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論　文　内　容　要　旨

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学位論文題目	Study on glycosylinositol phosphoceramide and glycosylinositol phosphoceramide-specific phospholipase D in plants （植物におけるグリコシルイノシトールホスホセラミドおよびグリコシルイノシトールホスホセラミド特異的ホスホリパーゼ D に関する研究）

Glycosylinositol phosphoceramide (GIPC) is a predominant sphingolipid that is widely present in plant tissues. However, metabolism and physiological functions of this sphingolipid in plants are poorly resolved. Previously, we detected an uncharacterized phospholipid in cabbage, and identified it as phytoceramide 1-phosphate (PC1P). We also found an enzyme activity which produces the PC1P by the hydrolysis of GIPC. Although abundance of GIPC and PC1P have been reported in several vegetables, digestibility and nutritional relevance of them have not characterized yet. One of difficulties in researches on these sphingolipids is lacking methods for isolation of them. In this study, I established methods for isolation of GIPC and PC1P, and examined their chemical stabilities. The method for isolation of GIPC from plant tissues includes extraction of GIPC-containing lipid fraction using lower layer of isopropanol: hexane: water (55:20:25, v/v/v; solvent A), Sephadex column chromatography using solvent A as eluate, and isolation of GIPC by TLC. The recovery of GIPC by the method is around 50-70%. Although GIPC was hardly dissolved in chloroform, PC1P was found to be dissolved in chloroform. Thus, popular method used for phospholipid extraction was applicable for PC1P. The PC1P-containing lipid fraction was extracted from cabbage leaves by a two-phase separation system consisted with chloroform, methanol and water. The PC1P was isolated from the lipid extract by TLC. The yield of PC1P is around 55-70% by the method. Chemical stability experiments revealed that GIPC, but not PC1P, was decomposed at high temperature (over 125℃) and high concentration of acid (over 1.0 M HCl), indicating that the inositol glycan moiety in GIPC is susceptible under these conditions. I also characterized GIPC-PLD activity in cabbage and found that the PLD activity prefer GIPC with two-sugar chain but not GIPC with zero-, one- or three-sugar chain. I also found that GIPC-PLD activity catalyzes transphosphatidylation. The preferred acceptor of phosphatidyl residue was primary alcohol with carbon chain below C4. Neither secondary, tertiary, choline, serine nor glycerol served as an acceptor for transphosphatidylation of GIPC-PLD activity. The knowledge obtained in these studies will be useful for biochemical research or industrial application of GIPC and PC1P.