clsa élcv Canadian Longitudinal Study on Aging Étude longitudinale canadienne sur le vieillissement	**Title:**	**Bone Density by Dual- energy X-ray Absorption (DXA) - IVA Lateral Spine Measurement**		
	Version Date:	2017-AUG-09	**Document Number:**	SOP_DCS_0016
	Effective Date:	2017-NOV-15		
Data Collection Site (DCS)	**Version:**	3.2	**Number of Pages:**	5

1.0 Purpose:

The purpose of this document is to describe the standardized procedure for completing bone mineral density (BMD) and intervertebral assessment (IVA) of the lateral spine 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 measurement of the spine on 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 manual for the Dual X-ray Absorptiometry (DXA)
- **SOP_DCS_0014 –** Bone Density Questionnaire
- **SOP_DCS_0043 –** Dual-energy X-ray Absorption (DXA) SOP – Calibration (Quality Control) and Maintenance
- **SOP_DCS_0066 –** DEXA Gold Standard Process

5.0 Definitions:

- **Sacrum:** a large, triangular bone at the base of the spine and at the upper and back part of the pelvic cavity, where it is inserted like a wedge between the two hip bones.
- **Laminectomy:** removal of part or all of a lamina at one or more levels in the spine "ectomy" means removal - e.g. appendectomy means removal of appendix.

6.0 Equipment:

- DXA machine (Hologic Discovery A)

7.0 Supplies:

- Square cushion for positioning;
- Head positioner;
- Radiation badges; and,
- Disinfectant spray.

8.0 Procedure Steps:

Contraindications:

- Weight over 450lbs (204kg);

- From the Contraindication Questionnaire:
  - Pregnancy;
  - Unable to stand unassisted;
  - Participated in any nuclear medicine studies within the past 2 days; or,

- Please make a note of the following conditions from the Contraindications Questionnaire in the comments section of Onyx:
  - Laminectomy (Contraindication Questionnaire);
  - Polio;
  - Previous breaks or fractures of the back ; or,
  - Note the test type is participant was involved in nuclear medicine more than 48 hours ago but less than 7 days ago.

Sponges

Sponges can be used to provide participant comfort or support during DXA scans on an **as needed basis.** The sponge provides comfort to an **already existing** gap; it should not provide a further elevation or a further bend in the knee (i.e., if a participant is unable to place their head against the DXA table during a whole body scan or they already have a slight bend in their knee and require support as they are uncomfortable with holding the position). Sponges are not used to routinely position during bone density, but only in extreme cases where participants need some support from the positioning.

IVA Lateral Spine Scan

Step 1: Before this scan can be performed the Bone Density Questionnaire stage must be completed. Refer to *SOP_DCS_0014 - Bone Density Questionnaire* and complete the **Starting the BD Questionnaire** section.

Step 2: To start the scan refer to *SOP_DCS_0014 - Bone Density Questionnaire* and complete the **Starting Each DXA Scan** section.

NOTE:
The default scan length is 39.3cm and can be found on the left hand side of the DXA IVA imaging screen (the one with the showing the patient on the table in position). If the participant's height is over 168 cm (5'6"), the scan length needs to be changed from 39.3cm to 45.2cm. This must be done at **Step 2** of *SOP_DCS_0014 - Bone Density Questionnaire* and complete the **Starting Each DXA Scan** section.

Step 3: If the participant

- Completed the AP Lumber Spine Scan their body position on the table is correct, ask them to raise their hands above their head as shown in the picture and proceed to Step 6.

- If the participant did not complete the AP Lumbar spine position the participant by ensuring that they are straight and centred on the table and that their shoulders are just within the hatched marks on the table. If the patient is shorter, i.e., 5'-2" or less, their shoulders can be below the marks for shoulders (see picture).

  NOTE: it may be helpful to stand at the head of the table, reach under the participant's underarms, and gently pull the participant toward you to straighten the spine. You may also stand at the foot of the table and pull the feet. Centre the table and move the participant so they are centred on the table.

Step 4: Place the large square cushion under the participant's lower legs with the thighs as close to a 90 degree angle as possible. Use the tallest cushion side possible, without making the participant's feet stick up in the air. Place a cushion under the participant's head (if not already done) and ask the participant to place their arms above their head (see picture).

Step 5: Place the **laser** to the left of the tape, which is to the left on the side of the bed. Adjust your participant upward or downward, so that the laser is 2 inches below the participant's belly button. If the laser is not in this position,+ then shift the participant accordingly. This is to avoid error messages about positioning. Taller participants may also need the scan length increased on the 'start scan' page.

If you do get an error message, click OK. Then go to the main screen of Hologic. On top of the menu bar under 'utilities', click AP reposition. Move the participant down the table; reselect 'patient' from perform exam and then select IVA imaging

Step 6: Select **IVA Imaging** from the list of scans and then select **Next**.

Step 7: Continuously press **Enable Lateral** on the Control Panel until the C-arm has rotated fully to the lateral scan position.

Step 8: If the participant is positioned correctly for the scan, press **Start Scan** to begin. Ask the participant to take a small breath and hold during the scan.

Step 9: Inspect the image as the scan starts.

Make sure only a small part of the sacrum is showing at the bottom of the scan. If too much sacrum is visible or not enough sacrum is visible, use the reposition tool to adjust.

L5 to T4 needs to be visible on the image. Tell the participant to breathe normally once the scan is complete.

Do not stop the scan, let it complete and stop on its own.

Step 10: On the 'Exit Exam' window, press **Analyze Scan.**

Step 11: On the **'Analyze Setup"** window click Next.

Step 12: 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.
- Press **Marker**. With cursor over the scan, right click and select **Add Marker.** The L4 marking will appear. You need to place the marker on L4 (two vertebrae up from the sacrum or above L5) before clicking on **Close.**
  NOTE: If scoliosis is present and L4 is tilted, put the centre marker in the centre of the superior or inferior surface aspect. (see picture)
- Place each marker on the outer edge of the vertebrae.
- Click out of the area to turn the marker from yellow to red.
- Results should appear on the lower right window.
  NOTE: Aortic Calcification is assessed by looking at vertebrae L5 to L1.

Step 13: The Dose Area Product (DAP) will come up, click **OK**.

Step 14: Minimize the APEX program and go back to Onyx**.**

Step 15: At the *Interview Tab* in Onyx, look for Bone density – IVA Imaging in the list of stages. Then select Start in that row.

Step 16: The 'Bone density – IVA Imaging: Start' window will pop up.

Step 17: Scan the Interview ID barcode, click on **Continue**.

Step 18: Press **Start** in the Instrument application launch to open the Hologic software. A Hologic Apex Receiver box will pop up.

Step 19: Go back to the Apex Program. Make sure the report type selected is 'Interpreting' with one copy. Select **DICOM/IVA**. Next the 'DICOM/IVA' page will come up, click on **Send**.

Step 20: One or two messages will pop up. Click on **OK** (after each message), until you are back to the 'DICOM/IVA' page. Go back to Onyx.

Step 21: In Onyx press the **Capture** button. Wait until the 2 rows below go green, click on **OK**. Press **Refresh** so that the scans will appear on this page. If there is more than the required amount of scans, check which one should have transferred and delete the other one.

Step 22: Click on **Next**. The 'Bone density IVA Imaging: Finish' screen will pop up.

Step 23: 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 personal identifying information.

Step 24: Click **Continue** to return to the *Interview Tab* page.

Step 25: Return to the 'Apex program – Report' and click on **Cancel**.

Step 26: Continuously press **Enable Lateral** on the Control Panel until the C-arm has rotated to its original position.

Step 27: Remove the cushion from underneath the participant's legs, clean with disinfectant spray, and put away.

Step 28: You will now move on to the next scan. If the participant is unable or unwilling to do this scan, or no further scan is prompted, then refer to the **Final Steps** section of *SOP_DCS_0014 - Bone Density Questionnaire*.

9.0 Documentation and Forms:

- **CRF_DCS_0014_1 –** DXA Case Report Form

10.0 References:

- Body Composition Procedures Manual. NHANES; 2006.

- Discovery QDR Series: Operator's Manual. Document No. MAN-01794 Revision 002. Hologic, Inc.; 2010.

F1 Revision History:

New Version #	Revision Date	Revision Author	Content Approval
3.2	2017-AUG-09	Lorraine Moss	Harriet Sauve
Summary of Revisions			
Removed starting and ending scans information			
SOP edited to correct the Contraindications and to be noted sections for this measurement.			
New Version #	**Revision Date**	**Revision Author**	**Content Approval**
3.1	2015-OCT-29	Lorraine Moss	Mark Oremus
Summary of Revisions			
Step 1: Added ethnicity to the list of participant data to be entered.			
NOTE for Step 5 changed back to: If the patient's height is over 168 cm (5'6") the scan length needs to be changed from 39.3cm to 45.2cm.			
Step 10 edited to direct the use of the reposition tool, rather than repositioning the participant. As well, the scan should be allowed to stop on its own when it is complete, rather than being stopped by the interviewer.			
The instruction to Exit the program moved from Step 33 to Step 31, and following steps were renumbered.			