Study: Relief of pain is a reward

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(Medical Xpress)—The Pain Research Group at the UA College of Medicine-Tucson studies the underlying causes of acute and chronic pain to promote the discovery of new targets for drug development with the ultimate goal of improved pain management.

Scientists have learned a lot about pain, but this has not led to the discovery of many new medications to help the millions of people whose lives are affected by chronic pain.

In an effort to improve pain management, Frank Porreca and his research group from the department of pharmacology at the University of Arizona College of Medicine-Tucson have been exploring new preclinical measures that may better reflect features of the human experience of pain and that can be used to find new therapies.

Relief of pain is rewarding, according to Porreca and his colleagues. They have demonstrated that treatments that relieve the unpleasant feeling of pain also activate reward circuits and reinforce behaviors that result in relief of pain.

Their study, "Pain relief produces negative reinforcement through activation of mesolimbic reward/valuation circuitry," is reported in the Nov. 26 Early Edition issue of the Proceedings of the National Academy of Sciences.

"Determining how we feel, including knowing if we are in pain, depends on a brain neural representation of information that is gathered by a

multitude of sensors that monitor the body and its tissues for local temperature, blood flow, blood pressure, heart rate, pH, carbon dioxide level and other states," said Porreca.

"These 'interoceptors' constantly evaluate and report the state of the body to the brain, generating specific conscious sensations that tell us that we are hungry, thirsty or cold, or that something is wrong. Nociceptors are a special class of interoceptors that produce sensations of pain. They 'sound the alarm' to tell us that our tissues have been – or soon may be – damaged."

Thirst, hunger, itch, cold, heat, pain and other states of imbalance are unpleasant feelings that demand a behavioral response to correct the problem, Porreca said. If you feel cold, you want to get warm; if you are thirsty, you want to drink; if you are in pain, you want relief.

What motivates an organism to respond to these feelings? Things that are essential to the life of an organism or the survival of the species, such as food or drink, are rewarding. Rewards activate neural circuits in the brain and produce pleasant and positive feelings that reinforce behaviors that increase our ability to survive, notes Porreca.

The UA researchers have demonstrated that treatments that relieve the unpleasant feeling of pain also result in activation of these same reward circuits and reinforce behaviors that result in relief of pain. The novel demonstration of pain relief as a reward provides an entirely new way to discover medicines for patients.

"The activation of the reward circuit by pain relief provides an output measure for assessment of the potential effectiveness of novel molecular targets," Porreca explains. "The activation of these ancient and evolutionarily conserved circuits by pain relief can serve as a basis for translation of treatments that will likely be effective in humans."