Scientists Silvio Varon and others use human placenta to repair damaged nerves in brain and spinal cord

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UCSD SCIENTISTS USE HUMAN PLACENTA TO REPAIR DAMAGED NERVES IN BRAIN AND SPINAL CORD

Severe injury to the brain or spinal cord can cause irreversible damage. The body does not have the tools to repair or replace crippled nerve cells in the central nervous system.

However, scientists at the University of California, San Diego have fashioned a "bridge" out of the human placental tissue to reestablish the link between damaged neurons and other nerve cells.

In the May 29 Science magazine, researchers reported success in restoring axons, the fibers that interconnect neurons, in cultured cells growing in peetri dishes and in the brains of experimental rats.

Working in tandem, research teams from the Department of Biology and the Department of Neuroscience of the School of Medicine found that certain growth promoting factors in the placenta stimulate the regeneration of these fibers -- the initial step toward restoring communication between neurons.

"We have provided a bridge from human sources that raises no ethical questions since the placenta is discarded by hospitals following a normal delivery," said Silvio Varon, the cell neurobiologist who conducted the in vitro or cell culture experiments. He has a joint appointment to the biology department and the medical school.

Varon and research biologist Marston Manthorpe found that "human placental tissue is very effective in promoting the regrowth of fibers in cultured neurons. The membrane contains chemical promoters that naturally stimulate growth of fetal nerve fibers."

The experiments in rats were conducted in the laboratory of Dr. Fred H. Gage, professor of neuroscience. To simulate damaged human tissues in rat brains, researchers severed bundles of axons which extend out of nerve cells and carry signals across synapses to other cells.

Gage and his associates did their work on the septo-hippocampal system, a part of the brain involved in memory and learning processes. They cut the fibers which connect the septum to the hippocampus and inserted a slice of placental membrane, which contains the protein laminin and other chemicals that promote nerve cell growth, in the cavity between the two regions.

As the scientists had predicted, the neuron fibers from the septum grew across the placental bridge and reconnected with neurons in the hippocampus. In other words, molecules in the placental tissue actually stimulated and guided the growth of the axon across the gap. Moreover, the implanted membranes prompted neither an immunological reaction nor inflammation in the rat brains, an earlier concern of the researchers.

Varon cautions that it will be a long time -- if ever -- before placenta membranes could be used to treat people. At the moment, the work is being done only in rats, and it is at a very preliminary stage. Scientists have not yet completed work to find out if the regenerated nerve cells function normally.

Varon and Manthorpe undertook the study of nerve cell regeneration in the late 1970s to learn why nerves outside the central nervous system have the potential to regenerate and eventually function normally again, while nerve cells in the spinal cord and brain do not.

Other collaborators in this research were George E. Davis, now at the National Cancer Institute in Bethesda, Md.; Scott N. Blaker of the UCSD Department of Neuroscience; and Eva Engvall of the La Jolla Cancer Research Foundation.

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