

The carbohydrate structures of gangliosides and their different roles in the sensory functions.

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Gangliosides are abundant glycolipids in neural tissues and are divided into four groups such as o-, a-, b- and c-series according to the number and position of sialic acids. We reported that intraplantar injection of GT1b, b-series gangliosides, caused mechanical allodynia and *Arthrobacter Ureafaciens* sialidase that degrades sialyl conjugates including gangliosides reduced inflammatory pain. Although both intraplantar and intrathecal injection of GM1, a-series gangliosides, into naïve mice had no effects on mechanical thresholds, daily intrathecal injection of GM1 ameliorated mechanical allodynia during chronic inflammatory pain. Furthermore, intradermal injection of GM1 increased low dose chloroquine-induced itch. *Arthrobacter Ureafaciens* sialidase has low activity on the sialic acid of GM1. Thus, F-11 cells (the dorsal root ganglion neuron derived cell line) treated with sialidase showed high intensity staining using chorea toxin B subunit, GM1 binding protein, and shortened neurites. In addition, sialidase injection reduced epidermal nerve fibers that elongated into epidermis during inflammation, indicating that axon retraction by sialidase led to analgesic effects during inflammatory pain. These results suggested that gangliosides are involved in different sensory functions according to their structure of carbohydrate chain.