



Press Release

A Sharper View into the Brain

Researchers from Freiburg are the first to detect the exact border between two important brain regions

Deep in the human brain, two small but very important regions lie close together: the amygdala, which plays an important role in the generation and perception of emotions, and the hippocampus, which is a central switchboard for memories. These two small neighboring regions have until now been hard to tell apart in neuroimaging investigations of the living human because of their small dimensions, the amygdala being only the size of an almond. This difficulty is due to the insufficient spatial resolution of the common imaging methods for detecting the exact course of the fine border between the amygdala and the hippocampus. Owing to the innovative use of ultra-high-field magnetic resonance imaging to approach this problem, scientists from Freiburg and Magdeburg succeeded in a joint attempt in revealing the border between these brain regions with unprecedented clarity. The team of Dr. **Tonio Ball** at the Bernstein Center Freiburg and the Cluster of Excellence BrainLinks-BrainTools at the University of Freiburg report on these findings in the current issue of the journal *Human Brain Mapping*.

The team examined six healthy subjects in a 7-Tesla magnetic resonance scanner at the University of Magdeburg. These machines produce a magnetic field several times stronger than that of scanners usually employed in medical use. The stronger field produces a much more detailed image of structures in the human body. Only a few of these devices are available in Germany.

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Freiburg, xx.xx.xxxx

When examining their subjects in the scanner, the scientists made a surprising discovery: The border between the amygdala and the hippocampus was different from person to person, and there were even differences between hemispheres of the same brain. As this border is the place where the two regions exchange information with each other, these variations might also be responsible for differences in personality, the scientists write. In the future, these brain regions should be measured in detail when patients are examined for psychiatric conditions such as anxiety disorders. Furthermore, the study showed that standardized maps of the brain do not make much sense in the case of the amygdala and the hippocampus. These regions must be measured individually in each patient, the scientists state, in order to prevent attributing a piece of brain to the wrong region, which may lead to a false diagnosis.

Original publication:

Derix, J., Yang, S., Lüsebrink, F., Fiederer, L. D. J., Schulze-Bonhage, A., Aertsen, A., Speck, O. and Ball, T. (2014), Visualization of the amygdalo-hippocampal border and its structural variability by 7T and 3T magnetic resonance imaging. Hum. Brain Mapp.. doi: 10.1002/hbm.22477

Caption:

The border between the important brain regions hippocampus and amygdala is visible in high-resolution magnetic resonance images as a fine, light strip ("amygdala-hippocampal border," AHB). Photo: AG Ball, Universität Freiburg

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