

Muscle loss finding may one day save physiques

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Hey guys, remember the muscle shirts we wore in our teens and 20s? After the age of 40 that meager part of our wardrobes usually is obsolete. Yes, at the big 4-0 we begin to lose muscle, and by age 80 up to a third of it may be gone. It's an inevitable process of aging called sarcopenia.

Why does sarcopenia happen and can it be stopped? A study conducted in mice with accelerated muscle loss at The University of Texas Health Science Center at San Antonio provides this insight: Less protection from antioxidants and more damage from oxidative stress results in impairment to cells' energy centers, which slowly leads to death of [muscle cells](#).

A team directed by Holly Van Remmen, Ph.D., associate professor with the university's Barshop Institute for Longevity and Aging Studies and the Department of Cellular and Structural Biology, found that without a certain antioxidant enzyme to balance the formation of harmful [reactive oxygen species](#) (ROS), cellular energy centers called mitochondria fail to work properly. The mitochondria even add to the spate of ROS molecules and release factors leading to cell death.

"The impaired function of mitochondria also has a detrimental effect on the way motor neurons 'talk' to the muscle to achieve muscle contraction," Dr. Van Remmen said. "This interaction occurs at a specialized synapse where the nerve and muscle come in close contact." This key structure is called the neuromuscular junction, she said.

Smaller and weaker muscles

Youngmok C. Jang, Ph.D., a leading author in the study, investigated mice that were genetically engineered to lack an antioxidant enzyme called copper-zinc superoxide dismutase. He compared mitochondria from these mice and normal mice and found reduced function of the energy centers in the enzyme-deficient mice. This contributed to more cell death and [muscle atrophy](#) in the rodents. "As a result, their muscles were a lot smaller and weaker," Dr. Van Remmen said.

Insights gleaned about [muscle loss](#) can help scientists better understand other neuromuscular diseases such as amyotrophic lateral sclerosis (Lou Gehrig's disease). "Age-related muscle atrophy is a complex process and involves multiple systems," Dr. Van Remmen said. "There are, however, common mechanisms occurring in sarcopenia and other neuromuscular diseases. By understanding the mechanisms underlying age-related muscle atrophy and alterations at the neuromuscular junction, we should be able to gain insight that will help us to discover new therapeutic interventions."

If a muscle-preserving therapy is one day developed, future generations of young men will be able to keep their muscle shirts a bit longer.

More information: This paper was published online by The FASEB Journal on Dec. 29, 2009.

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