Application of phosphatidylinositol as a functional food for health and longevity focused on anti-obesity

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It is well known that phosphatidylinositol (PI) plays important roles in signal transduction. This lipid mediator is expected as a seed of functional food, and reported to prevent neurotoxicity of amyloid β protein, inhibit VEGF-induced angiogenesis in vitro, and reduce liver triacylglycerol concentration in Zucker $^{(fa/fa)}$ rats. Absorption and *in vivo* behavior of orally taken PI, however, are little known at present. Therefore, in this study, we determined the fate of PI after oral administration, and anti-obese function of PI in mice.

About 10% radioactivity was recovered from blood and various organs at 3 hr after administration of radio-labeled PI. However, the biodistribution of the radioactivity was similar to that after administration of radio-labeled *myo*-inositol, suggesting that PI is easily degraded to *myo*-inositol, which is usually detected in plasma, during absorption. Then, the radioactive compounds in plasma after administration of them were fractionated into organic and inorganic phases. Almost all radioactivity was recovered from inorganic aqueous phase after administration of radio-labeled *myo*-inositol. On the contrary, a few but significant percentage of radioactivity was recovered from organic phase after administration of radio-labeled PI, suggesting that some of PI would be absorbed as intact or converted to lipidic compounds which might have desirable functions in a body.

Next, we prepared obese mouse model by feeding with high fat diet. The body weight gain in diet-induced obese (DIO) mice was significantly suppressed by the treatment with PI. PI intake also significantly improved the indicator values in plasma such AST, free cholesterol, total choresterol, LDL-cholesterol and uric acid in DIO mice. Finally, we examined the specific gene expressions in liver of DIO mice by use of DNA array after treatment with PI. As a result, expression of some genes encoding proteins related to lipid and carbohydrate metabolism was altered. Our present study suggest that PI is a promising anti-obesity component of diet.