



ORYZA OIL & FAT CHEMICAL CO., LTD.

Rice Germ Enriched with γ -Aminobutyric Acid

ORYZA GABA[®]

Anti-Hypertension Effect
Ataractic Effect

- *ORYZA GABA*[®] GERM-P
- *ORYZA GABA*[®] EXTRACT-C
- *ORYZA GABA*[®] EXTRACT-HC5
- *ORYZA GABA*[®] EXTRACT-HC90



ORYZA OIL & FAT CHEMICAL CO., LTD.

ver. 7.4 ST

**Rice Germ Enriched with γ -Aminobutyric Acid
ORYZA GABA[®] SERIES**

Through a joint research project with the Ministry of Agriculture, Forestry and Fisheries Chugoku National Agricultural Experiment Station, ORYZA has established the world's most innovative technology for production of rice germ enriched with highly concentrated γ -aminobutyric acid (GABA).

GABA, an amino acid found throughout the animal and plant kingdoms, exists in the cerebrospinal fluid (CSF) of animals. As the primary inhibitory neurotransmitter in the brain, it activates the blood flow and increases the oxygen supply in the brain to enhance metabolic function of brain cells. GABA is recognized to improve conditions such as post-stroke sequellae, tinnitus, amnesic syndrome, mild depression, and headaches caused by encephalopathy arteriosclerosis. GABA is also effective for lowering blood pressure by working on vasomotor center of the medulla oblongata.

According to a recent report by Masashi Ohmori, professor at Ohtsuma Women's University, a result of continuous intake of rice germ enriched with GABA is a remarkable decline of blood pressure and lower triglyceride (TG) levels in the blood stream. In addition, GABA is reported to activate alkaline phosphatase (ALP), which serves as a barometer for hepatic function and causes decreased blood urea nitrogen (BUN) levels associated with improved renal function.

● Eight Effects of ORYZA GABA®

Six different effects of GABA contained within rice germ have been identified.

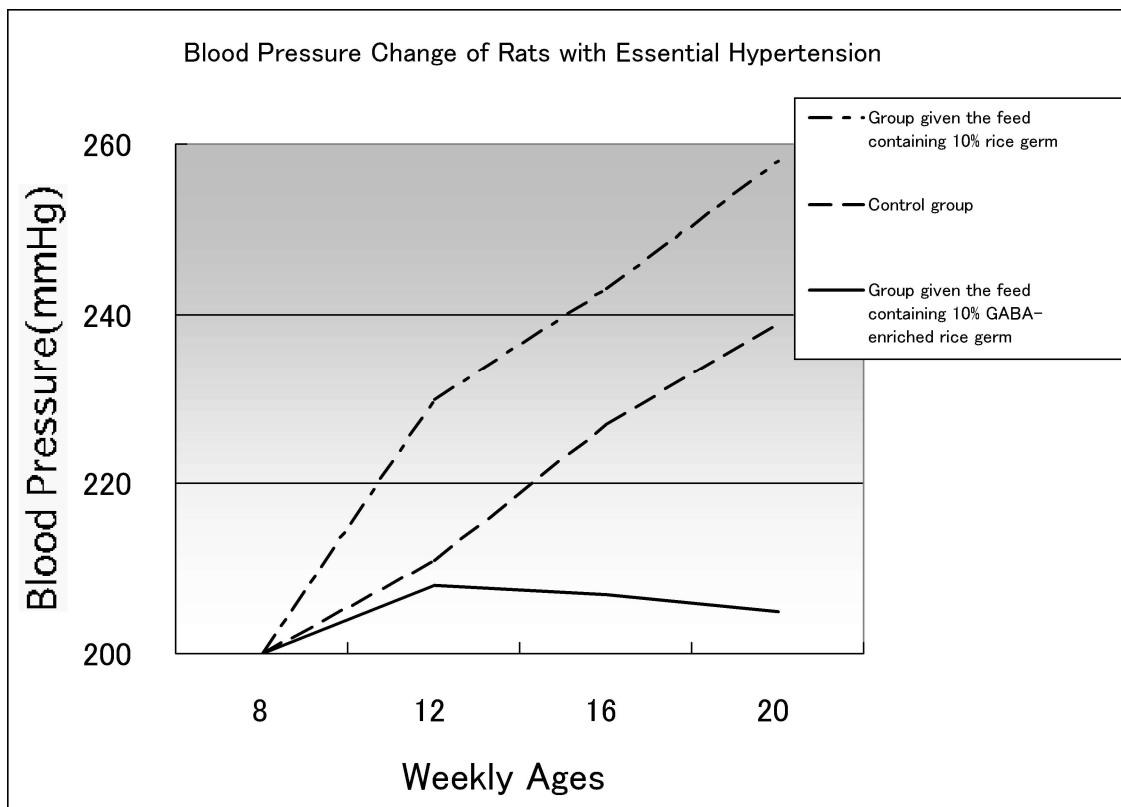
Reported test results are as follows:

1) The Inhibitory Effect on Hypertension

According to a report presented by Masashi Ohmori, professor at Ohtsuma Women's University, continuously feeding of GABA-enriched rice germ results in a remarkable inhibitory effect on hypertension in rats.

The Effect of GABA enriched Rice Germ on Rats with Essential Hypertension

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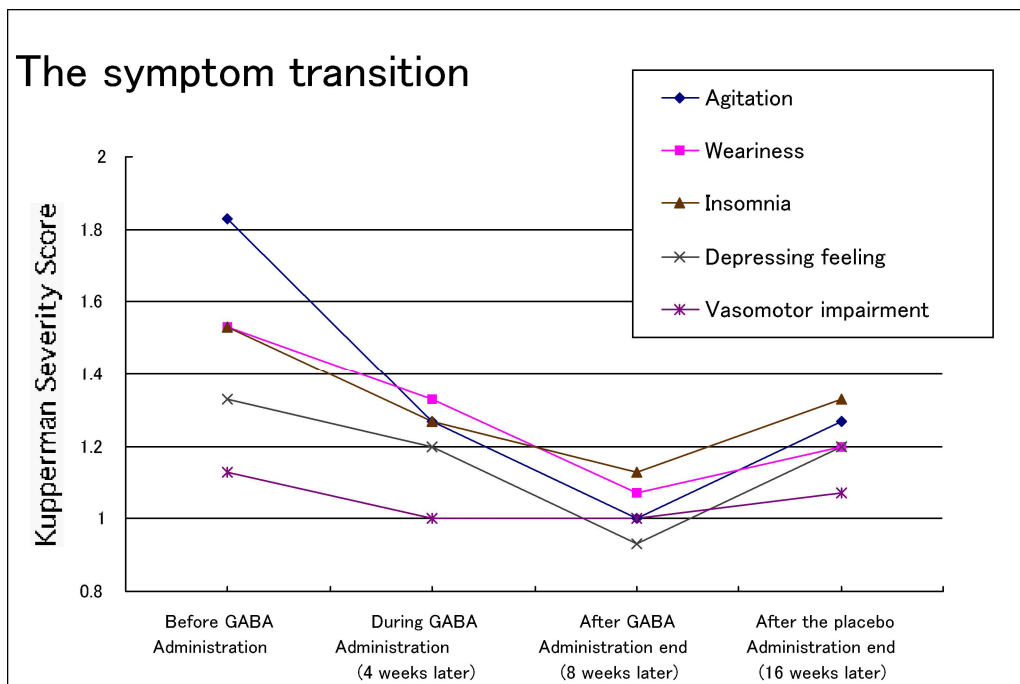
※ The blood pressure remained stable among the rats sustained by feed contain GABA-enriched rice germ. Without GABA, the blood pressure would be elevated.

2) Ataractic Effect (Clinical Test)

As a joint research with the Ministry of Agriculture, and the cooperation with the School of Medicine of Osaka University, the double blind study against a placebo on the rice germ enriched with GABA was conducted. The purpose of this study was to examine its usefulness as function food in its stabilizing action for sleeplessness, depression, autonomic disorder and others experienced by those who were menopause or passing middle ages.

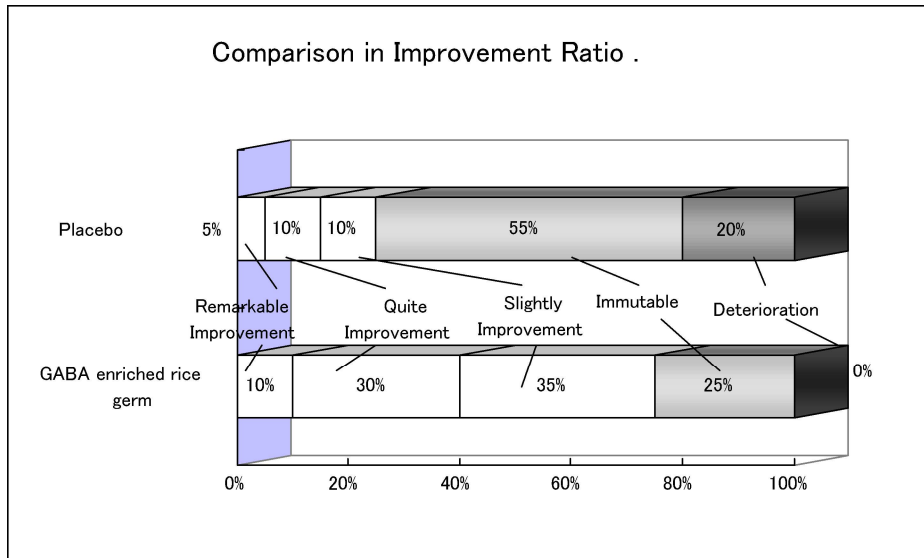
[Ataractic]

The symptom transition of the group administered with the GABA-enriched rice germ
 After administrated with the GABA enriched rice germ, every symptom of the group had been improved gradually. By the eighth week, the improvement had been recognized to have a statistical significance. Symptoms of the group had been back to be worse again when the group was administered a placebo instead of the rice germ enriched with GABA.

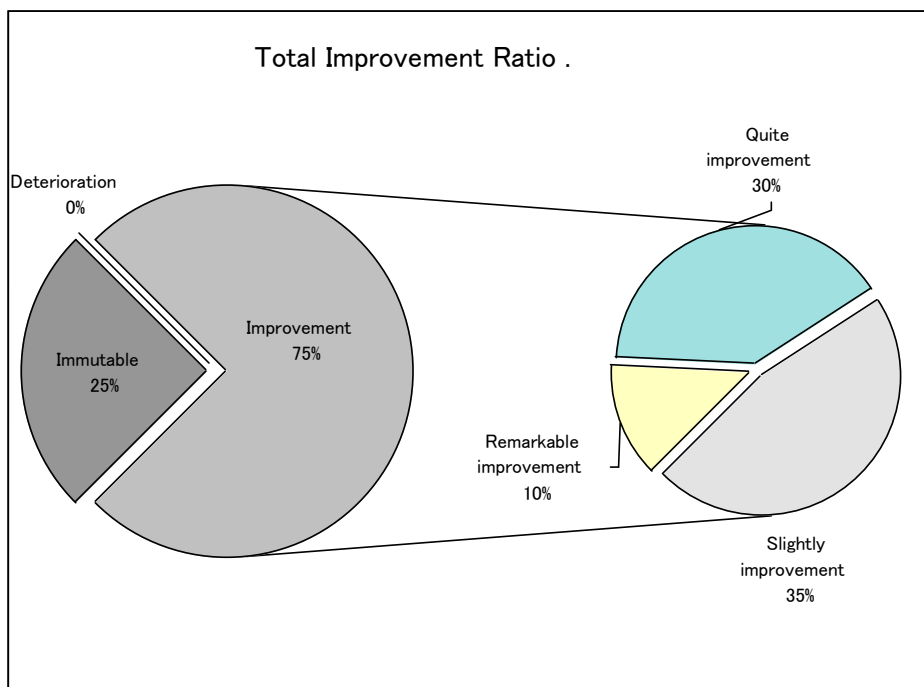


Another statistical significance had also been recognized in the improvement of the group administered with the rice germ enriched with GABA over one with a placebo as showed in the figure of the summary in the next page. Especially, the improvement in symptoms such as insomnia and depressing feeling experienced by those who were in the constant complaint with the climacteric psychosis or were passing middle ages was more than 65%. In all, 75% of all symptoms has been recognized to be improved in this research due to peroral administration of the rice germ enriched with GABA.

Comparison in improvement rate of the group administered with the GABA-enriched rice germ over one with a placebo



Total improvement ratio of the GABA-enriched rice germ



These results show that the rice germ enriched with GABA could mitigate, as much as GABA medical supplies do, mental symptoms considered to be difficult to be cured. Moreover, any side effects due to administering the rice germ enriched with GABA that could deteriorate a certain symptom did not appeared.

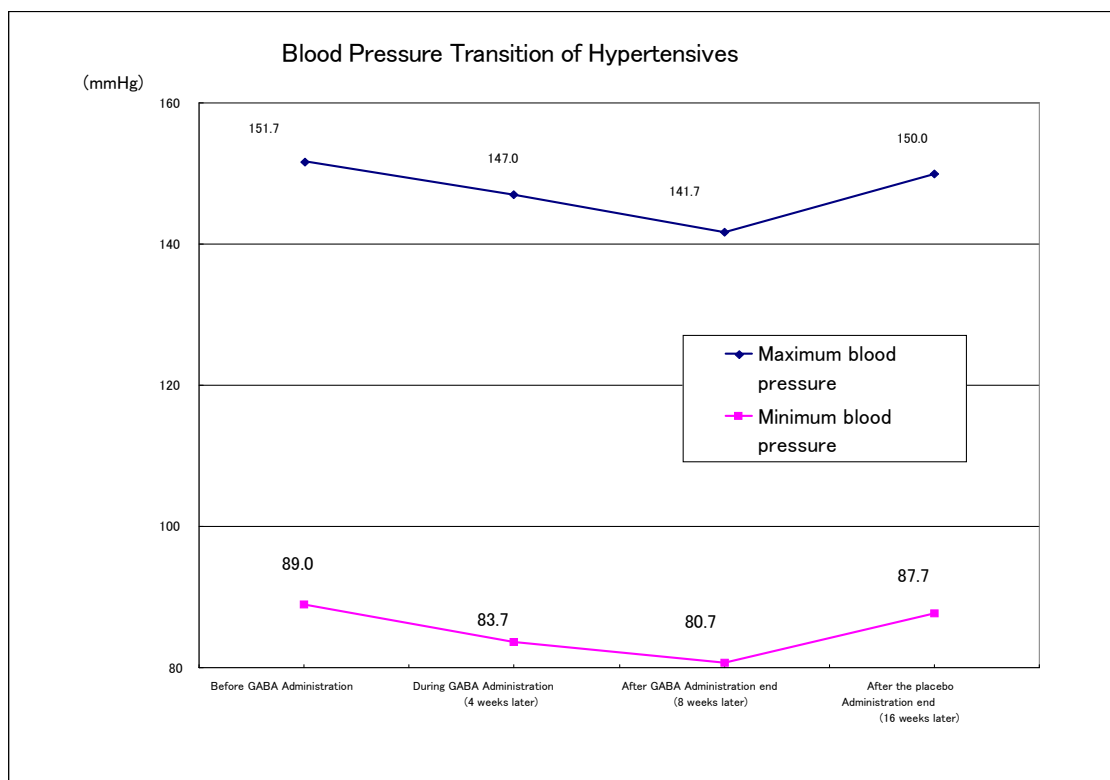
Results of other clinical test (Change in blood pressure and blood inspection)

[Change in Blood Pressure of Hypertensives]

This clinical test investigated, on human species, the change in blood pressure of 6 patients of hypertensive disease including ones on the border line to the disease since administered with the rice germ enriched with GABA. A mild but significant degree of the blood pressure reduction had been noticed in both higher and lower pressure after the eighth week of the administration.

The rice germ enriched with GABA is one of the excellent function foods for patients on the border line to the hypertensive disease, but not serious enough to be medicated, to prevent the symptoms from getting deteriorate.

Blood Pressure Transition of Hypertensives



[Blood Pressure Inspection Result] (Side Effects and Safety)

Any negative side effects had not been noticed at any time of administering both the rice germ enriched with GABA and the placebo.

Blood Inspection Results

Inspection item	White blood cell		Red blood cell		Hemoglobin		ALP	
Normal Value	3500-9500		376-516		11.2-16.0		74-223	
Patient name	Before	After	Before	After	Before	After	Before	After
H.T	7700	8000	402	420	13.8	13.8	142	130
Y.M	6780	7200	480	455	14.4	14.3	160	160
A.A	9600	6000	402	430	13.7	14.2	160	148
O.S	7000	5400	410	432	12.1	12.6		
T.H	7300	7100	461	451	13.3	13.8		
T.T	5800	6400	508	507	15.6	15.5		
I.K	6800	7000	420	430	14.2	14.6	158	170
S.H	7500	6800	370	385	13.2	13.7	123	143
T.F	10500	6800	420	434	14	14.2	180	165
Average	7664	6744	430.3	438.2	13.8	14.1	153.8	152.7
Abnormal fluctuation	non		non		non		non	

Inspection item	GOT		GPT		Total cholesterol		TG	
Normal Value	10-40		5-45		150-219		50-149	
Patient name	Before	After	Before	After	Before	After	Before	After
H.T	24	22	32	28	168	170	124	128
Y.M	28	28	33	30	192	184	120	132
A.A	38	27	42	29	203	189	103	120
O.S	13	13	14	13	175	193	53	139
T.H	21	14	29	16	179	180	375	259
T.T	30	30	49	45	256	306	523	309
I.K	38	36	30	38	170	172	108	120
S.H	20	15	18	15	123	143	98	106
T.F	38	32	40	34	202	200	138	130
Average	27.8	24.1	31.9	27.6	185.3	193.0	182.4	160.3
Abnormal fluctuation	non		non		non		non	

Inspection item	BUN		Crea		Na		K	
Normal Value	8-20		0.6-1.0		135-145		3.5-5.0	
Patient name	Before	After	Before	After	Before	After	Before	After
H.T	20	16	0.7	0.6	138	142	4	3.9
Y.M	10	12	0.4	0.4	138	138	4	3.8
A.A	12	15	0.6	0.6	140	140	4	4.2
O.S	7.4	9.5	0.6	0.5	142	143	4.5	4.4
T.H	8.7	8.7	0.7	0.8	142	143	3.8	3.8
T.T	12.6	11.6	0.7	0.8	142	143	3.9	4.5
I.K	18	16	0.8	0.7	140	137	3.9	3.8
S.H	12	13	0.3	0.4	140	142	3.7	3.8
T.F	15	14	0.9	0.7	138	142	4	3.9
Average	12.86	12.87	0.63	0.61	140.0	141.1	3.98	4.01
Abnormal fluctuation	non		non		non		non	

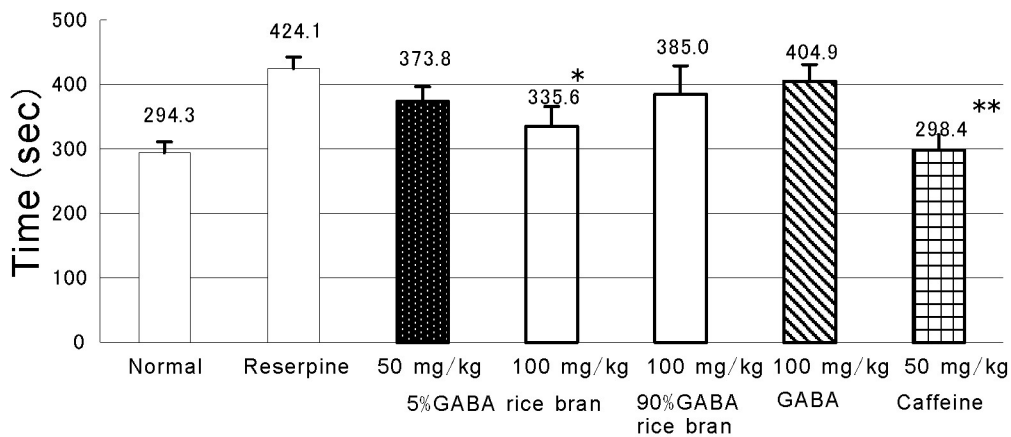
The inspection above showed the extremely high safety in dosage of the rice germ enriched with GABA administered this time.

For more information in detail of the clinical test data (Effect 6 & 7) on the rice germ enriched with GABA, please contact us.

3) Anti-mental Fatigue Effect

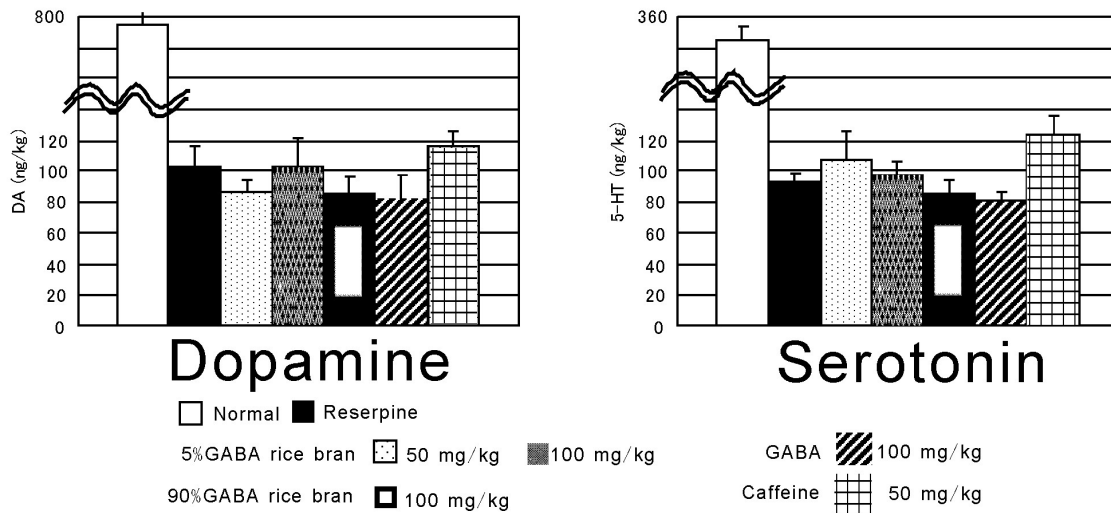
We evaluated anti mental fatigue effect of GABA in mice. Neural transmitters in brain control mental health by keeping the balance of the transmitters. Reserpine depletes the transmitters and cause depression in mice. We gave rice bran rich in GABA and loaded 10 min forced swimming. During swimming, immobilizing time was measured. As a result, reserpine induced increase in immobilizing time; however the group given the rice bran containing 5% GABA suppressed the time in dose-dependent manner. Especially the time of group given 100 mg/kg was approx. 90 sec shorter than the group injected reserpine with significance ($p < 0.05$). Although, the efficacy of rice bran containing 90% GABA (100 mg/kg) is equal to the bran containing 5% GABA (50 mg/kg), the immobilizing time was shorter than the time of group given commercial absolute GABA (100 mg/kg). Therefore, superiority of rice-derived GABA was confirmed in this experiment.

Immobilizing time in 10 min



N=7-9, *: $p < 0.05$, **: $p < 0.01$

Moreover, as a result of determination of cerebral dopamine and serotonin, both contents were decreased by reserpine. 5% GABA rice bran slightly recovered cerebral serotonin.



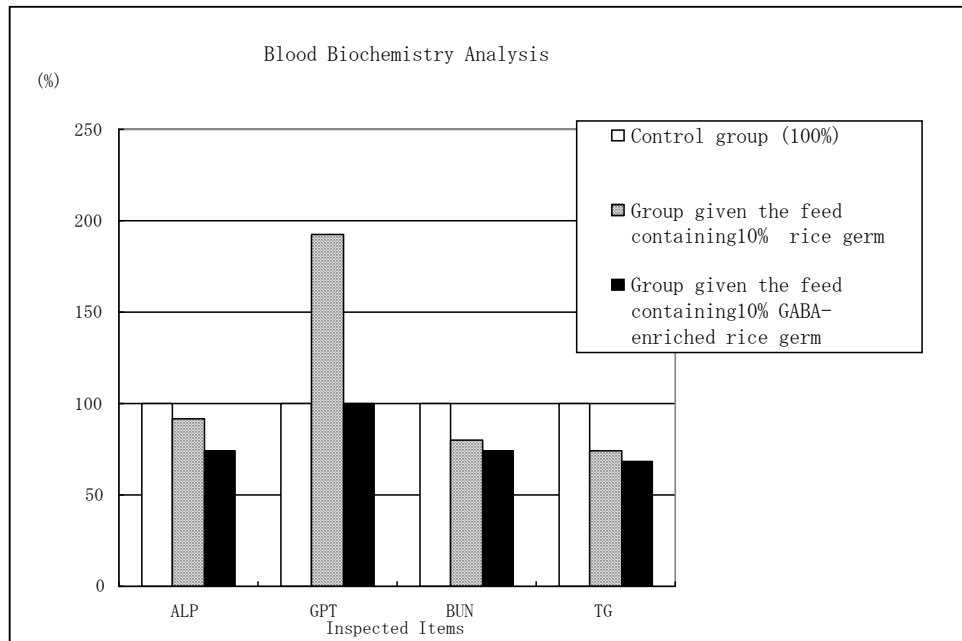
4) Positive Effects on Renal and Hepatic Function

As shown in the graph below, Professor Ohmori suggests that GABA- enriched rice germ activates renal function. This is based on the findings of a 26% decline of BUN level among the group administered with GABA-enriched rice germ, compared to the control. Lower BUN levels are associated with increased renal function, which helps prevent hypertension. Consequently, these findings are good news for people with hypertension.

The levels of alkaline phosphatase (ALP) as well as glutamic-pyruvic transaminase (GPT) are good indicators of hepatic function. When the hepatic physiology becomes dysfunctional, the activity levels of ALP and GPT increase. The graph below denotes that the ALP and GPT levels among the group given GABA-enriched rice germ are the same or lower than other comparison groups.

5) Prevention of Obesity

A sharp decrease of triglyceride (TG) level in the liver and in the blood was observed among the group administered with GABA-enriched rice germ. Among the same group with longer administration periods, no further weight gain was observed. Thus, the effect of GABA on the prevention of obesity is highly correlated.

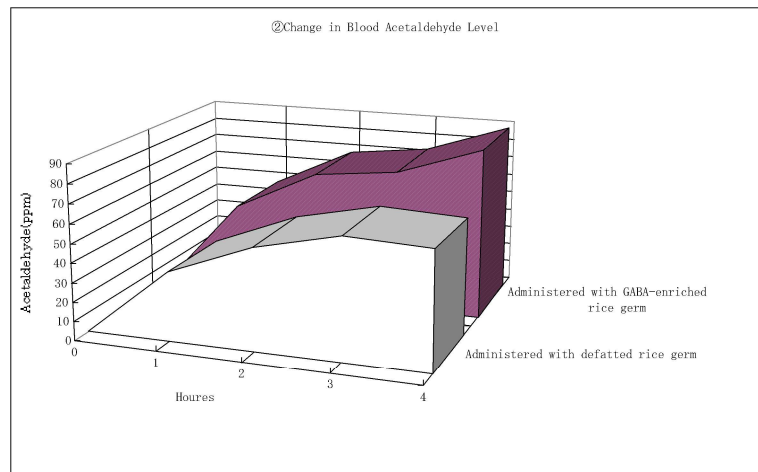
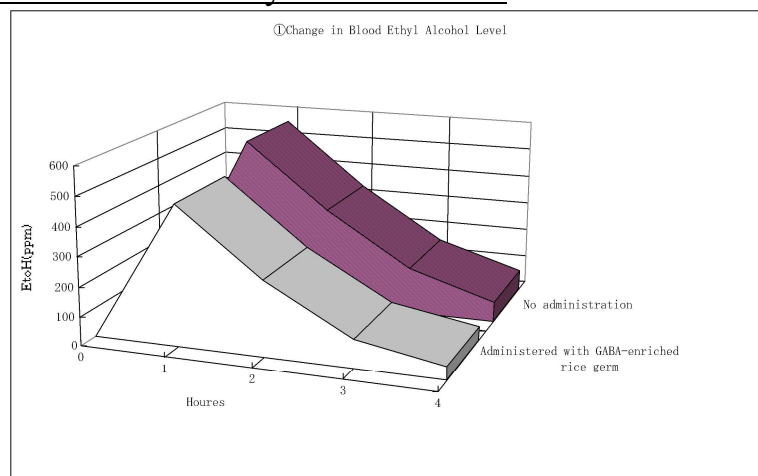


ALP : Alkaline Phosphatase GPT : Glutamic-pyruvic Transaminase
 BUN : Blood Urea Nitrogen TG : Triglyceride

7) Ethyl Alcohol and Acetaldehyde Metabolism

A test was conducted on humans to investigate the effect of GABA-enriched rice germ on ethyl alcohol and acetaldehyde metabolism. Among the group administered with 10 grams of GABA-enriched rice germ, there was a 15% decline in the blood alcohol level and 25% decline in blood acetaldehyde level. The expected effects of the GABA-enriched rice germ decreases the effects of hangovers and nausea from drinking.

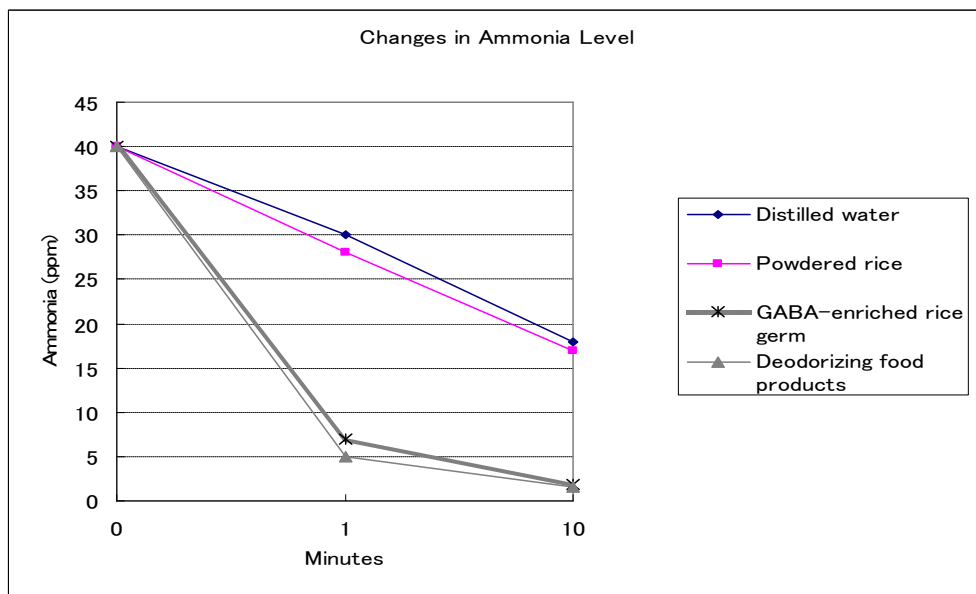
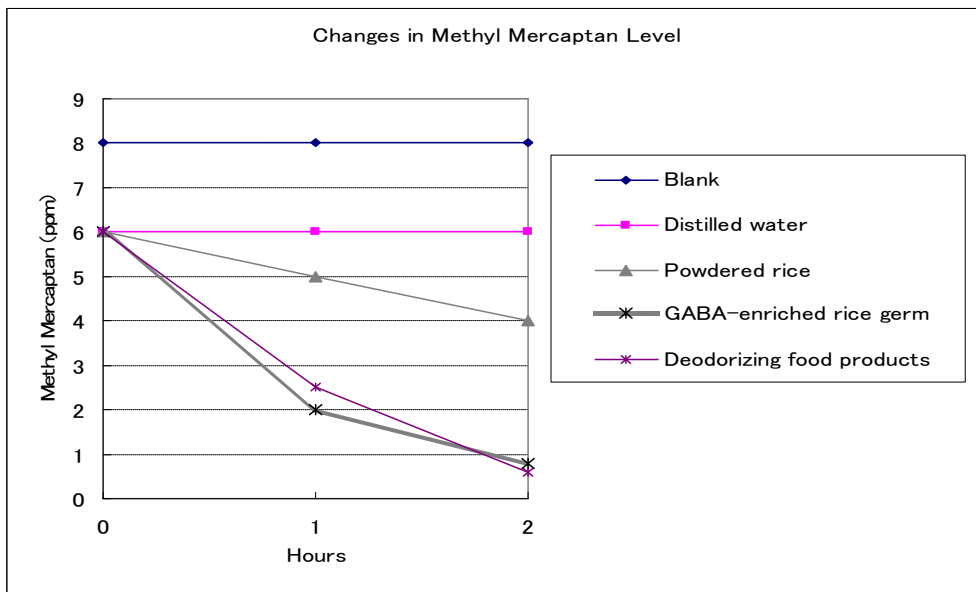
Ethyl Alcohol and Acetaldehyde Metabolism



- ※①Reduced blood alcohol level and improved metabolism were observed among the group in which GABA-enriched rice germ was administered.
- ※②Reduced blood acetaldehyde level was detected among the group in which GABA-enriched rice germ was administered.

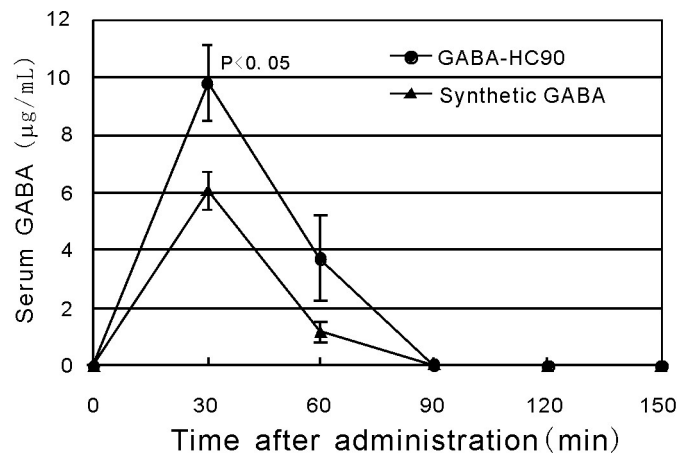
8) Deodorization

An evaluation test was conducted to analyze the effect of GABA-enriched rice germ on deodorization by using methyl mercaptan and ammonia *in vitro*. The evaluation, carried out by means of a headspace testing method, proved that GABA-enriched rice germ is as effective for deodorization as deodorizing food products on the market.



● Comparison of the absorbability of rice-derived GABA and synthetic GABA in rats

We compared absorbability of rice-derived GABA and synthetic GABA. ORYZA GABA®-HC90 (HC-90, GABA: 92.2%) and GABA (GABA: more than 99.0%) were used. As a result, serum GABA was increased to maximum 30 min after administration in both groups. The maximum concentration of GABA (9.8 $\mu\text{g}/\text{mL}$) in the group of HC-90 was 1.6 times higher than that of GABA group (6.1 $\mu\text{g}/\text{mL}$).



Mean with the SE, n=4-6

Thus, the bioavailability of rice-derived GABA (ORYZA GABA® HC-90) was found to be superior than synthetic GABA.

[Method]

HC-90 or synthetic GABA diluted in water were given orally to rats fasted for 18 hr. The dosage were equal to 100 mg of GABA. Blood was collected from abdominal aorta at 30, 60, 90, 120 and 150 min after administration under ether anesthesia. Serum was obtained by centrifugation and the GABA contents were determined by HPLC.

● ORYZA GABA® comes in 2 different types:

1. ORYZA GABA® GERM

ORYZA GABA® GERM provides your body with GABA accumulated through the germ's natural germinating processes and all the valuable nutrients originally contained in rice germ. It comes in three different forms for diverse compatibility to various kinds of foods. The pleasant aroma and flavor will complement almost any kind of food.

The whole nutrients of unpolished rice germ packed into 2 forms:

- ◆ ORYZA GABA® GERM-P: Powdered, made of 100% rice germ. Effective by 2.4 g
~
8 g/day
- ◆ ORYZA GABA® 21: 500mg × 210 triangular tablets

2. ORYZA GABA® EXTRACT

ORYZA GABA® EXTRACT was produced by adding water-soluble nutrients from the unpolished rice germ to the highly concentrated GABA. It was then dried and made into powder form. As a result of this unique production method, GABA may be easily incorporated into beverages, seasonings and soup. You can expect ORYZA GABA® EXTRACT to produce the same benefits as ORYZA GABA® GERM-P. It is a new type of nutritional supplement, which may be incorporated into the diet to prevent adult diseases such as hypertension. Its practical application is useful for nutraceutical products and throughout the food industry.

Four kinds of water soluble GABA high component things:

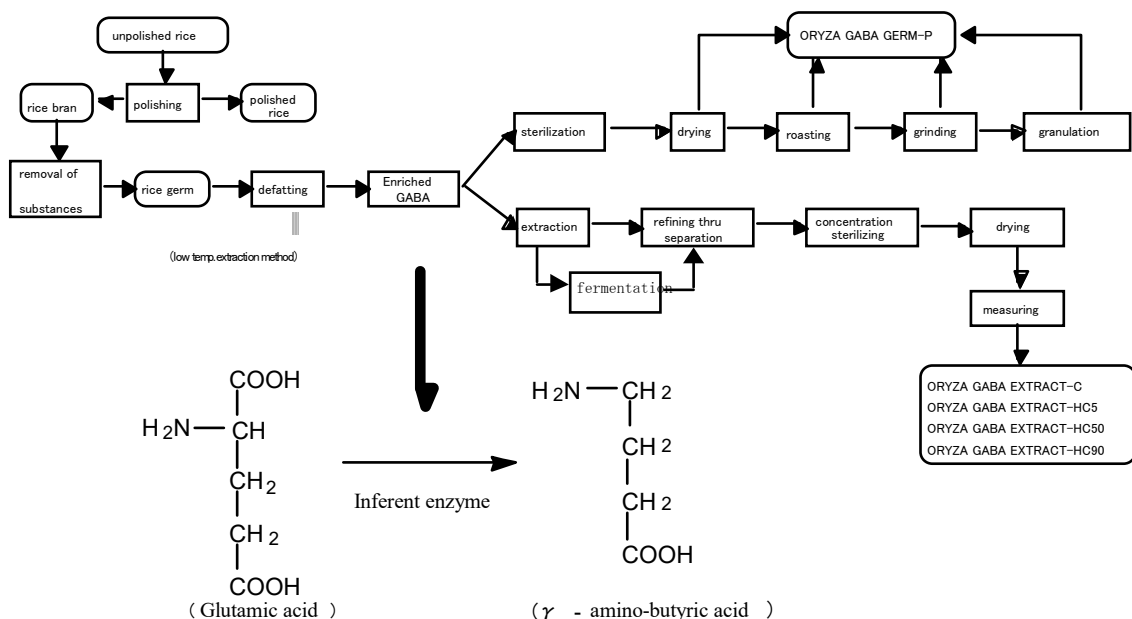
- ◆ ORYZA GABA® EXTRACT-C: Concentrated type; Effective by 1.2 g ~ 4 g/day
- ◆ ORYZA GABA® EXTRACT-HC5: Highly concentrated type; Effective by 120 mg
~ 400 mg/day
- ◆ ORYZA GABA® EXTRACT-HC90: Highly concentrated type; Effective by 6.7 mg
~ 22 mg/day

● Manufacturing Process

ORYZA GABA® is produced in a sterile environment via the manufacturing process shown in the flowchart below.

- 1) The rice germ, the main ingredient of GABA, is obtained after a series of refining processes. Refinement of the unpolished rice is followed by refinement of the resulting rice bran.
- 2) Free fatty acids, which cause flavor spoilage, is removed through a low temperature extracting method.
- 3) Our patented production method activates the enzymes inherent in the germ, thereby increasing the content of GABA.
- 4) The GABA-enriched rice germ is sterilized and processed via roasting and smashing to become **ORYZA GABA® GERM-P**.
- 5) Instead of the sterilization/roasting/smashing process, the GABA-enriched rice germ is treated with water extraction, concentrated and spray-dried. This will become **ORYZA GABA® EXTRACT-C** and **ORYZA GABA® EXTRACT-HC5**.
- 6) Instead of the sterilization/roasting/smashing process, the GABA-enriched rice germ is treated with water extraction, fermented by lactic acid, concentrated and spray-dried. This will become **ORYZA GABA® EXTRACT-HC90**.

ORYZA GABA® Production Flowchart



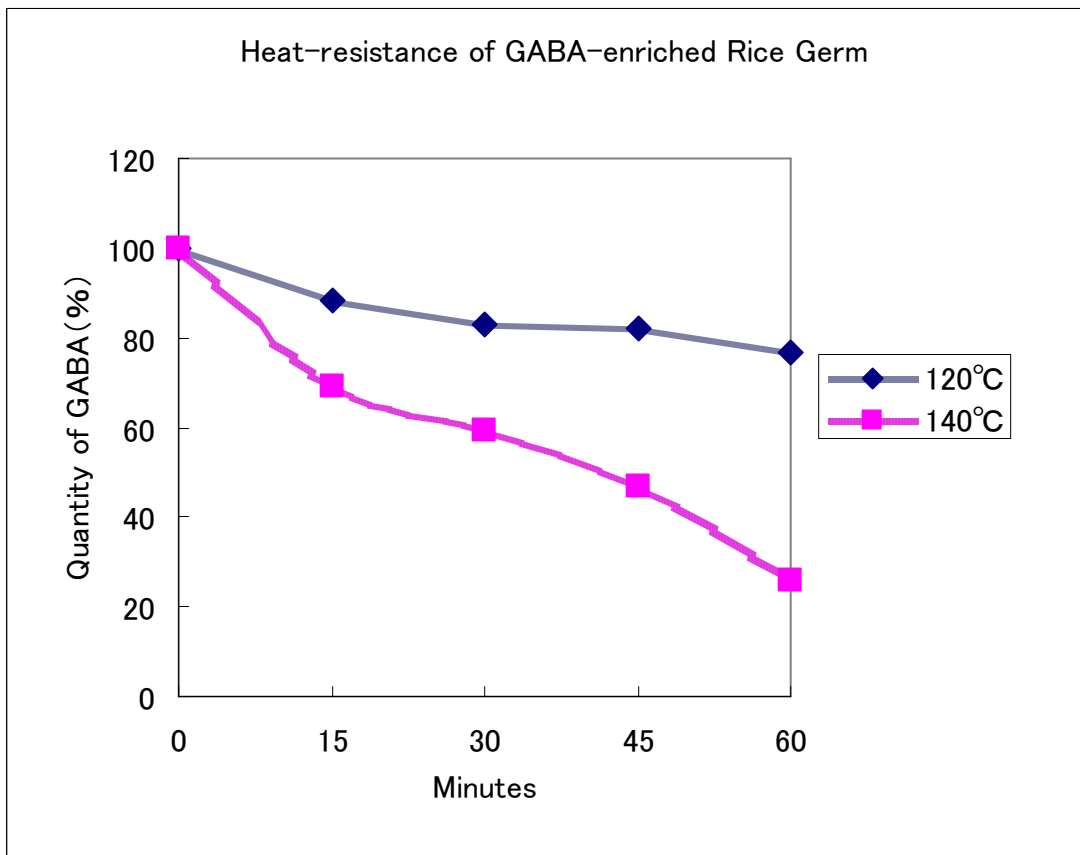
● **Stability of ORYZA GABA® Series**

The ORYZA GABA Series is extremely stable during processing.

● **ORYZA GABA® GERM-P**

Thermal Resistance

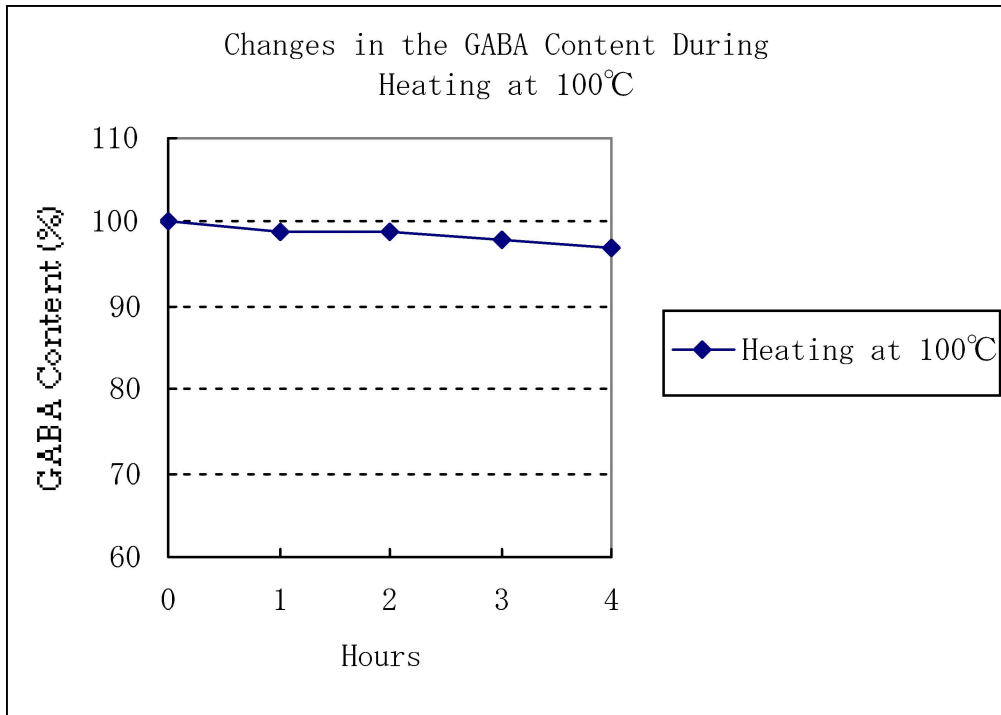
The pyrolysis of GABA does not occur at a normal food processing temperature; degradation begins when it is heated at 140°C and above. An example is when GABA is roasted for a prolonged time.



● **ORYZA GABA® EXTRACT-C**

Thermal Resistance

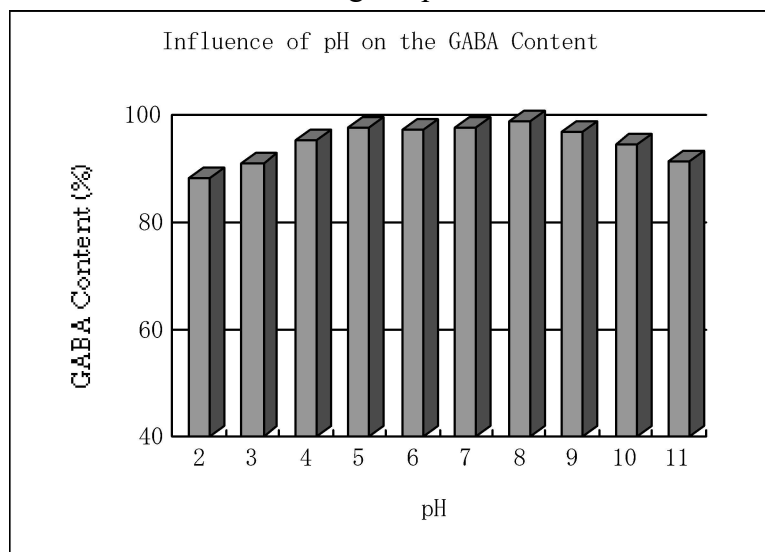
GABA remained stable for more than 4h in 5% aqueous solution at 100°C.



※Initial GABA content was set at 100%

pH Stability

GABA remained stable at a wide range of pH-fields.



※The GABA concentration in 5% aqueous solution (pH5.7/unregulated) was set at 100%



● ORYZA GABA® Series' Nutritional Facts

ORYZA GABA® is abundant in nutrients. Notably the amount of vitamin B1 and B6 is one of the highest among natural foods on the market.

Nutrition Facts of ORYZA GABA Series

Items Analyzed	ORYZA GABA GERM-P	ORYZA GABA EXTRACT-C	ORYZA GABA EXTRACT-HC5	ORYZA GABA 21	US RDA
GABA	250~350mg/100g	500~700mg/100g	Min.5000mg/100g	200mg/100g	(6~20mg)
Calories	289kcal/100g	348kcal/100g	329kcal/100g	314kcal/100g	2900kcal
Protein	23.4g/100g	13.0g/100g	18.7g/100g	14.7g/100g	63g
Fat	1.8g/100g	0.2g/100g	0.5g/100g	3.5g/100g	—
Sugar	44.7g/100g	73.5g/100g	62.3g/100g	55.8g/100g	—
Sodium	7.46mg/100g	27.0mg/100g	27.5mg/100g	5.5mg/100g	—
Dietary Fiber	13.3g/100g	1.7g/100g	2.9g/100g	17.4g/100g	—
Water	5.8g/100g	2.3g/100g	3.7g/100g	2.5g/100g	—
Vitamin B1	9.69mg/100g	6.46mg/100g	No data	9.74mg/100g	1.5mg
Vitamin B2	0.40mg/100g	0.53mg/100g	No data	0.30mg/100g	1.7mg
Vitamin B6	2.30mg/100g	No data	No data	10mg/100g	2mg
Zinc	16.3mg/100g	93 μg/100g	No data	8.83mg/100g	15mg
Iron	11.4mg/100g	No data	No data	No data	10mg
Magnesium	807mg/100g	234mg/100g	No data	498mg/100g	420mg

GABA content was analyzed by ORYZA OIL & FAT CHEMICAL CO., LTD.

—: Data Unavailable

Tested by: Japan Food Research Center Foundation

Research results issue number 397060548

NA 69030030

NA 69010429

NA 69040583

301070520-001

● ORYZA GABA® Acute toxicity and Safety Residual Agricultural Chemicals

Assayed Items	Results	Detection Limits	Assaying Method
BHC	Not Detected	0.02ppm	Gas Chromatography
DDT	Not Detected	0.02ppm	Gas Chromatography
Aldrin	Not Detected	0.01ppm	Gas Chromatography
Dieldrin	Not Detected	0.01ppm	Gas Chromatography
Endrin	Not Detected	0.01ppm	Gas Chromatography
Parathion	Not Detected	0.05ppm	Gas Chromatography
Phenitrothion	Not Detected	0.05ppm	Gas Chromatography
Malathon	Not Detected	0.05ppm	Gas Chromatography

Tested by: Japan Food Research Center Foundation

Research results issue number 397060548

The ORYZA GABA® EXTRAC-HC90 and ORYZA GABA® EXTRAC-HC5 were again examined for 498 residual agricultural chemical compounds following the provisions of the Food Hygiene Law and pesticide legislation. As a result, contents of all compounds were confirmed to be below the standard values (measurable limits).

Test trustee: Food Safety Evaluation and Analysis Center, Masis Co., Ltd.

Date of test report issued: November 5, 2007

April 2, 2008

Report No.: 15275, 20060

Acute Toxicity and Safety

ORYZA GABA® GERM-P

- Five weeks old mice were orally given ORYZA GABA® GERM-P (2,000mg/kg) and then fed a laboratory chow for two weeks. No toxic effect were observed, thus the LD₅₀ (mouse) is more than 2,000mg/kg.
- After administering 30g/day for two consecutive weeks, no toxic effects were observed.

ORYZA GABA® EXTRACT-C

- Five weeks old mice were orally given ORYZA GABA® EXTRACT-C (5,000mg/kg) and then fed a laboratory chow for two weeks. No toxic effect were observed, thus the LD₅₀ (mouse) is more than 5,000mg/kg.

ORYZA GABA® EXTRACT -HC5

- Five weeks old mice were orally given ORYZA GABA® EXTRAC-HC5 (5,000mg/kg) and then fed a laboratory chow for two weeks. No toxic effect were observed, thus the LD₅₀ (mouse) is more than 5,000mg/kg.

ORYZA GABA® EXTRACT -HC90

- Five weeks old mice were orally given ORYZA GABA® EXTRAC-HC90 (2,000mg/kg) and then fed a laboratory chow for two weeks. No toxic effect were observed, thus the LD₅₀ (mouse) is more than 2,000mg/kg.

Mutagenicity Test

Ames test was performed with/without S9mix using *Salmonella* strains of TA1535, TA1537, TA98, TA100 and *E. coli* strain WP2uvrA. ORYZA GABA® EXTRAC-HC90 showed no mutagenicity at concentrations from 50 to 5000 µg/plate.

● Practical Applications of ORYZA GABA®

Applications	Examples
Drinks	Tea, Blended Tea, Protein Shakes, and Nutritional Drinks.
Dried Foods	Soup, Dried Noodles, Seasoning, Pasta, Cereal, Oatmeal, and Topping for Pizza.
Snacks	Rice Crackers, Cookies, and Wafers.
Fermentative Foods	Bean paste, Soy sauce, Bread, and Yogurt.
Others	Health Foods, Nutraceutical Foods, and Functional Foods.

● Packaging

ORYZA GABA® GERM-P

10kg Interior packaging: a double layered plastic bag
 Exterior packaging: 18 L thin and cardboard box

ORYZA GABA® EXTRACT-C

ORYZA GABA® EXTRACT-HC5

ORYZA GABA® EXTRACT-HC90

5 kg Interior packaging: a double layered plastic bag
 Exterior packaging: 18 L thin and cardboard box

● Storing Method

Store in cool, dry place. Avoid humidity.

● Expression of ORYZA GABA®

ORYZA GABA® GERM-P

- Rice Germ (including natural γ -aminobutyric acid)

ORYZA GABA® EXTRACT-C, -HC5

- Rice Germ Extract (including natural γ -aminobutyric acid)

ORY ZA GABA® EXTRACT-HC90

- Rice Germ Extract (including natural γ -aminobutyric acid)
- γ -aminobutyric acid

※Please refer to your nation's standard.

PRODUCT STANDARD

PRODUCT NAME

ORYZA GABA® GERM-P

(FOOD)

This product is defatted rice germ with enzymatically enriched gamma-aminobutylic acid (GABA). Rice germ from *Oryza sativa* Linne (Gramineae) seeds, was processed with an enzyme originated from rice germ, to convert glutamic acid to GABA. It guarantees minimum 250 mg GABA in 100 g of the product.

<u>Appearance</u>	Light brown powder with slight unique aroma.	
<u>γ-Aminobutyric Acid</u>	Min. 250 mg/100 g	(HPLC)
<u>Loss on Drying</u>	Max.10.0 %	(Analysis for Hygienic Chemists, 1g,105°C,2h)
<u>Ignition Residue</u>	Max.15.0 %	(The Japanese Standards for Food Additives)
<u>Purity Test</u>		
(1) Heavy Metals (as Pb)	Max. 20 ppm	(Sodium Sulfide Colorimetric Method)
(2) Arsenic (as As ₂ O ₃)	Max. 2 ppm	(Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)
<u>Standard Plate Counts</u>	Max. 3 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Moulds and Yeasts</u>	Max. 1 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Coliforms</u>	Negative	(Analysis for Hygienic Chemists)

Composition

<u>Ingredients</u>	<u>Contents</u>
Defatted rice germ	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA GABA® EXTRACT-C

(FOOD)

This product is made from glutamic acid contained in rice germ from the rice seed of *Oryza sativa* Linne (*Gramineae*), which is transformed with the help of rice germ enzyme and lactic acid fermentation into Gamma-aminobutyric acid (GABA). The enriched GABA and water soluble nutrients are extracted, dried and powdered. The powder is water-soluble.

<u>Appearance</u>	Light brown powder with slight unique aroma.	
<u>γ-Aminobutyric Acid</u>	Min. 500 mg/100 g	(HPLC)
<u>Loss on Drying</u>	Max.10.0 %	(Analysis for Hygienic Chemists, 1g,105°C,2h)
<u>Ignition Residue</u>	Max.12.0 %	(The Japanese Standards for Food Additives)
<u>Purity Test</u>		
(1) Heavy Metals (as Pb)	Max. 10 ppm	(Sodium Sulfide Colorimetric Method)
(2) Arsenic (as As ₂ O ₃)	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)
<u>Standard Plate Counts</u>	Max. 3 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Moulds and Yeasts</u>	Max. 1 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Coliforms</u>	Negative	(Analysis for Hygienic Chemists)

Composition

Ingredients	Contents
Rice germ extract	70 %
Dextrin	30 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA GABA® EXTRACT-HC5

(FOOD)

This product is made from glutamic acid contained in rice germ from the rice seed of *Oryza sativa* Linne (*Gramineae*), which is transformed with the help of rice germ enzyme and lactic acid fermentation into Gamma-aminobutyric acid (GABA). The enriched GABA and water soluble nutrients are extracted, dried and powdered. The powder is water-soluble.

<u>Appearance</u>	Light yellowish powder with slight unique aroma.	
<u>γ-Aminobutyric Acid</u>	Min. 5.0 %	(HPLC)
<u>Loss on Drying</u>	Max.10.0 %	(Analysis for Hygienic Chemists, 1g,105°C,2h)
<u>Ignition Residue</u>	Max.15.0 %	(The Japanese Standards for Food Additives)
<u>Purity Test</u>		
(1) Heavy Metals (as Pb)	Max. 10 ppm	(Sodium Sulfide Colorimetric Method)
(2) Arsenic (as As ₂ O ₃)	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)
<u>Standard Plate Counts</u>	Max. 1.5×10^3 cfu/g (Analysis for Hygienic Chemists)	
<u>Moulds and Yeasts</u>	Max. 1×10^3 cfu/g (Analysis for Hygienic Chemists)	
<u>Coliforms</u>	Negative	(Analysis for Hygienic Chemists)
<u>Composition</u>		

Ingredients	Contents
Rice germ extract	90 %
Dextrin	10 %
Total	100 %

PRODUCT STANDARD

PRODUCT NAME

ORYZA GABA® EXTRACT-HC90

(FOOD)

This product is made from glutamic acid contained in rice germ from the rice seed of *Oryza sativa* Linne (*Gramineae*), which is transformed with the help of rice germ enzyme and lactic acid fermentation into Gamma-aminobutyric acid (GABA). The enriched GABA and water soluble nutrients are extracted, dried and powdered. The powder is water-soluble.

<u>Appearance</u>	Light yellowish powder with slight unique aroma.	
<u>γ-Aminobutyric Acid</u>	Min. 90.0%	(HPLC)
<u>Loss on Drying</u>	Max. 5.0 %	(Analysis for Hygienic Chemists, 1g,105°C,2h)
<u>Ignition Residue</u>	Max. 5.0 %	(The Japanese Standards for Food Additives)
<u>Purity Test</u>		
(1) Heavy Metals (as Pb)	Max. 10 ppm	(Sodium Sulfide Colorimetric Method)
(2) Arsenic (as As ₂ O ₃)	Max. 1 ppm	(Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)
<u>Standard Plate Counts</u>	Max. 3 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Moulds and Yeasts</u>	Max. 1 × 10 ³ cfu/g	(Analysis for Hygienic Chemists)
<u>Coliforms</u>	Negative	(Analysis for Hygienic Chemists)
<u>Composition</u>		
	Ingredients	Contents
	Rice germ extract	100 %

ORYZA OIL & FAT CHEMICAL CO., LTD. striving for the development of the new functional food materials to promote health and general well-being.

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