One Molecule Opens the Door to New Treatments for Depression

ScienceDaily (Apr. 12, 2010) — There has been little progress in the way we treat depression and anxiety for over thirty years, but a recent study at EPFL Ecole Polytechnique Fédérale de Lausanne (EPFL) may open the door to new strategies. In an article published online in *Molecular Psychiatry*, researchers from two laboratories at the Brain Mind Institute at EPFL explain how understanding the functioning of a molecule called MIF, or macrophage migration inhibitory factor, may change the way we treat depression.

Clinical depression affects 121 million people around the world, according to the World Health Organization, but only 60% to 80% of cases are effectively treated with current medication and psychotherapy. "These findings underscore MIF as a potentially relevant molecular target for the development of treatments linked to deficits in neurogenesis, as well as to problems related to anxiety, depression, and cognition," explains Carmen Sandi from the Laboratory of Behavioral Genetics.

MIF is normally thought to play a role in tissue swelling and even cancer development, but its precise location and function in the brain remained a mystery before Sandi's study. Sandi's team first detected a concentration of MIF protein in stem cells in the hippocampus, a key area for memory formation and neuron generation during adulthood. New neurons are thought to be linked to the creation of new memories but they may also play an important role in curbing anxiety -- previous studies have shown that prolonged periods of stress reduce neurogenesis, and many anti-depressants actually boost the production of new neurons.

By genetically and pharmaceutically manipulating the level of MIF in the hippocampus of rats, the researchers discovered that the absence of MIF significantly reduced the production of neurons and increased anxiety. They also found that the lack of MIF decreases the ability of anti-depressants to stimulate neurogenesis.

These findings have led the researchers to conclude that MIF plays an important role in neurogenesis and, in turn, the condition of anxiety and depression. Hilal Lashuel's group, from the Laboratory of Molecular Neurobiology and Functional Neuroproteomics at EPFL's Brain Mind Institute, had already been interested in MIF, but this discovery has led the team to explore new possibilities for treatments focusing on the MIF molecule.
Journal Reference:

1. L Conboy, E Varea, J E Castro, H Sakouhi-Ouertatani, T Calandra, H a Lashuel and C Sandi. Macrophage migration inhibitory factor (MIF) is critically involved in basal and fluoxetine-stimulated adult hippocampal cell proliferation and in anxiety, depression, and memory-related behaviors. *Molecular Psychiatry*, 23 February 2010 DOI: 10.1038/mp.2010.15

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