NEWS

Anxiety drug enhances brain connections in autism

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Talk soup: A drug prescribed for anxiety may improve verbal fluency in people with autism.

A small pilot study suggests that the drug propranolol, typically used to treat hypertension and anxiety, enhances functional connectivity between certain brain regions and improves verbal fluency, according to research presented Saturday at the **2012 Society for Neuroscience annual meeting** in New Orleans.

Lead investigator **David Beversdorf**, associate professor of radiology, neurology and psychology at the University of Missouri, aims to test the theory that the drug, which is sometimes prescribed for stage fright, will act on the core symptoms of autism, such as communication disorders, rather than solely soothing anxiety.

The new finding follows two small studies from the same group, published in the past year, showing that the drug **improves working memory** and verbal fluency in people with autism[1].

“We wanted to understand the mechanism behind the benefit, so we decided to look at functional connectivity using [functional magnetic resonance imaging],” says **John Hegarty**, a graduate student in the lab who presented the research. Functional connectivity is a rough measure of the linked activity between brain regions.

In a pilot study of eight people with autism, the researchers confirmed that treatment with

propranolol improves performance on a challenging verbal task. The participants were given three words, such as ‘dew,’ ‘comb’ and ‘bee,’ and asked to come up with a word that could pair with all three — in this case, honey.

The participants performed significantly better when given the drug than they did when given either placebo or nadolol. The latter is a drug that affects heart rate and blood pressure similarly to propranolol but, unlike propranolol, does not cross the blood-brain barrier.

Functional links:

The researchers also measured functional connectivity as the participants performed the test. A number of regions involved in verbal fluency — the inferior frontal cortex, the fusiform gyrus, the middle temporal lobe and the posterior parietal lobe — appeared more highly connected when they took the drug.

When taking the drug, the more the child improved on the test, the more greatly enhanced the functional connectivity in their brains, the researchers said.

The researchers said they controlled for the effects of head motion, which can **sometimes skew results** in functional connectivity studies.

When taking propranolol, the participants also performed better on a social interaction test, sharing more information and making more eye contact. People with autism often fixate more on the mouth than others do, and treatment with propranolol appears to decrease that fixation. However, the drug failed to improve performance on a test of visual memory, in which the participants had to remember an image and draw it after a certain period of time.

Researchers caution that given the small size of the study, the findings are preliminary. They are planning a larger study that compares 20 people with autism and 20 controls given both propranolol and placebo in turn. They aim to look at whether functional connectivity or other factors such as heart rate variability will predict who is most likely to respond to the drug.

If propranolol proves effective in this group, they plan to run a larger clinical trial.

It’s not clear why or how the drug has these benefits, and whether the benefits are tied to the anti-anxiety effect. Propranolol blocks the chemical messenger norepinephrine, which is involved in the body’s stress response.

One theory is that when a person is under stress, norepinephrine triggers the brain to be hyperfocused on getting out of the stressful situation. “That means it’s harder to associate loosely connected networks, so you perform worse on tasks of cognitive flexibility,” says Hegarty.

People with autism tend to be overly focused on things. “So by giving them the drug, we hope it reduces that hyperfocus,” says Beversdorf.

*For more reports from the 2012 Society for Neuroscience annual meeting, please **click here**.*

References:

1: Beversdorf D.Q. *et al.* ***Cogn. Behav. Neurol.*** **24**, 11-17 (2011) **PubMed**