
PRACTICAL APPLICATION

International Journal of Sport Nutrition and Exercise Metabolism, 2006, **16**, 122-125
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Research in Sports Nutrition: An Interview with David Pyne

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The year 2006 sees the launch of a new journal focused on sports performance: the *International Journal of Sports Physiology and Performance*. The stated mission of this journal is the publication of authoritative research in sports physiology and related disciplines, with an emphasis on work having direct practical applications in enhancing sports performance in sports physiology and related disciplines. In this issue of *IJSNEM*, we talk to the editor of this journal, Dr. David Pyne, about his experiences in sports science research.

David, you are a senior physiologist in the Department of Physiology at the Australian Institute of Sport (AIS), with a service record of 18 years in the organization. Your research interests are wide and have included specific intervention studies with athletic populations, as well as descriptive studies arising from your work in the daily training environment of elite athletes. Can you provide a brief overview of the types of studies that you have conducted in relation to sports nutrition?

Over the years we've employed most of the traditional approaches to studies of athletes: retrospective, prospective, observational, and randomized control trials. Of course where possible we employ a randomized double-blind placebo-controlled crossover design that gives us the level of rigor and statistical power necessary to have confidence in the experimental findings. In terms of sports nutrition, we have undertaken a study on carbohydrate intake during a half-marathon, investigations of the effects of supplementation with creatine, bicarbonate, glutamine, caffeine, and studies on probiotics. Much of this work has focused on interactions between nutrition, immune function, and athletic performance. Keeping athletes healthy through good nutritional practices is important for maintaining and improving training and competitive performance. We are mindful that daily nutritional practices are probably more important than the possible effects of selective supplements taken for health or ergogenic benefits.

Some of your intervention studies have involved highly-trained athletes, including elite athletes from the AIS. Do you have any tips for budding researchers in sports nutrition on how to recruit such highly-trained athlete populations into studies and what steps need to be taken to create a successful research outcome?

We are fortunate to work directly with elite level athletes and coaches. After all, this is our core business and it is rewarding to help very committed individuals

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reach their goals. Even when you already work in such an environment, it is important to work closely with athletes and coaches to ensure that any research that you undertake is of mutual interest and benefit, rather than just being your personal “hobby horse.” Of course, any experimental procedures or interventions must fit into the athlete’s training program without causing significant interruption. There are several other avenues to recruit trained athletes. Personal contacts and networking with local sporting groups is a good place to start. Most exercise and nutritional science researchers are on good terms with local cyclists, triathletes, and runners. These athletes are well suited to controlled laboratory investigations using cycling or treadmill ergometry. Often, contact with a few athletes can be used to recruit training partners in their team or to alert you to other suitable individuals in the area.

Recruitment information should include a clear presentation of the research question, the background to the problem, the nature of the athlete’s commitment in terms of time, experimental procedures, and the necessity for control of normal dietary and training practices. It is important to lay out all the experimental procedures, and particularly the details of any invasive biomedical procedures and the nature of protracted or exhaustive exercise protocols. While this step is mandatory in gaining institutional review board or ethical approval, it is very important to make this as clear as possible to potential subjects. Most people naturally require some convincing and reassurance of the need for multiple venepunctures, muscle biopsies, or 2 hour exercise protocols! The selling point is that subjects are likely to be interested in anthropometric, hematological, physiological, and performance testing, which occurs as an outcome of their involvement in the study. Coupled with information on the primary nutritional outcome of the study, it should be possible to provide an enticing list of benefits for each subject.

More recently you have been working with Professor Will Hopkins from the Auckland University of Technology on the interpretation of meaningful changes in performance of athletes. This is a departure from the usual research model in which the success of an intervention in altering an athlete’s performance is judged in terms of “statistical significance.” Can you tell us more about this, and how it tries to bridge the gap between the interests of a researcher and a coach in looking at a change in performance?

I don’t think the emergence of establishing the practical or clinical significance (or substantiveness) is really a departure from the usual approach, but more a recognition of the shortcomings of traditional statistical significance testing. While the statistical significance model has been the convention in academia and peer-reviewed literature for several decades, its limitations in both theoretical and practical terms have been highlighted many times in the last 20 years. Essentially, the newer approach centers on three key elements: the precision of estimation of effects, the magnitude or size of effects, and whether the magnitude of effects are worthwhile in practical (clinical) terms. Precision of estimation employs confidence limits that should be de rigeur now for authors of peer-reviewed research. The notion of effect size is well established in the scientific literature, and it is very useful in practice to advise a coach or athlete that an effect or nutritional intervention is either “trivial” or “small” or “moderate” or “large.” Mention of statistical significance to the majority of lay people leads to either a glazed look or substantial eye rolling.

Methods for determining threshold values for practical or clinical significance are emerging and will continue to evolve as more clinicians and researchers consider these approaches.

What steps has the new journal taken to try to encourage this type of analysis in the papers it publishes?

The new journal, the *International Journal of Sports Physiology and Performance (IJSP)*, is seeking contributions in the areas of sport and exercise physiology and similar disciplines relating to sports performance. Like most journals, we can only provide limited direction in the guidelines for authors in both the print and on-line versions. But we have also taken the opportunity to provide guidelines for reviewers so they have a template and an understanding of the journal's approach. It is surprising that many journals provide little or no guidelines or instructions to their reviewers, yet the quality and scope of the peer review process remains an issue for every author submitting a manuscript. We also have a Technical Report section that will feature articles on analytical and research issues relating to experimental design and statistical approaches. We hope this feature will be informative and stimulate readers and submitting authors to think critically on the quality of published research in the sport and exercise science disciplines.

One outcome of your longevity at the AIS and service to various elite level sports is that you have produced large data sets and longitudinal data on high level athletes. It is easy in a busy job to be focused on the day-to-day tasks, but what are the rewards of being able to stand back occasionally and look at the "big picture" of your work with athletes? What are some of the outcomes of your recent "data mining" activities? In particular, what did you discover by looking over your many years of assessing the physique of elite swimmers?

There is no doubt that many rich data sets generated in laboratory and clinical settings are often overlooked in the heavy workload of day-to-day activities. The busy daily schedule and the priority to provide short-term feedback generally mean that any quantitative analysis that is undertaken is superficial. Becoming an expert in any given field requires a combination of training and academic qualifications, practical experience, an eye on the literature, and a keen interest in the science underpinning the discipline. In all scientific disciplines a key theme is the quantitative data. "Data mining" has a particular meaning for the analytical experts, but even simple descriptive statistics of existing clinical or research data is a good place to start. One approach that I use is to categorize questions into either within-subject changes (how a given athlete changes over time from assessment to assessment or season to season) or between-subject differences (how different athletes within a group, team, or cohort vary at any given assessment or time point). This of course is the classical mixed modeling approach involving fixed and random effects.

We've used this approach with the physique or anthropometric assessment of swimmers to establish reference values for swimmers of different ages, genders, and training background, and typical values for the magnitude of changes in mass, body fat, and lean mass from phase to phase within a season, and from season to season. Our recent work in the new journal reports changes in a newly proposed lean-mass index (the so-called LMI) that provides a quantitative means of estimating within-subject changes in lean mass using simple measures of body mass and

skinfolds (Pyne et al., *Int. J. Sports Physiol. Perf.* 1(1):14-26, 2006). Experienced clinicians develop a good feel for these effects with several years of service. This type of information is useful for educating emerging athletes, coaches, and scientists, and providing objective rather than subjective evidence for those already in the sporting and academic systems.

Do you have any final tips for sports nutritionists who have the opportunity to work with groups of elite athletes over a period? What steps can be taken so that this experience allows the opportunity for undertaking research?

The most important thing is building a close rapport with the coaches and athletes. A useful tip is to attend both training and competitions to learn more about the sport and demonstrate your commitment to the athlete's cause. Just doing the clinical visits focused on your work is fine, but the athletes and coaches will definitely notice your interest, if you take the opportunity to be involved beyond your own nutritional activities. Attendance at these times can often generate discussion and ideas on potential research questions and priorities. Another important consideration is to interact with other professionals, such as the physiologist, psychologist, or sports physician, to identify collaborative opportunities. With routine clinical work, it is essential to provide clear and concise feedback in verbal, written, and even electronic form. Always keep the coach informed particularly if you are consulting with individual athletes in your clinic without the coach being present. Finally, taking a close and personal interest in the athlete's progress is essential, but it is important not to cross the line of directing the athlete in areas other than nutrition and related fields. Leave the coaching to the coach.