



## Brief Report

### Validity and Reliability of Ultrasound for Body Composition Assessment

The first studies to show that ultrasound could be used to measure fat thickness in humans were published in the mid-1960s (Bullen, et al. 1965; Booth, et al. 1966). Despite its 50+yr history, however, ultrasound has been little used in this field: many researchers, and clinicians are not familiar with its usefulness and versatility as a body composition assessment tool.

Much of the current research on ultrasound has shown it to be a highly accurate and reliable technique of body composition assessment with some significant advantages over many of the better-known modes of assessment.

We have used MuscleSound to assess body composition/percent body fat with great success for the last 4 years, predominantly using the seven-site Jackson Pollock Generalized Prediction Equations (Jackson, Pollock & Ward, 1980; Jackson & Pollock, 1978).

This article presents a brief overview of the research reporting that ultrasound...

- i. Accurately and reliably measures subcutaneous adipose tissue (SAT)
- ii. Is highly correlated with other methods of assessing Body Composition.

#### **i. Ultrasound accurately and reliably measures subcutaneous adipose tissue (SAT)**

Storchle, et al., (2017) has reported the high reliability of ultrasound to measure skinfold thickness. Other major studies have confirmed this finding, including those published on behalf of the International Society for the Advancement of Kinanthropometrics (Mueller et al., 2013) and the International Olympic Committee Medical Commission (Mueller et al., 2016).

Conclusions (paraphrased) from these last two studies have included the following statements...

- Ultrasound is a highly accurate and reliable method of assessing SAT
- Ultrasound also enables quantification of fibrous or other structures embedded in SAT.
- There are good reasons to assume that ultrasound will replace the widely used skinfold, bioimpedance, and other field methods with their well-known inherent shortcomings.

#### **ii. Ultrasound is highly correlated with other methods of assessing percent body fat**

In summary, studies have reported high correlations between ultrasound and DEXA for percent body fat measures in athletic, non-athletic, lean and overweight individuals. For example Stewart & Hannan (1999), da Fonseca (2007), and Chambers et al. (2014) have reported good agreement between ultrasound, traditional skinfolds and DEXA. Pineau, et al. (2007) has reported ultrasound as better correlated with DEXA than BIA and BodPod in both males and females. Ultrasound estimates of percent body fat were also highly correlated with DEXA in both male and female athletes (Pineau, et al. 2009).



In addition, a recent review (Wagner, 2013) cites studies reporting high correlations between ultrasound, hydrostatic weighing and skinfolds. Ultrasound has also been reported as more accurate than skinfold techniques in obese adolescents (Pineau, et al. 2010).

Finally, a recent study in collegiate athletes (Hyde, et al 2016) stated that...

*The results of this study indicate that a 7-site US technique, as a measure of %BF ... produce results similar to skinfolds making it a cost-effective, time-efficient alternative to typical laboratory testing methods for coaches. Ultrasound offers other distinct advantages over skinfold measurements. The high degree of inter-rater error seen when using skinfold measurements may be reduced when using US imaging because of the ability to capture and save images. Additionally, because US does not require isolation of folds, it may be easier to measure the full thickness of adipose tissue.*

### Conclusions

There is compelling research supporting the validity and reliability of ultrasound to assess body composition, from two major perspectives.

1. Accurate and reliable measurement of specific skinfold thicknesses
2. High correlation with DEXA and hydrostatic weighing, in some cases higher than more traditional measures such as BodPod and BIA

We have additional internal supporting material on our website

<http://support.musclesound.com/article/152-skinfolds-vs-musclesound-comparison>

<http://support.musclesound.com/article/169-body-composition-comparisons>

### Studies Cited

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