The ability to pay attention to our surroundings is associated with the levels of the GABA neurotransmitter in the visual parts of the brain, new study reveals.

We sometimes fail to listen to the name of a person we are being introduced to or miss an item we are looking for even though the item is within our visual field. These are examples of cognitive failures, something that people suffering from chronic stress and ADHD in particular struggle with.

A new, Danish-led study reveals that the ability to pay attention to our surroundings is associated with the levels of the inhibitory neurotransmitter gamma-aminobutyric acid (GABA) in brain regions associated with the processing of visual stimuli.

The researchers found that the correlation is so strong that it is possible to predict how often a person experiences cognitive failure by looking at the levels of GABA in that person’s brain.

"It would be interesting to see if this correlation in healthy people also applies to people with attention disorders such as ADHD and ADD. This would give us a greater understanding of problems that many people are struggling with on a daily basis,” says Kristian Sandberg, a postdoc fellow at the Department of Clinical Medicine, Aarhus University, Denmark.

He is the lead author of the new study, published in the journal *NeuroImage*.

Findings could lead to new ADHD medicine

People who suffer from ADHD have the same attention problems that the researchers in this study looked at – only to a much greater extent.

“If attention errors are generally linked with the concentration of GABA in specific areas of the brain, we have reason to believe that scientists working with ADHD will also find such correlations,” says Sandberg, who believes the new findings may pave the way for the development of new drugs:

"Medicine can alter the overall levels of chemicals in the brain. One could easily imagine that this could contribute to the development of new drugs for ADHD patients. However, more specific research within attention disorders is required for this.”

The sensory brain is important

Up to now, when researchers have studied attention as a phenomenon they have mainly looked at the cell connections in the frontal regions of the brain where they believed there was some sort of an ‘attention system’. These are the same areas where it is believed that the exclusively human characteristic of complex thought takes place.
“What we are showing in our study is that attention also involves characteristics in the regions of the brain that deal with sensory impressions. This has not been studied until now,” says Sandberg.

"In other words, it is not enough to only look at the nerve cells. We also need to look at the neurotransmitters. This opens up a wide range of research opportunities in the future.”

The research group at Aarhus University has already started studying the role of GABA in connection with other disorders such as pathological gambling, and also in connection with brain damage that results in attention disorders.

Study is the first of its kind

In the study, researchers from Aarhus University, University College London, Sussex University (UK) and McGill University (Canada) asked 36 healthy participants to fill in an established cognitive failures questionnaire.

The answers revealed how often the respondents experienced attention problems – for instance how often they overlooked items in the supermarket even though they were looking at the shelf where those items were placed, or how often they failed to register the name of a person they had just been introduced to.

The researchers then measured the concentration of GABA in the visual part of the brains of each participant.

"This is the first time that researchers study the link between people’s ability to maintain attention and the amounts of GABA in the visual areas of the brain.”

GABA variation difficult to explain

The authors of the study find it difficult to explain why GABA levels vary from one person to the next, but they conjecture that it may be lifestyle-related:

"There is no doubt that there are some genetic causes at play here, but it is entirely possible that other factors also play in, such as external influences during foetal development or at other stages in life,” says Sandberg.

"There may for example be a link to more temporary factors such as stress and other lifestyle factors.”

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Our ability to pay attention to our surroundings is closely associated with the concentration of the neurotransmitter GABA in the areas of our brains that process visual impressions. (Photo: <a href="http://www.shutterstock.com/" target="_blank">Shutterstock</a>)

Fact box

GABA (short for for gamma-Aminobutyric acid) is an inhibitory neurotransmitter that regulates neural excitability. GABA helps us control the activity in our brain, enabling us to focus on specific cell networks.

Source: Kristian Sandberg

Fact box
Studies of GABA in humans are relatively new. Up until about five years ago, it was not possible to measure the concentration of GABA in the brain, as the method and the technology had not been invented.

Source: Kristian Sandberg

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Kristian Sandberg


Bo Christensen [22]

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