COULD YOUR CALORIE EQUATION BE THE REASON WHY YOU AREN'T MAKING GAINS?

›› **By** Pedro van Gaalen, Editor

CALORIE CONFUSION

NUTRITION PLAYS A MAJOR ROLE in our ability to perform or to build the body we desire, alongside the right type of training.

For example, in our quest to add significant muscle to our physiques we know that we need to create a calorie surplus by eating quality food sources, especially protein, to support our recovery and drive the anabolic rebuilding process following intense weight training.

In terms of performance, we need to ensure we are ingesting the right amount of calories to fuel our training sessions and racing, and also aid recovery. It is also important to know what source of those calories would best serve our needs.

However, when we stop making gains or underperform we're quick to point to a training plateau as the culprit. Seldom do we consider that the cause of our inability to add muscle or maintain peak performance may have started right at the beginning, back when we first sat down to calculate our daily calorie requirements.

Scott Robinson is an Exercise Physiologist and Performance Nutritionist at Guru Performance LTD (www.guruperformance.com), and is also the Assistant Program Director of the ISSN Diploma in Applied Sports and Exercise Nutrition (http://guruperformance.com/institute/)

ARE EQUATIONS GUESSTIMATIONS?

You see, recent research has uncovered that the common equations many of us rely on to calculate a key component in the energy balance equation – our resting or basal metabolic rate (RMR) – can be woefully inaccurate.

Even many of the common devices used today to determine your RMR via body composition analysis can differ somewhat from more accurate measures such as gas exchange testing (also known as indirect calorimetry) to determine resting substrate (energy) utilisation.

What that effectively means is that we're potentially under-dosing our bodies with the fuel they need to perform at optimal levels. It's a common issue recently highlighted by the Guru Performance Institute, the UK's leading specialist consultancy for performance nutrition, exercise physiology, wellness and weight management, located in Mayfair, London.

Scott Robinson, Exercise Physiologist & Performance Nutritionist, and the Assistant Programme Director, ISSN Diploma Post Graduate Programme at the Guru Performance Institute, explains that an accurate measure of RMR is required to determine exactly how many calories your body burns at rest each day.

"This is crucial to determine your daily calorie requirements or targets based on specific goals, be it enhanced performance, muscle gain or weight loss, when combined with your active metabolic rate – your energy expenditure from daily activity and exercise. It is also essential for monitoring of metabolic adaptations to dieting and training", he adds.

The Resting Metabolic Rate (Resting Energy Expenditure) + Resting Substrate Utilisation test that Guru Performance offers "determines the amount of calories required (at rest) per day," according to the Guru Performance website.

"The information we derive from these tests can also help us determine the balance of fuels utilised at rest – the amount of protein, carbohydrate and fat that is oxidised – which is important information in the broader picture", asserts Robinson. In this regard, it is best to "test, don't guess", advocates the Guru Performance Institute.

With this scientific approach, the Guru Performance Institute helps numerous elite athletes to optimise their performance. "We also have a number of 'weekend warrior' athletes who visit the institute, but our focus with them is to use these tests and protocols to improve their health and weight first, which then has a beneficial impact on their performance. We also work with people in the general population who want to change their body composition, particularly those who may have reached a plateau in terms of weight loss or muscle gain."

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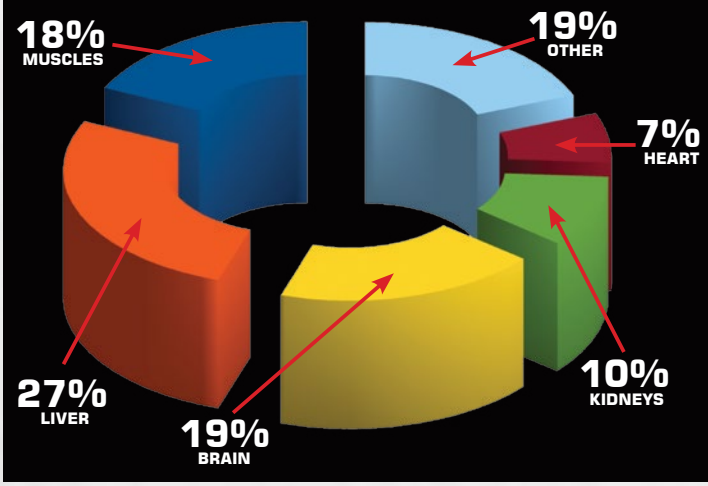
YOUR BODY'S RMR

Aside from your metabolically active muscle tissue, which accounts for around 18% of your RMR, your internal organs are the other major contributors to your metabolic requirements at rest. The liver accounts for up to 27% of your resting metabolism, the brain 19%, kidneys 10%, and the heart 7%.



EXPLAINING THE DIFFERENCE

The main reason offered for the discrepancies in these figures is that RMR is often estimated using predictive equations commonly found on the Internet, but when compared to test results at Guru Performance there is often a large discrepancy, sometimes as large as 500kcal per day.

This can have a significant impact on energy balance and the attainment of specific goals, especially those related to body composition, because working from a 500kcal deficit at the outset can result in a reduction of weight of up to 0.5kg a week depending on a myriad factors. It would also mean you're constantly in an energy deficit when engaging in a sports performance-based training programme, which will eventually catch up with you.

However, this stance is based on more than mere observation and anecdotal evidence. There is also sufficient science to support the notion that most of us are underestimating our RMR.

For instance, a validation of several established equations for resting metabolic rate in obese and non-obese people by David C. Frankenfield, MS, RD, et al, which looked at 130 non-hospitalised adult volunteers grouped by degree of obesity, found that "resting metabolic rate was more than 10% different from measured in 22% of subjects using the Mifflin equation, 33% using the Harris-Benedict equation, and 35% using the Owen equation. The error rate using Harris-Benedict with adjusted weight in obesity was 74% (vs 36% in obese subjects using actual weight in the standard Harris-Benedict equation)."

RESTING METABOLIC RATE IS A MEASURE OF THE AMOUNT OF ENERGY USED BY THE BODY IN A RELAXED, BUT NOT POST-ABSORPTIVE (DURING THE DIGESTION OF FOOD), STATE. RMR MEASUREMENTS REQUIRE THAT THE PERSON BEING TESTED IS IN A THERMAL-NEUTRAL ZONE AND RELAXED.

The results were published in the September 2003 edition of the Journal of the Academy of Nutrition and Dietetics.

Of the four major equations commonly used, researchers from the University of Massachusetts, Department of Kinesiology, and Ohio University, Applied Health Sciences and Wellness found that "the Harris Benedict equation was more likely than the Owen, Mifflin–St. Jeor, and WHO/FAU/UNU equations to predict RMR to within 10% of measured RMR" when tested against a MedGem® metabolic analyser.

Many of these equations are inaccurate because they fail to consider differences in body composition as users only have to input their total body mass. This delivers inaccuracies because someone who is a lean and muscular 70kg would have a much higher RMR than an obese 70kg person because muscle tissue is metabolically active, whereas fat is not, yet the calculation would deliver the same value for both.

"It is also worth noting in this context that it is extremely difficult to accurately measure active metabolic rate outside of clinical settings, which needs to be added to RMR to get an accurate estimate of daily energy requirements", explains Robinson. "The implication of this is that the variance in estimates versus real values can be pushed out even further. This can have a massive impact on someone actually reaching their goals." It therefore pays to be as accurate as you can be whenever possible.

The other issue to consider, says Robinson, is that RMR is a dynamic figure, not a static number. "As a person changes their body composition by adding more lean mass and decreasing fat mass, their RMR will increase. If they keep working off their initial RMR figure to determine calorie intake requirements they are most likely underestimating their daily requirements. This can have a significant impact on their ability to add more muscle to their frame and can negatively impact sporting performance and recovery."

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INDIRECT CALORIMETRY

For this reason devices that determine body composition, such as the Tanita scale, are often a better option in determining a more accurate RMR, but there still seems to be some discrepancy in the final figure when compared against indirect calorimetry gas exchange testing.

This is why the Guru Performance Clinic prefers indirect calorimetry gas exchange testing to determine RMR. The test requires clients to simply lay down for 10-20 minutes while wearing a mask over their nose and mouth. During the test the calorimeter will measure the volume of air breathed in and out via an air flow sensor while an oxygen sensor measures the concentration of oxygen. By precisely measuring the volume and concentration of oxygen in the expelled air, RMR can be accurately determined because burning 1 calorie (1 kilocalorie) requires 208.06 milliliters of oxygen. This testing procedure is the most accurate and is therefore generally deemed to be the only clinically-feasible method of measuring energy expenditure.

It is also worth noting, however, that this test is not infallible as various factors can also influence indirect calorimetry. *A systematic review of best practice methods to measure RMR in adults by researchers from Penn Nursing and Hospital of University of Pennsylvania Clinical Nutrition Support Service, Philadelphia, which was published in 2006 in the Journal of the American Dietetic Association, found that "food, ethanol, caffeine, and nicotine affect RMR for a variable number of hours after consumption; therefore, intake of these items must be controlled before measurement. Activities of daily living increase metabolic rate, but a short rest (< or =20 minutes) before testing is sufficient for the effect to dissipate. Moderate or vigorous physical activity has a longer carryover effect and therefore must be controlled in the hours before a measurement of RMR is attempted."*

With these factors controlled for, an indirect calorimetry test could potentially swing your progress back in the right direction by giving you a more accurate assessment of your daily calorie requirements. "This test helps us to tease out the factors that may have caused the plateau and then we can help develop suitable interventions to get clients back on track", states Robinson.

So, if you've reached that dreaded plateau, it might be better to overhaul your approach from the ground up before you start messing around with your training, as this may only serve to exacerbate the problem.

If you don't have access to or can't afford an indirect calorimetry test, the only other option to get a more accurate measure of your RMR would be to use as many of the online resources and calculators as possible and determine the average of the various results.

Robinson also suggests finding a calculator that takes body composition into account, and to also take the figure with a pinch of salt. "At the end of the day, fixating on hitting very specific calorie intakes or expenditures can bog you down in the detail. This is not a pragmatic approach to nutrition, whatever your goals, as this can lead to unhealthy practices. The most important element is consistency in your diet and training, which is why we try to use scientific methods to offer our clients pragmatic solutions that can then be taken forward in their everyday lives", he concludes. ■

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"BY PRECISELY MEASURING THE VOLUME AND CONCENTRATION OF OXYGEN IN THE EXPELLED AIR, RMR CAN BE ACCURATELY DETERMINED BECAUSE BURNING 1 CALORIE (1 KILOCALORIE) REQUIRES 208.06 MILLILITERS OF OXYGEN. THIS TESTING PROCEDURE IS THE MOST ACCURATE AND IS THEREFORE GENERALLY DEEMED TO BE THE ONLY CLINICALLY-FEASIBLE METHOD OF MEASURING ENERGY EXPENDITURE."