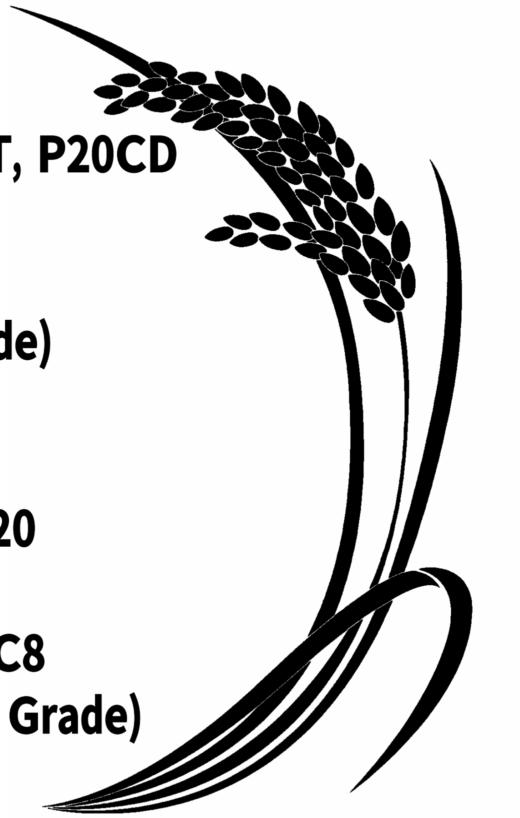
ORYZA OIL & FAT CHEMICAL CO., LTD.

ORYZA CERAMIDE

Cosmeceutical Food Supplement



- ■ ORYZA CERAMIDE-PT, PCD, P8T, P20CD
  (Powder, Food Grade)
- ■ ORYZA CERAMIDE-WSP, WSP8
  (Water Soluble Powder, Food Grade)
- ■ ORYZA CERAMIDE-L, L0.8
  (Liquid, Food Grade)
- ■ ORYZA CERAMIDE-PC, PC8, PC20
  (Powder, Cosmetic Grade)
- ■ ORYZA CERAMIDE- WSPC, WSPC8
  (Water Soluble Powder, Cosmetic Grade)
- ■ ORYZA CERAMIDE- L, L0.8
  (Liquid, Cosmetic Grade)

ORYZA OIL & FAT CHEMICAL CO., LTD.
Ver. 6.0MK

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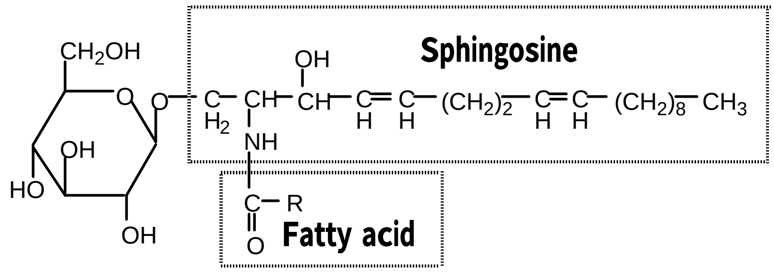
Rice (Oryza sativa) have been widely grown in the Southeast Asia, not only as a chief crop but also as an integral part of traditional culture and lifestyle in some Asian countries.
In recent years, much attention have been focused on rice bran and rice germ, due to its unique bioactive compounds.
In the course of our investigation on rice bran and rice germ for a long time, some products were developed by utilizing its functional compounds, and have been used as medicines, cosmetics, health foods, and food additives.
Recently, glycosphingolipids were extracted from rice bran and rice germ for application in nutritional and cosmeceutical supplement.

1. ORYZA CERAMIDE

ORYZA CERAMIDE, brownish in colour, extracted and refined from rice bran or rice germ. It contains a large amount of glycosphingolipid.
The glycosphingolipid of rice bran is similar to the animal glycosphingolipid, in which the backbone is ceramide including sphingoid bases with fatty acid in an amide linkage, and the terminal hydroxyl group is substituted by glucose. There are different species of glycosphingolipids due to its chemical structure of sphingoid bases and different fatty acid components.
Fujino et al. reported more than twenty species of sphingolipids identified in rice bran. ORYZA CERAMIDE was found to contain four major constituents. The structures of these constituents were established by analysis of various chromatograph and NMR spectra, as shown in Fig. 1.



R: 1. $-(CH_2)_7CH{:}CHCH_2CH{:}CH(CH_2)_4CH_3$ 2. $-(CH_2)_{14}CH_3$
3. $-(CH_2)_7CH{:}CH(CH_2)_7CH_3$ 4. $-(CH_2)_{16}CH_3$

Fig. 1 Structures of ORYZA CERAMIDE

In a joint research with Professor Igarashi from Hokkaido University Graduate School of Pharmaceutical Sciences, we analyzed the chemical structure of rice-derived glycosphingolipid with high content (No. 7 in Fig. 2) and determined the structure of the main ceramide as shown in Fig. 3.

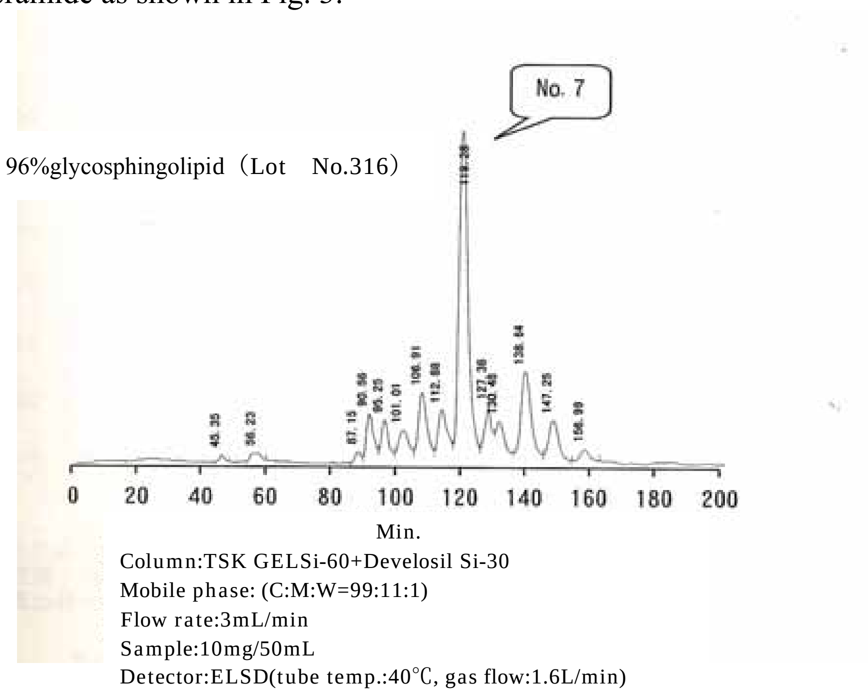


Fig. 2 HPLC chart of rice-derived glycosphingolipid

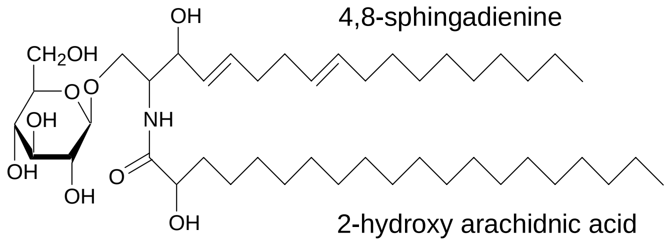


Fig. 3 Structures of rice-derived glycosphingolipid

2. Biological Function of Ceramide in Human

In 1884 the ceramides were found in human brain tissues by Dr. Thudichum. Since then, the presence of several ceramides in skin and biological membrane was observed. Their structures and biological activities have been well elucidated.
The human skin consists of epidermis, corium and tela subcutanea. The epidermis was classified into four layers, namely stratum corneum, stratum granulosum, stratum spinosum and stratum basale as shown in Fig. 4.

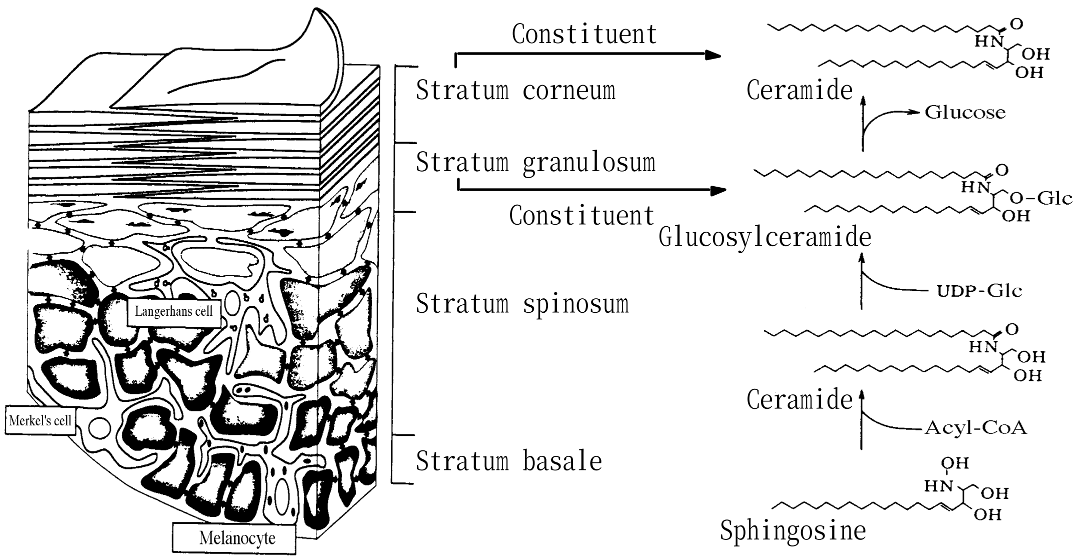


Fig. 4 Structure of Epidermis and Biosynthesis of Ceramides

Six different species of ceramide were found in skin (as shown in Fig. 5). These ceramides were formed via several biosynthetic processes in epidermis, and were accumulated at stratum corneum as major constituent, about 40~60% of stratum corneum lipids (Fig. 6). In epidermis, these ceramides play important roles for forming lamella phases and maintaining barrier functions.

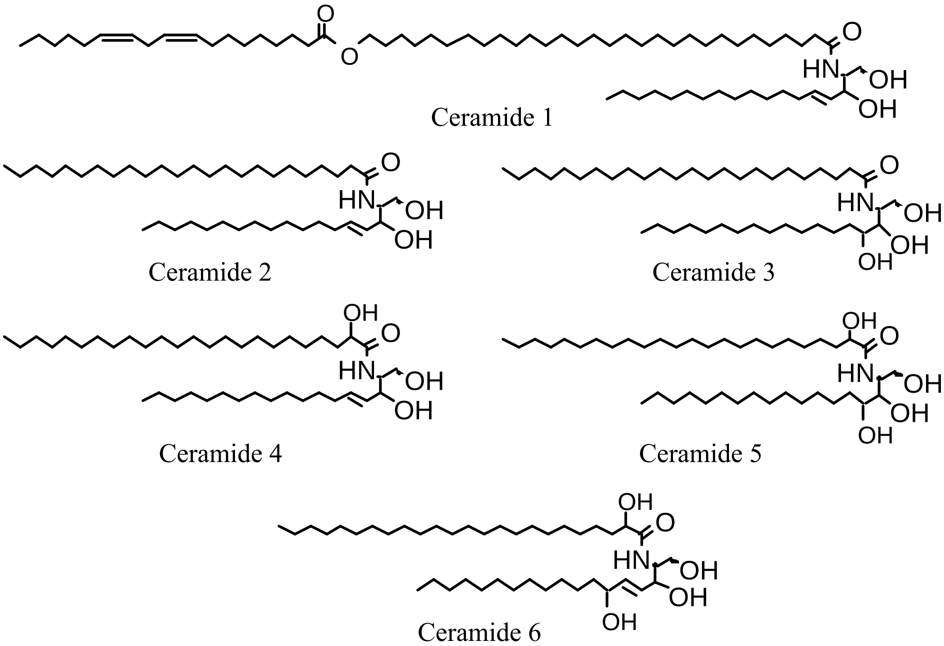


Fig. 5 Species and Structures of Ceramides

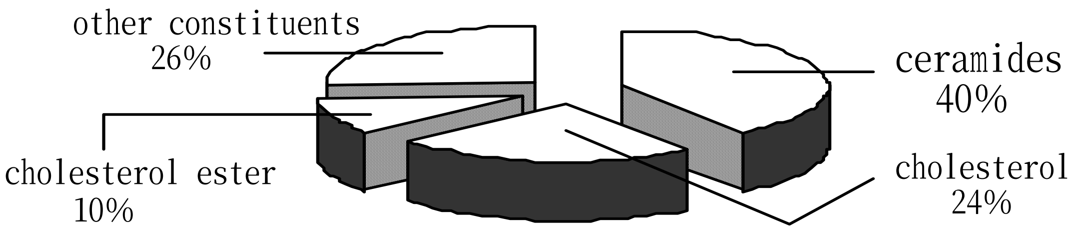


Fig. 6 Composition of Stratum Corneum Lipids

Quantity of ceramides was lower in the stratum corneum of atopic dermatitis, dry skin and aged individual. Study conducted by Imokawa *et. al* demonstrated that the ceramide content declines with increasing age (Fig. 7). As the forearm skin of aged persons (especially those over 70 years old) are usually xerotic, hence that the decrease in ceramide content is associated with dry appearance in xerotic skin. In addition, comparison of total ceramide content of forearm stratum corneum between atopic dermatitis and healthy subjects (Fig. 8) shows that in atopic dermatitis, there is a marked reduction in the amount of total ceramide in both lesional and non-lesional forearm skin as compared with that of healthy individuals of the same age. This result suggested that ceramide is a key factor for moisture maintenance and barrier function of stratum corneum. Fine lines and wrinkles appear when ceramide content is reduced. Thus of ceramides is necessary for maintaining healthy youthful looking skin.

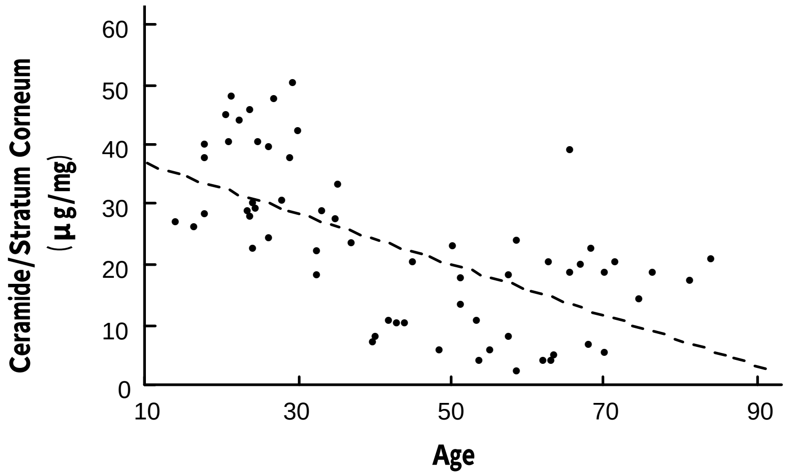


Fig. 7 Total Ceramide Content of Stratum Corneum in Healthy Subjects

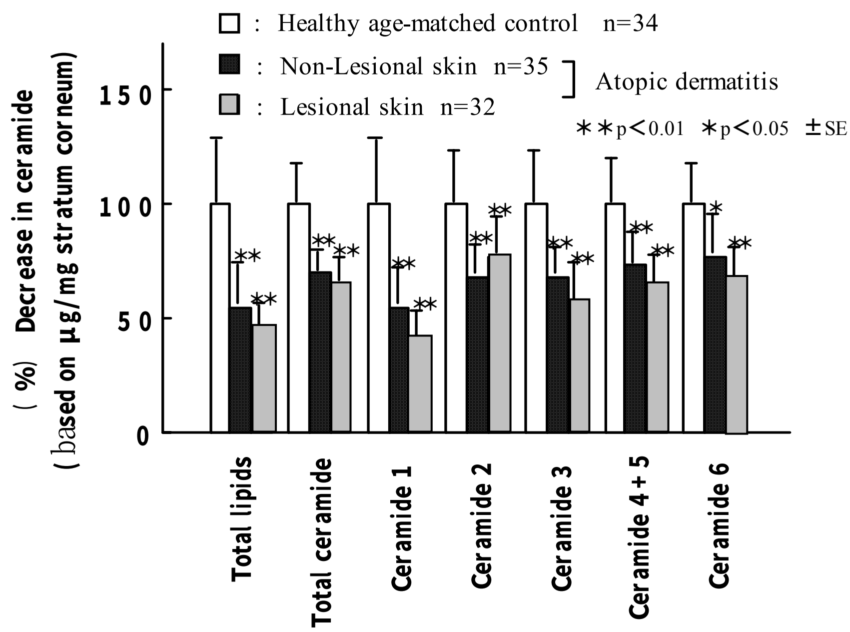


Fig. 8 Comparison of Ceramide Content in Forearm Skin Between Atopic Dermatitis and Healthy Subjects

3. Digestion, Absorption, and Metabolism of Sphingolipids

In order to study digestion, absorption, and metabolism of food-derived sphingolipids, Schmelz and his research group examined how it is metabolized and distributed in the intestinal canal by giving labeled sphingomyelin to model mice in 1994. Sphingomyelin appeared in all parts of the intestinal canal and most of it was broken down to ceramide and its metabolite. Only 1% of sphingomyelin moved from the intestinal canal to the

liver in 30 to 60 minutes after administration. This indicates that transport of sphingomyelin and its metabolite from the intestinal canal to other tissues of the body is not very efficient and that absorption and metabolism of sphingolipids vary according to the types. It also indicates that sphingomyelin is hydrolyzed and absorbed in the intestinal canal as a synthetic raw material of bio-complex sphingolipids.
Nyberg and his research group examined the site of digestion and digestive capacity of sphingomyelin in 1997. The group reported that sphingomyelin is digested by sphingomyelinase mainly in the middle and lower areas of the small intestine and that the enzyme plays an important role in the first stage of digestion of sphingomyelin.

4. The Physiological Function and Application of The Plant Ceramide

The synthetic and animal ceramide have been mainly used as materials of cosmetic. Recently, it is discovered that Creutzfeldt-Jakob disease may be contracted from eating or using contaminated animal products, especially that of cattle. Therefore, much attention has been given to the plant ceramide, and some products have been incorporated into cosmetics and food preparations.
ORYZA CERAMIDE derived from rice bran suitable to be used d as functional food supplements. The whitening and moisturing effect of this product were determined as follows.

4-1-1. Whitening Effect (*in vitro*)

ORYZA CERAMIDE is similar to other ceramides, possess various physiological functions. In this study, the effect of ORYZA CERAMIDE on melanogenesis was examined using cultured B16 melanoma cell *in vitro*. The result (as shown in Fig. 9), illustrated that ORYZA CERAMIDE is more potent than ascorbic acid, arbutin, and ellagic acid except for kojic acid. Thus it is expected that the whitening effect is achievable by daily consumption of ORYZA CERAMIDE.

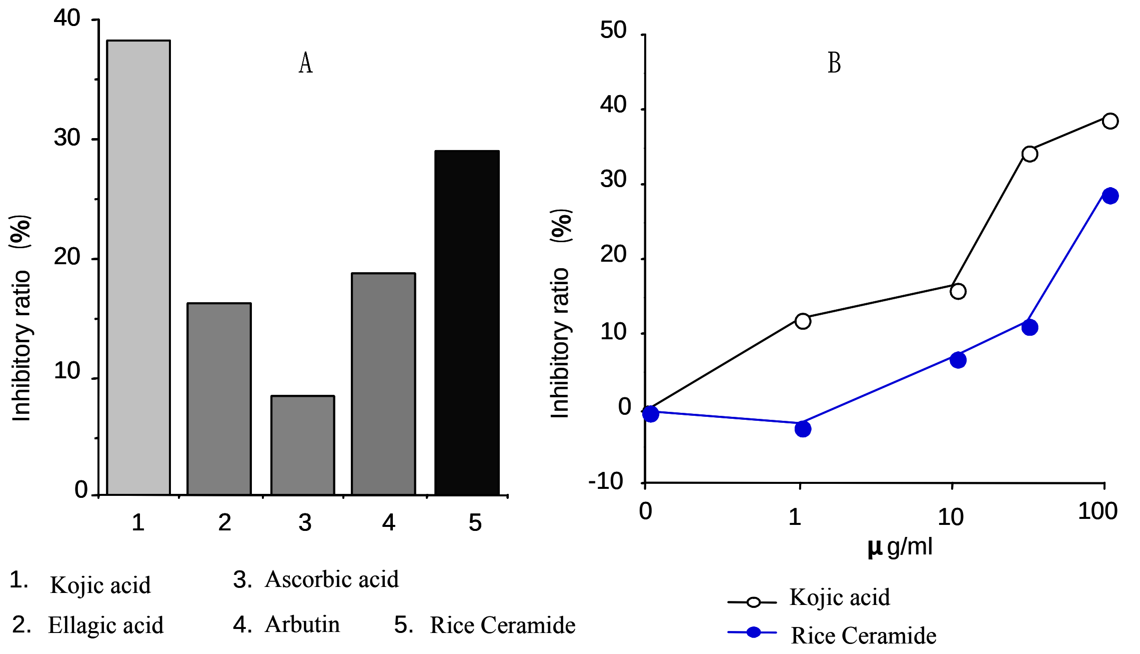


Fig. 9 Inhibitory Effect of ORYZA CERAMIDE on Melanin

[Method]

B16 melanoma cells (2×10^3 cells/mL) were placed in dishes (60 mm) and incubated for 24 hours in growth medium (D-MEM containing 10%FCS). The medium was replaced with sample medium [emulsified glycosphingolipids (> 90% of purity)]. After 2-day incubation, the sample-containing medium was replaced with fresh growth medium, followed by another 2-day incubation. The number of cells was counted, and then, cells were lysed with 2 N NaOH and absorbance was measured at 450 nm. The value was normalized by the cell number.

4-1-2. Supression of Melanin Production in Melanocyte (melan-a)

Professor Igarashi and his assistant Mitsutake of Graduate School of Pharmaceutical Sciences Hokkaido University, examined the effects of rice-origin glycosphingolipid and its acid-hydrolyzed product* on tyrosinase activity and melanin production using mouse melanocyte. Tyrosinase is an enzyme responsible for melanin formation. As shown in Fig. 10 and 11, both rice-origin glycosphingolipid and its hydrolyzed product showed inhibitory effects on tyrosinase activity and melanin production in a dose-dependent manner. Rice-origin glycosphingolipid is a promising material applicable to skin-lightening foods or cosmetics.

* Rice-origin glycosphingolipid was hydrolyzed in 1 N HCl in methanol. After the hydrolysis, methanol layer was recovered by liquid – liquid distribution,then concentrated and dried.

Tyrosinase activity　　　　　　　　Melanin production

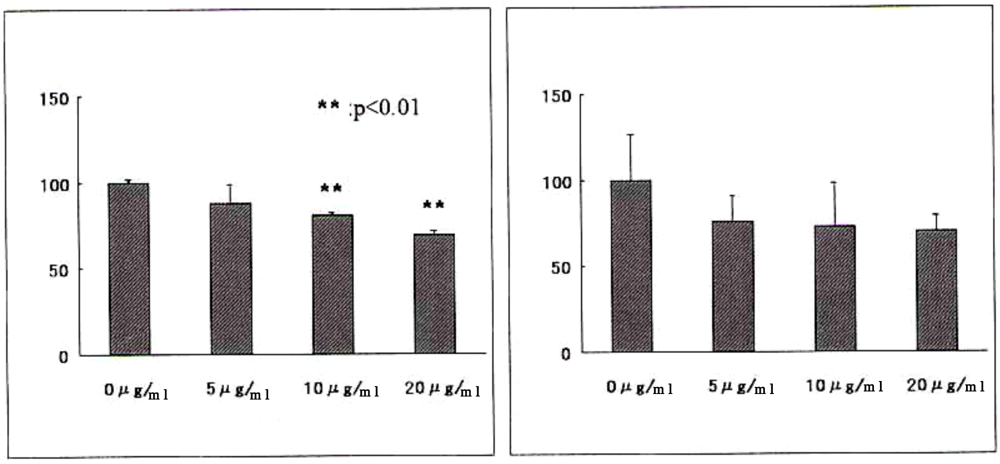


Fig. 10　Effects of rice-derived glycosphingolipid

Tyrosinase activity　　　　　　　　Melanin production

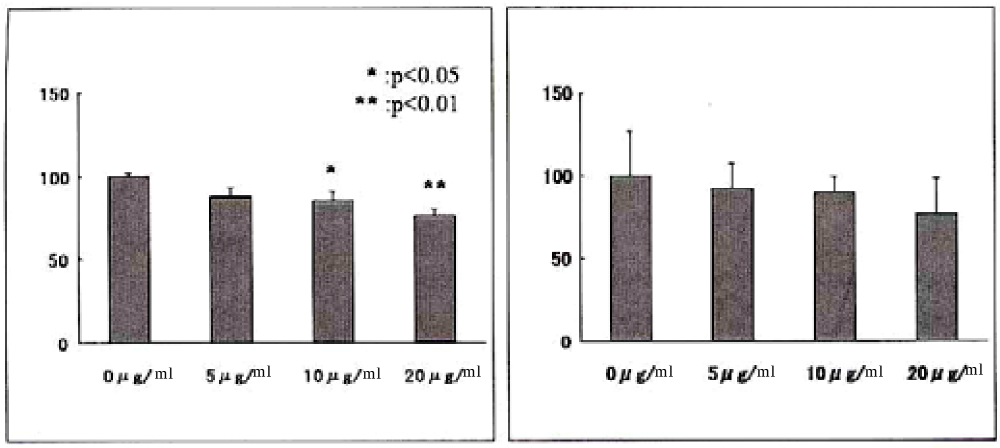


Fig. 11　Effects of rice-derived glycosphingolipid acid-degraded product

[Method]

1) Determination of tyrosinase activity

Mice melanocyte (melan-a cells, 1×10^4 cells/well) were placed in a 96-well plates and incubated for 24 hours in grouth medium (RPMI 1640 containing 10% FCS and 200 nM TPA). The medium was replaced with sample-containing medium (glycosphingolipids > 95% of purity). Cells were lysed with PBS (90 μL/well) containing 1% tritonX-100, then mixed for 1 minuite. Ten μL of substrate (10 mM L-DOPA) was added to each well, and incubated for 1 hour at 37 ℃. Absorbance was measured at 475nm. Tyrosinase activity was normalized by the amount of total protein.

2) Determination of melanin production

Melan-a cells (3×10^5 cells/well) were placed in a 10-cm plates or 6-well plates. The culture condition and sample addition was the same as mentioned in 1). Cells were lysed in 1 N NaOH (500 μL) for 30 minutes at 100 ℃. Absorbance was measured at wavelength of 405 nm. Melanin production was normalized by the amount of total protein.

4-2. The Moisturising Effects of Ceramide (*in vitro*)

The moisturizing effect of ceramide was established by several clinical studies. In these reports, ceramides were absorbed in the intestine, and circulated into the stratum corneum, and finally work for improving barrier and moistuizing function. Therefore, the moisturizing effect of ORYZA CERAMIDE was examined *in vitro*.
The moisturizing effects of ORYZA CERAMIDE was compared with other commercially available ceramides. Moisturising effect of various ceramides were compared in Fig. 12. ORYZA CERAMIDE – P demonstrated superior moisturizing effect with moisturizing ratio of 35%.

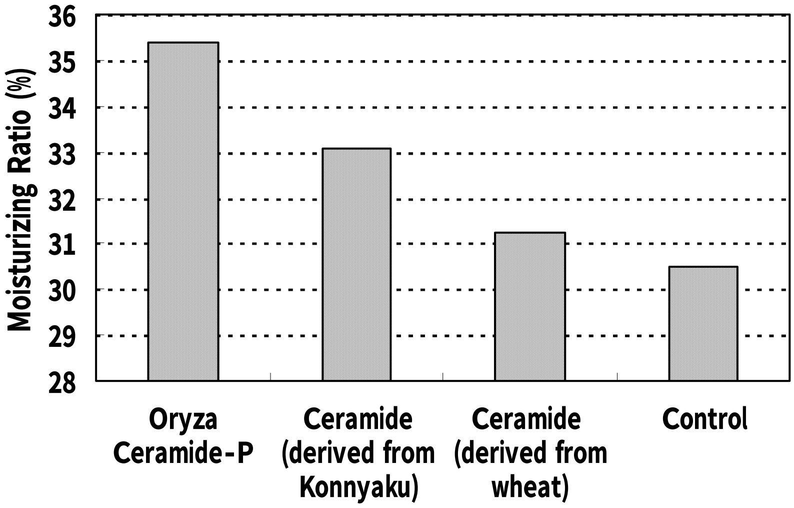


Fig.12 The moisturizing Effects of Ceramide

[Protocol]
Samples
1. Oryza Ceramide-P (from rice)
2. Ceramide (derived from konnyaku)
3. Ceramide (derived from wheat)
Samples were prepared in 3%(ceramide-base) solution
Condition : Temperature 35 ℃, RH 40 %
Preparations
Samples of ceramides were mixed with Basis LP-20H and distilled water as per the following ratio:
Samples : 3 %, Basis LP-20H 5 %, Distilled Water 92 %

[Method]

1 g of test sample was weighed and added to vessel (3cm). Samples were weighed 8 hours later.

Moisturizing ratio was calculated as follows:

Moisturising Ratio (%)=

{(Weight at 0 hour – Weight at 8 hour) / Original Weight} x 100

4-3 Activation of normal human dermal fibroblast growth by glycosphingolipids. (*in vitro*)

To compare the activating effect of glycosphingolipids of varuous origin on normal human dermal fibroblast growth.

The effect of various types of ceramide on normal human dermal fibroblast growth is illustrated in Fig 13. The experiment shown that rate of cells growth ORYZA CERAMIDE excellent fibroblast growth, that is 163% of cell growth rate at 300 μg/ml performed.

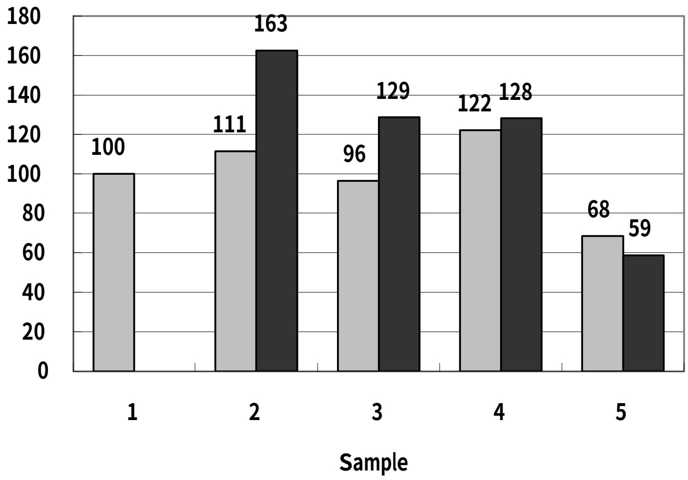


Fig. 13 The activating effect of various glycosphingolipids on normal human dermal fibroblasts cells growth

[Samples]

1. Control
2. Oryza ceramide containing glycosphingolipids > 95 %
3. Konnyaku derived ceramide containing gylcosphingolipids > 95 %
4. Corn derived ceramide containing glycosphingolipids > 95 %
5. Wheat derived ceramide containing gylcosphingolipids > 95 %

[Method]

Normal human dermal fibroblasts (HS-K) was cultured in RITC80-7 medium containing 10 % plasma FBS, 1000 unit/ml penicillin and 100 µg/ml streptomycin at 5 % CO_2 and 37 ℃ condition.

The cultured cells were placed in a 96-well microplate with each containing approximately 1×10^5 cells (100 µl/ml) in RITC80-7 medium (containing 1 % plasma FBS, 1000 unit/ml penicillin and 100 µg/ml streptomycin) for 24 hours. Cultured cells were treated with various samples of ceramides and incubated for 72 hours. Cells growth were determined using Cell Counting Kit-8. The intensity of colour reaction revealed by Cell counting Kit-8 was measured at wavelength 450 nm. The cells growth rate was hence determined.

4-4. Improvement of Barrier Function and Atopic Dry Skin

The ceramides are located in the stratum corneum of skin and play important roles for maintaining barrier function, and protecting the skin against various foreign damages. Study by Imokawa *et al*. confirmed that the symptoms of atopic dry skin was improved by topical application of the ceramides Meanwhile, Lati *et al*. reported that plant ceramides is beneficial in as antiallergic, antioxidant by inhibiting free radical effect and inhibition of elastase, collagenase and tyrosinase. Hence, ORYZA CERAMIDE is suitable to be used as, supplement for prevention against aging and rejuvenate stressed skin.

The effect of rice-derived glycosphingolipid on mouse itch model triggered by compound 48/80 and degranulation from sensitized mast cells were examined. These tests suggest that rice-derived glycosphingolipid reduces histamine release and itch of atopic dermatitis caused by histamine.

4-4-1 Effect on itch induced by compound 48/80 in mice

It was found that scratching action of mice which glycosphingolipids were fed to, decreased against compound 48/80 injection in a dose dependent manner (Fig. 14).

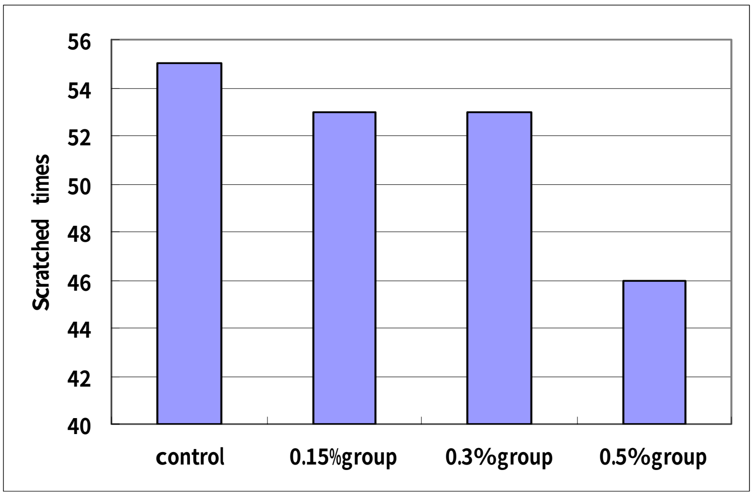


Fig. 14 Effect of rice-derived glycosphingolipid on compound 48/80 induced itch

[Method]

Mice (ddy, male) were fed rice-derived glycosphingolipid (0, 0.15, 0.3, and 0.5%) freely for 3 days. Three % of compound 48/80 solution was injected intradermally on the cervical skin to induce scratching action. The action was monitored for 30 minutes after they started to scratch themselves, and counted the number of scratching.

4-4-2 Effect on mast cell degranulation induced itch by compound 48/80

Effects of glycosphingolipid derived from a variety of plant on the degranulation from mast cells were examined in RBL-2H3. It was found that rice origin glycosphingolipids has the strongest effect in wheat-, devil's tongue-, and corn-origin glycosphingolipid (Table 1) to surpress mast cell degranulation.

Table 1 Inhibitory Effect of Glycosphingolipids on Degranulation from RBL-2H3 Mast Cells

Origin	Inhibition (%)
Rice	87.3±2.2
Wheat	82.2±5.9
Devil's-tongue(konnyaku)	70.8±5.9
Corn	64.2±5.4

Sample concentration: 1 μg/mL, mean ± S.E., n=6

[Method]

RBL-2H3 cells were cultured in Eagle's (MEM) containing 10 % FCS, 1000 unit/mL penicillin, and 10 μg/mL streptomycin. Cells (2.0×10^5 cells, 400 μL/well) were seeded into 24-well plates. Rat monoclonal antibody DNP (dinitrophenyl)-IgE (Seikagaku Industry) were added to each well (final concentration of 0.45 μg/mL) and cultured for 24 hours for sensitization.

Cells were washed twice with 500 μL of Siraganian buffer (pH 7.2), and then 160 μL of Siraganian buffer containing 5.6 mM glucose, 1 mM $CaCl_2$, and 0.1% BSA was added. Cells were pre-incubated for 10 minutes at 37 ºC, and 20 μL of test sample solution was added. Ten minutes later, antigen [DNP-BSA (dinitrophenyl bovine serum albumin), final concentration of 10 μg/mL] was added and incubated for 30 minutes at 37 ºC, to stimulate cells. Stimulation was stopped by cooling for 10 minutes on ice, and then, 50 μL of supernatant were transfered to a 96-well micro plate. Reaction buffer 0.1 M citrate buffer (50 μL) containing 1 mM PNAG (*p*-nitrophenyl-*N*-acetyl -β-glucosaminide) was added, and incubated it for another one hour at 37 ºC.Stopping buffer (200 μL, 0.1 M $NaHCO_3/Na_2CO_3$, pH 10.0) was added to the reaction solution, and the absorbance (wavelength: 410 nm) was measured using a micro plate reader.

The ratio of degranulation was calculated using the following equations.

Rate of β-hexosaminidase release (%) =

$$\frac{\text{Amount of β–hexosaminidase released by stimulation***– amount of native release *}}{\text{Total amount of β–hexosaminidase in the cells** – amount of native release *}} \times 100$$

Inhibitory ratio of β-hexosaminidase release (%) =

$$\left[1 - \frac{\text{Release rate when the sample is added}}{\text{Release rate when the sample is not added***}} \right] \times 100$$

*Supernatant of culture with no antigen, antibody, or sample

**Supernatant of culture that were sonicated and freezed at -80ºC

***Supernatant of culture with antigen and antibody but without the sample

[Test samples]

Glycosphingolipids from rice (> 98 %)

Glycosphingolipids from wheat (> 95 %)

Glycosphingolipids from devil's-tongue (konnyaku) (> 95 %)

Glycosphingolipids from corn (> 95 %)

4-5 Clinical Test Results of Skin Beautifying Effect (*in vivo*)

This clinical investigation was conducted in OSAKA City University using ORYZA CERAMIDE. The detail results are described in "CLINICAL INVESTIGATION OF SKIN-BEAUTIFYING EFFECT OF A BEAUTY SUPPLEMENT CONTAINING RICE-DERIVED CERAMIDE ". Please refer to it.

4-6 Effect to Prevent Colon Cancer

In Japan, stomach cancer is the highest cause of death, followed by colon cancer among digestive cancer. Incidence of colon cancer is increasing as diet becomes more and more westernized. In a joint research with Professor Yoshimi and coworkers of Ryukyu University, preventive effect of rice-origin glycosphingolipid to colon cancer. The result indicated that rice-origin glycosphingolipid is potentially a safe, natural food to privent colon cancer.

A carcinogen, azoxymethane (AOM) was hypodermically injected to F344 rats (5-week old, male) once a week for the first two weeks to induce aberrant crypt foci (ACF) and mucin depleted foci (MDF) both of which are precancerous lesions of colon cancer. In groups 2 and 3 (groups that received G_1CM administration at the initiation stage) , the number of ACF and MDF cases was significantly fewer, compared to group 1 (the positive control group) in the fourth week of the test. In groups 4 and 5 (groups that received G_1CM administration at post-initiation stage), the number of ACF and MDF cases of each group in the eighth week was also significantly fewer, compared to group1.
These date indicate that rice-origin glycosphingolipid prevents precancerous lesions from getting worse when it is administrated in the promotion stage of tumorigenesis, even without simultaneous administration. Actually, no large intestinal mucosa was found in groups 2, 3, 4 and 5, which G_1CM was fed to.
Immuno histochemical staining suggests that rice-origin glycosphingolipid induces apotosis of cancer cells.

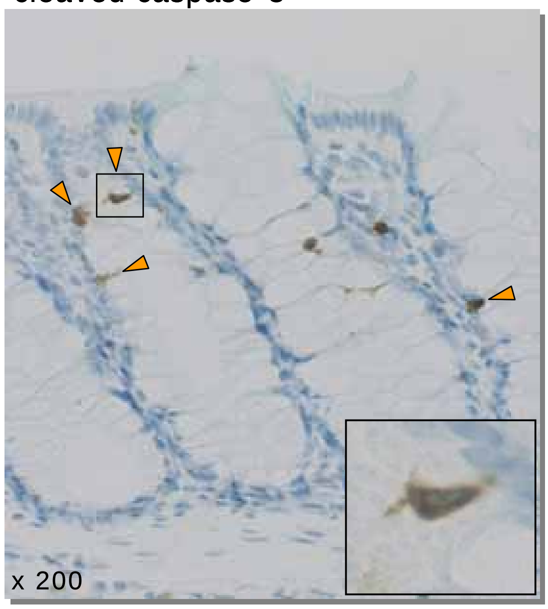
Table 2 Effect of rice-derived glycosphingolipid on colon cancer induced by AOM in rats

Group	Conc. (ppm)	N	Number of ACF 4 w	Number of ACF 8w	Number of MDF 4w	Number of MDF 8w
1	0	12	75±17	111±33	9.2±5.2	17.1±6.6
2	100	12	46±9 $^{p<0.01}$	90±28	0.8±0.8 $^{p<0.05}$	10.8±5.9 $^{p<0.05}$
3	250	12	45±14 $^{p<0.01}$	75±20 $^{p<0.05}$	0.8±0.4 $^{p<0.05}$	6.8±2.7 $^{p<0.05}$
4	100	12	-	89±28	-	10.0±5.1
5	250	12	-	78±15 $^{p<0.05}$	-	9.6±3.1 $^{p<0.01}$
6	250	3, 6	0	0	0	0
7	0	3, 6	0	0	0	0

(mean ±standard deviation)

PCNA

cleaved caspase-3



・PCNA immunoreactivitiy is positive in nucleus (▽)

・Cleaved caspase-3 positive cells are mainly localized in upper half of the crypt (▽), and its immunoreactivity shows cytoplasmic pattern in high power magnification.

[Method]

F344 rats (5 week-old, male) were divided into seven groups and hypodermically injected azoxymethane (AOM, 20 mg/kg) once week for the first two weeks to induce ACF and MDF. In the forth and eighth weeks, their were picked up large intestines, fixed with formalin, stained with Alcian Blue (pH 2.5), then counted the number of ACF and MDF cases under an optical microscope. In addition, immunohistochemical staining with antibodies of proliferating nuclear antigen (PCNA) and cleaved caspase-3 was performed to confirm tumorigenesis (PCNA) and apoptosis (caspase-3).

Group 1: Basic feed before the AOM administration (the first week) to the end of the test (the eighth week).

Groups 2 and 3: Fed with pure glycosphingolipid(>90% purity) (G_1CM 100 or 250 ppm) before the AOM administration(the first week) to the fourth week of the test, and then basic feed to the end of the test (the eighth week).

Groups 4 and 5: Basic feed before the AOM administration (the first week) and then, feed with 100 or 250 ppm of G_1CM from the third week of the test to the end (the eighth week).

Groups 6 and 7: AOM was not administrated. Fed with 250 ppm of G_1CM or basic feed throughout the test period.

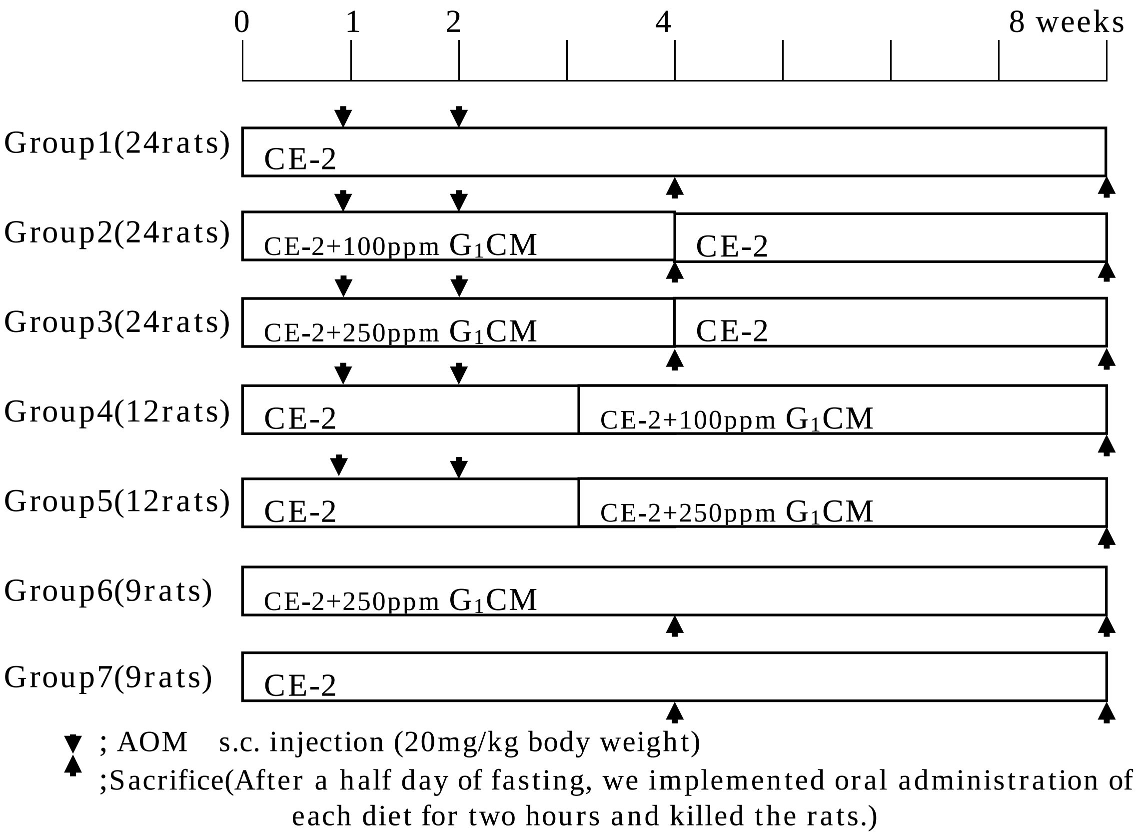


Fig. 15 Protocol of AOM induce rats colon cancer model

References

1) Eva-Maria Schmelz et al., *J. of Nutrition*, **124**(5), 702(1994)

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3) Futerman A. H., *CHAPTER 4, Current Topics in Membranes*, Vol.**40**, 93(1994)

4) Elian Lati., *Fragrance Journal*, **23**(1), 81(1995)

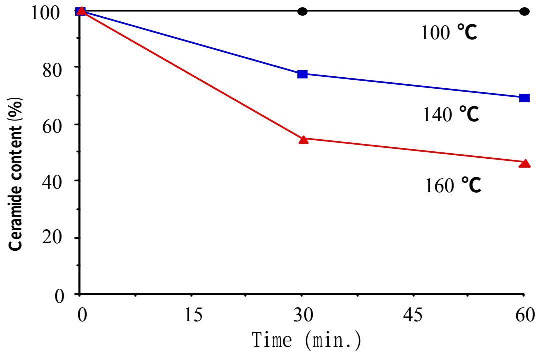
5) Genji Imokawa, *Yukagaku*, **44**(10), 751(1995)

6) Lena N. *et al., J.Nutr.Biochem*., **8**(3),122(1997)

5. Stability

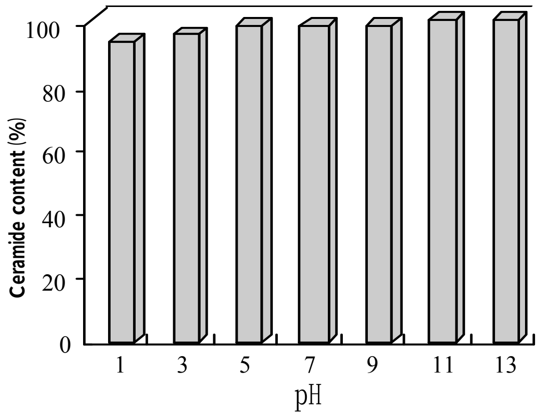
(1) Thermo stability

The pyrolysis of ORYZA CERAMIDE does not occur at a normal food processing temperature for 60 min.



(2) pH stability

ORYZA CERAMIDE remained stable at a all pH range field.



* The ceramide concentration in 90% ethanol solution (pH 6.8, unregulated) was set 100%.

6. Nutrition Information

Items (/100 g)	ORYZA CERAMIDE- PT	PCD	P8T	P20CD	WSP WSP8	L L0.8
Water (g)	1.2	1.8	1.1	2.2	1.8	40.2
Protein (g)	5.3	3.8	7.3	4.7	3.8	0.4
Fat (g)	19.6	33.8	21.8	42.2	33.8	5.9
Ash (g)	66.3	2.5	67.2	3.1	2.5	0.2
Available carbohydrate (g)	5.6	58.3	0.4	47.8	58.3	53.3
Dietary fiber (g)	2.0	0.0	2.2	0.0	0.0	0.0
Sodium (mg)	337	524	328	655	524	52
Energy (kcal)	224	552	232	590	552	268

7. Safety Profile

(1) Residual Agricultural Chemicals

The rice bran and rice germ-derived extract containing glycosphingolipids (without binder) is conformed to regulation stipulated for 447 residual agricultural chemical compounds. No residual agricultural chemicals detected as confirm by test trustee.

Test trustee：Masis Co. Ltd. Date：September 5, 2006

(2)Acute Toxicity (LD_{50})

ORYZA CERAMIDE (5000 mg/kg) were given orally to mice (5 weeks old) and fed with laboratory chow for 2 weeks. No toxic effect observed, at 5000 mg/kg.

LD_{50} (in mouse) is deduced to be > 5000 mg/kg.

(3) Four-weeks repeated dose toxicity test

Toxicity on 28-day repeated dose was conducted on Slc:ddy male and female mice (4 weeks old). 60 mg/kg (corresponding to 3.6 g/human when a human weight would be 60 kg) of rice-derived sphingolipids was given to mice any restrictions on test condition during the 28-day period. No abnormal changes observed in organs, weight and blood profile of rats at end of test.

(4) Other Information about Safety

Glycosphingolipid in Oryza Ceramide (mainly sphingosine derivative extracted from rice bran) is registered as an emulsifier of food additive. This safe material is the only ceramide approved by the Ministry of Health, Labour and Welfare among various types of ceramides.

8. Recommended Daily Dosage

	Recommended Dosage (mg/day)	
Effect / Product	Whitening effect	Moisturizing effect
ORYZA CERAMIDE-PT, PCD (powder)	30~50	20~40
ORYZA CERAMIDE-P8T (powder)	11~19	7.5~15
ORYZA CERAMIDE-P20CD (powder)	4.7~7.5	3~6
ORYZA CERAMIDE-WSP (water soluble powder)	30~50	20~40
ORYZA CERAMIDE-WSP8 (water soluble powder)	11~19	7.5~15
ORYZA CERAMIDE-L (milky liquid)	300~500	200~400
ORYZA CERAMIDE-L0.8 (milky liquid)	113~188	75~150

9. Applications

Applications	Examples
Health foods	Soft-capsule, Tablet, Hard-capsule, etc.
Foods	Candy, Gum, Cake, Cookie, Wafer, Drink, Nutritional oil, etc.
Cosmeceuticals	Face care (lotion, milk, cream, etc.) Body care (body lotion, body cream, etc.) Cleansing cosmetics (soap, etc.) Makeup cosmetics (lipstick, foundation, etc.) etc.

10. Packaging

<table>
<tr><td colspan="2">Powder</td><td colspan="2">Water soluble powder</td><td colspan="2">Liquid</td></tr>
<tr><td>Food</td><td>Cosmetic</td><td>Food</td><td>Cosmetic</td><td>Food</td><td>Cosmetic</td></tr>
<tr><td colspan="6">ORYZA CERAMIDE-</td></tr>
<tr><td>PT
PCD
P8T
P20</td><td>PC
PC8
PC20</td><td>WSP
WSP8</td><td>WSPC
WSPC8</td><td>L
L0.8</td><td>LC
LC0.8</td></tr>
<tr><td colspan="4">1kg
Exterior packaging
: Cardboard box
Interior packaging
: Polyvinylidene coating bag and Can</td><td colspan="2">5kg
Exterior packaging
: Cardboard box
Interior packaging
: A double layered plastic bag</td></tr>
</table>

11. Storage

Store in cool and dark place. Avoid humidity.

12. Expression

<Food>

Product name	Expression
ORYZA CERAMIDE -PT, PCD -P8T -P20 -WSP, WSP8 -L, L0.8	Rice Ceramide Rice Extract (including rice ceramide) Rice Extract (including rice glycosphingolipid)

<Cosmetic>

Product name	INCI name
ORYZA CERAMIDE -PC, PC8, PC20	Cyclodextrin Oryza Sativa (Rice) Bran Oil Glycosphingolipids
ORYZA CERAMIDE -WSPC, WSPC8	Maltosyl Cyclodextrin Cyclodextrin Maltose Oryza Sativa（Rice）Bran Oil Glyco sphingolipids
ORYZA CERAMIDE-LC	Glycerin Water Polyglyceryl-10 Oleate Lecithin Oryza Sativa (Rice) Bran Oil Glycosphingolipids
ORYZA CERAMIDE-LC0.8	Glycerin Water Polyglyceryl-10 Oleate Oryza Sativa (Rice) Bran Oil Glycosphingolipids

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-PT

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 3.0 % glycosphingolipid.

1. Appearance	Light yellowish powder with slight unique aroma	
2. Glycosphingolipid	Min. 3.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1 ×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	25.00 %
Calcium carbonate	65.60 %
Sodium caseinate (milk)	5.00 %
Pullulan	2.00 %
Enzymatic lysolecithin (soybean)	0.57 %
Glycerin ester of fatty acid	0.50 %
Xanthan gum	0.20 %
Food materials	1.13 %
Total	100.00 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-PCD

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 3.0 % glycosphingolipid.

1. Appearance	Light yellowish powder with slight unique aroma	
2. Glycosphingolipid	Min. 3.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	40 %
Cyclodextrin	60 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-P8T

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 8.0 % glycosphingolipid.

1. Appearance	Light yellowish powder with slight unique aroma	
2. Glycosphingolipid	Min. 8.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	25.00 %
Calcium carbonate	65.60 %
Sodium caseinate (milk)	5.00 %
Pullulan	2.00 %
Enzymatic lysolecithin (soybean)	0.57 %
Glycerin ester of fatty acid	0.50 %
Xanthan gum	0.20 %
Food materials	1.13 %
Total	100.00 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-P20CD

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 20.0 % glycosphingolipid.

1. Appearance	Light yellowish powder with slight unique aroma	
2. Glycosphingolipid	Min. 20.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1 ×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	50 %
Cyclodextrin	50 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-WSP

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 3.0 % glycosphingolipid. This product is water-soluble.

1. Appearance	Slightly yellow powder with slightly unique smell	
2. Glycosphingolipid	Min. 3.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	40 %
Cyclodextrin	60 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-WSP8

(FOOD)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 8.0 % glycosphingolipid. This product is water-soluble.

1. Appearance	Slightly yellow powder with slightly unique smell	
2. Glycosphingolipid	Min. 8.0 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Loss on Drying	Max. 5.0 %	(Analysis for Hygienic Chemists, 1 g, 105℃, 2 h)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1×10^3 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Rice extract	40 %
Cyclodextrin	60 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-L

(FOOD)

This product is water-soluble emulsion containing glycosphingolipids extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Graminea)* It contains a minimum of 0.30 % glycosphingolipid.

1. Appearance	Lightl brown liquid with light unique smell	
2. Glycosphingolipid	Min. 0.30 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
4. Standard Plate Counts	Max. 1 $\times 10^3$ cfu/g	(Analysis for Hygienic Chemists)
5. Moulds and Yeasts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
6. Coliforms	Negative	(Analysis for Hygienic Chemists)

7. Composition

Ingredients	Contents
Purified water	38 %
Rice extract	4 %
Glycerin	40 %
Glycerin ester of fatty acid	13 %
Enzymatic lysolecithin (soybean)	5 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-L0.8

(FOOD)

This product is water-soluble emulsion containing glycosphingolipids extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Graminea)*. It contains a minimum of 0.80 % glycosphingolipid.

1. Appearance	Light yellowish liquid with slight unique aroma	
2. Glycosphingolipid	Min. 0.80 %	(Densitometory Method) (HPLC Light Scattering Method)
3. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
4. Standard Plate Counts	Max. 1 $\times 10^3$ cfu/g	(Analysis for Hygienic Chemists)
5. Moulds and Yeasts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
6. Coliforms	Negative	(Analysis for Hygienic Chemists)

7. Composition

Ingredients	Contents
Purified water	40 %
Rice extract	4 %
Glycerin	46 %
Glycerin ester of fatty acid	10 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-PC

(COSMETIC)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 3.0 % glycosphingolipid.

1. Appearance	Yellowish powder with slightly unique smell	
2. Certification Test Cyclodextrin	Add 2 ml of iodine reagent to 0.2 g of this product and boil it in water bath. Yellow brown precipitate is formed at the room temperature.	
3. Glycosphingolipid	Min. 3.0 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Loss on Drying	Max. 5.0 %	(1 g, 105 ℃, 2 h)
5. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Second method)
(2)Arsenic	Max. 1 ppm	(The Third method)
6. Standard Plate Counts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Moulds and Yeasts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
8. Coliforms	Negative	(Analysis for Hygienic Chemists)

9. Composition

Ingredients	Contents
Cyclodextrin	60 %
Oryza Sativa (Rice) Bran Oil	37 %
Glycosphingolipids	3 %
Total	100 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-PC8

(COSMETIC)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 8.0 % glycosphingolipid.

1. Appearance	Yellowish powder with slight unique aroma.	
2. Certification Test Cyclodextrin	Add 2 ml of iodine reagent to 0.2 g of this product and boil it in water bath. Yellow brown precipitate is formed at the room temperature.	
3. Glycosphingolipid	Min. 8.0 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Loss on Drying	Max. 5.0 %	(1 g, 105 ℃, 2 h)
5. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Second method)
(2)Arsenic	Max. 1 ppm	(The Third method)
6. Standard Plate Counts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
8. Coliforms	Negative	(Analysis for Hygienic Chemists)

9. Composition

Ingredients	Contents
Cyclodextrin	60 %
Oryza Sativa（Rice）Bran Oil	32 %
Glycosphingolipids	8 %
Total	100 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-PC20

(COSMETIC)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 20.0 % glycosphingolipid.

1. Appearance	Light yellowish powder with slight unique smell.	
2. Certification Test Cyclodextrin	Add 2 ml of iodine reagent to 0.2 g of this product and boil it in water bath. Yellow brown precipitate is formed at the room temperature.	
3. Glycosphingolipid	Min. 20.0 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Loss on Drying	Max. 5.0 %	(1 g, 105 ℃, 2 h)
5. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Second method)
(2)Arsenic	Max. 1 ppm	(The Third method)
6. Standard Plate Counts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
7. Moulds and Yeasts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
8. Coliforms	Negative	(Analysis for Hygienic Chemists)

9. Composition

Ingredients	Contents
Cyclodextrin	50 %
Oryza Sativa (Rice) Bran Oil	30 %
Glycosphingolipids	20 %
Total	100 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-WSPC

(COSMETIC)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 3.0 % glycosphingolipid. This product is water-soluble.

1. Appearance	Slightly yellow powder with slightly unique smell.	
2. Certification Test	Add 2 ml of iodine reagent to 0.2 g of this product and boil it in water bath. Yellow brown precipitate is formed at the room temperature. (β-Cyclodextrin)	
3. Glycosphingolipid	Min. 3.0 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Loss on Drying	Max. 5.0 %	(1 g, 105 ℃, 2 h)
5. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Second method)
(2)Arsenic	Max. 1 ppm	(The Third method)
6. Standard Plate Counts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
7. Moulds and Yeasts	Max. 1 $\times 10^2$ cfu/g	(Analysis for Hygienic Chemists)
8. Coliforms	Negative	(Analysis for Hygienic Chemists)

9. Composition

Ingredients	Contents
Maltosyl Cyclodextrin Cyclodextrin Maltose	60 %
Oryza Sativa (Rice) Bran Oil	37 %
Glycosphingolipids	3 %
Total	100 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-WSPC8

(COSMETIC)

This product is extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Gramineae)*. It contains a minimum of 8.0 % glycosphingolipid. This product is water-soluble.

1. Appearance	Slightly yellow powder with slightly unique smell.	
2. Certification Test	Add 2 ml of iodine reagent to 0.2 g of this product and boil it in water bath. Yellow brown precipitate is formed at the room temperature. (β-Cyclodextrin)	
3. Glycosphingolipid	Min. 8.0 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Loss on Drying	Max. 5.0 %	(1 g, 105 ℃, 2 h)
5. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Second method)
(2)Arsenic	Max. 1 ppm	(The Third method)
6. Standard Plate Counts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
8. Coliforms	Negative	(Analysis for Hygienic Chemists)

9. Composition

Ingredients	Contents
Maltosyl Cyclodextrin Cyclodextrin Maltose	60 %
Oryza Sativa (Rice) Bran Oil	32 %
Glycosphingolipids	8 %
Total	100 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-LC

(COSMETIC))

This product is water-soluble emulsion containing glycosphingolipids extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Graminea)* It contains a minimum of 0.30 % glycosphingolipid.

1. Appearance	Slightly brown liquid with slightly unique smell.	
2. Certification Test		
(1)	10 g of this product is dissolved in 50 ml of ethanol in separating funnel. Ethanol layer is evaporated. When 0.5 g of potassium hydrogensulfate is added in residue and heated, it occurs irritating smell. (Glycerin)	
(2)	1 g of this product, 5 g of potassium sulfate, 0.5 g copper sulfate and 20 ml of sulfuric acid are heated in kjeldahl frask. After solution changes transparent blue, heat for 2 hours. After cool, 20 ml of water is added. 10 ml of ammonium molybdate solution is added in 5 ml of this solution, then it occurs yellow precipitate. (Lecithin)	
3. Glycosphingolipid	Min. 0.30 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Glycerin	40.0 %
Water	38.0 %
Polyglyceryl-10 oleate	13.0 %
Lecithin	5.0 %
Oryza Sativa（Rice）Bran Oil	3.7 %
Glycosphingolipids	0.3 %
Total	100.0 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

PRODUCT STANDARD

PRODUCT NAME

ORYZA CERAMIDE-LC0.8

(COSMETIC))

This product is water-soluble emulsion containing glycosphingolipids extracted with hexane and ethanol from rice bran and rice germ of *Oryza sativa* Linne *(Graminea)* It contains a minimum of 0.80 % glycosphingolipid.

1. Appearance	Slight yellowish liquid with slight unique aroma.	
2. Certification Test		
(1)	10 g of this product is dissolved in 50 ml of ethanol in separating funnel. Ethanol layer is evaporated. When 0.5 g of potassium hydrogensulfate is added in residue and heated, it occurs irritating smell. (Glycerin)	
3. Glycosphingolipid	Min. 0.80 %	(Densitometory Method) (HPLC Light Scattering Method)
4. Purity Test		
(1)Heavy Metals	Max. 10 ppm	(The Japanese Standards for Food Additives)
(2)Arsenic	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation)
5. Standard Plate Counts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
6. Moulds and Yeasts	Max. 1 ×10^2 cfu/g	(Analysis for Hygienic Chemists)
7. Coliforms	Negative	(Analysis for Hygienic Chemists)

8. Composition

Ingredients	Contents
Glycerin	46.0 %
Water	40.0 %
Polyglyceryl-10 oleate	10.0 %
Oryza Sativa (Rice) Bran Oil	3.2 %
Glycosphingolipids	0.8 %
Total	100.0 %

Ref: The Japanese Standards of Quasi-Drug Ingredients.

ORYZA OIL & FAT CHEMICAL CO., LTD.

ORYZA OIL & FAT CHEMICAL CO., LTD., striving for the development of the new functional food materials to promote your health.

- **From product planning to OEM** - For any additional information or assistance, please contact :

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ISO 9001 UKAS QUALITY MANAGEMENT 008

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