

Press Release

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New study by euglena Co., Ltd. confirms that *Chlorella* cell wall membrane extract enhances host antitumor immunity and inhibits colon carcinoma growth in mice

euglena Co., Ltd.

euglena Co., Ltd. (Headquarters: Minato-ku, Tokyo; President: Mitsuru Izumo) scientists have conducted research in collaboration with Professor Masaaki Tamura of Kansas State University. They have found the results indicating that components derived from *Chlorella* cell wall membrane^{*1} inhibit colon carcinoma growth by stimulating host antitumor immunity. This research was published in the medical journal "Integrative Cancer Therapies" on February 1, 2020.

*1 Components contained in the supernatant of *chlorella* culture solution.

■ Purpose of research

Cancer is the most common cause of death among the Japanese population. The prevalence of colorectal cancer is the highest among men, and the second highest among women, compared to other cancers^{*2}. In this study, the scientists evaluated the effects of *Chlorella* cell wall membrane extract on colon cancer, a type of colorectal cancer. Specifically, they evaluated its antitumor activation and immunomodulatory function through a human cell test and a mouse model of colon cancer. *Chlorella* is a single-celled microalga containing a wide variety of nutrients, such as vitamins, minerals, amino acids, carotenoids, unsaturated fatty acids, and chlorophyll. *Chlorella* has been reported so far by several research papers to have the antitumor effect^{*3} and lifestyle-related disease^{*4} improvement effects.

*2 National Cancer Center 2019 Cancer Statistics Forecast (https://ganjoho.jp/reg_stat/statistics/stat/short_pred.html)

*3 Tanaka K, Konishi F, Himeno K, Taniguchi K, Nomoto K (1984) Augmentation of antitumor resistance by a strain of unicellular green algae, *Chlorella vulgaris*. *Cancer Immunol Immunother* 17: 90-94.

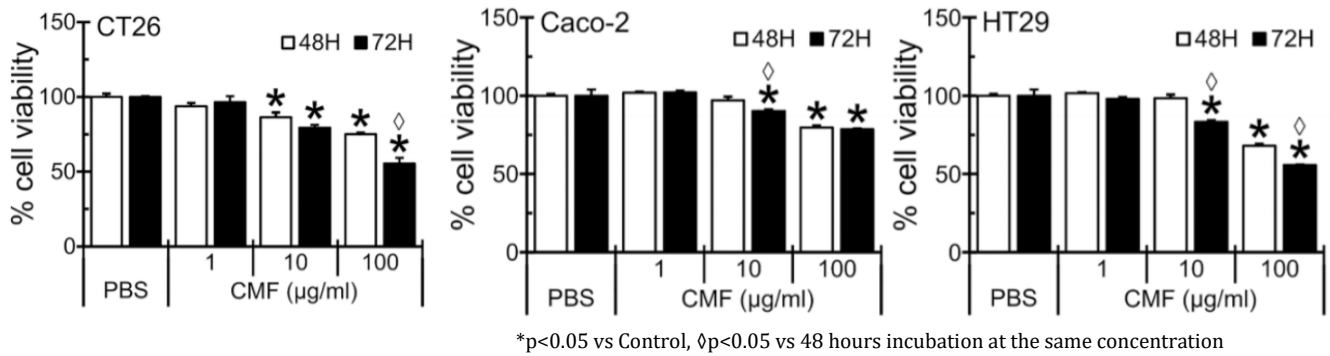
*4 Mizoguchi T, Takehara I, Masuzawa T, Saito T, Naoki Y (2008) Nutrigenomic studies of effects of *Chlorella* on subjects with high-risk factors for lifestyle-related disease. *J Med Food* 11: 395-404.

■ Results of the research

(1) *Chlorella* cell wall membrane extract suppressed colon cancer cell viability (CT26, Caco-2, HT29^{*5}) in a dose- and time-dependent manner

Chlorella cell wall membrane extract was added while culturing mouse and human colon cancer cells. Afterwards, the proliferation rate of colon cancer cells was measured. At the higher concentrations of *Chlorella* cell wall membrane extract and for the longer culture time, the more the viability of colon cancer cells was suppressed.

*5 A type of colon cancer cell.

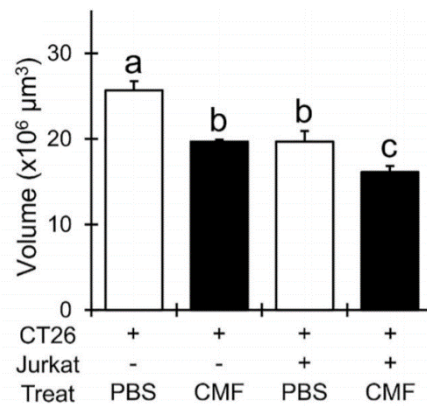


(2) *Chlorella* cell wall membrane extract suppressed growth of mouse colon cancer spheroids*⁶ in a 3D cell culture in the presence of immature T cells (immune cells)*⁷

Chlorella cell wall membrane extract was added while culturing mouse colon cancer spheroids, which significantly suppressed the growth of colon cancer spheroids. When immature T cells coexisted with colon cancer spheroids, the spheroids' growth was significantly suppressed in the presence of *Chlorella* cell wall membrane extract. This suggests the possibility that *Chlorella* cell wall membrane extract helps mature immature T cells, thereby inhibits the growth of colon cancer spheroids.

*6 A ball-like cell aggregate. It is used in experiments as a reconstructing system for biologically similar structures.

*7 A type of lymphocyte among white blood cells. Involved in cellular immunity.

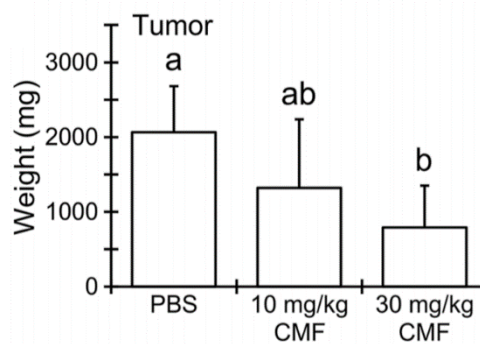


a-c, Significant difference between different letters

(3) *Chlorella* cell wall membrane extract suppressed colon carcinoma growth *in vivo* in a mouse model

Administration of *Chlorella* cell wall membrane extract into the peritoneal cavities of mice that developed colon cancer significantly attenuated colon cancer tumor growth. This may involve the mechanism by which *Chlorella* cell wall membrane extract increases T cells in immune cells and decreases granulocytes*⁸.

*⁸ A type of white blood cell composed of neutrophils, eosinophils, and basophils.



a-b, Significant difference between different letters

■ Reference

Susumu Ishiguro, Nicole Robben, Riley Burghart, Paige Cote, Sarah Greenway, Ravindra Thakkar, Deepa Upreti, Ayaka Nakashima, Kengo Suzuki, Jeffrey Comer, Masaaki Tamura (2020) **Cell Wall Membrane Fraction of *Chlorella sorokiniana* Enhances Host Antitumor Immunity and Inhibits Colon Carcinoma Growth in Mice.** Integrative Cancer Therapies.

<https://journals.sagepub.com/doi/10.1177/1534735419900555>

<About the microalga *Chlorella*>

The microalga *Chlorella* is a type of small algae that contains a wide variety of nutrients, including vitamins, minerals, amino acids, carotenoids, unsaturated fatty acids, and chlorophyll.

<About euglena Co., Ltd.>

In 2005, euglena Co., Ltd. established edible outdoor mass culture technology of microalgae Euglena (Japanese name: Midorimushi) in Ishigaki Island for the first time in the world. We develop and sell functional foods and cosmetics using *Euglena*, *Chlorella*, etc., produced at Ishigaki Island, and conduct biofuel production research. Listed on TSE Mothers in December 2012. Tokyo Stock Exchange partial market change in December 2014. The management philosophy is "to make people and the Earth healthy." <https://euglena.jp>

- Press Relevant Contacts -

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