

# **THE SCIENCE OF ENERGY BALANCE AND 'METABODY' – HOW IT WORKS**

**BY**  
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The elite athlete's match success, training and recovery edge is influenced by many contributory factors including physical, psychological and biomechanical performance. It is hugely influenced by the biochemical processes involved in metabolising his or her nutritional intake. Lance Armstrong, the cyclist, attributed much of his phenomenal success to the attention paid to his energy balance by him and his support team. Armstrong calculated to the calorie his precise energy needs at any point during a race and adjusted his intake to meet that demand exactly.

Metabolism is the biochemical process of combining food with oxygen to release the energy contained for use by the body. The elite athlete needs to utilise this energy as efficiently as he or she is able, ensuring that he/she has sufficient energy for performance throughout the duration of the event, while generating as little surplus energy as possible (Bean. A. 2006). The meticulous attention to detail that Armstrong and his dedicated team of nutritionists were able to commit themselves to, might be difficult to replicate in a team sport and in the more financially constrained environment of most clubs. However, a similar level of detailed, precise knowledge about the individual athlete's unique, individual energy balance enables the coach and the athlete to, at least, minimise the damage done by poor diet and, at best, optimise his or her nutritional intake and enhance performance, training and recovery.

The "Metabody" © programme, designed and delivered by Steve Birchett ([www.metabody.co.uk](http://www.metabody.co.uk)), is a cost-efficient, easily applied and practical way of measuring metabolism and utilising the science of energy balance to bring the detailed knowledge of the individual athlete's metabolism into play. The programme uses energy balance to prescribe accurate diet, nutrition and exercise regimes for athletes, sports performers and the general public. It has been widely and successfully tested with obese and overweight people as a foundation part of their weight management programme and with amateur, junior and elite athletes.

"Metabody" © integrates accurate measurement of the client's Resting Metabolic Rate (RMR) with measurements of body fat percentage, lean mass, water content and bone density to enable the trainer to generate a complete picture of the client's energy needs. The "Metabody" © programme can thus be used with the trainer and the player to design the diet and nutrition programme specifically for the individual athlete, avoiding generalised eating plans and maximising effective nutrition during training, match and recovery periods.

RMR can constitute up to 75% of the client's energy demand. Accurate measurement of RMR is the starting point for the programme. "Metabody" © uses an indirect calorimeter, the BodyGem® metabolic measurement device by HealtheTech Inc., a

simple to use, hand-held device to measure the client's RMR. The indirect calorimeter measures oxygen consumption ( $V_{O_2}$ ) and air pressure at the point of the test and, using the Weir equation and a constant RQ value of 0.85 ( $RMR = 6.931 \times V_{O_2}$ ), calculates the client's metabolic rate. Metabolic rate is traditionally assessed using either direct or indirect calorimetry. Direct calorimetry requires the precise measurement of the person's heat output using a large, technically complex and expensive whole body calorimeter. Direct calorimetry is usually undertaken in laboratory or clinical environments and is not generally suited to the sports club or weight management environment. Oxygen consumption measurements are typically undertaken with a metabolic cart or a Douglas Bag, both of which are complex and time consuming. The BodyGem® metabolic measurement device by HealtheTech Inc., incorporated into the "Metabody" © programme, brings indirect calorimetry into the coaching and training environment. The accuracy of this method compares favourably with direct calorimeter measurement and makes the technology more immediately accessible.

The client's RMR is the starting point for the programme. This information is combined with accurate measurement of the client's weight, body fat % and lean mass using impedance scales. Measuring body fat is an inexact science; callipers are invasive and difficult to use and hand-held impedance monitors can generate inaccurate measurements if the client's body temperature is high or the person has high levels of body fat distributed in their upper body. The Metabody coach uses impedance "stand-on" scales. These can have a 3-4% error rate and, like hand-held devices, are prone to discrepancies caused by body temperature and the client's fluid content. Notwithstanding these limitations, those used generate as accurate a reading as any non-invasive measuring devices and are easy to use.

The suite of measurements is added to calculations of the person's activity. The total package generates a comprehensive account of that person's energy needs. The Metabody coach records the amount and intensity of activity and exercise undertaken by the client during different phases of that person's training, resting and performance cycle and uses this full account to work with the club's dieticians and coaches and the athlete to design a truly unique diet and nutrition programme for the individual athlete.

The benefit to the athlete is that the information generated is applicable to him or herself personally and can be adapted to suit changing circumstances and times. For example, the pre-season training programme will require a different nutrition regime from the one when preparing for or recovering from a match or from injury. The coach and club benefit from the straightforward reportage and easily understood diet and nutrition plans that the programme generates. These are written up as portions of readily available and easily prepared foodstuffs that the individual athlete can understand and access. The programme recognises that, while many athletes have time on their hands, they might not like to spend much of it on shopping and eating well!

The "Metabody"© programme makes a complex but vital element of the modern athlete, coach and nutritionist's work accessible, easy to disseminate and simple to

understand. If the vital edge can be achieved by the player having the energy to make a crucial metre or the upper body power or a split second on his or her opponent because he or she has the energy reserves to call upon, that player will win the encounter and add to the chances of his or her team winning. If the team can be confident that their players are eating well and ensuring their individually precise energy balance, less is left to chance and the prospect of success is made greater. “Metabody” © cannot guarantee winning every time but it can make the chances greater.

References:

Bean A. 2006: “The Complete Guide to Sports Nutrition”. A&C Black. London