Pathology and Chemistry of the Brain in Sanfilippo Syndrome Type B

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The effects of Sanfilippo syndrome type B, a rare lysosomal storage disorder, on the mouse brain were studied in this novel research. It was hypothesized that affected mice would have lowered volume and/or neuron density in the amygdala region of the brain. Also, it was hypothesized that the activities of choline acetyltransferase (ChAT) and acetylcholinesterase (AChE), enzymes involved with the acetylcholine neurotransmitter pathway, would be lower in diseased mice. Using stereology software, volume and cell count measurements of the amygdala region were made using frozen brain tissue sections of both carrier (healthy) and mutant (diseased) mice treated with both a Nissl stain and an AChE activity stain. The activity of both AChE and ChAT throughout the brain was quantified by performing enzyme activity assays using brain tissue homogenate from healthy and diseased mice. ChAT immunohistochemistry staining was also performed to locate specific affected regions. While there was no significant difference in volume or cell counts, it was observed that the intensity of AChE staining was lower in brains of mutant animals. It was measured that the activity of AChE was lower by 25% in the region of the brain containing the amygdala and by 12% throughout the brain. Likewise, the ChAT activity was lower by 13% in the amygdala region for mutant animals. Although the hypothesis regarding amygdala volume and cell density was disproved, observations made during that study led to discovering significant decreases in the activities of AChE and ChAT. These enzyme activity changes provide an indicator of disease progression and could provide an indicator of the success of an attempted therapy, a major step toward developing a treatment.

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