

EDITORIAL

Measurement error – the missing link?



We met our goal of publishing four issues of the *Journal* in 2005. We will try hard to meet this goal again this year. The factor limiting us will be whether sufficient good-quality papers get passed by our peer-review process. One of the criteria of submitted studies that the reviewers are being asked to scrutinise is the precision of the measurements of the outcome variables. This is particularly important in our field of research.

Scientists having to make decisions about changes in physical performance are always faced with the predicament of deciding whether a change is a real, meaningful change, or whether the change is merely the measurement error associated with the variable that is being studied. For example, how can a decision be made about whether a new pre-race strategy improves 10 km race performance? Are changes of the 10 km running performance within the expected variation? The predicament also extends to clinicians who have to decide, for example, whether a change in blood pressure after the intervention of an exercise programme is real, with meaningful clinical consequences, or whether the changes in blood pressure are within the error associated with the measurement of blood pressure. Dieticians need to be able to distinguish whether the self-reported dietary intake is different after intervention – to do this they need to know the measurement error of their self-reported measurement.

A more intuitive, practical approach to interpreting results has been suggested.¹ This approach is based on calculating the confidence intervals around the true difference of the measurement. If the change in the measurement is beyond this confidence interval, then it may be concluded that the intervention has a real effect (positive or negative). This approach requires scientists to be more precise about publishing reliability and validity data on their main outcome measurements. The typical error of each measurement also needs to be established. An example of this approach shows that fast runners in cross-country and road races have a variation in performance of 1.2-1.9% and in the marathon the variation is 2.6%.² The variation in the slow runners is almost two-fold higher than for the faster runners. These objective measurements provide the basis for interpreting changes in performance as a result of an intervention. Expressing the results this way makes the interpretation of the data more believable.

International journals that focus on applied physiology are starting to require this form of data analysis for the studies they

accept for publication. This is a common sense approach and one we are going to start applying in our *Journal*. Readers are encouraged to familiarise themselves with the methods as described in the cited papers below.

This issue of the *Journal* includes a variety of studies. The first study investigated the effects of a single dosage of a non-steroidal drug (naproxen) and a cyclooxygenase inhibitor (rofecoxib) on the exercise-induced stress response. This study showed that different anti-inflammatory drugs may affect the exercise-induced stress response differently and supports the concept that these drugs should be prescribed with discretion.

The study reporting on shoulder injuries in competitive swimmers in Kwa-Zulu-Natal shows that the incidence of such injury is high. This study should act as a catalyst for further mechanistic studies designed to reduce the risk of shoulder injuries in competitive swimmers.

The study on the rating of perceived exertion (RPE) for a training session was submitted by the research group that pioneered this subjective method of quantifying the training load. This method is becoming more popular in endurance and team sports. The RPE method is simple and practical and this study shows that the validity and reliability of this tool makes it a sufficiently precise tool to use with confidence.

Another study examines the biomechanical factors associated with the risk of knee injury when landing from a jump. This is a review paper examining 26 studies that were selected after they met certain criteria. The authors are able to derive conclusions that will direct future mechanistic studies.

Finally, this issue includes a review paper on C-reactive protein, an acute phase protein that is regulated in response to injury or infection. This concise review is filled with facts and discusses the synthesis, biological properties and functions of C-reactive protein. The next section of the paper links C-reactive protein to cardiovascular disease and acute and chronic exercise training. Many of the ideas are novel and provide a good foundation for future studies.

May you enjoy reading this issue!

Mike Lambert

Editor-in-Chief

1. Batterham AM, Hopkins WG. Making meaningful inferences about magnitudes. *Sportscience* 2005; **9**: 6-13.
2. Hopkins WG, Hewson DJ. Variability of competitive performance of distance runners. *Med Sci Sports Exerc* 2001; **33**: 1588-1592.