

Cardio exercise and strength training affect hormones differently

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For exercise, many people cycle to and from work, or visit the gym to lift weights. Regardless of the form of training they choose, people exercise to improve their health. But researchers actually know surprisingly little about exactly how different forms of training affect health.

However, researchers from the University of Copenhagen have now come closer to understanding the diverse effects of different forms of training. In a new study published in the scientific *Journal of Clinical Investigation—Insight*, the researchers show that cardio training on an exercise bike causes three times as large an increase in the production of the hormone FGF21 than [strength training](#) with weights. FGF21 has a many positive effects on metabolism.

"Of course, it is very exciting for us researchers to see how different forms of physical activity actually affect the body differently. We have known about the effects of various forms of training on more well-known hormones like adrenaline and insulin for a long time, but the fact that strength training and cardio exercise affect FGF hormones differently is new to us," says Associate Professor Christoffer Clemmensen of the Novo Nordisk Foundation Center for Basic Metabolic Research, one of the researchers behind the study.

The researchers studied the effects of exercise on 10 healthy young men who were randomly divided into two groups and did both forms of training once a week. Both training forms were relatively hard and lasted 60 minutes. The cardio exercise consisted of cycling at a level of 70 percent maximum oxygen intake, while the strength training consisted of five exercises repeated five x 10 times involving the main muscle groups in the body.

Subsequently, eight blood samples were taken from the participants over a period of four hours in order to measure changes in blood sugar, lactic acid, various hormones and bile acid in the body. These measurements revealed a significant increase in the production of the hormone FGF21 in connection with cardio exercise, while strength training showed no significant change with regard to this hormone.

"Endurance training on a bicycle has such a marked effect on the

metabolic hormone that we know ought to take a closer look at whether this regulation of FGF21 is directly related to the health-improving effects of cardio exercise. FGF21's potential as a drug against diabetes, obesity and similar metabolic disorders is currently being tested, so the fact that we are able to increase the production ourselves through training is interesting," Clemmensen says.

Muscle Hormone Surprised the Researchers

The researchers also measured the content in the blood of another hormone, FGF19, which among other things has been linked to muscle growth in animal tests. Due to these previous studies, the researchers expected the strength training to have an effect on this hormone. However, the results proved them wrong.

"Directly contrary to our hypothesis, the production of the growth hormone FGF19 actually dropped slightly after strength training. To me, that stresses that there is something about the effect of strength training that we simply have too little knowledge of. And of course, that gives rise to more research," says co-author Jørn Wulff Helge, professor of [physical activity](#) and health at the Center for Healthy Aging and the Department of Biomedical Sciences.

The researchers will now look more closely at other links between hormones involved in both metabolism and exercise.

The study was a so-called randomised crossover study, which means that evidence holds greater weight than studies performed on animals and cell cultures, but less than large cohort studies on humans.

The researchers point out that their results are limited by the fact that the blood samples were not taken more than four hours after the training, and that they can say nothing about the effects of a full training

programme on these hormones. However, the results, especially regarding the metabolic hormone FGF21, are so significant that they provide a solid foundation for studying whether similar effects can be seen in other groups of test persons.

More information: Thomas Morville et al, Divergent effects of resistance and endurance exercise on plasma bile acids, FGF19, and FGF21 in humans, *JCI Insight* (2018). [DOI: 10.1172/jci.insight.122737](https://doi.org/10.1172/jci.insight.122737)

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