A rating scale for the assessment of body composition in children

JR Allen[1], DCK Roberts[2], KJ Gaskin[1]

[1]James Fairfax Institute, New Children's Hospital, Westmead, NSW, 2124
[2]Discipline of Nutrition and Dietetics, The University of Newcastle, NSW, 2308

The choice of which method to use for the assessment of body composition (BC) will be influenced by a number of factors including accuracy, precision, cost, ethical rating, technical difficulty for the observer, portability and subject acceptability. Most BC techniques have been developed for use in adults, so often these methods have not been well described for use in children. The present study evaluated the main techniques currently available for use in children where it is important to choose non-invasive techniques with low radiation exposure.

Technique	Ethical rating	Subject acceptability	Cost	Difficulty for observer	Portability	Precision	Accuracy	Total
	1=lowest 5=best	1=least 5=most	1=most 5=least	1=most 5=least	1=least 5=most	1=least 5=best	1=least 5=best	7=worst 35=best
D	5	1	3	1	1	4	3	18
Skinfold	5	3	5	3	5	2	2	25
BIA	5	3	4	4	5	4	2	27
DXA	3	3	1	4	1	4	3	19
IVNAA	2	3	1	1	1	5	5	18
TBW	5	4	3	3	4	4	3	26
TBK	5	3	1	2	1	4	3	19

Abbreviations: BIA = bioelectrical impedance; D = densitometry; DXA = dual energy x-ray absorptiometry; IVNAA = in vivo neutron activation analysis; TBK = total body potassium; TBW = total body water

The methods which rely on a two component BC model (fat mass and fat free mass (FFM)) are less accurate in children as their FFM is continually changing. Multi-component models, which use techniques such as IVNAA and DXA reduce the error associated with the biological variability of FFM because there are fewer assumptions between components. These multi-component models which are independent of age, maturation, sex or ethnicity provide the most accurate and precise assessment of BC in children and are used as reference methods for the development of other BC techniques. This is the procedure used for the development of predictive equations which can be used in the field such as for BIA and skinfold anthropometry.

However, IVNAA which has the highest score for precision and accuracy has an overall low score (19/35), while skinfold anthropometry which has a lower score for precision and accuracy has a higher overall rating (25/35). In practice, a compromise has often to be made in the choice of a method which will be dependent upon the aims of the proposed study.

Overall, BIA and TBW scored highest for children with IVNAA and D lowest. There is not one method which receives an optimal rating for all factors.