New mechanism underlying pain found

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Researchers at Johnson & Johnson Pharmaceutical Research & Development (J&JPRD) today announced that they have discovered a new molecular mechanism that may underlie neuropathic pain. The clearer understanding of the root-cause of chronic neuropathic pain, and the preclinical validation of new targets for pharmaceutical therapies shown in this research, together present an opportunity for the development of new ways to treat the severe pain associated with such common conditions or diseases as sciatica, diabetic neuropathy and shingles.

This research was presented at Neuroscience 2006, the annual meeting of the Society for Neuroscience.

Neuropathic pain, or the spontaneous pain and abnormal sensitivity following a nerve injury, typically results from a traumatic injury, an infection or disease, or surgery, and can persist long after the initial injury has healed. Millions of people worldwide suffer some form of neuropathic pain, and the current treatment options are limited or inadequate for many people. The research presented today suggests that the persistent pain may be caused by specific types of ion channels, called "pacemaker channels," which initiate a constant and rhythmic transmission of pain signals to the brain, rhythmically similar to those generated by pacemaker cells that regulate one's heart rate.

"What we have shown in our early preclinical research is that we can inhibit the inappropriate neuronal activity and resulting sensitivity that follows nerve injury," said Alan Wickenden, Ph.D., Research Fellow in

the Pain and Related Disorders Team at J&JPRD. "Trauma to nerves and the tissues that surround them seems to trigger a complicated cascade of events that results in an increase in the activity of these pacemaker ion channels and the resulting transmission of pain signals to the brain. We are encouraged by early evaluations of certain chemical structures that seem to disrupt this rhythmic transmission."

Ion channels are openings that exist within a cell that allow the passage of certain ions into a cell to regulate activity. It is believed that hundreds of different types of ion channels exist in the body, each with a distinct responsibility for sending a specific message, and that specific pacemaker channels exist in peripheral nerves as well as in the heart and the central nervous system. In the heart, for instance, signals generated by pacemaker channels stimulate the heart muscle to contract, and in the brain, they control sleep and waking. Made up of glycoproteins, or proteins with sugar molecules attached, pacemaker channels -- also known as HCN channels (Hyperpolarization activated, Cyclic Nucleotide-gated cation channels) -- allow the entrance of sodium ions into the cell based on the configuration of the protein. Entry of sodium ions can trigger electrical activity in both cardiac cells and neurons.

"We think we have only scratched the surface in this area, as pacemaker channels may also play a role in inflammatory pain as well as other types, " said Dr. Wickenden. "More research is needed before this will translate to patient benefit, but the better understanding we've gained of the mechanism can enable us to narrow our focus."

Source: Johnson & Johnson Pharmaceutical Research & Development, L.L.C.