BODY COMPOSITION ASSESSMENT IN ATHLETES

Richard Chessor explains current methods used and future possibilities...

LEAD NUTRITIONIST, SCOTTISH RUGBY
RICHARD CHESSOR

SENr AUTUMN EVENT

Richard Chessor will be speaking at the next SENr event along with Dr Stuart Galloway, Ruth Wood-Martin, Irene Riach, Mark Ellison and Olivia Busby.

Date: 13 November
Venue: BT Murrayfield Stadium (Edinburgh)

To book visit www.bda.uk.com/events/home

Monitoring the athlete's body composition is important to help understand and quantify changes in body fat, muscle mass, total body water and bone mass in relation to the training programme and athlete's development. Often there is significant emphasis placed on the outcome of the test and the data can be used by the athlete's support team to make decisions on nutrition requirements, training programme design and even selection or contract offer. Thus the method chosen must be robust.

CHALLENGES

Not all methods can produce a full body composition profile in a reliable manner. When searching for a method, the practitioner should consider the following:

- **validity** – the extent to which a measurement is representative of a particular characteristic
- **precision** – the observed variability of repeated measures made on the same subject
- **reliability** – degree of consistency
- **accuracy** – the true value compared to the criterion measure.

In addition, the primary practical considerations are:

- **time** – how long does it take to measure each subject and is it practical to measure a large number of subjects in a relatively small period of time?
- **cost** – is it affordable to repeat the measures at the desired frequency?
- **intrusion** – how intrusive is the measure on the athlete and are they comfortable with this? What level of intrusion on the training programme can be committed to?
- **frequency** – how frequently can the measures be conveniently taken and what impact may this have on the athlete's understanding of how their actions influence their body composition?
- **pre-requisites** – most methods require standardisation of the athlete's pre-testing state so the practitioner must consider how easy and convenient it is to achieve and replicate this state for each measure
- **equipment & training** – can the necessary equipment be accessed as and when required and is specialist training required for the practitioner?

Following the assessment there must be careful consideration of how the data will be used and fed-back to the athlete and the support team.

COMMON METHODS

The four most common methods currently employed with athletes are surface anthropometry via skinfolds, air displacement plethysmography (BodPod), bioelectrical impedance (BIA) and dual-energy x-ray absorptiometry (DXA).[1]

Skinfolds – the field-practitioners solution

- low cost and convenient in the field
- a measure of intra- and inter-tester error (commonly identified as the technical error of measurement, TEM) must be continually monitored to effectively demonstrate change
- often regression equations that are not representative of the sample can be inappropriately applied resulting in data with low external validity

BodPod – the gadget enthusiast's solution

- quick and requires little training to undertake
- numerous trivial variables can affect the results such as facial hair, body temperature, skin moisture and air pressure in the measurement room
- makes assumptions regarding the density of fat mass and fat-free mass that may be inappropriate for athletic populations

BIA – the convenience solution

- very quick and some units can provide detailed information on segmental fat and fat-free mass as well as total body water and fluid distribution
- significant control of pre-test status must be employed – small changes in hydration status, gastric content and body temperature can have a significant influence on the results

DXA – the scientist's solution

- detailed segmental analysis from a quick scan
- very small, large, lean or broad athletes may experience errors greater than athletes of a 'standard' size or composition
- can be costly and access to scanners may be impractical

FUTURE METHODS AND POSSIBILITIES

Body composition assessment will evolve with new technology and as existing technology is enhanced. More recently, ultrasound imaging has gathered popularity. It involves an ultrasound pulse passing through the skin and from the resulting scan image the underlying tissue can be accurately measured.

Another novel approach to body composition assessment may be 3D scanning in which a 3D image of the body is built and body composition is derived from body volume. This method has potential, but requires significant cost, specialist equipment, space and expertise.

When selecting a method of body composition assessment the practitioner must consider a number of technical and practical matters. However, the overriding question will be "How do you want to use the data?" ●

REFERENCES

1 Ackland et al. Current status of body composition assessment in sport. *Sports Med.* 2012;42(3):227-249