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Cellular roles of ganglioside GM3 biosynthesis in human cancer cells

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Ganglioside GM3, sialic acid (NeuAc)-containing glycosphingolipid is the first and the simplest of the gangliosides and are found on the outer leaflet of the plasma membrane in vertebrates. It plays important roles in a large variety of biological processes such as cellular interactions, differentiation, oncogenesis, adhesion, cell growth and receptor function in various cell systems. Ganglioside GM3 is synthesized by lactosylceramide α -2, 3-sialyltransferase (hST3Gal V, EC 2.4.99.9) which catalyzes the transfer of NeuAc from CMP-NeuAc to the non-reducing terminal galactose of lactosylceramide in human. The amount of ganglioside GM3 increases with a concomitant increase of hST3Gal V activity during megakaryocytic differentiation of K562 cells treated with PMA that is a megakaryocytic differentiation inducer but not with an erythrocyte differentiation inducer, hemin. Ganglioside GM3 may play an important role as a trigger in differentiation induction of K562 cells. The hST3Gal V is a key regulatory enzyme for ganglioside biosynthesis because it catalyzes the first committed step in the synthesis of nearly all gangliosides. Differentiation of K562 cells requires Erk1/2 activation and p38 MAPK inhibition for the transcriptional activity of lactosylceramide α -2, 3-sialyltransferase (hST3Gal V) and synthesis of ganglioside GM3. The expression of hST3Gal V mRNA induces expression of the megakaryocytic markers and differentiation of K562 cells. Ganglioside GM3 mediates megakaryocytic differentiation of human chronic myelogenous cells and apoptosis of many human cancer cells.

Biography

Cheorl-Ho Kim has completed his PhD at the age of 28 years from The University of Tokyo and was positioned as a Senior Scientist from Korea Research Institute of Bioscience and Biotechnology. He is a Professor of Molecular Glycobiology, Sung Kyun Kwan University, Korea, leading organization of Korea which is cooperated with the SamSung Group. He has published more than 337 papers in reputed journals and serving as an Editorial Board Member, Executive Editor and Editor-In Chief of the international journals. His work was contributed to the mechanisms of glycan-mediated Hepatitis B viral oncogenesis and invasion, sialoglycan-mediated leukemic differentiation and vascular biology. He is being serves as an Editor-in-Chief of *Journal of Glycobiology*, Editor-in-Chief of *Journal of Microbial and Biochemical Technology*, Executive Editor of *Journal of Glycomics and Lipidomics* and Editor of *eCAM*.

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