

UK Biobank

Body Composition Measurement

Version 1.0

<http://www.ukbiobank.ac.uk/>

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This manual details the procedure for Body Composition Measurement at an Assessment Centre of the UK Biobank

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1. Introduction

1.1: This manual details the procedure for Body Composition Measurement at an Assessment Centre of the UK Biobank. This takes place at the 5th “station” of the Assessment Centre visit, as listed in Table 1.

Table 1: sequence of assessment visit

	Visit station	Assessments undertaken
1	Reception	<ul style="list-style-type: none"> • Welcome & registration • Generating a USB key for Participants
2	Touch screen Section	<ul style="list-style-type: none"> • Consent • Touch screen questionnaire • Hearing Test • Cognitive function tests (Shape, Pairs, Fluid Intelligence, Snap)
3	Interview & blood pressure	<ul style="list-style-type: none"> • Interviewer questionnaire • Blood pressure measurement • Measurement of arterial stiffness (Pulse Wave Velocity)
4	Eye measurements	<ul style="list-style-type: none"> • Visual acuity • Auto-refraction • Intraocular pressure • Retinal image (OCT Scan)
5	Physical measurements	<ul style="list-style-type: none"> • Height (Standing and Sitting) • Hip & waist measurement • Weight and Bio-impedance (Body Composition) measurement • Hand-grip strength • Ultrasound bone densitometry • Spirometry (Lung function Test)
6	Cardio (Physical fitness)	<ul style="list-style-type: none"> • Exercise ECG (Cycling)
7	Sample collection & exit	<ul style="list-style-type: none"> • Blood samples collected • Urine sample sought • Saliva sample sought • Consent & result summary printed • Travel expense claim provided
8	Web-based diet questionnaire	<ul style="list-style-type: none"> • Dietary assessment

1.2: Throughout this document, the term “Participant” signifies a study participant who is taking part in the Assessment Centre process, regardless of whether they eventually give or withhold consent to take part in the UK Biobank study.

1.3: The collection of data from assessment visits uses the direct data entry system of the Assessment Centre Environment (ACE). This has five components (**Assessment Centre Environment**), of which Vox operates the Physical Measurement test station of the assessment visit.

1.4: At the start of their visit, each participant is issued with a USB Key at the Reception station. This USB Key acts as a participant identifier (it contains Participant ID, name, date of birth and gender) and as a temporary storage device for the recorded data. As the participant progresses between stations, the USB key acts as an identifying token and also as a data transfer mechanism. At the Reception & Exit module, all data on the USB key is removed, after it has been backed up to the Assessment Centre head PC.

2. Staff

Healthcare technicians or nurses certified to conduct assessments undertaken at this station are responsible for carrying out this procedure. The Assessment Centre Manager oversees that all Assessment Centre staff work in accordance with the protocol.

3. Order of physical measurements

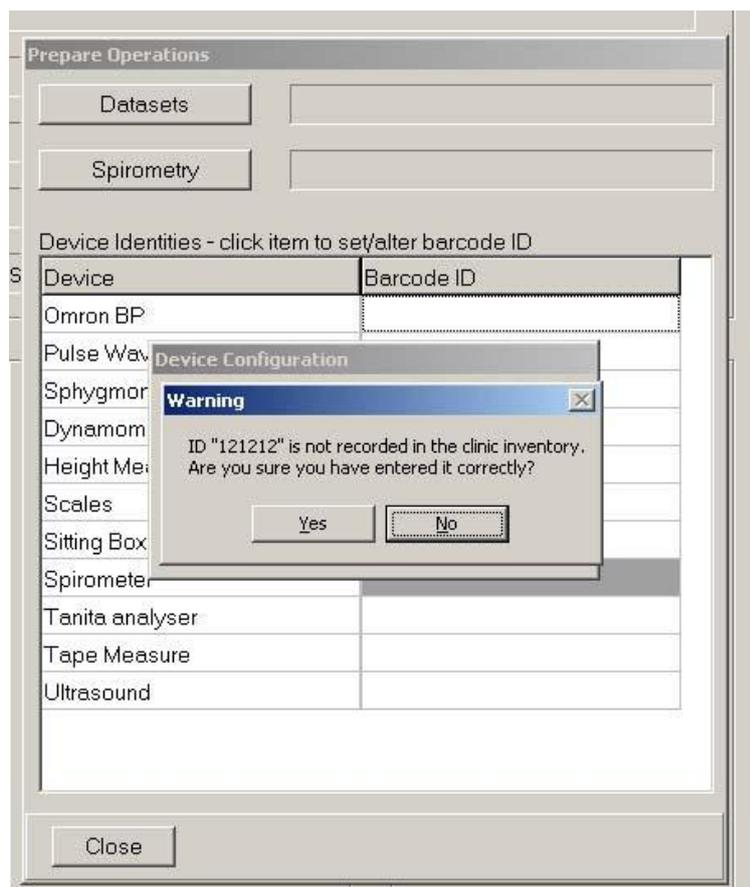
After completing the Interview and Blood Pressure procedures, the participant arrives at the Physical Measurements station, which follows the order:

1. Measurement of grip strength
2. Measurement of waist and hip circumference
3. Measurement of standing height
4. Measurement of sitting height
5. Measurement of weight & bioimpedance
6. Left and Right Heel ultrasound measurement
7. Spirometry

3. Preparations at the start of the day

3. 1: Before switching on the computer base unit the Tanita BC 418ma Body Fat Analyser is switched on.

3. 2: The staff member then opens the Vox component of the Assessment centre environment, entering their username and password. From the Vox start-up screen ‘Prepare’ is selected to display the following screen:



3. 3: The barcode scanner is used to enter the unique identifier for each device listed. If the equipment ID number is not recognised by the Assessment Centre inventory the coordinating centre is notified of the equipment identifier discrepancy.

4. Participant assessment

The participant proceeds to measurement of weight and bioimpedance after the height measurements.

Note: If the participant cannot, or does not wish to undergo a particular measurement, “#” is entered in the relevant field and the reason why is recorded (along with ‘P’ if participant’s decision or ‘N’ if nurse’s decision).

5. Measurement of weight & bioimpedance

5.1: Bioelectrical Impedance (BI) is a quick and easy way to test body fat. A safe low electrical current passes through the body and measures body composition and percentage body fat. The faster the signal travels the more muscle content. Fat contains very little water whereas muscle contains 70% water, which conducts electricity. From the speed of the current the BI analyser can calculate body fat. This method can be accurate but is influenced by hydration status, food intake and skin temperature.

BI measurement is not possible where a participant is:

- Wheelchair-bound
- An amputee
- Unable to grip handles of the Tanita analyser
- Unable to stand
- Not willing to remove their shoes
- Wearing a plaster cast
- Pregnant
- Using a pacemaker

5.2: The Tanita BC418MA body composition analyser (figure 1) produces segmental readings of fat percentage, fat mass, fat free mass and predicted muscle mass for: right arm, right leg, left arm, left leg and trunk. Data are captured by direct entry into Vox from the Tanita analyser.

Figure 1: Tanita BC418MA body composition analyser



5.3: The Tanita BC418MA body composition analyser is placed in the “On” or “Standby” mode before the computer is switched on, so that the computer recognises the Tanita.

5.4: The participant is asked whether they have a pacemaker or (if female) are pregnant, and the answers recorded onto the computer (as shown below). If ‘Yes’ is recorded for either question or ‘Unsure’ in relation to pregnancy, the computer will display a message to

undertake 'manual measurement of weight only'. The participant is weighed using standard scales, and the value entered into the computer.

The screenshot shows a software window titled "UK Biobank, Mrs Bio Metric : Biometrics, Body Composition". It contains several form fields and radio buttons:

- "Has a pacemaker" with radio buttons for "Yes" and "No" (selected).
- "Is pregnant" with radio buttons for "Yes", "Unsure", and "No" (selected).
- "Tanita analyser : not-set" with a small icon.
- "Body composition method" with radio buttons for "Direct entry" (selected), "Manual entry of full results", "Manual measurement of weight only", and "Not performed".
- A large empty text area labeled "Direct Entry" with a "Measure" button below it.
- Navigation buttons at the bottom: "< Prev", "Help", "Lock", and "Next >".

5.5: For all other participants, it is explained that the Tanita analyser measures body composition by passing a small electric current through the body.

5.6: From the screen above, 'Direct entry' is selected. An audible 'beep' is heard when the Tanita receives information from the computer and is ready to take measurement. If the participant does not wish to undergo this procedure then their weight is measured using standard scales, and 'manual measurement of weight only' is selected from the screen above.

5.7: The participant is asked to place any valuables from their pockets into the tray provided if not already done so.

5.8: When display arrow flashes 'STEP ON', the participant is asked to place their bare feet on the analyzer platform's feet markings, (ensuring no obstruction by trousers) and to keep their feet still and in contact with the platform. The participant is asked to use their hands to grip the two metal handles firmly with arms hanging loosely by their sides.

5.9: The analyzer measures weight first, and then emits a 'beep' each time it measures body impedance (while display screen shows zero readings). It emits a 'beep beep' noise to indicate that it has finished measuring both weight and body impedance.

5.10: Following Body Composition measurement, the participant remains in the assessment area and proceeds to **Ultrasound Bone Densitometry**. The Tanita body composition analyzer is cleaned with Azowipes after each participant.