A push makes neuron longer

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Some neurons from spinal cord have quite long neurites, but the molecular mechanism of long-neurite outgrowth has been still mysterious. The research team led by Assistant Professor Koji Shibasaki in Gumma University and Professor Makoto Tominaga in National Institute for Physiological Sciences (NIPS) in Japan, reported that TRPV2 receptor can act as mechanical stretch-sensor in developing neurons to help their neurites grow much longer. They report their finding in *Journal of Neuroscience* published on March 31, 2010.

TRPV2 receptor has been known as noxious heat-sensor (activated by >52°C). The research group found that, during early embryonic stages, TRPV2 had been already expressed in restricted neurons (spinal motor neurons and DRG sensory neurons), although embryos don't have any situation to be exposed to such high temperature. Thus, these results strongly indicate that TRPV2 has a distinct role to contribute neuronal development except for its thermo-sensitive role. The research group found that activation of TRPV2 in developing neurons caused further axon outgrowth. Endogenous TRPV2 was activated in a membrane-stretch dependent manner in developing neurons. Thus, for the first time, Dr. Shibasaki and the research group elucidated that TRPV2 is an important regulator for axon outgrowth through its activation by mechanical membrane stretch during development.

"We revealed the molecular mechanism why spinal motor and DRG sensory axons can extend such long neuritis toward peripheral tissues. It is really important finding that extending axon can convert mechanical power to electrical energy. I hypothesized that axon outgrowth is

regulated by the positive feedback mechanisms through membrane stretch. Now, we can explain why rehabilitation is necessary to improve severe neuronal damage (ex. after traffic accident). The answer could be the activation of TRPV2 by movement of damaged tissue. This molecular mechanism can be applied to neuronal repair, if we can synthesize TRPV2 targeted medication", said Dr Shibasaki.

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