

"Long before it's in the papers"

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To keep muscles strong, “garbage” must go

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Courtesy Cell Press
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To maintain muscle strength with age, cells must get rid of garbage that slowly accumulates in them, just as a household does, according to a new study.

The cellular junk includes toxic clumps of malformed proteins, pathogens and spent organelles, which are cellular compartments used for specific functions.

The researchers studied mice deficient for a gene required for the tightly controlled process of degradation and recycling within cells known as autophagy. The rodents showed profound muscle shrinkage and weakening that worsened with age.

“If there is a failure of the system to remove what is damaged, and that persists, the muscle fiber isn’t happy,” said Marco Sandri of the University of Padova in Italy. The research by Sandri and colleagues appears in the December issue of the journal *Cell Metabolism*.

The muscle wasting in mice seems to bear some resemblance to certain forms of muscle-wasting diseases, Sandri said. He now suspects that this kind of mechanism may offer insight into some of those still-unexplained conditions, as well as the muscle weakening that comes with normal aging.

Researchers knew before that excessive autophagy could also lead to muscle loss and disease. The new findings highlight the importance of maintaining a normal level of autophagy. Although that seems to make sense in retrospect, Sandri said, it wasn’t what his team had initially expected.

“We thought if you reduced autophagy it might protect against” muscle shrinkage, he said. “Instead, it’s the opposite. We realized, OK, of course, if you don’t remove the damage, it triggers weakness.”

The findings may have clinical implications, he said. There has been interest in developing therapies to block proteins’ degradation for treating certain muscle-wasting disorders. But in some cases, at least, “it may be better to activate autophagy and remove the garbage in the cells,” Sandri said. The researchers think similar treatments might combat muscle weakness with aging as well, noting that another study has shown a decline in the efficiency of autophagy with age.