

## Product Summary of CHITOGLUCAN

Product Name: CHITOGLUCAN  
Raw material: Edible mushroom



### What is CHITOGLUCAN?

CHITOGLUCAN is a functional food ingredient that contains dietary fiber, beta-glucan, and complex carbohydrates. The dietary fiber in CHITOGLUCAN is obtained through deacetylation of an edible mushroom, increasing its solubility in water and making it fat absorbent. CHITOGLUCAN is vegetarian and gluten free.

### Functions of CHITOGLUCAN

CHITOGLUCAN is known to promote fat degradation and inhibit absorption of fat in the intestine. Taken before a meal, CHITOGLUCAN coats the intestinal mucous membrane and promotes the formation of natural fat-trapping chemicals called micelles.

### Approximate dose of CHITOGLUCAN

Take 300mg of CHITOGLUCAN daily to reduce body fat. This is the recommended dose based on studies with human subjects.

### Effects of CHITOGLUCAN

By lowering overall body fat, CHITOGLUCAN helps reduce BMI, body weight and body-fat percentage. Human and animal studies suggest CHITOGLUCAN may have an effect in preventing and improving obesity.

### Patents and trademarks of CHITOGLUCAN

[Patents]	[Trademarks]
<ol style="list-style-type: none"><li>1. Japan No. 4468665</li><li>2. USA No. 7,195,675</li><li>3. China No. ZL 200380105219.8</li><li>4. Korea No.10-0674672</li><li>5. Taiwan No. I 247752</li><li>6. Hong Kong No. HK 1085489</li><li>7. Canada No. 2,501,820</li></ol>	CHITOGLUCAN Japan: Class 29, Class 32

### Basic properties of CHITOGLUCAN

Form and taste	Light brown to brown powder, with a slight mushroom taste
Time-dependent change	Stable for 3 years stored unopened at room temperature
Heat resistance	Stability has been demonstrated at 100°C for 5 hours and 130°C for 30 minutes; CHITOGLUCAN is stable under ordinary food-processing conditions
Solubility	Partially soluble and insoluble; swells in water and acids
Granularity	50-mesh pass fine powder containing a slight amount of mushroom-derived fiber
Compatibility	With its slight mushroom taste, CHITOGLUCAN combines with almost any food materials

## Functional properties of CHITOGLUCAN

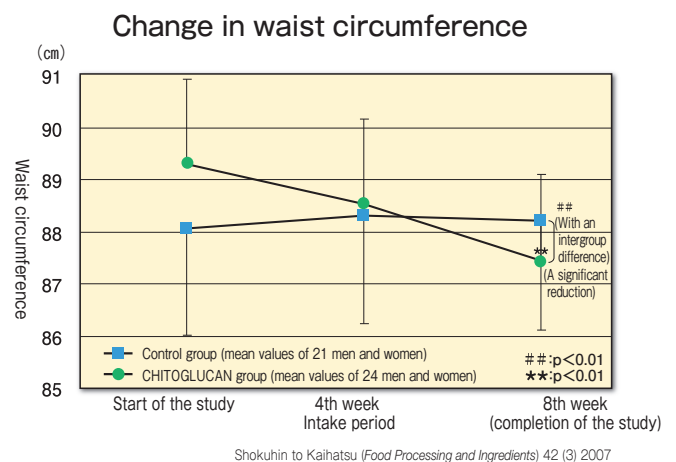
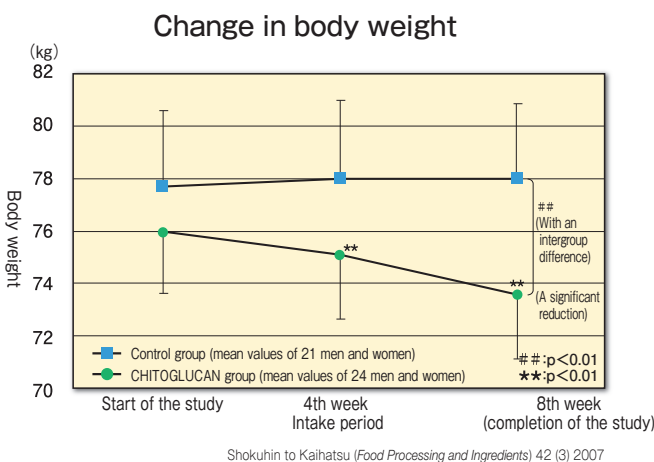
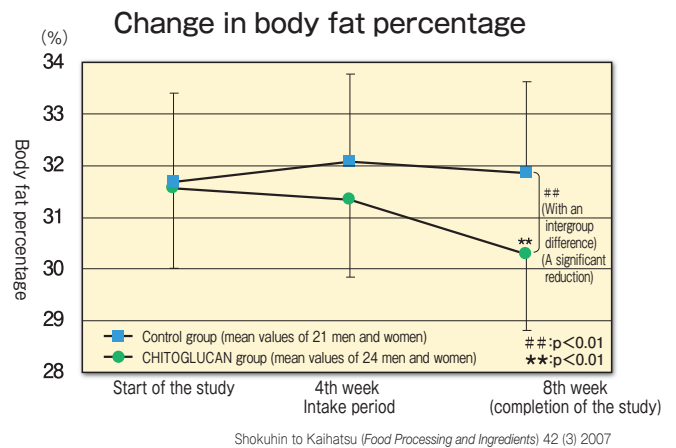
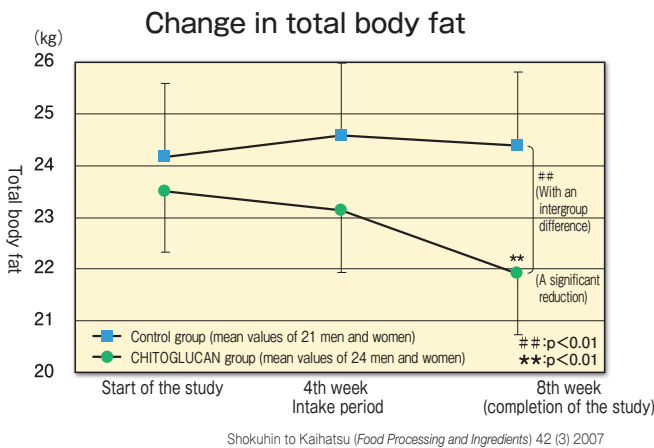
CHITOGLUCAN lowers body fat by enhancing the degradation of fat accumulated in the body and suppressing the absorption of fat by the intestine. In human studies, reduction of body fat was demonstrated throughout the study period with no difference in the calorie intake and the amount of exercise before and after the studies.

### 1 Promotion of fat degradation

#### (1) Reduction of body fat, body weight and waist circumference

##### ● Results from a double-blind study of granules containing CHITOGLUCAN in 45 men and women

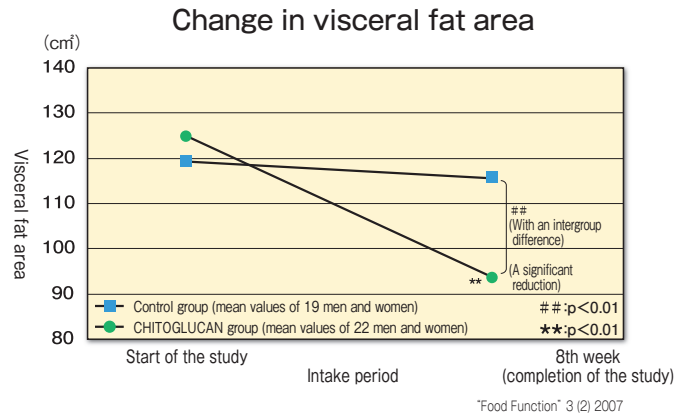
In a double-blind study of CHITOGLUCAN granules in 45 men and women (24 in the CHITOGLUCAN group, 21 in the control group), mean values of total body fat, body fat percentage, weight and waist circumference were significantly reduced by the 8th week in the CHITOGLUCAN group (300mg/day). No change was observed in the control group for the same period. There was also a significant difference between the two groups.



## (2) Visceral fat-reducing effect confirmed by abdominal CT images

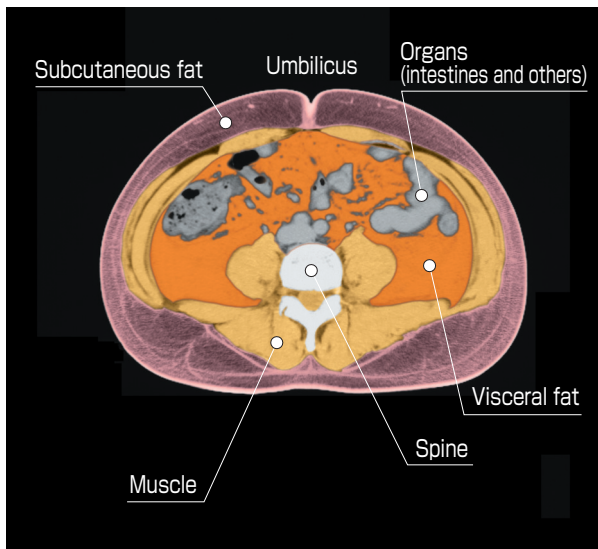
● Results from a double-blind study of granules containing CHITOGLUCAN in 42 men and women

Of 42 subjects with BMI 24 or higher, 41 (19 in the control group and 22 in the CHITOGLUCAN group) underwent CT scanning. While the control group showed no change in their mean visceral fat area in the 8<sup>th</sup> week, the CHITOGLUCAN group (CHITOGLUCAN 300mg/day) showed a significant reduction. There was also a significant difference between the two groups.



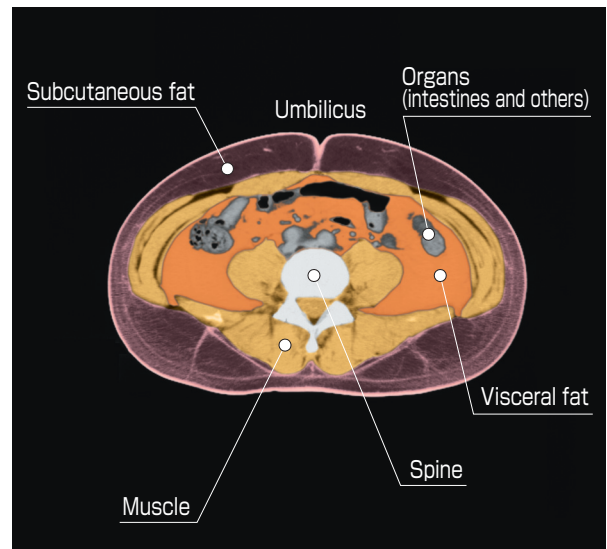
[Subject with the most significant reduction in visceral fat (44-year-old man) among the 41 men and women]

**Before intake**



Visceral fat area	153cm <sup>2</sup>
Subcutaneous fat area	211cm <sup>2</sup>

**8th week**

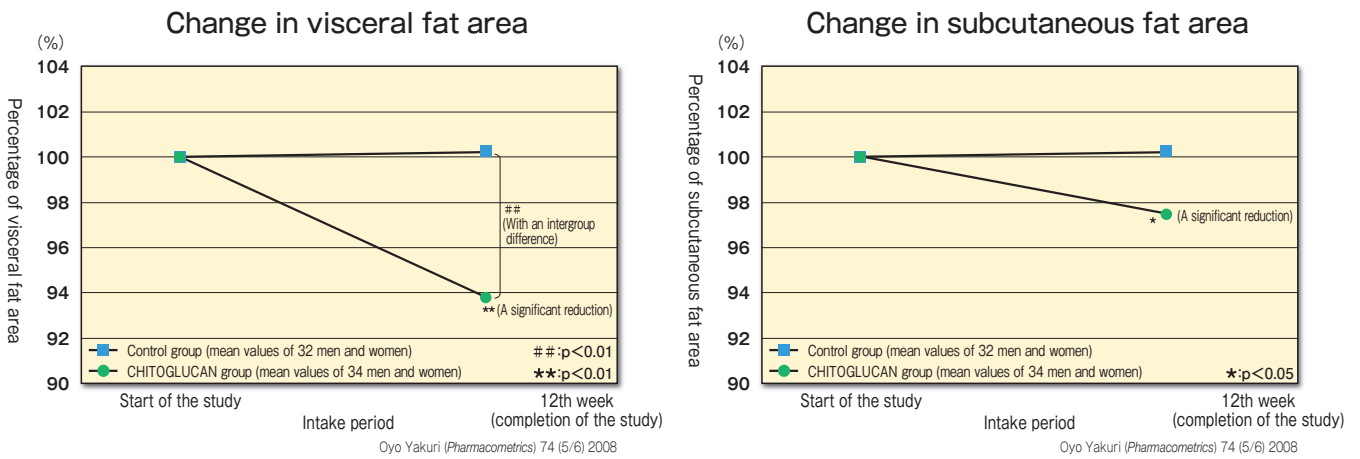


Visceral fat area	74cm <sup>2</sup>
Subcutaneous fat area	195cm <sup>2</sup>

Visceral fat shrank by about 50% after intake of CHITOGLUCAN (300mg/day).

● Results from a double-blind study of a tea drink containing CHITOGLUCAN in 76 men and women

Of 76 subjects with BMI 25 or higher who were 30 to 60 years old, 66 (32 in the control group and 34 in the CHITOGLUCAN group) underwent CT scanning. While the control group showed no change in the mean visceral fat and subcutaneous fat areas by the 12<sup>th</sup> week, the CHITOGLUCAN group (CHITOGLUCAN 300 mg/day) showed significant reductions in both areas. In addition, a significant difference in mean visceral fat area was observed between the two groups.



(3) Improvement of obesity

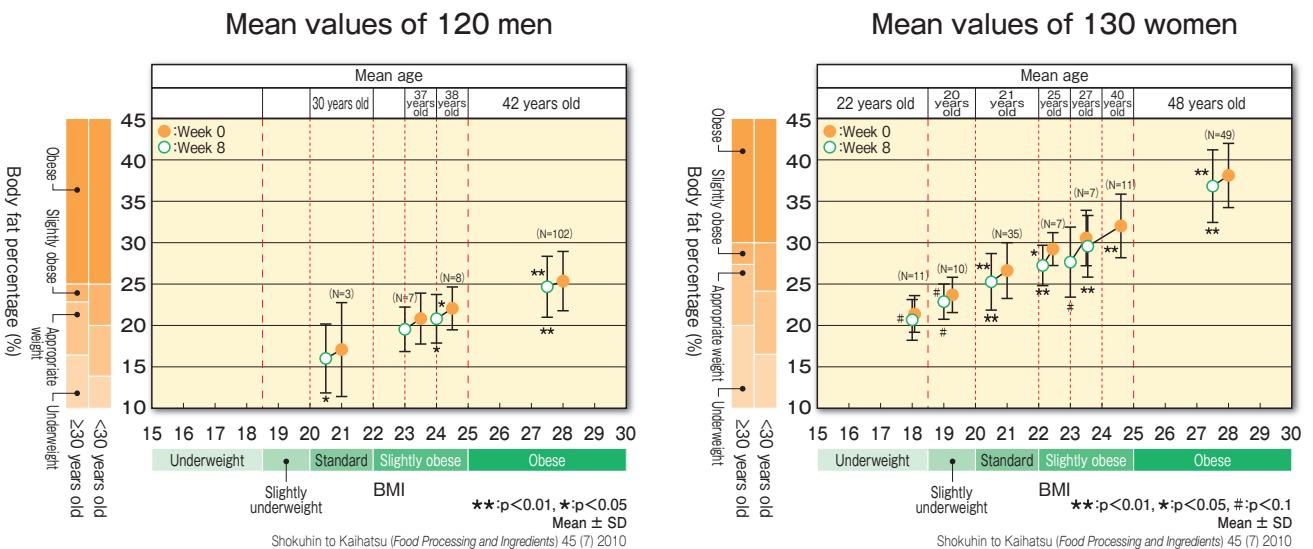
● Trends in the occurrence of the effects of CHITOGLUCAN based on results from a study of 250 subjects

Two hundred and fifty test subjects (120 men and 130 women) who took 300mg of CHITOGLUCAN (or an equivalent dose) daily for 8 weeks were classified as obese or slightly obese based on their BMI to evaluate the effect of CHITOGLUCAN on BMI and body fat percentage.

The evaluation showed that CHITOGLUCAN demonstrated a greater effect in men and women classified as obese or slightly obese based on BMI and body fat percentage.

Body fat percentages tended to decrease also in “latent obese” men and women – individuals who had a high level of body fat but were classified as “standard” or “slightly underweight” based on their BMIs.

Improvement matrix for BMI and body fat percentage after 8-week intake of CHITOGLUCAN

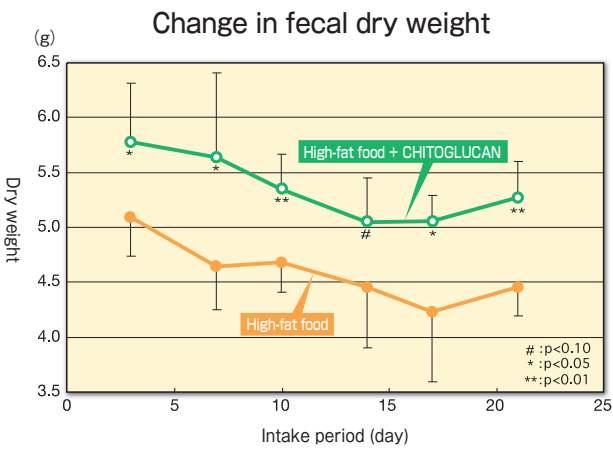


## 2 Fat-absorption inhibitory effects (animal tests)

To verify CHITOGLUCAN's effectiveness at inhibiting fat absorption, 12 8-week-old Wistar male rats were divided into two groups: one fed high-fat food alone (6 rats; HFF group) and the other fed high-fat food containing 5% CHITOGLUCAN (6 rats; HFF with CHITOGLUCAN group). These were the results after 21 days of intake:

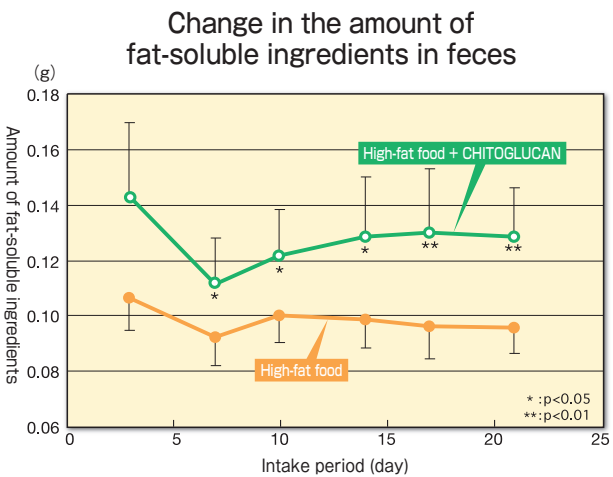
### (1) Effects on the amount of feces and the amount of fat in feces

The HFF with CHITOGLUCAN group significantly increased its feces output.



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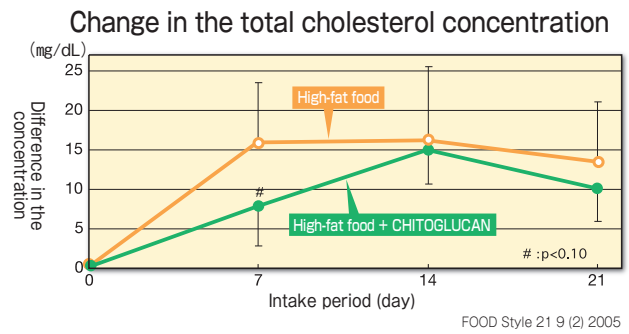
The amount of fat in feces increased significantly in the HFF with CHITOGLUCAN group. This indicates CHITOGLUCAN inhibits fat absorption.



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### (2) Effects on total cholesterol

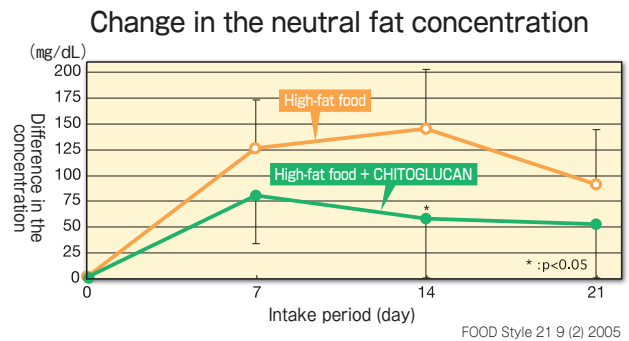
The HFF with CHITOGLUCAN group reduced its total cholesterol.



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### (3) Effects on neutral fat

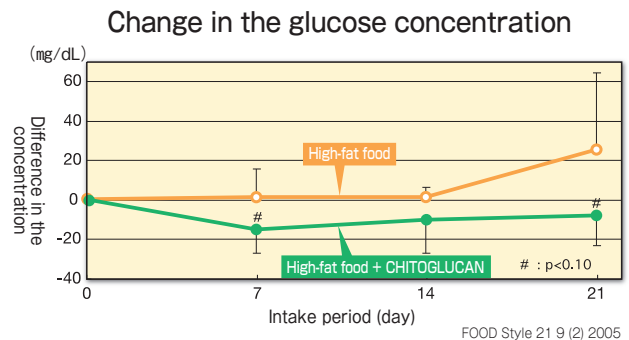
The HFF with CHITOGLUCAN group decreased its neutral fat content.



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### (4) Effects on blood glucose level

The HFF with CHITOGLUCAN reduced its glucose concentration.



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**Proven in scientific studies on humans  
and animals to reduce weight,  
CHITOGLUCAN is a safe and reliable  
ingredient for diet foods.**

● CHITOGLUCAN is safe ●

< Dietary Habits >

CHITOGLUCAN is made from a mushroom that has long been a dietary staple. CHITOGLUCAN is safe to ingest vegetarian and gluten free.

< Safety Tests >

No abnormalities were observed as a result of using CHITOGLUCAN in the following safety tests.

- ① A 90-day subchronic toxicity study with 120 mice
- ② A reverse mutation test (Ames test)
- ③ A DNA damage test (umu test)

● CHITOGLUCAN is effective ●

1. CHITOGLUCAN reduced obesity in human clinical study.  
(Oyo Yakuri (*Pharmacometrics*) 74 (5/6) 2008 and  
Oyo Yakuri (*Pharmacometrics*) 76 (1/2) 2009)
2. An animal study demonstrated CHITOGLUCAN's reduction of visceral fat.  
(Oyo Yakuri (*Pharmacometrics*) 77 (3/4) 2009)
3. An animal study demonstrated CHITOGLUCAN's ability to improve conditions related to poor lipid metabolism, including abnormally high levels of total cholesterol, neutral fat and LDL cholesterol.  
(The 60<sup>th</sup> annual meeting of the Japan Wood Research Society)