Scientists discover how brain corrects bumps to body

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Researchers have identified the area of the brain that controls our ability to correct our movement after we've been hit or bumped -- a finding that may have implications for understanding why subjects with stroke often have severe difficulties moving.

The fact that humans rapidly correct for any disturbance in motion demonstrates the brain understands the physics of the limb – scientists just didn't know what part of the brain supported this feedback response – until now.

Several pathways and regions of the central nervous system could contribute to our response to external knocks to the body, but researchers only recently discovered that the pathway through the primary motor cortex provides this knowledge of the physics of the limb.

"To say this process is complex is an understatement," says Stephen Scott, a neuroscience professor and motor behavior specialist in the Department of Biomedical and Molecular Sciences. "Voluntary movement is really, really hard in terms of the math involved. When I walk around, the equations of my motion are like a small book. The best physicists can't solve these complicated equations, but your brain can do it incredibly quickly."

The corrective movement pathway works by limiting and correcting the domino effect of involuntary bodily movement caused by an external blow. For example, a blow to the shoulder that causes the whole arm to swing about may require the brain to quickly turn on muscles in the shoulder, bicep, forearm and hand in order to regain control of the limb. Likewise, a football player who collides with an opponent during a game has to respond quickly to correct the movement and remain upright.

Strokes that take place in the primary motor cortex may cause varying levels of damage to this corrective movement pathway. This varying damage may explain why some stroke patients are able to improve their movement skills in rehabilitation and why some patients remain uncoordinated and unsteady.

Dr. Scott now wants to apply these findings to stroke patients by examining the damage these patients have to their sensory pathways and how this damage relates to movement problems. He believes that these findings may support an increased focus on first-stage sensory rehabilitation to help rebuild pathways that transmit sensory information to the brain before treatment moves to a focus on motor skills.

More information: This work was recently published in *Nature*.

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