Obesity is associated with altered brain function

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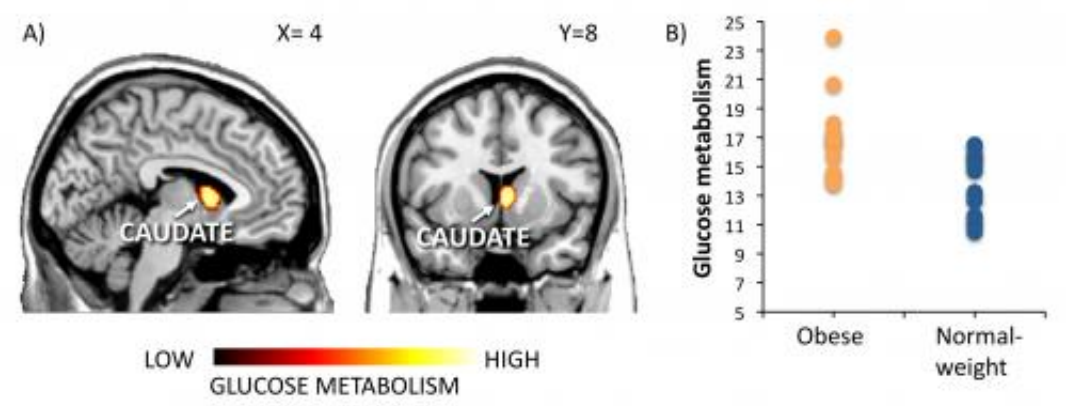

Glucose metabolism of the caudate nucleus in the midbrain (A) was significantly higher in obese versus lean individuals (B).

In most western countries the annual increase in the prevalence and the severity of obesity is currently substantial. Although obesity typically results simply from excessive energy intake, it is currently unclear why some people are prone to overeating and gaining weight.

Because the central nervous system is intimately involved in processing of hunger signals and controlling food intake, it is possible that the cause of weight gain and obesity might be in the brain.

Researchers at the University of Turku and Aalto University have now found new evidence for the role of the brain in obesity. The researchers

measured the functioning brain circuits involved in with multiple brain imaging methods.

The results revealed that in obese versus lean individuals, brain glucose metabolism was significantly higher in the brain's striatal regions, which are involved in processing of rewards. Moreover, obese individual's reward system responded more vigorously to food pictures, whereas responses in the frontal cortical regions involved in cognitive control were dampened.

"The results suggest that obese individuals' brains might constantly generate signals that promote eating even when the body would not require additional energy uptake," says Adjunct Professor Lauri Nummenmaa from the University of Turku.

"The results highlight the role of the brain in obesity and weight gaining. The results have major implications on the current models of obesity, but also on development of pharmacological and psychological treatments of obesity," Nummenmaa says.

The participants were morbidly obese individuals and lean, healthy controls. Their brain glucose metabolism was measured with positron emission tomography during conditions in which the body was satiated in terms of insulin signalling. Brain responses to pictures of foods were measured with functional magnetic resonance imaging.

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