

# New study explains why you bulk up with resistance training, not endurance training

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Credit: Peter Griffin/Public Domain

Resistance and endurance exercises affect the body very differently. These differences suggest that adapting to exercise involves many processes, but scientists have observed that one gene in particular, peroxisome proliferator-activated receptor-gamma coactivator PGC-1 $\gamma$ , controls many of them. New research in *Physiological Reports* shows that although both resistance and endurance exercises activate the PGC-1 $\gamma$  gene, the adaptation processes stimulated are not the same and depend on the type of exercise.

Proteins run the body: They turn processes on or off or speed them up or slow them down. The body has many different proteins, and the instructions to make them are written on sections of DNA, referred to as [genes](#). Different genes code for different proteins, but different proteins can also come from the same gene. Called isoforms, these proteins are produced when only part of the gene's code is read.

The PGC-1 $\gamma$  [protein](#) turns on other genes. Several studies have shown that isoforms of PGC-1 $\gamma$  exist and that the isoform produced depends on the

exercise. In this new study, researchers at the University of Jyväskylä in Finland comprehensively examined the isoforms present shortly after exercising and the genes those isoforms turned on.

Samples were taken from the thigh muscles of healthy men after they performed high-intensity resistance exercises or moderate-intensity endurance exercises. The researchers found that both endurance and resistance exercises produced isoforms PGC-1 $\gamma$  exon 1b, PGC-1 $\gamma$  exon 1b' and truncated PGC-1 $\gamma$ , while only endurance exercise produced PGC-1 $\gamma$  exon 1a isoform. Endurance exercise activated genes that stimulated growth of new blood vessels and increased [endurance](#). Resistance exercise also activated a gene that promoted [blood vessel growth](#), along with a gene that encouraged muscle growth.

"Our results support that gene expression responses of PGC-1 $\gamma$  isoforms may have an important role in exercise-induced muscle adaptations," the researchers stated.

The study "PGC $\gamma$ 1 isoforms and their target genes are expressed differently in human skeletal muscle following resistance and [endurance exercise](#)" is published in the October issue of *Physiological Reports*, a joint journal of the Physiological Society and American Physiological Society.

**More information:** Mika Silvennoinen et al. PGC $\gamma$ 1 isoforms and their target genes are expressed differently in human skeletal muscle following resistance and endurance exercise, *Physiological Reports* (2015). [DOI: 10.14814/phy2.12563](#)

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