

**Long-Term Chlorella Intake Decreases Degree of Arteriosclerosis in Type 2 Diabetic Rats by Increasing Production of Endothelium-Derived Relaxing Substances**

Presented at the 71st Annual Meeting of Japan Society of Nutrition and Food Science

[Study objectives]

Type 2 diabetes mellitus is known to increase degree of arteriosclerosis by decreasing vascular endothelial function.

In type 2 diabetic patients, habitual aerobic exercise decreases degree of arteriosclerosis by increasing the production of endothelium-derived relaxing substances (nitric oxide: NO). In recent years, long-term chlorella intake with antioxidant effects has been reported to decrease degree of arteriosclerosis in healthy middle or advanced, and young people. However, it is unknown whether long-term chlorella intake improves degree of arteriosclerosis in type 2 diabetic patients and the mechanism is also unclear. In this study, we examined whether long-term chlorella intake decreases degree of arteriosclerosis in type 2 diabetic rats with increasing degree of arteriosclerosis by increasing the production of endothelium-derived relaxing substances.

[Study method]

OLETF male rats (type 2 diabetic model rat) aged 20 weeks were divided into 4 groups, 7 rats in each group as follows, and the test was conducted.

As a healthy control group, we used LETO rats that were housed under resting conditions for the same period.

- [1] OLETF healthy control group (LETO group)
- [2] Resting control group (OLETF-Con group)
- [3] Chlorella intake group (OLETF-CH group)
- [4] Aerobic training group (OLETF-Ex group)

OLETF-CH group received basic feed containing 0.5% chlorella powder for 8 weeks. OLETF-Ex group ran on a treadmill at 25 m/min for 60 minutes 5 days a week for 8 weeks.

As an index for degree of arteriosclerosis, carotid-femoral pulse wave velocity (cpPWV) was measured.

Also, phosphorylation of endothelial NO synthase (eNOS) in arterial tissue was measured with the Western blotting method and blood NO<sub>x</sub> (nitrite/nitrate) level was measured with the Griess method.

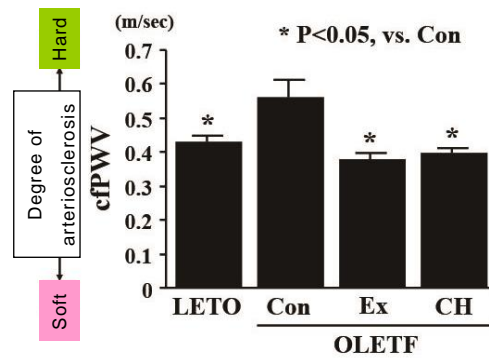
[Results]

Although cfPWV in OLET-CON group significantly increased as compared with that in LETO group, cfPWV in OLET-CH and OLET-Ex groups significantly decreased as compared with that in OLET-CON group ( $P < 0.05$ ). (Fig. 1)

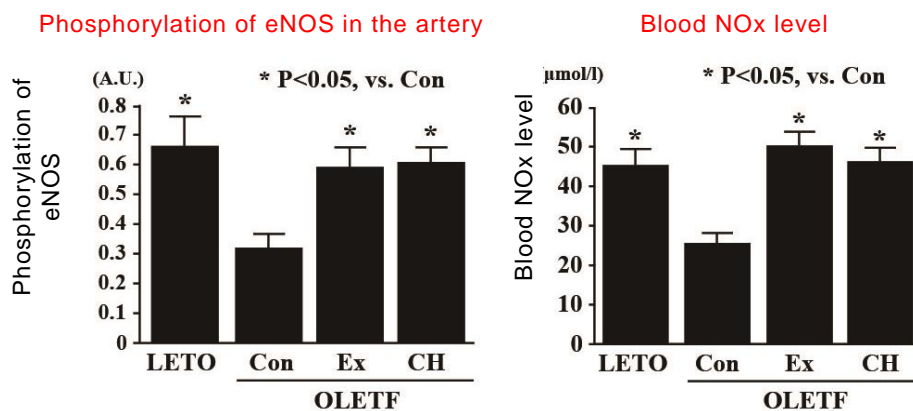
Also, phosphorylation of eNOS and blood NOx level in OLET-CON group significantly decreased as compared with those in LETO group, whereas they significantly increased in OLET-Ex and OLET-CH groups. (Figs. 2 and 3)

The above results suggested that as with an aerobic training, long-term chlorella intake could have effects of decreasing degree of arteriosclerosis in type 2 diabetic rats by increasing the production of endothelium-derived relaxing substances.

**Fig. 1 Degree of arteriosclerosis (cfPWV: Index of central artery)**



**Fig. 2 Phosphorylation of eNOS in the artery, blood NOx level**



<Details>

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