

Researchers identify mechanism that could help old muscle grow

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Sarcopenia – the significant loss of muscle mass and function that can occur as we age – is associated with many chronic conditions such as diabetes, high cholesterol and obesity. In findings published online ahead of publication in the September 2014 issue of the *FASEB Journal*, researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University identify a muscle-building mechanism that could be important in addressing sarcopenia.

When people strength train the body responds by making muscle. The researchers recruited 16 healthy but sedentary men to perform a single bout of resistance exercise to trigger [muscle growth](#) and examined tissue samples taken before and six hours after the exercise. Half of the men were in their twenties and the other half in their seventies.

"In order for the body to make proteins that build muscle, certain genes need to be turned on," said lead author Donato A. Rivas, Ph.D., a scientist in the Nutrition, Exercise Physiology and Sarcopenia Laboratory at the USDA HNRCA at Tufts University. "We noticed the [older people](#) had a lot fewer genes turned on compared to the younger people, showing us their muscles weren't responding as well to the exercise."

Rivas and colleagues observed that the level of microRNAs, small RNA molecules that have a prominent role in regulating genes, was lower in the [muscle tissue](#) of the [older men](#), compared to younger men. "One of the steps in building muscle seems to be missing in the older men,

preventing them from responding to the exercise as strongly as the [younger men](#) did," Rivas said. "It is possible that the suppression of these microRNAs is setting off a chain of events that is causing older people to be less efficient in developing muscle."

With the population of older adults in the United States projected to increase significantly in the coming decades, more effective sarcopenia treatment and prevention could help control healthcare costs. "Age-related muscle loss has been associated with a myriad of other health problems," said senior author Roger A. Fielding, Ph.D., director of the Nutrition, Exercise Physiology and Sarcopenia Laboratory at the USDA HNRCA at Tufts University. "Muscle mass is closely tied to our metabolism and losing it increases the risk of developing metabolic diseases like type 2 diabetes and cardiovascular disease. We also know that a program of moderate physical activity, including resistance exercises, can strongly influence a person's chances of maintaining their ability to walk after age 70."

In addition to resistance exercises, scientists are exploring different approaches to preserving and building [muscle mass](#) in [older adults](#). "A few studies suggest gene therapy, nutrient supplementation or hormone replacement therapy can assist with building muscle," said Fielding, who is also a professor at the Friedman School of Nutrition Science and Policy at Tufts University and the Tufts University School of Medicine. "Our identification of a possible microRNA target could help advance the study of these largely untested, but promising approaches to promoting [muscle](#) growth in older people."

The authors note the small size of the study necessitates future research in clinical models and in men and women, particularly those who have sarcopenia.

More information: Rivas DA, Lessard SJ, Rice NP, Lustgarten MS,

So K, Goodyear LJ, Parnell LD and Fielding RA. "Diminished skeletal muscle microRNA expression with aging is associated with attenuated muscle plasticity and inhibition of IGF-1 signaling." *The FASEB Journal*. Published online ahead of print June 13, 2014. In print: September 2014. [DOI: 10.1096/fj.14-254490](https://doi.org/10.1096/fj.14-254490)

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