed by one isolate of Trichosporon asahii and filamentous fungi (one each of Fusarium solani,Curvalaria lunata,Aspergillus terreus). A non sporulating mold and a dermatatious mold are yet to be identified.
Discussion
Fusarium, Aspergillus and Candia spps are the common agents reported in literature. However many rare agents have also been documented like in our study.
The commonly associated risk factors in our study are trauma, use of corticosteroids, immunocompromised states, contact lens wear and topical antifungals.
Conclusion
Mycotic Keratitis / Fungal corneal infections have emerged as a major eye disease globally and are a preventable cause of blindness. The tropical climate of India coupled with the facts that agriculture is the main occupation and that fungi are present in major crops seems to be the reason for fungi being the frequently associated etiological agents.
The prognosis worsens with delayed treatment, with inadvertent antifungal agents and takes a recalcitrant course. Intrinsic resistance has to be borne in mind while choosing the antifungals.
Identification up to species level, and documenting regional MIC values is important for good prognosis

Cutaneous/superficial fungal infections

ABST#20

Fungi associated with Philippine cacao (Theobroma cacao L.).

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Objectives
The Philippine cacao industry is currently rising due to its demand in the global market. Ascribed to its apparent need, Theobroma cacao L. (cacao) has been identified as a priority crop of the Department of Science and Technology; hence, the emergence of the "Philippine Cacao Challenge 2020" campaign to sustain the demand, and to motivate stakeholders and farmers. Accordingly, natural factors including pathogenic fungi may affect the production of cacao; thus, the objective of this research is to identify the fungi associated with Philippine cacao by morphological and molecular analysis.

Methods
Fungal samples were isolated in different parts of T. cacao L. such as bark, leaves, and fruits at a cacao plantation in Alfonso, Cavite, Philippines. All samples were brought, processed and preliminarily identified at the Polytechnic University of the Philippines, Manila. Purified fungal isolates observed morphologically were described based upon colony characteristics such as their aerial mycelium, elevation, margin, odor, color, shape, and size. For microscopic characterization, the structures that were identified as sexual and asexual that are vital to essential taxonomic classification were observed such as conidia, conidiophores, chlamydospores, and other spore-bearing structures. Likewise, the primers ITS1 and V9G were used for partial ITS sequencing on the molecular study of the fungal isolates. Finally, a phylogenetic tree was constructed through maximum likelihood analysis using MEGA7.

Results
Nine purified colonies were subjected to the morphological observation and molecular analysis with a ratio of 1:5:3 plates for infected bark, leaves, and pods, respectively. Phylogenetic analysis using the partial ITS sequence revealed that the fungal isolated from the infected bark was Lasiodiplodia sp. Subsequently, isolates from infected leaves were identified as Lasiodiplodia laeliocattleyae, Lasiodiplodia sp., and Trichoderma parareesei. Lastly, Lasiodiplodia laeliocattleyae and were identified from infected pods.

Conclusions
Philippine cacao (T. cacao L.) were found to be susceptible to infections with various fungal species. For this research, a total of four species were identified in the sample isolates that mainly belong to Phylum Ascomycota: L. laeliocattleyae and Lasiodiplodia sp., Trichoderma parareesei and Aspergillus nidulans isolated from leaves, bark, and pods of T. cacao. These species were already identified as pathogenic species also to other crops except Trichoderma parareesei. Hence, for future works, isolates will be subjected to pathogenicity testing to prove its pathogenicity to Philippine cacao.

ABST#68

Effects of Malassezia globosa on thymic stromal lymphopoietin and differentiation of helper T cells in atopic dermatitis-like BALB/C mice model

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【Background】
Atopic dermatitis (AD) is a chronic and inflammatory disease with an immunogenetic basis that can be triggered by extrinsic and intrinsic factors, including dysbiosis of the skin microbiota. The lipophilic Malassezia globosa is one of the dominant fungal species on the skin of AD patients. Malassezia and the host pathophysiologic mechanism underlying its role in exacerbating AD symptoms remain to be elucidated.

【Objective】
Through establishing a mouse model of AD with overgrowth M. globosa investigating the effects of M. globosa colonization on TSLP secretion and helper T cell differentiation in AD mice.

【Methods】
Fungal overgrowth model were established by topical administration suspension of M. globosa on BALB/c mice (M group) and MC903-induced AD model (AD+M group). Macroscopic, mycological and histopathological examination were performed to detect the severity of skin lesions. Real-time polymerase chain reaction was performed to assess the mRNA levels of thymic stromal lymphopoietin (TSLP) and inflammatory cytokines including IL-4, IFN-γ, IL-17A and IL-22 in skin lesions. Serum IgE and above inflammatory cytokines levels were measured by enzyme-linked immunosorbent assay. The percentage and numbers of T helper cells in spleen were analyzed by flow cytometry.

【Results】
More severe AD-like lesion and higher scoring of dermatitis were observed in AD+M group compare with AD group. The expression of TSLP mRNA in tissue and serum IgE were highly increased in AD group, while decreased significantly in AD+M group. The expression levels of IL-17A

and IL-22 both in ear tissues and in serum were significantly increased with M. globosa stimulation, especially in AD+M group. Meanwhile, the percentage of Th17 and Th22 cells in spleen were positively correlated with IL-17A and IL-22 levels in serum. In contrast, IFN-γ and IL-4 production were significantly decreased in AD+M group compared with AD group.

【Conclusion】
The overgrow M. globosa could aggravate AD symptoms and that IL-17A and IL-22 may be involved in the process. The promotion of IL-17A and IL-22 production induced by M. globosa may restrain the development of TSLP and inhibit the Th1/ Th2 type skin inflammation.

ABST#70
Pustular psoriasis-like tinea incognito due to Trichophyton rubrum
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【Objectives】
We present herein four cases of pustular psoriasis-like tinea incognito caused by Trichophyton rubrum due to the administration of high-potency steroids, and provide clinical clues for early diagnosis.

【Methods】
Case 1: A 28-year-old Chinese male presented pustular rash over the waist, berry, groins and right thigh. It started 2 weeks ago after using the topical steroids on the waist because of a previous diagnosis of eczema. The rash spread to involve the other part of the body, and the number of pustules increased, coalescing into small pustular lakes over the body. It was severe itchy, but not painful. Patient was otherwise healthy. From June 2017 to July 2018, three additional patitents with tinea incognito were treated in our clinics (two male patients and one female patient). These patients also reported on using topical steroids 2 weeks to 2 months earlier before the onset of pustular lesions. The clinical presentation was comparable in all patients: pustular psoriasis-like lesions. In 2 patients swollen inguinal lymph nodes were noticed.

A swab was taken from the pustule for bacterial and fungal examination. Direct fungal examination of 10% KOH wet mounts from the skin swab revealed long I hayaline, septate hyphae, while G +/- stain were negative.On Sabouraud's glucose agar (SGA; Difco) at 25'C for three weeks yielded colonies with a powdery granular surface and reddish reverse. Microscopic examination of slide cultures showed tear shape microconidia, columniform smooth-walled macroconidia. The urease test was positive. The fungus was identified as T. rubrum on the basis of morphology, and confirmed by molecular analysis using ITS sequencing. A diagnosis of pustular psoriasis-like tinea incognito due to T. rubrum was made to all four cases. They were treated with topical bifoconazole and systemic antimycotis terbinafine. At follow up, 1 months after treatment, clinical and mycological recovery was confirmed in all patients.

【Results】
The anthropophilic T rubrum usually causes mild lesions with little inflammation, rarely causing aggressive and invasive form of infections. The application of topical steroids suppresses the local immune response and increase the fungus to grow easily,then acute inflammatory lesions may develop. The appearance of four cases was similar with those of generalized pustular psoriasis or acute generalized exanthematous pustulosis, which could be induced by allylamine fungicidial agent. The formation of pustules is supposed to cause by the appearance of neutrophils in the epidermis, as those forming in pustular type of tine pedis.

【Conclusion】
Our cases describe illustrates that T. rubrum can cause suppurative infections, highlight the unusual appearance of tinea incognito following inappropriate treatment with topical steroids.

ABST#72
Hortaea werneckii infections: what else besides tinea nigra?
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【Background】
Tinea nigra is a superficial phaeohyphomycosis caused by the dematiaceous fungus Hortaea werneckii, which is characterized by single asymptomatic pigmented macules. It usually occurs on the palms or soles, occasionally involves the neck and trunk. Though the diagnosis of tinea nigra can be identified through the clinical presentation and a simple direct microscopic or dermoscopic examination, it can also be misdiagnosed because of its rarity, especially outsides coastal areas in the tropics.

【Objective】
We present two typical tinea nigra cases due to H. werneckii, and also an eczema-like lesion of the hand and an onychomycosis caused by H. werneckii, which not match with the hitherto known clinical spectrum of the fungus.

【Methods】
Between May 2016 and July 2018, four patients (two females and two males; age range 6-30 years) consulted our outpatient dermatology clinic

because of lesions on their hands. All the patients were otherwise healthy. Case 1 and Case 2 had similar asymptomatic black, brown macules on their palms, which gradually augmented in size . Case 3 was a primary school student complaining of erythematous, dry scaly lesions with scattered erosion on both palms for one months. Case 4 presented with an eight-year history of a slow deformation of his right thumbnail, which was untreated. The nail showed light brownish discoloration, subungual hyperkeratosis, and distal nail plate dystrophy.

【Results】
In Case 1, histopathology examination showed numerous short hyphae and yeast like cells in the superficial stratum corneum level. In Case 2, dermoscopy revealed brown, fine strands forming in a reticular-like pattern. Culture of the etiologic agents in all four cases on Sabouraud´s glucose agar (Difco) at 25°C for 3 weeks yielded black yeast-like colonies, and slide cultures showed brown septate hyphae, annellidic conidiogenous cells producing ellipsoidal conidia with darker septa, which exhibiting budding in different directions. The fungus in all cases was identified as Hortaea werneckii on the basis of morphology and confirmed by molecular analysis showing 99.6%-100% rDNA ITS similarity to H. werneckii CBS 119.50 (http://www.westerdijkinstitute.nl).

【Conclusion】
Tinea nigra has been described worldwide, but it is relatively uncommon in China. Hyperhidrosis is assumed to play a significant role in tinea nigra as well as hand eczema. This study enhances our knowledge in understanding the various clinical manifestations of H. werneckii infection.

ABST#101
MICROSPORUM CANIS AS A CAUSED OF ONYCHOMICOSIS : REPORT OF A RARE CASE
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Onychomycosis is a disease of the nails that causes patients seeking for treatment. Onychomycosis is a superficial fungal infection that affects the nails. Almost all types of fungi can cause onychomycosis, with the most common species being Trichopyton rubrum and Trichophyton interdigitale. Other species that can cause onychomycosis such as Candida and Microsporum but this are rare. Onychomycosis is characterized initially by discoloration of the nails, then brittle nails, onycholysis, and onychodystrophy are found. In severe cases, complete loss of the nail may also occur. A woman came into our hospital complaints about pain in her fingernails and turned yellow in the last 2 months. She complaints of painful little finger nails. Initially the little fingernail of the right hand felt painful and stiff. She also said that the little finger nail felt softer than the other fingernails. Then complaints also appeared on the ring finger of the left hand, pain was found and the nails became yellowish. She has never experienced complaints like this before. She also denied complaints of itching in the area around the nails. She was diagnosed with Rheumatoid Arthritis (RA) since 8 years ago, and has been receiving regular treatment for the last 2 years. She has a cat and lived together for about 2 years. On examination of the right and left manus regions, discoloration and onychodystrophy of the patient's nails were found. The patient's nails were sampled and examined with potassium hydroxide 20% solution. From the results of the examination under the microscope, it is found that long hyphae and branched. For further examination, the patient's nail samples were cultured on Sabourad dextrose agar at room temperature and incubator temperature. From the fungal culture results, the species Microsporum canis was obtained. The patient was then given oral therapy Fluconazole 150 every week with a plan of administration for 12 weeks. Microsporum canis is a dermatophyte that is generally found in tinea capitis. Microsporum canis is a dermatophyte genus which belongs to the zoophilic group. Microsporum canis is found in cats and dogs. Direct contact with animals is the mode of transmission of the fungus. In this case, the culture results showed Microsporum canis culture which was not the most common cause of onychomycosis. This can occur due to several factors, including the patient has a history of fungal infections in other parts of the body or direct contact with animals that contain the fungus. This suggests, that direct contact with the main host of the fungus can also cause disease manifestation in humans, especially in patients with a history of autoimmune disease.

ABST#105
Gray Patch Tinea Capitis With Tinea Corporis And Tinea Faciei In Children With Acute Lymphoblastic Leukemia
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Tinea capitis is a dermatophyte fungal infection that occurs on the hair and scalp, generally caused by the species Trichophyton and Microsporum. Tinea capitis can occur at any age but is more common in children aged three to fourteen years. Immunocompromised patients with conditions such as haematological malignancy, systemic corticosteroid, and solid organ transplants are easier to be infected by dermatophytosis The clinical symptoms of tinea capitis may vary, depending on the species causing, the patient's immunological response, and the type of hair invasion. The gray patch type has the characteristics of fine scaling with patchy circular alopecia, as well as dull grey colored hair due to arthroconidia coating the affected hair. Dermatophytosis manifestations will be more extensive, widespread, and appear in more numerous areas in immunocompromised patients. The laboratory diagnosis of tinea capitis is made by first examining scale and hair on a microscope slide in a potassium hydroxide wet mount and second, by culturing a sample of the hair and scalp scale. Infections at the scalp usually require oral anti fungal treatment, as dermatophytes penetrating the follicle are typically out of reach for topically applied agents. We report a case of gray patch type tinea capitis with tinea corporis and tinea faciei in a four years old child with acute lymphoblastic leukemia. The patient undergoes laboratory dermatophyte identification with potassium hydroxide preparation (KOH) 20% and culture which resulted in Trichophyton mentagrophyte infection. Patient was given griseofulvin with a dosage of three tablets 125 mg daily for 6 weeks, 5 mg of cetirizine syrup, and 2% ketoconazole shampoo, which resulted in a significant therapeutic response.

ABST#106

Outbreaks and epidemic due to Tricophyton indotineae in India: Clinical forms and challenges

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Abstract:
Objectives:
Recent outbreaks and epidemic due to Trichophyton indotineae in India has been somewhat alarming and as a matter of great concern. We conducted various studies to study the different clinical forms, e.g. tinea faciei, tinea cruris, tinea genitalis, tinea corporis and steroid modified tinea.
Methods:
In routine, phenotypic characteristics were observed on Sabouraud dextrose agar with chloramphenicol and cycloheximide, and conventional methods of identification were used, but for confirmation of the isolates, samples were sent to Sybren de Hoog's laboratory, Netherland for molecular typing.
Results and Discussion:
All our samples were found to be Trichophyton mentagrophytes ITS Genotype VIII and Trichophyton indotineae according to the latest classification. It confirmed our outbreak. We still need to confirm the source of infection in animals if any.
Outbreaks and epidemics due to dermatophytes have been reported from various regions of India during the past few years. Thakur et al reported the first outbreak of Trichophyton interdigitale (T. indotineae) in India in 2016, when one third of the OPD patients were of superficial dermatophytosis. Most of the patients presented with involvement of groin and some with tinea genitalis and tinea corporis. The outbreak and extensive lesions of the dermatophyte have been linked to over the counter availability of potent topical steroids with antifungal and antibacterial combinations. However, it lead to lower incidence of Trichophyton rubrum which is surprising. Going through the old literature, T. rubrum was the commonest species in India and most of the cases of tinea capitis in children were due to Trichophyton violaceum. According to Mukherjee et al., terbinafine resistance phenomenon may not be acquired due to exposure to the drug but can be innate. According to new taxonomy and nomenclature by Sybren de Hoog, 2017, Trichophyton interdigitale is considered anthropophilic species and Tricophyton mentagrophytes zoophilic species. When we were witnessing the outbreak, different nomenclatures were used, which were quite confusing. Now, it is considered Trichophyton mentagrophytes/Trichophyton interdigitale complex. According to old nomenclature of Nenoff, it was T. interdigitale (anthropophilic strains) and
T. interdigitale (zoophilic strains). Rippon used the term Trichophyton mentagrophytes var. mentagrophytes and Trichophyton mentagrophytes var. interdigitale. We need molecular typing to differentiate the two species. It wasn't available and no patient gave any history of having pets like cats and dogs. Also, there was human-to-human transmission. Though the lesions were extensive, but we didn't see any patient with involvement of scalp and nails due to T. interdigitale. Also, none had involvement of lymph nodes, or deep dermatophytel infection.
Conclusion:
Strict legislation should be implemented against easy access to various steroid combinations available as over-the-counter drug. T. mentagrophytes genotype VIII, has already been reclassified as a new species, T. indotineae by Kano et al. Because the taxonomy of the T. mentagrophytes/T. interdigitale complex is still in debate, with three possible names existing for the Indian outbreak, an in-depth taxonomic study is awaited. Possibility of the source of infection should be searched in rodents and they could be the source of infection as symptomatic or asymptomatic carrier.

ABST#110

Emerging Problem of Recalcitrant Dermatophytosis in Sri Lanka

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Introduction
A changing clinical scenario of dermatophytosis was observed in Sri Lanka. Increase in the number of chronic, relapsing and recalcitrant infections was noted, in keeping with the trend described in South East Asia. This multi- center study was undertaken to assess the magnitude and possible causative factors for this problem.

Objectives
1. Identify the common species of dermatophytes causing skin infections in Sri Lanka
2. To identify any possible therapeutic failures to standard antifungal drugs
3. To identify predisposing factors for recalcitrant dermatophyte infections

Methodology
A descriptive, observational, cross sectional study was carried out in nine hospitals representing all provinces. All patients with dermatophyte infection, forthree months were included in the study. Data was collected by an interviewer administered questionnaire and skin scrapings were collected for mycological studies.
Itraconazole was selected as the standard first-line treatment considering its availability in the government hospitals. Itraconazole 100 mg twice daily and topical miconazole were offered with instructions on preventing the spread. A two weeks itraconazole supply was given for those who had not received any topical steroids previously, whereas a four weeks supply was issued for those with a past history of steroid use. Clinical response was assessed at two and four weeks for the two groups and further supply of itraconazole up to six weeks was offered for those who had partial response. Non responders to itraconazole and partial responders at six weeks were given a course of terbinafine 250 mg daily for

four weeks.
The subjects who achieved complete clearance were observed for further three months to detect recurrences.

Results
A total of 796 patients were included in the study. Fifty-two percent were symptomaticfor more than three months at presentation. Sixty-five percent had multiple site involvement, while 63.2% had a history of prior usage of topical steroids, prescribed predominantly (58.4%) by doctors at outpatient departments.
Skin scrapings were positive for fungal elements in the direct smears of 81.6 % and the predominant organism isolated was Trichophyton mentagrophytes (45.1%). At ten weeks, among 70.1 % of naïve tinea, only 57.6% of tinea incognito were completely cleared ($p<0.001$). A recurrence rate of 22.7% in naïve infections and 44.2% in tinea incognito were observed during the follow up period.

Conclusions
This study highlights the magnitude of the emerging problem of low therapeutic response in dermatophytosis in Sri Lanka. It also sheds some light in to possible causative factors and topical steroid abuse. Education of primary care physicians is an essential strategy in overcoming this, as misuse of steroid is a major contributory factor.

ABST#112
Systematic review on antifungal versus keratolytic agents for topical treatment of tinea versicolor
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Background:
Keratolytics are popular as alternative over-the-counter treatments for tinea versicolor to the conventional antifungal agents. Since they are less expensive, readily available, physically acting and do not induce resistant strains, they are preferred by some patients. However, evidence of their safety and efficacy are still lacking.
Objectives:
To compare the efficacy and safety of topical antifungals to topical keratolytics in the treatment of tinea versicolor.
Methods:
We searched the following databases: MEDLINE (from 1966) through PubMed, CENTRAL (Issue 9 of 12, September 2020), EMBASE (from 1974), LILACS (from 1987); Herdin (from 1970), www.clinicaltrials.gov, www.isrctn.com, www.trialregister.nl. We contacted researchers in the field, hand searched relevant conference abstracts, and the Journal of the Philippine Dermatological Society 1992-2019).
We included all randomized controlled trials involving patients with diagnosed active tinea versicolor where topical antifungal was compared with a topical keratolytic for treatment.
Two review authors independently applied eligibility criteria, assessed risk of bias, and extracted data from included studies. We pooled dichotomous outcomes using risk ratios (RR) and continuous outcomes using the mean difference (MD), using random-effects meta-analysis. We tested for statistical heterogeneity using both the Chi^2 test and the I^2 test. We presented results using forest plots with 95% confidence intervals. We planned to create a funnel plot to determine publication bias but were unable to due to few studies. A Summary of Findings table was created using GRADE profile software for the primary outcomes.
Results: We included 7 RCTs with a total of 598 participants. Pooled cure rates comparing clotrimazole cream with Whitfield's ointment showed there is probably little or no difference in mycologic cure (RR 1.03, 95% CI 0.82, 1.29; 2 RCTs, N=62; I2=0%; moderate quality of evidence). We are uncertain on whether they differed as to clinical cure (RR 1.24, 95% CI 0.85 to 1.80; 1 RCT, N=31; moderate quality of evidence)
There is probably little or no difference in clinical cure rate for econazole shampoo and selenium sulfide shampoo (0.98, 95% CI 0.93, 1.04; 1 RCT, N=118; moderate quality of evidence). There was significantly less minor adverse events (RR 0.11, 95% CI 0.01, 0.88) and better patient satisfaction (1.18, 95% CI 1.05, 1.32] for econazole shampoo. Bifonazole solution had little or no difference in clinical cure rate (1.00, 95% CI 0.90, 1.11; high quality of evidence) from selenium sulfide shampoo, and a trend towards greater mycologic cure (1.22, 95% CI 0.93, 1.59; moderate quality of evidence) and better patient satisfaction (1.12, 95% CI 0.93, 1.36), but this was based on 1 small RCT (N=37).

Conclusion: There is moderate quality of evidence that clotrimazole cream is probably as effective as Whitfield's ointment, and has less adverse events and higher patient satisfaction. Similarly, econazole shampoo is probably as effective as selenium sulfide shampoo, while being less irritating and have higher patient satisfaction. Larger RCTs with low risk of bias are recommended.

ABST#113
A four-year review of fungal isolates from suspected superficial, cutaneous and subcutaneous mycoses In Hospital Universiti Teknologi MARA (HUiTM)
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Introduction/ Background
The superficial and cutaneous mycoses remain the major causes of infections that affect the skin, hair and nails while subcutaneous mycoses is a rare disease which are typically caused by fungal inoculation during traumatic injury. Local epidemiological data of the disease is still scarce

to reflect the true prevalence in our population, thus this study was conducted.

Objectives
The aim of this study is to provide demographic data, determine the types of specimen sent and fungal isolated on fungal culture in suspected superficial, cutaneous and subcutaneous mycoses.

Methodology
A retrospective, descriptive analysis of medical and laboratory records of fungal culture from year 2017 to 2020 in HUiTM was done. Only data on suspected diagnosis of superficial, cutaneous and subcutaneous mycoses will be included. Data such as the patient's age, medical diagnosis, type of specimen sent and final results of the fungal culture were analysed. Any incomplete data will be excluded. Results were analysed with Microsoft Excel and tabulated into graphs and tables.

Results
A total of 380 samples with suspected cases of superficial, cutaneous and subcutaneous mycoses were received for fungal culture in HUiTM from 2017 to 2020. Out of the total number, 109 samples received from 107 patients had positive growth of mycoses. Patients aged 60 years old and above had the highest prevalence with 61.5% of the suspected cases. Most of the suspected patients had underlying medical illness with 61.6% of the cases. Majority of the diagnosis in the cases were superficial and cutaneous mycoses. Most of the samples were positive with one fungal isolate, but 2 specimens had more than one growth of fungal isolates. The most common fungal isolates were Aspergillus sp and Fusarium sp; both contributed 20 (18.3%) and 19 (17.4%) isolates respectively. This is followed by dermatophytes, Candida sp. Cladosporium sp. and Trichosporon sp.

Conclusion
Local epidemiological data may guide the clinicians to prevent and treat the affected patients effectively. This study has improved our understanding of the epidemiology on the common fungal infections occurring in our local population area.

ABST#132
Cutaneous Aspergillosis from a patient with electric burn: a case report from India
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Cutaneous infection of burn patients by filamentous fungal pathogen causes severe morbidity & mortality. This patient was admitted in ABVIMS & Dr. RML Hospital, New Delhi with severe electric burn on back and right lower limb. After initial treatment & proper dressing was done &patient was admitted in ICU. On 5th day post dressing, white patches were seen in the burn wounds, suggestive of fungal infection. Post-debridement, tissue sample from right lower limb was sent to microbiology lab for fungal identification. KOH mount of the sample was prepared which showed branched septate hyphae. On culture, Aspergillus flavus was isolated.Despite aggressive treatment the patient succumbed to his injuries.

ABST#143
Extensive chromoblastomycosis: rapid clinical improvement with combination of systemic itraconazole and topical heat therapy
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Background: Chromoblastomycosis is a subcutaneous fungal infection caused by melanized fungi (dematiaceous) that mainly affects male rural workers in tropical regions. Infection occurred upon fungal entry following skin tissue injury that further develops over the years. The initial lesion may evolve into various types of skin lesions leading to polymorphic clinical appearance.

Case: We report a case of a 68 years old farmer presenting with itchy thick verrucous plaque resembling “cauliflower like” masses on his whole right leg and buttock. The patient had an injury on his right knee 16 years ago while working in a farm that turns into a thick plaque that enlarge gradually, without receiving any treatment. Direct mycological examination showed sclerotic bodies. Skin biopsy showed suppurative granuloma and sclerotic bodies. Tissue culture grown Fonsecaea pedrosoi (F. pedrosoi) sensitive to amphotericin B, fluconazole, itraconazole, ketoconazole, and voriconazole. The patient was treated with systemic itraconazole daily and topical heat therapy 50-60oC for 30 minutes 2 times a day and showed rapid clinical improvement after 1 month evaluation.

Discussion: Topical heat therapy is cost-efficient, applicable to various types of chromoblastomycosis. F. pedrosoi is susceptible to temperatures above 40oC thus topical heat therapy is an excellent adjuvant. Direct heat therapy leads to increase in skin temperature, causing direct fungicidal or fungistatic effect to F. pedrosoi and initiate host defense mechanism. F. pedrosoi reported to be resistant to itraconazole but exceptional in this case.

Conclusion: Combination of systemic itraconazole and topical heat therapy may result to rapid clinical improvement in extensive chromoblastomycosis.

ABST#155
Talaromycosis of an Immunocompetent Patient: A Case Report
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Penicilliosis (talaromycosis) is an emerging deep and systemic mycosis caused by the fungus Talaromyces marneffei. Talaromyces marneffei was previously classified under Penicillium subgenus Biverticillium based on morphological characteristics. In 2011, the subgenus Biverticillium was found to form a monophyletic group with Talaromyces distinct from Penicillium, and taxonomically merged with the genus Talaromyces. Here we present, A 23-year-old immunocompetent male patient with talaromycosis (penicillosis). The patient complained of red, scaly patches on the chest, abdomen, back and arms since one and a half year ago. The patient was misdiagnosed as tinea corporis. The findings from the history that support the diagnosis of talaromycosis were just the presence of risk factors for atopic dermatitis (disrupted skin barrier) and the patient's occupation related with soil. Suspicion of immunocompromise was not found in the history. Physical examination either present status or general status of the patient are within normal limit. These findings were not in accordance with the literature for talaromycosis. The lesions found in the patient were erythematous plaques and fine white scales. The result of the KOH 10% examination was not found any fungal elements. The result of the fungal culture with Saboraud's Dextrose Agar medium grew on day 10, the macroscopic features showed fine grayish white colonies and formed a layer like cotton, looked brownish red on the back of the medium. Microscopic features with lactophenol cotton blue staining at 10x magnification found twisted hyphae and at 100x magnification found conidiophores, conidia shaped globose to sub-globose and phialides. From the features description above, we identified the fungal species as Talaromyces marneffei. Histopathological examination result on Periodic acid Schiff's staining was not found any fungal elements and there was no typical histopathological feature of talaromycosis. Patient also underwent HIV test and the result is negative. The diagnosis of talaromycosis is based on the findings of the history, physical examination and the fungal culture. The patient's atypical clinical manifestation makes it possible that maybe this case is the first reported case. The patient was treated with Itraconazole 400mg tablets every 24 hours intraoral (pulse dose) as in superficial mycoses, 3% salicylic acid + 4% sulfur precipitate every 12 hours topically on the red lesions. On further observations, improvements were found. The patient's prognosis is dubia ad bonam.

Keywords: talaromycosis, penicilliosis, talaromyces marneffei, fungal infection, itraconazole, pulse dose

ABST#158
A Rare Case of Tinea Imbricata
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Introduction: Tinea imbricata is a chronic dermatophytosis caused by Trichophyton concentricum. Tinea imbricata is a rare fungal infection and more commonly found in the tropics. Topical steroids misuse are rampant in Indonesia and may worsen fungal infection and cause increase incidence rate of Tinea imbricata. Case: A 28 years old man, from Papua, presented with a complaint of a generalized rash accompanied by scales since a year ago, initially appearing in the abdominal area then spread to the chest, accompanied by pruritic white fine scales. The patient has poor hygiene standard. The patient has never been treated for this complaint because he thinks it is normal. On physical examination found within normal limits. Patient presented with a multiple well-defined erythematous to hypopigmented polycyclic patches, confluent, geographically shaped of various sizes, some has thick scales on top arranged concentrically, lesions are distributed generally in the anterior and posterior thoracic regions, abdomen, superior and inferior extremities dextra et sinistra. Microscopic examination using 10% potassium hydroxide (KOH) found branched hyphae and epithelium. Fungal culture using Saboraoud Dextrose Agar media shows an image of Trycophyton concentricum. The results of the examination support the diagnosis of Tinea imbricata. The treatment given is griseovulfin 500 milligrams intraorally every 12 hours. Administration of cetirizine 10 milligrams intraoral every 24 hours and topical miconazole 2% cream every 12 hours. Topical keratolytic administration in the form of 3% salicylic acid mixed with 10% urea cream which is applied to the lesion every 12 hours. Hygiene education is also given to patients. Griseofulvin is given for up to 15 weeks until the KOH test is negative and the culture does not grow. Discussion: In Indonesia, tinea imbricata is endemic in Sulawesi, West Papua, Kalimantan, Sumatra, and the islands in Eastern Indonesia. The morphology of tinea imbricata is very distinctive in the form of confluent squamous papules, with concentric circles, it may look reticulated or centrifugal tiles. Morphological features of tinea imbricata are often considered beautiful and patient sometimes does not seek treatment. The growth of Tricophyton concetricum is very slow, it can be seen in the third week and can show a rough, stacked surface, with an orange-brown color, with a yellow-brown discoloration on the back. The microscopic picture shows branching hyphae without spores. Currently, griseofulvin is an easily available treatment for tinea imbricata but requires a slightly longer course of therapy than terbinafine. Combination therapy with oral antifungal agents in combination with topical keratolytics is essential to accelerate healing; treatment period takes up to three months but remission may be seen in the first month. Conclusion: Public awareness about fungal infections is still very lacking and coupled with the misuse of topical corticosteroid, cause Tinea imbricata. The diagnosis can be made by history taking, clinical examination of characteristic morphology as well as 10% KOH examination and culture to see the growth of Tricophyton concentricum. Combined systemic and topical antifungal therapy combined with keratolytics has shown good results in tinea imbricata.
Keywords: Tricophyton concetricum, tinea imbricata, whorly tinea

ABST#195
2 Cases of Grey Patch Type Tinea Capitis Caused by Microsporum Canis
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Introduciton: Tinea capitis is a fungal infection of the scalp and hair follicles. Tinea capitis is the most common fungal infection in childhood. The causes of tinea capitis can vary, most often caused by Microsporum and Trychophyton. The clinical picture of tinea capitis varies greatly, from

mild non-inflammatory alopecia to severely inflamed lesions characterized by deep kerionic alopecia and ulcerative eruptions. Case: We report two cases of grey patch tinea capitis in a 3-year-old and a 4-year-old girl who was both given combination antifungal therapy. Clinical symptoms in our patients are itching, hair loss accompanied by baldness, and dull hair. On dermatological examination, we found fine thin scales, broken hairs, and alopecia patch that was consistent with the grey patch type of tinea capitis. On Wood's lamp examination, green fluorescence was found, and on dermoscopy examination we found comma hairs. Microscopic examination with 10% potassium hydroxide (KOH) found ecthothrix spores and the culture in Sabouraud's dextrose agar shows the colony of Microsporum canis. The medication given to the patients are combination of antifungal therapy, which consists of microsize griseofulvin tablets 250 mg every 24 hours orally given for 6 weeks and 2% ketoconazole shampoo 3 times a week, applied to the hair for 5-10 minutes for 6 weeks. There was significant clinical and mycological improvement in the patients. The patient's prognosis is dubius ad bonam. Discussion: Data from the World Health Organization notes that tinea capitis can occur in about 7% to 33% of children. At the Dermatology and Venereology departement in Sanglah Hospital, from 2019 to 2021 there were 11 new cases of tinea capitis where all of the case were children. The patients shows several clinical features, such as fine thin scales, broken hairs, and alopecia patch that suit the clinical features of grey patch type of tinea capitis. And both patients shows the Microsporum canis from the fungal culture. This findings suit the fact that both patients loves to play with stray cats, where Microsporum canis infection most often comes from canines such as cats. Currently, griseofulvin is an easily available treatment for tinea capitis, and many studies concluded that griseofulvin have a better effication in treating the tinea capitis that comes from Microsporum canis infection. Oral antifungal agents in combination with topical antifungal agents is essential to accelerate the treatment outcome. Conclusion: Tinea capitis is a condition where if it's not treated properly, leads to severe fungal infection and permanent alopecia. The diagnosis of tinea capitis can be made by history taking, clinical examination, and micological examination through 10% KOH examination and fungal culture. Sistemic antifungal therapy along with the combination of topical antifungal therapy has shown good result.

Keywords: Microsporum canis, tinea capitis, grey patch, griseofulvin.

Diagnostic mycology

ABST#11

Species distribution and Biofilm profile of Candida isolated from clinical specimens at a Tertiary Care hospital in India

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Introduction
Epidemiology of candidiasis is dynamically changing given to the environmental factors, therapeutic modalities, barrier breaks and selection pressures. Use of indwelling medical devices, prosthetic heart valves, implants and central venous catheters provide ample opportunity for Candida to produce biofilms and set up a nidus for disease that is not easily amenable to conventional antifungal therapy.

Objectives
The present study aimed to determine the species distribution of Candida isolated from clinical specimens of hospitalized patients, biofilm production by different Candida species, and correlate clinical and microbiological findings.

Methods
A total of 100 Candida isolates from patients with suspected candidiasis were tested for the production of biofilm. Based on clinical history, 62% of the patients were found to have clinically relevant infections while in 38%, the Candida isolates represented commensals/colonizers. Speciation of Candida was done on the basis of germ tube test, CHROMagar, Dalmau plate technique, and carbohydrate fermentation and assimilation tests. Four isolates that failed to be identified by conventional methods were identified by MALDI-TOF MS. Biofilm production was detected and graded by visual (test tube) and spectrophotometric (microtiter plate) methods.

Results
Non-albicans Candida spp. (NAC) were the predominant isolates in clinically relevant infections (71%) while C. albicans was most commonly associated with colonization (68.4%). Amongst NAC, C. tropicalis (23%) was the most common isolate followed by C. glabrata (11%), C. krusei (8%), C. parapsilosis (6%), C. lusitaniae (2%), C. kefyr (2%), C. rugosa (2%), C. guilliermondii (1%), and C. famata (1%). Fifty five percent of the Candida isolates produced biofilm. Biofilm positivity in clinically relevant isolates was found to be significantly higher than commensals/colonizers ($p<0.05$). Biofilm positive Candida were most commonly isolated from urine (84.6%) followed by blood (67.8%). Biofilm production by NAC (69%) was found to be significantly higher than C. albicans (31%) ($p<0.05$). Majority of the biofilm positive Candida isolates produced Grade 2 (moderate) biofilm (36.4%). C. tropicalis accounted for maximum biofilm production comprising 20% of Grade 4, 53.8% of Grade 3 and 50% of Grade 2 biofilm. There was 72.7% concordance between the two methods in grading of biofilm. Spectrophotometric method was found to be the more sensitive than visual method for detection of biofilm production.

Conclusion
The knowledge about local epidemiological trends of Candida species is important to guide therapeutic choices. Our study demonstrated a paradigm shift from C. albicans to NAC with the isolation of C. tropicalis from a large number of cases, highlighting the growing importance of this pathogen. Most studies on Candida biofilm haven't classified the isolates as clinically relevant and commensals/colonizers. The present study showed that clinically relevant Candida isolates have greater ability to produce biofilms than commensals/colonizers. This study will help in understanding the properties of biofilms and offer a better knowledge regarding the current trends and predict the overall long-term trends that will be helpful for physicians in managing these infections clinically, thereby reducing morbidity, mortality, and drug resistance.

ABST#53

Histoplasma Antigen Detection in the Sera of Patient with Positive Aspergillus Galactomannan

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Introduction: Galactomannan is a cell wall polysaccharide that is released during tissue invasion by Aspergillus hyphae and can be detected in body fluids. A commercial Aspergillus galactomannan detection is available using the Platelia Aspergillus EIA kit (Bio-Rad, France) for a probable diagnosis of invasive pulmonary aspergillosis. Several studies reported cross-reactivity between histoplasmosis and aspergillosis because both Aspergillus and Histoplasma can produce galactomannan. Therefore, patients with suspicion of histoplasmosis could be detected by Platelia Aspergillus EIA. The purpose of this study was to determine the presence and prevalence of Histoplasma galactomannan antigens in patients with positive Aspergillus galactomannan.
Methods: The sample used in this study was a serum collection from the Mycology Laboratory Department of Parasitology FKUI from 2018 until early 2019 with positive Platelia Aspergillus (Bio-Rad, France) results. The sera then tested for galactomannan Histoplasma using the Histoplasma Galactomannan EIA Test kit (IMMY, USA) following the manufacturer's instructions.
Results and Discussion: The results of this study indicate that the majority of serum patients with positive Aspergillus galactomannan were also positive Histoplasma galactomannan with a prevalence of 25%. Histoplasma galactomannan antigens detected in the serum of patients with positive Aspergillus galactomannan can occur due to cross-reactivity or co-infection. The hypothesis of the cross-reactivity between the detection of Aspergillus and Histoplasma antigens due to the chemical structure galactomannan produced by both fungal has only a slight difference in the galactofuranose-containing side chains. Another possibility is the coinfection between aspergillosis and histoplasmosis. Furthermore, to prove both hypotheses, further tests such as serial antigen detection and isolation of fungi from clinical specimens are needed.

Conclusion: In areas with limited diagnostic facilities for histoplasmosis, Platellia Aspergillus detection could be helpful for diagnosis patients with suspicion of histoplasmosis.

ABST#64

Oropharyngeal candidiasis in HIV infected patients, associated risk factors and antifungal susceptibility testing of isolates by disc diffusion method.

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Objectives
Oropharyngeal candidiasis (OPC) is an opportunistic fungal infection that is commonly found in HIV infected patients. Acquired Immunodeficiency syndrome (AIDS), a disease of human immune system caused by HIV, has emerged as a global crisis since its discovery in summer of 1981 in United States. Hence, a study was conducted with a primary objective, to isolate and identify Candida species among HIV infected patients and perform susceptibility testing of isolates by disc diffusion method and secondary objective, to estimate the frequency of oral candidiasis according to age, sex, and other factors (CD4+ count, Upper Respiratory Tract Infection (URTI), recent antibiotic consumption) in HIV infected patients.
Methods
A total of 408 Throat swab collected aseptically from patients using sterile cotton swab were seeded on Sabouraud's Dextrose Agar (SDA) and incubated at 37˚c. Any whitish, creamy, pasty colonies on SDA was suspected to be candida, gram staining and germ tube test was done for preliminary identification, further speciation was done based on colony morphology and color production on Candida Chrom Agar (HiMedia), pattern of blastoconida and chlamydospores on Cornmeal agar, and sugar fermentation test. Antifungal susceptibility testing (AST) of isolates was performed and interpreted according to Clinical and Laboratory Standards Institute (CLSI) M44-A document.
Results
Among the 65 candida species isolated, Candida albicans 53 (81.5%), was the most common species followed by Candida tropicalis 3 (4.6%), Candida krusei 2 (3.1%), Candida glabrata 1 (1.5%) and 6 (9.2%) other Candida species. Age group 40-50 years followed by 30-40 years had the maximum distribution of Candida species. The sex wise distribution shows that 36 (55.38%) Candida isolates were from male and 29 (44.61%) from female. Although the number of infected males is slightly higher than female, there is no significant influence in the occurrence of oral candidiasis (p= 0.966).26 patients had CD4+ ≤ 200 cells/mm³and 39 patients had CD4+ >200 cells/mm³.There was a significant association between oral Candida carriage and CD4+ cell count ≤ 200 cells/mm³ (p<0.001).similarly, there was a significant association between URTI and oral Candida isolation (p=0.029) followed by a significant association between recent antibiotic consumption and oral Candida isolation (p=0.002). Among the antifungal discs tested, Fluconazole was found to show resistance in most of the isolates (27 out of 65) whereas Amphotericin B was the most sensitive one in which 54 out of 65 isolates were sensitive.
Conclusion
C. albicans was the common species isolated in our study. Candida Chrome Agar can be used as a routine media for rapid identification and candida speciation. Amphotericin B was the most potent antifungal followed by voriconazole, Itraconazole and conversely Fluconazole the most resistant. AST needs to be done routinely to know the susceptibility pattern of isolates and initiate proper treatment of patients. Since Oral yeast colonization was associated with low CD4+ count (<200 cells/mm³). Thus oral lesion can serve as early marker for HIV infection.

ABST#66

Rare cases of Candida haemulonii infection in Northern Malaysia: Laboratory Investigations

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Objectives:
i) To provide the total number of positive cases of Candida haemulonii by culture method from year 2016 to 2020 in Northern Malaysia (for state of Kedah and Perlis)
(ii) To compare the methods of detection and antifungal susceptibility test for diagnostic purposes
(iii) To assess the patients' demography and preceding history

Methods:
A retrospective review of all positive cultures with Candida haemulonii from January 2016 to December 2020 was done. Patients' medical records and laboratory worksheets were retrieved and analyzed according to demography. Yeast isolates were identified by Gram staining, colony morphology on Sabaraud agar plate, Vitek2 YST system and also using MALDI-TOF MS.

Results:
Total of 1087 blood cultures positive for fungaemia were analyzed in this 5 years. Out of these 1087 fungaemia, 937 isolates were attributed by candidaemia (86.2%). Only 2 isolates were C.haemunonii which means 0.18% from total fungaemia and 0.21% from total candidaemia. Both isolates were isolated and detected in 2017 (using Vitek2 YST) and 2019 (using MALDI-TOF) respectively and both were resistant to amphotericin B susceptibility testing.
Both isolates belong to immunocompromised patients, which are Acute Myeloid Leukaemia (a lady) and HIV with Hepatitis C reactive (a gentleman) receiving treatment in one of the state hospitals.

Conclusion:

Candida haemulonii infection is very rare and has been misidentified as Candida auris in certain study. Infection with C.haemulonii is associated with resistance to amphotericin B. A standard treatment regimen has yet to be established due to limited treatment data. Our patients were both susceptible to azoles and echonocandins.

ABST#85

Fungemia Caused by Uncommon Ustilaginomycetous Yeast in Debilitated Patients

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The genus Pseudozyma and Triodiomyces are Ustilaginomycetous yeast which are mainly isolated from plants. However, there have been few reports regarding Pseudozyma and Triodiomyces infections in patients with underlying diseases or in neonates. Here, we report another two cases that involved uncommon species of Pseudozyma and Triodiomyces from blood of debilitated patients from Malaysian hospitals. The strains were identified as Pseudozyma churashimaensis and Triodiomyces triodiae using DNA sequencing of internal transcribed spacer (ITS) and large subunit (LSU). Antifungal susceptibility patterns of both strains showed resistance to caspofungin, anidulafungin, fluconazole and itraconazole.

ABST#88

COVID-19 era: A relook at the KOH Mount in the rapid diagnosis of Mucormycosis

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Objectives
To augment institution of Institutional protocols by rapid diagnosis of Mucormycosis in the presence of limited sampling techniques available in patients with concurrent COVID-19 for enhanced patient outcomes
Methods
The Mycology section of the Dept of Laboratory sciences upped its game and started 24x7 reporting of Mycology in that all samples being received at the Reception were prepared and put up by post graduates and were reported with the help of faculty within one hour of receipt of clinical sample for the Potassium hydroxide mounts and Giemsa stain preparations. Culture plates of clinical samples were inoculated at four places to rule out reporting contaminants and plated were observed 8 hourly such that real time reporting could be carried out for culture positivity, since typical colonies of Mucormycetes are obvious in 10-16 hours in freshly diagnosed patients who are not on management with Amphotericin B; a bit of delay being seen in onset of growth in clinical samples from patients who are on therapy with Amphotericin B. Report of KOH mount/ Giemsa stain/ Culture positivity was communicated on two levels, between postgraduate residents and between faculty and postgraduates were made accountable for ensuring enhanced reporting to the clinician. Gomori modification of Grocott stain was not done as Giemsa stain was found to be adequate during the spate of positive cases. A total of 55 consecutive samples were received by the Mycology section from 11May21 to 24May21. Categories of COVID-19 cases included the following: a. initial sampling in suspect cases (nasal swab) b. Repeat sampling in OT (tissue) to remove the necrotic tissue and enhance blood supply c. surveillance of cases on Amphotericin B (nasal swab) on day 14 d. Repeat sampling carried out in case clinical and mycological correction was absent (occasionally observed in a few cases) After removing repeat sampling a total of 23 samples tested positive by at least two of the three techniques used, Potassium hydroxide mount, Giemsa stain and culture on SDA at Chloramphenicol.
Results
The Mucormycosis cases were initially dynamically managed based on Potassium hydroxide mounts and Giemsa stain reports and mortality of cases was reduced to zero after institution of the Institutional protocols which resulted in bringing loss of life due to Mucormycosis in COVID-19 cases manifesting with Mucormycetes infection to nil. The clinical and therapeutic details of all the cases will be discussed.
Conclusion
Institutions across the country were battered with the rapid rise in demand of Liposomal Amphotericin B. Correct protocols and 24x7 reporting of Mycology with reduced turn-around time of Mycology reporting not only greatly enhanced the ability of the team of specialists, nurses and paramedical staff caring for patients of COVID-19 with Mucormycetes infection to clinically manage these patients better as well as supported the administration by helping to restrict and redirect the use of an expensive life saving drug which was in gross short supply to only those who needed it.

ABST#93

Respiratory symptomatic patient with adult chronic disseminated paracoccidioidomycosis in the COVID-19 era.

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Objetives: To present a clinical case of endemic mycosis presented as a respiratory symptomatic case that made it necessary to rule out COVID-19 and tuberculosis.

–Methods: Case report.

–Results: A 40-year-old man, farmer, with a history of heavy smoking and use of tetrahydrocannabinol (THC). He came to the clinic due to a clinical picture of 30 days of evolution due to odynophagia, halitosis, nocturnal sweating, unquantified weight loss, occasional dry cough. On physical examination he was feverish, whitish plaques were documented on the tonsils, and bilateral diffuse rales. The ELISA for HIV, the PCR for COVID-19 and the glycosylated hemoglobin were negative, the chest X-ray revealed generalized alteration of the lung parenchyma, thickening of the interstitium and patchy opacity in ground glass and subsegmental multifocal pneumonia in the right upper lobe segment. It was labeled as respiratory symptomatic, ruling out pulmonary tuberculosis. A community pneumonia scheme was indicated with ampicillin sulbactam plus clarithromizine, a microbiology was requested in sputum induced for tuberculosis, the evaluation by otorhinolaryngology revealed ulceronecrotic pharyngotonsillitis justifying tonsillectomy. The KOH validated in the tonsil biopsy was positive and the pathological anatomy showed severe acute and chronic inflammatory infiltrate, with granulomatous areas and multinucleated giant cells of the Langhans type surrounding areas of necrosis, special stains were performed, including methenamine silver being positive for structures consistent with paracoccidioidomycosis (Figure 1). Complementary studies such as immunodiffusion and complement fixation serology for fungi were reactive with a band of precipitate and reactive paracoccidioidin with dilution> 64 respectively. Studies of tuberculosis and other mycoses were negative (Table 1). Management was started with itraconazole, scheduled for 6 months, therapy with which the patient responded favorably.

Conclusions: Paracoccidioidomycosis is a systemic systemic fungal disease endemic to territories, which occurs in a chronic and progressive manner that mainly affects the oropharyngeal mucosa, lungs and the reticuloendothelial system; performs both hematogenous and lymphatic dissemination, which is why any organ can be affected. This mycosis is acquired directly by inhalation of conidia from humid soils and high rainfall (1). In Colombia, the first case was described in 1949, with multiple presentations since then (2). Currently the world is going through a state of emergency due to the pandemic potential of SARS CoV2 COVID-19, the first case in our country was reported on March 6 and to date 3,432,422 million cases have been confirmed with 89-297 deaths, however, lethal endemic pathologies in our territory should not go unnoticed.

ABST#115

Cryptococcus neoformans isolated from HIV/AIDS patients

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Background
Cryptococcosis is an opportunistic fungal infections occassionally found in HIV-infected patients. Cryptococcus neoformans is the causative agent of Cryptococcosis and the only pathogenic species of the genus Cryptococcus.
Objective
The aim of this study is to isolate C. neoformans from HIV patients suspected with Cryptococcosis
Method :
Cerebrospinal fluid (CSF) and blood specimens of HIV patients with low CD4 cell count (10 cells/µl and 18 cells/µl, respectively) were sent to the Microbiology Laboratory of RSUP HAM from March to June 2021. Indian ink staining was done for the CSF sample. Serum and CSF samples were tested for Cryptococcal antigen with Lateral Flow Assay (IMMY). Furthermore, the CSF and blood were cultured according to the standard procedures, followed by incubation at 370C. Yeast identification and antifungal susceptibility testing were conducted using a VITEK®2 compact. AST-YS08 card was used for the antifungal susceptibility testing.
Results
Indian ink preparation from CSF has revealed the round, budding yeast cells with distinct halos. Cryptococcal antigen assays were positive for both specimens. Blood and CSF cultures revealed creamy white colonies on Sabouraud's Dextrose Agars. Identification of the CSF and blood culture result were positive for C. neoformans and both were susceptible to Amphotericin B
Conclusion
We successfully diagnosed of cryptococcosis in HIV-infected patients with low CD4 counts by direct examination, detection of antigens and culture (as the gold standard).
Keyword: Cryptococcosis, Cryptococcus neoformans, low CD4 counts HIV-infected patient

ABST#117

Species identification, antifungal susceptibility profile and biofilm formation of Rhodotorula species isolates from ocular infections

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Background and Objectives:
Members of genus Rhodotorula are widely distributed in nature and have been traditionally considered non-pathogenic. Last few decades have seen the yeast as an emerging pathogen in particular hosts and body sites; and a handful of ophthalmic infections have also been reported. As we observed increase in numbers of Rhodotorula isolates from ocular infections in the last few years, a prospective study was planned for speciation and study of virulence factors in Rhodotorula isolates from ocular infections; with the objectives to a) identify the species distribution of Rhodotorula isolates from ocular infections, and b) know the antifungal susceptibilities and study the biofilm formation attributes of different Rhodotorula species isolates.

Materials and Methods:

26 Rhodotorula isolates obtained in the prospective, cross sectional study of 13 months' duration at the Ocular Microbiology section of a tertiary care institute were speciated using conventional mycological procedures and Matrix Assisted Laser Desorption and Ionisation – Time of Flight (MALDI- TOF). Antifungal susceptibility testing (AFST) was done using disc diffusion test and E-test, and biofilm formation attributes were studied using XTT [2,3-bis (2-methoxy-4nitro-5-sulfo-phenyl)-2H-tetra-zolium-5-carboxanilide] assay.

Results:
24 isolates (92.3%) were identified as R. mucilaginosa and two as R. Minuta, both by conventional methods and using MALDI-TOF.
In AFST, high MICs were seen against Fluconazole, Amphotericin-B, Caspofungin, Micafungin and Flucytosine; MICs against Voriconazole, Itraconazole and Natamycin showed distribution from low to very high; and consistently very low MICs were seen against Posaconazole (Table-1).
15 (57.7%) of isolates were found to be strong biofilm producers, six (23.1%) were moderate, and five (19.2%) isolates were mild/non biofilm producers .

Conclusion:
This is the first prospective study on species distribution, antifungal susceptibility and biofilm production attributes of Rhodotorula isolates from ocular infections; and has first time demonstrated the utility of proteomics based MALDI-TOF in diagnosing Rhodotorula up to species level. The study has shown MICs against the conventional azoles and the antifungal agents of choice- Amphotericin-B and Flucytosine to be outside the therapeutic range in most of the isolates. However, low MICs against Posaconazole and Natamycin give a ray of hope for their possible therapeutic use in treating ocular infections caused by this emerging pathogen.

ABST#119
Real-time assay for detecting the Microsporum canis complex in patients with tinea capitis
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Objectives: Tinea capitis remains a common fungal infection in children worldwide. Species identification is critical to determining the source of infection and cutting off transmission. Based on conventional method, macro- and microscopy analysis is time-consuming and with slow fungal growth or low specificity. We propose a rapid real-time diagnostic PCR method that allows species-specific identification of the Microsporum canis complex in patients with tinea capitis.
Methods: Hair and scrapings specimens were collected from 94 patients with tinea capitis who were positive for fungal elements by direct microscopy using potassium hydroxide. Each specimen was subjected to the real-time PCR assay which was designed based on difference in the DNA fragments of β-tubulin and fungal culture.
Results: Of 94 specimens, 66 (70.2%) were positive by fungal culture, 62(66.0%) were identified as Microsporum canis. 81 (86.2%) were positive for the Microsporum canis complex including Microsporum canis and Microsporum ferrugineum by PCR.
Conclusion: We developed a new diagnostic assay using rapid real time TaqMan PCR assay using specific primers that can be applied in routine laboratory practice in order to obtain a higher efficiency.

ABST#125
Matrix-assisted laser desorption ionization-time of flight mass spectrometry for identification of Aspergillus isolates, including cryptic and rare species
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Objectives: Matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) is a novel technique for identification of bacteria and fungi. This study aimed to identify common, cryptic and rare Aspergillus based on MALDI-TOF MS analysis.
Methods: A total of 209 Aspergillus isolates preserved at the Research Center for Medical Mycology of Peking University were selected in this study. Forty-one of 209 isolates were used to construct a supplementary database. The remaining 168 isolates were selected as challenge strains used for MALDI-TOF MS analysis (the Bruker Filamentous Fungi Library v1.0 and the Bruker library combined the supplementary database) compared with beta-tubulin and calmodulin sequences analysis.
Results: The Bruker Biotyper system identified 108 (64.3%) isolates at the species level using the Bruker library alone, which showed good application in A. fumigatus, A. terreus, A. nidulans, A. parasiticus, A. clavatus, A. ochraceus, A. sclerotiorum, A. unguis and A. candidus. A combination of the Bruker library and the supplementary database allowed MALDI-TOF MS to identify 144 (85.7%) isolates at the species level, exhibiting excellent performance on cryptic species such as A. tubingensis, A. spinulosporus, A. lentulus, A. oryzae and A. alabamensis. However, there were still some misidentifications when involving in species of A. niger, A. welwitschiae, A. luchuensis, A. flavus and A. sydowii.
Conclusion: when using Bruker library alone, MALDI-TOF MS showed good performance on most common and rare Aspergillus species but poor performance on cryptic species. The supplementary database is crucial for the precise identification of cryptic species. However, our study showed that MALDI-TOF MS had a limited performance in identifying some closely related species of the section Nigri, Flavi and Versicolores.

ABST#140
Boba in the Belly? A Rare Case Report of *Exophiala* CAPD Peritonitis
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Introduction
Peritonitis is a common complication in end stage renal failure (ESRF) patients who require continuous ambulatory peritoneal dialysis (CAPD) for renal replacement therapy (RRT). However, Exophiala CAPD peritonitis is extremely rare, with less than 10 cases reported worldwide.

Case report
A 27-year-old gentleman with ESRF secondary to focal segmental glomerulosclerosis was admitted to our hospital after noticing that his peritoneal dialysis (PD) fluid was cloudy in nature. Upon closer inspection, there were black specks floating in the PD fluid that he collected. Otherwise, he was feeling relatively well, with neither any complaints of abdominal pain nor fever. Further history taking revealed that he was hospitalized 6 months ago for bacterial peritonitis. Intravenous Amphotericin B was started on day 3 of hospital admission after the Gram stains of both the PD fluid as well as the black debris showed yeast-like cells and fungal elements. The fungal isolate was identified as Exophiala dermatitidis by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). The patient's Tenckhoff catheter was removed on day 6 and RRT had to be converted to haemodialysis temporarily. Plans for renal transplant also had to be shelved. He was discharged home after completing three weeks of intravenous Amphotericin B.

Discussion
Although fungal peritonitis causes up to 15% of CAPD peritonitis cases, they are rarely attributed to dematiaceous fungi. The risk factors for fungal CAPD peritonitis include immunocompromised state, recent history or recurrent bacterial peritonitis and treatment with broad-spectrum antimicrobial therapy. Currently, there are no distinct clinical features to describe dematiaceous fungal CAPD peritonitis yet, but the treating clinician should raise the suspicion when black specks are present in the PD fluid. Prompt catheter removal, appropriate systemic antifungal therapy and temporary haemodialysis are the recommended treatment measures for fungal peritonitis. A few yeast-like cells were noticed on the Gram stain of the PD fluid and the Gram stain of the black specks revealed both the yeast and fungal elements. The colonies were initially brown- black, moist and yeast like; eventually becoming olive grey with suede-like texture after 10 days. The reverse side was brown-black pigmented. Unfortunately, they grew at a very slow rate, leading to delays in accurate phenotypic fungal identification. MALDI-TOF MS with its expanding database is extremely helpful for laboratories that lack molecular techniques, for more rapid identification of the organism, down to the species level. In conclusion, early suspicion and advanced mycology diagnostic technology play an important role in helping clinicians to better manage fungal peritonitis.

Keywords: CAPD peritonitis, dematiaceous, black yeast, Exophiala

ABST#147
Comparison of eight DNA extraction methods for detection Candida albicans in blood samples
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Objectives: Effective fungal DNA extraction is a crucial step prior to any PCR-based assay for detection of invasive mycoses. This study aims at comparing different methods of fungal DNA extraction.
Methods: Eight extraction protocols including a conventional method and seven commercial kits were used to extract DNA from blood samples containing various concentration of Candida albicans, followed by PCR targeting ribosomal RNA gene.
Results: The conventional method was able to detect 10 CFU/ml, whereas the commercial kits showed detection limit of 104-105 CFU/ml. Almost all protocols required 300 ml of blood samples. Except for conventional method which took up to 5 hours, other commercial kits took 15 minutes to one hour to complete.
Conclusion: Conventional DNA extraction method remains superior than commercial kits in term of extraction efficacy, but more laborious and time-consuming.

ABST#152
Direct Identification of Candida spp. in Positive Hemoculture Samples
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Background: Candidemia, fungal bloodstream infection caused by Candida spp., is one of the serious conditions carrying a high mortality and morbidity rate in hospitalized patients, especially in ICU, worldwide. With the species-specific susceptibility profile of Candida, delay in identification often leads to a poor prognosis.1

Objective: To develop an accurate, rapid, simplified, and efficient sample preparation protocol for the direct identification of Candida spp. from positive hemoculture bottles (BD BACTEC, USA).

Methods: The previously developed three different based protocols were modified for direct identification of Candida spp. in positive hemoculture bottles and compared. There were protein-based (MALDI-TOF MS, Bruker Daltomics, Germany), nucleic acid-based (Multiplex PCR), and biochemical-based (Vitek II bioMérieux, France).2 To separate Candida cells from the whole blood sample, red blood cell lysis buffer or BD Vacutainer® gel tube was applied in the pre-identification step.

Results: Of the 321 Candida spp.-spiked blood culture samples, each hemoculture bottle containing one isolate of C. albicans (n=142), C. tropicalis (n=110), C. parapsilosis (n=32), C. krusei (n=24), C. glabrata (n=9), and C. lusitaniae (n=4), the 100% correct identification for both genus and species level by Vitek II with 18-22 hours-time to identification (TTI), and multiplex PCR with 5 hours-TTI were examined. Regarding MALDI-TOF MS, the modified protocol with 15 minutes-TTI also showed comparable results with the routine protocol that processed from pure yeast colony. The concordance with identification result was 91% (292/321 isolates) and 95% (305/321 isolates) to genus and species based on reference cut-off value (score >2.0) and after applying modified cut-off values (score >1.7), respectively. No misidentification was presented in both cut-off value criteria.

Conclusion: Our study provides three fast, easy and accurate sample preparation protocols for direct identification of Candida species in positive hemoculture bottles.

Keywords: blood culture, candidemia, direct identification, MALDI-TOF MS, multiplex PCR, Vitek II

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ABST#165

Spectrum of fungal infections diagnosed in COVID & POST COVID patients during second COVID wave in a tertiary care hospital

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OBJECTIVE- To study the spectrum of fungal infections in COVID-19 patients and patients with Post Covid complications in our tertiary care hospital during second wave of COVID-19.

METHODS- In this retrospective study, 56 samples were received from patients diagnosed with COVID-19 and patients with Post Covid complications from April 2021 to 15 June 2021. All samples (tissue, nasal crust, nasal swab, urine, sputum, BAL) were processed for microscopy with KOH mount, Calcoflour white and gram stain. Fungal culture was carried out on SDA as primary isolation media. Mould identification was done by LPCB mount and slide culture. Yeast identification was done with conventional methods and Further identification and antifungal susceptibility testing was done by VITEK 2 compact automated system.

RESULTS –Out of 56 samples received, 62.5% were positive for fungal etiology. 21(51.2%) isolates were identified as Candida spp. Candida tropicalis (n=9, 21.9%) was the most common spp isolated followed by Candida albicans, Candida parapsilosis, Candida gulliermondii, Candida glabrata & Candida auris. Three Fluconazole & Voriconazole resistant isolates of Candida tropicalis was identified from blood(2) and urine(1). Out of the 16 tissue & nasal crust samples received, KOH mount of one tissue sample showed broad aseptate hyphae and Rhizopus spp was isolated in 3 samples. None of the respiratory sample showed the growth of Aspergillus spp although galactomannan was positive in 10 serum samples. Fusarium spp was isolated from tissue sample of one patient.

CONCLUSION- The study found a high frequency of fungal infections in patients who developed new symptoms after recovery with COVID19. A high index of suspicion for fungal etiology is of paramount importance as it would lead to early diagnosis of fungal infections in post covid patients. This would result in better patient management & outcome.

ABST#170

Spectrum of mucormycetes species from a tertiary care hospital

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Introduction
Mucormycosis is a highly aggressive fungal infection caused by members of the order mucorales. The incidence of disease caused by mucoralean fungi is increasing, especially in hosts with immune or metabolic impairment, e.g. in patients with uncontrolled diabetes mellitus, haematological malignancies and haematopoietic stem cell transplant. Although the majority of infections are caused by species of the genus Rhizopus, other frequently reported genera include Mucor, Lichtheimia, Rhizomucor, Apophysomyces, Cunninghamella, Saksenaea and Syncephalastrum. The species of mucormycetes show significant differences in susceptibility to amphotericin B, posaconazole, itraconazole, voriconazole and terbinafine. Of these amphotericin B lipid formulations remain the mainstay of treatment, whereas posaconazole has been successfully used as salvage therapy. In the present study we collected the clinical specimens from patients suspected of mucormycosis.

Method
A total of 63 clinical specimens were collected from the patients suspected of mucormycosis. All the collected specimens were cultured on various mycological media and RT PCR for the presence of mucormycetes. Briefly, the collected specimens were processed for nucleic acid extraction using STRATAC nucleic acid extraction kit and the extracted nucleic acid was further processed for real time PCR for the confirmation of presence of mucormycetes in the specimens.

Result
Out of 63 specimens 47 were positive for mucormycetes by RT PCR, whereas 45 of them were also found positive by culture. Out of 45 mucormycetes grown in culture were identified as Rhizopus arrhizus (n = 22), R. microsporus (n = 12), Syncephalastrum racemosum (n = 5), Mucor circinelloides (n = 4) and Lichtheimia ramosa (n = 2).

Conclusion
Mucormycosis is challenging both to microbiologists and clinicians pertaining to difficulties in diagnosis and treatment. Furthermore, the associated high mortality and resistance of mucorales to the most widely used antifungal drugs require a thorough identification of the aetiologic agent using molecular tools.

ABST#176
Multiple & Appropriate sample collection proved to be key for diagnosis of Covid associated mucormycosis(CAM)
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INTRODUCTION:
Covid-19 pandemic resulted a silent epidemic: Covid associated mucormycosis(CAM) has recently been increasingly reported, particularly among patients with uncontrolled diabetes.
Mucorales do not cause disease in the immunocompetent host where phagocytosis could effectively contain the invasion and infection. The germination of spores into hyphae with resultant angioinvasion is initiated when the immunity is impaired. The primary sites of infection in rhino-orbital cerebral mucormycosis are the nasal turbinates. After an acute sinusitis, it progresses into all sinuses within a few days with contiguous spread to the palate, orbit, and brain.It is one of the most common invasive mycoses in patients who are immuno-compromised.
Can be classified into a) Rhino-orbital b) Rhinocerebral c) Cutaneous d) Pulmonary e) Disseminated
With increase of systemic corticosteroid therapy, prolonged ICU stay after Covid-19 pandemic there is a sudden upsurge of mucormycosis cases.
Clinical approach to diagnosis of mucormycosis lacks sensitivity and may delay the diagnosis. Direct microscopy and culture remain the gold standard for diagnosis of mucormycosis. So, appropriate sampling techniques depending on clinical progress is important for accurate and early diagnosis. It is well known fact that Mucorales are saprophytic& also colonizer in airways & so, it can often contaminate specimens so clinical correlation is highly required while reporting. This study aims to detect the utility of appropriate sampling for diagnosis of CAM
OBJECTIVES:
To detect the utility of multiple & appropriate sampling in the diagnosis of CAM.
Material &Methods :
Study type: Retrospective study
Study duration: 15th April 2021- 15th June 2021 (2 months)
Sample size: All the samples from clinically suspected mucormycosis patients received in Department of Microbiology, AIIMS, Raipur in the study period
Inclusion criteria:
All samples of clinically suspected CAM (Covid associated mucormycosis) subjects in AIIMS, Raipur
Exclusion criteria: i) Dry swabs
ii) Samples flooded with Normal saline
Methodology :
All samples are processed by following standard mycology protocol
RESULTS:
During the study period, 699 samples were received from 361suspected CAM patients.
32% - nasal swabs in which only 8% were KOH positive,
15.7%-nasal discharge and nasal secretion of which 15.3% were KOH Positive,
12.8% Nasal crust of which 10.9% were KOH positive ,
12.5% were Tissue samples of which 32.8 % are KOH positive ,
11.3% were pus discharge of which (13.8%) were KOH positive,
3% necrotic debris of which 6.5% were KOH positive ,
3.2% Tooth+bone of which 9.4% were KOH Positive, 0.5% were sinus lining of which 1 was KOH positive , 5 were CSF , 2 brain tissues, one vitreous tap was received.
Total KOH Positive patients were 37%. Total culture positive samples were- 26%.
Total 26% of patients detected microbiologically positive after processing of repeating samples from multiple sites. and in this 26%, 12% are swabs which came positive after repeat sampling.

Conclusion: For early and accurate diagnosis of CAM, testing of multiple samples from various sites is recommended. Swab is inappropriate sample and may give false-negative results if collected singly and there are chances of missing of the cases.

ABST#182
Purification and Characterization of Hydrophobin from medically relevant filamentous fungi- A Pilot study
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Objectives
To isolate and identify Filamentous fungi from various clinical specimen.
To extract the amphiphilic hydrophobins from the clinical isolates
To characterize the purified hydrophobins

Methods
A total of 7 isolates were used in this pilot study (n=7). The filamentous fungi were identified by conventional methods ie, colony morphology of the culture, temperature differentiation, ability to grow in the presence of actidione, microscopic identification and slide culture. The isolates of filamentous fungi were cultured in Potato dextrose agar and SDA and into culturing flasks by the technique described by Tchuenbou-magaia et al using Tchuenbou-magaia's modified medium. From the pure broth culture, extraction of the hydrophobin was made by breaking the cells in the sonication bath and shaking a separation funnel to create foam. The foam was separated from the rest of the medium and washed with ethanol, and evaporated. The remaining substance was freeze dried and the protein concentration in the freeze dried sample was determined by Braford method. Characterization was done by evaluating the molecular weight of the protein in the freeze dried sample by SDS- PAGE and comparing it to the standard.

Results
The isolates were from pus (3) sputum (4) and mycotic keratitis (2).The cultures were identified using conventional methods as Aspergillus flavus (2)A.fumigatus (1) A.niger (2) Scedosporium species (1), Absidia corymbifera (2), Mucor (1), Curvalaria lunata (1), Fusarium solani (1).etc.,.Hydrophobin isolation and characterization results-ongoing

Conclusion
Hydrophobins are the surface active proteins produced by filamentous fungi. The conidia of airborne fungi are protected by a hydrophobic protein layer that coats the cell wall polysaccharides and renders the spores resistant to wetting and desiccation. A similar layer is presented on the outer surface of the aerial hyphae of some fungi. This layer serves multiple purposes, including facilitating spore dispersal, mediating the growth of hyphae into the air from moist environments, aiding host interactions in symbiotic relationships and increasing infectivity in pathogenic fungi. Class I and class II hydrophobins are small secreted fungal proteins that self-assemble at hydrophilic–hydrophobic interfaces into amphipathic films. This study aims to isolate this protein from medically relevant filamentous fungi as a pilot study. Our further study includes use of hydrophobin for valuable tool in early diagnosis of direct samples especially when dealing with non sporulating molds and culture negative mycosis.

ABST#190
The use of combined PCR, immunohistochemical staining and fluorescence in situ hybridization to diagnose Mucormycosis from formalin-fixed paraffin-embedded tissues
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Objectives Early diagnosis and treatment are essential to improve the outcome of mucormycosis. The aim of this study was to develop a new diagnostic platform with real-time PCR assays, immunohistochemical staining, and fluorescence in situ hybridization to improve the diagnosis of mucormycosis from formalin fixed paraffin embedded tissues.
Methods A total of 11 primers and probes for specific qPCR assays were designed based on the genome sequences. The sensitivity and specificity of qPCR assays were verified by 24 fungal strains including Mucorales (8 species), Aspergillus (6 species), Fusarium (2species),, Scedosporium (2 species),, Cryptococcus (2 species),, and Candida (5 species).Twenty-two FFPE tissues from Aspergillus fumigatus and different Mucorales-infected mice were collected and detected by the qPCR assays. Then seventeen histopathologically proven mucormycosis FFPE specimens were collected and detected by the new diagnostic system. The established system consists of semi-nested PCR targeting the 18s rDNA of Mucorales and fungal ITS region, four genus-specific qPCR assays for identification of Aspergillus, Mucorales, Cryptococcus, and Pneumocystis jeroveci, seven species-specific qPCR assays for detection of different Mucorales, immunohistochemical staining and fluorescence in situ hybridization for Aspergillus and Mucorales.
Results These assays can detect a minimum of 32.4fg DNA of each species, and there was no cross-reaction with gDNA among strains. For 22 infected mice FFPE sections, the sensitivity and specificity of qPCR assays were 86.67% and 100%, respectively. For 17 fungal infection human FFPE samples, 100% were positive from qPCR, while only 35.29% (6/17) were positive from traditional PCR. Overall, Mucorales qPCR positive testing rates were 88.24% (15/17). The tested Mucorales species were Rhizomucor pusillus in 5 (29.41%) cases, Rhizopus arrhizus in 4 (23.53%) cases, and Mucor irregularis in 3 (17.65%) cases. Among 17 cases, immunohistochemical staining were positive in 5 (29.41%) cases, and fluorescence in situ hybridization were positive in 11 (64.71%) cases. Combined with PCR, immunohistochemical staining, and fluorescence in situ hybridization, all cases were tested positive.
Conclusion The real-time PCR assays can identify the mucormycosis causative agents to species level in the histopathologically positive but uncultivable specimen. The use of IHC and FISH were recommended to detect the Mucorales in tissue sections. Developing a culture-independent platform combined with qPCR, IHC and FISH can improve the ability of species identification for the timely diagnosis of Mucormycosis.

ABST#194
Clinicomycological profile of Invasive Pulmonary Aspergillosis at a tertiary care hospital in Central India
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Objectives - Isolation, identification and clinical correlation of Aspergillus species from clinically suspected cases of Invasive Pulmonary Aspergillosis attending Pulmonary Medicine Department at All India Institute of Medical Sciences, Raipur,India

Methods - Duration of the study is 18 months starting from December 2019 to May 2021. Bronchoalveolar lavage (BAL) and serum from clinically suspected patients of Invasive Pulmonary Aspergillosis was collected in sterile container following the standard protocol. The sample was subjected to direct microscopy with 10% KOH mount, Calcofluor white stain & Gram stain to reveal fungal filaments. Remaining part of sample was centrifuged at 3000 rpm for 15-20 minutes and was inoculated on two sets, each set having plain Sabouraud's dextrose agar (SDA) & SDA with Chloramphenicol. One set was incubated at 37°C & another at 25°C for 4 weeks before attributing them as negative for fungi. Identification of Isolates was done by macroscopic examination of colonies, microscopic examination of colonies with lactophenol cotton blue mount and slide culture technique. The morphology of conidia, phialides, conidiophore, hyphal arrangement was observed on microscopic examination of colonies & slide culture. The organism was identified at the species level. Detection of Galactomannan in BAL & Serum was done by double antibody sandwich ELISA using XEMA Galactomannan Antigen ELISA kit.

Results - A total of 19 clinically suspected cases of Invasive Pulmonary Aspergillosis occurred during this time-period. Four (21%) out of total cases were Galactomannan Antigen positive by ELISA. Seven (36.83%) out of total cases were Culture positive. Three (42.85%), Two (28.57%), One (14.28%) and One (14.28%) out of Culture positive cases were caused by Aspergillus flavus, Aspergillus fumigatus, Aspergillus niger and Aspergillus terreus respectively. Four (21%) out of total cases revealed fungal elements on direct microscopy by 10% KOH mount/Calcofluor white. Fifteen (78.94%) out of total cases were on corticosteroid therapy, five (26.31%) had organ transplantation, four (21%) were on chemotherapy and four (21%) had neutropenia. Nineteen (100%) out of total cases had ARDS (acute respiratory distress syndrome) pattern with pleural effusion on chest X-Ray.

Conclusion - The most common etiological agent of Invasive Pulmonary Aspergillosis at AIIMS, Raipur is Aspergillus flavus. Other agents include Aspergillus fumigatus, Aspergillus niger and Aspergillus terreus. Culture of Bronchoalveolar lavage fluid is better than Serum Galactomannan Antigen ELISA and direct microscopy by 10% KOH mount/Calcofluor white, in detecting Invasive Pulmonary Aspergillosis. Immunodeficiency caused by corticosteroid use, chemotherapy, neutropenia and organ transplantation is a major risk factor which predisposes to Invasive Pulmonary Aspergillosis. Radiological findings are consistent with ARDS pattern and pleural effusion and provide vital clue towards the diagnosis of Invasive Pulmonary Aspergillosis. Because these infections do not require compulsory notification, data related to their incidence and prevalence is scarce and fragmentary. Their impact on public health is high and timely diagnosis and appropriate treatment is important.

ABST#198

Study of mucormycosis in rhinosinusitis like cases presenting over a period of nine years at tertiary care centre in Western Maharashtra, India

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OBJECTIVE-
To evaluate and analyse the actual occurrence of mucormycosis infection and study the increase in its occurrence during COVID-19 pandemic.
METHODOLOGY-
This is a retrospective study involving analysing of data from available laboratory records, as collected from two adjoining laboratories of tertiary care centre in Pune. Data from patients having rhinosinusitis like presentation with suspicion of fungal infection were included. The data from laboratory registers was compiled and analyzed in Microsoft Excel Worksheets and studied with regard to year of occurrence, type of sample and the fungus detecting methods.
RESULT-
A total of 126 samples out of 1141 from 01 Jun 2012 to 31 May 2021 at Lab 1; and 81 samples out of 530 from 01 Jan 2018 to 31 May 2021 at Lab 2; that had suspected fungal infection and rhinosinusitis like clinical picture were included in the study. From,Lab 1 over a period of 108 months ,32, 13 and 22 had positive findings with regard to KOH mount, fungal stain (GMS) and fungal culture respectively. From Lab 2, over a period of 41 months, positive findings were seen in 26, 24 and 29 samples with regard to KOH mount, fungal stain (giemsa) and fungal culture respectively. During last eight years, a total of 9 mucormycosis samples were confirmed, but in second wave of COVID -19 pandemic in the months of April and May 2021 alone, a total of 27 confirmed mucormycosis samples were received.
CONCLUSION-
KOH mount, fungal stains and culture are still the widely used method for diagnosis of most fungal infections. The spurt of mucormycosis cases in second wave of COVID-19 stands in stark contrast to the preceeding years' incidence of mucor related infection.

Epidemiology

ABST#29

Rhizopus homothallicus: Emerging mucormycetes species among various clinical settings

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Introduction: Presently, a huge change in epidemiology of fungal infections is seen. Not only, there are more number of fungal infections, we are encountering newer fungal pathogens as well i.e. Rhizopus homothallicus is one such pathogen. Traditionally, Rhizopus has been the most common mucormycetes genus with R. arrhizus followed by R. microsporus as main human pathogens. R. homothallicus is newer emerging species of the genus which has been isolated from human infections. Till date, very few cases infected by R. homothallicus have been reported but most of them have been from Indian continent. The fungus can be easily identified phenotypically by presence of golden brown zygospores with unequal suspensor cells, poor development of rhizoids, sporangiophores and sporangia. Hereby, we are presenting seven cases where Rhizopus homothallicus was the causative agent.
Objectives: To study clinical profile and outcome of patients presenting with R. homothallicus infections.
Materials and Methods: Various clinical samples were processed in Mycology Laboratory, Department of Medical Microbiology namely biopsy tissue from nasal cavity in rhino-orbital infection, necrotic tissue from cutaneous infection and sputum/BAL in case of pulmonary involvement as per the standard mycological protocol. Fungal etiology was established by direct KOH examination and fungal culture was put on Sabouraud's dextrose agar. The morphological identification of fungal isolates was done by LCB preparation and whenever needed, slide culture was also put up. Histopathological examination of tissue samples was done by hematoxylin and eosin (H&E), periodic acid-Schiff (PAS) and Gomori methenamine silver (GMS) staining. The final diagnosis of isolates was established on the basis of molecular identification done by sequencing ITS region of isolates and compared with those of type strains.
Results: During the time period January 2013 - December 2019, R. homothallicus was isolated from seven clinical cases. Maximum cases (3) were pulmonary mucormycosis followed by Rhino-orbital mucormycosis (2), cutaneous mucormycosis (1) and mucormycosis of middle ear (1). All seven patients were diabetic and all were positive on direct KOH wet mount examination for aseptate fungal hyphae. Culture grew R. homothallicus in all the cases. Four patients were treated with liposomal amphotericin B, along with surgical debridement wherever needed. Two patients left against medical advice. One patient of rhino-orbital mucormycosis underwent FESS and was not given antifungal medical therapy. Four patients survived, two went LAMA could not be followed up and one patient of cutaneous mucormycosis expired despite starting antifungal treatment.
Conclusions: Rhizopus homothallicus is the newer agent establishing itself as a cause of mucormycosis. It is must that we look for the endemic niche for these newer fungal agents. Epidemiological changes in etiological agents drives the need for awareness, quick diagnosis and prompt treatment. Mucormycosis being a serious infection with high mortality further makes it prudent to be up to date about the ever-expanding field of medical mycology.

ABST#31

Invasive Fungal Infections among Kidney Transplant Recipients: A Single Transplant Center Study in Thailand

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Objectives
Invasive fungal infections (IFIs) could represent an unfavorable complication that affects kidney transplant (KT) recipients. However, an epidemiological study of this infection after kidney transplantation (KT) in Thailand has not been performed. Therefore we aimed to investigate clinical characteristics, risk factors, and outcomes of IFIs in these immunocompromised patients.
Methods
A single transplant center retrospective study was conducted from January 2016 to December 2018. All adult KT recipients, age 18 or older, were included. IFI was defined as a clinical syndrome that was compatible with relevant microbiological and/or histopathological findings. Epidemiology and outcome of IFIs were assessed. Risk factors of IFIs were analyzed by the Cox proportional hazard model.
Results
A total of 518 patients were included in the study. Thirty-eight % were female with a mean +/- SD age of 43 +/- 12 years. Sixty-five % and 57 % received a deceased-donor allograft and induction immunosuppressive therapy, respectively. There were 27 (5.2%) IFIs occurred which included candidiasis (53%), pneumocystosis (25%), aspergillosis (10%), cryptococcosis (4%), mucormycosis (4%), and trichosporosis (4%). The median (IQR) onset of IFIs was 16 (8-337) days with a trend of early-onset (< 2 months after KT) yeast infections, and late-onset (> 6 months after KT) mold infections and pneumocystosis. In multivariate analysis, female recipients (HR 2.98; 95%CI, 1.12-7.92, [p=0.03]) and living-related KT (HR 4.62; 95%CI, 1.34-15.87, [p=0.02]) were independent risk factors of IFIs. Instead, older recipient age (HR 0.94; 95%CI, 0.89-0.98, [p=0.006]) was an independent protective factor of IFIs. Among those with IFIs, 1 (4%) patient expired and attributed to pulmonary mucormycosis.
Conclusions
IFIs could potentially occur among KT recipients and occasionally result in unfavorable consequences. Clinicians should be aware of this infection especially in KT recipients with specific risk factors.

ABST#75

Prevalence of Candida infections and antifungal susceptibility-resistance pattern in Malaysia

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OBJECTIVES
This study measures the prevalence of Candida infections and the species distribution based on the published data and assesses the antifungal susceptibility pattern in Candida species infections in Malaysia.
METHODS
Data was collected from NCBI (National Center for Biotechnology Information) and Google scholar from 2010 to 2019 with the key words to search the articles (Candida and Malaysia). The data obtained from the full text of these articles. Total number of search articles were (n=27), total number of articles included in this study are n= 22, based on inclusion criteria (studies published from 2009-2019) and exclusion criteria (published before 2009).
In most studies, conventional methods were used including culture, microscopic examination, CHROMagar, API 20C AUX, germ tube test and carbohydrate assimilation test while in two of the studies molecular (PCR-RAPD) techniques were used to identify Candida species.
Antifungal susceptibility was performed by Sensititre yeastOne and E-test method
RESULTS
Total 22 studies were collected from all possible data bases, in which Candida isolates were collected and analyzed for different purposes or objectives. All these studies were done in different hospitals, reference laboratories and Universities of Kuala Lumpur region only.
A total 35608 Candida isolates were collected from 2010 to 2019 in these studies for different purposes. A total of 19 Candida species were identified. C albicans were predominant species generally with n=23640 (66.3%), followed by Candida glabrata 4169 (11.7%), Candida parapsilosis 3842 (10.7%), Candida tropicalis 3392 (9.5%) and Candida krusei 424(1.19%). But in three of the studies, Non albicans marginally outnumbered Candida albicans. In Candida non-albicans Candida glabrata predominate with n= 4169 (11.7%), followed by C. parapsilosis (3842, 10.7%), C. tropicalis (3392, 9.5%) and C. krusei (424, 1.19%) among 5 most common non-albicans Candida species.
Highest number of isolates was collected from vaginal swabs 23318 (65.4%) followed by 4963 (13.9%), from respiratory tract, 3911 (10.9%) from urine, 2118 (5.9%) were from blood, 328 (0.92%) from Oral, 293 (0.82%) from Pus and 677(1.9%) from other sites. Demographic racial data and gender were recorded only in two studies.
Total of 396 (1.1%) isolates were tested for antifungal susceptibility against most common antifungal drugs. Almost all isolates were susceptible to Amphotericin B (98%) while against the Azole group the samples showed variation in susceptibility. Resistance of non- albicans against Fluconazole showed an increasing trend. In one study, all C. tropicalis were resistant to Fluconazole while in another study all C. krusei were resistant against Fluconazole. According to data reviewed, the resistance of common antifungal drugs is increasing in non-albicans of Candida.
CONCLUSION
The variability of the Candida species distribution and increasing resistance highlights the importance of local epidemiology in disease management and selection of antifungal agents.

ABST#83
Epidemiological and Risk Factors Analysis Of Onychomycosis In Rural Indonesia
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Objective : Onychomycosis is a fungal infection either dermatophyte, yeast, or non- dermatophyte on the fingers and toes. This study was conducted to improve knowledge of epidemiology and risk factors that influence onychomycosis.

Method : Samples were taken using secondary data in the form of medical records at a tertiary care hospital with a total sample of 54 patients in 2018 – 2019 period.

Results : The results of the study of 54 patients showed that 25 people (46.3%) were positive with onychomycosis. The culture-positive results showed yeast of the genus Candida (Candida Parapsilosis) was dominant in 15 patients (60%), dermatophytes (Tricophyton sp. and Microsporum sp.) in 8 patients (32%), and mould (Aspergillus sp.) in 2 patients (8%).

Conslusion : Genus Candida is the main causal factor of onychomycosis in our region. The culture-positive results also showed that age ≥ 45-year-old (33.3%) and women (42.6%) had more risk of the incidence of onychomycosis in our region. Meanwhile, occupational aspect of the patients did not indicate a clear tendency in particular types of job to have a high risk of onychomycosis.

Keywords: onychomycosis, epidemiology, risk factor, Candida sp.

ABST#89
An Overview of Fungal Infections in Covid-19 Patients Who are Admitted to The Intensive Care Unit at One of Covid-19 Referral Hospitals In The Capital City of Indonesia
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Objectives: To find out an overview of the results of fungal sputum culture in Covid 19 patients who are admitted to the intensive care unit at one of referral hospitals in Jakarta, Indonesia.

Method: A retrospective survey of the patient records and microbiology data of the patient who admitted to the Covid 19 intensive care unit

(October - December 2020). Patient demographics were analysed.

Results: A total of 37 patients with confirmed SARS-CoV 2 and admitted to ICU were included. 9 (24.3%) of 37 had confirmed of fungal isolates from respiratory samples. Candida tropicalis isolate was identified in 2 patients (5.4%) and also Candida albicans was identified in 2 patients (5.4%). Other isolates were identified; Candida glabarta in 1 patient (2.7%), Candida lusitaniae in 1 patient (2.7%), and another fungal isolates in 3 patients (8.1%).

Conclusion: We found a variety of fungal coinfected and Candida is particularly the most common types of fungi.

Keywords: SARS-CoV 2, fungal coinfected, Candida, intensive care unit

ABST#118

Isolation, speciation and antifungal susceptibility testing of Candida yeasts from oral thrush patients in a teaching hospital in Malaysia

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Objectives
The clinical diagnosis of oral thrush is essentially based on recognition of active lesions in the oral cavity, which can be then confirmed by the isolation of Candida yeasts. This study aims to identify and determine the in vitro antifungal susceptibility of Candida yeasts isolated from oral swab and rinse samples of Malaysian patients with oral thrush.

Methods
Oral swab and rinse samples were obtained from 35 patients attending dental clinics and medical wards at the University Malaya Medical Centre. Isolation of Candida spp. was performed on Brilliance Candida Agar (BCA). Candida isolates were identified using polymerase chain reaction–restriction fragment length polymorphism (PCR-RFLP) analysis or sequence analysis of the internal transcribed spacer (ITS) region. Antifungal susceptibility testing against amphotericin B (0.03 – 16 µg/ml) and fluconazole (0.125 – 64 µg/ml) were performed using broth microdilution method. Sequencing of cytochrome P-450 lanosterol 14α-demethylase (ERG11) gene was carried out to determine any mutations associated with fluconazole resistance.

Results
Candida yeasts were isolated from 26 patient samples. Mixed cultures of Candida spp. were obtained from 13 patients. Of 42 Candida spp. isolated in this study, C. albicans (45.8%) was most commonly isolated from the oral thrush patients. C. tropicalis (16.7%) was the most predominant non-albicans Candida species, followed by C. glabrata (12.5%) and C. dubliniensis (6.3%). All isolates were susceptible to amphotericin B (MIC ≤ 1 µg/ml). Two C. albicans isolates exhibited dose-dependent susceptibility to fluconazole while one C. albicans isolate was resistant (MIC ≥ 64 µg/ml). Two mutations (D116E and R469K) were detected from the ERG11 gene of the fluconazole-resistant C. albicans isolate.

Conclusion
C. albicans was the predominant species isolated from almost 50% of oral thrush patients examined in this study. Fluconazole resistance is low among Candida yeasts investigated. Future research should include a larger number of patients to determine the actual distribution and antifungal susceptibility profiles of Candida species in oral thrush cases.

ABST#128

Prevalence of invasive fungal infection in patients with acute leukemia in a teaching hospital in Malaysia

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Objectives:
Invasive fungal infections (IFI) are associated with significant morbidity and mortality especially in patients who are immunocompromised. IFIs are not uncommonly reported in patients with acute leukemia (AL) as a result of intensive chemotherapy and underlying immunocompromised state. It was reported that 11% of patients with AL had a probability of developing IFI within 100 days. Although Southeast Asia is an area with potential high incidences of IFIs, there is generally paucity of data concerning IFI in AL patients. Hence, the aim of this study was to determine the epidemiology and risk factors of IFI in acute leukemia patients undergoing chemotherapy in a teaching hospital in Malaysia.

Methods:
We retrospectively studied all admissions of AL patients to haematology ward in University Malaya Medical Centre (UMMC) from January 2020 to December 2020. Sociodemographic and clinical data including age, gender, and ethnicity were extracted from the hospital electronic medical record (EMR) system. Criteria used to diagnose IFI were according to the European Organization for Research and Treatment of Cancer /Mycoses Study Group (EORTC/MSG) consensus.

Results:
A total of 44 AL patients with 91 admission episodes were included. The median age of the patients was 49 years (range 15-83 years old) and 59.3 % were females. Majority of the patients (37.4 %) were Chinese followed by Malays (29.7 %) and Indians (25.5 %). Duration of neutropenia ranged from 2 days to 231 days with a mean of 25.5 days. Most of the patients (51.6 %) had peripherally inserted central catheter (PICC) and 68.1 % had underlying acute myeloid leukemia (AML). Majority of the patients (59.3 %) received antifungal prophylaxis. The antifungal prophylaxis used were fluconazole (50.5 %), voriconazole (7.7 %) and anidulafungin (1.1 %). Proven IFI were reported in 7.7 %, probable IFI in 1.1 % and possible IFI in 3.3 %. All the proven IFI cases were due to candidaemia. Candida tropicalis was the leading pathogen (57.1 %) followed by Candida krusei (42.9 %). The probable IFI had Aspergillus fumigatus cultured from sputum. Most of the patients with IFI had AML (72.7 %) and 81.8 % had neutropenia for more than 7 days. Amongst the IFI patients, 72.7 % had PICC. Although the patients were given antifungal prophylaxis, they were still at a higher risk (72.7 %) of developing IFI. All-cause mortality was 20.9 % based on the last follow up and patients with proven IFI had a higher mortality rate with 57.1 % (P = 0.016).

Conclusion:
The prevalence of IFI in AL patients in our center is 12.1 % with candidaemia as the cause for proven IFI. This study demonstrated a significant higher mortality in patients with proven IFI as compared to non-proven IFI.

ABST#136
Genotypic diversity and antifungal susceptibility of clinical isolates of Scedosporium spp. in China
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Scedosporium spp. have been drawn significant interest in recent years due to its worldwide prevalence and the high mortality due to their disseminated infections. However, to date there is little information on the genotypic diversity and antifungal susceptibility of clinical isolates of Scedosporium spp. from China. Based on the ISHAM-MLST consensus scheme for molecular typing of Scedosporium spp., we found that the genetic background of clinical Scedosporium spp. isolates from China is extremely diverse, with both S. apiospermum and S. boydii being predominant. S. aurantiacum firstly reported here. The predominant sequence types (STs) of the isolates were ST17 in S. apiospermum, ST3 in S. boydii and ST92 in S. aurantiacum, including three novel ST (ST40, ST41 and ST42) isolates in S. apiospermum. Using the CLSI-M61 criterion, voriconazole was the only antifungal compound with low MIC values (MIC90 of ≤ 1 μg/mL) for all Scedosporium spp. isolates in our study, and posaconazole, micafungin and anidulafungin showed moderate activity against the majority of the isolates. Further investigations on Scedosporium spp. isolates around the world, particularly relating to population genomics and the evolution of drug resistance, are warranted for better prevention and treatment of scedosporiosis.

ABST#139
Histoplasmin skin test In Patient's with Chronic Pulmonary Disorder in Indonesia
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Background: Histoplasmosis is an endemic mycosis caused by the thermally dimorphic fungus, Histoplasma capsulatum. In Indonesia histoplasmosis has been reported since 1932 but no large-scale epidemiological study has been conducted. Objective: In this study, we were conducting a histoplasmin skin test in various areas that reported disseminated histoplasmosis cases. Method: Throughout 2019-2020, HST was carried out in six cities: Malang, Jakarta, Bandung, Semarang, Surabaya, Sukabumi, and Manado, on 290 patients, 166 of whom were male. The patients studied were patients with chronic pulmonary disorders such as post-TB/chronic TB/COPD and five positive people were found, consisting of three males and two females, with age ranges between 50-74 years. Result: In patients with positive HST, we found pulmonary symptoms that are not different from other chronic lung disorders. Conclusion: The most common symptoms were fever, cough, and shortness of breath. A history of contact with poultry was found in three subjects.

ABST#149
Geographic Distribution and Clinical Features of Pythiosis
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Objectives
Pythiosis is a difficult-to-treat and life-threatening infectious condition caused by the oomycete Pythium insidiosum. Direct exposure to a zoospore (asexual stage of the pathogen) in its habitat (i.e., swampy area) initiates an infection. Affected individuals manifest various clinical features. Early detection of the P. insidiosum infection leads to decreased morbidity and mortality. Diagnosis of pythiosis is challenging. Treatment relies primarily on radical surgery since antimicrobials are ineffective in most cases. The first case of animal pythiosis was reported in the 19th century, whereas the disease in humans was first documented in 1985. Although pythiosis is still under-recognized among healthcare

workers, new cases have been increasingly reported during the past decades. This study aims to compile reported cases and draw geographic distribution and clinical features of pythiosis.

Methods
We searched pythiosis cases reported in the literature until June 2021 using the keywords “pythiosis” and “Pythium insidiosum”. Geographic location (i.e., country) and clinical features of the pythiosis patients were analyzed. Regarding the imported cases, the country where each patient acquired the infection was recorded. Potentially overlapped patients were excluded from the collection.

Results
A total of 240 reports of pythiosis patients were collected from the public literature domains. After excluding the redundant cases, recruited patients comprised 1440 animals and 777 humans from 22 countries worldwide. The majority of animal cases were from Brazil (44.4%, n = 640), Australia (18.1%, n = 261), and USA (14.9%, n = 214), while most affected humans were reported from India (55.5%, n = 431) and Thailand (40.9%, n = 318). Animals with pythiosis usually manifested clinical features associated with an infection of the skin (87.2%, n = 1256), gastrointestinal tract (10.5%, n = 152), or multiple organs (so-called dissemination; 1.7%, n = 25). Most infected animal species included horses (71.0%, n = 1023), dogs (13.1%, n = 189), cows (7.9%, n = 114), and sheep (5.6%, n = 81). Human pythiosis almost exclusively presented an infection of the eye (75.3%, n = 585) or artery (22.0%, n = 171). In recent years, many human patients have been reported from India. The diagnosis of pythiosis was based on the recognition of clinical manifestation and at least one of the following laboratory findings: histopathological examination, organism isolation, zoospore induction, immunological assay (i.e., immunodiffusion, Western blot, ELISA, immunochromatography, antibody-based tissue staining), and molecular method (i.e., PCR, sequence analysis, MALDI-TOF).

Conclusion
Pythiosis is widespread across major continents. Horses are the most reported animal species, followed by humans and dogs. Skin, eye, and artery are primary infection sites. Many new cases of pythiosis were observed in the past several years, indicating that healthcare personals are more familiar with the disease, and diagnostic tools have become widely available. Based on the up-to-date literature review, we demonstrate the expansion of geographic distribution, case number, and affected animal species of pythiosis to promote awareness of this infection.

ABST#189

Some Clues of CARD9 Mutations in Fungal Infections

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Objective: Autosomal recessive CARD9 deficiency has been reported invasive fungal infections in otherwise healthy individuals, life-threatening and refractory, we want to find potential laws of CARD9 mutations in invasive fungal infections through data analysis.
Methods: By searching from Pubmed(https://pubmed.ncbi.nlm.nih.gov/), Scopus(https://www.scopus.com/), CNKI(https://www.cnki.net/) and VIP(http://vpcs.cqvip.com/), with ‘CARD9’, ‘caspase recruitment domain’, ‘mutations’, ‘deficiency’, ‘fungal infection’, ‘candidiasis’, ‘dermatophytosis’ and ‘phaeohyphomycosis’, then deleting cases with unknown mutation sites or unknown pathogens, 66 cases are sort out with 30 CARD9 mutations.
Results: Datas of the 66 cases showed the frequency of D274fsX60, Q289X and Q295X mutation 13.6%, 14.8% and 18.5%, while Badali2 reported 8.1%, 25.8% and 17.7%, respectively. To our interest, these three mutation cites seem to manifest significant predilection in different fungal species. 53.8% of D274fsX60 mutation patients were infected with Dematiaceous fungi(OR=3.95 , 95%CI: 1.18-13.27, P=0.02), 80% of Q289X mutation patients were infected with Dermatophytes(OR=21.67, 95%CI: 5.31-88.49, P<0.001), while 64.3% of Q295X mutation patients were infected with Candidas(OR=5.22, 95%CI: 1.56-17.43, P=0.004). According to the Dematiaceous fungi causing infections more opportunistically than Dermatophytes and Candidas in usual, D274fsX60 may bring about more serious antifungal immunosuppression than other two mutations.
Conclusion: For one thing, nonsense mutations D274fsX60, Q289X and Q295X are near to each other on the gene CARD9, indicating the core function area nearby. Considering function differs significantly in different lengths here, we question why changes in such a short peptide make specific predilections in fungal infections? We doubt whether such a core area can be designed for potential compensatory therapy or not? For another thing, given that frequency of CARD9 mutations, mainly nonsense mutations, up to 50% in exon 6, it demonstrates fragments in and after exon 6 are of great importance in human-being antifungal immunity. Since exon-skipping therapy has been proposed as an investigational therapy for another X-linked recessive disorder Duchenne muscular dystrophy by employing synthetic antisense oligonucleotide targeting splicing of protein pre-mRNA, will this therapy be designed to make up for CARD9 defects by producing truncated but partially functional protein in fungal infections? More studies are needed to uncover CARD9 mutation predilections in fungal pathogens, to find more clues for novel therapy strategy.

Fundamental/basic mycology

ABST#12

Demonstrating a Material Making Process Through The Cultivation of Mycelium Growth

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Today, mycelium is used in many different ways: As packaging in industry; as acoustic panels; wall insulation; bricks in buildings; as a textile or as a raw material in designed objects such as furniture. The purpose of this research is to explore the ways to cultivate mycelium as a living building material that has its own tendencies. Going beyond the limitations of linear moulding techniques and developing a method that guides the mycelium growth will help designers to, as Richard Sennett says, always be a step ahead of the material. The first phase of the study involves experimentation by paying close attention to any factors that might cause a difference in the behaviour of mycelium, to understand its properties and nature. After having understood its act, the research will continue by the cultivation of mycelium growth. Design of an automated system that enables to reach the intended growth, by anticipating its reactions, is going to be the end product and the final phase of this investigation. In this study, rethinking about architectural fabrication that focuses on revealing potentials of living organisms such as autonomy, self-assembly or responsivity, can demonstrate a new approach in material making processes and geometries.
Key words: Cultivating mycelium, non-linear materiality, reconfigurable moulding, guided growth

ABST#18

Isolation and Identification of Plant Fungal Pathogens in Avocado (Persea Americana Mill.)

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Phytopathogenic fungi are the cause of 70% of disease in plants worldwide (USEPA, 2005) and are mostly occuring on economically significant crops including of which is avocado. The last dated study on fungal phytopathogens in avocado in the Philippines was more than a decade ago by Sotto et al. in 2000. Thus, this study aims to isolate and identify the fungal phytopathogens in avocado through the tradional morphological characterization combined with molecular techniques. Pathogenicity testing was also carried out to assess the pathogenicity of the isolated fungi. Results showed a total of eight (8) different genera of pathogenic fungi infecting Persea americana. Six members from division Ascomycota - Colletotrichum spp., Lasiodiplodia spp., Geotrichum sp., Phomopsis sp., Fusarium sp., and Campylocarpon sp. – and one both for Zygomycota (Mucor sp.) and Basidiomycota (Ceratobasidium sp.). Results of the pathogenecity testing implies that all of the isolates are pathogenic to avocado, as necrotic lesions were observed. This study also revealed three new genera able to infect avocado - Campylocarpon sp., Mucor sp., and Ceratobasidium sp. causing branch canker, rot and necrosis respectively.

ABST#49

Siderophore production and alternative carbon sources usage in Talaromyces marneffei are regulated by AcuK transcription factor

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Objective
To investigate the role of acuK on iron metabolism and gluconeogenesis in Talaromyces marneffei
Methods
Siderophore production in Talaromyces marneffei was determined by Chrome Azurol S (CAS) liquid assay. An acuK gene of T. marneffei was retrieved from BLAST search on the whole genome sequence of T. marneffei 18224 strain by using an acuK gene from Aspergillus fumigatus as a query sequence. The acuK deletion and reconstitution strains of T. marneffei (ΔacuK and ΔacuK::acuK strains) were generated by target gene deletion method. In order to determine the effect of acuK deletion on iron metabolism, the growth of T. marneffei ΔacuK was observed on regular ANM-minimal medium, iron-depleted- and iron repleted-ANM. Additionally, we verified the growth of T. marneffei ΔacuK on the medium containing gluconeogenic carbon sources; proline, acetate, and ethanol to determine the role of acuK in gluconeogenesis.
Results
Talaromyces marneffei produced large amount of siderophores under iron-limited conditions. To determine the role of AcuK transcription in control of iron metabolism, the ΔacuK was generated. Phenotypic analysis found that the ΔacuK could not grow under iron-depleted condition and on medium containing gluconeogenic substrates (proline, acetate, and ethanol) as the sole carbon sources. These results indicated the role of acuK in control of iron acquisition and gluconeogenesis in T. marneffei.
Conclusions
Siderophore biosynthesis was enhanced in the iron starvation condition. The transcription factor AcuK involved in iron acquisition and gluconeogenesis in Talaromyces marneffei.

ABST#87

FungiDB: Tools for genomic-scale data exploration, analysis and discovery

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FungiDB (https://fungidb.org) is a component of the Eukaryotic Pathogen, Vector & Host informatics Resources (VEuPathDB; https://veupathdb.org). VEuPathDB.org is a robust, sustainable data-mining resource, expediting discovery across diverse groups of organisms. VEuPathDB is a free online database that provides public access to computational platforms and analysis tools enabling collection, management, integration and mining of genomic information and other large-scale datasets relevant to model organisms, pathogens including their interaction with hosts (https://hostdb.org) and invertebrate vectors of disease (https://vectorbase.org), and also examining complex environmental and epidemiological information at ClinEpiDB (https://clinepidb.org). With the FungiDB/VEuPathDB resource, you can:
Browse genomes & examine gene record pages
Create search queries to mine omics scale datasets, including genomes, functional data (e.g. transcriptomic, proteomic, variation data), annotation, & the results of in-house analyses (protein domains, orthology predictions via OrthoMCL.org, metabolic pathways, etc.)
Analyse your own data through a private VEuPathDB Galaxy workspace & transfer your results into My Data Sets workspace to further explore the data.
Capture expert knowledge about phenotypes, PubMed records, etc. by adding user comments
Nominate datasets for integration and learn how to use VEuPathDB by engaging with tutorials and live webinars, and more...

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* Presenting on behalf of the entire VEuPathDB project

ABST#153

Phagocytic activity of macrophage in patients with vascular pythiosis

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Background: Immunotherapy using Pythium insidiosum antigen (PIA) is one of the combination treatments for patients with vascular pythiosis along with aggressive amputation and certain antifungal agents.1 Based on our previous study, the prominent of interferon-gamma (IFN-g) after vaccination was observed among recovery cases. Basically, the IFN-g also plays a role in macrophage activation including phagocytic activity.2 However, the information in pythiosis is very limited. Here, the role of macrophage in patients with vascular pythiosis was investigated.

Objectives:
1) To compare the phagocytic activity of macrophages isolated from survived and deceased patients with vascular pythiosis.
2) To investigate the effect of IFN-g in inducing of macrophage's phagocytic activity

Methods: To compare the phagocytic activity among responsive and unresponsive cases, monocytes derived macrophages were isolated from peripheral blood mononuclear cells (PBMCs) of survived (n=5) and deceased (n=5) patients with vascular pythiosis. The phagocytic activity against zoospore of P. insidiosum was examined by using co-cultured technique and flowcytometry. Regarding the effect of IFN-g in phagocytosis activation, THP-1 monocyte derived macrophage was used as model. Totally 5 concentrations of IFN-g (1, 5, 10, 50, 100 ng/ml) were co-cultured with zoospores and macrophages (MOI 1:1), then the phagocytic activity were examined by using the same techniques as mentioned above.

Results: The higher percentage of phagocytic activity in macrophages isolated from survival than from the deceased patients was observed by using both co-cultured technique (43% and 14% phagocytic activity, respectively) and flowcytometry (67% and 20% phagocytic activity, respectively). Regarding the effect of IFN-g in THP-1 model activation, the 4-6 times higher of phagocytic activity were presented after 1-100 ng/ml IFN-g challenging. In all conditions of THP-1 model, 30 minutes approximately after phagocytosis, the germination of phagocytosed zoospores leading to the breakout of macrophage cells was detected.

Conclusion: More effective of phagocytic activity in macrophages isolated from survival than the deceased group was observed which probably related to IFN-g induction. By using macrophage cell line, it was proved that IFN-g is able to activate the phagocytic activity of macrophage. Even though those phagocytosis reactions seem unable to kill zoospores, this is the first report mentioned unmet need data leading to the understanding of pythiosis pathogenesis in the future.

Keywords: vascular pythiosis, phagocytic activity, macrophage, interferon-gamma

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ABST#187

Mitochondrial Genome analysis among Four Mucor Species related to Pathogenicity

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Objectives: To better understand the pathogenicity of Mucor with mitochondria which plays an important role in energy metabolism.
Methods: By sequencing the mitochondrial genomes of Mucor irregularis, Mucor hiemalis, Lichtheimia corymbifera and Rhizopus arrhizus based on illumina NovaSeq technology.
Results: A total of 274.18 clean reads were generated assembled, the complete mitochondrial genomes of M. irregularis, M. hiemalis, L. corymbifera and R. arrhizus was obtained with totally different length. After the genome annotation and comparison, the mitochondrial genome sequence of M. irregularis was found more similar with M. hiemalis than L. corymbifera and R. arrhizus, especially of the small (rrns) and large (rrnl) subunits of mitochondrial ribosomal RNA (rRNA) genes. The GC content, ncRNAs and the distribution of the SNPs and InDels were also compared and discussed here.
Conclusion: This study partially uncovered the pathogenicity variances among the four mucor species and the relationship between features and pathogenicity. For further study in the pathogenicity of mu-cor species, comparison of nuclear genomes, spatial structure of mitochondrial genomes and the com-prehensive analysis of transcription regulation are needed.

ABST#188

Transcriptional comparison of Mucor irregularis related to thermal tolerance and virulence

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Objectives: Our study aimed to better understand the different thermal adaptation among Mucor irregularis (M. irregularis) at high temperature, and explore the genes possibly related to virulence, which may offer more appropriate explanation for the special pathogenicity of M. irregularis in human beings.
Methods: M. irregularis isolates were incubated at 30°C and 35 °C for Illumina HiSeq technology (RNA-seq) , as well as the virulence difference detected through Galleria mellonella infection models. We verified the transcriptome profile with RT-PCR, and analyzed differentially expressed genes with GO- and KEGG-annotations.
Results: The isolates all displayed the biggest colonies at 28°C, while differently inhibited at 22°C and 35°C, and not growing at 37°C, of which six selected ones displayed high virulence in sync with good growth status at high temperature. From the outcomes of RNA-seq, a total of 1559 differentially expressed genes (FC ≥ 2, FDR < 0.05) were obtained, of which 1021 were up-regulated and 538 were down-regulated. Cell wall structure related genes as ras-like and GH16 protein, influx-efflux pumps consist of transmembrane proteins as ABC and MFS protein, and metabolic genes as DGKε and HSFs, seem to be essential in thermal adaptation and virulence of M. irregularis.
Conclusion: We found some genes commonly vary at high temperature, while some others possibly related to different virulence among M. irregularis isolates as well as different thermal adaptation. Further researches of genes of M. irregularis in the pathogenic process are needed, for which the development of potential targeted antifungal therapy is possible.

ABST#192

Probiotic vaginal pessary as an adjuvant for vaginal infections caused by Candida species

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Title: Probiotic vaginal pessary as an adjuvant for vaginal infections caused by Candida species

Objective:
The aim of the current study is to develop a probiotic vaginal pessary containing lyophilised Lactobacillus reuteri 29B (Lr29B) that was isolated from a healthy Malaysian woman. The probiotic vaginal pessary is developed as an adjuvant for vaginal infections caused by Candida species.

Methods:
Prior to the development of the vaginal pessary, probiotic properties of the lyophilised Lr29B strain including antifungal activity, spermicide resistance, acid tolerance, adherence, stability and viability were assessed. Hollow-type pessary was prepared by melting polyethylene glycol (PEG) and poured into a pessary mould that is equipped with a cylindrical tube in the centre. The lyophilised Lr29B strain (10 billion colony-forming units, CFU) was added to each cavity. The physical and chemical characterisation of the pessary was assessed.

Results:
The lyophilised Lr29B strain showed a stable viability for the duration of 12 months at cool storage (4°C). Its antimicrobial activity efficacy, acid tolerance and resistance towards spermicide were not compromised by the lyophilisation process. Inhibition against Candida albicans and Candida glabrata clinical isolates by the Lr29B strain was 65.8% ± 0.1 and 67.9% ± 0.05, respectively. The survival rate of Lr29B was 66.3% ± 0.06 in pH 4.5 acidic condition, which mimics the vaginal environment. It also showed resistance against high concentration of spermicide (10%). The percentage of adhesion to HeLa cells was 88.7% ± 0.1. As for the characteristic of the vaginal pessary, it disintegrates in less than 30 min in vaginal stimulating fluid (VSF) releasing the Lactobacillus strain. The survival rate of the released Lr29B into the VSF was 92.9% ± 0.03 at 60 min.

The breaking strength of the vaginal pessary was 3.25kg/cm2 ± 1.03.

Conclusion:
The lyophilised Lr29B strain showed potent inhibition against VVC-causing Candida species with high acid and spermicide tolerance. It displayed strong adhesion ability on HeLa cells as well as high survivability in vaginal low pH conditions. The PEG-based probiotic vaginal pessary proven with good physicochemical properties serves as a potential approach for prophylaxis and as adjuvant for therapeutic purpose in vaginal infections.

Infection control and prevention

ABST#32

Hospital infection control committee efforts in containing Candida auris infection in a private tertiary care hospital at western part of India over last 3 years

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Background: Candida auris is an emerging multidrug-resistant (MDR) yeast pathogen that causes healthcare-associated invasive infections. There is growing evidence suggesting that C. auris may persistently colonize in the hospital environment and at multiple body sites of patients, leading to high transmissibility, and prolonged outbreaks. High number of C.auris infection been described in north Indian hospital ICU apart from outbreaks in several other countries including UK and USA.

Objective: to describe burden of C.auris infection and HICC efforts to reduce transmission in our hospital

Methods: We conducted a retrospective study from 1 January 2017 to 31 December 2019 in a tertiary care hospital in western part of India. All inpatients with C.auris isolation during study period were included in this analysis. Infection control work flow; microbiology lab alerted Hospital Infection Control Committee and Infection Control Nurse (ICN) will implement and monitor strict contact isolation of the particular patient. Hand hygiene practices are strengthened and upon discharge of patient, bed railings, monitors, ventilator, infusion pump were cleaned with disinfectant containing Alcohol (Ethanol, 2-Propanol IP & 1 Propanol BP). Microbiology department performs additional surveillance from the patient environment in the ICU after discharge.

Results: From January 2017 through December 2019, out of total 103 candida isolates from blood and sterile body fluids, 5 cases were identified as C. auris (Table 1). Among these 5 cases, 3 were transferred from other hospitals and 2 patients possibly acquired nosocomial C.auris infection (case: 2 and 4).

Age/Sex	Mon/year	Diagnosis	Transfer from other hospital	Site of isolation	Hospital stay (days)	Outcome
1 74/M	Sept/2017	Urosepsis	Yes	Blood	32	Died
2 21/F	Sept/2017	Dengue/Acute Pancreatitis	No	Blood and Pancreatic tissue	25	Cured
3 65/M	Feb/2019	Acute Pancreatitis	Yes	Pancreatic tissue	12	Died
4 64/M	Feb/2019	Urosepsis	No	Urine	26	Cured
5 61/M	Oct/2019	Carcinoma Appendix	Yes	Blood	14	LAMA*

* LAMA: Left against medical advice

Conclusion: We have only 2 possible nosocomial transmission of C.auris during study period. Prompt call from microbiology department with identification of C.auris clubbed with strict monitoring of hospital infection control practice by ICN and post discharge environment cleaning and monitoring helped us to restrict nosocomial transmission of C.auris in our hospital.

ABST#82

Assessment of airborne fungal contamination in rooms occupied by immunocompromised patients in a tertiary hospital

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Objectives:

This study is aimed to compare the numbers of airborne fungi and describe the fungal genera that were observed in filtered air room (intensive care unit) with non-filtered air room (hematology ward) in our hospitals where immunosuppressed patients reside and also aimed to compare the performance of two different fungal media.

Methods:

The active air sampling (MAS-100 NT, Merck Milipore) was performed in the hematology and adult intensive care unit ward for three consecutive months with a total of 90 agar plates. The flow rate of 100L/min was used and passed through the Saboraoud dextrose agar (SDA) supplemented with chloramphenicol and CHROMagarTM Candida. The plates were incubated at room temperature (25-30°C), the fungal colonies were counted after 24-48 hours of incubation, and macroscopic and microscopic identification was performed after 7-10 days of incubation. If the fungal reproductive structure and mycelia were not identified on a microscopic basis, slide culture was performed for 10 days to promote sporulation of fungi and microscopic identification was performed again.

Results:
The mean concentration of airborne fungi ranged from 120.6 – 1085 CFU/m3 in the hematology ward and 9.375 – 42.31 CFU/m3 in the intensive care unit and was significantly different in each month. Aspergillus spp. (90.9%) and Penicillium spp. (54.5%) were the most prevalent fungal genera in the hematology ward, meanwhile, Yeasts (52.6%) and Aspergillus spp. (47.3%) were the most prevalent fungal genera in the

intensive care unit ward. This study also demonstrated that there is no meaningful difference between the two agars that were used for fungal colony counting (93.39 for SDA and 129.7 for CHROMagarTM Candida).

Conclusion:
This study indicated that the hematology ward air was heavily contaminated, meanwhile, the intensive care unit was lightly contaminated with airborne fungi. Therefore, the urgency to provide filtered air especially in the hematology ward could help to enhance the air quality. In addition, we also found that both media can be used to quantify fungal propagules in hospital air.

ABST#138
Nigrospora sphaerica in a sealed dialysate fluid container from Sri Lanka
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Introduction
Nigrospora is a common laboratory contaminant. Although it has been isolated from a few clinical samples, its pathogenicity in man remains uncertain. We are reporting possible contamination of seemingly sterile medical fluid (dialysate) with this airborne organism.

Problem
At a hemodialysis unit in Sri Lanka, the dialysate - Drycard C-50, manufactured by Hospitech (India) was used since 2005 until April 2018. Visible contamination was noted in April in one batch of dialysate in containers with intact seals, suggesting the possibility of a manufacturing defect. Samples from this batch were forwarded to the Department of Mycology, Medical Research Institute, Colombo by the Consultant Microbiologist for further evaluation of the possible contaminant. The organism isolated at MRI was identified as the fungus Nigrospora sphaerica. Following identification of this contaminant, the Consultant Microbiologist informed the Medical Supplies Division, Ministry of Health, Sri Lanka to immediately stop the use of the dialysate. Prompt recognition of contamination and immediate identification of a microbial cause resulted in prompt notification to relevant authorities and prevented the said dialysate from being distributed and used island-wide. This intervention prevented the use of this batch of dialysate in patients undergoing haemodialysis.

Conclusion
We report this case to demonstrate the possibility of contamination of seemingly sterile medical fluids with airborne organisms during manufacture, and the importance of implementation of inspection and structured testing as a measure of quality assurance as well as the need to establish an efficient mode of notification of such mishaps to the relevant authorities at a hospital level.

ABST#171
Novel metabolic proteins as important targets for new antifungals against Candida tropicalis
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Title: Novel metabolic proteins as important targets for new antifungals against Candida tropicalis
Objectives: To identify and validate essential metabolic proteins from the proteome of Candida tropicalis
Methods: A series of computational algorithms were employed to identify essential drug target candidates from the proteome of Candida tropicalis (CTP). These include methods like subtractive genomics, protein-protein interaction network analysis and systems biology based approach. The identified potential targets were classified into metabolic and non-metabolic proteins based on KEGG pathway analysis. Novelty of these identified targets was ascertained by reviewing published literature reports. In order to determine the essentiality of these genes in Candida, in silico gene knockout was performed using the C. tropicalis genome-scale metabolic model (iCT646), simulated under glucose and oxygen stress to represent host niche conditions.
Results: 128 putative drug targets were obtained from CTP using comparative genomic analysis, PPI network analysis and flux variability analysis. Of these 78 CTP proteins were found to be associated with metabolic pathways. 20 metabolic pathways including lipid and amino acid metabolism were found to be significantly enriched in CTP. About 50% of these metabolic targets belonging to enriched pathways were found to be validated in literature. 12 novel targets belonging to amino acid, secondary metabolite, and carbon metabolism were found to be lethal when deletion was simulated under in silico conditions.

Conclusion: We have identified novel metabolic targets in Candida species using a rigorous and comprehensive computational workflow. Majority of the lethal genes belonging to arginine biosynthesis and pentose phosphate pathway considerably reduced biomass outcomes under simulated conditions. These targets can be explored for developing new antifungals against Candidiasis. We have also developed a standalone tool for this workflow which can be applied to identify targets from pathogen proteomes. This tool can be downloaded from http://pbit.bicnirrh.res.in/offline.php and executed locally.

ABST#180
Antibacterial potential of biogenic ZnO nanoparticles synthesized from Aspergillus flavus
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• Objectives:
o Biogenic synthesis of ZnO (Zinc Oxide) nanoparticles.
o Physicochemical characterization of nanoparticles.
o Assessment of antibacterial potential of nanoparticles.

• Methods:
o Biogenic synthesis of ZnO nanoparticles was carried out utilizing a fungal endophyte (Aspergillus flavus) (isolated from bark of Punica granatum) and a Zinc salt.
o The physicochemical characterization of nanoparticles was availed via Ultra Violet Visible (UV-Vis) Spectroscopy, Fourier Transform Infrared (FTIR) Spectroscopy, Diffraction Light Scattering (DLS), Zeta Potential (ZP), X-Ray Diffraction (XRD), Field Emission Scanning Electron Microscopy along with Energy Dispersive X-Ray Spectroscopy (FESEM-EDS) and Transmission Electron Microscopy (TEM).
o The antibacterial potential of these nanoparticles was assessed against Staphylococcus aureus MTCC 96, Bacillus cereus MTCC 6629, Pseudomonas aeruginosa MTCC 4673 and Acinetobacter baumannii MTCC 1425 via agar well diffusion method.

• Results:
o Well defined, hexagonal nanoparticles with an average size of 71nm were obtained.
o These nanoparticles demonstrated appreciable antibacterial activity against both Gram positive and Gram negative bacteria.

• Conclusion:
o Biogenic synthesis of ZnO nanoparticles using endophytic fungi, is an eco-friendly and cheap method.
o Antibacterial potential of these nanoparticles can be suitably tapped for future remedial endeavours.

Pathogenesis and immunity

ABST#39

Phylogenetic analyses and B-cell epitope mapping of virulence factors of C. neoformans and C. gattii: An in-silico insight

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Objective- Virulence factors ensure survival of the pathogen in its host. They modulate host's immune system and play significant role in pathobiology of the disease. Cryptococcosis is a life threatening fungal infection caused by Cryptococcus species in humans and animals. Here we outline recent advances in our understanding of virulence factors of C. neoformans neoformans, C. neoformans grubii and C. gattii. An in-silico approach has been employed to phylogenetically analyse relationship between virulence factors of Cryptococcus sps. and to map their B-cell epitopes.

Methodology- The amino acid sequences of virulence factors (glucuronoxylomannan (GXM), superoxide dismutase (SOD), mannoprotein (MP), urease, CAP binding protein, galactoxylomannan (GalXM), phospholipase-B and laccase) of C. n. neoformans, C. n. grubii and C. gattii were retrieved from NCBI. Web servers ABCpred, BCPred and BcePred were used for the prediction of linear B-cell epitopes. Maximum likelihood test was performed by PHYML server while JMP 13.1 software was used for clustering orthologs of virulence factors.

Results- Hierarchical clustering grouped glucuronoxylomannan, mannoprotein, urease, superoxide dismutase, CAP binding protein, galactoxylomannan, phospholipase B and laccase into eight clusters. However, superoxide dismutase (SOD) was found to diverge separately. The lowest value of gamma shape parameter of SOD suggests that variation of substitution rates among sites is highest in SOD. Amongst all virulence factors, the epitopes of SOD showed lowest antigenicity.

Conclusion- It is suggested that virulence factors of C. n. neoformans, C. n. grubii and C. gatti might be governed by pressures of natural selection. Among all the virulence factors, SOD was found to be highly variable and may possibly become a critical virulence factor of Cryptococcus in future. Moreover, the identification and mapping of B-cell epitopes could be useful for the designing of potential drug candidates against cryptococcosis.

ABST#127

Screen diagnostic biomarkers for invasive aspergillosis and explore their roles in immune infiltration

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Abstract
Objectives: Invasive aspergillosis (IA) leads to significant mortality in immunocompromised patients. In recent years, with more aggressive immunosuppressed therapies, the incidence of IA was increasing. However, diagnostic biomarkers with high sensitivity and specificity remain rare. This study was aimed to screen out the potential diagnostic biomarkers for IA.
Methods: Weighted gene co-expression network analysis (WGCNA) was used to identify hub genes. Roc curves were employed for investigating diagnostic biomarkers for IA.
Results: TLR4, TP53I3/PIG3, and TMTC1 were screened as novel diagnostic biomarkers. In addition, our results revealed that TP53I3/PIG3 was obviously higher expression in patients with bacterial infections compared with IA. Conspicuously, we also observed that TP53I3/PIG3 and TLR4 had a strong positive correlation with the infiltration of Monocytes and Neutrophils, respectively.
Conclusions: Taken together, our study suggested that TLR4, TP53I3/PIG3, and TMTC1 might be used for the diagnosis of IA, and TP53I3/PIG3, can also be used to discriminate hematological aspergillosis and bacterial infections. Moreover, TP53I3/PIG3 and TLR4 may promote the infiltration of Monocytes and Neutrophils during Aspergillus infections.

ABST#130

Research on the role of Dectin-1 in Fonsecaea monophora wild strain and melanin knockout strain induced macrophage immune killing effect

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Background Chromoblastomycosis is a chronic skin and subcutaneous granulomatous disease. Fonsecaea monophora is a common pathogen of Chromoblastomycosis in southern China. The wild strain contains a large amount of melanin, and the melanin knockout strain is obtained after polyketide synthase gene knockout. Dectin-1 is one of the important pattern recognition receptors on the cell surface of macrophage, which can induce intracellular signal transduction after binding to ligands.
Objectives This study aims to investigate the role of Dectin-1 receptor in macrophage immune killing induced by F. monophora wild strain and melanin knockout strain.
Methods We established a co-culture system of F. monophora wild strain or melanin knockout strain and THP-1 human macrophages with normal or low Dectin-1 expression. We compared the killing rate, phagocytosis rate and the expression levels of inflammatory cytokines TNF-α, IL-1β and IL-6 in each group.

Results The killing rate, phagocytosis rate and the level of inflammatory factors of macrophages with normal Dectin-1 expression against the melanin knockout strain were all higher than those of the wild strain. The above indicators in macrophages with Dectin-1 low expression were higher than macrophages with normal Dectin-1 expression, and there is no significant difference in the above indicators between the wild strain group and the melanin knock-out strain group in macrophages with low Dectin-1 expression.
Conclusions Melanin in F. monophora plays a certain role in inhibiting the immune response of the host. Melanin may inhibit the inflammatory response by inhibiting Dectin-1 from recognizing F. monophora, causing the pathogen removal obstacle.

ABST#162
PATHOGENESIS OF MALASSEZIA-ASSOCIATED SKIN DISEASE
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The fungal genus Malassezia is a lipophilic yeast species that are part of the normal skin microbiota. Recently, the genus Malassezia has been implicated in the etiology of various skin diseases; including pityriasis versicolor (PV), Malassezia folliculitis (MF), seborrheic dermatitis (SD) and atopic dermatitis (AD). While Malassezia spp. are directly responsible for the infectious diseases, PV and MF, they act as an exacerbating factor in SD and AD.
The prevalence of pityriasis versicolor is higher (approximately 50%) in the tropics and in warmer months. Outpatient report from Sanglah Hospital, Denpasar in 2017 showed that PV contributes to 1.13% to the overall visits, in fact there are many cases that were not reported. Malassezia spp is divided into various life phases; during the yeast phase, Malassezia spp lives on normal skin then once it evolves into the mycelium phase, they can invade and penetrate the stratum corneum, causing skin lesions. The spectrum of skin color changes that may be seen including hypopigmentation and hyperpigmentation, as well as erythematous to salmon-colored skin lesions. Through lipase, Malassezia metabolizes various fatty acids, such as arachidonic acid and releases azelaic acid as one of its metabolites. This acid inhibits the action of the dopa-tyrosinase enzyme, which blocks the passage of tyrosine to melanin and consequently results in the appearance of hypopigmented macules. In addition, Malassezia spp. produces a number of indole compounds which are thought to cause hypopigmentation without inflammatory symptoms.
Malassezia folliculitis is an inflammatory condition caused by pilo-sebaceous invasion by the Malassezia yeast. It is also more common in tropical climates and in warmer months. Histologically, Malassezia folliculitis displays an infiltration of inflammatory cells including lymphocytes, histiocytes and neutrophils. Free fatty acids hydrolyzed from triglycerides by Malassezia are thought to cause this inflammation.
Seborrheic dermatitis is an inflammatory dermatosis with a predilection for anatomical areas with high concentrations of sebaceous glands. This disease affects 2-5% of the population, can affect infants in the first three months of life and adults aged 20 to 50 years. Changes in sebum composition and epidermal barrier in seborrheic dermatitis will create favorable conditions for Malassezia to colonize the area and become the dominant species producing oleic acid metabolites to penetrate the damaged barrier and cause inflammation.
Atopic dermatitis is a common inflammatory skin disease associated with other atopic diseases. The prevalence of AD in industrialized countries has tripled over the past 30 years, affecting 15%-30% of children and up to 10% of adults. Malassezia spp. produces a variety of immunogenic proteins that elicit the production of specific IgE antibodies and may induce the release of pro-inflammatory cytokines. In addition, Malassezia spp. induces auto-reactive T cells that cross-react between fungal proteins and their human counterparts. These mechanisms contribute to skin inflammation in atopic dermatitis and therefore influence the course of this disorder.
The aim of this paper is to provide an overview on the pathogenesis of Malassezia-associated skin disease.

Keywords: pityriasis versicolor, Malassezia, folliculitis, seborrheic dermatitis, atopic dermatitis

ABST#174
The Ubiquitin-Proteasome System Regulates virulence of Cryptococcus neoformans Through the Choline Transporter
Tongbao Liu[1]
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Cryptococcus neoformans is the leading cause of fungal meningitis in immunocompromised populations, which kills hundreds of thousands of people every year and seriously endangers human health. The ubiquitin-proteasome system (UPS) is the major protein turnover mechanism that plays an important role in regulating a variety of cellular functions. Knockout of the key protein Fbp1 in this system can lead to the loss of pathogenicity and shapes the immunogenic potential of C. neoformans. However, the molecular mechanism of its regulation of pathogenicity of C. neoformans is still unclear. Our group identified the choline transporter protein Cht1, a downstream substrate of Fbp1. Protein interaction and stability assays showed that Cht1 interacts with Fbp1 and is a downstream target of Fbp1. Fungal virulence assay showed that the CHT1 overexpression strain completely lost its pathogenicity. In this study, we aim to study the role of Fbp1 and Cht1 in the pathogenicity of C. neoformans. We also aim to detect the effect of Cht1 overexpression on the changes of choline concentration and inflammatory responses in host cells and its effect on C. neoformans infection at the molecular, cell and individual levels through the Cryptococcus-macrophage cell interaction. Our results will help reveal the molecular mechanism of Cryptococcus Cht1 in macrophage inflammation and clarify that the ubiquitin-proteasome system regulates cryptococcal pathogenicity through choline transporters. Our results will also provide a new theoretical basis and ideas for the clinical treatment of cryptococcosis and the discovery of new targets for antifungal drugs.

ABST#175
HIF-1α upregulation induced proinflammatory factors boost the killing capacity of host exposed to Aspergillus fumigatus
Huilin Su[1], Jiu Yi[2], Clement Tsui[3], Chunxiao Li[4], Min Zhu[5]

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Objectives: Hypoxic induced factor (HIF)-1α is an important transcription factor in regulation of metabolic and immune response genes expression in hypoxia environment and inflammation. We aim to investigate the protective function of HIF-1α in the host response to Aspergillus fumigatus.
Methods: In this study, we used lentivirus transfection to induce HIF-1α upregulation in A549 cells, and cocultured the cells with A. fumigatus to detect the internalization, killing capacity, TLRs expression, NO releasing and pro-inflammatory factors. We further conducted HIF-1α overexpression with adeno-associated virus (AAV) in mice airway cells in vivo, and performed the fungal burden, HE stains and pro-inflammatory factors detection
Results: HIF-1α overexpression was found to enhance the killing capacity of A549 cells exposed to A. fumigatus through boosting proinflammatory factors (TNF-α, CCL2,CCL5 and CXCL8), NO and TLRs. HIF-1α overexpression with AAV in mice airway cells in vivo, and the HIF-1α overexpressedmice exhibited lower fungal burden at early stage after A. fumigatus infection and reduced airway inflammation after infection for one week, which was consistent with the variation of proinflammatory factors in vivo.
Conclusion: We identified that HIF-1α have a protective role in anti-A. fumigatus immunity, and modulation of HIF-1α signaling might be a potential area for aspergillosis therapy development.

ABST#179

Studies on immunomodulatory effects of tenuazonic acid, a mycotoxin

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Objective- Tenuazonic acid (TeA) is a mycotoxin usually produced by species of the genus Alternaria that contaminate tomatoes. Mycotoxins are toxic, secondary metabolites that are known to cause mild to fatal symptoms in humans and other vertebrates. The effects of mycotoxins are often mediated through a number of organs notably the liver, kidney, lungs, and nervous, endocrine, and immune systems. They are known to cause immuno-suppression which increases an individual's susceptibility to opportunistic infections. In the present study, the potential of TeA as an immunomodulatory agent has been studied.
Method- MTT assay was performed to measure LD50 of TeA using splenocytes isolated from inbred Swiss mice. Three different concentrations of TeA- 12.5 µg/ml, 25 µg/ml and 50 µg/ml were investigated in vitro. Further, innate (respiratory burst) immune functions with the use of peripheral blood leukocytes collected from healthy Swiss mice were carried out. The leukocytes were subjected to in vitro exposure to 0 and 25 µg/ml TeA. After 24 hrs of incubation, cells were incubated at 37°C for 1 hr with PMA (10 ng/ml). The cells were again incubated with 1 µM DCFDA for 10 min at 37°C in dark and then washed twice with PBS for FACS. The intensity of fluorescence was measured by flow cytometry.
To further check the effect of TeA on immuno-modulation, an in vivo model was developed. TeA (50 µg/kg/BW) was administered to Swiss mice (C3HHC strain) orally for 8 weeks. Mice were divided into immuno-competent (PO) and immuno-suppressed (ISO) groups. After 8 weeks of sub-chronic exposure, mice were euthanized. Blood was collected for differential leukocyte count (DLC) and spleen was collected to carry out morphological, biochemical, and histological analyses. Cell apoptotic marker (Caspase 3) was also measured spectrophotometrically.
Result-
In vitro- Twenty-five µg/ml of TeA was able to kill 50% of the total cells incubated and results of flow cytometry represented oxidative burst stimulation property of TeA (25µg/ml).
In vivo- Results of DLC showed lymphocytosis and neutropenia in the experimental groups (PO and ISO). Morphologically, the size and weight of the spleen in both the experimental groups increased indicating signs of splenomegaly. Further, histopathological studies revealed mast cell and red pulp hyperplasia concurrent with the studies of caspase 3. ROS studies marked the presence of oxidative stress by showing elevated levels of MDA resulting in lipid peroxidation and lowered SOD and CAT activity. On comparing both the experimental groups, the immuno-suppressed group was more affected than the immuno-competent group.
Conclusion- Isolation of TeA has widely been performed from tomatoes. Since tomato and its products are consumed worldwide on a regular basis, the present study is an effort to suggest the risk for immunomodulation in humans and free-ranging animals as a result of natural exposure. Understanding the risk for immunomodulation upon TeA exposure will contribute to the health assessment associated with TeA mycotoxin and its management.
Keywords: Tenuazonic acid, immunomodulation, leukocytes, FACS

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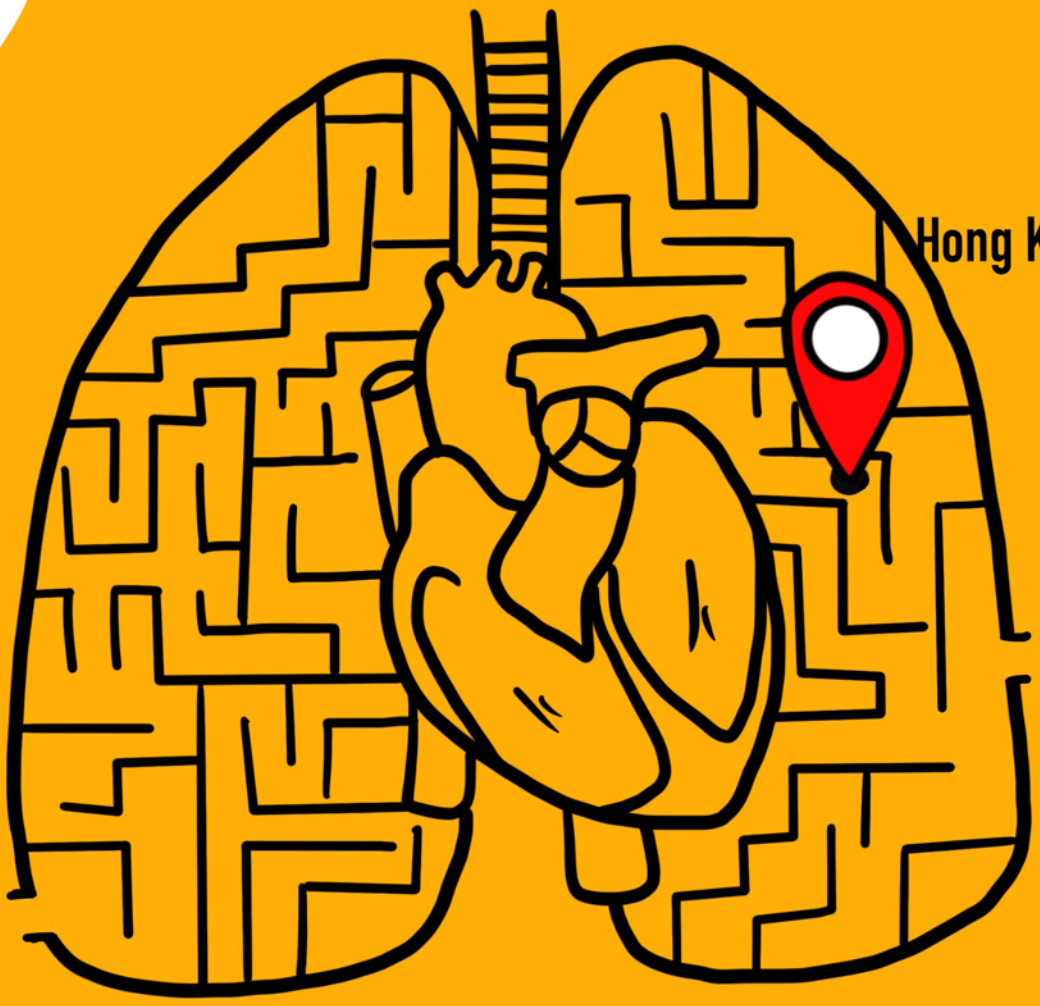

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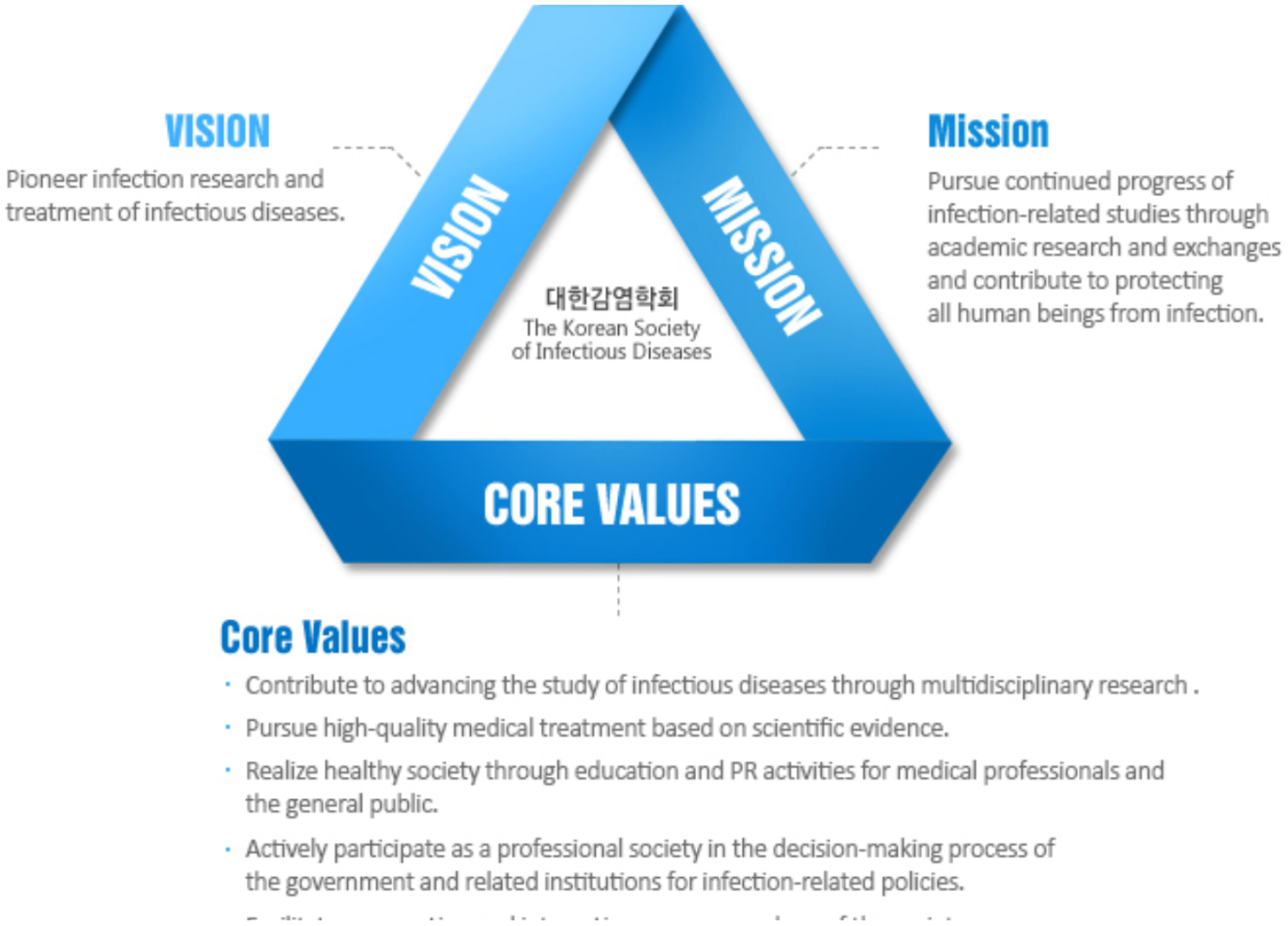

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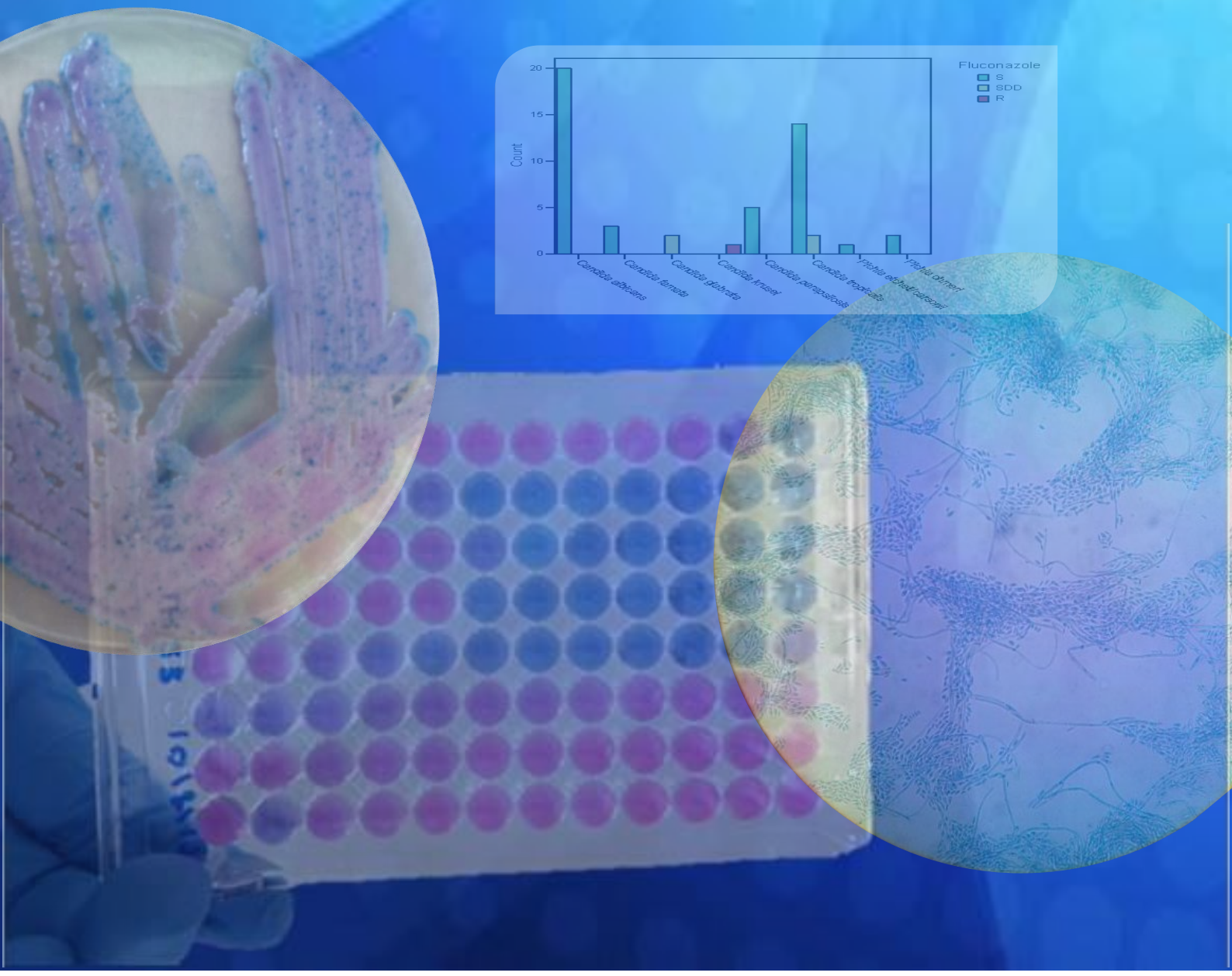

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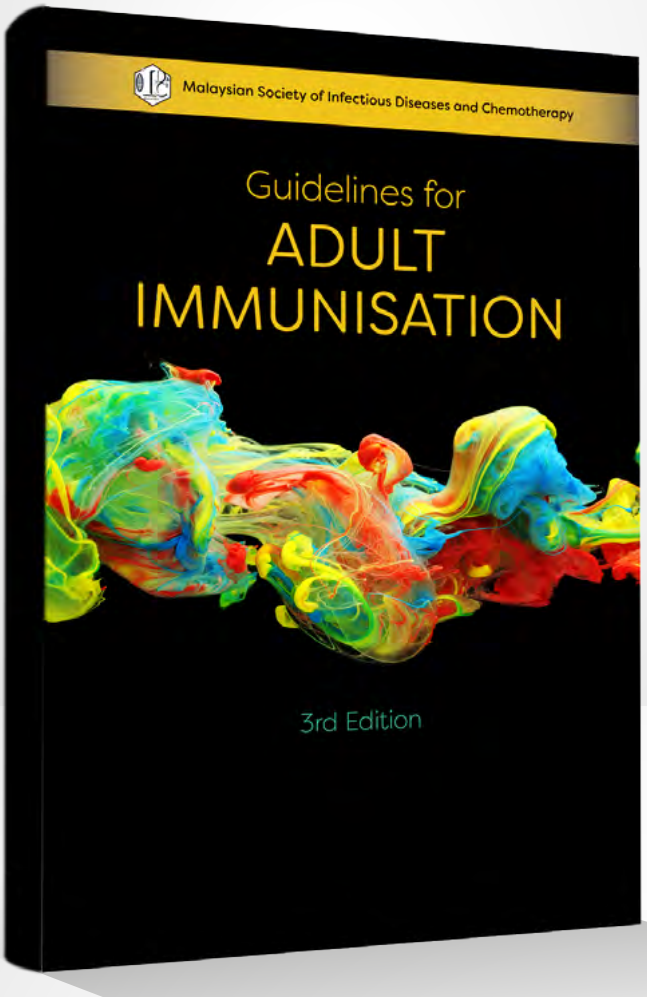

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