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Isolation and Characterization of Intestinal Glucose Uptake Inhibitor from *Punica granatum*

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Dietary carbohydrates are hydrolyzed and absorbed in the small intestine. Intestinal glucose uptake is mainly performed by the sodium-dependent glucose transporter, SGLT1. Therefore, inhibition of intestinal glucose uptake is beneficial in reducing the blood glucose level for diabetes and controlling weight gain in obesity. By using human intestinal epithelial Caco-2 cell, mice intestinal BBMV and novel fluorescent glucose analog, 2-NBDG, we screened the inhibitory activities of intestinal glucose uptake in six hundred extracts prepared by solvent extraction based on polarity from the two hundred kinds of edible plants. In this study, existence of SGLT1 in the Caco-2 cell were detected by using enzyme-linked immunoabsorbent assay (ELISA), Western blot analysis and immunocytochemistry, and regulation activity of SGLT1 protein was measured In addition, inhibitory effects of extracts of *Punica granatum*, *Diospyros kaki*, *Raphanus sativus* and *Eucommia ulmoides* on intestinal glucose uptake of streptozotocin-induced diabetic mice were measured. Particularly an appreciable high inhibitory effect was found in methanol extract of *Punica granatum* PG-1a isolated from methanol extract of *Punica granatum* was tentatively determined as a phthalic acid-diisononylester or hydroxyl alkyl ester with molecular weight of 418. The present results suggest that *Punica granatum* could play a role in controlling the dietary glucose absorption by inhibiting intestinal transporters as well as reducing blood glucose level.

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Isolation and Characterization of Intestinal Glucose Uptake Inhibitor from *Laminaric japonia*

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Recently, the obesity population were rapidly increased according to westernization of lifestyle, and increased adult disease, diabetes mellitus(DM) and hypertensive arteriopathy. Inhibition of intestinal glucose uptake may be beneficial to reduce the blood glucose level after meals for diabetic and control weight gain for obesity. In the present study, by using Caco-2 cell line and fluorescent glucose analog, 2-NBDG, we found that the edible seaweeds potently inhibited the glucose uptake and transport *in vitro* system. Existence of SGLT1 in Caco-2 cells and brush-border membrane vesicles (BBMVs) were detected by using enzyme-linked immunosorbent assay (ELISA), immunocytochemistry and regulation activity of SGLT1. Detailed studies on the effect in methanol extract of *Laminaric japonia* from *Jumunjin*, *Endarachne binghamiae* from *Wando* and *Hizilia fusiforme* from *Wando* were performed by using mice intestinal brush-border membrane vesicles (BBMVs) and *in vivo* assay system. The methanol extract of *Laminaric japonia* showed particularly high glucose uptake inhibitory activity. LJ-3a, the inhibitory compound was isolated by silica gel column chromatography, Prep. TLC and Prep. HPLC. The present results suggest that *Laminaric japonia* could also play role in controlling the dietary glucose absorption by inhibiting intestinal glucose transporters and possibly contribute to blood glucose homeostasis and body weight It may also be possible that *Laminaric japonia* are a good model material for new drugs as well as for a functional food ingredient.