

New target discovered to treat epileptic seizures following brain trauma or stroke

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New therapies for some forms of epilepsy may soon be possible, thanks to a discovery made by a team of University of British Columbia and Vancouver Coastal Health Research Institute neuroscience researchers.

The researchers found that hemichannels - the same channels the researchers previously found to that cause cell death following a stroke - may also cause epileptic seizures that occur following head trauma or a stroke.

The findings, published tomorrow in *Science*, will allow researchers to focus on new treatments that block these channels. A hemichannel is a channel that can form in nerve cells which allows chemical ions to pass through.

"The glutamate receptor that is linked to cell death following a stroke also triggers opening of hemichannels," says UBC Psychiatry Prof. Brian MacVicar, who is a member of the Brain Research Centre at UBC and VCH Research Institute. "Therefore both stroke itself or the glutamate released by a stroke can open hemichannels and cause cell death or epileptic seizures."

The researchers tested the effect of glutamate at levels less than those reached during stroke and found that more moderate activation of glutamate receptors opens hemichannels and causes seizure but does not produce cell death associated with stroke.

Glutamate is one of the brain's most abundant chemical messengers. Gap junctions are connections that allow molecules and ions, to flow between cells. Junctions are composed of two hemichannels that bridge intercellular space.

When epileptic seizures occur, hemichannels unexpectedly open near the synapses, which disrupt the normal electrical activity of the brain leading to seizures.

"We found that blocking hemichannels reduced the epilepsy-like discharges," says Roger Thompson, a former UBC Psychiatry post-doctoral Fellow who is now an Assistant Professor of Cell Biology, Anatomy and Clinical Neurosciences at the University of Calgary.

"With these results we are confident that the discovery of safe blockers of hemichannels will provide a new therapy in the treatment to reduce cell loss and seizures that are caused by stroke," says MacVicar, who also holds the Canada Research Chair in Neuroscience at UBC.

"The next step will be to develop a compound to block brain cell hemichannels from opening," says MacVicar. "Therapies for epilepsy patients who have suffered a stroke or head trauma may be available within five to 10 years."

According to the BC Epilepsy Society it is estimated that one out of 12 people will have a seizure in their lifetime, and close to one in 100 Canadians have epilepsy. An epileptic seizure is an abnormal burst of electrical activity within the brain.

Source: University of British Columbia

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