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Researchers develop a compound to improve stroke patient recovery

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A new compound shows promise for improving motor function recovery for stroke patients in combination with rehabilitation therapy. Human clinical trials for a new drug are underway



A team of Japanese researchers has developed a new compound that enhanced motor function recovery after brain damage in animal tests, according to a study published in the journal Science.

The small-molecule compound, called edonerpic maleate, was developed by a research team led by Yokohama City University and Toyama Chemical Co., Ltd. in Japan.

When administered to rodents and monkeys undergoing rehabilitation for brain damage, both groups of animals showed greater and faster recovery of motor function than those with just rehabilitation alone.

Toyama Chemical has already completed a clinical trial for the drug in healthy people, and plans to next conduct a clinical trial with stroke patients.

In this new study, the researchers describe how edonerpic maleate helps accelerate recovery of motor function.

For example, macaque monkeys doing physical therapy and receiving edonerpic maleate were able to pinch small food with their fingers within a month of starting treatment. Recovery of such fine motor movements is often difficult for stroke patients.

"I hope this drug will help a lot of patients who suffer from paralysis after stroke," said Professor Takuya Takahashi, of Yokohama City University Graduate School of Medicine, who led the research.

Notably, the small-molecule compound shows positive results even when treatment started a month after the induction of brain damage - not just hours.

This has the potential to boost recovery prospects for many stroke patients.

The compound appears to work in tandem with rehabilitation to enhance neural plasticity. Neural plasticity is the brain's ability to learn and adapt in response to experience.

Brain cells affected by stroke cease to function normally within seconds of the trauma. However, the brain can create new pathways between neurons with external stimuli, in this case, physical rehabilitation - this is the essence of neural plasticity.

Edonerpic maleate helps this process by facilitating the delivery of an important neurotransmitter receptor, called AMPA receptor, to the structures called synapses, which mediate information between neurons. The AMPA receptors are very important for signal transmission and information processing.

They receive signals from glutamate, a major neurotransmitter, and help transmit the glutamate signal to the next neuron.

By helping build up AMPA receptors at synapses in conjunction with rehabilitative training, edonerpic maleate helps increase the potential for a signal transmission and neuron response.

The researchers further determined that edonerpic maleate works by binding to an intracellular protein called collapsin-response-mediator-protein 2 (CRMP2), which is related to synaptic plasticity.

Mice lacking CRMP2 protein did not show an increase in AMPA receptors nor recovery of motor function, even with edonerpic maleate, indicating that CRMP2 is critical for the compound to work.

The research was done in collaboration with Japan's National Institute of Advanced Industrial Science and Technology, and the National Institutes of Biomedical Innovation, Health, and Nutrition.