7 Whole Body

This application allows you to quantify multiple types of skeletal image data and review the results. It has these methods:

- Three Phase Analysis: This calculates count density mean ratios.
- Ileosacrum Ratio Computation: This calculates the ratio of the Left and Right Ileosacrum with respect to the Spine (Spine = 100%).

The methods are used to create these Preferences:

- WB Display
- Three Phase With Pool and Delay
- Three Phase Analysis
- Three Phase + SI Ratio
- SI Ratio

For information on loading requirements, and on calculations and algorithms used in this application, see the appropriate section in the *NM Application Suite Reference Manual.*

3000063441 81_A/881 * 2021-02-28

NOTICE

For the Time Activity Curves displayed in this application, the first point is the time for the end of the first frame. For example, if the first frame is 60 sec., the first point in the curve is not 0, but 60 (if seconds are the units; it would be 1 if the units were minutes). This reflects the fact that the frame completion is at the end of the time span.

In this application you can mask areas to improve image contrast in any workstep. See section “Using Ileosacrum Ratio Computation” on page 248 for details.

Whole Body Tutorial

This tutorial has two parts: the first part shows how to use the WB Display Preference to mask a hot area and view the results; the second part shows how to calculate the SI Ratio.

NOTICE

This tutorial is designed to use a particular sample patient that works well to illustrate certain features of the software. Nothing prevents you from substituting your own patient, but be aware that it may not load the same way or produce similar results. If you try to load your own data and it fails because of automatching, see section “Editing Auto Matches” on page 27.

If you would like to start this tutorial over at any time, just click **Restart** in the application. This reloads the data as it does in the first workstep, as long as the default Preference has not been changed.

Setup for WB Display

1. In the IntelliSpace Portal Patient Directory's Local Devices list, select the NM Demo Data folder.
2. From the list of patients, select Patient Name **JETPack- Whole Body Ileo-Sacrum** with Patient ID **LSSPINE, JP-Whole Body Skylight**.
3. Click on the arrow in the Analysis menu and select the NM Whole Body application.
4. After the data loads, open the Preferences Data Manager and select the WB Display Preference by clicking on its light bulb icon ( ).

The patient data automatches with the Preference by default, so you do not need to load data into buckets individually. Since this is a display Preference, there are no regions to define, and no results to review. For this reason, the workflow skips the Define Regions and Review Results worksteps and jumps directly to the Review workstep.

Review Images

This workstep provides multiple layouts to view the images. Click on each layout to view its contents. Layouts with a dark blue background are unavailable.

You may want to mask an area to improve the contrast in other areas of the image. Mask the bladder in the image:

1. Right-click on the first anterior image and select **Measurements->Circle** from the menu.
2. Draw a circle around the bladder hot spot.

   The ROI is propagated to all the images, posterior and anterior. However, any adjustments affect only the one you touch. You can edit a circle by dragging it or by adjusting the handles.
3. Right-click on the circle and select **Mask In** from the menu.

   The masking process sets the pixels inside the ROI to 0 and adjusts the brightness and background in the rest of the image accordingly. It also performs the same masking on all the images. To undo the masking, right-click in a viewer and select **Undo Mask Operation**.

The masked images are automatically bucketed in place of the original images.

Setup for the SI Ratio

1. To learn how to calculate the SI Ratio, first reset the application by clicking **Restart**. This reloads the original data.
2. Select the "SI Ratio" Preference by clicking on its **Apply Preference** icon ( ).

300006344181_A/881 * 2021-02-28

Philips

Although it may look like the correct images have been assigned to their buckets, notice the message at the bottom of the screen: “Assign all mandatory images.” This means that some buckets have not been assigned.

3. Scroll down the list of buckets until you see the Spot bucket.

   The exclamation point means that the bucket is not filled. But it will be filled appropriately just by extracting an image. Notice the pair of red lines on the image, one at the top of the image and the other about a quarter of the way down.

4. Drag the lower red line until the pelvis is centered between the two red lines.
5. Right-click on the image and select **Extract** (at the bottom of the list).

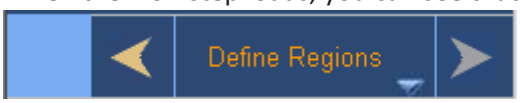
NOTICE

The exclamation point has disappeared from the Spot bucket, indicating that the data has been provided. Now the Next Workstep button is also available.

6. Click the **Next Workstep** button to proceed to the Define Regions workstep:

Define Regions for the SI Ratio

When the workstep loads, you can see that the Next Workstep button is grayed out:

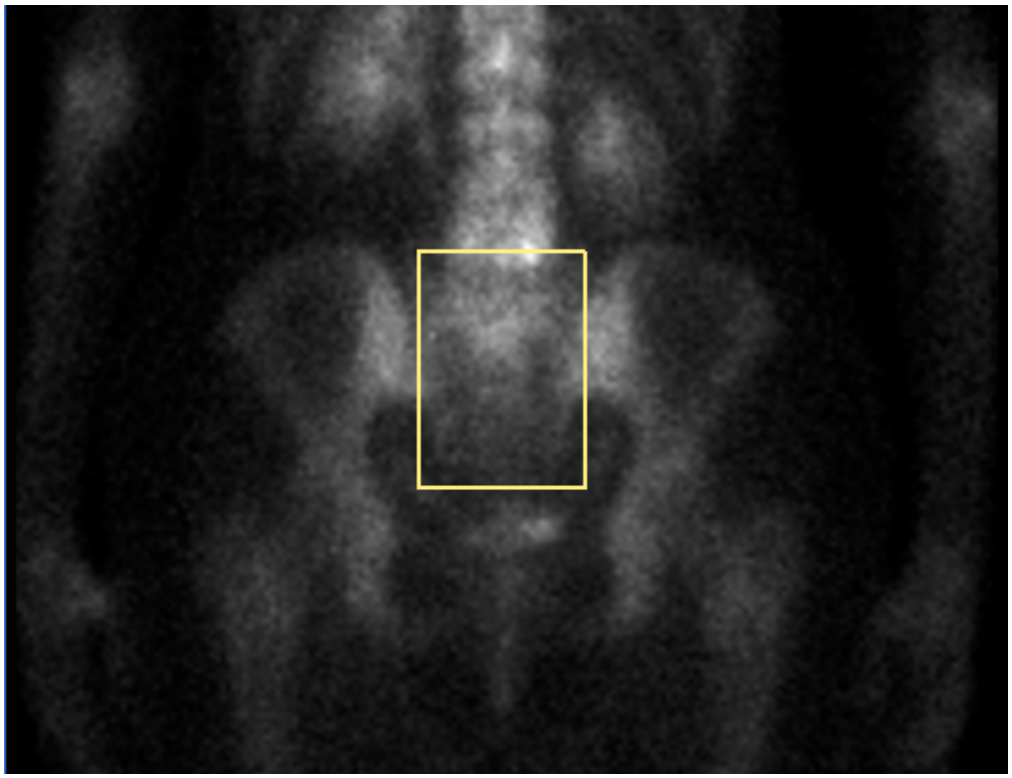


This indicates that a requirement for the workstep has not been met. Different applications may have different requirements: drawing certain ROIs, setting parameters, etc. When all requirements have been met, the button becomes available.

1. Following the instruction at the top of the Posterior viewer to draw the sacrum, draw an approximate ROI by dragging out the diagonal of a rectangle (you will draw a more precise one later). Here is an example of an approximate ROI:

3000063441 81_A/881 * 2021-02-28

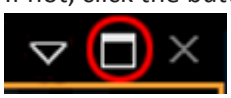
Philips



NOTICE

The Sacrum Draw Region icon changes to an eraser icon.

2. Click the eraser to delete the ROI.The eraser changes back to a pencil, indicating that you can redraw the ROI.
3. Click the viewer's Maximize button. This allows you to use a larger window if that is useful. If not, click the button again to restore the default view.



4. Now draw the ROI more correctly, using whatever conventions apply in your situation.
5. Draw the left SI similarly.

300006344181_A/881 * 2021-02-28

NOTICE

The right SI is drawn automatically as a mirror image of the left SI (but you could adjust it if you chose to).

6. Hover the cursor over the sacrum ROI line and notice that the control points are indicated by boxes.
7. Drag the control points to edit the ROI so it is exactly correct, however you define that. (Remember, if you need to redraw the whole ROI, click the region's eraser.)
8. If necessary, adjust the SI ROIs similarly.
9. If you have not restored the viewer to the default view, do that now by clicking on the Restore icon, formerly Maximize.
10. Notice that the Next Workstep button is now available. This indicates that there are no more ROIs to be drawn.

11. Advance to the next workstep by clicking the Next Workstep button.

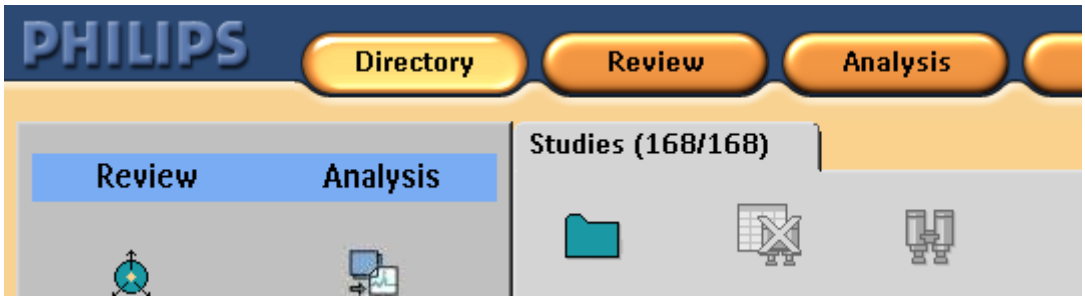
Review Results

In this workstep, you can review the quantification results. For a list of the results displayed, see the "Results" section later in this chapter. You can also save the page as a Secondary Capture (as you can in any workstep). Secondary Captures can be either single-frame or multi-frame. Multi-frame allows you to embed a cine.

Now create a Secondary Capture of the results:

1. In the Image Tools Manager, click the arrow on the **Save all images** button () and select **Secondary Capture**.
2. Type in a description for the Secondary Capture.
3. Check the **RGB** option.
4. Click **Save**.
5. Click on the orange IntelliSpace Portal **Directory** button at the top of the screen (the active button in the image below) to display the Patient Directory and notice that the saved image is listed in the Series list at the bottom.

3000063441 81_A/881 * 2021-02-28



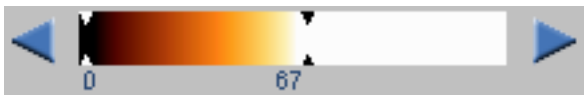
6. Return to the application by clicking on the orange IntelliSpace Portal **Analysis** button at the top.
7. Advance to the next workstep by clicking the Next Workstep button.

Review Images

This workstep provides multiple layouts to view the images. Click on each layout to view its contents. Layouts with a dark blue background are unavailable. You can also hide and show individual viewers:

1. Click the triangular Remove button in the upper left viewer to remove the viewer from the display area.

2. From the Global Image Tools, select the **Utilities** tab.
3. Click **Show Hidden Viewers** () to list currently hidden viewers.
4. Select the hidden viewer to redisplay it.
5. Use the Image Colorbar in the Image Tools Manager to adjust the background (white bar) and brightness (black bar).
6. Right-click on the Image Colorbar to open a menu that lets you select Colormap, Intensity, and Pixel Values:



When you are done, click **Exit** to exit to the Patient Directory. If you are prompted to save images, click **No** unless you want to save any new images.

Using Three Phase Analysis

As you draw the Numerator/Denominator ROI pairs, the ratio is displayed in the viewer:

3000063441 81_A/881 * 2021-02-28

Philips

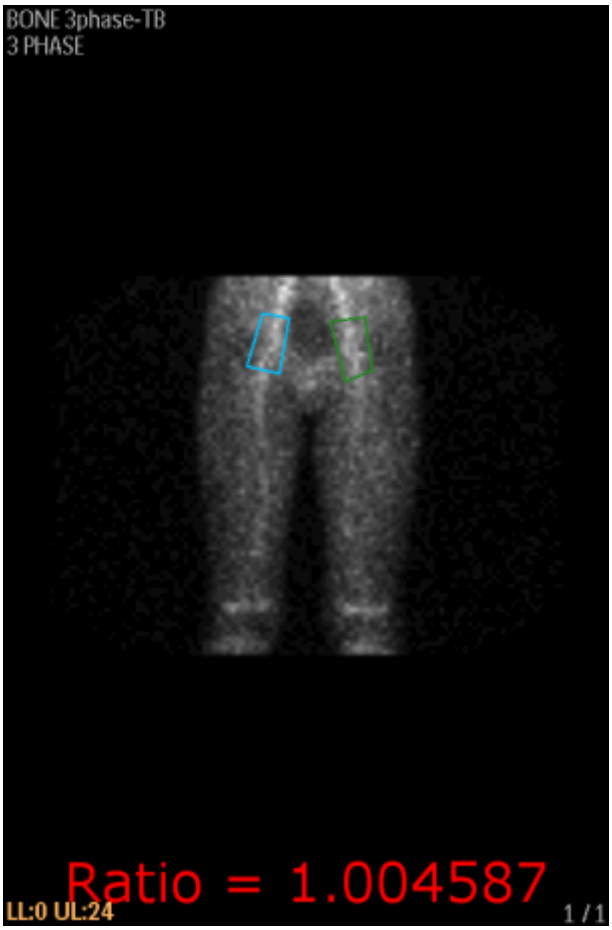


Fig. 47: Numerator/denominator ROI pair and ratio

Results for Three Phase Analysis

- Composite image with ROIs and Ratio
- Pool & Delayed images, with ROIs and Ratio
- Splash display with ROIs
- Time Activity curve for Flow Numerator and Denominator

If you do not see all the result images in the Review Results workstep, it may be that one or more viewers are hidden. If you suspect this, try using the **Show Hidden Viewers** tool in the **Utilities** Data Manager. For more information, see section “Review Results Workstep” on page 27.

Parameters for Three Phase Analysis

To change the Preferences for this application:

1. Select the **Preferences** Data Manager

2. Click **Open Preference Editor** at the bottom of the Preferences section (the second icon ).
3. Make changes in the preferences window using the information in the table below.

For details on editing Preferences, see section “Creating and Editing Preferences” on page 59.

You can save these parameters as Preferences:

Parameter	Default	Description
Smooth Curve	False	This determines whether the results curves are smoothed.

Using Ileosacrum Ratio Computation

If you do not have the required dataset, you can create a substitute by displaying the Posterior image, adjusting the red limit bars, and using **Extract** in the right-click context menu. This allows you to proceed to the Define Regions workstep and draw ROIs.

In any workstep, you can mask hot areas to improve image contrast using **Mask In** and **Mask Out**:

1. Select the images to mask by Control-clicking on the viewers.
2. Right-click on an image and select a tool such as Circle or Rectangle from the **Measure** menu.
3. Draw an ROI around the spot to be masked.

   You can edit the ROI after drawing it by dragging it or by adjusting the handles.
4. Right-click on the ROI and select **Mask In** or **Mask Out** from the menu.

   Mask In sets the pixels inside the ROI to 0 and adjusts the brightness and background in the rest of the image accordingly. **Mask Out** is similar, but sets the pixels outside the ROI to 0. The masking operation is performed on all selected images.

   To undo masking, right-click on an image and select **Undo Mask Operation** from the menu.

   The masked images are automatically bucketed in place of the original images.

Results for Ileosacrum Ratio Computation

- Review image with all ROIs
- Counts in Left, Right, and Sacrum regions
- Number of pixels in Left, Right, and Sacrum regions
- Normalized counts in Left, Right, and Sacrum regions
- Raw (%) for Left and Right compared to Sacrum
- Normalized (%) for Left and Right compared to Sacrum
- L/R Raw Ratio

3000063441 81_A/881 * 2021-02-28

Philips

- L/R Normalized Ratio
- IS-Ratio L/R
- IS-Ratio R/L
- Left SIJ Index
- Right SIJ Index
- All Images

If you do not see all the result images in the Review Results workstep, it may be that one or more viewers are hidden. If you suspect this, try using the **Show Hidden Viewers** tool in the **Utilities** Data Manager. For more information, see section “Review Results Workstep” on page 27.

Review Layouts

Below are the layouts in the Review workstep:

- Whole Body Comparison
- Flow With Statics
- Static Review
- Whole Body With Spots
- Whole Body Display
- SC images
- Custom Display

300006344181_A/881 * 2021-02-28

Philips

300006344181_A/881 * 2021-02-28

Philips