

Is physical frailty inevitable as we grow older?

<http://well.blogs.nytimes.com/2011/11/09/aging-well-through-exercise/>

That question preoccupies scientists and the middle-aged, particularly when they become the same people. Until recently, the evidence was disheartening. A large number of studies in the past few years showed that after age 40, people typically lose 8 percent or more of their muscle mass each decade, a process that accelerates significantly after age 70. Less muscle mass generally means less strength, mobility and among the elderly, independence. It also has been linked with premature mortality.

But a growing body of newer science suggests that such decline may not be inexorable. Exercise, the thinking goes, and you might be able to rewrite the future for your muscles.

Consider the results of a stirring study published last month in the journal *The Physician and Sportsmedicine*. For it, researchers at the University of Pittsburgh recruited 40 competitive runners, cyclists and swimmers. They ranged in age from 40 to 81, with five men and five women representing each of four age groups: 40 to 49, 50 to 59, 60 to 69, and 70-plus. All were enviably fit, training four or five times a week and competing frequently. Several had won their age groups in recent races.

They completed questionnaires detailing their health and weekly physical activities. Then the researchers measured their muscle mass, leg strength and body composition, determining how much of their body and, more specifically, their muscle tissue was composed of fat. Other studies have found that as people age, they not only lose muscle, but the tissue that remains can become infiltrated with fat, degrading its quality and reducing its strength.

There was little evidence of deterioration in the older athletes' musculature, however. The athletes in their 70s and 80s had almost as much thigh muscle mass as the athletes in their 40s, with minor if any fat infiltration. The athletes also remained strong. There was, as scientists noted, a drop-off in leg muscle strength around age 60 in both men and women. They weren't as strong as the 50-year-olds, but the differential was not huge, and little additional decline followed.

The 70- and 80-year-old athletes were about as strong as those in their 60s.

"We think these are very encouraging results," said Dr. Vonda Wright, an orthopedic surgeon and founder of the Performance and Research Initiative for Masters Athletes at the University of Pittsburgh Medical Center, who oversaw the study. "They suggest strongly that people don't have to lose muscle mass and function as they grow older.

The changes that we've assumed were due to aging and therefore were unstoppable seem actually to be caused by inactivity. And that can be changed."

Other recent studies have produced similar findings. Last year, researchers at the Canadian Centre for Activity and Aging, for instance, examined muscle tissue from older competitive runners, checking for the density of their motor units, a measure of muscle health. A motor unit is, essentially, the control mechanism of a functioning muscle, composed of a neuron and the particular

muscle fibers that that neuron activates. The more motor units in a muscle, the stronger it generally is.

In multiple earlier studies, people over 50 have been found to possess far fewer muscle motor units than young adults. But that wasn't true for the sexagenarian runners, whose leg muscles teemed with almost as many motor units as a separate group of active 25-year-olds. Running, the scientists wrote, seemed able to "mitigate the loss of motor units with aging well into the seventh decade of life."

Of course, the volunteers in both Dr. Wright's and the Canadian study were, for the most part, lifelong athletes. Whether similar benefits are attainable by people who take up exercise when they are middle-aged or older "isn't yet clear," Dr. Wright says, "although there's no reason to think that you wouldn't get similar results no matter when you start."

In an encouraging animal study from last year, elderly rats that had been sedentary throughout their adult lives were put on a running program. After 13 weeks, their leg muscle tissues had filled with new satellite cells, a specialized type of stem cell that is known to build and repair muscle. Comparable experiments in older people have yet to be done, though.

Other questions about the impacts of exercise on aging muscle also remain unanswered. "We don't know what kinds of exercise are best," Dr. Wright says and, in particular, whether endurance exercise is necessary for muscle sparing or whether weight training might be as good or better. Scientists also haven't determined just how much activity is required to maintain muscle mass, or how intense it needs to be.

"What we can say with certainty is that any activity is better than none," Dr. Wright says, "and more is probably better than less. But the bigger message is that it looks as if how we age can be under our control. Through exercise, you can preserve muscle mass and strength and avoid the decline from vitality to frailty."