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JOURNAL ARTICLES

Body Composition

Not the Holy Grail

Tony Leyland

In last month's *CrossFit Journal*, I explained why you shouldn't pay for expensive tests such as gas analysis to measure your VO₂ max. Simple tests repeated often will show your improvement (or decline) and how steep the trend curve is. Expensive tests can be accurate, but if you want to know how your fitness is progressing, an expensive test, measuring one component of fitness once per year, isn't going to give you that information.

The most common request I get from students, athletes, and the general public is to measure percent body fat. Most people get the same reply I give regarding a gas analysis for VO₂ max: "Save your money." However, the reasons behind that same reply are not identical.

There are two main reasons I do not like to measure someone's percent body fat:

1. I can't do it very accurately and neither can anyone else (despite their sales pitches).
2. It is not a component of fitness and is more than likely not a causative factor in poor health (despite what the media and medical literature say).

Measuring body fat

I do not want to get overly technical about the first point. In short, fat in the body is found around nerve cells, in the blood (lipoproteins and triglycerides), in cell membranes, within our organs, deep in the torso, in subcutaneous adipose tissue, etc. Clearly it is not an easy thing to measure, and even underwater weighing, often considered the gold standard test, is not that accurate.

If you get a body composition test done and you are told your percent body fat is, for example, "12%," you are being given only part of the results. The accurate information would be something like "12% body fat with a standard error of estimate of 3%." What that means is that approximately two-thirds of the people getting this result would actually be between 9% and 15% body fat. The other third would be outside this range. About 95% of the population would be between 6% and 18% body fat with 5% of people outside even this range. Now we are really getting our money's worth! Why would someone pay for such information? The answer is that they wouldn't; so the margin of error is never communicated by the companies selling the procedure.

Of course, as with our VO₂ max discussion, simple effective tests repeated often can help those who just have to know. But these simple tests do not actually yield real measurements of body fat. Most reasonable simple body composition measurement systems are simply trying to provide more information than you can get from stepping on the scales.

Because no single body composition tool is ideal, the best scenario is to use a combination of simple measures. The Canadian Society for Exercise Physiology uses the BMI (body mass index = weight in kilograms divided by height in meters squared) in conjunction with five skinfold measurements and waist girth. If BMI and skinfold measurements are both high, you can be more confident that the cause of the high BMI is probably excess body fat. If, on the other hand, the BMI is high and the skinfolds are normal or low, then the high BMI is

1 of 4

Body Composition (continued...)

likely due to above average musculoskeletal development (denser bones, tendons and ligaments and greater muscle mass). This is why BMI calculations and BMI-based determinations of overfatness are notoriously inapplicable to athletes. This is a condition that many CrossFit athletes may find themselves in: heavy for their height, according to BMI tables, but not overfat. Waist girth measurements are used in conjunction with skinfold readings from sites on the torso to assess whether there is a high level of non-essential visceral adipose tissue (fat stored deep in the torso).

Ultimately, though, the only accurate way to measure your percent body fat is to cut up your cadaver and extract all the body fat using chemicals. So do you really want to know your percent body fat accurately? I think I'll just eat healthily and get some regular CrossFit exercise, thank you very much!

Fitness and body fat

I think the second point above requires the most discussion. I will go to my grave arguing that body composition is not a component of fitness. Improved body composition is the result of fitness. There is a big difference. Look at the ten components of fitness according to CrossFit: cardiovascular and respiratory endurance, stamina, strength, flexibility, power, speed, coordination, agility, balance, and accuracy. No “body composition” there.

Now look at the ExRx website's [description of the components of fitness](#).

Fitness Components

Health Related	Performance Related
<ul style="list-style-type: none">• Body composition• Cardiovascular endurance• Muscular strength• Muscular endurance [i.e., stamina]• Flexibility	<ul style="list-style-type: none">• Power• Speed & quickness• Agility• Balance• Motor skill [i.e., coordination & accuracy]

ExRx is a site maintained by highly qualified individuals; it is well respected, and yet it includes body composition in its list of fitness components. Don't get me wrong, I

think this is a wonderful and extremely useful site, which is precisely why I am pointing out this discrepancy: even otherwise very good health and fitness resources and publications commonly list body composition as a component of fitness.

(On a side note, ExRx breaks the components of fitness into health-related and performance-related components. CrossFit wouldn't make the distinction and neither would I. But at least ExRx.net lists power, speed, agility, balance, and motor skill; many university-level textbooks on health and fitness that I review do not even mention these.)

All components of fitness on the CrossFit list relate to a physiological function. Cardiovascular and respiratory endurance refers to the ability of the body to deliver oxygen and nutrients to the working muscles. Muscular strength and endurance relate to the performance of muscular contractions (maximal and repeated sub-maximal contractions). Flexibility is the range of motion of muscle/joint complexes. Coordination, agility, balance, and accuracy involve central nervous system coordination of muscle groups. Power and speed? These too are related to the application and coordination of force.

But body composition is simply an anatomical snapshot of the body. It is related to anatomy, while the other components are related to physiology (movement). Good body composition does not necessarily prove good physiological functioning. If you believe body composition is a component of fitness then you must also believe that liposuction surgery, which will reduce the percentage of fat in the body, will actually make you fitter!

Health and body fat

Coach Glassman has been known to say “The magic is in the movements.” I couldn't agree more, and in addition to movements of the whole body, such as pull-ups, squats, thrusters, sprints, and the like, I would add internal movements. Health is about physiology; it is about how efficiently the cardiovascular system pumps blood and how the pressure within the arterial walls is regulated, how fats are transported in the bloodstream, how the body moves oxygen and nutrients into tissues across cell membranes, how it moves carbon dioxide and waste products out of the tissues, how waste products are filtered, etc. I could go on, but I think you

Body Composition (continued...)

get the picture. Thinking about health in terms of these types of physiological parameters makes sense; trying (ineffectually) to estimate how much body fat you have doesn't.

I am not ignoring the large body of epidemiological data that has documented the association between obesity and numerous adverse health consequences including a spectrum of metabolic and cardiovascular disorders. I have read a lot of it. But correlation is not causation, and there is an emerging set of research that questions "obesity" as a health risk. Increasing evidence suggests that obesity is not the causative health problem but that factors such as poor diets, inactive lifestyles, weight cycling (yo-yo weight loss and gain) are. If you were to examine the lifestyles of 100,000 obese North Americans, how many of these do you think eat a healthy diet and exercise regularly? I admit I don't know, but I wouldn't put money on finding many, if any.

Obviously we see many obese people who, for example, transport fats inefficiently in the bloodstream (in LDL and VLDL lipoproteins) and certainly there are physiological correlates between these derangements and body composition. But a healthy diet and a regular exercise regimen will greatly improve blood lipid profiles, irrespective of body composition. The point is that unless you have an extremely rare metabolic disorder, eating and exercising correctly will result in a healthy body composition for you.

However, a "good" body fat percentage is not necessarily a marker of fitness either. Go to a party full of serious marathon runners (with really low percent body fat) and the topic of conversation will be their latest injury and/or upper respiratory tract infection. And professional bodybuilders who pack unnaturally large amounts of muscle onto their frames and maintain very low percent body fat have what many would consider "excellent" body composition, but their performance on many of the components of fitness would be dismal.

What I am arguing is that we should always focus on performance (at the whole human and cellular level). If one CrossFit athlete has 7% body fat (let us imagine for the moment that we could measure it accurately) and another 10%, who is the fitter? No idea. Let us check their 10K run and rowing times; times on Fran, Grace, and Helen; rounds on Cindy; CrossFit Total score, etc. Now we have some measures that are worthwhile.

CrossFit emphasizes the *effective* application of force,

and anyone who has seen CrossFit athlete Nicole Carroll better a male twice her size on overhead squats understands that all components of fitness impact performance. You can have large muscles and low body fat, but if your flexibility, torso strength, coordination, stamina, or balance is poor, you can forget outperforming many lighter athletes in the overhead squat. If you do not have the skill and power to correctly perform the Olympic lifts, pure muscle mass is not going to compensate for this inadequacy. Obviously excess body fat can impact performance, but the reality is that the vast majority of athletes adhering to CrossFit training and nutrition will eventually stabilize at a percent body fat that allows good broad-based performance (and that is quite low compared to many other athletes). However, we all have genetic differences and our optimum body composition will vary.

If you seem to be genetically resistant to being very lean, current research seems to show that there are no health consequences as long as your fitness and nutrition are good. A recent study showed that people with relatively high levels of body fat who exercised regularly had fewer health risks than a similar group of individuals who were thin and did not exercise. In this study, obese people who exercised were seen to have half the death rate of those who were trim but didn't exercise. Do any of you reading this know some thin people who do not exercise? Are they healthy and fit? According to research by Dr. Ralph Paffenbarger, a world-renowned epidemiologist, "Fitness level is far more important than body weight as a predictor of longevity. Individuals as great as 50 pounds over the recommended weight in height/weight charts have lower mortality rates than thin people who are sedentary."

Steven Blair, director of research at the Cooper Institute for Aerobics Research in Dallas, argues that previous studies linking obesity and death from heart disease and other major killers have missed the important influence of exercise. Blair argues that "there is a misdirected obsession with weight and weight loss. The focus is all wrong. It's fitness that is the key."

The medical profession is still generally of the opinion that it is obesity per se that is the problem. If, for example, a doctor is counseling an obese patient with normal blood pressure, ECG (heart electrical activity), glucose tolerance, and blood lipid profile, the doctor will still recommend weight loss. Why? What physiological factors would warrant this advice in such a case? I suggest

Body Composition (continued...)

it is the epidemiological evidence from large sedentary populations that has caused this misconception.

There are really three main things that affect fitness and health: diet, exercise, and genetics (including age). (Admittedly, I am leaving out things like avoidance of accidents, sleep, stress management, etc.) In some cases, our genetic make-up may leave us prone to certain diseases despite our being very fit. So if you just love measuring your body's performance, do CrossFit and record your scores. If you really want even more quantifiable data, rather than paying for an approximate estimate of your percent body fat, you could spend the money on an automatic blood pressure cuff or a blood glucose kit or on appropriate medical screening such as blood lipid profiles. Take me for example. I have just turned 50. I can run a sub-40-minute 10k, row 5K in 20 minutes, and do each of three 800-meter repeats in 2:45 with a 1:1 work:rest ratio. So my cardiovascular fitness looks OK, right? I agree, but I still check my blood pressure regularly, since my lean and active older brother has high blood pressure.

CrossFitters are a group who have taken responsibility for their health and fitness. Research supports the contention that eating a hormonally sound diet (Zone, paleo, or low GI) and doing frequent CrossFit workouts are the best things you can do for your health. Admitting there are genetic and age-related problems that can occur even in the fittest of us, and testing for those is also a responsible and sensible thing to do. Relying on and paying good money for expensive "fitness" tests, whether they are accurate (VO₂ max by gas analysis) or very approximate (percent body fat by any method), is not.



For additional information and a full reference list for the arguments presented here, please see the reference [document](#) on my website.

Tony Leyland is Senior Lecturer at the School of Kinesiology in Vancouver, Canada. He has taught at the university level for 24 years and has been heavily involved in competitive sports such as soccer, tennis, squash, and rugby as both an athlete and a coach for over 40 years. He is a professional member of the National Strength and Conditioning Association, a Canadian National B-licensed soccer coach, and a level-I CrossFit trainer.