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From Superfit to Superfat

Suppose you live in a Western society. You have westernized sedentary behavior. You eat a Western diet. You love sports. This probably means that after a good night's sleep you drove a fast car to work, where you sat all day looking at your computer screen before driving back home to sit in a comfortable chair in front of your flat-screen television to watch your favorite sport, well provided with a snack consisting of packaged food full of saturated fat and processed sugars. Besides having a nice house, a fast car, a good job, plenty of food, and a high-tech TV, chances are you also have a cluster of abdominal obesity, hypertension, disturbed glucose metabolism, and dyslipidemia; that is, you suffer from metabolic syndrome.[1] You are one among the superfat watching the superfit. But if you ever wonder whether the superfit can also become superfat, the answer is yes, they can. And it would not take long!

Those athletes you are watching on TV are genetically gifted,[2] and unlike you, they eat healthy diets and train all day to reach impressive levels of fitness and performance. But superfitness is high maintenance. Training elicits or preserves specific adaptations that enhance an athlete's ability to tolerate the stressing factors arising from training. On the other hand, when athletes stop training due to injury, end-of-season break, or any other reason, detraining occurs and they suffer a partial or complete reversal of previously acquired adaptations, thus compromising their athletic performance. From a metabolic perspective, this scenario implies marked changes in the pattern of substrate availability and utilization during exercise within 1 to 3 wk without training.

One of the metabolic consequences of a short period of inactivity in athletes is a shift toward an increased reliance on carbohydrate as an energy substrate for exercising muscles, concomitantly with a decreased contribution from lipid metabolism. The increase in peripheral sensitivity for insulin-mediated whole-body glucose uptake seen in trained athletes is rapidly reversed, at least partially mediated by changes in insulin receptor number. A reduction in muscle GLUT-4 transporter levels also plays a role in the decrease in glucose disposal rates.[3]

As little as 2 wk of training cessation from endurance training yields a condition that favors the storage of adipose tissue, as shown by a marked increase in adipose tissue lipoprotein lipase activity coupled with a decrease in muscle lipoprotein lipase activity of similar magnitude, reduced fasting concentrations of high-density lipoprotein cholesterol, decreased metabolism of chylomicrons, and increased low-density lipoprotein cholesterol. These changes are associated with an increased incidence of atherosclerosis. Muscle glycogen concentration allowing highly trained athletes to exercise at high intensity for prolonged periods of time declines rapidly with training cessation, in association with a reduction in glucose-to-glycogen conversion and glycogen synthase activity. [3]

What all this means is that a brief interruption in aerobic training reverses the antiatherogenic lipoprotein profile and body composition exhibited by highly trained athletes. Healthy, lean, superfit athletes are just a few weeks of sedentary

lifestyle away from the path to become superfat.[4] Unfortunately for the superfat, they are not a few weeks away from becoming superfit. At an individual level, many years of active lifestyle and healthy eating would be needed for this change to take place. At a collective level, profound social changes need to be made in Western societies to create conditions to stimulate a change in sedentary and other unhealthy behaviors.

We sport physiologists can play a key role in pushing these changes forward. It is true that we have a commitment to sports performance and its improvement during the competitive career of an athlete, but we should also be concerned about preparing them for life after competition. Our advice and encouragement could contribute to athletes maintaining active and healthy lifestyles. Sport physiologists can play an important role in a multidisciplinary health support team alongside the physician, nutritionist, and other health professionals. Further, our commitment should not be limited to athletes under our direct influence, but also to the broader sports community and the general public. This endeavor could markedly broaden and deepen the social impact of our profession.

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