

The Application of Rice Oil-derived Phytochemicals

Potential Effect of Rice-derived Compounds on Skin and Muscle
for Functional Foods and Cosmetics

Toru Takarada Ph.D.
Oryza Oil & Fat Chemical Co. Ltd.

ICRBO2018



Founded **April 1939**



Office location in world

Head office

Aichi, JAPAN

Tokyo office

Tokyo, JAPAN

Thailand office

Bangkok, Thailand

Malaysia office

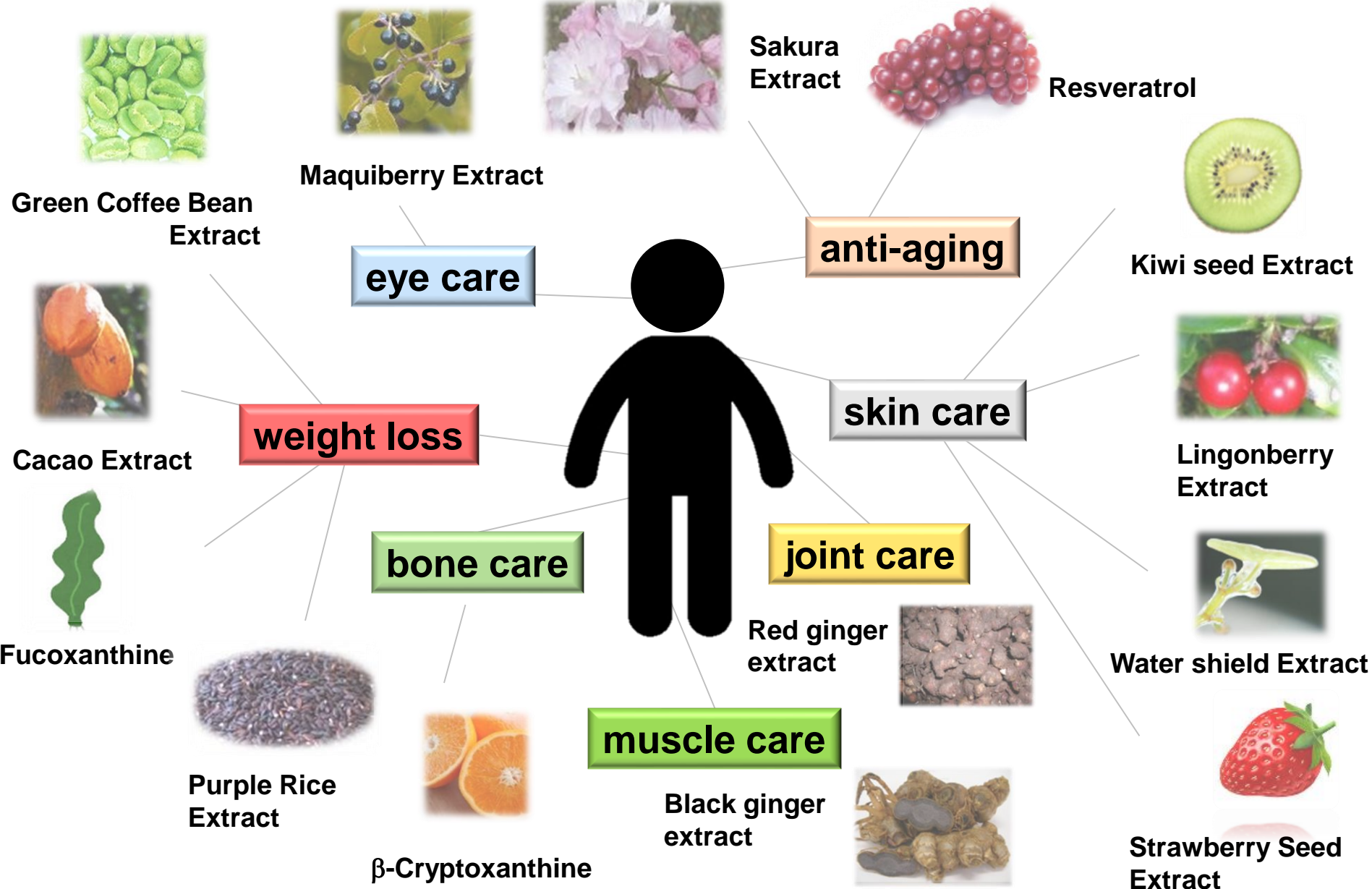
Kuala Lumpur, Malaysia



Part of corporate history

| | |
|------|--|
| 1939 | Founded as manufactural rice bran oil company |
| 1980 | Began production of γ-Oryzanol |
| 1996 | Launched and sold GABA-enriched rice bran extract |
| 1998 | Developed rice-derived Tocotrienols |
| 1999 | Developed rice-derived Glucosylceramide |

Utilization of our extraction and purification technique



Chapter 1

Gamma-Oryzanol

For the symptoms of menopause

Rice bran oil and Phytochemicals –gamma-oryzanol-

Composition of Rice Bran Oil

| <u>Description</u> | | <u>Content</u> |
|-------------------------|----------------|-------------------|
| Unsaturated Fatty Acid | Oleic acid | 40 ~ 50 |
| | Linoleic acid | 29 ~ 39 |
| | Linolenic acid | 0 ~ 1 |
| Fatty Acid | Myristic acid | 0.4 ~ 1 |
| | Palmitic acid | 13 ~ 18 |
| Gamma - Oryzanol | | 1.2 ~ 1.5% |
| Tocopherols | | 0.2 ~ 0.4% |
| Tocotrienols | | 0.03~0.05% |
| Acid Value | | 0.35 max |
| Saponification Value | | 180 ~ 195 |
| Iodine value | | 92 ~ 115 |
| Unsaponification | | 5.0 max |



“Rice Bran Oil” Oryza produces as retail products.

Functional effects

« Skin »

Elevation of surface temperature,
Activation of sebaceous glands,
Inhibition of melanin formation

« Stomach »

Anti-ulcer,
Centrally acting stomach movement

« Brain »

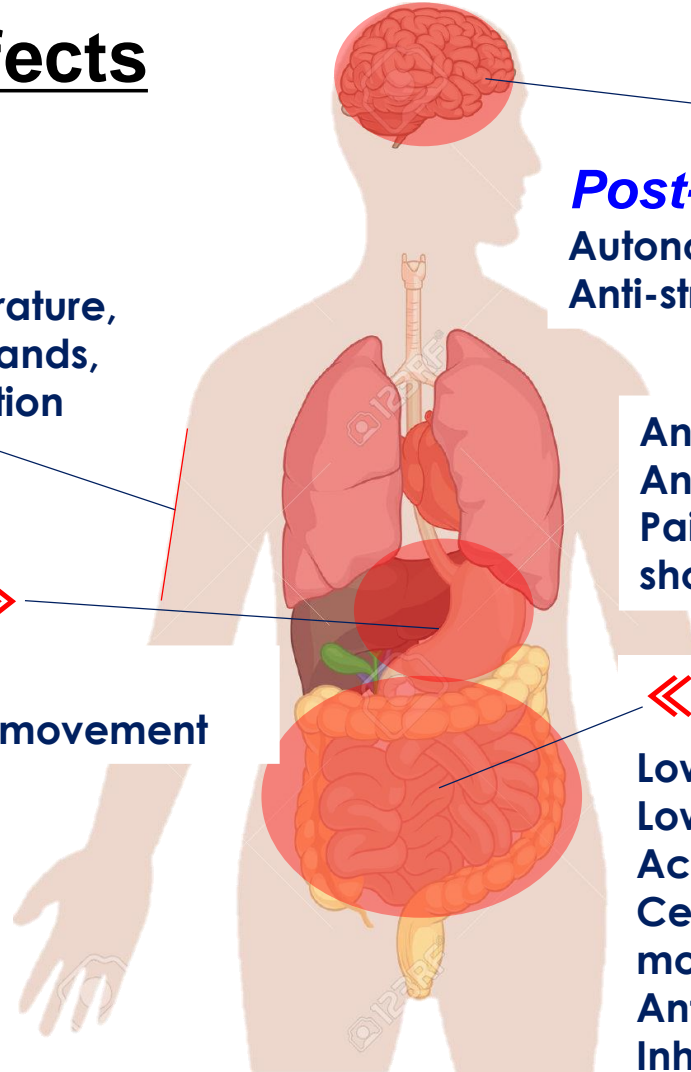
Post-menopausal syndrome,
Autonomic nerve disturbance,
Anti-stress

« Whole Body »

Anti-allergy, Anti-inflammation,
Anti-oxidation, Vitamin E-like effect
Pain relief of head, neck, eyes,
shoulder and hip.

« Metabolism, Digestion »

Lowering of cholesterol,
Lowering of blood sugar level,
Accumulation of glycogen,
Centrally acting intestinal
movement
Anti-colon cancer
Inhibition of IBS



Improvement of menopausal symptoms by γ -Oryzanol intake

Improve menopausal symptoms



| Application | Dose (mg/day) | Treated term | Effect |
|---------------------|---------------|--------------|--|
| Menopausal symptoms | 5-10 | 10-38 days | Menopausal index >50% reduction |
| | 90 | 14 days | Menopausal symptoms 76.6% improved |
| | 15-30 | 7-14 days | Autonomic dysfunction 70-90% improved |
| | 300 | 4-8 weeks | Subjective symptoms >80% improved Serum peroxy lipid Significantly improved |

<http://www.oryza.co.jp/html/english/pdf/ORYZANOL%203.1TK.pdf>

End product

OTC Drug in Japan



大正製薬



For Menopause in the overseas



For Athlete & Muscle builder in the overseas



For Cosmetics in the overseas



Chapter 2

Tocotrienols

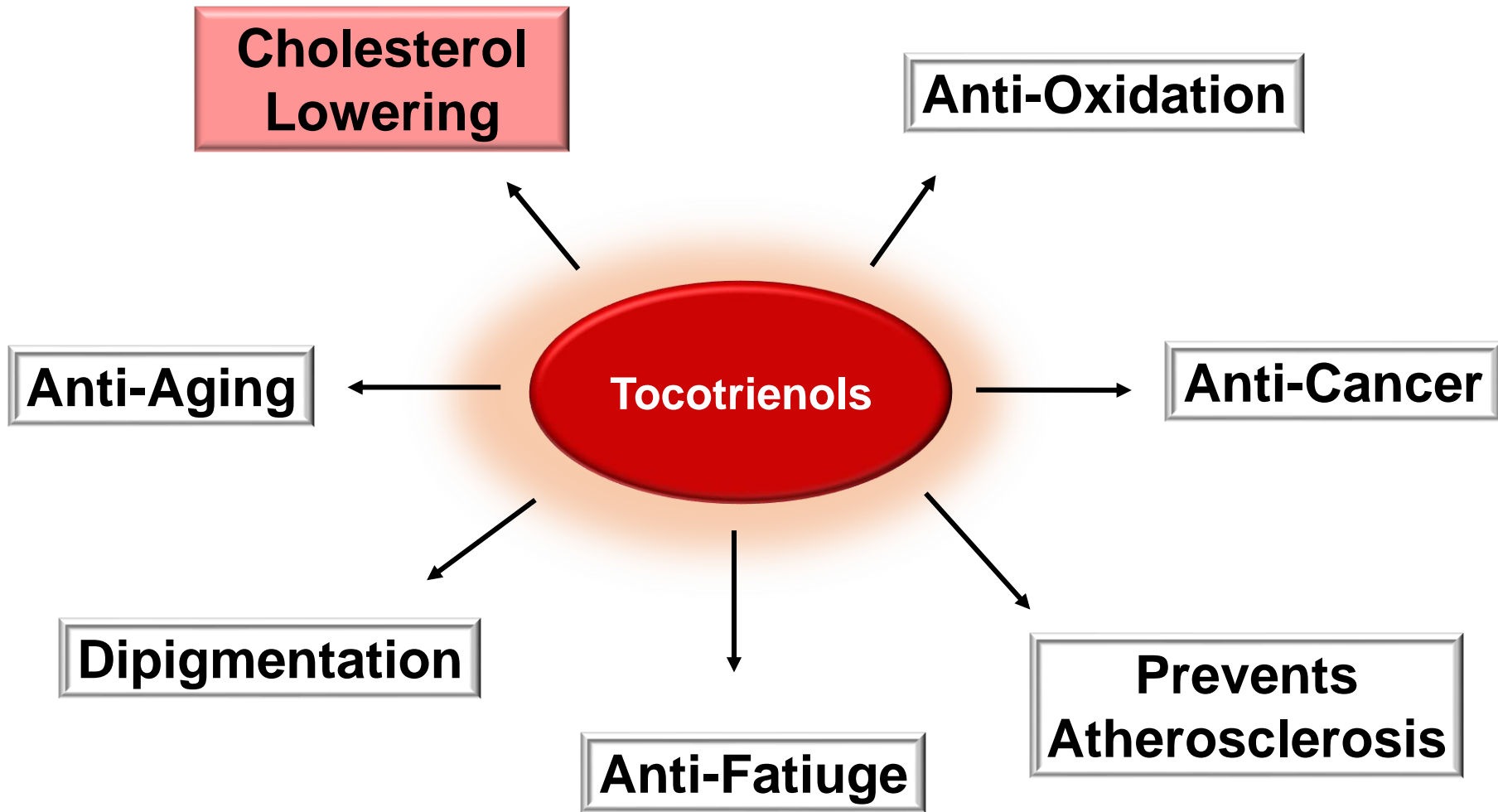
Lowering LDL cholesterol

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Tocotrienol has various benefits for health

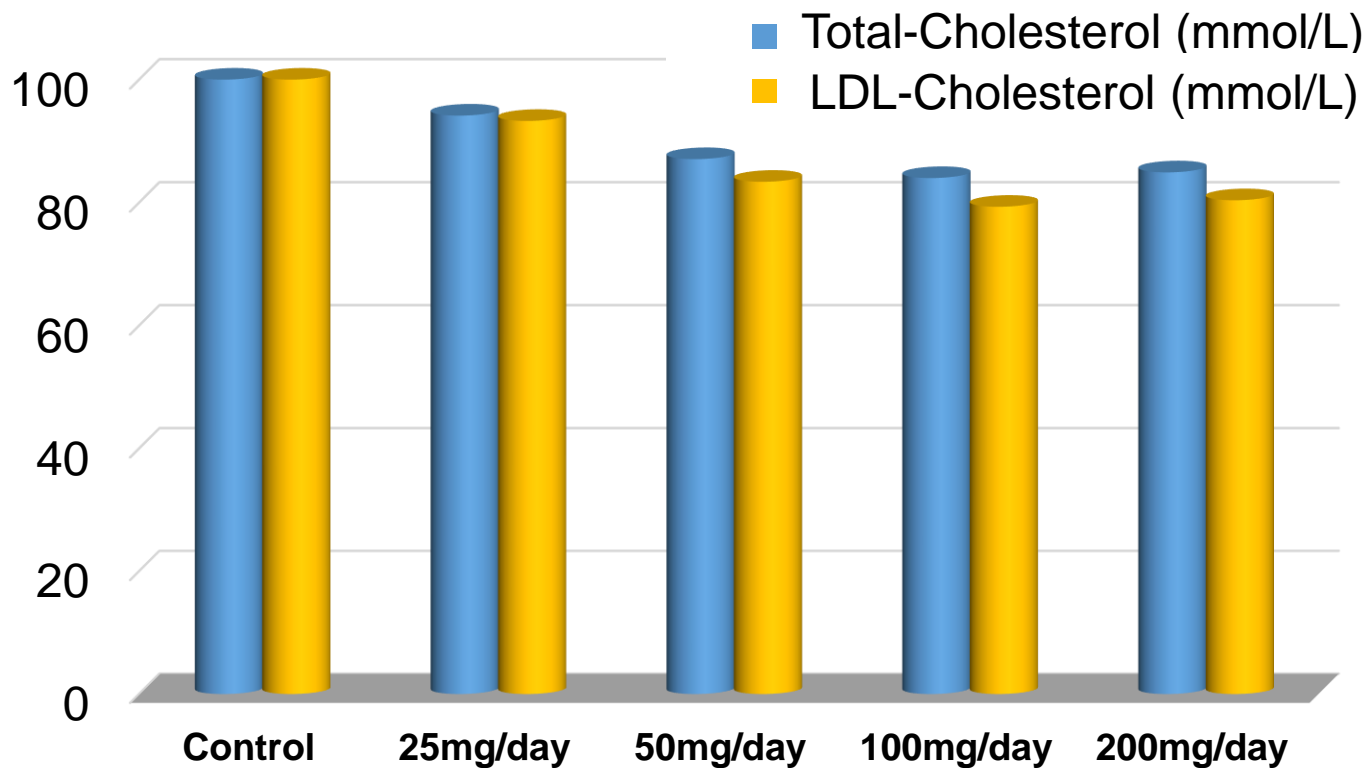
Cholesterol Lowering Effect

«Method»

Subjects; **18 subjects per group** (90 hypercholesteremic patients)

Sample; **the tocotrienol-rich fraction (TFR) of rice bran**

Intake duration; **35 days**



100mg/day group was highly effective against lowering of cholesterol

Our Customer's Products (Food and Cosmetics: Japan)



Our Customer's Products (Food and Cosmetics: Overseas)



Chapter 3

ORYZA CERAMIDE®

**Pioneer of 1st Edible Ceramide
As Excellent Skin Rejuvenator**

Oryza Ceramide®

Appearance: Light yellowish powder

Contents of Glycosphingolipid: Min. 3.0%



Oryza ceramide-PT

Application of our ORYZA CERAMIDE®



Our Customer's Products (Food: Japan)



FANCL



meiji



SUNSTAR



Asahi



AVON

お菓子に夢を... Pine パイン株式会社



小林製薬

DHC



湧永製薬株式会社

Our Customer's Products (Cosmetics: Japan)

sagina



DHC



小林製薬

山田養蜂場 YAMADA BEE FARM



あしたは、もっと美しく ISEHAN SINCE 1825

Our Customer's Products (overseas)



USA



China



Vietnam



Malaysia



Indonesia



Taiwan



New Zealand

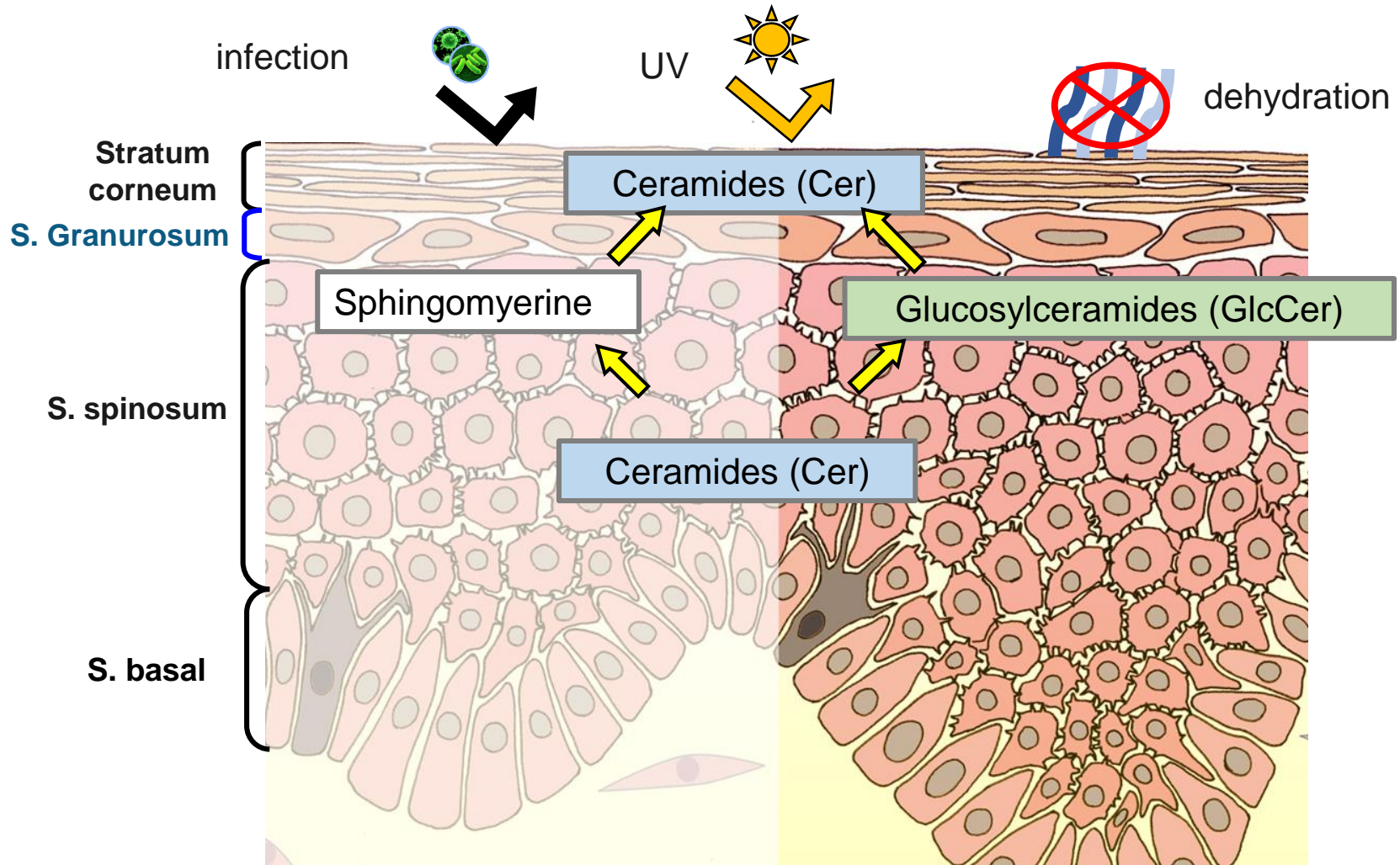


Thailand



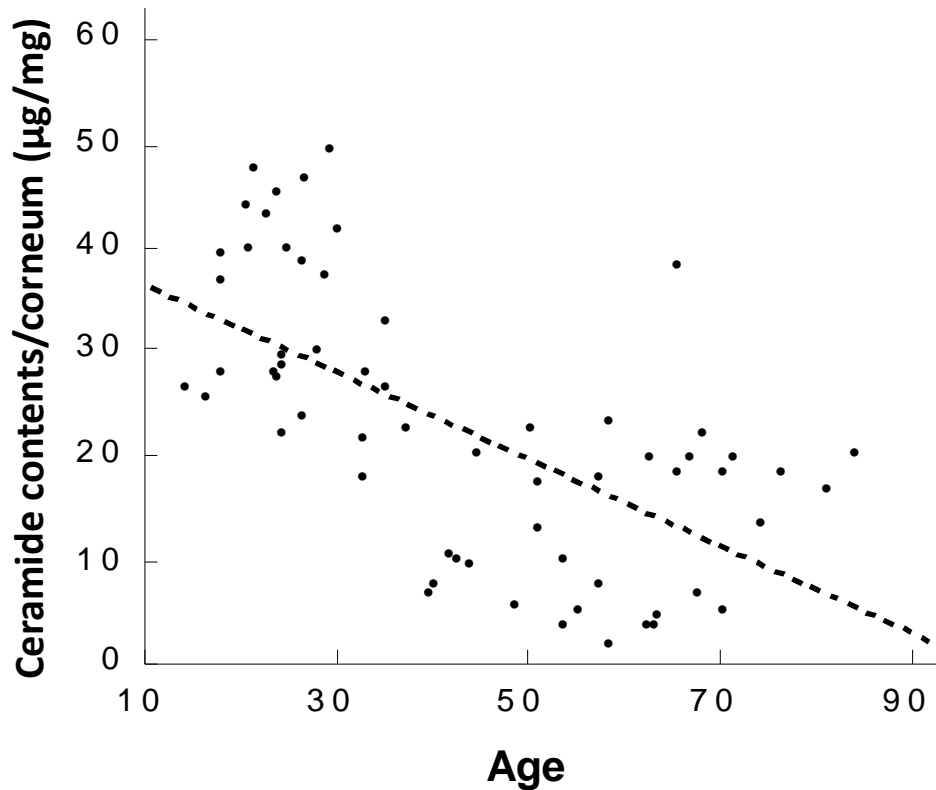
Lipid Composition in Human Stratum Corneum

Ceramides (Cer) and Glucosylceramides (GlcCer) in Epidermis



Depletion of skin ceramide causes skin dysfunctions

Age-related Decrease in Skin Ceramide



Imokawa G, J. Invest. Dermatol. 6, 523 (1991)

Atopic dermatitis



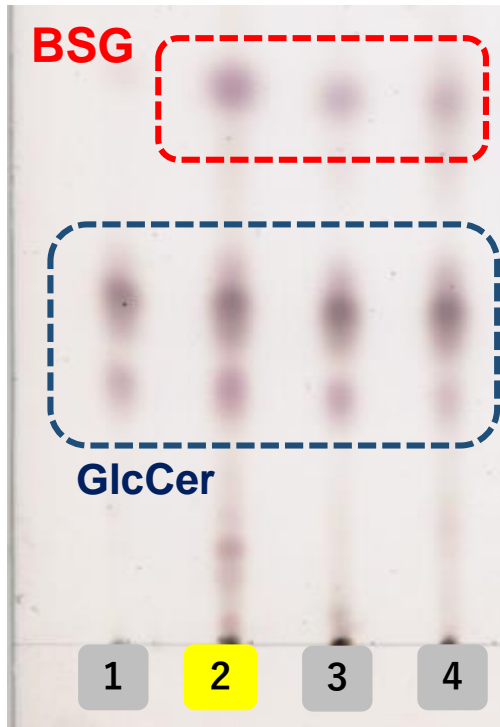
<https://www.dermquest.com/image-library/>

Senile xerosis



http://www.tonbyo.org/contents/series/2009_04.html

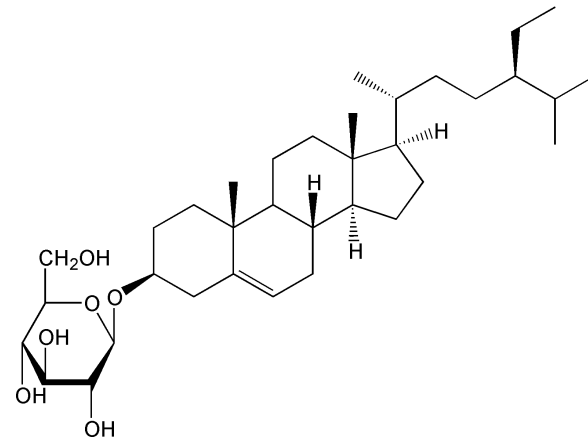
β -Sitosterol-3-O-glucoside (BSG) in Oryza Ceramide®



- 1 : GlcCer std
- 2 : **Oryza Ceramide®**
- 3 : rice ceramide (company A)
- 4 : rice ceramide (company B)

Oryza ceramide® is
the largest amount of BSG

We have identified the function of BSG
for the first time in the world

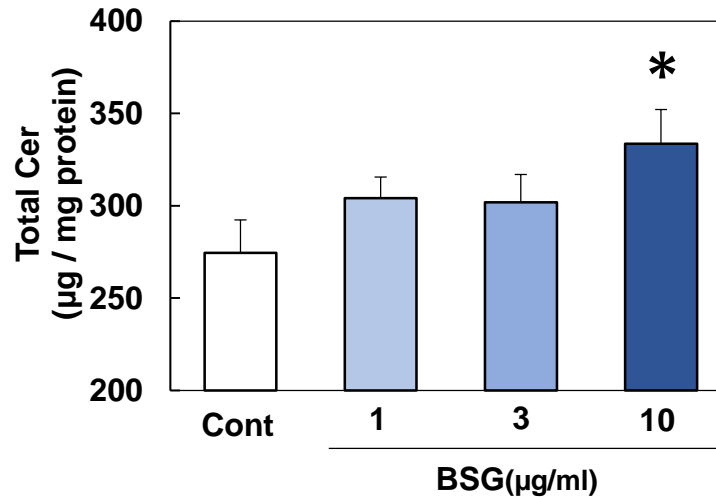


stigmast-5-en-3-O- β -d-glucopyranoside

β -sitosterol-3-O-glucoside (BSG)

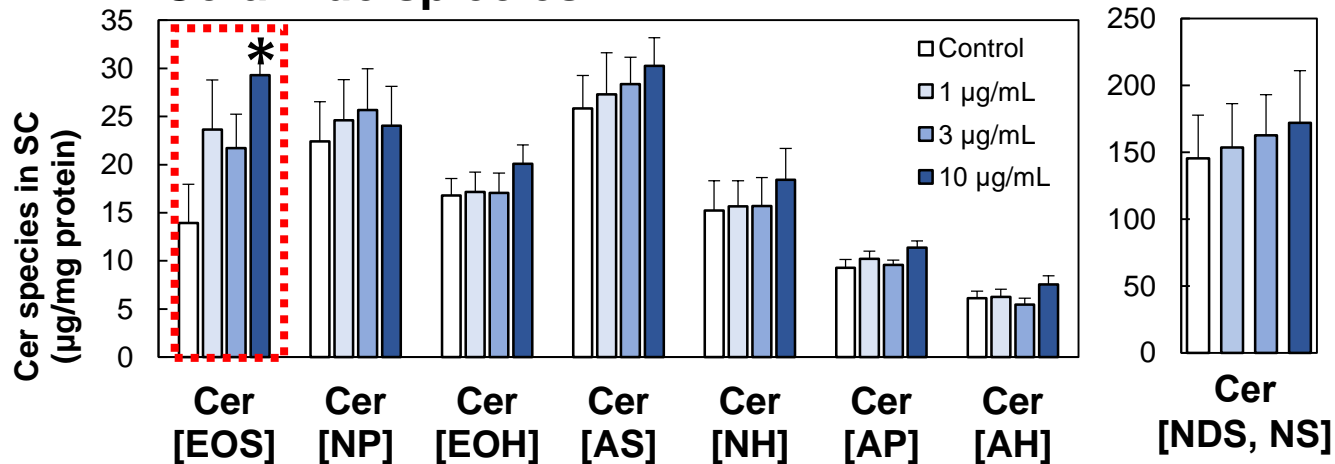
**Does BSG influence the ceramide
production?**

Total ceramide



Mean ± SE (n=5-6)
* : P < 0.05

Ceramide species



BSG enhances the production of total ceramide and Cer[EOS]

Human Clinical Trials

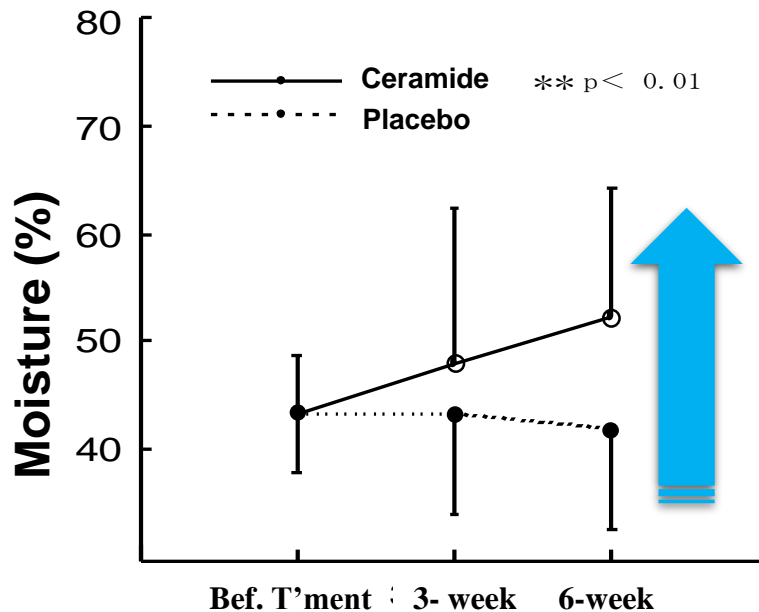
Design of clinical test; Double blind trial

Subjects: 33 (6 Male, 27 Female, average aged 25.1 ± 7.8)

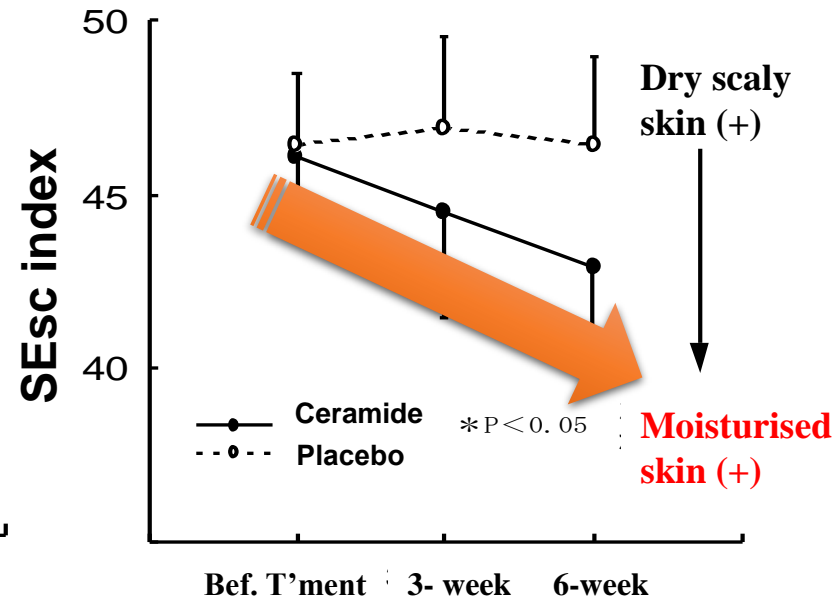
Dosage: Ceramide 40mg/day, Placebo 0mg/day

Duration: 6 weeks

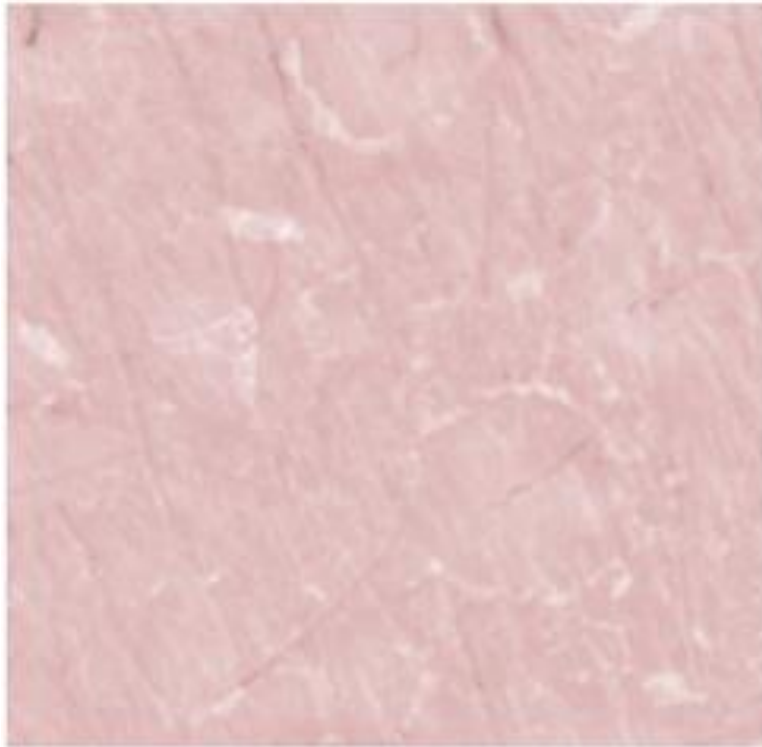
Area of examination: whole body, left lower eye area, back area of neck, left upper arm inner area



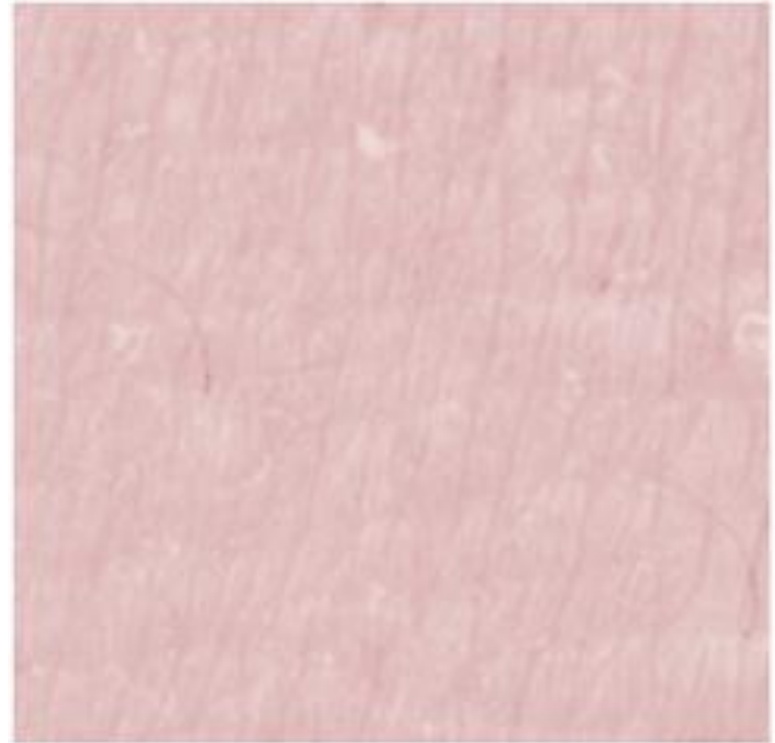
Changes of Moisture content on lower left eye area



Changes of SE sc value at the back of neck area

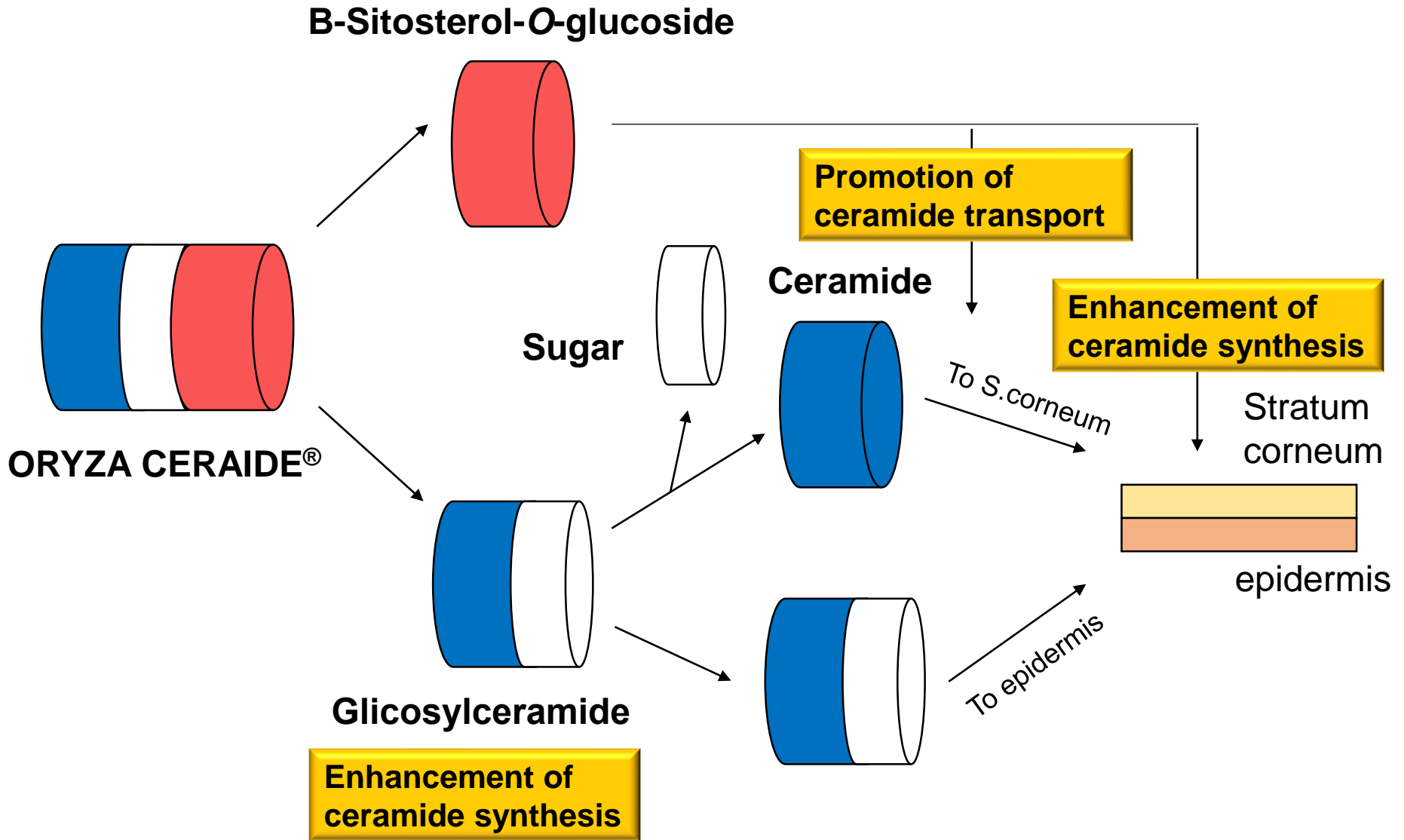


Before



After

3D Microscopic Illustration of skin surface before and after treatment of Oryza Ceramide (oral) on the lower left eye area of a 23-yr old female



Chapter 4

FERMENTED RICE GERM EXTRACT

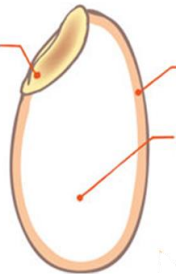
Rice germ fermentation process
Potential effect of rice derived phytochemicals

Fermented rice germ extract (FRGE)

Appearance: slightly brown powder

Contents of polyphenols: Min. 3.0%

Rice Germ



Rice bran
endosperm

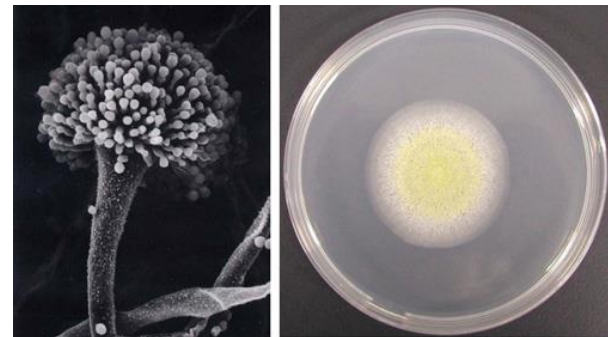
Active ingredients

- γ -Orizanol
- Ferulic acid
- Sterol
- Tocotrienol
- Tocopherol
- GABA



Fermented rice germ extract-P
(our product)

Fermentation of rice germ by
Aspergillus oryzae



Aspergillus oryzae

Immunostimulatory activity of fermented rice germ extract

- Prevention against infection

phagocytotic activity
of macrophages

- Anti-cancer effect

NK cells activities
(cytotoxic lymphocyte)

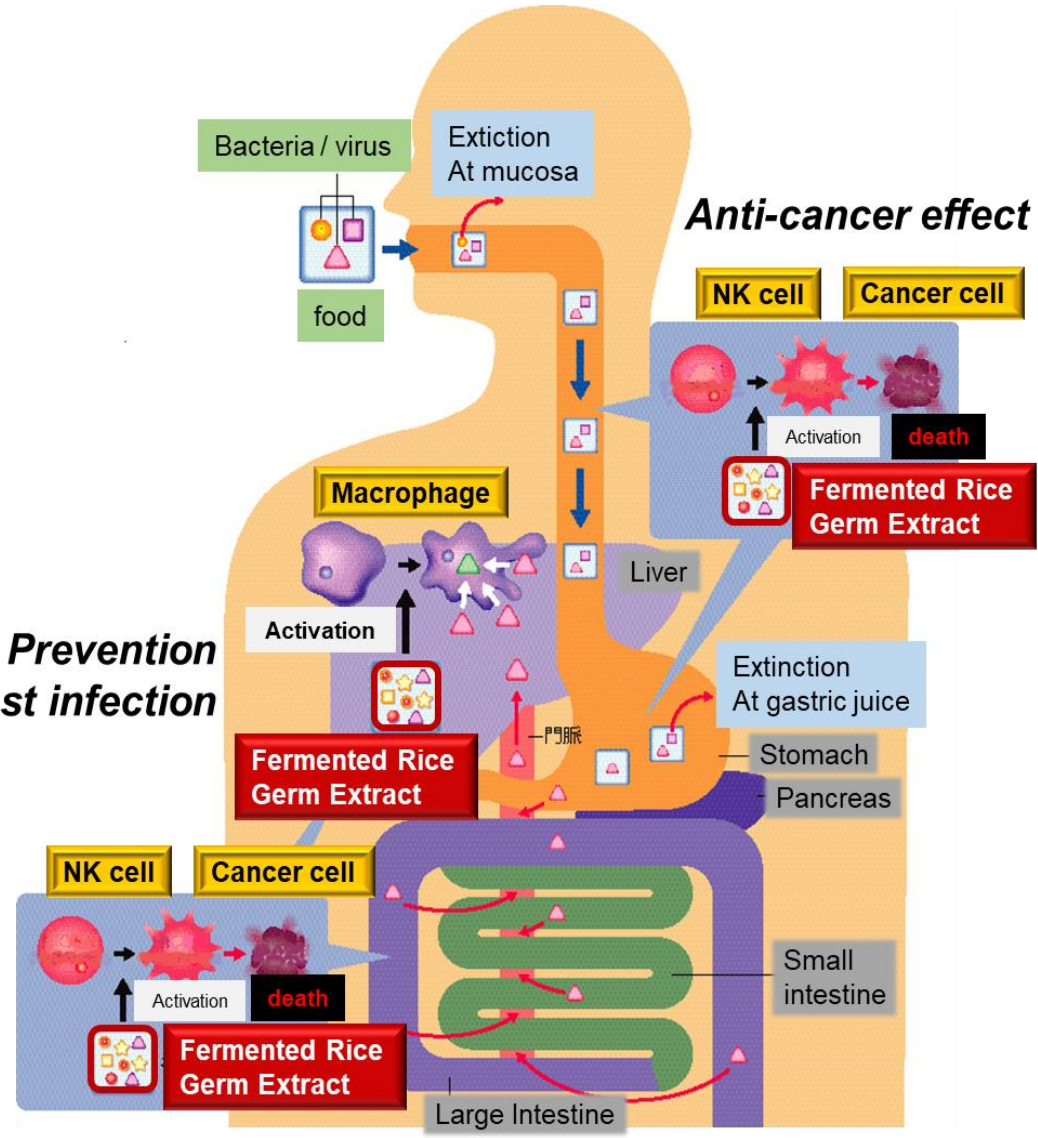
Structure determination

Collaboration study with Sugiyama
Jogakuen University, Aichi, Japan .

Bioactivity assay

Collaboration study with Osaka City
University, Aichi, Japan .

Anti-cancer effect

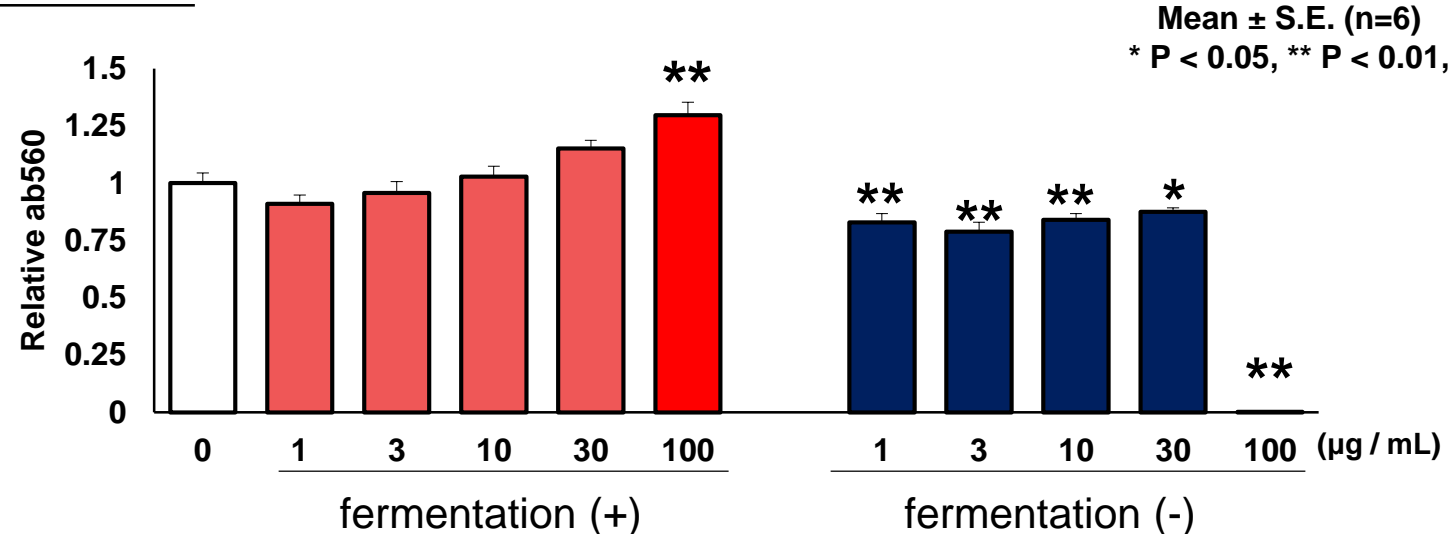


Next

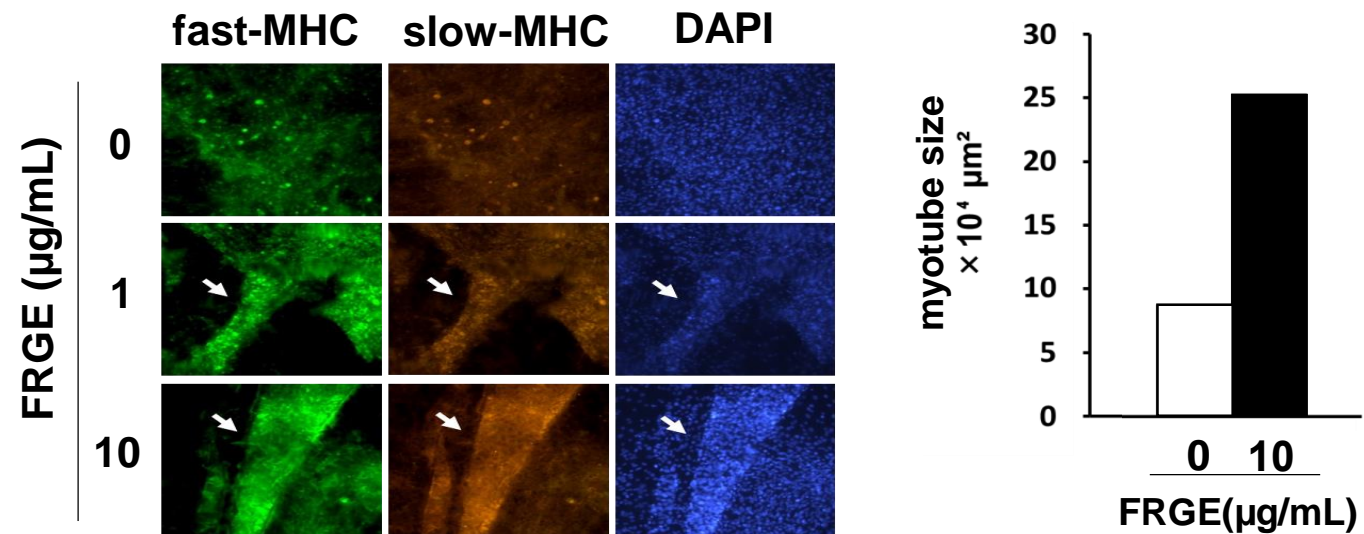
Effect of fermented rice germ extract on muscular function and performance

Effect of fermented rice germ extract on myotube maturation

Myoblast proliferation



Myotube differentiation

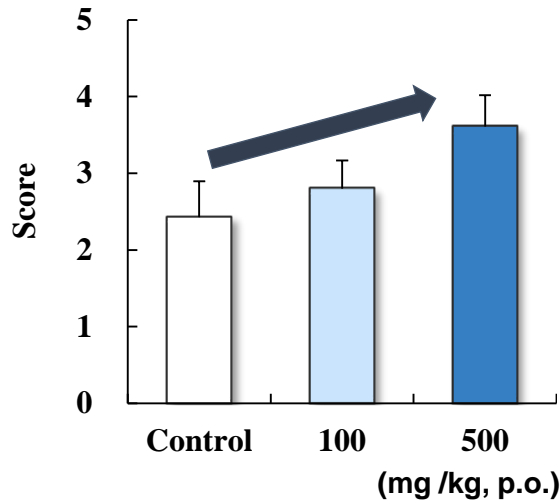


Effect of FRGE on muscle strength and muscle mass

Horizontal bar test

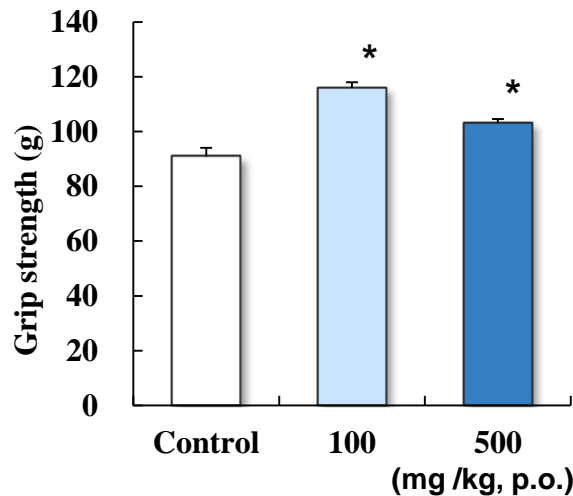


| | |
|---|---------------------------|
| 5 | 60 seconds and reach edge |
| 4 | 46-60 seconds |
| 3 | 31-45 seconds |
| 2 | 16-30 seconds |
| 1 | 5-15 seconds |



Means \pm S.E.M. (n = 14-18).

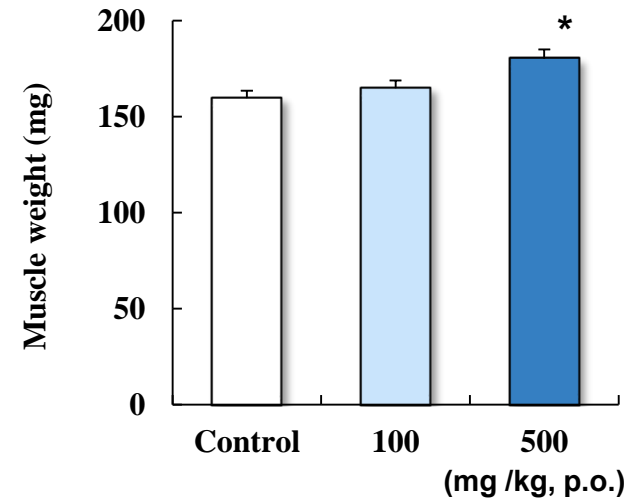
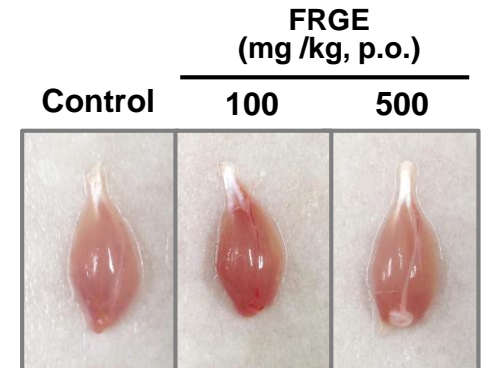
Grip strength test



Means \pm S.E.M.

*; p < 0.05 vs. Control (n = 6-9).

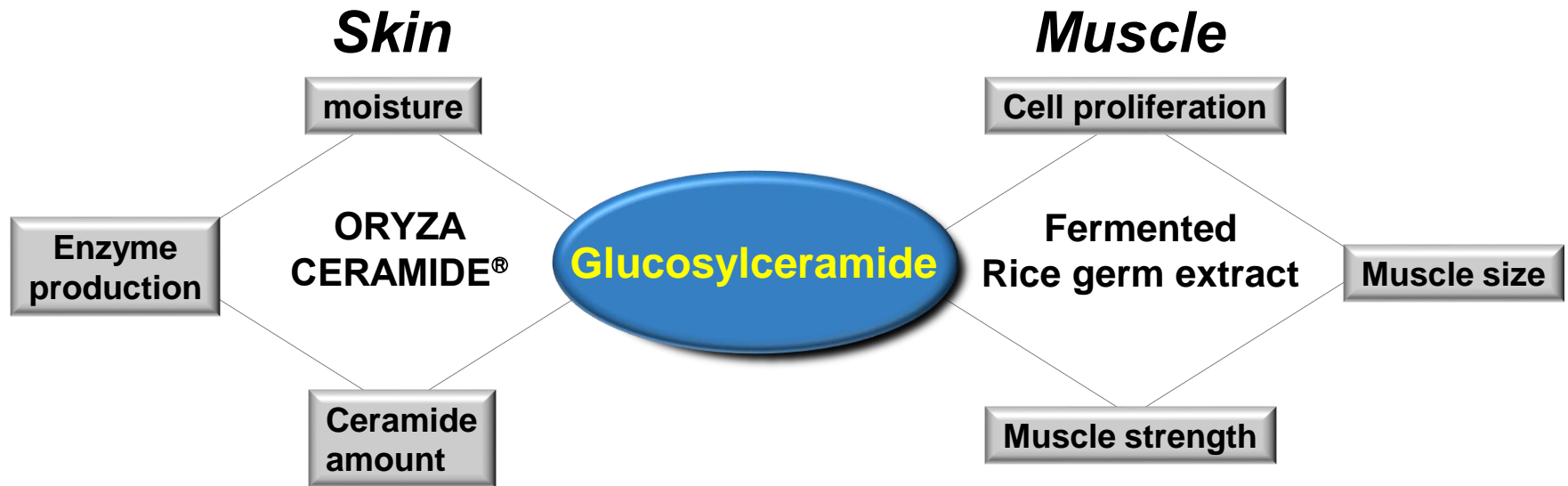
Muscle weight



Means \pm S.E.M.

*; p < 0.05 vs. Control (n = 8-10).

Improvement of skin and muscular function by rice-derived glucosylceramide



GlcCer derived from rice is a promising phytochemical to exert skin and muscular health benefits.

Glycosphingolipid

γ -oryzanol

Ferulic Acid

Tocopherol

Phytic Acid

Tocotrienols

We believe that rice still contains potential ingredients for our health

Phytosterol

γ -Amino butyric acid

Octacosanol

Squalane

Inositol

