

Practical Sports Nutrition: An Interview With Linda Houtkooper

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This article represents an experiment we hope to continue in future issues: an opportunity to look at the practical issues underpinning some of the papers published in *International Journal of Sport Nutrition and Exercise Metabolism*. To debut this feature, we present an interview with Dr. Linda Houtkooper, principal author of the manuscript “Body Composition Profiles of Elite American Heptathletes” (beginning on p. 162 of this issue), and a member of the editorial board of *IJSNEM*.

Linda, you’re based at the University of Arizona in Tucson, in the Department of Nutritional Sciences. What does your work encompass?

I work in 3 major areas: nutrition and health for chronic disease prevention, sport nutrition, and physical activity and exercise.

How did you become interested in the field of sports nutrition? What did you study? How did your career path lead you to where you are now?

My first degree was in Home Economics, and for 3 years I taught in a junior high school and high school. But I was only really interested in the food and nutrition aspect of health, so I went on to get a Master’s degree in Dietetics, then worked in a clinical setting in a major medical center. Doing this, I realized that I wasn’t happy working with sick people — rather I was much more interested in prevention.

I got interested in sport nutrition through my PhD training and dissertation on the assessment of body composition. I was really interested in seeing what would happen if you combined changes in nutrition status with changes in physical activity. I was intrigued with the idea that combining physical activity with nutrition would achieve a better health outcome. But my other interest was how does nutrition affect optimal performance. At the university I had the opportunity to work with some really good researchers in the field — for example, Dr Jack Wilmore was one of my early mentors. Through my PhD training I was able to develop a sound understanding of exercise physiology and nutritional biochemistry. Then because the university athletic program was interested in nutrition, trainers and coaches sought me out to provide individual counseling to athletes or conduct group education sessions.

Initially I was particularly interested in swimmers, because swimming is what I do for fitness. When I spoke at a state conference for swimmers and coaches, I met the publisher of *Swimming World* magazine who invited me to write articles for this publication. I did this for several years and found that a popular activity was to provide practical answers to queries raised in a Q&A-type section. Later on I became involved with USA track and field.

So I didn’t ever start out with a definite plan to work in sports nutrition. Rather, it

evolved from serendipitous meetings and relationships with people along the way.

Budding sports nutritionists are always keen to specialize and focus on sports nutrition as soon as possible. But how have your other experiences in other areas of nutrition or physiology prepared you to work in sports nutrition?

Working in a medical setting, providing counseling to patients with disease states and health problems, really consolidated for me the importance of eating well. It has also been very useful in working with athletes who have medical problems, such as diabetes or a family history of health problems related to nutrition. The medical model is important for dealing with these athletes and working within the perspective of their total health needs as well as their sports interests. This background was valuable for developing counseling skills and the expertise in producing education resources that are really practical in improving nutrition knowledge and practice.

How did you come to work with USA Track and Field and the heptathletes in particular?

One of our track and field coaches at University of Arizona was involved in USA Track and Field, helping to create developmental programs for Olympic-caliber athletes. Through my work with this coach I got involved with projects, and launched my heptathlete nutrition development program, which I have now been running for about 12 years.

What kind of nutrition activities have you undertaken with these heptathletes?

I've been focussing on developing education resources that individual athletes and coaches can use to improve their nutrition knowledge and ability to make good food choices to meet their sporting goals. We've developed a training manual that each of the heptathletes receive. It provides a counseling manual to support the individual consultations we do with these athletes, as well as more specific information to back up the education sessions undertaken at their camps. Luckily, for the first 6 years of the program, they brought the athletes to the U of A for their summit meetings, which gave us a chance to do body composition assessments in the laboratory, using the best techniques available.

At the core of our activities has been the desire to make these athletes more aware of their eating patterns in training and around their competition activities. We try to look for nutrition factors that could be influencing their successes and positive experiences as well as their failures and problems. Of course there are many other issues such as their skill development and their basic physical preparation, but we try also to focus on the nutrition links. We also give some attention to their coaches, since at this level coaches have a very important influence on eating patterns. Our long range goal is to provide on-line services; we have been moving towards providing a lot of information and assessment forms, for example, food records and questionnaires, on a website <<http://ag.arizona.edu/nsc/new/hept/index.htm>>. We try to provide some email access to athletes, although of course they always prefer the face-to-face contact or a phone call.

What have you identified to be the main nutritional challenges and requirements during training for these athletes?

Maintaining fluid intake and spreading food intake over the day are major challenges for these athletes. Meeting protein needs has never been a problem, but some

individuals struggle to achieve their requirements for some vitamins and minerals. This is often because of the limited range of foods that they're prepared to eat; we've been trying very hard to increase the fruit and vegetable intake of the majority of the group. Occasionally because they are focussed on achieving or maintaining a low body fat level, some athletes will restrict their energy intake below what is needed to fuel their training. We're often able to show athletes that they need more food than they thought they did, especially if they choose more nutrient-dense foods like fruits and vegetables. The net effect of better choice can be greater food intake, better energy levels for training, and overall better performance. These athletes often know a lot about the need for fluid and fuel replacement, but we need to help them find practices that achieve these goals.

What are their main challenges and practices during competition? How do you approach nutritional support for a competition that is carried out over 2 days, involving 7 separate events?

It took us 2–3 years to figure this out, but one of our best achievements has been the production of nutrition planners, which plot out all their events and plan their fluid and fuel replacement strategies, before they go to the competition. Just consciously sitting down and thinking through what they were going to do throughout both of the days of competition and the day before has been a tremendous help to achieve optimal performance.

How did the idea of the body composition profile study come about? Why did you see the needs to cross-validate the body composition estimates determined by skinfold assessments or BIA against the DEXA gold standard?

Typically, when these athletes are involved in their usual training and competition activities, they do not have access to sophisticated body composition assessment techniques like DEXA. The coaches, and the athletes themselves, were interested in having some sort of assessment procedure that could travel with them to wherever they were and keep track of their body composition status. Since this is one of my areas of expertise I thought it would be useful to validate skinfold and BIA techniques using some published equations for estimating body fat in this group of athletes, against a gold standard. Now that our summit meetings are held at The Olympic Training Center at San Diego, we only really have skinfold predictions available, so it made sense to find out which was the best way to make use of this most commonly practiced field technique.

Your study found that skinfold-derived assessments of body fat were suitably accurate and reliable for use in the field with athletes—as long as the skinfold technician is suitably skilled. Do you think the people currently undertaking body composition assessments of athletes in the field are suitably trained?

Clearly the expertise of people making skinfold assessments of body fat varies from site to site. The staff members at the OTC do a good job, but the skill levels available at some local situations may not be the same. In the ideal world, there would be schemes to systematically train people in the skinfold assessment techniques. One thing we have done is give information to the athletes so they can give guidelines to their local sources. And we also found that two of the equations used with BIA gave a pretty good estimate of body fat, so that offers another alternative with a simpler technical requirement. Of course this has its own set of issues such as being valid

for the equipment we used, and requiring care with electrode placement and control of the subject's food intake and hydration status.

Your measurements were taken during a period of minimal training, with attention to ensure that the athletes were well hydrated? Do you have any feeling for the level of error that dehydration might cause to estimates of body fat derived from BIA?

This will definitely double or triple the error compared to well done laboratory estimates.

Your measurements on these elite female heptathletes found them too lean, to have high levels of lean body mass compared with other types of athletes, and to have higher bone density than age- and race-matched controls. This physique seems to balance out the unique combination of factors needed for performance in such a multitude of events.

This was one of the really interesting outcomes of the study, that athletes could be very lean but still have higher bone mineral density than age- and racially-matched controls, which is in contrast to findings found in other groups of female athletes with low body fat levels. Our athletes were tall, and had a higher ratio of fat-free-mass to height than other athletes such as distance runners. Of course what we see in this unique sport is compromise; the performances of these athletes never come close to the performances achieved by athletes who compete in each of the events as an independent sport. The skill requirements and the physique requirements cover quite a range.

So how do the heptathletes see their physiques? Do they generally feel comfortable with their size and shape? Or is it another sport in which females are unhappy with their physique and are continually striving to alter it or maintain it against what seems natural for them?

Female athletes love to concentrate on having a low body fat level, but what we have been trying to impress on them is the benefit of having a high fat-free mass relative to their height; we call this a fat-free body mass index. We impress on them that they need strength, and although body fat influences the amount of mass they will have to move, if they concentrate on muscle mass and power, they will perform better.

Finally what advice do you have for young people wishing to establish a career in sports nutrition?

A cluster of skills is required to work in sports nutrition. You need a sound background in physiology and biochemistry of exercise. But you also need skills in teaching and counseling to translate research into practice, and a good knowledge of food composition and preparation to make recommendations about eating practices and food choices. Young people should consider volunteering to help out in athlete education and nutrition counseling practices. It's a great idea to have some sort of professional internship or mentoring situation so that you can enhance your skills under guidance and experience.