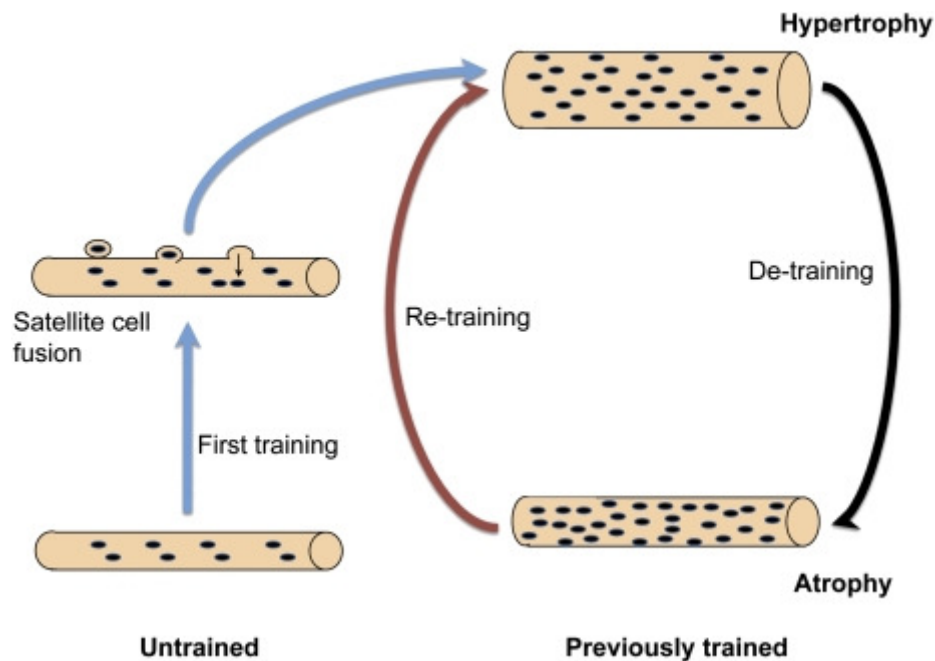


MUSCLE MEMORY REDONE

Muscle fibers contain hundreds of nuclei (myonuclei). During strength training and before the appearance of hypertrophic muscle mass, there is an increase in myonuclei that appears to remain as part of your body history, even during absence of training.



A model for the connection between muscle size and number of myonuclei. In this model, myonuclei are permanent. Previously untrained muscles acquire newly formed nuclei by fusion of satellite cells preceding the hypertrophy. Subsequent detraining leads to atrophy but **no loss of myonuclei**. The elevated number of nuclei in muscle fibers that had experienced a hypertrophic episode would provide a mechanism for muscle memory, explaining the long-lasting effects of training and the ease with which previously trained individuals are more easily retrained. (From Bruusgaard JC, Johansen IB, Egner LM, et al: **Myonuclei acquired by overload exercise precede hypertrophy and are not lost on detraining.** [Proc Natl Acad Sci U S A.](#) 2010 August 24; 107(34): 15111–15116.¹

BEGINNING LATE

Beginning late? Barbells? Weight lifting? Why not? There are lots of really good trainers to help you along. Consider the benefits such as strength, flexibility, sturdy bone, good friends, camaraderie, lots of laughs and that hoped-for continued independence.

Learn here about how your muscle fibers handle oxygen and your lungs can be helped to create more surface for the carbon dioxide/oxygen exchange and how these functions change as we age.

It's all about the O₂

Muscle contraction young and old. During contractions there is a reduction in the partial pressure of oxygen in the micro-vasculature of elderly skeletal muscles. This deficit in the availability of O₂ causes a shorter contraction time and a longer relaxation. The young have a more sustained contraction and a shorter recovery time.² Well shoot!!! That's why I need a longer rest between reps!! I'm actually entitled. Don't you just love it when there's a reason for all that lagging behind? There's more and it has to do with respirations.

Exchange of CO₂ and O₂. Are you the only one sucking air during that workout? Could be you're the only one in the group older than 65 or 85! The elderly work harder at breathing during exercise because of an age-related reduction in the number of alveoli (little air sacs in the lungs). This means that with fewer alveoli, there is less real estate for the exchange of CO₂ and O₂.³ Everyone, of course, breathes more deeply during and immediately after exercise. If you actually fill the lazy alveoli at the base of your lungs, you may activate and preserve more alveoli into an even older age. It's good to check in with the base of your lungs every once in awhile with some **big deep breaths**. And do your lungs a favor; deliver filtered, moist air to them instead of that dry unfiltered stuff you suck in through your mouth. Inhale through your nose and exhale through your mouth.

Blood pressure. Although skeletal muscle vascular resistance during physical exertion is higher with old age, as is evidenced by blood pressure, and appears to be related to a somewhat sedentary and proinflammatory state, it can be diminished with exercise training⁴ and an anti-inflammatory diet.^{4 5}

Set-Backs Along the Way

We can't expect to be free of set-backs. Some are, but most of us get caught up and batted down by one physical problem or another, big and small, as we negotiate our paths through life. Set-backs, even small ones, are discouraging because for the elderly the get-back is always longer than for the young and middle aged.

Atrial fibrillation or atrial flutter? This I know about! Get the cure; there *is* one and it's sweet, but be diligent in finding a Cardiologist with an outstanding, 5 star success record. The procedure is worth it and the result gives you a special kind of treasured freedom.

Joint replacements —hip, knee, ankle? I have no experience with this. I just know that there is a healing process, tissues need to repair themselves, adjacent bones need to bond with the new arrival and you need to be totally devoted to getting your life back! Don't give up.

Injury. For really good advice on a turn-around and comeback from injury, big or small, I liked "**Coming Back from an Injury**", a blog by Gretchen Bleiler, a smart gutsy

Olympic snowboarder who had a potentially life-altering injury and refused to believe the nay-sayers. Here's your link: <http://www.teamusa.org/Team-USA-Winter-Bloggers/Gretchen-Bleiler/Life-Lessons-One-Year-Later>

Malpractice. In closing, a warning. In spite of my background as a Nurse, I once made a really bad choice in a "Sports Physician" and then trotted blindly on to his Neurology referral only to run headlong into very serious ignorance and incompetence — malpractice almost impossible for the uninformed to recognize. I walked away from that experience deflated and trying to accept my fate. I was told "You are not going to get any better." Really? Where had all my hubris and fire gone? I had not been alert to my danger and was appalled at my dependent mind set. Three weeks later I found an honest, competent Neurologist who made a correct diagnosis and set about curing me. Through all of the disappointment and pain, for more than two years, my CrossFit trainer, Jim Baker, never abandoned me. I continued to train safely, but in pain, was never totally deconditioned and, when cured, was ready to move on thanks to Jim at CFSCC and the brilliant John E. Welsh M.D. in Los Altos.

Don't give up. Ever. Do your homework when seeking medical attention. Keep your back strong, abs tight, shoulders back, chest up, breathing deeply, moving, rowing, biking, swimming, dancing, climbing, walking, pressing, lifting, laughing. See you in the gym!

References

¹ <http://www.pnas.org/content/107/34/15111.full>

² Hirai DM, Copp SW, Herspring KF: **Aging impacts microvascular oxygen pressures during recovery from contractions in rat skeletal muscle.** *Respir Physiol Neurobiol.* 2009

³ Yoonjung Park, Prisby RB, Behnke BJ, et al: **Effects of aging, TNF- α , and exercise training on angiotensin II-induced vasoconstriction of rat skeletal muscle arterioles,** *J Appl Physiol October 1, 2012 113:(7) 1091*

⁴ Hartwig, Melissa and Dallas: **It Starts with Food**

⁵ Wolf, Robb: **The Paleo Solution**

— mc/16 Aug 2013