Issues in antifungal sensitivity tests

Antifungal sensitivity testing using VITEK 2

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VITEK 2 Systems

The VITEK® 2 System is intended for the **automated identification and susceptibility testing of most** clinically and/ or industry significant organisms (bacteria and yeast) routinely isolated in the microbiology laboratory.

VITEK 2 in AST- UMMC experience..

- The principle of the VITEK® 2 AST cards is based on the **broth microdilution minimum inhibitory concentration technique.**

- The VITEK® 2 AST card is essentially a miniaturized, abbreviated and automated version of the doubling dilution technique for MICs determined by the microdilution method.

- The automated growth-based detection uses attenuation of light measured by an optical scanner.

- Each AST card contains 64 microwells. .

Why VITEK 2 in UMMC

- The automation system already used for bacteriology identification.
- Identification done with AST card, results are faster than other methods (24 hours ID and AST results)

  Compare to 48 hours ID alone.

  Cost is reduced – **No API, No Cornmeal Agar Carbohydrate assimilation tests.**
- Human errors reading minimized
- Comfortable usage :only sterile sites were focused.(5-10 per week)
- As a reference centre, many request for clinician for fast results as to start the treatment as fast as possible
- To assist on Resistance antifungal and failure treatments
- Staffing issues.

VITEK 2 usage begins

- Started around Julai – August 2016.
- Many samples came from private required AST
- **Sensititre Yeast One Colorimetric Antifungal** testing methods required expertise and trained personal
- Results were subjective
- Took longer time to release the results (ID and Sensitivity testing 3 days)
- Previous experience with E test wasn't really convincing and pleasing

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Problems No 1 faced by US

- VITEK card **AST YS 07 – Yeast Susceptibility Card** were given to us.
- This VITEK AST card- were not validated or updated to CLSI **2012** latest breakpoints
- **Other problems**
- Identification : Many teleomorph of candida were identified in blood, thus no antifungal were given by this card system- hurdle to overcome
- e.g *Kodomaea ohmeri*

Expert help..

- Dr. Sateesh from Singapore came November to help us on clarifying the new breakpoint changes in yeast.
- With his help, we manually adjust and change the breakpoints according to the 2012 updated CLSI breakpoints

AST YS 07 – Yeast Susceptibility Card

CONTENTS OF THE CARD

Antimicrobic	Code	Concentration §	Calling Range ≤	Calling Range ≥	FDA Indications for Use
Amphotericin B	AB	1, 4, 16, 32	0.25	16	
Caspofungin SDD	CAS	1, 4, 8	0.25	4	*C. albicans, C. krusei, C. parapsilosis, C. tropicalis, C. guilliermondii, C. glabrata*
Fluconazole SDD	FLU	1, 4, 8, 16	1	64	*Candida* spp.
Flucytosine	FCT	4, 8, 16, 64	1	64	
Micafungin SDD	MCF	0.06, 0.25, 1, 4	0.06	4	N/A**
Voriconazole SDD	VRC	0.5, 1, 4, 8	0.12	8	*C. albicans, C. krusei, C. parapsilosis, C. tropicalis, C. lusitaniae, C. guilliermondii*

Numerical values are expressed in µg/ml.

§ Equivalent standard method concentration by efficacy.

SDD = Susceptible-Dose Dependent (SDD) reports as Intermediate (I).

**N/A = No specific FDA Indications for Use available

Manual changes in the reporting systems according to 2012 CLSI

- Changes made mainly for Six Candida species:
- ***Candida albicans, Candida krusei, Candida glabrata, Candida parapsilosis, Candida tropicalis and guilliermondii***.

- No breakpoint changes were given for other *candida* spp.

Breakpoints.

- As no breakpoints are yet available till the latest CLSI guideline (CLSI M27-A3, 2008 and CLSI M27-Supplement 4, 2012) for rest of *Candida* spp, no changes have been made in Vitek 2 and they still follow the generic breakpoints for *Candida* spp, (CLSI M27-S3)

AZOLES- SDD

- Unlike Echinocandins, the Azoles breakpoints are classified with **Susceptible-Dose dependent(SDD**).
- However, the software in Vitek 2 do not have the category of SDD.
- So the SDD breakpoints of CLSI for azoles were incorporated in Vitek 2 as an Intermediate (I).

- To manage the lab reporting, we set a **bioART rule** (inside Vitek 2) to recognize and the alert the microbiologist.

- Thus every time the isolate is reported with "I" so the microbiologist has to report the result to the clinician as SDD instead of "I"

U1

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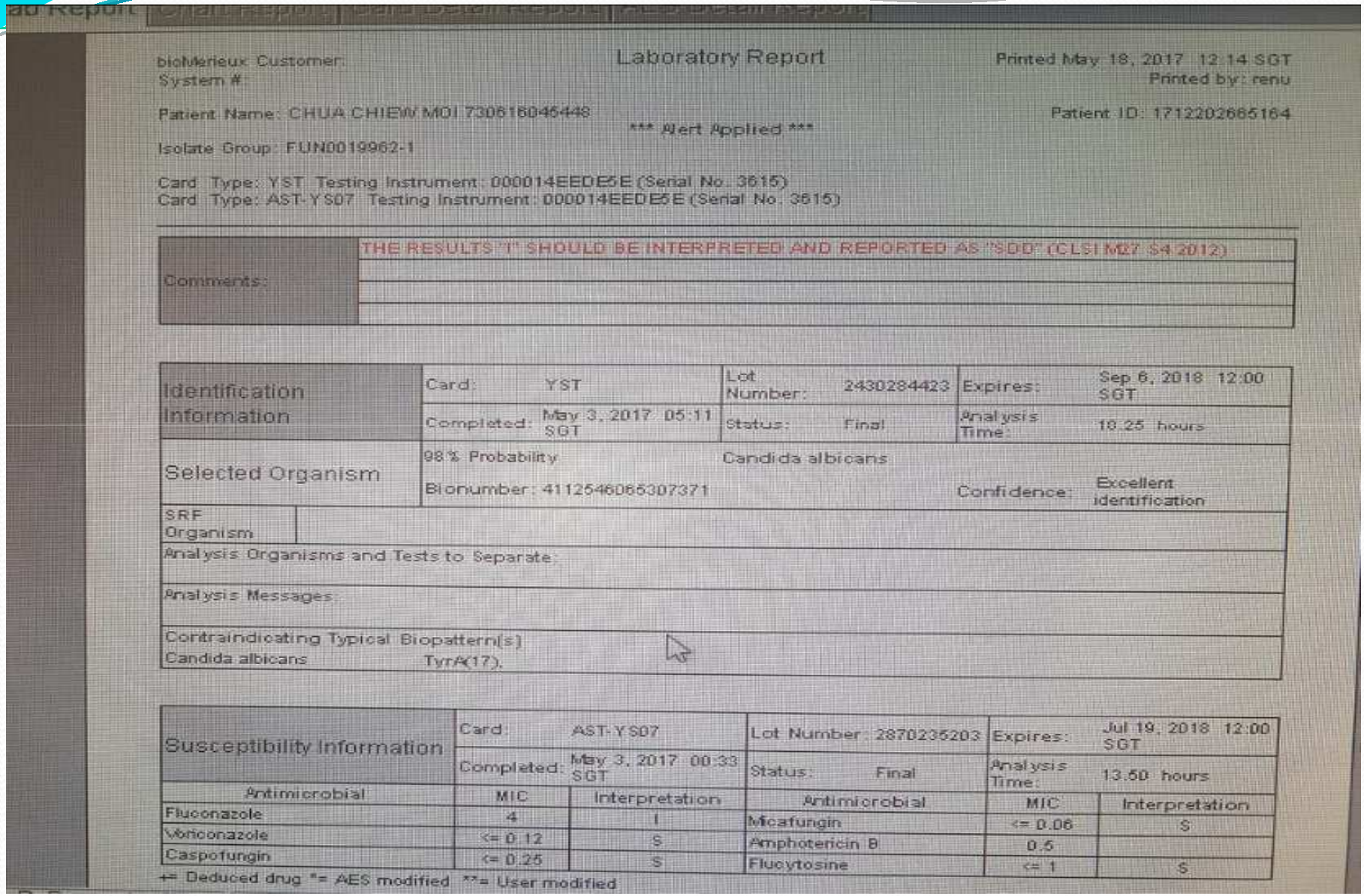
Slide 11

U1 User, 5/18/2017

Azoles results



bioMérieux Customer System #:

Laboratory Report

Printed May 18, 2017 12:14 SGT
Printed by: renu

Patient Name: CHUA CHIEW MOI 730616046448

*** Alert Applied ***

Patient ID: 1712202665164

Isolate Group: FUN0019962-1

Card Type: YST Testing Instrument: 000014EEDE5E (Serial No. 3615)
Card Type: AST-YS07 Testing Instrument: 000014EEDE5E (Serial No. 3615)

Comments:	THE RESULTS "I" SHOULD BE INTERPRETED AND REPORTED AS "SDD" (CLSI M27 S4 2012)

Identification Information	Card: YST	Lot Number: 2430284423	Expires: Sep 6, 2018 12:00 SGT
	Completed: May 3, 2017 05:11 SGT	Status: Final	Analysis Time: 18.25 hours
Selected Organism	98% Probability Candida albicans		
	Bionumber: 4112546065307371		Confidence: Excellent identification
SRF Organism			
Analysis Organisms and Tests to Separate:			
Analysis Messages:			
Contraindicating Typical Biopattern[s] Candida albicans TyrA(17).			

Susceptibility Information	Card: AST-YS07		Lot Number: 2870235203	Expires: Jul 19, 2018 12:00 SGT	
	Completed: May 3, 2017 00:33 SGT		Status: Final	Analysis Time: 13.50 hours	
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	4	I	Micafungin	<= 0.06	S
Voriconazole	<= 0.12	S	Amphotericin B	0.5	
Caspofungin	<= 0.25	S	Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified

Azoles and Caspofungin:

Isolate Group: B170308199-1

Card Type: YST Testing Instrument: 000015F1461D (Serial No. 3811)
Card Type: AST-YS07 Testing Instrument: 000015F1461D (Serial No. 3811)

Comments:	THE CARD VITEK YS07 DOESNT HAVE THE DILUTION FOR "S" RANGE=0.12ug/ml (REF CLSI M27 S4 2012). THE RESULTS "I" SHOULD BE INTERPRETED AND REPORTED AS "SDD" (CLSI M27 S4 2012)
	THE CARD VITEK YS07 DOESNT HAVE THE DILUTION FOR "S" RANGE=0.12ug/ml (REF CLSI M27 S4 2012).

Identification Information	Card:	YST	Lot Number:	243391412	Expires:	Sep 1, 2017 12:00 SGT
	Completed:	Apr 30, 2017 06:24 SGT	Status:	Final	Analysis Time:	18.25 hours
Selected Organism	99 % Probability		Candida glabrata			
	Bionumber: 4000104000201111				Confidence:	Excellent identification
SRF Organism						
Analysis Organisms and Tests to Separate:						
Analysis Messages: The following antibiotic(s) are suppressed from analysis: Caspofungin,						
Contraindicating Typical Biopattern(s)						

Susceptibility Information	Card:	AST-YS07	Lot Number: 2870125203	Expires:	Mar 31, 2018 12:00 SGT
	Completed:	Apr 30, 2017 00:01 SGT	Status: Final	Analysis Time:	11.75 hours

Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	8	I	Micafungin	<= 0.06	S
Voriconazole	(-)	(-)	Amphotericin B	<= 0.25	
Caspofungin			Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified (-)= Susceptibility testing not recommended; species is a poor target for therapy

Antifungal in AST card

a. Caspofungin: All new breakpoints were updated according to the latest guidelines. However, the present AST card (AST-YS07) do not cover the lower range for *Candida glabrata* (0.12mg/ml). So until, we start with new AST card (AST-YS08), which is due for June 2017, we block the result for caspofungin for *C.glabrata.*

**** It was a bit difficult as sometimes many C. glabarata showed pan resistant***

b. Micafungin: All new breakpoints were updated according to the latest guidelines.

c. Anidulafungin: **Not used widely in clinical practice so no breakpoints updates were not made in the Vitek 2 for now.**

d. Fluconazole: All new breakpoints were updated according to the latest guidelines. (No breakpoints for *C.krusei* as it is considered intrinsically resistance).

e. Voriconazole: All new breakpoints were updated according to the latest guidelines. (No breakpoints for *C.glabrata*)

f. Amphotericin B: CLSI has given a single breakpoint (>1mg/ml) for classifying the resistant isolates from susceptible isolates. This was incorporated into Vitek 2. (M27- A3 ,2008).

g. Itraconazole : No longer appears in CLSI M27-S4 thus will not be routinely reported

Special Microbiological comments: AZOLES

- **Azoles (SDD – Susceptibility/Dose Dependent category)**

- **SDD – Susceptibility is dependent on achieving the maximal possible blood level.**
- **For fluconazole, doses of 400mg/day(6mg/kg/d) or more be required in adults with normal renal function and body habitus. Expert consultation on selection of maximum dosage regimen may be useful.**

Echinocandins.

- **Echinocandins (Intermediate category)**

I - *The susceptibility of these isolates is not certain, and the available data do not permit them to be clearly categorized as either “susceptible” or “resistant”.

AMPHOTERICIN B

- **Amphotericin B**
- **MIC of 1 >ug/ml is concluded that this isolates is resistant to Amphotericin B**

Others special comments

- ***Candida krusei***

  There is no interpretation for fluconazole with *C. krusei* as this species is considered to be intrinsically resistant to fluconazole

- ***Candida glabrata***

  There current data are insufficient to demonstrate a correlation between in vitro susceptibility testing and clinical outcome for *C.glabrata* and voriconazole

  Caspofungin interpretation is suppressed because for Candida glabrata -THE VITEK Card YS07 DOESNT HAVE THE DILUTION FOR "S" RANGE=0.12ug/ml.

Availability of new antifungal card – Might me the answer….

PIONEERING DIAGNOSTICS

BIOMÉRIEUX

New Yeast card : AST-YS08 (420739)

- Developed to CLSI BMD **(not EUCAST compliant)**
  - EUCAST and CLSI use different broths in their reference methods, which is why **YS08 is not EUCAST compliant.**
- Compliant with latest CLSI breakpoints (BP)
- Same drug composition as YS07, with new drug versions** :
- **Not in use yet in UMMC. We will be doing evaluation soon.**
- redeveloped versions for: **Caspofungin, Fluconazole, Flucytosine and Micafungin**.

Package inserts and label available

Antifungal	YS08 Calling Range	CLSI (M27-S4) Dec 2012 Range to cover BPs
Amphotericin B	0.25 - 16	-
Caspofungin NEW	0.125 - 8	0.12 - 8
Fluconazole** NEW	0.5 - 64	2 - 64
Flucytosine** NEW	1 - 64	-
Micafungin NEW	0.06 - 8	0.06 - 8
Voriconazole	0.12 - 8	0.12 - 2

*** Redeveloped with a newer base broth that provides more robust growth and faster time to call compared to previous version.*

CLSI (M27-S4) Dec 2012 – Current latest breakpoints

Table 1. Interpretive Guidelines for *In Vitro* Susceptibility Testing of *Candida* spp. and Echinocandins[1]

Antifungal Agent	Species	MIC Range (µg/mL)		
		S	I[a]	R
Anidulafungin[b]	*C. albicans*	≤0.25	0.5	≥1
	C. glabrata	≤0.12	0.25	≥0.5
	C. tropicalis	≤0.25	0.5	≥1
	C. krusei	≤0.25	0.5	≥1
	C. parapsilosis	≤2	4	≥8
	C. guilliermondii	≤2	4	≥8
Caspofungin[b,c]	*C. albicans*	≤0.25	0.5	≥1
	C. glabrata	≤0.12	0.25	≥0.5
	C. tropicalis	≤0.25	0.5	≥1
	C. krusei	≤0.25	0.5	≥1
	C. parapsilosis	≤2	4	≥8
	C. guilliermondii	≤2	4	≥8
Micafungin[b]	*C. albicans*	≤0.25	0.5	≥1
	C. glabrata	≤0.06	0.12	≥0.25
	C. tropicalis	≤0.25	0.5	≥1
	C. krusei	≤0.25	0.5	≥1
	C. parapsilosis	≤2	4	≥8
	C. guilliermondii	≤2	4	≥8

Abbreviations: I, intermediate; MIC, minimal inhibitory concentration; R, resistant; S, susceptible.

NOTE 1: All MIC breakpoints in this table were adopted at meetings of the subcommittee held on June 12, 2010 in Atlanta, Georgia, USA, and January 8, 2011 in Orlando, Florida, USA. These breakpoints are considered tentative for one year from the publication date of M27-S4 and are open for comment.

NOTE 2: The selected breakpoints have been established to discriminate resistant mutants from susceptible isolates and differences in breakpoints reflect methodological issues. Due to *in vitro* methodological issues, the interpretive breakpoint of micafungin against *C. glabrata* is lower than that of other echinocandins. This does not reflect any inherent clinical differences in efficacy. True differences in antifungal activity amongst the echinocandins are rare.[2]

Table 2. Interpretive Guidelines for *In Vitro* Susceptibility Testing of *Candida* spp and Selected Azoles After 24-hour Incubation

Antifungal Agent	Species	MIC Range (µg/mL)		
		S	SDD[a]	R
Fluconazole[b]	*C. albicans*	≤2	4	≥8
	C. glabrata	–	≤32	≥64
	C. krusei	–	–	–
	C. parapsilosis	≤2	4	≥8
	C. tropicalis	≤2	4	≥8
Voriconazole[c,d]	*C. albicans*	≤0.12	0.25–0.5	≥1
	C. glabrata[e]	–	–	–
	C. krusei	≤0.5	1	≥2
	C. parapsilosis	≤0.12	0.25–0.5	≥1
	C. tropicalis	≤0.12	0.25–0.5	≥1

RESULT EXAMPLES

- ID : *Candida parasiplosis*
- Confidence Level : Low discrimination
- Susceptibility Information
- AES Finding : Analysis not performed (No AES interpretation)

Identification Information	Card: YST	Lot Number: 243379320	Expires: May 3, 2017 12:00 SGT
	Completed: Sep 16, 2016 04:05 SGT	Status: Final	Analysis Time: 18.25 hours
Selected Organism	89% Probability	Candida parapsilosis	Confidence: Low discrimination
	Bionumber: 0502544643333371		
SRF Organism			

Analysis Organisms and Tests to Separate:

Low Discrimination Organism	
Candida famata	dRAFFIN.a(100),
Candida parapsilosis	dRAFFIN.a(0),

Analysis Messages:

Contraindicating Typical Biopattern(s)

Candida famata	GENa(82),URE(1),AGLU(99),dRAFa(82),
Candida parapsilosis	IMLTa(17),URE(1),AGLU(99),GRTas(81),

Susceptibility Information	Card: AST-YS07		Lot Number: 287393410	Expires: Sep 21, 2017 12:00 SGT	
	Completed: Sep 16, 2016 02:57 SGT		Status: Final	Analysis Time: 17.00 hours	
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	>= 64	R	Micafungin	1	S
Voriconazole	<= 0.12	S	Amphotericin B	2	I
Caspofungin	1	S	Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified

AES Findings:	Last Modified: Jul 7, 2015 11:59 SGT	Parameter Set: Global CLSI-based+Natural Resistance 2014
Confidence Level:	Analysis not performed	

Installed VITEK 2 Systems Version: 07.01
MIC Interpretation Guideline: Global CLSI-based 2014 Therapeutic Interpretation Guideline: NATURAL RESISTANCE 2013
AES Parameter Set Name: Global CLSI-based+Natural Resistance 2014 AES Parameter Last Modified: Jul 7, 2015

- ID : *Candida albican*
- Confidence Level : Excellent identification
- Susceptibility Information
- AES Finding : Analysis not performed
- (No AES interpretation)

Identification Information					
	Card: YST		Lot Number: 243391412	Expires:	Sep 1, 2017 12:00 SGT
	Completed: Oct 6, 2016 03:32 SGT		Status: Final	Analysis Time:	18.25 hours
Selected Organism	97% Probability	Candida albicans			
	Bionumber: 4102544065327371			Confidence:	Excellent identification
SRF Organism					
Analysis Organisms and Tests to Separate:					
Analysis Messages:					
Contraindicating Typical Biopattern(s)					
Candida albicans	NAGA1(91),				

Susceptibility Information					
	Card: AST-YS07		Lot Number: 287393410	Expires:	Sep 21, 2017 12:00 SGT
	Completed: Oct 5, 2016 22:09 SGT		Status: Final	Analysis Time:	12.75 hours
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	<= 1	S	Micafungin	<= 0.06	S
Voriconazole	<= 0.12	S	Amphotericin B	<= 0.25	S
Caspofungin	<= 0.25	S	Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified

AES Findings:	Last Modified: Jul 7, 2015 11:59 SGT	Parameter Set: Global CLSI-based+Natural Resistance 2014
Confidence Level:	Analysis not performed	

Action	Name (User ID)	Date/Time	Comment
Reviewed by:	(hafiz)	Oct 6, 2016 09:20 SGT	

Installed VITEK 2 Systems Version: 07.01
MIC Interpretation Guideline: Global CLSI-based 2014 Therapeutic Interpretation Guideline: NATURAL RESISTANCE 2013
AES Parameter Set Name: Global CLSI-based+Natural Resistance 2014 AES Parameter Last Modified: Jul 7, 2015 11:59 SGT

- ID : *Candida tropicalis*
- Confidence Level : Excellent identification
- Susceptibility Information
- AES Finding : Analysis not performed (No AES interpretation)

Identification Information	Card: YST	Lot Number: 243379320	Expires: May 3, 2017 12:00 SGT
	Completed: Sep 16, 2016 04:05 SGT	Status: Final	Analysis Time: 18.25 hours
Selected Organism	98% Probability Candida tropicalis		
	Bionumber: 6112544245323771		Confidence: Excellent identification
SRF Organism			
Analysis Organisms and Tests to Separate:			
Analysis Messages:			
Contraindicating Typical Biopattern(s)			
Candida tropicalis TyrA(21),			

Susceptibility Information	Card: AST-YS07		Lot Number: 287393410	Expires: Sep 21, 2017 12:00 SGT	
	Completed: Sep 15, 2016 23:12 SGT		Status: Final	Analysis Time: 13.25 hours	
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	<= 1	S	Micafungin	<= 0.06	S
Voriconazole	<= 0.12	S	Amphotericin B	<= 0.25	S
Caspofungin	<= 0.25	S	Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified

AES Findings:	Last Modified: Jul 7, 2015 11:59 SGT	Parameter Set: Global CLSI-based+Natural Resistance 2014
Confidence Level:	Analysis not performed	

- ID : *Candida glabrata*
- Confidence Level : Excellent identification
- Susceptibility Information
- AES Finding : Analysis not performed (No AES interpretation)

Identification Information	Card: YST	Lot Number: 243379320	Expires: May 3, 2017 12:00 SGT
	Completed: Sep 10, 2016 09:35 SGT	Status: Final	Analysis Time: 18.25 hours
Selected Organism	99% Probability	Candida glabrata	
	Bionumber: 4000104000201111		Confidence: Excellent identification
SRF Organism			
Analysis Organisms and Tests to Separate:			
Analysis Messages:			
Contraindicating Typical Biopattern(s)			

Susceptibility Information	Card: AST-YS07		Lot Number: 287393410	Expires: Sep 21, 2017 12:00 SGT	
	Completed: Sep 10, 2016 03:12 SGT		Status: Final	Analysis Time: 11.75 hours	
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Fluconazole	8	S	Micafungin	<= 0.06	S
Voriconazole	0.25	S	Amphotericin B	<= 0.25	S
Caspofungin	<= 0.25	S	Flucytosine	<= 1	S

+= Deduced drug *= AES modified **= User modified

AES Findings:	Last Modified: Jul 7, 2015 11:59 SGT	Parameter Set: Global CLSI-based+Natural Resistance 2014
Confidence Level:	Analysis not performed	

- QC Result for Identification
- ID : *Candida albican*
- ATCC No: 14053

Testing Instrument: 000014EEDE5E (Serial No. 3615)

Actual Organism: Candida albicans
Bionumber: 6102546065327771
QC Reference ID: ATCC14053

Expected Organism: Candida albicans ATCC14053

Comments	

ID Card Information	Card: YST	Lot #: 243391412	Expires: Sep 1, 2017
	Completed: Oct 6, 2016 03:29 SGT		Status: Final, 18.25 hrs
Actual Organism:	Candida albicans		Bionumber: 6102546065327771
Expected Organism:	Candida albicans ATCC14053		
ID Analysis Messages			

Biochemical Details

Well	Code	Actual	Expected	Well	Code	Actual	Expected	Well	Code	Actual	Expected
3	LysA	-	-	27	GGT	-	v	49	NO3a	-	-
4	IMLTa	+	+	28	dMALa	+	+	51	IARAa	-	v
5	LeuA	+	+	29	dRAFa	-	-	52	dGATa	+	v
7	ARG	+	+	30	NAGA1 - 🔑	+	+	53	ESC	-	-
10	ERYa	-	-	32	dMNEa	+	+	54	IGLTa	+	+
12	GLYLa	-	v	33	dMELa	-	-	55	dXYLa	+	+
13	TyrA	-	v	34	dMLZa	-	-	56	LATa	+	+
14	BNAG	-	-	38	ISBEa	-	-	58	ACEa	+	+
15	ARBa	-	-	39	IRHAa	-	-	59	CITa	+	+
18	AMYa	-	v	40	XLTa	+	+	60	GRTas	+	v
19	dGALa	+	+	42	dSORa	+	+	61	IPROa	+	+
20	GENa	-	-	44	SACa	+	+	62	2KGa	+	+
21	dGLUa	+	+	45	URE	-	-	63	NAGa	+	+
23	LACa	-	-	46	AGLU	+	+	64	dGNTa	+	+
24	MAdGa	+	+	47	dTURa	+	+				
26	dCELa	-	-	48	dTREa	+	+				

* Discrepant result + = positive - = negative v = variable 🔑 = Key Indicator Well

- QC Result for Susceptibility
- ID : *Candida parapsilosis*
- ATCC No: 22019

Testing Instrument: 000014EEDE5E (Serial No. 3615)

Organism ID: Candida parapsilosis ATCC22019
QC Reference ID: ATCC22019

Comments	

AST Card Information	Card: AST-YS07	Lot#: 287393410	Expires: Sep 21, 2017
	Completed: Sep 20, 2016 23:21 SGT		Status: Final, 13.75 hrs
Organism ID:	Candida parapsilosis ATCC22019		
Organism Entered By:	LabTech		Entered: Sep 20, 2016 09:26 SGT
AST Analysis Messages			

Antibiotic Details					
Antibiotic	Actual	Expected	Antibiotic	Actual	Expected
Amphotericin B	<= 0.25	<=0.25 - 1	Flucytosine	<= 1	<=1
Caspofungin	1	<=0.25 - 1	Micafungin	0.5	0.25 - 2
Fluconazole	2	<=1 - 4	Voriconazole	<= 0.12	<=0.12 - 0.25

* Discrepant result

Action	Name (User ID)	Date/Time	Comment
Reviewed	(Tuti)	Sep 22, 2016 08:00 SGT	

- QC Result for Susceptibility
- ID : *Candida krusei*
- ATCC No: 6258

- Weekly ones

Testing Instrument: 000014EEDE5E (Serial No. 3615)

Organism ID: Candida krusei ATCC6258
QC Reference ID: ATCC6258

Comments	

AST Card Information	Card: AST-YS07	Lot#: 287393410	Expires: Sep 21, 2017
	Completed: Sep 15, 2016 06:54 SGT		Status: Final, 21.25 hrs
Organism ID:	Candida krusei ATCC6258		
Organism Entered By:	LabTech		Entered: Sep 14, 2016 09:27 SGT
AST Analysis Messages			

Antibiotic Details					
Antibiotic	Actual	Expected	Antibiotic	Actual	Expected
Amphotericin B	<= 0.25*	0.5 - 2	Flucytosine	8	4 - 32
Caspofungin	<= 0.25	<=0.25 - 1	Micafungin	0.12	0.12 - 0.5
Fluconazole	16	8 - >=64	Voriconazole	<= 0.12	<=0.12 - 0.5

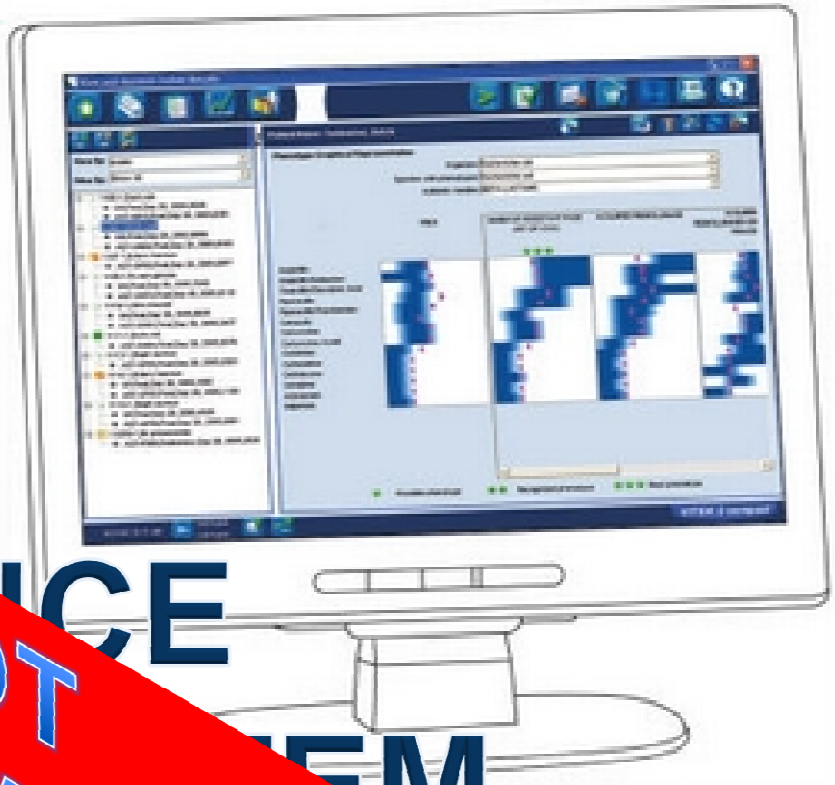
* Discrepant result

Action	Name (User ID)	Date/Time	Comment
Reviewed	(Tuti)	Sep 22, 2016 07:59 SGT	

ADVANTAGES- Advance Reporting Tool – In Vitek 2

- **Uses for bioART rules:**
  - ✓ Laboratory procedures
  - ✓ bioMérieux customer communication letters
  - ✓ CLSI® antibiotic reporting recommendations
  - ✓ FDA Indications for Use
  - ✓ Product limitations
  - ✓ Formulary restrictions
  - ✓ Speed up reports
- **bioART and AES**
  - ✓ AES validates the ID and Susceptibility results
  - ✓ bioART helps to standardize the reporting of results to meet the needs of your laboratory.
  - ✓ ***Advanced Reporting Tool -*** *bioART is a customizable, rules-based, logic system that can be used to address laboratory workflow, communication and reporting issues*

Yeast AES Interpretation- Disadvantages



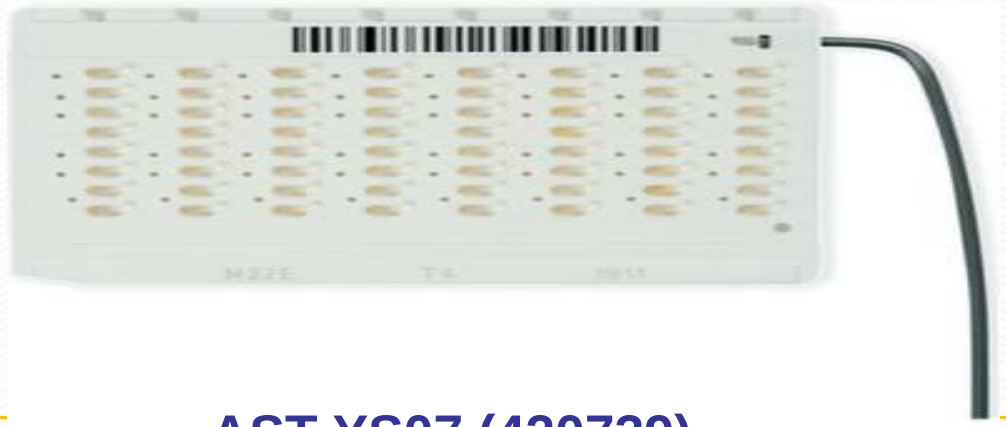
NOT AVAILABLE

ADVANCE EXPERT SYSTEM (AES)

Advanced Expert System are not incorporated

e.g Explaining natural resistance (Wild Type) versus acquired resistance and others

Benefits of using VITEK® 2 cards



AST-YS07 (420739)

- Streamlined set up
- Automated reading and interpretation
- No “special” reagents and media to inventory
- Rapid result
- Less biohazardous waste

The VITEK® 2 test card is sealed, which minimizes aerosols, splattering, spills, and personal contamination. Disposable waste is reduced by more than 80% over microtiter methods.

Summary: Evidence 1

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Research Paper

Use of the VITEK 2 system to identify and test the antifungal susceptibility of clinically relevant yeast species

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- The ability of the VITEK 2 system to **provide quantitative MIC results is reproducible and accurate, identifying high MIC values that indicate resistance to flucytosine, voriconazole, and fluconazole**.
- The MICs of fluconazole, voriconazole, amphotericin B, and flucytosine could be determined rapidly (~15 h) for most species of *Candida* using this system.

VITEK 2 Evidence 2

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Reliability of the Vitek 2 Yeast Susceptibility Test for Detection of In Vitro Resistance to Fluconazole and Voriconazole in Clinical Isolates of *Candida albicans* and *Candida glabrata*▽†

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In conclusion, the Vitek 2 system provides a **very promising alternative to reference methods for antifungal susceptibility testing of isolates** belonging to the most clinically relevant Candida species, thus providing fast and reliable means for detecting azole resistance.
However, the available therapeutic options are limited in cases of isolates found to be cross resistant to azoles (fluconazole and voriconazole)

Future plans in UMMC

- New Card with revised breakpoints. New Yeast card : AST-YS08 (420739)
- ID with MALDI-TOF mass spectrometry (better data base)
- Not only convincing for Yeast and yeast like fungi but also for Molds (Now under evaluation).
- No available breakpoints for MOLDS in CLSI
- Comparative AST with **Sensititre Yeast**, mainly looking at 5 major antifungal drugs used here for difficult cases.
- Research on emergence of resistance : Fluconazole resistance in candida and caspofungin resistance in glabarata
- Help to set up an good reference lab for antifungal sensitivity testing by using recommended methods such as micro broth dilution methods.
- Train more MLTs on Mycology.

Take Home Message in my humble experience

- Start doing AST in your hospital as we have noticed a lot of resistance and SDD category in fluconazole especially in ***Candida albicans and Candida glabrata.***
- At least do the main antifungal drugs group
- Know your common *spp* isolated at least from the sterile sites.
- The availability of rapid antifungal susceptibility data may play a major role in optimizing the therapy of invasive candidal infections.
- Furthermore, surveillance of antifungal susceptibility profiles provides a useful tool for hospitals to validate empirical treatment regimens.
- Aware that resistance are emerging and is unavoidable, discuss with clinician if the patient need other antifungal options..
- Aware of treatment failure, liaise with reference lab for AST request.
- ** BE VIGILLANT and RECEPTIVE...

VITEK® 2 SYSTEMS

THE END

"And suddenly you just know…it's time to start something new and trust the magic of beginnings." -Meister Eckhart