COMPARISON OF TECHNIQUES IN THE MEASUREMENT OF BODY FAT

J.E. PRITCHARD, B. KAYMAKCI, D. PRIJATMOKO*, C. NOWSON, B.J.G. STRAUSS*, R. BAINBRIDGE*, L. SIMPSON**, J. CARLSON** and J.D.WARK

Dual energy X-ray absorptiometry (DEXA) is a new, precise technique providing quantitative analysis of bone mineral density and soft tissue. Its convenience and claimed precision in determining body fat content has led to the recognition of its potential role in the field of body composition analysis (Martin and Drinkwater, 1991). It is a safe, painless, clinical technique more acceptable to the subject than the traditional criterion method of hydrodensitometry (UWW). It also offers the opportunity of specific-site analysis.

The aim of this study was to evaluate the accuracy of the DEXA technique in measuring percentage body fat by comparing its performance with that of other methods. Observations using the Hologic QDR 1000-W (software version 5.35) at the Royal Melbourne Hospital (QDR-RMH) and the Lunar DPX (software version 3.4) at the Monash Medical Centre (DPX-MMC) were compared with densitometric analyses (UWW) at the Victoria University of Technology. The other methods used for comparison were anthropometry (SKM) and bioelectrical impedance (BIA) at both RMH and MMC and total body water determined by deuterium oxide dilution (D_2O) at MMC.

The observations were carried out on 12 fasting, healthy, adult subjects (six males, six females). All measurements for each subject were made within a single session of 5 hours. The D_2O and UWW analyses were performed at the completion of all other observations.

Results of the comparison of other methods to UWW, expressed as linear regression equations, are summarised in the following table.

Test			Y = a + bX			
			a	b	r	p
UWW	vs	RMH-QDR	1.44	0.866	0.916	<0.0001
	vs	BIA	4.20	0.706	0.870	<0.0001
	vs	SKM	3.33	0.667	0.890	<0.0001
	vs	MMC DPX	4.31	0.624	0.895	<0.0001
	vs	BIA	-0.20	0.882	0.817	<0.0001
	vs	SKM	0.74	0.909	0.920	<0.0001
	vs	D_2O	6.09	0.770	0.807	<0.002

DEXA methods, both QDR and DPX, compare well with other methods, with MMC SKM showing the most favourable relationships to UWW. Other factors warranting objective comparison are cost, time, convenience, ease of use, precision and reliability.

MARTIN, A.D., and DRINKWATER, D.T. (1991). Sports Medicine 11: 277.

University of Melbourne Department of Medicine, Bone and Mineral Service, Royal Melbourne Hospital. * Clinical Nutrition and Metabolism Unit, Monash Medical Centre, Prince Henry's Hospital. ** Centre for Human Performance and Development, Victoria University of Technology, Victoria