

Decreased serotonin transporter immunoreactivity in the human hypothalamic infundibular nucleus of overweight subjects

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Research question and background

That serotonin plays a role in the regulation of feeding behavior and energy metabolism has been known for a long time. Serotonin transporters (SERT) play a crucial role in serotonin signaling by regulating its availability in the synaptic cleft. The neuroanatomy underlying serotonergic signaling in humans is largely unknown, and until now, SERT immunoreactivity in relation to body weight has not been investigated.

Methods and tissues used

To clarify the distribution of SERT immunoreactivity throughout the human hypothalamus and to compare SERT immunoreactivity in the infundibular nucleus (IFN), the human equivalent of the arcuate nucleus, in lean and overweight subjects. DESIGN: First, we investigated the distribution of serotonin transporters (SERT) over the rostro-caudal axis of six post-mortem hypothalami by means of immunohistochemistry. Second, we estimated SERT immunoreactivity in the IFN of lean and overweight subjects. Lastly, double-labeling of SERT with Neuropeptide Y (NPY) and melanocortin cell populations was performed to further identify cells showing basket-like SERT staining. RESULTS: SERT-immunoreactivity was ubiquitously expressed in fibers throughout the hypothalamus and was the strongest in the IFN. Immunoreactivity in the IFN was lower in overweight subjects ($p = 0.036$). Basket-like staining in the IFN was highly suggestive of synaptic innervation. A very small minority of cells showed SERT double labeling with NPY, agouti-related protein and α -melanocyte stimulating hormone.

Results and conclusion

SERT is ubiquitously expressed in the human hypothalamus. Strong SERT immunoreactivity, was observed in the IFN a region important for appetite regulation, in combination with lower SERT immunoreactivity in the IFN of overweight and obese subjects, may point toward a role for hypothalamic SERT in human obesity. PMID: 24860418 [PubMed].