Abstract

Sphingolipid has a unique physiological function in animal cells such as cell growth and apoptosis. Recent studies indicate that dietary sphingolipid from animal tissues such as bovine brain and milk also have physiological function. Here, we report properties and physiological effects of plant cerebrosides species as functional lipids.

Plant cerebrosides used in this study were obtained from seeds of five plant species. Physical properties of cerebrosides were estimated by fluorescence polarization measurements and DSC analysis. As the physiological effects of plant cerebrosides for human, we determined their apoptosis-inducing activity using human cancer cell lines. Apoptotic cells with fragmented nuclei were quantified as reported previously.

The major sphingoid bases of cerebrosides from soybean, maize, and rice bran were trans-4, cis or trans-8-sphingadienine. However, the major sphingoid base in wheat and rye grains were 8-sphingenine mainly with the cis-configuration (more than 60%). The fluorescence depolarization values of liposomes composed of asolecthin were increased by the addition of plant cerebrosides. However, the existence of the cis-8 double bond in the component sphingoid base suppressed increases in depolarization value. Plant cerebroside-derived compounds such as sphingoid base and C2-ceramide induced apoptosis in human colon cancer cell lines. This result suggested that dietary plant cerebroside has a potent physiological function similar to that of animal sphingolipid.