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Editorial

Glycosphingolipids in the Human Parathyroid and Thyroid Glands were studied

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EDITORIAL

Acid and non-acid glycosphingolipids from human thyroid and parathyroid glands were extracted and described using mass spectrometry and carbohydrate-recognizing ligand binding, with a focus on complex molecules, as part of a thorough examination of glycosphingolipids in human tissues. The human parathyroid and thyroid glands had remarkably similar glycosphingolipid patterns. Sulfatide and the gangliosides GM3, GD3, GD1a, GD1b, GT1b, and Neu5Ac-neolactotetraosylceramide were the most common acid glycosphingolipids, whereas globotriaosylceramide and globoside were the most common non-acid glycosphingolipids. In both tissues, we discovered neolactotetra- and neolactohexaosylceramide, the x2 glycosphingolipid, and complex glycosphingolipids with O and A blood group determinant. The thyroid gland contained a glycosphingolipid with a blood group Lab determinant, while the parathyroid sample included a glycosphingolipid with a terminal blood group B determinant. Both the thyroid and parathyroid glands expressed blood group A antigen, according to immunohistochemistry. The thyroid had a poor GD1a ganglioside expression in the cytoplasm, whereas the parathyroid gland had a significant GD1a expression on the cell surface. As a result, the glycosylation of the thyroid and parathyroid glands in humans is more complicated than previously thought. Our findings pave the way for more research into cell surface glycosphingolipid changes in thyroid and parathyroid malignancies.

Primary hyperparathyroidism is one of the most common endocrine illnesses, with a prevalence of 1%-2%. It is caused by the increased release of parathyroid hormone by one or more parathyroid glands on their own. Fatigue, muscle weakness, sadness, abdominal discomfort, kidney stones, and osteoporosis are all symptoms of primary hyperparathyroidism. The surgical excision of all damaged glands is the sole cure for primary hyperparathyroidism. The use of targeted parathyroid surgery, which is associated with lower complication rates and shorter operating durations, is enabled by accurate preoperative localization. Unfortunately, traditional methods for locating all sick glands, such as parathyroid scintigraphy, ultrasonography, and four-Dimensional Computed Tomography (4D-CT), have limitations. Furthermore, such approaches frequently fail to detect normal parathyroid glands. However, the identification of cell surface parathyroid specific markers, to which tracer molecules bind precisely, may make this possible. Glycosphingolipids are essential components of the plasma membrane, embedded in its outer layer and facing the extracellular environment, making them suitable epitopes for the development of novel molecular markers. Due to the close physical proximity of the thyroid and parathyroid glands, discriminate glycosphingolipids between the two would be beneficial for correct preoperative localization.

Glucosylceramide, galactosylceramide, lactosylceramide, galabiosylceramide, trihexosylceramide, globoside, sulfatide, and the gangliosides GM3, GD3, GD1a, GD1b, GT1b, and Neu5Ac-neolactotetraosylceramide were identified as the primary glycosphingolipids. However, the glycosphingolipids of human parathyroid glands have not been described with the methods available today. The goal of this research was to characterize the glycosphingolipids of human parathyroid and thyroid glands, with a focus on minor complex molecules, in order to do comparative comparisons. By using mass spectrometry and binding a battery of carbohydrate-recognizing ligands, the glycosphingolipids were identified, and the tissue distribution of selected compounds was studied using immunohistochemistry.

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