SINK OR SWIM?

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10-20%

The swim leg only contributes 10-20% to the triathlon event.So it's not uncommon for athletes to focus body composition in favour of ride and run performance.

Consider the simplicity. A "swimming suit", some water and away you go. Goggles will certainly help with navigation. For the follicular endowed, a head cap will contain your crop and provide a degree of aero advantage. Then you join a squad and begin to realise it takes a lot more detail to excel at swimming than meets the eye. Like all technical sports, it takes significant commitment and discipline to master the systems and processes that are required to generate speed and endurance, reduce drag and improve performance. Furthermore, for triathletes, these challenges are exemplified with the need to balance the additional running, cycling and strength training.

Athletes are well versed in looking for performance improvements in areas that they can control. Body composition, particularly the density and distribution of lean muscle and fat mass, is one of those "controllable" variables that athletes, coaches and scientists turn to when it comes to performance.

TRACKING BODY COMPOSITION - MORE THAN SKIN DEEP

Measuring body composition several times per year will provide those professionals (coaches, sports scientists, dietitian, medical) working with athletes, a guide to interactions between training and dietary responses and adaptations. Indeed, it is impossible to interpret what is best practice and sustainable for long-term progress without evaluating body composition – particularly aspects contributing to injury and illness prevention. Furthermore, for those who only swim, and do not practice other modes of training, tracking lean mass and bone density is imperative, since swimming is low-impact. For triathletes, the independent effects of body composition on swimming, cycling and running vary considerably and this heightens the need for monitoring to ensure that an effective and integrated balance is managed.

PERSPECTIVES OF BODY COMPOSITION AND SWIMMING PERFORMANCE

Watching the world's best take to the blocks before an Olympic final, it's clear for all to see that competitive pool swimmers are invariably muscular and lean. Whereas endurance open water swimmers are characterised by less lean muscle and more body fat. Triathletes, on the other hand, sit somewhere in between, leaning a little more toward the body type of an endurance cyclist/runner.

Although body composition is central to human performance, there is unfortunately very little published data on the topic when it comes to swimming – particularly in elite athletes.

That said, a recent study by Roelofs and colleagues (2016) examined body composition trends in elite collegiate pool swimmers during a full season. They found that as the season progressed, lean muscle mass increased and body fat decreased, contributing to performance gains. While it is commonly accepted by sports scientists that pool swimming (as opposed to open-water) performance improvement is associated with a reduction in body fat, there are also others (cited in Roelofs et al, 2016) that have found swimming performance is not adversely affected by higher body fat composition. The trade-off with higher fat stores is perhaps an advantageous buoyancy effect. The counter-argument is that excess body fat increases drag forces in the water, therefore limiting performance.

The greater body weight to height and higher body fat content characterised in open water endurance swimmers contributes to improved cold water tolerance. However, as with pool swimmers, there is inconsistency within the limited scientific data that supports the anthropometric link to performance. Interestingly, as the distance of an open water race increases, the difference between male and female performance decreases. In part, this may be associated with higher body fat stores in females compared to males, providing a buoyancy and metabolic economy advantage (Baldassarre et al, 2017).

BODY COMPOSITION CONSIDERATIONS FOR TRIATHLETES

Triathletes who come to see us in the performance lab are ambitious and highly motivated to get the best out of themselves – regardless of their age or athletic prowess. One hundred per cent of them will ask: "How much body fat and muscle mass is optimal for improving performance?" or "What's the best way to lose weight?" The initial rationale from these athletes, as they routinely describe, is to improve their power to weight ratio on the bike (including getting over hills easier), and to feel lighter on their feet when running. Interestingly, no triathlete has ever enquired about what effects modification of their body composition will have on their swimming performance. Therefore, careful holistic consideration of the triathlon's sum of parts must be made. Once an athlete's body composition is evaluated, decisions can then be made around strategies that may be effective in improving performance while maintaining the illness and injury prevention status quo. After all, attempting to maintain extremely low body fat for extended periods can lead to significant immune system challenges.

It is also important to highlight acute body composition changes that occur during a triathlon. Ironman competitors typically lose 2.3-5% body mass (Mueller et al, 2013), with fat catabolism contributing to ~50% of the deficit. The balance of body mass loss includes muscle glycogen, metabolic water (water bound to muscle glycogen) and non-metabolic water (sweat loss).

These acute body composition findings provide a critical perspective on physical and metabolic exertional demands that co-exist with endurance competition and training. Together, the chronic and acute changes in body composition also demonstrate the rationale of athletes undertaking periodic body composition evaluations. Measuring only body mass tells us very little about body composition. Indeed, most athletes have a tendency to wrongly assume that an acute change in body mass (after racing or training) reflects only fluid loss.

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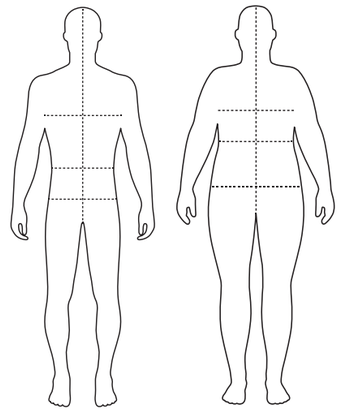

BODY SIZE: Swimming performance is not adversely affected by a higher body fat. The trade-off with higher fat stores is an advantageous buoyancy effect.

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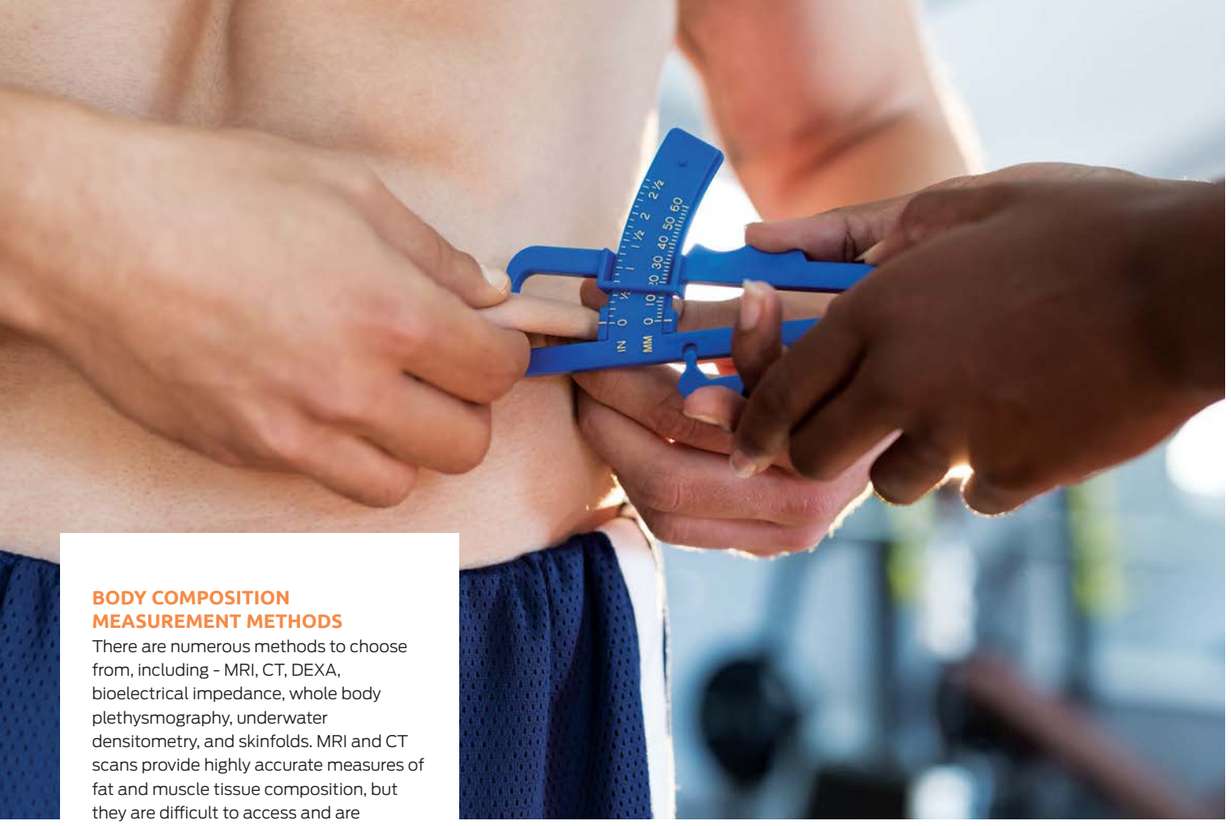

BODY COMPOSITION MEASUREMENT METHODS

There are numerous methods to choose from, including - MRI, CT, DEXA, bioelectrical impedance, whole body plethysmography, underwater densitometry, and skinfolds. MRI and CT scans provide highly accurate measures of fat and muscle tissue composition, but they are difficult to access and are relatively expensive. Whole body plethysmography (air displacement) is gaining momentum in the anthropometry field as a reliable measure of fat and muscle mass but it's mostly found in university and hospital labs. Underwater densitometry was the granddaddy of body composition methods before MRI, CT, and DEXA were invented, although these days rarely found outside of university labs. Bioelectrical impedance devices are more readily available in private practices, however, intra-device reliability is sometimes questionable. Dual-Energy X-ray Absorptiometry (DEXA) correlates strongly to MRI and CT for fat and lean tissue. An added bonus for DEXA is the well-established capacity to quantify bone mineral density. Furthermore, DEXA is accessible in private practice and relatively inexpensive for the recipient. As the name suggests, DEXA does emit some radiation, albeit at very low, safe levels – lower than radiation exposure when flying in a plane. Skinfold measurements are popular amongst dietitians and sports scientists, although they are limited to estimating whole body fat via the subcutaneous fat thickness (immediately below your skin). Indeed, a very recent study by Zemski and colleagues (2017) found that existing skinfold equations were unreliable when estimating body fat composition in rugby players. Skinfold equations tended to underestimate and overestimate body fat percentage in those athletes with low and high body fat, respectively.

TAKE HOME MESSAGE FOR TRIATHLETE SWIMMERS

There is no one size that fits all. The intra- and inter-athlete body composition and swimming performance relationship will vary considerably, depending on event distance and conditions. Triathletes should also be wary of pigeonholing their body composition intentions and consider a balanced sum-of-parts approach to the demands of the sport.

Given that the swim leg of a triathlon contributes to 10-20% of the total event duration, it is not unreasonable for triathletes to focus body composition changes in favour of cycling and running performance. An experienced practitioner should implement a graduated strategic plan in order to facilitate requisite changes in lean and fat tissue, and allow ample opportunity to carefully validate the effects of the changes - to ensure performance outcomes are heading in the right direction and not at the expense of maintaining good health. AT

MEASURING UP: Skinfold measurements are popular among dietitians and sports scientists, although they are limited to estimating whole body fat via the subcutaneous fat thickness immediately below your skin.

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