A Novel Lipid Mediator Induced by Salt Stress

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Summary

Steryl glucosides are sterol derivatives which are glucosylated at 3-OH of sterol. These are naturally occurring compounds in higher plants, yeast, mold and helicobacter, but their physiological role(s) is not clarified yet.

We reported previously that heat stress induced the immediate production of a poriferasteryl glucoside in the myxoamoebae of *Physarum polycepharum*, and that the activity of UDP-glucose:poriferasterol glucosyltransferase was also expressed rapidly after the heat shock. These observations suggested that steryl glucoside play an important role in cellular stress responses.

In the present study, we investigated the heat-induced glycosylation of membrane sterol in human cultured fibroblasts (TIG-3 cells) to verify if this glycosylation is a general phenomenon in any organism. Salt stress-dependent accumulation of streryl glucoside in TIG-3 cells was also examined.

A certain glycolipid band was detected on a TLC plate in lipid extracts from TIG-3 cells, which were exposed to high temperature (42°C) for 15 and 30 min, while it was hardly detectable without heat shock. The lipid was accumulated similarly by salt stress. The structure of lipid molecule was elucidated to be a cholesteryl glucoside by structural analyses. A 30-min exposure of fibroblasts to chemically synthesized cholesteryl glucoside induced apparently HSP70, a family of proteins known as the enhancer of cell survival following exposure to a variety of stress conditions. Longer treatment (more than 90 min) was necessary for the induction of the same level of HSP70 by heat-treatment at 42°C.

These findings suggested that the heat-induced glycosylation of sterol may have a significant role(s) in a signal transduction system to cause succeeding stress responses such as induction of HSPs in cells from mold to mammal.