fMRIs reveal brain's handling of low-priority ideas

February 10 2010

Peter T. Fox, M.D., is director of the Research Imaging Institute at the University of Texas Health Science Center at San Antonio. He and his coauthors studied a brain network that enables people to place interpersonal decisions on the back burner for later processing. The team's research provides evidence that genetics plays a role in this network. Credit: UT Health Science Center San Antonio

When we put an idea on the back burner, it goes into a processing area of the brain called the default-mode network. This network enables us to hold the low-priority idea in abeyance until a time when we aren't busy

with something else.

"The default-mode network appears to be the brain's back burner for social decision making," said Peter T. Fox, M.D., director of the Research Imaging Institute at The University of Texas Health Science Center at San Antonio. "Usually these back-burner ideas relate to interpersonal interactions and decisions that can't readily be quantified and shouldn't be rushed."

Dr. Fox likened this to putting a computer batch job into background processing to wait until the system is less busy.

A recently released study from the Research Imaging Institute, the Southwest Foundation for Biomedical Research and other institutions offers evidence that genetics plays a role in this back-burner setup, which has been shown to be abnormal in a variety of psychiatric disorders.

The work was described in the Jan. 18-22 online edition of Proceedings of the National Academy of Sciences *(PNAS)*.

The default-mode network is one of several neural networks that operate whether the mind is at rest or is occupied doing a task. A separate *PNAS* paper, published in 2009 by Dr. Fox and the same collaborators, presented a strong case that all human behaviors may be properly viewed as cooperative interactions among these networks, Dr. Fox said.

The newer research estimated the importance of genetic effects on the default-mode network by creating maps of eight anatomically distinct regions within the network. These maps were obtained by functional magnetic resonance imaging (fMRI) studies in 333 individuals from 29 randomly selected, extended-family pedigrees.

Network connectivity and gray-matter density were correlated to genetic factors. "We found that more than 40 percent of the between-subject variance in functional connectivity within the default-mode network was under genetic control," Dr. Fox said.

Based on this information, it is possible new diagnostic tools could be considered for various psychiatric or neurological illnesses, he said.

The study also included collaborators from the Yale University School of Medicine, the University of Oxford in Oxford, U.K., and Imperial College in London, U.K. The project is an outgrowth of longstanding collaborations between the UT Health Science Center and the Southwest Foundation for Biomedical Research using tools for gene discovery. It is also a result of substantial collaborations between the Research Imaging Institute and Oxford to develop novel applications of imaging methods.

"One long-term research goal is to test whether other intrinsically connected networks are also under genetic control, which we expect they will be," Dr. Fox said. "We also want to identify the genes that are controlling the default-mode network and other networks, and identify disorders associated with their abnormalities. A final goal is to develop treatment strategies."

Provided by University of Texas Health Science Center at San Antonio