

'Connection error' in the brains of anorexics

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Network for body processing: When people look at body images, the visual information first enters in the central occipital lobe (mOC). The "fusiform body area" (FBA) and the "extrastriate body area" (EBA) then process the images further. In anorexic women, the connection from the mOC to the FBA is unaffected (black arrow). However, the FBA and EBA do not work normally together in the left hemisphere (red arrow). Credit: Boris Suchan

When people see pictures of bodies, a whole range of brain regions are active. This network is altered in women with anorexia nervosa. In a



functional magnetic resonance imaging study, two regions that are important for the processing of body images were functionally more weakly connected in anorexic women than in healthy women. The stronger this "connection error" was, the more overweight the respondents considered themselves.

"These alterations in the brain could explain why women with anorexia perceive themselves as fatter, even though they are objectively underweight" says Prof. Dr. Boris Suchan of the Institute of <u>Cognitive</u> <u>Neuroscience</u> at the Ruhr-Universität. Together with Prof. Dr. Dietrich Grönemeyer (University of Witten-Herdecke), Prof. Dr. Silja Vocks (University of Osnabrück) and other colleagues, the Bochum researchers report in the journal *Behavioural Brain Research*.

Anorexics misperceive their body shape

The researchers tested ten anorexic and fifteen healthy women of similar age. To start with, all the women judged on the computer which of several different silhouettes corresponded best to their own <u>body shape</u>. Ten control subjects who did not participate in the MRI scan answered the same question by matching a photo of the test subject to the right silhouette. Both healthy and anorexic women estimated their body shape differently than outsiders: healthy subjects rated themselves as thinner than the control subjects. Anorexic women on the other hand perceived themselves to be fatter than the control subjects did.

Brain areas for body perception examined with MRI

In <u>MRI scanners</u>, the researchers then recorded the brain activity of the 25 participants while they observed photos of bodies. Above all, they analysed the activity in the "fusiform body area" (FBA) and the "extrastriate body area" (EBA), because previous studies showed that



these <u>brain regions</u> are critical for the perception of bodies. To this end, the neuroscientists from Bochum calculated the so-called effective connectivity between the FBA and EBA in both hemispheres. This is a measure of how much the activity in several <u>brain areas</u> is temporally correlated. A high degree of correlation is indicative of a strong connection.

Brains of anorexics structurally and functionally altered

The connection between the FBA and EBA was weaker in women with anorexia nervosa than in healthy women. In addition, the researchers found a negative correlation between the EBA-FBA connection in the left hemisphere and the misjudgement of body weight: the weaker the effective connectivity between the EBA and FBA was, the fatter the subjects with anorexia falsely estimated themselves to be. "In a previous study we found that there are structural changes in the brains of patients with anorexia", says Boris Suchan. They have a lower density of nerve cells in the EBA. "The new data shows that the network for body processing is also functionally altered." The EBA, which has a lower cell density in anorexics, is also the area that stood out in the connection analysis: it receives reduced input from the FBA. "These changes could provide a mechanism for the development of anorexia", says Suchan.

More information: Suchan, B. et al. Reduced connectivity between the left fusiform body area and the extrastriate body area in anorexia nervosa is associated with body image distortion, *Behavioural Brain Research*, 2012. DOI: 10.1016/j.bbr.2012.12.002

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