BIA Measurement Using TANITA Body Composition Device

Rationale

The Accelerator and Overload hypotheses have been put forward by Wilkin (2001) and Dahlquist et al (2006) as etiological models for type 1 diabetes (T1D). There is evidence that increased height and/or weight gain may have a role in the etiology of T1D, but no information is available whether the amount or distribution of body fat could play a role in the etiology of T1D. Availability of body fat measurement would increase the usability of dietary data in addition to other covariates of obesity and energy usage.
Waist circumference (WC) and bioelectrical impedance assessment (BIA) were considered the most relevant options. DEXA is the golden standard for body composition measurement but cannot be done in a large epidemiological study.

DAISY will use the Tanita DC-430U device to perform BIA measurement in all subjects.

Bioelectrical Impedance Assessment (BIA)	
Equipment	Foot-to-foot
Economic costs	~$3,300 / device
Training effort	Baseline + annual repetition.
Burden - study protocol	Performance 30 sec – 1 min
Burden – children, families	Noninvasive, the currency is too low to be felt. No scientific data found on potential psychological burden
Validity	One foot/foot study in children showed excellent test-retest reliability, moderately strong absolute agreement with DEXA, and high specificity (but not sensitivity) for overfat and obese classification." (Kabiri et al. 2015)
Availability of reference values	US 8-17y (ProjectBeat, Mueller et al. 2004 – In NHANES, DXA and skinfolds); Germany 3-16y (Plachta-Danielzik et al. 2012); Sweden and Finland NA

Data Collection Overview

1. BIA measurement will be collected at each DAISY visit.
   Validation has previously been completed and approved per TEDDY.
2. Meaurements
   - Staff should stand clear of the subject during measurement to ensure accuracy.
   - Bare feet should be placed correctly on the electrode platform.
   - The correct positioning of the feet allows contact on all 4 electrode surfaces. See picture in the Body Composition Analyzer DC430-U Instruction Manual, page 16.
   - Make sure the soles of feet are free of excess dirt, as this may block the mild electric current.
   - Place arms straight down during measurement.

- **Operation of the Tanita DC-430U device:**

Settings/Set Up can be found in the TanitaDC-430U Manual

<u>Recommended Settings (One step flow)</u>

1. Turn the machine on using the "On/Off" button once the machine has been plugged in.
2. When the screen automatically says "PT 0.0 kg", then press "Enter".

3. The subject ID screen is now displayed. Enter the DAISY ID number using the key pad 55555 and press "Enter".

4. Select the appropriate sex for the subject by pressing the "Male" or "Female".

1. Enter the whole year age of the subject using the key pad and press "Enter".

2. Enter the subject's height in centimeters from our DAISY height measurement (it allows us to enter to the .1) and press "Enter".

3. "88888 kg" will blink until the machine is ready for use. Then the control box displays "Step On", prompting for the subject to get on the electrode pads. **The feet should make contact on all 4 electrode surfaces.**

4. The subject will then be measured for the body composition data. The process is complete once there is a beep and the weight in kilograms, kilograms of body fat, and body fat % is displayed on the control box.

5. Record the kilogram weight (the first number displayed) and the kilograms of body fat (the second number displayed) on the DAISY Physical Exam form.

6. Lab staff will enter the data into the appropriate Clinic Visit after visit is complete

7. Clean the electrode pads with a non-corrosive disinfectant after each subject. Alcohol pads are sufficient.

Calibration/Maintenance

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- Using standard weights; machines should be tested on the same basis as previous scales (monthly)
- Internal comparison to assess need for calibration: each site/clinical center should measure the same person on the same day, on each of their machines for kg. body fat to assess agreement between machines.
- Establish the criteria/range for being considered consistent, e.g. within +/- 0.1 kg. for any comparison
- Monthly calibration should be logged.

TANITA recommends conduct periodic checks of each unit.

Check the following at least daily:

- The unit is on a stable and level surface ie on a firm flooring, not on a thick carpet.
- Date and time settings.

Visually inspect the following at least weekly:

- The display for any damage or contamination
- All cables, cords, and connector ends for damage or contamination
- All safety-related labeling for legibility
- All accessories (electrodes, etc.) for wear or damage