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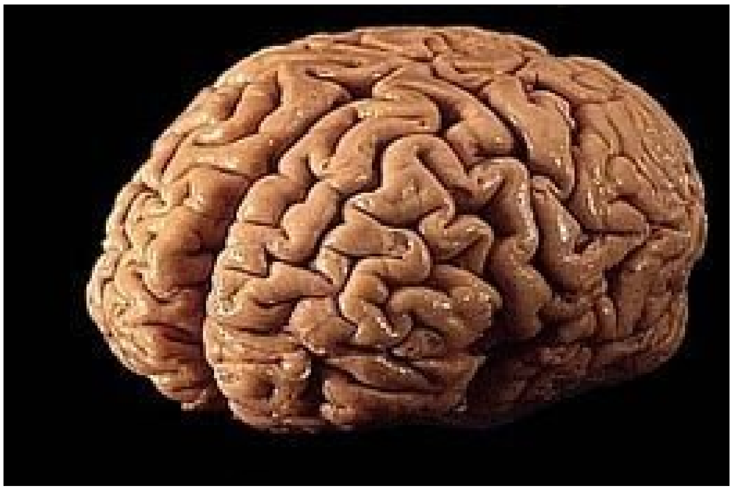
Scientists create 3D brain-like tissue

12 August 2014 | News | By BioSpectrum Bureau



Singapore: Scientists have created three-dimensional brain-like tissue that functions like and has structural features similar to tissue in the rat brain and that can be kept alive in the lab for more than two months.

As a first demonstration of its potential, researchers used the brain-like tissue to study chemical and electrical changes that occur immediately following traumatic brain injury and, in a separate experiment, changes that occur in response to a drug. The tissue could provide a superior model for studying normal brain function as well as injury and disease, and could assist in the development of new treatments for brain dysfunction.

The brain-like tissue was developed at the Tissue Engineering Resource Center at Tufts University, Boston, funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB) to establish innovative biomaterials and tissue engineering models.

Dr David Kaplan, stern family professor of Engineering at Tufts University is director of the center and led the research efforts to develop the tissue.

Currently, scientists grow neurons in petri dishes to study their behavior in a controllable environment. Yet neurons grown in two dimensions are unable to replicate the complex structural organization of brain tissue, which consists of segregated regions of grey and white matter. In the brain, grey matter is comprised primarily of neuron cell bodies, while white matter is made up of bundles of axons, which are the projections neurons send out to connect with one another. Because brain injuries and diseases often affect these areas differently, models are needed that exhibit grey and white matter compartmentalization.

Recently, tissue engineers have attempted to grow neurons in 3D gel environments, where they can freely establish connections in all directions. Yet these gel-based tissue models don't live long and fail to yield robust, tissue-level function. This is because the extracellular environment is a complex matrix in which local signals establish different neighborhoods that encourage distinct cell growth and/or development and function. Simply providing the space for neurons to grow in three dimensions is not sufficient.

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