Modifying scar tissue can potentially improve outcome in chronic stroke

May 21 2012

New research from the Buck Institute for Research on Aging shows that modifying the scar tissue that develops following a stroke is a promising avenue for future treatments. The need for therapeutics for chronic stroke is compelling. There are 750,000 new strokes per year in the U.S., a leading cause of morbidity and mortality. Aside from physical and occupational therapy, treatments for the six million patients in the U.S. who suffer from chronic stroke are lacking; the vast majority of patients remain in an ongoing state of disability with little hope of return to normal function.

The research, published in the May 21, 2012 online edition of The Proceedings of the National Academy of Sciences, builds on ongoing spinal cord repair studies. Working in rats, scientists in the Greenberg laboratory infused the stroke cavity with either the enzyme chondroitinase ABC (ChABC) or the protein heparan sulfate proteoglycan glypican (glypican). In both cases the treatments improved outcome in the animals – they had less weakness and improved coordination.

Lead scientist, Justin Hill, MD, says both treatments reduced the size of the scar tissue that had formed following the stroke and essentially "woke up" neurons in the areas surrounding the injury, stimulating the growth of new neurites, which are the terminal extensions of nerves. "We think the scar tissue not only blocks off areas of the brain that are injured during stroke, we also believe the scar tissue secretes factors that impact the function of nearby neurons," said Hill. "Dissolving the scar

may spur neurons to re-route connections around the area injured during the stroke." Researchers found that treatment with glypican increased the expression of fibroblast growth factor-2 (FGF-2) near the site of injury and that ChABC increased brain-derived neurotrophic factor (BDNF) expression, both of which have been shown to increase neuron size and survival.

"There are only a handful of laboratories that are focused on treatments for chronic stroke," said Buck faculty David Greenberg, MD, PhD. "Dr. Hill's research is groundbreaking in that it is the first to apply this research on spinal cord injury to stroke and uncovers some of the underlying mechanisms involved in improved function."

Future research is aimed at discovering possible drug candidates to help patients suffering from chronic stroke.

Provided by Buck Institute for Age Research