MedicalXpress

Singapore scientists discover a possible off-switch for anxiety

January 11 2011

Scientists from the Agency of Science, Technology and Research/Duke-NUS Neuroscience Research Partnership, A*STAR's Institute of Molecular and Cell Biology, and the National University of Singapore have made a breakthrough concerning how anxiety is regulated in the vertebrate brain. Their work, published in the journal Current Biology, sheds light on how the brain normally shuts off anxiety and also establishes the relevance of zebrafish as a model for human psychiatric disorders.

The team of scientists, led by Dr Suresh Jesuthasan, showed that disrupting a specific set of neurons in the habenula prevents normal response to stressful situations. In their experiments, Dr Jesuthasan's team trained larval zebrafish to swim away from a light in order to avoid a mild electric shock. While normal fish easily learned this task, fish that had a specific set of neurons in the habenula damaged displayed signs of "helplessness". Although they initially tried to avoid the shock, they soon gave up.

What's more, these fish showed indications that they were more anxious than normal fish, such as being startled easily by non-harmful stimuli. Because of the similarity of the zebrafish brain to the mammalian brain, the study suggests that malfunction of the habenula is a possible cause of certain anxiety disorders in humans. This means that it may be possible to use direct stimulation of the habenula as a way of treating some types of anxiety disorders in humans. The zebrafish model which the scientists developed in the course of their work may also be used in future drug

discovery efforts for psychiatric medicines.

Said Dr Jesuthasan, "Our work deals with fundamental aspects of human experience – stress and anxiety. We think that the habenula of the brain is associated with the assessment of whether a stress has been overcome. Our study provides one possible explanation as to why the need to control the environment is such a critical component of human behavior – the feeling of control enables organisms to deal with stress."

Prof Dale Purves, Program Director of the Neurosciences and Behavioral Disorders Program at Duke-NUS Graduate Medical School and Executive Director of theA*STAR-Duke-NUS NRP, commented, "It may seem strange to be exploring anxiety in a tiny fish, but the advantages of animal models like this for understanding complex human disorders may well be our best bet. This important work by Dr. Jesuthasan and his colleagues is a first rate example of this."

Dr Jesuthasan and his team plan on continuing their studies of the habenula in humans and are also exploring how they can use their knowledge of habenula function to treat anxiety disorders.

Provided by Agency for Science, Technology and Research (A*STAR)