The power of mental visualization in maintaining real-life muscle

January 5 2015, by Stacy Brooks

Anyone who has worn a cast knows that rebuilding muscle strength once the cast is removed can be difficult. Now researchers at the Ohio Musculoskeletal and Neurological Institute (OMNI) at Ohio University have found that the mind is critical in maintaining muscle strength following a prolonged period of immobilization and that mental imagery may be key in reducing the associated muscle loss.

Strength is controlled by a number of factors—the most studied by far is skeletal muscle. However, the nervous system is also an important, though not fully understood, determinant of strength and weakness. Brian C. Clark and colleagues set out to test how the brain's cortex plays into strength development. They designed an experiment to measure changes in wrist flexor strength in three groups of healthy adults. Twenty-nine subjects wore a rigid cast that extended from just below the elbow past the fingers, effectively immobilizing the hand and wrist, for four weeks. Fifteen subjects who did not wear casts served as the control group.

Of the group with wrist-hand immobilization, half (14) were asked to regularly perform an imagery exercise, imagining they were intensely contracting their wrist for five seconds and then resting for five seconds. They were verbally guided through the imagery exercise with the following instructions: "Begin imagining that you are pushing in as hard as you can with your left wrist, push, push, push…and stop. (Five-second rest.) Start imagining that you are pushing in again as hard as you can, keep pushing, keep pushing…and stop. (Five-second rest.)" This was

repeated four times in a row followed by a one-minute break for a total of 13 rounds per session and five sessions per week. The second group performed no imagery exercises.

At the end of the four-week experiment, both groups who wore casts had lost strength in their immobilized limbs when compared to the control group. But the group that performed mental imagery exercises lost 50% less strength than the non-imaginative group (24 percent vs. 45 percent, respectively). The nervous system's ability to fully activate the muscle (called "voluntary activation" or VA) also rebounded more quickly in the imagery group compared to the non-imagery group.

"These findings suggest neurological mechanisms, most likely at the cortical level, contribute significantly to disuse-induced weakness, and that regular activation of the cortical regions via imagery attenuates weakness and VA by maintaining normal levels of inhibition," the research team wrote. "Thus our findings that imagery attenuated the loss of muscle strength provide proof-of-concept for it as a therapeutic intervention for muscle weakness and voluntary neural activation."

More information: "The power of the mind: the cortex as a critical determinant of muscle strength/weakness." *Journal of Neurophysiology* Published 15 December 2014Vol. 112no. 12, 3219-3226. DOI: 10.1152/jn.00386.2014

Provided by American Physiological Society