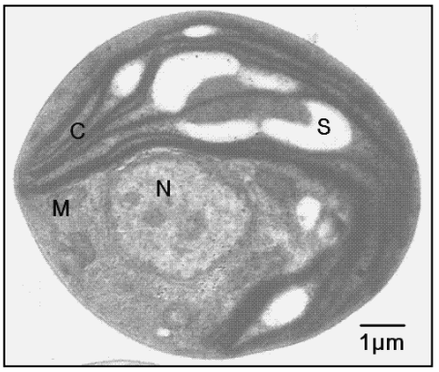
About *Chlorella vulgaris*

◆ What is *Chlorella* ?

Chlorella is freshwater green alga, and contains many nutrients such as proteins (more than 60%), vitamins, effective minerals, essential fatty acids and dietary fiber. It has been eaten as a safe, natural food for more than 50 years in Japan. *Chlorella* is helpful for human health.



Electron micrograph of *chlorella*
C: chloroplast, N: nucleus,
M: mitochondria, S: starch

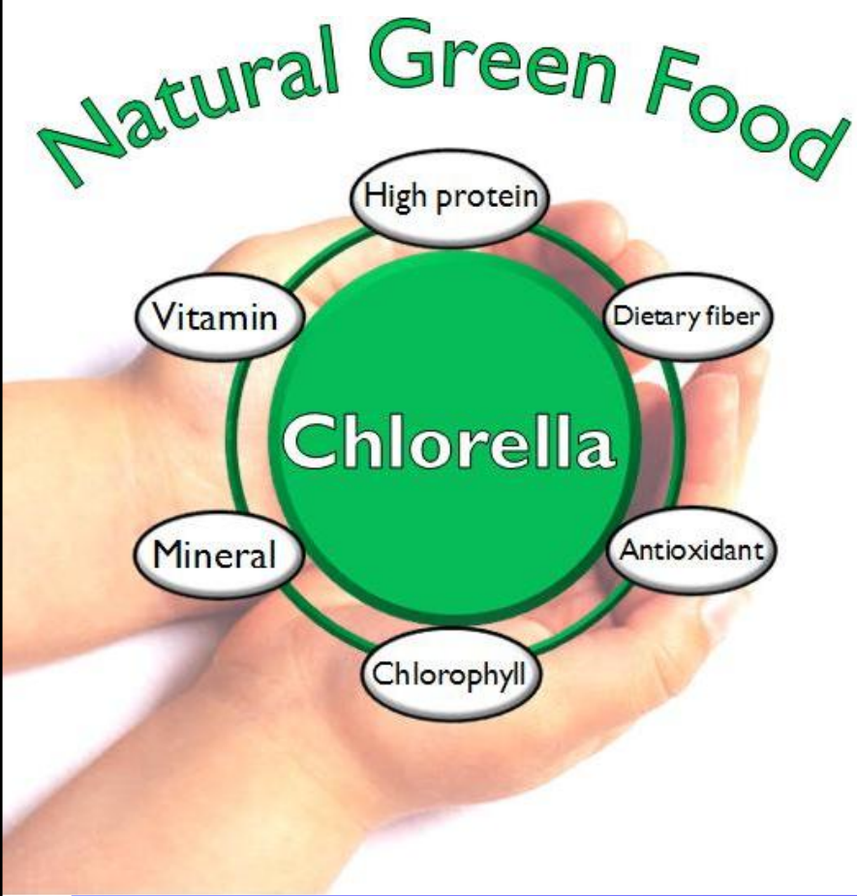
◆ Nutrients of *Chlorella*

Chlorella contains many nutrients, protein, essential fatty acids, dietary fiber, vitamins and minerals. Furthermore, it includes chlorophyll for algal photosynthesis and carotenoids such as β-carotene and lutein. In addition, *chlorella* involves a unique component,"chlorella extract".

The amino acid score (AAS) of *chlorella* is estimated at 88, higher than that of soybeans (AAS = 82). It has 9 essential amino acids and a wide variety of nonessential amino acids. Furthermore, chlorella includes excellent antioxidants such as lutein and β-carotene.

Nutrition of chlorella powder (100g)

Nutrients	Contents
Protein (g)	63.1
Lipid (g)	13.0
Dietary fiber (g)	13.7
Na (mg)	31.8
Mg (mg)	329
K (mg)	1,390
Fe (mg)	48.1
Vitamin B_1 (mg)	1.86
Vitamin B_2 (mg)	5.41
Vitamin K_1 (μg)	297
Crotenoid (mg)	570
Chlorophyll (g)	2.9



◆ About Chlorella Industry Co., Ltd.

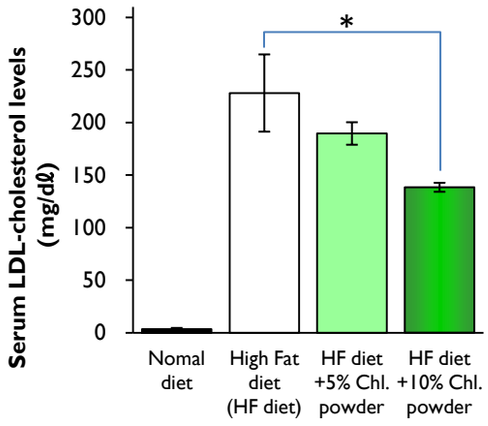
In 1964, Chlorella Industry Co., Ltd. succeeded in the mass-culturing of chlorella for the first time in the world. Since then, we have focused on sharing the excellent nutritional values of chlorella, and have developed many chlorella products such as dietary supplements, medicines, food materials, aquaculture feeds and agriculture manures. Our products are utilized throughout Japan, USA and Europe, and support human health and various businesses requiring chlorella. Furthermore, more than 400 scientific researches and studies have been performed on chlorella and presented at Japanese medical, pharmaceutical, and nutritional society meetings and at international conferences.

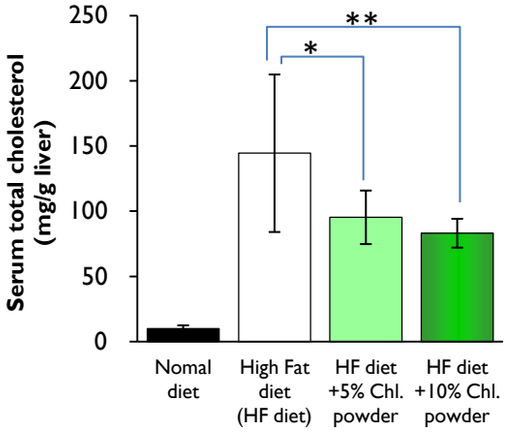
Functional Effect of Chlorella

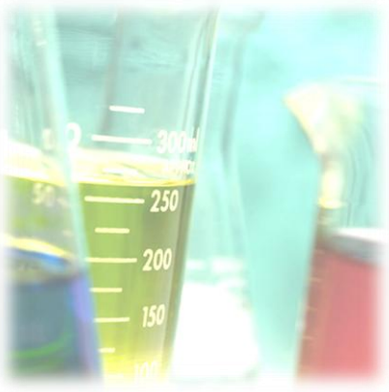
◆Improves Cholesterol Metabolism

【Experiment-1】 Male Wistar rats (aged 7 weeks) were randomly divided into 4 groups [① Normal diet, ② High-fat diet (HF diet), ③ HF diet+5% chlorella powder, ④ HF diet+10% chlorella powder] consisting of six animals each. Animals were housed in cages for 3 weeks and cared for according to NIH guidelines. After three weeks, blood was collected for serum total- and LDL-cholesterol analysis. Significant differences (*, $p < 0.05$; **, $p < 0.01$)

Chlorella reduces total-cholesterol and LDL-cholesterol levels







【Conclusion】 In an animal study, four weeks of chlorella intake decreased serum total-cholesterol and LDL-cholesterol (bad cholesterol) in a concentration-dependent manner.

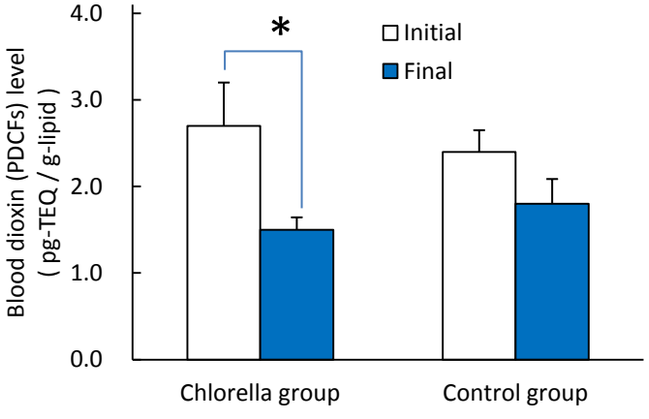
[*Food Style 21* (in Japanese); Vol.17 (11), 2013]

◆Detoxicates the Harmful Substances

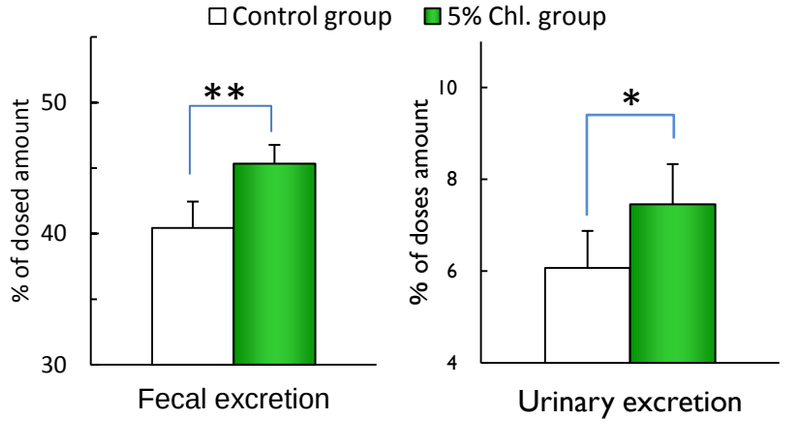
【Experiment-2 & Fig. A 】 Twenty healthy pregnant volunteers were divided into 2 groups, a chlorella group and a control (Non-intake) group, consisting of ten subjects each. The subjects of the chlorella group were asked to take chlorella tablets (30 tablets/day) for approximately 6 months from gestational week 16–20 up to the day of delivery. Collected blood was analyzed for dioxins (PCDFs). Significant differences (*, $p < 0.05$)

【Experiment-3 & Fig. B 】 Female C57BL/6 mice (aged 10 weeks) were randomly divided into 2 groups, a control group fed a basal diet and a 5% chlorella diet group (5% Chl), consisting of six animals each. Animals were housed in cages for 3 weeks and cared for according to the NIH guidelines. Feces and urine during the test period were collected for mercury (Hg) analysis. Significant differences (*, $p < 0.05$; **, $p < 0.01$)

A] Chlorella reduces maternal blood dioxin levels in human.



B] Chlorella accelerates methyl-mercury excretion.



【Conclusion】

A] Daily chlorella intake supports the decrease of maternal blood dioxin (PDCFs) levels in human.

B] Chlorella contributes to the acceleration of methylmercury excretion in mice.

A) *Organohalogen Compounds*; Vol.75, 246-249, 2013. B) *J. Toxicol. Sci.*; Vol.36 (1), 121-126, 2011.

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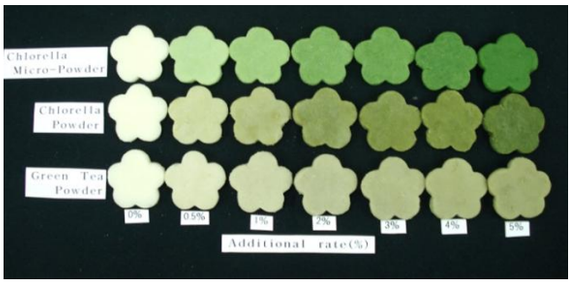
Utility of Chlorella Product

◆ Food Coloring and Dispersion

Chlorella colors green stronger than green tea powder

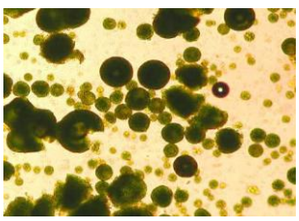
Chlorella powder is a natural green food, and contains abundant natural green pigment chlorophyll. As a food additive, it can produce a stronger green than green tea powder. Chlorella micro-powder has even stronger coloring ability.

Coloring ability on mashed potato

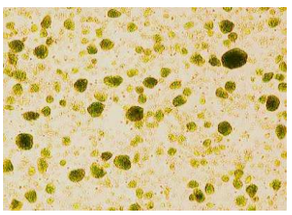


Chlorella micro-powder has high-dispersion

Chlorella micro-powder is a fine-grained product having an average particle size of 15 μm. It has greater dispersion in liquids than normal chlorella powder.

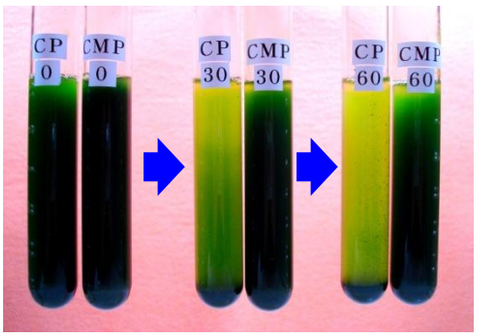


Chlorella powder
(× 150, particle size 40-120 μm)



Chlorella micro-powder
(× 150, particle size 10-30 μm)

Dispersion Difference of Chlorella



CP: Chlorella Powder, CMP: Chlorella Micro-Powder
※Each values labeled tube indicate the time (min) after suspending powder in water.

◆ Our Products

MADE IN JAPAN!!

★ Chlorella Powder

Chlorella powder is a standard powder item, and is made by spray-drying an algal slurry. It is utilized to manufacture various chlorella products.

Packaging unit: 10 KG Aluminum bag / cardboard box
Recommend dose: 0.1% - 1.0% **Application example: Supplements, Noodles, etc.**

★ Chlorella Tablets

Chlorella tablets (200 mg/tablet) are manufactured by tableting chlorella powder, without food additives or excipients. Many people take the tablets as dietary supplements for health.

Packaging unit: 10 KG Aluminum bag / cardboard box
Recommend dose: 15-30 tablets/day (3-6 g/day) **Application example: Supplements**

★ Chlorella Micro-powder

Chlorella micro-powder is manufactured by pulverizing chlorella powder. It is used to change the appearance of food. According to the amount added, the appearance of food can be changed to pale green all the way to strong green.

Packaging unit: 500 G ×4 Aluminum bags / cardboard box
Recommend dose: 0.1% - 1.0% **Application example: Bread, Ice-cream and Noodles etc.**

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