Identification of a novel N-glycan structure containing α-2,6-sialic acid in the mouse cerebral cortex during development

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Oligosaccharides of the glycoproteins expressed on cell surface play an important role in cell-cell interactions in the neural cells. In particular, sialylated N-glycans, negatively charged acidic sugar chains, may mediated neuronal and biological phenomena in the brain. We have been analyzing sialylated N-linked sugar chains expressed in the mouse cerebral cortex during development, using 3D-HPLC.

Recently, resolution of normal-phase HPLC was improved, which allowed us to perform 3D-HPLC analysis of N-linked sugar chains. We showed most of the terminal galactose residues without outer fucosylation on N-linked sugar chains were constantly sialylated in the mouse cerebral cortex during development.

Structure of some of the sialylated sugar chain was also determined. In this study, most of the identified acidic oligosaccharides were N-glycans containing an α2,3-sialyl linkage, and a few sialylated N-glycans were composed of α2,6-sialyl linkage. We found a novel structure of sialylated oligosaccharide[NeuAcα2-6Galβ1-3GlcNAc-], which was increased during development. In addition, we found that the amount of Lewis X and/or Lewis A on N-linked sugar chains and tri-,tetra-antenary branched sugar chains expressed in the adult mouse cortex were increased in comparison with fetal and neonatal mouse brain. These results indicated that these molecules play significant roles in the neurons such as higher brain functions.