profil
ANSWERS FOR DIABETES

Methodology fact sheet: Assessment of body composition by means of BOD POD®

Background

- Obesity, characterized by an increased ratio of body fat to lean body mass (i.e., muscle, bones and organs), is a major risk factor for diseases like stroke and diabetes.
- The BOD POD® is a highly accurate air displacement plethysmograph that is used to measure body composition.

How does air displacement plethysmography by means of BOD POD® work?

Air displacement plethysmography (ADP) uses the relationship between pressure and volume to derive the body volume of a subject seated inside a fiberglass chamber. The commercially available BOD POD® (Body composition tracking system, COSMED, Rome, Italy) uses air displacement plethysmography to determine body volume, which in combination with body mass can be used to calculate body density. Body mass is measured using the BOD POD® electronic scale and body volume is measured in the BOD POD® test chamber.

The determination of body composition by densitometry is based on modelling the body into two compartments, a fat and a fat free mass compartment. Body density is measured and the values for density of fat and fat free mass are assigned to estimate percent body fat and subsequently percent fat free mass.

Which endpoints can be determined?

- Fat mass (kg and %)
- Fat free mass (kg and %)
- Body volume (l)
- Body density (kg/l)

Who can be investigated?

- Adult subjects: healthy/ obese/ with pre-diabetes/ type 1 diabetes/ type 2 diabetes.

Figure 1: BOD POD test chamber (right), computer system (left), and electronic scale and calibration weights and volume (middle).

Did you know?

Subjects should wear tight underwear or bathing gear and not wear glasses and jewelry to avoid any influence on body volume.

Important!

Before the test: fasting for at least 3-4 hours, no water intake in the last 2 hours, no strenuous exercise in the last 3-4 hours, no alcohol since the evening before!

Other considerations

The method has been validated against other laboratory-based techniques for the assessment of body composition - such as dual-energy X-ray absorption (DXA).

Advantages of measuring body composition by means of BOD POD®:

- → Like most non-invasive methods, BOD POD® is ideal for efficient subject recruitment.
- → The measurements are very fast and can easily be incorporated into any trial design.
- → Because there is no radiation exposure, much faster regulatory trial approval is possible compared to methods involving ionizing radiation such as DXA.

Challenges with measuring body composition by means of BOD POD®:

- → No information on fat distribution pattern (only total body fat content).
- → Potential claustrophobic measurement environment and due to chamber size measurements in subjects with body weight above 150 kg are cumbersome.
- → The measurement result can be influenced by body hair, body movement and irregular breathing patterns.

Conclusion:

- → Air displacement plethysmography is the gold standard for radiation-free body composition measurements.
- → The method is especially convenient due to its rapid procedure and immediate availability of results.
- → BOD POD® devices are available for use at all Profil sites.

Further reading

1. COSMED USA, Inc.. BOD POD gold standard body composition tracking system operator's manual – P/N 210-2400 rev. U (07/2019).
2. Siri W.E.. Body composition from fluid spaces and density: analysis of methods.1961. Nutrition 1993; 9(5): 480-91; discussion 480, 492.
3. Fields D.A., Gunatilake R., Kalaitzoglou E.. Air displacement plethysmography: cradle to grave. Nutr Clin Pract 2015; 30(2): 219-26.

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