

## Feel the Burn

Written by Karel Nunnink

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Lactic acid build-up (that burning feeling)—from intervals and strength training—forces the mitochondria to process oxygen (and lactic acid) more efficiently. Let's see how that works.

There are two primary energy systems: aerobic and anaerobic. Both systems burn carbohydrate in the form of glucose (blood sugar) and glycogen (muscle sugar). The main difference between the two systems is the presence of oxygen—and the end product. Moderate exercise is mostly aerobic, with oxygen; it's clean burning, so there is no end product. When exercise becomes more intense and the aerobic system can't provide enough oxygen, the anaerobic system kicks in to provide energy, without oxygen. The end product of anaerobic exercise is lactic acid. (Intervals and strength training are both anaerobic.)

The two energy systems have been thought to operate as separate and distinct systems. Lactic acid was considered the enemy of aerobic metabolism, with the power in sufficient accumulations to bring it to a halt. As we learned a while back, that's old thinking. It is not true.

"It was one of the classic mistakes in the history of science," says UC Berkley integrative biology professor George A. Brooks.

Here's the bottom line from Professor Brooks: "The world's best athletes stay competitive by interval training. The intense exercise generates big lactate loads, and the body adapts by building up mitochondria to clear lactic acid quickly. If you use it up (as an energy source), it doesn't accumulate."

The job of the athlete is to train in a way that causes the mitochondria to process lactic acid faster and more efficiently.

Lactic acid is a fuel. To improve your capacity to use it as a fuel, you must increase the lactic acid load very high during training.

Dr. McGuff is on top of this new thinking. He says that high-intensity intervals and high-intensity

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strength training both perform the same function: they improve aerobic function by forcing the mitochondria to burn lactic acid more efficiently.

“It is during ‘recovery’ from high intensity exercise that you’re actually getting an increased stimulation of the aerobic system equal to or greater than what you would get from conventional steady-state ‘aerobic’ exercise,” McGuff writes.

“If you have been subjected to proper physical training, you can actually make good use of the lactic acid that is produced. If you are intent on improving your aerobic capacity, it’s important to understand that your aerobic system performs at its highest level when recovering from lactic acidosis,” McGuff adds. “It is also important to understand that since muscle is the basic mechanical system being served by the aerobic system, as muscle strength improves, the necessary support systems (which include the aerobic system) must follow suit.”

To improve the ability of your aerobic system to use lactic acid as a fuel, Lift weights. And then, let your mitochondria take over from there. Get your aerobic benefit on another day doing a light aerobic workout not exceeding 30/40 minutes, I suggest a brisk 20 minute walk, or even some yard work.

. THE key stimulus for strength—and aerobic fitness—is high-intensity muscular effort.

To see and hear Dr. McGuff explain, in 5:50 minutes, just about everything we’ve talked about so far—and why he believes ‘cardio’ really doesn’t exist—visit You Tube: <http://www.youtube.com/watch?v=RiHhc7eLpQY>

So to summarize, this type of training is one of the few ways to actually make new mitochondria and make existing Mitochondria more efficient. WOW!!

Also consider the shearing forces of repetitive joint usage, and you get the picture less time greater strength and muscular gains therefore greater metabolic burn, (remember a pound of muscle burns 60-90 times the amount of calories as a pound of fat) 1 hour of cardio will not increase muscle mass, in some cases actually decrease it.

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Now what is one of the major factors in accelerated aging? Loss of muscle mass.

Stay strong and young.