 <b>CLSA ÉLCV</b> Canadian Longitudinal Study on Aging Étude longitudinale canadienne sur le vieillissement	<b>Title:</b>	<b>Bone Mineral Density by Dual- energy X-ray Absorption (DXA) – Whole Body Scan</b>		
	<b>Version Date:</b>	2014-JUL-10	<b>Document Number:</b>	SOP_DCS_0017
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<b>Data Collection Site (DCS)</b>	<b>Version:</b>	2.1	<b>Number of Pages:</b>	6

### 1.0 Purpose:

The purpose of this document is to describe the standardized procedure for completing bone mineral density (BMD) and body composition measurements of the whole body on the Hologic Discovery A Dual Energy X-Ray Absorptiometry (DXA) machine.

### 2.0 Scope:

This document is to be used by the DCS staff when administering the BMD and body composition measurements of the whole body to a participant.

### 3.0 Responsibilities:

It is the responsibility of the DCS staff to perform the procedures as described in the current and approved version of the standard operating procedure.

### 4.0 Related Documents:

- **MAN\_DCS\_0014** - Additional training for the Dual-energy X-ray Absorptiometry (DXA)

### 5.0 Definitions:

- **Glenoid fossa:** the concavity in the head of the scapula that receives the head of the humerus to form the shoulder joint

### 6.0 Equipment

- DXA machine (Hologic Discovery A)

### 7.0 Supplies:

- Radiation badges
- Straps for positioning
- Disinfectant spray

### 8.0 Procedure Steps:

#### Contraindications:

- Weight over 450lbs (204kg);
- Height over 6'2" (187.96cm);
- Pregnancy (Contraindications Questionnaire);
- Had an x-ray with contrast material such as barium in the last 7 days (Contraindications Questionnaire);

- Participated in any nuclear medicine studies in the past 7 days (Contraindications Questionnaire); or,
- Please make a note of the following in the comments section of Onyx:
  - Pacemaker or defibrillator (Contraindications Questionnaire);
  - Cochlear implant or hearing aid (Contraindications Questionnaire);
  - Any metal implants in the body (e.g., plates or screws);
  - Previous breaks or fractures (Contraindications Questionnaire); or
  - Prosthetic limbs or joints (e.g., hip replacement) (Contraindications Questionnaire).

Because these scans may cause some anxiety in the participants, be sure to explain what you are doing as you go along. Make sure the participant is comfortable with being positioned for the scans.

If, at any point in the procedure, it is necessary to end the scan, press the red **Emergency Stop** button.

**Step 1:** Double click on APEX icon on the desktop to launch the Hologic software. **Before proceeding you need to have the participant's ID, gender, date of birth, height and weight.**

Ensure that the participant does not have any metal on their clothing or jewelry. If there are small pieces of jewelry that cannot be removed, the scan can still be done, but a note needs to be made about this. False teeth or hearing aids need NOT be removed.

**Step 2:** Press the **Patient ON/OFF** switch on the control panel of the Hologic densitometer to allow the C-arm to move to the far left and extend the table out from the base.

**Step 3:** Assist participant onto the table, if this is their first scan. Press the **Centre** button on the control panel and wait for the C-arm to position itself to the centre of the table. Have the participant lie on his/her back with the head to your right as you face the table.

**Step 4:** The participant must be positioned in the middle of the table, centred according to the centre lines on the head and foot of the table pad. To ensure that they are in the centre, stand at one end and look at the alignment of the body.

**Pull the participant's feet at their calves or from the head pull under their shoulders to make sure the participant's spine is straight.**

Make sure that the participant's body is entirely within the scan limit borders on the pad.

Alternatively you could ask the participant to 'wiggle' or move slightly to the side or other until the spine is straight.

**Step 5:** The legs should be positioned together with the feet flexed and pointed in, but not touching. Use a strap around the toes to support the legs in this position

and to reduce movement. Be sure that the feet are within the scan limit borders.

**Step 6:** The participant should lie flat on the table without a pillow. If the participant has trouble lying flat, use the radiolucent pillow to support the head. If the pillow does not supply sufficient support, use the radiolucent block or wedge. These may also be used under the knees. If the participant continues to have difficulty lying flat or with the head slightly supported, exclude him or her from the exam.



**Step 7:** Place the participant's arms straight at his or her sides, palms down (fingers can be splayed or tight together), with a separation from the thighs. Elbows should be slightly bent. Make sure the arms are within the scan limit borders. For a large participant, hands can be placed vertically next to their thighs to ensure that the hands and arms remain in the scan. There must be space between the participant's arms and sides whenever possible.

If it is not possible to get both hands in, cut equal amounts on both sides off in the scan.

**Step 8:** In the Hologic Discovery A screen, select **Perform Exam**.

**Step 9:** **If this is the first scan** - click on the **New Patient** button. **Enter participant ID, date of birth, height and weight** and press **OK**. **If this is not the first scan** in the "Patient ID" column, select the participant ID, press **OK**. Verify that their information (height and weight) is entered, press **OK**.

**Step 10:** Select the type of exam: **Whole Body** and then select **Next**.

**Step 11:** If the participant is positioned correctly for the whole body scan, press **Start Scan** to begin. Tell the participant to close their eyes. The participant should remain still until the scan is complete. Make sure the participant's arms are included in the scan on the first and last pass of the C-arm.


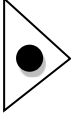
**NOTE:** If the Control Panel X-ray indicator fails to shut off within 10 seconds after the end of the scan, press the red Emergency Stop button immediately. Before the machine can be used again, the Hologic service representative should be called. To complete this task, refer to the DEXA Calibration and Maintenance SOP.

**Step 12:** When the exam completes, remove the strap from around the participant's feet and clean it with disinfectant spray.

**Step 13:** On the 'Exit Exam' window press **Analyze Scan**.

**Step 14:** On the 'Analyze Setup' window, Click **Next**.

## To make adjustments

- Click on **Sun/Moon** symbol  on the bottom left of the screen.
- Move the circle within the triangle to change the lightness or darkness of the scan. 
- Press the **zoom** button twice.
- Centre the image using the arrow keys.
- First move the horizontal lines using **Line Mode** and the arrow keys.
  - The top line should be just below the chin and above the shoulders.
  - The second line should be between T12 and L1 (last rib).
  - The third line should be just above the pelvis (iliac crests).
- Next adjust the vertical lines. Move the two inner vertical lines to just touch the spine on either side.
- Use the **Point Mode** to put the shoulder lines past the head of the humerus.
- Shoulder points should be just clear of glenoid fossa  
**NOTE: Point Mode** may also be needed to bend the lines either side of the spine, if the spine is not straight.
  - Un-zoom by clicking on **Sun/Moon** to move the image out. Click **Sun/Moon** again to return.
  - In **Point Mode** move hip triangle past the soft tissue, but not touching the hands. Move the lower triangle point down until the line passes through the femoral neck on both sides.
  - Adjust the bottom leg points to include the soft tissue, moving the lines outwards. Check the center line is between the two feet.
  - Verify that the shoulder points do not need adjusting.
- Click on **A/G regions**, then click on **Results**.
- Click on the **Sub Region** then the **Sub Region Results** button below.
- Click **Close**.

**Step 15:** The 'DAP Report' window will open. Click **OK**

**Step 16:** Select **Report** and the 'Select Patient' window will pop up. Click on the participant's whole body scan to select, click on **Next**.

- Step 17:** Minimize the APEX program and go back to Onyx.
- Step 18:** At the *Interview Tab* in Onyx, look for **Bone density – whole body scan** in the list of stages and select **Start** in that row.
- Step 19:** The **Bone density – whole body scan: Start** window will pop up.
- Step 20:** Scan the Interview ID barcode, click on **Continue**.
- Step 21:** Press **Start** in the Instrument application launch to open the Hologic software. A 'Hologic Apex Receiver' box will pop up.
- Step 22:** Go back to the APEX program. Make sure the report type selected is 'Interpreting' with one copy. Select **DICOM/IVA**. The 'DICOMM/IVA' page will come up, click on **Send**.
- Step 23:** One or two messages will pop up, click on **OK** (for each message), until you are back to the 'DICOM/IVA' page. Go back to Onyx.
- Step 24:** In Onyx press the **Capture** button and wait until the 2 rows below turn green, click **OK**.
- Step 25:** Press **Refresh** so that the scans will appear on this page. If there is more than the required amount of scans, delete the appropriate ones.
- Step 26:** Click on **Next**. The 'Bone density – Whole Body: Finish' screen will pop up.
- Step 27:** Click **Finish** and indicate in the comments field if there was anything that may have affected the measurement. Ensure that comments do not contain any personally identifying information.
- Step 28:** Click **Continue** to return to the *Interview Tab* page.
- Step 29:** Return to the APEX program- Report and click on **Cancel**.
- Step 30:** Press the **Patient ON/OFF** switch on the control panel and wait for the C-arm to move to the far left and extend the table out from the base.
- Step 31:** Once the machine has stopped moving, help the participant off of the table.
- Final Steps**
- Step 32:** If the participant needs to change clothes, follow the steps in the Participant Changing SOP to ensure that they are provided with privacy and assistance, as required.
- Step 33:** Click on **Exit** in the bottom right corner.
- Step 34:** On the 'Exit Analysis' window, select **Exit without shutdown** option.
- Step 35:** Wipe down the DXA tabletop.

## 9.0 Documentation and Forms:

- CRF\_DCS\_0014\_2 - DXA Questionnaire Case Report Form

## 10.0 References:

- Body Composition Procedures Manual. NHANES; 2006.
- DEXA Calibration and Maintenance SOP (SOP\_DCS\_0043)

## Revision History:

New Version #	Revision Date	Revision Author	Content Approval
2.1	2014-JUL-10	Lorraine Moss	Mark Oremus
<b>Summary of Revisions</b>			
Height contraindication corrected to read: 6'2" (187.96cm)			
In <b>Step 22</b> , added "Make sure the report type selected is 'Interpreting' with one copy."			
Updated SOP formatting. Grammar and spelling changes.			
Reviewed and updated Purpose, Scope, and Responsibilities sections.			
New Version #	Revision Date	Revision Author	Content Approval
2.0	2013-Jan-07	Lorraine Moss	Mark Oremus
<b>Summary of Revisions</b>			
<b>Step 9</b> of section <b>6.0</b> has been changed to "participant first and last name to participant ID,"			
The 8 <sup>th</sup> paragraph under "to Make Adjustments" in section <b>6.0</b> the word hip has been changed to "pelvis (iliac crests)".			
<b>Steps 24 &amp; 33</b> in section 6.0 have been split into 2 steps each for ease of following.			
Various formatting changes throughout the document.			
Under section <b>4.0 Contraindications</b> the height has been changed to read "Height over 6'5" (195.7 cm)"			
Added Training manual to section <b>7.0</b>			
Added Calibration SOP to section <b>9.0</b>			
Moved "Because these scans may cause some anxiety in the participants, be sure to explain what you are doing as you go along. Make sure the participant is comfortable with being positioned for the scans." from below <b>step 1</b> to above <b>step 1</b>			
Added the sun/moon symbol in the "To Make Adjustment" section under <b>step 14</b> .			
Added "Shoulder points should be just clear of glenoid fossa" above the note in to make adjustments section.			
The first sentence of <b>step 3</b> has been re-worded to read "Assist participant onto the table, if this is their first scan."			
<b>Step 7</b> reworded to read "Place the participant's <u>arms</u> straight at his or her sides, palms down (fingers can be splayed or tight together), with a..."			
Added glenoid fossa definition			