



Institute for Med.Microbiology, Immunology and Parasitology University Hospital Bonn	<h2>Standard operating protocol</h2>	Date: 11.07.2019
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<h3>SOP Anthropomorphic measurements</h3>	
Tasks/Parameter:	Body Mass Index, Body Weight, body fat/muscle ratio, visceral fat, basic calorie intake, Height, waist circumference
Abbreviation:	BMI, BW, BF, VF, WC
Method:	- Measuring BMI of the study subjects
Principle:	-Body mass index will be calculated using the formula weight in kilograms/height in meters squared (given by the weigh scale). Body fat measurement is based on the principle that body fat impedes electric current more than body protein. Impedance is a drop in voltage when a small constant current with a fixed frequency passes between electrodes spanning the body. Predictive equations estimate total body weight, free fat mass and body cell mass (BCM) using sex, age, weight, height and race
Reference range:	- BMI<25- lean - BMI≥30- obese -Abdominal obesity : ≥90 cm for male and ≥80 cm for female
Measuring range	[Kg], [%], [KJ], [cm]
Units:	bodyweight [kg]/ height [m ²]
Conversion factors or formulae:	bodyweight [kg]/ height [m ²]
Analyser:	Omron BF511: Body Mass Index, Body Weight, body fat/muscle ratio, visceral fat, basic calorie intake
Method implementation: 1. Measuring height 2. Measuring weight 3. Calculation of BMI	<ol style="list-style-type: none"> 1. <u>Measurement of height</u> <ul style="list-style-type: none"> • The subject should remove their: <ul style="list-style-type: none"> - Footwear (shoes, slippers, sandals etc) - Head gear (hat, cap, hair clips, turban etc) • Ask the subject to stand with feet together, heels, buttocks and upper back against the vertical back board, knees straight and arms hanging freely by the side • Ask the subject to look straight ahead and not to look up • Head rest should not be pressed down hard on the head • Read the height at the exact point indicated by the arrow • Record the height measurement in centimeters • Take measurements in a place where there is sufficient light and ventilation 2. <u>Measurement of weight, BMI, body fat/muscle ratio, visceral fat, baseline calorie demand</u> <ul style="list-style-type: none"> • Ask the subject to visit the toilet first to empty the bladder • Make sure the weighing scale is placed on a firm, flat surface • Do not place the scales on a carpet, sloping surface or a rough, uneven surface • Check the condition of the battery • The subject should remove their foot wear (shoes, slippers, sandals,

- etc), socks and belt
- Turn on the power. 'CAL' blinks on the display and then the display changes to 0.0kg
 - When the 0.0 kg is displayed take out the display unit
 - Press the GUEST button while holding the display unit. The GUEST indication G appears on the display
 - Set the personal data of the subject
 -   Age: press the arrows to adjust the age. Press set to confirm
 - Gender: Then the gender icon blinks on the display. set the gender
 - Height: Set the height in the same way
 - After all the settings are displayed for your confirmation, 0.0 kg appears on the display. This completes the setting.
 - Ask the subject to step on the main unit. Instruct the subject to place the feet on the foot electrodes with the weight evenly distributed
 - The subject should:
 - stand still with face forward
 - with barefoot feet on all 4 metal sensor plates
 - knees straight and
 - arms straight in front, holding with both hands the handle
 - wait until asked to step off the machine
 - The display will show the weight and , blink twice and then will start to measure body fat percentage, visceral fat, skeletal muscle percentage, BMI and resting metabolism
 - When START appears on the display, ask the subject to extend the arms straight at a 90 degree angle to the body. (The indicators in the measurement progress bar at the bottom of the display will gradually appear from left to right)
 - After the measurement is complete, the weight is displayed again and at this point the subject may be asked to step off the unit
 - Record the following:
 - **Body weight** in kg (*If the subject wants to know his/her weight in pounds, convert by multiplying the measured weight by 2.2*)
 - **BMI**
 - **Body fat %**
 - **Muscle %**
 - **Visceral fat value**
 - **Baseline calorie demand**
 - **Repeat the measurement a second time and calculate the mean values**
 - Press the appropriate button to view the desired measurement results. Last values of the previous measurement are shown in the last value area of the display
 - **To note**
 - Check for the batteries. Always have spare batteries in the field kit
 - Keep the equipment clean
 - Mention the appropriate device ID in the questionnaire

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	<ul style="list-style-type: none"> • Remove batteries when equipment not in use • Check whether the display is in kilograms • Place both legs evenly in the center of the machine • Do not place heavy objects on top of the weighing machine when it is not being used • Do not keep the machine in the hot sun for a long time, in places with risk of sudden shocks or vibrations, in places where chemicals are stored or corrosive gas is present • Do not take weight measurement for pregnant women • Avoid measurement of body composition immediately after eating or bathing or after vigorous exercise or after drinking alcohol <p>3. <u>Measurement of weight, BMI, body fat/muscle ratio, visceral fat, baseline calorie demand</u></p> <ul style="list-style-type: none"> • Waist circumference should ideally be taken without clothing, that is, directly over the skin. However, if this is not possible, it can be taken over light clothing • Ask the subject to stand with feet together and arms by their side with the palms of their hands facing inwards • Stand to the right side of the subject. Locate the inferior margin (lowest point) of the last rib and the crest of the ileum (top of the hip bone) • With a tape measure, find the midpoint of the lower margin of last rib and iliac crest and mark this point with a fine pen • Apply the tape just over the marked midpoint and wrap it around the subject's waist without twisting the tape • Measure the waist circumference and read the measurement at the level of the tape to the nearest 0.1 cm • Take the help of another interviewer to measure waist circumference, if required <p><u>To note</u></p> <ul style="list-style-type: none"> • Always explain the procedure to the subject before starting • Record the measurements in centimeters and not in inches • Take two independent readings • Ensure that the tape is in good condition • Always take waist measurement with the subject in the standing position • Read the measurement at eye level, if necessary the interviewer should kneel • Male staff could avoid taking the waist measurement of female subjects (being gender sensitive) • Do not record self-reported waist measurement or pant size
Confounding factors:	Heavy clothing of the study subjects; exercise before measurement, medical conditions that change serum electrolytes, edema and full bladder.
Evaluation and documentation	-Enter the readings in the appropriate column of the questionnaire immediately
Quality control:	The study supervisors would check 5% of the BMI measurements.

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