

# Cortical cause of anxiety states

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Fear, at the right level, can increase alertness and protect against dangers. Disproportionate fear, on the other hand, can disrupt the sensory perception, be disabling, reduce happiness and therefore become a danger in itself. Anxiety disorders are therefore a psychiatric condition that should not be underestimated. In these disorders, the fear is so strong that there is tremendous psychological strain and living a normal life appears to be impossible. Researchers at the MedUni Vienna have now found a possible explanation as to how social phobias and fear can be triggered in the brain: a missing inhibitory connection or missing "brake" in the brain.

Inside the [brain](#), the amygdala and the orbitofrontal cortex in the frontal lobe form an important control circuit for regulating the emotions. This control circuit is termed the brain's emotional control centre. Whereas in healthy subjects, this circuit has "negative feedback" and "calmness" was identified, scientists used functional [magnetic resonance imaging](#) (MRI) on people with social phobias and found the opposite to be true: an important inhibitory connection is different in these patients, which may explain why they are unable to control their fears.

In collaboration with the Centre for Medical Physics and Biomedical Technology and the University Department of Psychiatry and Psychotherapy at the MedUni Vienna, the research team lead by Christian Windischberger was also able to discover through its recent study at the MedUni Vienna's High Field MR Centre of Excellence how the areas of the brain that are involved with processing emotions are able to influence each other.

The study participants were shown a series of "emotional faces" while undergoing [functional magnetic resonance imaging](#). fMRI is a non-invasive method which uses radio waves and magnetic fields to measure changes in the levels of oxygen in the blood and therefore [neuronal activity](#) in individual regions of the brain. An analysis method developed at University College London was used to provide new perspectives on the data obtained.

## **Breaking the circle of fear**

When emotional facial expressions were shown - from laughing to crying, from happiness to anger - neuronal activity was triggered in the brain. The result: on a purely external basis, the test subjects looked no different, but the healthy subjects were kept calm thanks to their automatic "brake", despite the emotional nature of the images. For the

social phobics, on the other hand, the photographs put their brains into "overdrive", triggering very strong neuronal activity. This was demonstrated very clearly using the new analysis method: "We have the opportunity not only to localise brain activity and compare it between groups, but we can now also make statements regarding functional connections within the brain. In psychiatric conditions especially, we can assume that there are not complete failures of these connections going on, but rather imbalances in complex regulatory processes," says Ronald Sladky, the study's primary author.

This better understanding of the neuronal mechanisms involved will now be used to develop new approaches to treatment. The aim is to understand what effect medications and psycho-therapeutic support have on the networks involved in order to help patients break out of their circles of fear.

**More information:** "Disrupted Effective Connectivity Between the Amygdala and Orbitofrontal Cortex in Social Anxiety Disorder During Emotion Discrimination Revealed by Dynamic Causal Modeling for fMRI." Ronald Sladky, Anna Höflich, Martin Küblböck, Christoph Kraus, Pia Baldinger, Ewald Moser, Rupert Lanzenberger, Christian Windischberger. 2013, *Cerebral Cortex* [cercor.oxfordjournals.org/content/23/9/cercor.bht279.full](https://www.cercor.oxfordjournals.org/content/23/9/cercor.bht279.full).

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