

Brain Damage Occurs Within Minutes from the Onset of a Stroke, Study Reveals

February 14 2008

Scientists at the Brain Research Centre at the University of British Columbia and Vancouver Coastal Health Research Institute have found that harmful changes to the brain's synaptic connections occur within the first three minutes following a stroke.

The finding, using mouse models, published today in the international *Journal of Neuroscience*, suggests cardiac arrest and stroke in humans would trigger a similar chain of events. Stroke is caused by loss of blood flow to the brain and is a leading cause of death and disability in North America. Synapses are tiny brain switches that relay information from one neuron to another.

“Damage to the brain’s synaptic connections occurs much sooner than expected,” says Tim Murphy, UBC Professor of Psychiatry, senior investigator at the Brain Research Centre, and a member of the Vancouver Coastal Health Research Institute. “Potentially, stroke or cardiac arrest patients have undergone major changes in the structure of their synapses before anyone could think about calling 911.”

Murphy, lead author of the study says, “although stroke can be treated within three hours of onset, the implications of this study are that considerable damage – some of which is irreversible – has occurred almost immediately after a stroke. Given these results, stroke prevention through management of risk factors should be given greater emphasis.”

Using high-resolution microscopy, scientists demonstrated that the

structure and function of cortical synapses were severely compromised only one to three minutes after stroke during a massive wave of electrical discharge termed ischemic depolarization. Importantly, if blood flow was restored, as can occur using stroke treatments with clot-busting drugs, 94 per cent of all synaptic connections recovered from severe deformation. Further studies will examine the upper limits of blood flow restoration time and synaptic connection recovery.

The study suggests that even short duration loss of blood flow, (approximately one to three minutes) could lead to damaged synapses. In humans, brief loss of brain blood flow can occur during medical procedures such as bypass surgery, which can trigger blood clots to enter the brain. Other conditions with brief recurrent loss of blood flow include transient ischemia attacks, or mini strokes. For these situations Murphy suggests, “Strategies that control ischemic depolarization associated with stroke's effect on synapses would be fruitful avenues for future drug development.”

The study is available for free at the journal's website:

www.jneurosci.org

Source: University of British Columbia

Citation: Brain Damage Occurs Within Minutes from the Onset of a Stroke, Study Reveals (2008, February 14) retrieved 25 April 2024 from

<https://medicalxpress.com/news/2008-02-brain-minutes-onset-reveals.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--