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The Factory Inside Your Muscles

Why the same workout stops paying off as you age — and the surprising discovery that your body can rebuild the machinery that makes it work again.

TA Medical Research Team · TOPICS: #NAD⁺ #Exercise #Healthspan



A man in his seventies takes the same 30-minute walk his 25-year-old grandson does every morning — same pace, same effort. But inside their muscles, something different happens.

The grandson's body receives the walk as a clear instruction: build capacity, adapt, get stronger. The grandfather's body receives the same instruction — but the signal arrives weaker. Researchers call this a "blunted response." It isn't about motivation. It's a measurable difference in how aging muscle processes exercise itself.

Exercise isn't the improvement itself — it's a signal telling your cells to adapt. Dr. Joseph A. Baur, a physiologist at the University of Pennsylvania's Perelman School of Medicine, found the reason that signal fades: muscle manufactures its own local NAD⁺ using an enzyme called NAMPT, and that manufacturing capacity quietly declines with age.

For NMN users, this is genuinely good news. Exercise doesn't compete with NMN — it complements it. NMN supplies the raw material your body converts into NAD⁺; exercise helps rebuild your muscles' own local capacity to manufacture, recycle, and put that NAD⁺ to work. Research on muscle stem cells (satellite cells) adds one more piece: periodic activation through exercise appears to help keep these repair cells from sliding into permanent inactivity, preserving the muscle's own regenerative crew. This exact NMN-and-exercise combination hasn't been tested directly in humans yet — but the biology behind it is well established in animal research, and that gives real reason for optimism.

In Baur's study, published in *Cell Metabolism*, disabling NAMPT in mice caused an 85% drop in muscle NAD⁺ — along with muscle fiber degeneration, progressive weakness, and reduced treadmill endurance. Muscle, it turns out, isn't just a passive user of the body's NAD⁺ supply. It runs its own local factory.

The hopeful twist: this factory can be rebuilt. When Baur's team gave affected mice an NAD⁺ precursor, muscle function and mass were rapidly restored. In human studies, just twelve weeks of structured aerobic or resistance training increased NAMPT abundance by 28–30% in older adults — actually outpacing the gains seen in younger participants.



Putting This Into Practice

- Keep your NMN routine consistent, especially on days you're active.
- Aim for regular structured movement — walking, resistance training — rather than occasional bursts.
- Give your body weeks, not days: this is a gradual system that responds to sustained, consistent use.

Quick Glossary

NAD⁺ — a molecule every cell needs to produce energy, repair DNA, and function properly. Levels decline naturally with age.

NAMPT — the enzyme muscle uses to manufacture its own local supply of NAD⁺, rather than relying only on the body's general supply.

Satellite cells — muscle's own repair cells, responsible for regenerating and rebuilding tissue after use or injury.

Reference: Frederick, D.W., Loro, E., Liu, L., et al. (2016). Loss of NAD homeostasis leads to progressive and reversible degeneration of skeletal muscle. *Cell Metabolism*, 24(2), 269–282. (PMID: 27508874)

Read the full article at ta-medical.jp/blog · TA Medical, Okinawa, Japan