LETTERS TO THE EDITOR

Ultrasonographic assessment of adipose tissue volume

EDITOR.—The validity of an ultrasonic method for measurement of lean and adipose tissue volumes in the upper and lower limbs as a potential method of predicting body composition was described in 1994 by Eston et al. In trying to replicate this study we reached the opinion that their method was flawed. It was based upon ultrasonic measurements of segmental radii acquired using real-time ultrasound scanning. Proportionate volumes of adipose tissue were then calculated by the application of the geometry of a cone. This method describes the calculation of proximal and distal cross sectional areas of the inner and outer cones, which requires a measurement of the radius of the bones (humerus and femur). The image presented in the paper by Eston et al. showed measurements of the femoral bone cortex to skin surface and bone cortex to muscle boundary and failed to take into account the measurement of the bone radii. As the bone radii were omitted from the method we feel that it was not appropriate to use the measurements they obtained to calculate cross sectional area. If this were the case, it has to be assumed that no bone volumes were included in the calculation of segmental volumes and, therefore, all subsequent calculations of segmental and adipose tissue volume are incorrect. The consideration of the nature by which ultrasound is attenuated at a muscle–bone boundary throws further doubt on the method described. At such a boundary there is a large difference in the acoustic impedance between muscle and bone, consequently there is a strong reflection, which renders imaging deep to the bone surface impossible. A single frame real-time ultrasound image will therefore only show the anterior bone surface and does not permit the estimation of the bone radius as required for the calculation described.

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Authors' reply

Thank you for allowing us the opportunity to reply to the letter from Moscrop and Walton, regarding the paper by Eston, Evans, and Fu on “Estimation of body composition in Chinese and British men by ultrasonographic assessment of segmental adipose tissue volume”. Although we welcome their criticism, their assertion that our method is flawed is misguided.

As part of the study we set out to evaluate the validity of applying the geometry of a cone to both the upper and the lower limbs in order to estimate the lean and fat proportions as a method for predicting body composition. Figures 1 and 2 demonstrate this method.

Ultrasonography allows the above measurements to be taken at two representative cross sectional areas. In our study we used two arbitrary points which were 20 cm apart at the thigh and 10 cm apart in the upper arm. We regarded the distal femur and humerus as circular in shape, which is clearly not the case anatomically. We also made the assumption that the segments could be represented mathematically as cones with even surfaces, as suggested by Jones and Pearson. The methods used allowed us to calculate the respective cross sectional areas and hence the segmental adipose tissue and volumes and proportions of adipose tissue.

While we accept that Moscrop and Walton are correct in their statement that true bone radii cannot be measured with ultrasound, a bone diameter can be easily measured. Hence a representative bone radius is easily calculated. Unfortunately, our method for estimating the radius of bone was not fully explained in our paper. Clearly this has caused confusion. As can be seen from fig 1, which is an ultrasonic image on one of the subjects from the study (the same subject as shown in fig 3 in our original paper), calipers can be used to measure the bone diameter. Half of the diameter was taken as the radius, as shown in fig 2. In retrospect, perhaps we should have used an additional image in our original paper to show how we calculated bone radii.

It is clear from published reports to date, that the methods we used were innovative and offered a different approach to the estimation of percentage fat by ultrasound technology. However, in recognition of the possible limitations of the methodology, we also presented results from an alternative method that required direct measurement of the circumference at each segmental site by surface anthropometry. The adipose tissue thickness, as measured by the ultrasound, was then sub-
Injury in rugby league football: the new super league

EDITOR,—Previous research has suggested that the injury rate in rugby league is higher than in most other team sports.¹ Nineteen ninety six saw the game move its competitive season to the spring and summer months of the year. This resulted in changes in playing conditions, higher temperatures, and harder surfaces, but the playing season had about one third fewer games.

Preliminary analysis of our data from the first team of two professional rugby league clubs (one Super League, one First Division) indicates that the injury rate was 53.9 injuries per 1000 hours of play (95% CI 37.9 to 70.0); an injury being defined as a condition that occurred during match play requiring a player to miss the next competitive game. This is equivalent to a team receiving an injury every 86 minutes of match play. There were no significant differences in the rates between the two clubs (super league 50.3 (95% CI 28.8 to 71.8) per 1000 hours of play, first division 57.9 (95% CI 33.8 to 82.0) per 1000 hours of play).

These injury rates are higher than have previously been reported for winter rugby league in England (34 per 1000 hours of play)² and in Australia (45 per 1000 hours of play).³ Within the limitations of a cross sectional study such as this, these preliminary findings indicate that the introduction of summer rugby has increased the risk of injury. Whether this is actually due to the change in playing conditions, or to other factors, should be the subject of future research. This finding has implications for players, coaches, and sports medicine practitioners.

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Public health and The Health of the Nation have encouraged physical activity in all ages. Increased sporting activity will result in an increase in sports related injuries. No provision has been made for this in primary or secondary care. Over the past 10 years sports injury clinics have been set up in Scotland to treat chronic/recurrent sports related injuries at a primary care level. This excellent descriptive study of attendance at these clinics in Scotland adds considerably to the body of knowledge of sports related injuries and gives some indication of the need that exists.

This is the largest descriptive study of chronic/recurrent sports related injuries in the United Kingdom and the second largest such study worldwide. Data are presented on acute/chronic/recurrent injuries related to sporting activities from 18 out of 26 sports medicine clinics in Scotland supported by the Scottish Sports Council and by the Scottish Institute for Sports Medicine. Data were collected between 1990 and 1995 by standard record card completed, firstly, by the patient and then by the doctor or physiotherapist. The data in the final report give a detailed breakdown of 9440 attendances at 18 sports medicine clinics.

Data are extensive and extremely well presented in table and graphic form. They are available on referrals, type of injury, age groups, social class, time since injury, follow up, recovery rates, height and weight, numbers who warm up and warm down, time off work following injury, and injuries in children. All of these categories are broken down into sports giving a detailed in-depth analysis of sports related injuries. With these tables the most common injuries can be identified in each sport.

Published sports participation data are used to compare sports and to produce a table of injuries per 1000 participants in each sport. These data are presented in a league table of sports with athletics, rugby league, boxing, and skating at the top and cycling, dancing, aerobics, and swimming at the bottom, with other sports in between. This is fascinating reading but must be interpreted with caution owing to the extrapolation of the data.

Evidence of the high quality of this descriptive study is found in the comparison of the results relating to rugby injuries with a cohort study of rugby injuries funded by the Scottish Rugby Union (Garraway and Macleod, 1995). The results show reasonable consistency between the two studies for age, timing of injuries during the season, type of injuries, and time off work or sport. The consistency of results with a cohort study strengthens the value of this descriptive study.

No details are given about how these clinics are advertised. Considering that these clinics offer treatment at a primary care level, we are surprised that only 8.5% of patients are referred by general practitioners and that only 24% of GPs refer to the clinic at all. Self referrals account for 59.6% of those attending.

This report is an essential read for anyone involved in planning or providing a primary care type service for chronic or recurrent sports related injuries. The data available in this report will be useful not only in the treatment of injuries but also in prevention. The clear evidence of marked differences between sports highlights the need to prevent injury and to treat injury effectively. The study is now considering the need to increase awareness of risk factors and improve treatment by a structured dissemination of the information found in this report. Short reports with information relevant to individual sports will be sent to individual sports associations. The report also proposes to disseminate information to Scottish GPs.

With the possibility that a new Bill on Primary Care will enable funding of pilot projects in practices from April 1998 there may be an opportunity to improve the treatment of chronic sports related injuries at a primary care level. The data presented in this report would be essential to any practice applying to their health authority for funding.

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