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A Hairy Clue About Blepharospasm

April 22, 2005 Contributed by:LindaRoach

The answer to what goes wrong to cause blepharospasm might lie in a rat's whiskers. And that isn't as farfetched as it might sound, say University of California-San Diego researchers Quoc-Thang Nguyen, PhD, and David Kleinfeld, PhD.

The two neuroscientists have discovered that sensory input from a rat's whiskers runs in a neural circuit that is an exact mimic of the circuit that controls the eyeblink response. Furthermore, unlike every other previous reflex circuit found so far in the brain, the system operates through positive feedback.

"It turns out that the circuit we're studying in rat whiskers is exactly the same for the human eye," Dr. Kleinfeld said. "There's a parallel circuit also at the level of the brainstem that controls the eyeblink response."

The researchers found that when a rat's whiskers touch an object a positive-feedback loop is activated among the sensory neurons, the brainstem and motor neurons. This causes the rat to push the whisker against the object again. The reflex would continue indefinitely except for adaptation. So too with errant eyeblinking, they suggest.

"With this kind of positive feedback loop, the more you close the eyelid, the more sensory drive you're going to have for doing it again. The brain wants to close the eyelid even more," Dr. Nguyen said. "We think blepharospasm occurs when the adaptation that normally turns off the reflex doesn't happen."

"As best we know, people never thought about positive feedback going on in this way," Dr. Kleinfeld added. "It hasn't been proved yet, but that's our very small contribution to ophthalmology."

The next step? To investigate whether they can turn off the positive-feedback loop with neurotransmitters.

For more information:

Nguyen QT, Kleinfeld D. Positive feedback in a brainstem tactile sensorimotor loop. Neuron. 2005 Feb 3;45(3):447-57.

http://www.neuron.org/content/issue?volume=45&issue=3

Dr. Kleinfeld's website:

http://physics.ucsd.edu/neurophysics/index.html