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The Role of Strength and Resistance Training in Stroke Recovery and Healthy Aging

Analysis by Dr. Joseph Mercola | March 16, 2026

STORY AT-A-GLANCE

- Over 795,000 people in the U.S. have a stroke each year, and more than half of the survivors are aged 65 and older
- An animal study published in MedComm found that low-intensity exercise helped mitochondria from muscles travel to the brain, supporting repair after stroke and in vascular dementia models
- Sarcopenia, the age-related loss of muscle mass and strength, is driven by reduced responsiveness to protein and exercise signals, not aging alone
- Resistance training and strength training aren't the same; resistance training uses any opposing force, while strength training focuses on progressively heavier load
- Simple habits amplify exercise benefits, including adequate protein intake, reduced sedentary time, safe sun exposure, healthier fat choices, and short, consistent training sessions rather than excessive workouts

More than 795,000 people in the U.S. suffer from a stroke each year,[1] making it one of the major causes of long-term disability today. It significantly reduces mobility — more than half of stroke survivors ages 65 and older[2] are often left with challenges such as memory problems, difficulty walking, or needing help with everyday tasks.[3]

Stroke rehabilitation often leans on exercise, but many people recovering from a hospital stay are too weak to do too much physical activity. That's why researchers are beginning to look more closely — Instead of focusing only on muscle activity, they're turning to the mitochondria to explore whether the body's own repair systems can be guided to support brain recovery.

What Researchers Discovered About Exercise, Mitochondria, and Brain Repair

A recent animal study conducted by researchers at Juntendo University School of Medicine in Tokyo examined how physical activity may help repair the brain after a stroke or protect against vascular dementia. Published in MedComm,[4] the study examined how mitochondria can move from one part of the body to another, offering energy and support to damaged brain tissue.

The research team studied mice with brain damage designed to mimic stroke or dementia. Some mice performed low-intensity treadmill exercise, while the others remained inactive. The researchers then compared brain damage, memory, movement, and cellular health between the two groups.

- **Exercise triggered mitochondrial production and movement —** Mice that exercised produced more mitochondria in their muscle cells,[5] and these mitochondria entered the bloodstream. They were picked up by platelets, small blood cells best known for clotting, which then transported the mitochondria to the brain.

  Nobukazu Miyamoto, M.D., Ph.D., Associate Professor of Neurology at Juntendo University School of Medicine and one of the study authors, noted that this observation led to the realization that mitochondrial transfer could be used for various therapeutic applications.[6]

- **A boost in brain repair, memory, and movement —** Compared to inactive mice, those that exercised had less white matter damage and fewer long-term complications after stroke. They also exhibited better memory performance and improved

movement and coordination. These benefits extended beyond the immediate injury site, suggesting mitochondrial transfer plays a role in broader brain recovery rather than isolated repair.

- **Which brain cells received mitochondrial support?** According to the findings, platelets delivered mitochondria not only to neurons, but also to key support cells, including astrocytes, which help regulate the brain's internal environment, and oligodendrocytes, which produce myelin — the protective coating that allows nerve signals to travel efficiently.

- **What this means for older adults —** Many stroke survivors and older adults today are unable to get enough exercise, which limits their ability to gain neurological benefits from rehabilitation alone. Current medical options also offer limited protection against long-term disability or the progression of vascular dementia. According to Research Assistant Professor Toshiki Inaba from the Department of Neurology, Juntendo University School of Medicine:

  > *"[T]he proposed approach has the potential to contribute to a future in which neurological sequelae after cerebral infarction can be mitigated. Moreover, the therapeutic applications may extend beyond stroke to mitochondrial diseases and related neurodegenerative disorders."*[7]

- **How exercise supports healthy aging —** Regular exercise improves mitochondrial function, reduces oxidative stress, and supports healthy aging.

  > *"Customized exercise programs tailored to the metabolic needs of individuals, particularly older adults, can play a transformative role in mitigating the effects of aging and reducing the risk of developing age-associated neurodegenerative diseases,"* the researchers said.
  >
  > *"Integrating exercise and dietary strategies into both preventive and therapeutic frameworks offers a holistic approach to managing aging-related health challenges ..."*[8]

- **The role that platelets play —** Platelet-based therapies may eventually offer exercise-like brain benefits for people recovering from stroke or who are at risk for vascular dementia. If proven safe in humans, transfusing mitochondria-rich platelets could help protect against brain cell degeneration without physical exertion.

Knowing how exercise can enhance mitochondrial health is empowering, but it is only one piece of the puzzle. We all go through physical changes as we age, and that's completely normal. Understanding what's happening behind the scenes simply helps you prepare, adapt, and stay strong in the years ahead.

The Biology Behind Age-Related Muscle Loss

A comprehensive review published in Nutrients[9] examined why muscle loss accelerates with age and how targeted protein intake combined with exercise can slow down or prevent sarcopenia. The researchers analyzed decades of human and mechanistic studies to identify practical strategies that preserve muscle mass, strength, and independence in older adults.

- **Sarcopenia is driven by anabolic resistance, not just aging —** Older muscle becomes less responsive to protein and exercise signals, meaning the same diet and activity that once maintained muscle no longer works. This anabolic resistance shifts daily protein balance toward muscle loss unless intake and training are adjusted.

- **Protein needs increase substantially with age —** The authors report that older adults typically require 1.2 to 1.8 grams of protein per kilogram (g/kg) of body weight per day to maintain muscle mass, far above the current RDA of 0.8 g/kg. Higher intakes were associated with better retention of muscle mass, strength, and physical function over time.

I generally recommend adults get 0.8 grams of protein per pound of ideal body weight as opposed to total weight (or about 1.76 grams per kilogram), although older people may need a little more. Of that, one-third should come from collagen-rich foods such as bone broth, pure gelatin powder, oxtail, shanks, or grass fed ground beef containing connective tissue.

To determine your ideal bodyweight, use a calculator such as the Omni Ideal Weight Calculator.[10] For example, if you weigh 160 pounds but your ideal weight is 128 pounds (the equivalent of having 20% body fat), you'd multiply 128 by 0.8, giving you a daily protein target of 102.4 grams.

- **Per-meal protein dose matters as much as daily totals —** Aging muscle requires larger protein doses at each meal to stimulate muscle protein synthesis. The review suggests aiming for about 0.6 g/kg of protein per meal, along with at least 5 grams of leucine, to overcome anabolic resistance.

- **Resistance training amplifies protein's muscle-building effects —** Resistance exercise remains the most powerful stimulus for muscle growth at any age. When paired with adequate protein intake, it shifts muscle protein balance into positive territory, supporting hypertrophy, strength, and functional capacity.

- **Sedentary behavior accelerates muscle loss —** Even short periods of inactivity, such as reduced daily steps or bed rest, caused rapid declines in muscle protein synthesis in older adults.[11] These "catabolic crises" make recovery more difficult with age, underscoring the importance of regular physical activity.

- **Inflammation and poor circulation blunt muscle repair —** Chronic low-grade inflammation, reduced muscle blood flow, and mitochondrial dysfunction interfere with nutrient delivery and anabolic signaling. Exercise helps counter these effects by improving circulation, mitochondrial health, and anti-inflammatory signaling.

- **Exercise remains the foundation of prevention —** While higher protein intake supports muscle maintenance, the review emphasizes that protein alone is insufficient. Resistance training at least twice weekly, combined with reduced

sedentary time, produced the most consistent improvements in muscle mass and strength.

Your muscles aren't the only ones affected by aging — your nerves adapt too. Understanding these changes helps you stay ahead. Read "**Resistance Training May Help Preserve Aging Nerves**" for more information.

Strength Training vs. Resistance Training

If you're trying to rebuild strength, you've probably seen the terms "resistance training" and "strength training" used as if they mean the same thing. They're closely related, but not identical — and knowing the difference can help you train more effectively.[1][2]

- **Resistance training uses any opposing force to activate muscles —** Simply put, it means working your muscles against some kind of force. These may include free weights, bands, machines, or even your own body weight. Classic exercises such as squats, push-ups, and sit-ups all count and can help build strength and endurance.
- **Strength training focuses on gradually lifting heavier loads —** Strength training is a bit more specific, and typically involves increasing external load over time to achieve maximal strength. This approach is effective but often requires access to weights and careful attention to form.
- **Bodyweight exercises offer resistance without equipment —** You don't need weights to challenge your muscles. Using your own body weight creates natural resistance and can be a safe, accessible way to maintain and improve strength.
- **Consistent resistance training supports your overall health —** Resistance work doesn't just benefit muscles. It also supports bone density, metabolism, and everyday physical function. And while equipment can help, what matters most is staying consistent.

Cardio Helps Keep Your Immune System Alert and Young

A study in Scientific Reports[13] examined how long-term endurance training influences immunity in older adults, focusing on natural killer (NK) cells. These cells are key defenders that target infected or abnormal cells but tend to decline with age, increasing the risk of infection, cancer, and slower recovery.

- **Adults who trained for longer had powerful immune cells —** The team compared men over 60 years old who had been doing endurance training for many years with men of the same age who didn't exercise regularly. Those with a long history of cardio had NK cells that generated more energy and behaved like those of younger adults. They also showed lower levels of **chronic inflammation**, which is a major contributor to age-related disease.

- **Cardio improved how immune cells used energy —** In the endurance-trained group, NK cells relied on oxygen-based energy production, a more efficient and sustainable method. This enabled them to remain active longer without experiencing burnout. By contrast, the inactive group's NK cells favored a fast, sugar-driven pathway that delivered quick energy but left the cells fatigued sooner.

  This metabolic flexibility helps explain why older adults who remain physically active often recover more quickly from illness or injury.

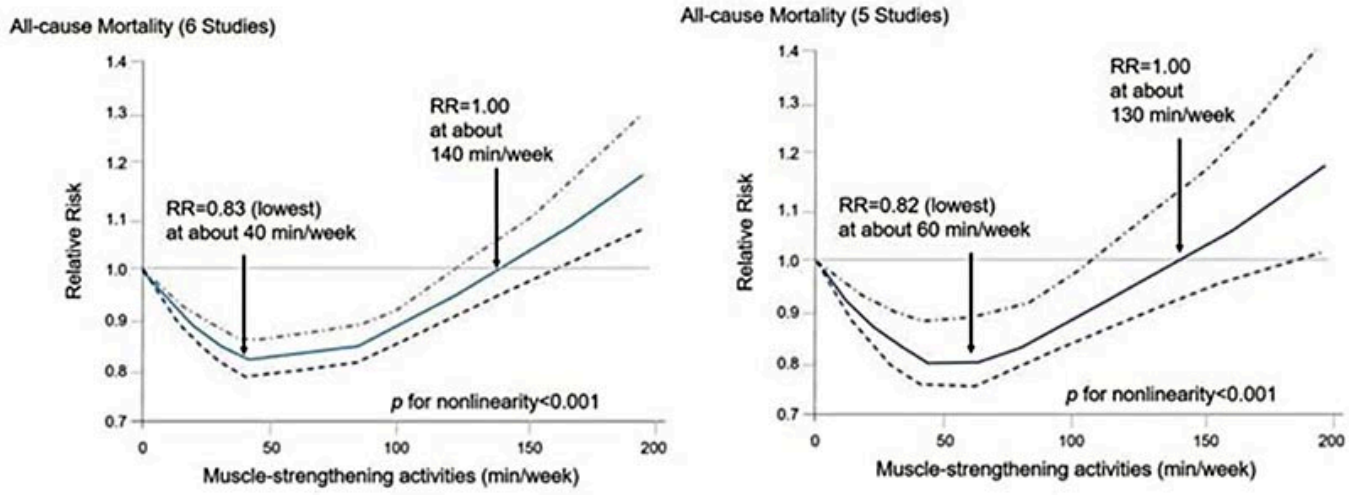
- **Cardio also supported mitochondrial health —** The benefits didn't stop with immunity. Participants who had maintained endurance activity for decades had higher **mitochondrial density** and better mitochondrial function within their NK cells. Consistent cardio appeared to replenish and strengthen these "cellular batteries," supporting healthier aging from the inside out.

The Strength Training "Sweet Spot"

In my **interview with cardiologist James O'Keefe, M.D.**, one theme that kept coming up was that more is not always better when it comes to intense exercise. His research shows that once strength training exceeds a certain threshold, the benefits begin to plateau and eventually reverse. I even redesigned my own routine after seeing his data.

- **Going overboard with workouts blunts the benefits —** O'Keefe found that people doing four to seven hours of high-intensity exercise per week begin to lose the health advantages normally associated with vigorous training. Strength training follows the same pattern.

  As he explained, "I've always been a fan of strength training ... But again, the devil is in the details about the dosing." His meta-analysis[14] shows a clear J-shaped curve: Benefits rise, peak, and then decline when volume becomes too high.



- **Short and focused sessions bring the most benefits —** In addition to his insights about over-exercising, O'Keefe shares how he incorporates strength training into his routine:

  > *"When I strength train, I go to the gym and spend anywhere from 20 to 40 minutes, and ... I try to use weights that I can do 10 reps with ... After that, you're feeling sort of like spent and ... it takes a couple of days to recover. If you do that two, at the most three, times a week, that looks like the sweet spot for conferring longevity."*

- **How much is too much?** Beyond 130 to 140 minutes, the survival advantage declines rapidly, making it comparable to not strength training. In essence, exceeding three to four hours per week is already excessive. Keep strength training brief, around 20 minutes twice a week or one 40-minute session.

BFR — Resistance Training Without the Heavy Weights

Blood flow restriction (BFR) training provides a means to stimulate muscle growth without heavy weights, making it particularly relevant for older adults and those concerned about joint stress or injury. Also known as KAATSU, this method was developed in Japan in the 1960s by Yoshiaki Sato and has since gained attention as a potential tool to counter sarcopenia.

During BFR training, bands are applied to partially restrict blood flow while muscles contract. This induces brief, controlled hypoxia that stimulates muscle fibers and promotes the release of myokines, which are muscle-derived signaling molecules that support anti-inflammatory and anabolic processes.

- **Safer muscle building —** KAATSU has the benefit of allowing older people to engage in relatively aggressive exercise with almost no risk of injury because you're using very light weights, or if you're frail and/or elderly, none at all. An added boon is that you don't need recovery days. You can use KAATSU every day if you want.

- **It supports muscle regeneration —** KAATSU appears to enhance blood supply to satellite stem cells, which are essential for muscle repair and growth. By improving metabolic support to these cells, BFR helps maintain muscle mass and function — a key concern in age-related muscle loss.

- **It's easy to work KAATSU into your day —** You can use BFR bands during workouts or even while doing regular everyday activities. As explained by **Steven Munatones**, a KAATSU expert who trained directly under Sato:

  > *"KAATSU cycle is basically a very clever biohack that will allow the muscles to work and allow the vascular tissue to become more elastic. You don't perceive the pain of heavy lifting, but your vascular tissue and muscle fibers are being worked out just as effectively, and you can do it for a longer period of time.*

Putting the KAATSU bands on your legs and walking down to the beach, walking your dog or just walking around the neighborhood, standing, cleaning your windows of your house, folding your clothes, banging out emails, all of these things can be done with the KAATSU bands on your arms or legs. You're getting the benefit of exercise.

Beta endorphins are being produced; hormones and metabolites are being produced as you're doing simple things — and that is the way to get the older population in Japan, in the United States, around the world, to understand that you can stop sarcopenia, but you have to exercise. You don't have to run a 10K, you don't have to go down to Gold's Gym. Just put on the KAATSU bands and live your life."

To learn more, check out my previous article, "How to Stay Fit for Life," in which I review the science behind KAATSU and explain in greater detail how to use it. The main difference between KAATSU and BFR is the tool you're using. BFR can be done with restriction bands, but KAATSU uses a device that also provides intermittent and not just constant pressure.

The KAATSU set is ideal as it is far easier to dial in to the correct pressures. You also get the benefit of intermittent pressure automatically, without having to adjust the bands yourself. I recommend the C4 model, because the C-series doesn't have Bluetooth (which emits harmful electromagnetic fields). For a limited time, you can get 10% off any KAATSU equipment by using the promo code DRM.

Order Now

Small Daily Tweaks That Support Your Training

Exercise matters, but so does what you do between workouts. The right foods and daily habits help your body repair, recover, and get the most from training.

- **Consider where you get your proteins —** After training, your muscles are primed to absorb amino acids. Choosing lean protein sources that are naturally low in linoleic acid (LA) helps speed recovery without adding unnecessary oxidative stress. I recommend avoiding pork and chicken, which tend to accumulate higher levels of LA. Instead, choose grass fed beef, bison, or a high-quality whey protein isolate to deliver fast, clean protein when your muscles need it most.

- **Choose healthier fat sources —** Excess LA from soybean, corn, and sunflower oil fuels inflammation. Keeping LA below 5 grams per day may support mitochondrial function and reduce oxidative stress. Replace vegetable oils with ghee or beef tallow. To stay on track, sign up for the Mercola Health Coach app and use its Seed Oil Sleuth feature to monitor your LA intake precisely.

- Include bone broth in your diet **—** While muscle meats provide excellent complete protein, they're low in the amino acids needed for tendons, ligaments, cartilage, and fascia. Including collagen-rich foods like bone broth, gelatin, oxtail, shanks, or grass fed ground beef helps supply glycine and proline, supporting joint integrity, tissue repair, and smoother recovery between workouts.

- **Make sure to get enough safe sun exposure —** Sensible sunlight supports vitamin D production, immune function, and pain regulation, all of which affect recovery and muscle health. If your dietary LA is still high, wait four to six months before longer midday exposure, since excess LA increases sun sensitivity. For more details, see "Beyond Vitamin D Production — How Sensible Sun Exposure Supports Overall Health."

Growing older is part of being human, but losing strength need not be. When you care for your body with nourishing food, daily movement, and intentional exercise, you're doing more than building resilience — you're giving yourself time.

Frequently Asked Questions (FAQs) About Exercise and Training for Seniors

Q: What did researchers at Juntendo University School of Medicine discover?

A: The researchers found that gentle exercise caused muscle cells to produce extra mitochondria, which then entered the bloodstream. Platelets carried these mitochondria to injured areas of the brain, where they supported energy production, reduced tissue damage, and improved memory and movement in animal models of stroke and vascular dementia.

Q: How does exercise help the brain recover after a stroke?

A: Exercise activates mitochondrial production in muscle, which can then be transported to the brain via platelets. These mitochondria help restore energy, reduce white matter damage, and support brain cells involved in memory, movement, and long-term repair.

Q: What is sarcopenia?

A: Sarcopenia is age-related muscle loss driven largely by anabolic resistance — reduced responsiveness to protein and exercise signals. Without adjustments in training and nutrition, muscle breakdown outpaces repair, increasing the risk of weakness, falls, and loss of independence.

Q: Do I need intense exercise to get brain and muscle benefits?

A: No. Research shows that low-intensity exercise, resistance training, and even blood flow restriction (BFR) can activate powerful repair pathways. The body responds to the right biological signals — not extreme intensity — especially in older adults.

Q: What daily habits will best support exercise and recovery as I age?

A: Consistent movement, adequate protein intake, resistance training at least twice weekly, reduced sedentary time, healthy fat choices, and safe sun exposure all reinforce mitochondrial health, circulation, and tissue repair — helping you stay strong and active longer.

Sources and References

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