Gangliosides modulate the nociceptive behavior and pruritus.

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Glycosphingolipids that have diverse variations in their carbohydrate-chains are abundant in neural tissues and previous studies revealed the important roles in neuronal functions. However, the roles of glycosphingolipids in the pain sensing pathway remain unclear. We reported that sialic acid-containing glycosphingolipids, gangliosides, are involved in nociceptive behavior. Depending on carbohydrate structures of gangliosides, they are divided into four groups such as o-, a-, b-, and c-series. Intraplantar injection of GT1b (b-series gangliosides) but not GM1a (a-series gangliosides) caused mechanical allodynia that was attenuated by the TRPV1 antagonist capsazepine. In addition, pretreatment of GT1b enhanced capsaicin induced nociception. On the other hand, intradermal injection of GM1a enhanced chloroquine induced pruritus.

These results suggested that the differences in carbohydrate structures of gangliosides lead to different effects on cutaneous sensation.