

Muscle loss in elderly linked to blood vessels' failure to dilate

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Why do people become physically weaker as they age? And is there any way to slow, stop, or even reverse this process, breaking the link between increasing age and frailty?

In a paper published online this Wednesday in the *Journal of Clinical Endocrinology & Metabolism*, University of Texas Medical Branch at Galveston researchers present evidence that answers to both those questions can be found in the way the network of blood vessels that threads through muscles responds to the hormone insulin.

Normally, these tiny tubes are closed, but when a young person eats a meal and insulin is released into the bloodstream, they open wide to allow nutrients to reach [muscle](#) cells. In elderly people, however, insulin has no such "vasodilating" effect.

"We were unsure as to whether decreased vasodilation was just one of the side effects of aging or was one of the main causes of the reduction in [muscle protein](#) synthesis in elderly people, because when nutrients and insulin get into muscle fibers, they also turn on lots of intracellular signals linked to muscle growth," said UTMB's Dr. Elena Volpi, senior author of the paper. "This research really demonstrates that vasodilation is a necessary mechanism for insulin to stimulate muscle protein synthesis."

Volpi and her collaborators reached this conclusion after an experiment in which they infused an amount of insulin equivalent to that generated

by the body in response to a single meal into the thigh muscles of two sets of young volunteers. One group had been given a drug that blocked vasodilation, while the other was allowed to respond normally.

Measurements of muscle protein synthesis levels were made using chemical tracers, while biopsies yielded data on specific biochemical pathways linked to muscle growth.

"We found that by blocking vasodilation, we reproduced in young people the entire response that we see in older persons — a blunting of muscle protein response and a lack of net muscle growth. In other words, from a muscle standpoint, we made young people look 50 years older," Volpi said.

Such results point the way to what could be a powerful new therapy for age-related frailty and the health and quality-of-life problems that come with it.

"Eventually, if we can improve [muscle growth](#) in response to feeding in old people by improving blood flow, then we're going to have a major tool to reduce muscle loss with aging, which by itself is associated with reduction in physical functioning and increased risk of disability," Volpi said.

Provided by University of Texas Medical Branch at Galveston

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