PHILIPS

DICOM Viewer 3.0

Instructions for Use

English

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GENERAL UPKEEP

The PHILIPS DICOM Viewer application runs from the CD or DVD that contains the application and the images. Be certain to follow the manufacturer's recommendations for safe handling and storage of the CD or DVD.

DISPOSAL

Disposal of this product shall be in accordance with all applicable laws and regulations in effect at the locality at the time of disposal.

LIMITATIONS FOR USE

CAUTION: Not for official interpretation.

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1 INTRODUCTION

Philips DICOM Viewer 3.0 is an application for viewing DICOM images. Read these instructions in their entirety prior to operation to ensure that the software is properly set up, and keep it available for future reference.

1.1 Intended Use

The Philips DICOM viewer can be used to view DICOM image information available on CD/DVD or any windows file system location for non clinical and/or non diagnostic illustration purposes.
When DICOM image information will be distributed by means of CD or DVD, the DICOM viewer can be distributed together with the DICOM image information by burning it onto that CD or DVD.
The Philips DICOM viewer is not intended for any kind of clinical and/or diagnostic purposes ("official interpretation").
The operator does not need any training specifically for the DICOM viewer.

1.2 System Requirements

Hardware:	• A color monitor that supports a minimum resolution of 800 x 600.
Software:	• Windows 8 Pro • Windows 7 Home Premium, Windows 7 Professional, or Windows 7 Ultimate 32 and 64 bit • Windows XP Home Edition or Windows XP Professional 32 bit and 64 bit • Windows Vista Home Basic, Windows Vista Home Premium, Windows Vista Business, Windows Vista Enterprise, or Windows Vista Ultimate 32 and 64 bit

1.3 Installation

Insert the CD/DVD/USB drive. The DICOM Viewer application is named "PmsDView.exe" . You can run this application directly from the CD/DVD/USB drive, alternately executable can be copied to hard disk and you can run from there.

1.4 Licensing

The advanced features of DICOM Viewer are licensed based. Almost all of the advanced features (protocols) are available either by dragging and dropping pictorials or by clicking the Protocols button in the toolbar. In the absence of a valid license, these features are unavailable.

1.5 Supported Data for 2D Viewing

DICOM Viewer supports 2D viewing of data from all modalities.

1.6 Supported Data for 3D Viewing

DICOM Viewer supports 3D viewing of data from PET, NM, PET/CT, PET/MR, and NM/CT modalities.

2 LIMITATIONS FOR USE

Not for official interpretation.

3 TARGET AUDIENCE

Radiologist, Cardiologist, Physicians, and End users.

4 SYSTEM OVERVIEW

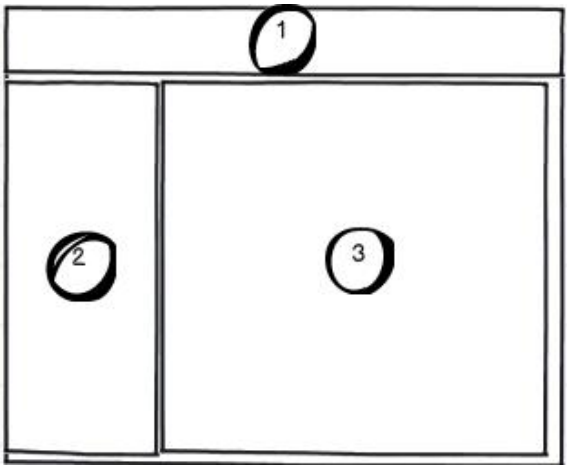


Illustration 1: System Overview

(1) Toolbar, (2) Series Panel– Preview, (3) Viewing Area

5 THE BUTTONS AND THEIR FUNCTIONS

	Open File
	Patient List
	Next/ Previous Patient
	Print
	Print Preview
	Next Series
	Cycle Series
	Cycle Study
	Copy
	Image Info
	DICOM Info
	Show Reference Lines
	Switch Between Protocols

Illustration 2: Control Elements

6 GETTING STARTED

6.1 Starting DICOM Viewer

Double click “PmsDView.exe” [ ] to start DICOM Viewer.

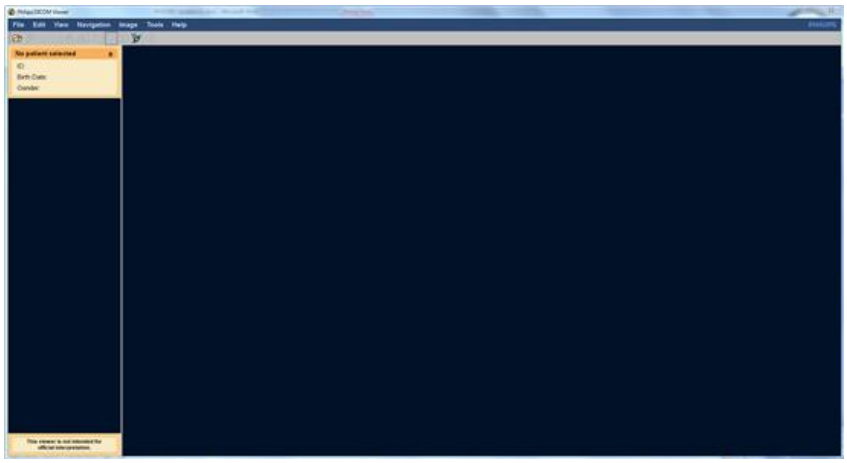


Illustration 3: DICOM Viewer 3.0

6.2 Opening DICOM files

On the File menu, click Open. Alternatively, click [ ] on the toolbar. The Folder Browser is displayed. Select one or more DICOM files of interest and then click OK.

i) If a single image is selected, the image is automatically loaded.

ii) If a DICOMDIR corresponding to a single patient is selected, then the first image of first series is automatically loaded.

iii) If a DICOMDIR corresponding to multiple patients is selected, a patient list dialog box is displayed for further selection.

iv) If 2 or more image files corresponding to different patients are selected, a patient list dialog box is displayed for further selection.

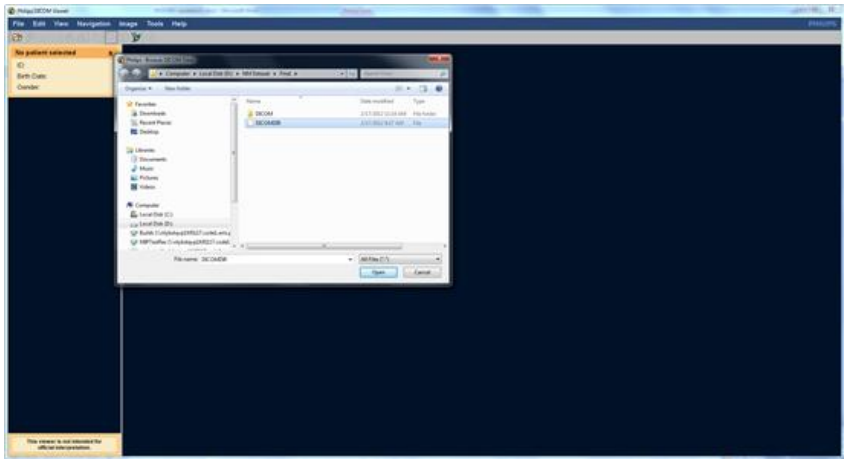


Illustration 4: Open File

6.3 Patient List

On the File menu, click Patients. Alternatively, click [ ] on the toolbar. A list of available patients is displayed.
Double-click on the desired patient to view

The patient study information screen contains a list of the exams that are stored on the DVD/CD. This screen shows Patient Name, ID number, (Exam) Description, Study Date, the number of images, and the modality tag for the exams on the disc.

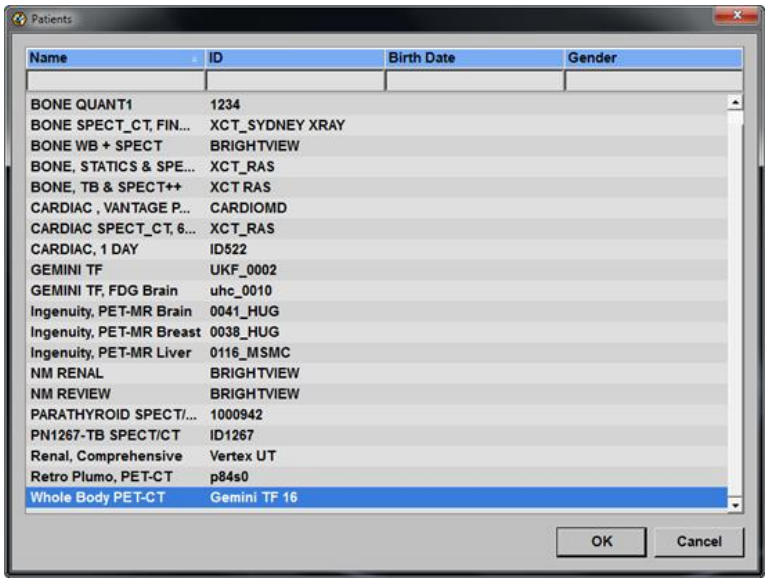


Illustration 5: Patient List

6.4 Next/ Previous Patient

You can navigate to the next and previous patients by clicking Next Patient or Previous Patient on the Navigation menu.

7 VIEWING ENVIRONMENT (MAIN WORKSPACE)

The viewing environment is displayed in the following figure:

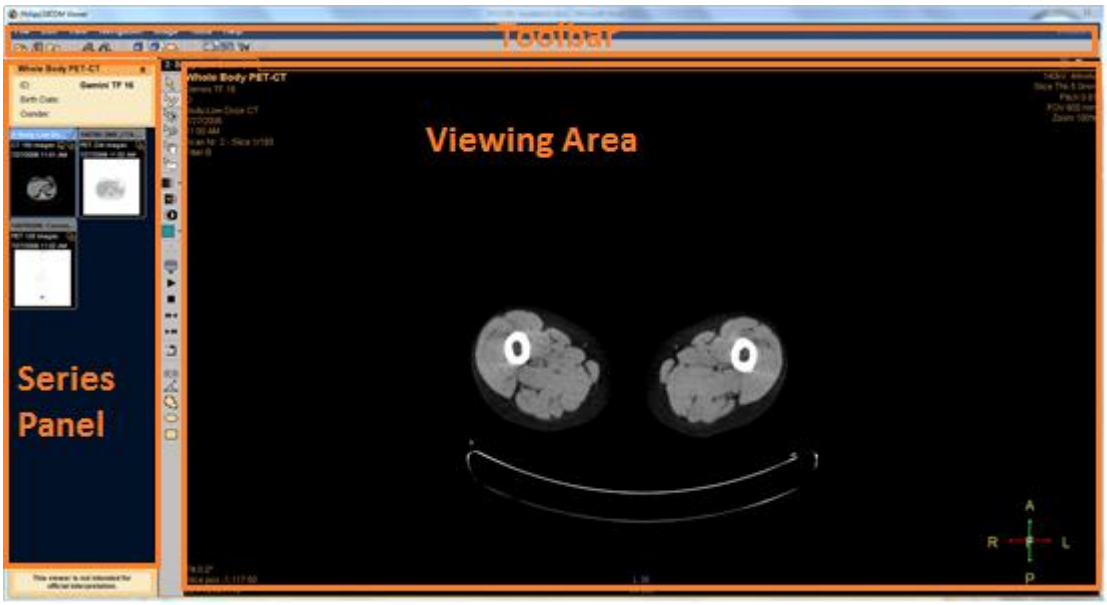


Illustration 6: DICOM Viewer Viewing Environment

The viewing environment consists of the following main areas:

- Patient Information Panel
- Series Panel
- Viewing Area
- Toolbar

7.1 Patient Information Panel

The patient information panel displays patient details of the study currently open in the viewer.

Click on the title bar of the patient information panel to expand it and view the full patient details.

Click on the title bar again to collapse the patient information panel.

Pause the mouse pointer on the patient information panel to view the full patient details in a tooltip.

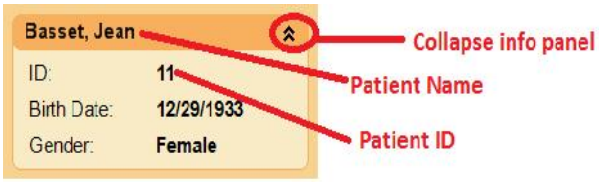


Illustration 7: Patient Information Panel

Note: Study information fields are blank if the exam does not contain data for that field.

7.2 Series Panel

The series panel contains thumbnails of series or of a multi-frame image. Clicking on a thumbnail displays the images in the viewing area.

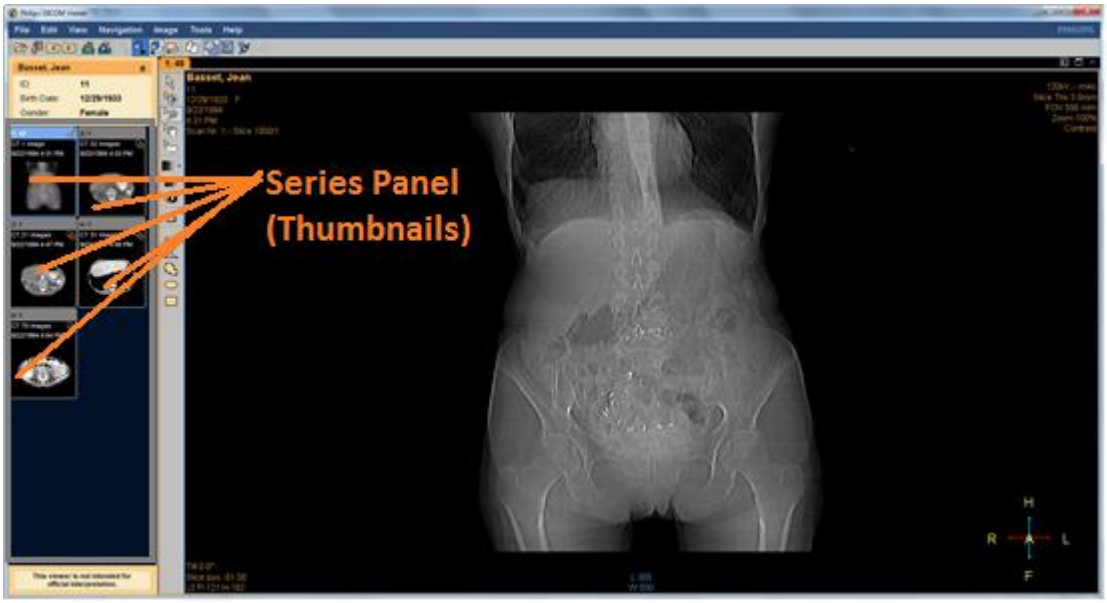


Illustration 8: Series Panel

7.3 Viewing Area

The viewing area displays the image series (single or multiple images) selected in the series panel.

Illustration 9: Viewing Area

7.4 Tool Bar

The toolbar provides tools to perform basic actions on the image and also to draw annotations.

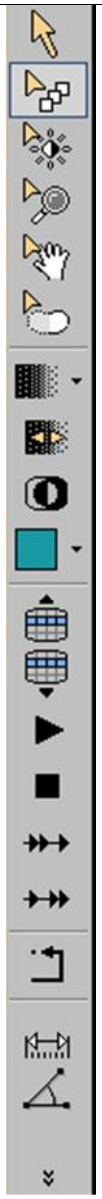
	Select – This tool is used for selection.
	Scroll – This tool is used for scrolling. Press the left mouse button and drag over the image to move to the next/previous available slices.
	Gray Level – This tool adjusts the gray level intensity. Press the left mouse button and drag over the image to increase or decrease the intensity.
	Zoom - This tool zooms the view. Press the left mouse button and drag over the image to increase or decrease the zoom factor.
	Pan – This tool pans the view. Press the left mouse button and move the mouse in the viewing area to reposition the image.
	Edge Enhancement – This tool smoothes the edges in the image to make it clearer. Press the left mouse button and drag over the image to smooth the edges.
	Window Presets – This tool provides an access to a list of standard gray level settings (only for CT images).
	Alternate Window – This tool switches between two windows.
	Invert Gray Level – This tool inverts the gray level.
	Layout - This tool allows you to change the layout of the viewing area.
	Previous Line - This tool displays the previous line.
	Next Line – This tool displays the next line.
	Play – This tool starts movie playback.
	Stop – This tool stops movie playback.
	Decrease Frame Rate – This tool decreases the movie frame rate.
	Increase Frame Rate – This tool increases the movie frame rate.
	Reset Viewing Setting – This tool resets all the viewing settings.
	Line – This tool allows you to measure a distance along a straight line.
	Angle – This tool allows you to measure a closed angle.
	This button indicates that there are more tools in the toolbar, which are not currently visible. Click this button to display the additional tools.
	Smoothed Polygon - This tool allows you to create a closed region with smoothed edges.
	Ellipse – This tool allows you to create an elliptical region.
	Box – This tool allows you to create a rectangular region.

Illustration 10: Toolbar Information

8 MENU ITEMS

8.1 File

- Open – Selects one or more DICOM files of interest. You can select an individual DICOM file or a DICOMDIR file. The DICOMDIR file can consist of a single patient or multiple patients. The Patients List is displayed when DICOMDIR contains multiple patients.
  (Refer to section 6.2.)
- Patients – Displays the patients list.

Illustration 11: File Menu

- Page Setup – Displays the Page Setup dialog box, which allows you to set the page orientation, margins, and other settings that are required for print preview and printing.

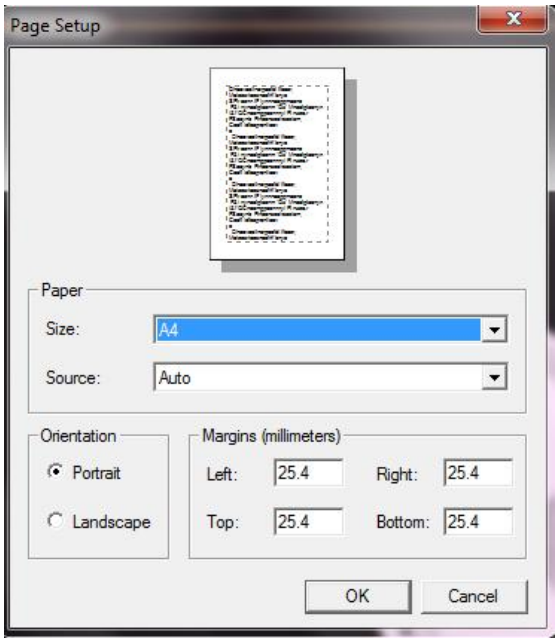


Illustration 12: Page Setup

- Print Preview – Displays the print preview of the patient images.

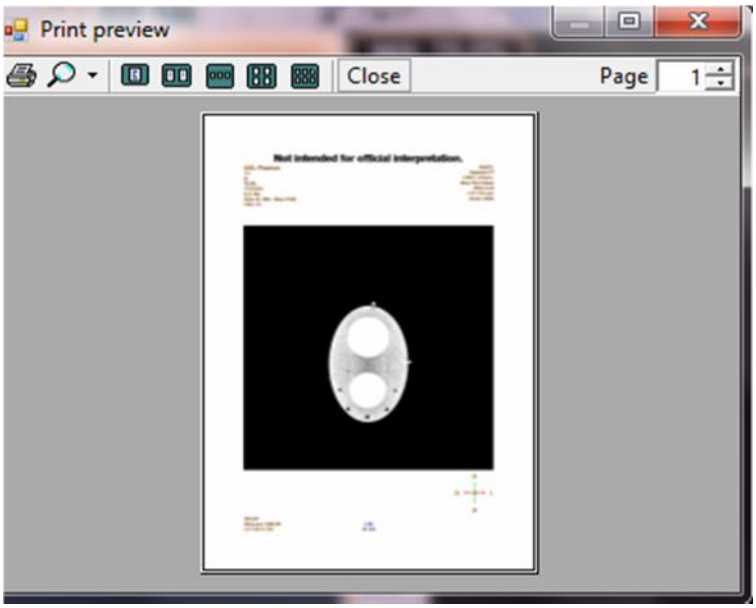


Illustration 13: Print Preview

- Print –Prints the images.
- Save Images As - Saves the images in the displayed layout in BMP or JPG format.
- Save Movie As - Saves the images as a movie in AVI format.
- Exit – Closes DICOM Viewer.

8.2 Edit

- Cut – Removes the graphical annotation drawn on the images.
- Copy – Copies the graphical annotations to clipboard.
- Paste – Pastes graphical annotations that have been copied to the clipboard

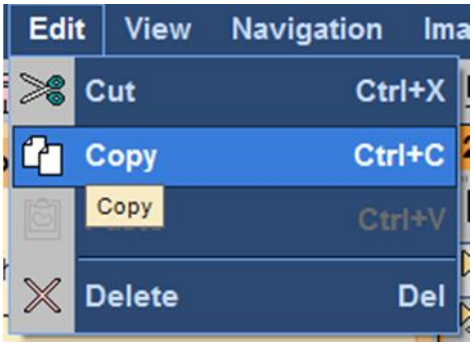


Illustration 14: Edit Menu

8.3 View

- Layout – Allows you to select a layout for the displayed DICOM images.

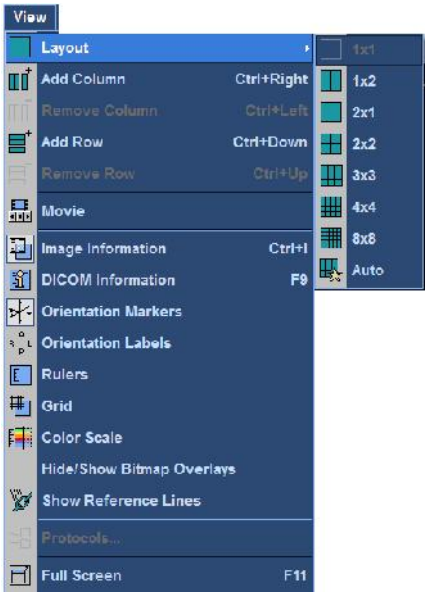


Illustration 15: View Menu

For example, if you select the 2x2 layout, the viewing area is divided into a2x2 grid as shown in the following figure:

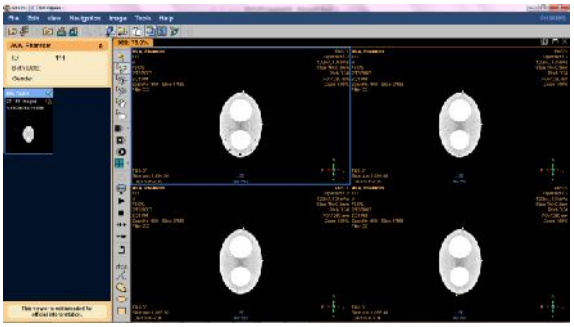


Illustration 16: 2X2 layout selected

- Add Column – Adds another column to the existing layout.

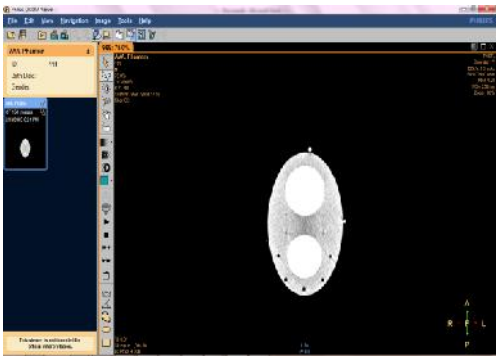


Illustration 17: Original Layout

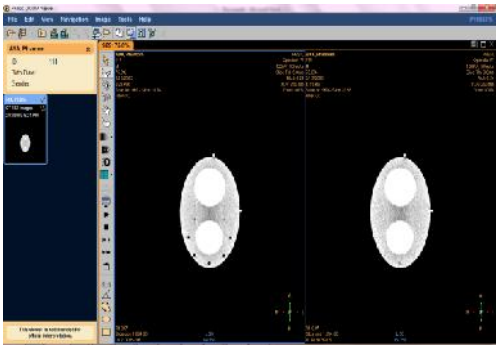


Illustration 18: After add Column

- Remove Column – Removes a column from the existing layout.
- Add Row – Adds a row to the existing layout.

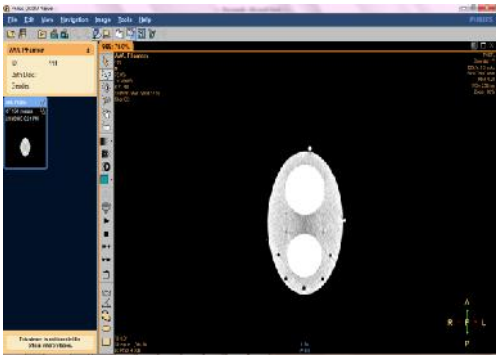


Illustration 19: Original Layout

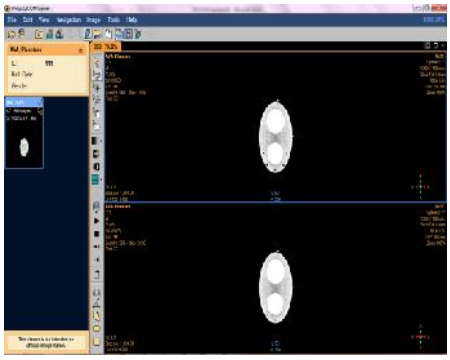


Illustration 20: After add Row

- Remove Row – Removes a row from the existing layout.
- Movie – Displays the movie toolbar, which provides options such as play, pause, and stop.
- Image Information – Shows or hides image information.

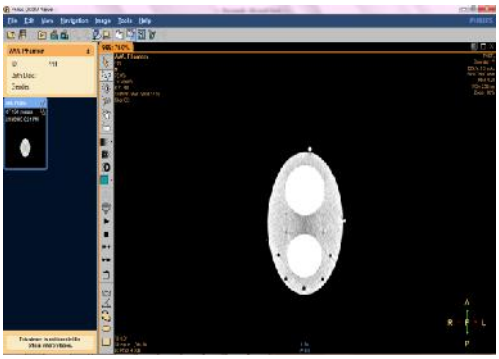


Illustration 21: Show Image information

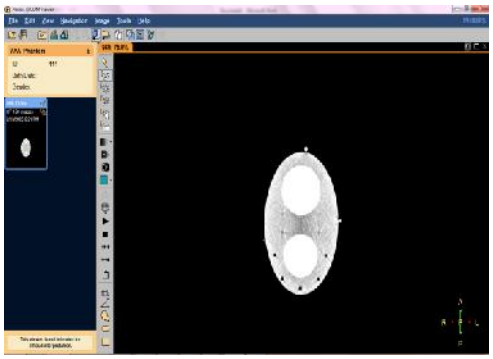


Illustration 22: Hide Image Information

- DICOM Information – A panel is displayed at the bottom of the image containing details of non-editable DICOM attributes.

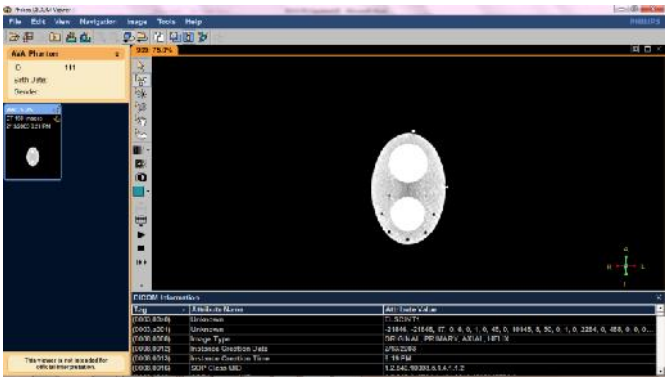


Illustration 23: DICOM Information

- Orientation Markers – Shows or hides the orientation markers (anterior / posterior / left / right / head / foot).

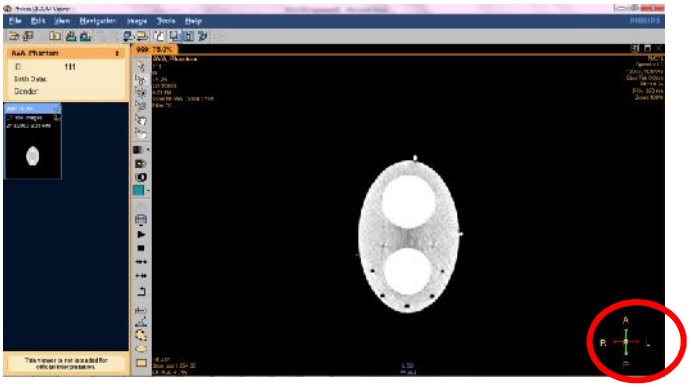


Illustration 24: Orientation Marker

- Orientation Labels – Shows or hides the orientation labels.

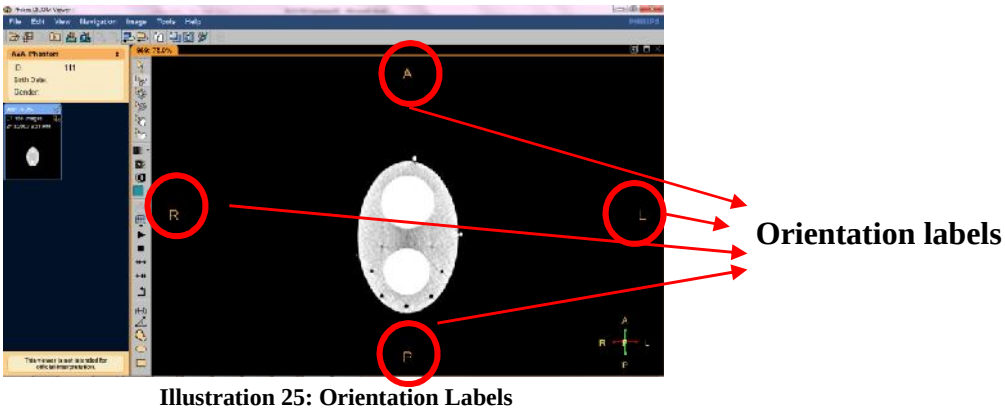


Illustration 25: Orientation Labels

- Rulers – Shows or hides the rulers.

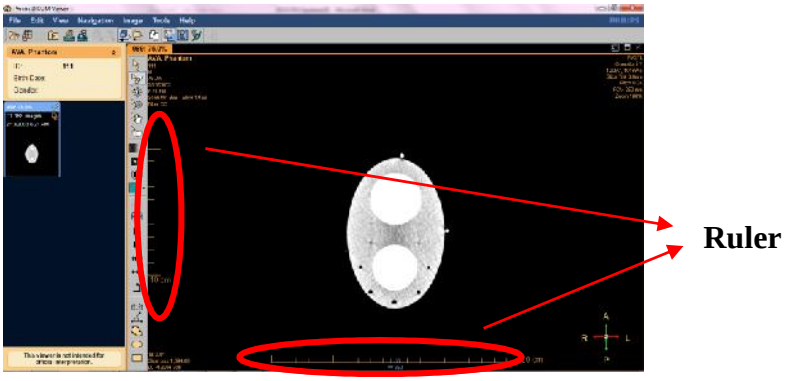


Illustration 26: Rulers

- Grid – Shows or hides the grid.

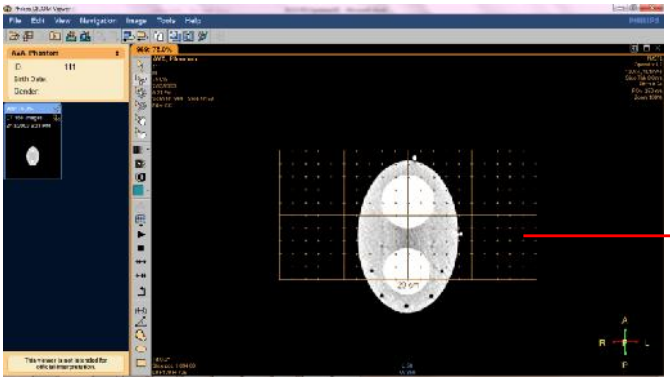


Illustration 27: Grid Lines

- Color Scale – Shows or hides the color scale.

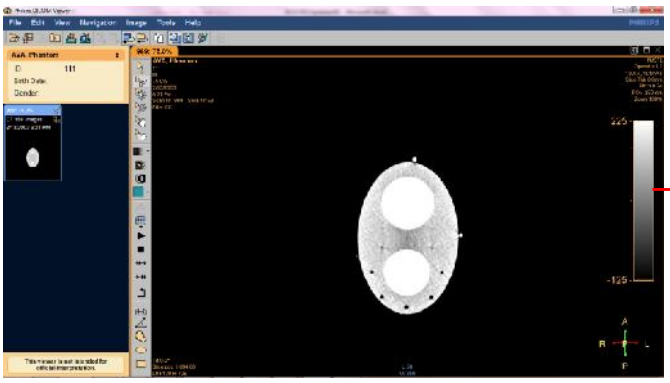


Illustration 28: Color Scale

- Hide/Show Bitmap overlays.
- Protocols – Displays a list of available protocols for the currently selected image.
- Full Screen – Switches the display between full-screen mode and normal mode.

8.4 Navigation

- Next Patient – Loads the next patient in DICOM Viewer, if available.
- Previous Patient – Loads the previous patient in DICOM Viewer, if available.
- Next Series – Loads the next series in DICOM Viewer.
- Previous Series – Loads the previous series in DICOM Viewer.
- Scroll to Next Line – Scrolls to the next image.
- Cycle Series – When this tool is selected, a movie is played in a cyclic manner: when the movie reaches the end of the series it starts again from the beginning.

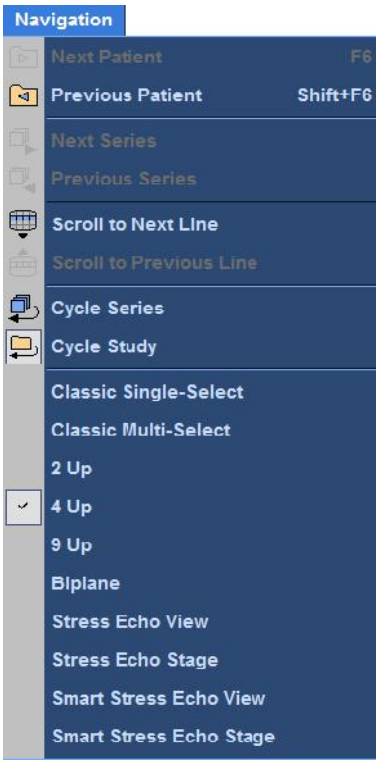


Illustration 29: Navigation Menu

- Cycle Study – When this tool is selected, and a movie reaches the end of a series, it continues with the next series until it reaches end of the collection of series.
- 2Up – When this tool is selected, the selection mode for pictorial index is as follows: if you select one pictorial, the following pictorial is also selected. Selecting “Next” and “Previous” navigates through the data two pictorials at a time.

The following are Ultrasound specific layouts:

- 4Up – This tool is similar to the selection mode “2Up”: along with the selected pictorial, the next three pictorials are also be selected. Selecting “Next” and “Previous” navigates through four pictorials at a time.
- 9Up – This tool is similar to the selection mode “2Up” and “4Up”: along with the selected pictorial, the following eight pictorials are also selected.
- Biplane – Allows you to select one of a pair of biplane images (Biplane A or Biplane B).
- Stress Echo View – When this tool is selected, the selection mode selects all four views belonging to one stage.
- Stress Echo Stage – When this tool is selected, the selection mode selects all four stages belonging to one view

8.5 Image

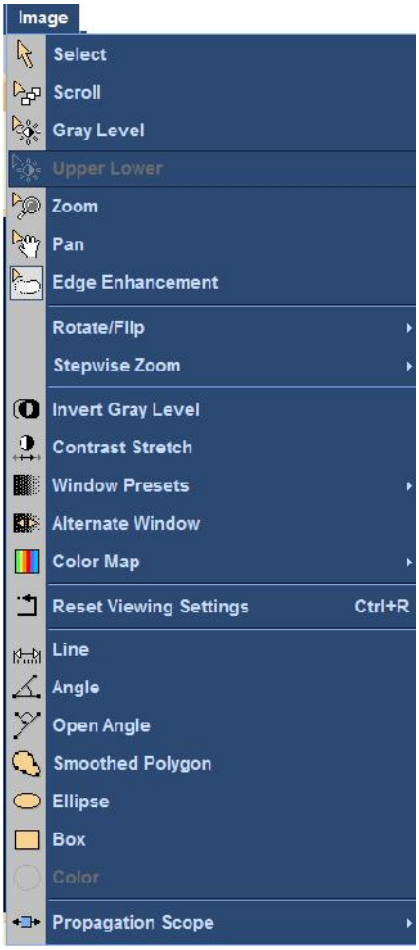


Illustration 30: Image Menu

- Select – Use this tool for making selections.
- Scroll – Use this tool to scroll the view. The mouse pointer is displayed as . To scroll, keep the left mouse button pressed down and move the mouse pointer up or down in the viewing area.
- Gray Level – Use this tool to change the gray level. The mouse pointer is displayed as . To change the gray level of the images, keep the left mouse button pressed down and and move the mouse pointer in the viewing area.
- Zoom – Use this tool to zoom. The mouse pointer is displayed as . To zoom in and out, keep the left mouse button pressed down and and move the mouse pointer in the viewing area.
- Pan – Use this tool to pan. The mouse pointer is displayed as . To pan the image, keep the left mouse pointer pressed down and and move the mouse pointer in the viewing area.

Edge Enhancement – Use this tool to enhance the edges in an image. The mouse pointer is displayed as To enhance edges, keep the left mouse button pressed down and move the mouse pointer in the viewing area.

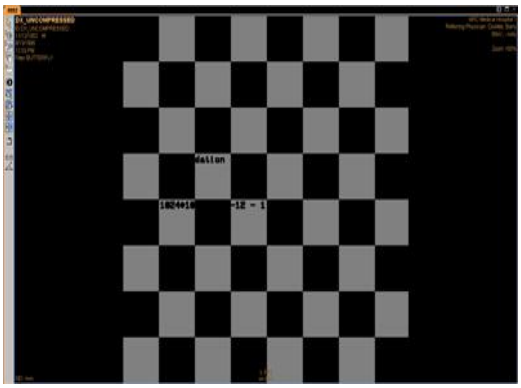


Illustration 31: Before edge enhancement

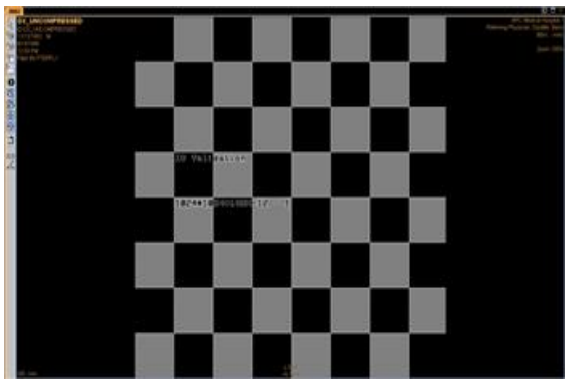


Illustration 32: After edge enhancement

- Step wise zoom – This tool provides the following options: Fit to view, zoom in, and zoom out.

- Invert Gray Level – Inverts the gray level of the image.

- Contrast Stretch – Adjusts the gray level automatically.

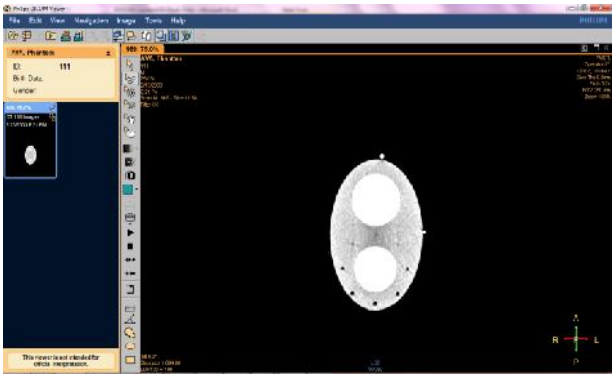


Illustration 35: Original Image

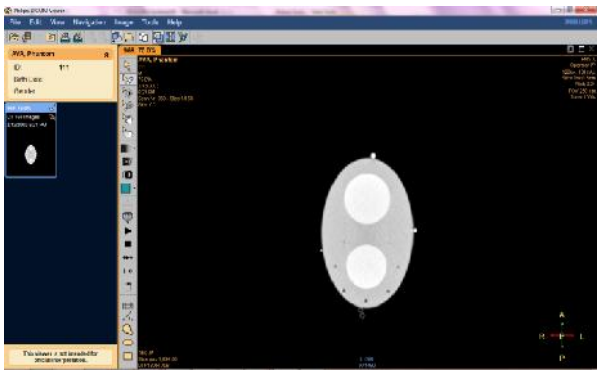


Illustration 36: After applying Contrast Stretch

- Window Preset – Only for CT Images (refer to Appendix B). You can select any of the following predefined settings: Abdomen, Bone, brain, IAC, Liver, Lung, Pelvis, P.F, and spine. (Refer to section 8.6)

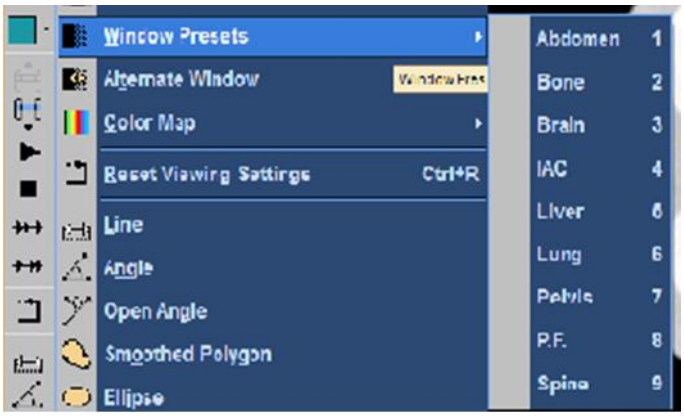


Illustration 37: Window Presets

- Alternate Windows – Selects the alternate window available with a different preset.

- Color Map – This tool allows you to select a color map from the color lookup table.

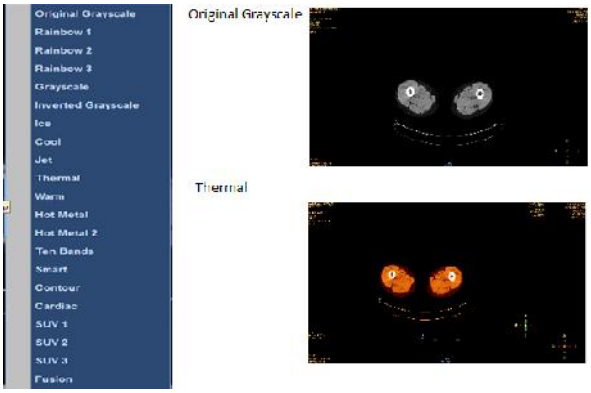


Illustration 38: Color Map

- Reset Viewing Settings – Removes all image processing performed in the current viewing session.

- Line – Allows you to draw a line on the image.
- Angle – Allows you to draw an angle on the image.
- Open Angle – Allows you to draw an open angle on the image.
- Smoothed Polygon – Allows you to draw a smoothed polygon on the image.
  - Ellipse – Allows you to draw an ellipse on the image.
  - Box – Allows you to draw a rectangle on the image.
  - Color – Allows you to change the color of the annotations drawn on the images.

8.6 Tools

Edit Windowing Preset

To apply a preset window setting, click Edit Window Presets on the Tools menu.

Window presets can only be applied to CT images.

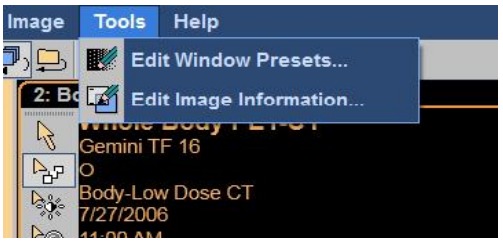


Illustration 39: Edit Window Presets Menu

A list of default presets is available for selection.
The window level and window width of the available presets can be modified in Window 1 and Window 2. The modified presets are shown in red.

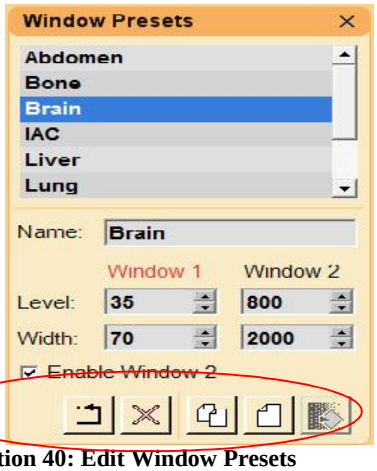


Illustration 40: Edit Window Presets

You can define a new preset, modify the existing preset, delete a preset, or reset to the default factory settings.

Illustration 41: Edit Window Presets Buttons

.

Edit Image Information

To edit the image information, click Edit Image Information on the Tools menu.
The Philips CT template is selected by default. User defined templates can be created or deleted, and selected as the default template to be used when you open a series in DICOM Viewer. You can check the patient name in the top left corner of the view.

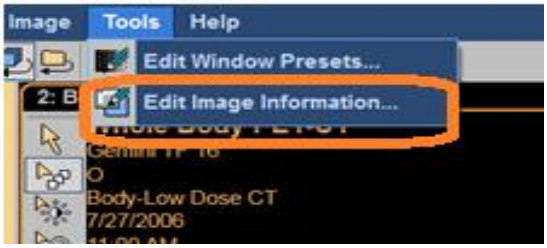


Illustration 42: Edit Image Information Menu

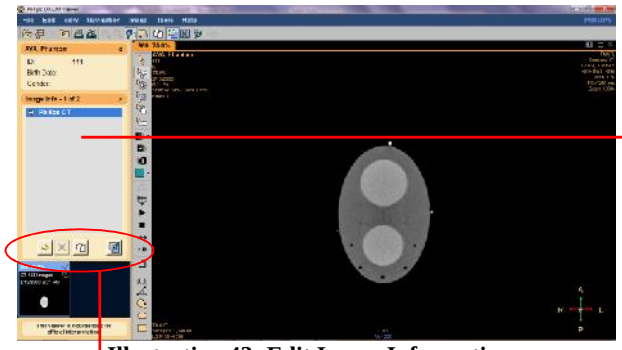


Illustration 43: Edit Image Information

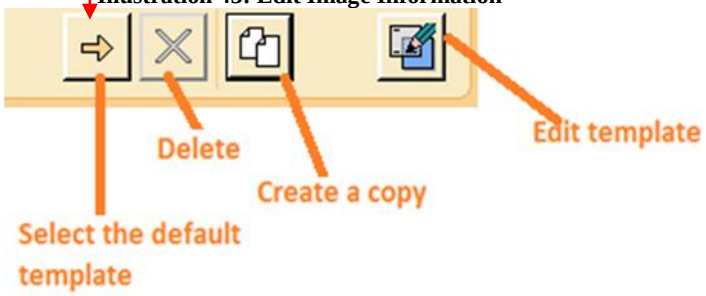


Illustration 44: Edit Image Information Buttons

Edit Template

- You can select the attributes to be displayed by selecting the check box next to the attribute.
- You can specify the location where the information is to be displayed. The following location options are provided: top left, top centre, top right, middle left, middle right, bottom left, bottom centre, and bottom right.
- You can select the position where the information should be displayed.
- Options for font style (regular, bold, italic) and font size (small, normal, large) are also provided.

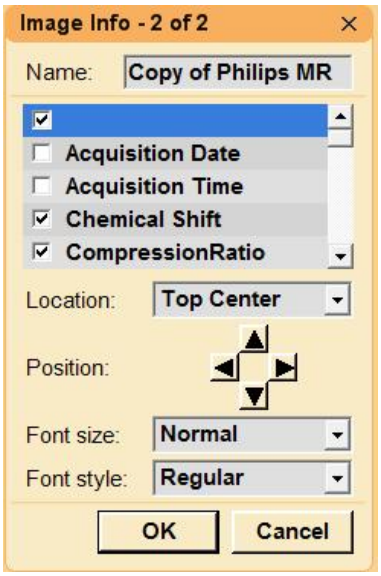


Illustration 45: Image Information

9 ACCESSORIES

Panning a View

- Click Pan on the Image menu. Alternatively, you can select the Pan tool on the Toolbar.
- Move the mouse pointer over the view that you want to pan and then drag the image in the desired direction.
- The applied panning offset is propagated to all images in the series.
  Pan tool can be temporarily activated by dragging while pressing the left and middle mouse buttons.

Zooming a View [ ]

The **Zoom** tool is selected by default when a single image is selected. When You apply a zoom factor to an image, it is propagated to all images in the series.

- Click **Zoom** in the Common tools panel.
- Move the mouse pointer over the view that you want to zoom and then do one of the following:
  • Drag up to zoom in.
  • Drag down to zoom out.

You can activate the Zoom tool temporarily by dragging while pressing right and middle mouse buttons.

Adjusting the gray levels [ ]

- Click **Gray Level** in the Common tools panel.
- Move the mouse pointer over the view that you want to adjust and then do one of the following:
  • Drag right to increase the contrast.
  • Drag left to decrease the contrast.
  • Drag up to increase the brightness.
  • Drag down to decrease the brightness.
  You can activate the Gray level tool temporarily by dragging while pressing the middle mouse button.
- To reset the gray levels to the original settings (as defined by the acquisition system), click the **Window** arrow in the Common tools panel, and then select **Default**.
- To apply a preset window setting, select the view, click the **Window** arrow in the Common tools panel, and then select a preset. Window presets can only be applied to CT images.
- When you change the gray levels of a view (not including selecting a preset), the Window preset selector in the Common tools panel indicates that the window settings are “modified”.
- If viewport controls are visible, you can apply a specific value to the window level or window width. Click the “L” or “W” viewport control, and then do one of the following:
  - Type a new value, and then press ENTER or click outside the field.
  - Click the up or down arrows in the image information interactor to change the value.
  - Press the UP ARROW or DOWN ARROW key.
  - Rotate the wheel button.
  - To invert the gray level values in all images of the selected series, click **Invert Gray Level** in the Common tools panel.

Window level presets

Standard window presets for images can be viewed as follows. Please note that standard presets are available only for CT images.

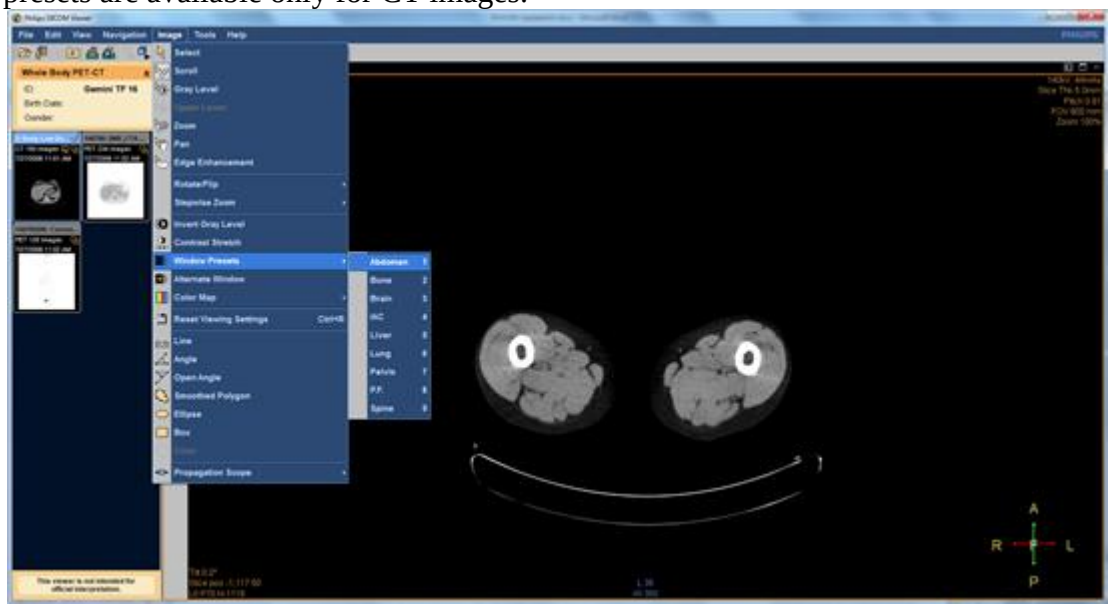


Illustration 46: Window level Presets

Window level settings may be manually configured by selecting the label “L” and “W” in the viewer, then adjusting the “Length” and “Width” values as shown below.

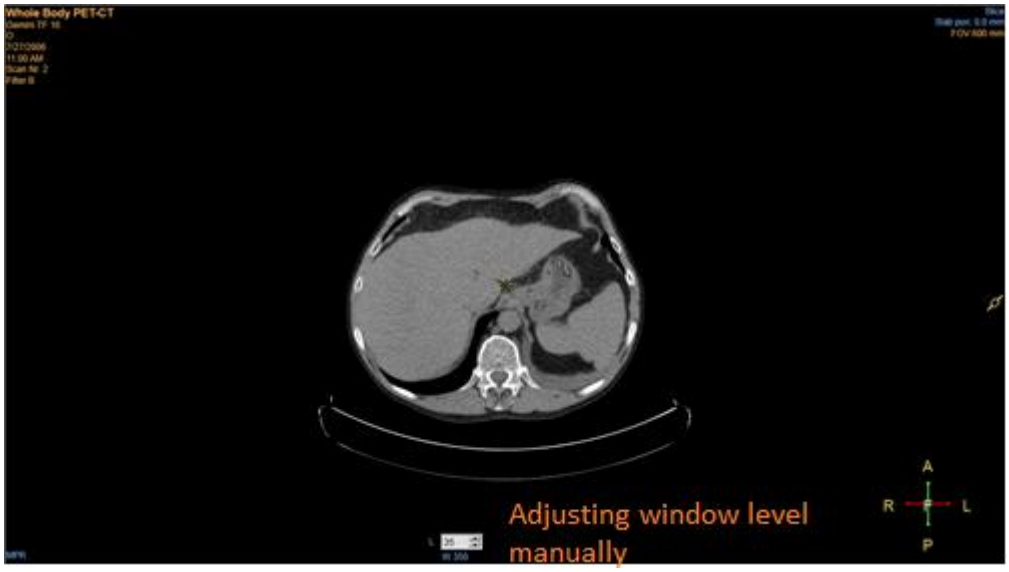


Illustration 47: Adjusting window level manually

10 MEASUREMENTS

Measurement tools are provided on the Image menu. The selected measurement tool remains active until a measurement has been made. To use the tool again, click the appropriate button again. To select a different tool, select one on the Image menu.

Measuring Distance

To measure a distance, use the line and angle tools.

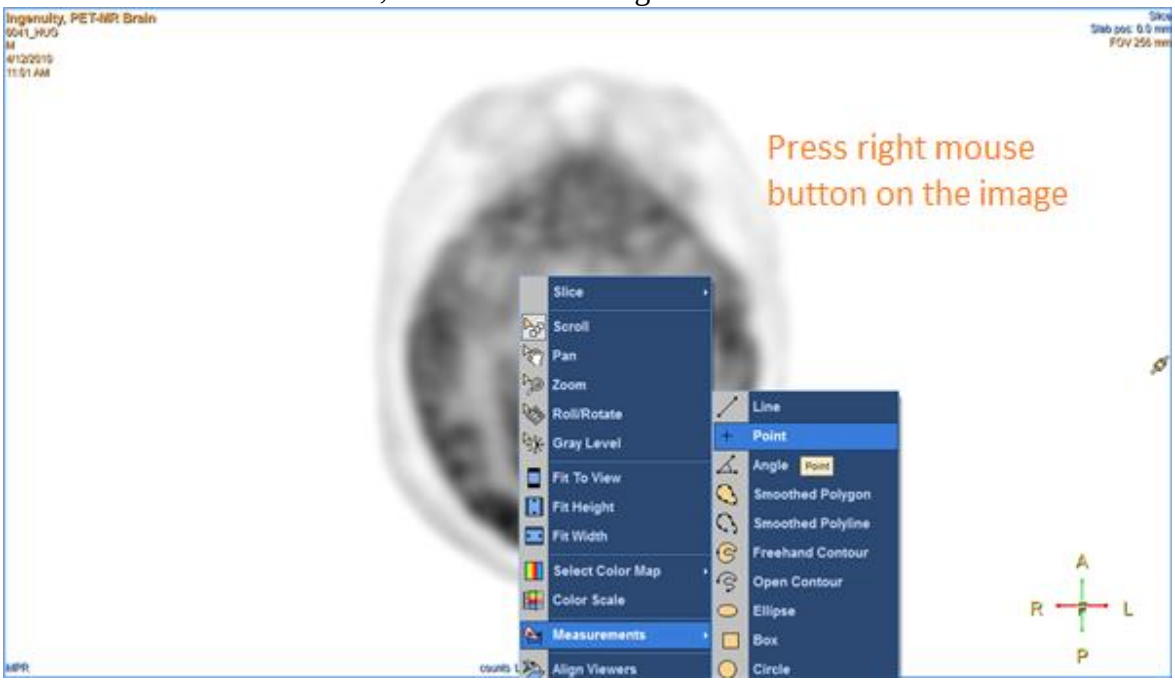


Illustration 48: Measuring Distance

Line [ ]

To measure a distance along a straight line, right-click on the image, click Measurements, and then click Line. Do the following:

- Move the pointer over the view in which you want to create the measurement.
- Click at the start point of the line, then move the pointer and click at the end point of the line.

Smoothed Polyline [ ]

To measure a distance along a line with smoothed curves, click Smoothed Polyline in the Common tools panel, and then do the following:

- Move the pointer over the view in which you want to create the measurement.
- Click at the start point of the line.
- Move the pointer and click at the next point in the line.
- Continuing making points along the line, and then double-click at the end point of the line.

Angle [ ]

To measure a closed angle, right-click on the image, click Measurements, and then click Angle. Do the following:

• Move the pointer over the view in which you want to create the measurement.
• Click at the start of the first leg.
• Click at the apex.
• Click at the end of the second leg

Measuring a region of interest

To measure a region of interest (ROI), use the ROI selector in the shortcut menu. After measuring a region of interest, measurement details are displayed next to it.

Box [ ]

To create a rectangular region right-click on the image, click Measurements, and then click box. Drag to create an ROI.

Circle [ ]

To create a circular region, click **Circle** in the Common Tools panel, and then drag to create an ROI.

Ellipse [ ]

To create an elliptical region, right-click on the image, click Measurements, and then click Ellipse. Do the following:

- Drag across the first dimension of the ellipse, and the release the mouse button.
- Move the pointer to set the perpendicular dimension, and then click the mouse button to create the ROI.

Smoothed Polygon [ ]

To create a closed region with a smoothed contour, right-click on the image, click Measurements, and then click Smoothed Polygon. Do the following:

- Click at the start point of the polygon.
- Move the pointer, and then click at the next boundary point of the polygon.
- Create as many boundary points as desired, and then double-click to create the ROI.

Freehand Contour [ ]

To create a closed region with a varying contour, click “Closed Contour” in the Common tools panel, and then do the following:

- Click at the start point of the contour.
- Trace the edge of the contour with the pointer, and then click to create the ROI.

11 VIEWING PROTOCOLS

11.1 Activating protocols

Drag and drop –Drag and drop a series to the viewing area for image fusion. In the example below, the PET image is already displayed in the viewing area. The MR thumbnail is dragged and dropped over the PET image. When you drop the thumbnail to the viewing area, a layout gallery window is displayed, providing a list of possible layouts that can be applied in this combination (PET and MR). Select the layout that you want to apply.

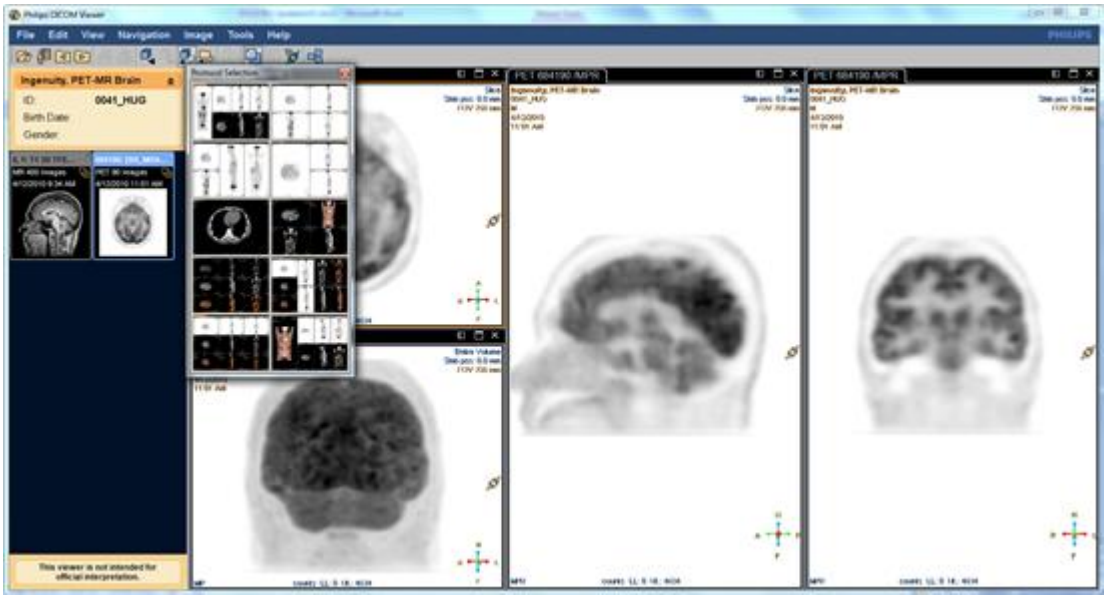


Illustration 49: Activating Protocols

11.2 Switch between protocols:

In order to switch between protocols, click “Protocols” in the toolbar.

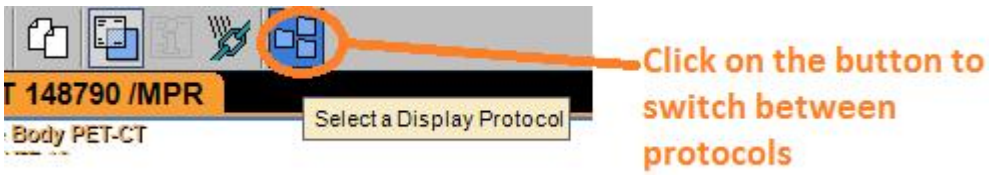


Illustration 50: Select Protocols Button

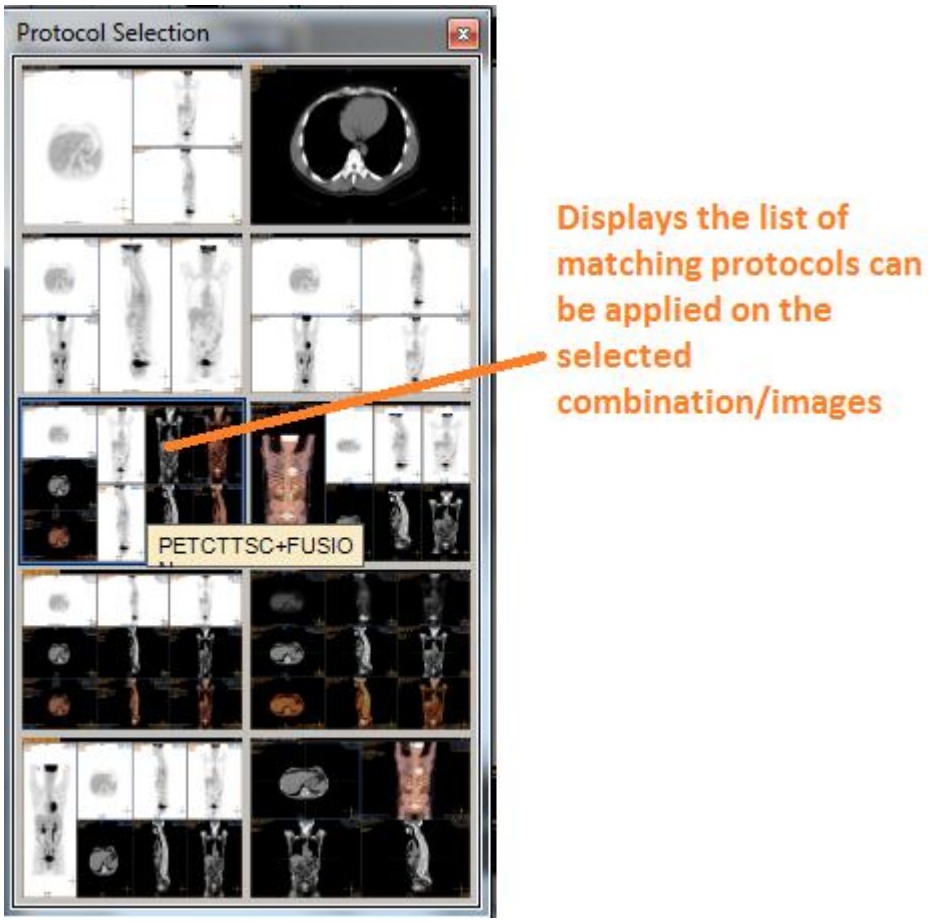


Illustration 51: Available Protocols

Select the protocol that you want to apply. In the image above, PETCTTSC+FUSION is selected, and will be displayed in the viewing area.

Illustration 52: Fused Protocol

A complete list of available protocols is provided in **Appendix A.**

11.3 Image Fusion

You can turn on fusion of two images using the following methods:

- ✓ Press “F12” on the keyboard.
- ✓ Select “Fusion” in the shortcut menu, when you right-click on the image, as shown below.

Fusion is applied and the default alpha blending value that is applied to the fused data sets is 50%, as shown below. Alpha blend can be adjusted by selecting “Alpha Blend” in the shortcut menu.

Illustration 53: Fusion in the shortcut menu

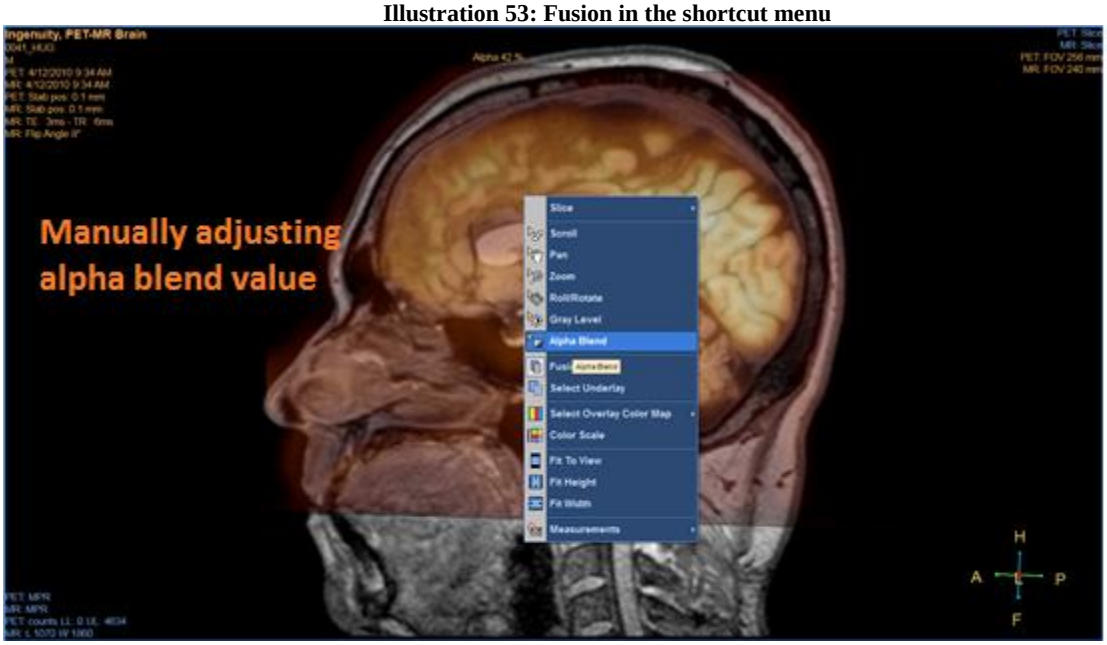


Illustration 54: Manually adjusting alpha blend value

12 SHORTCUTS

Key	Functionality
CTRL + O	Open file
CTRL + R	Original gray level mapping applied
CTRL + P	Print dialog
CTRL + I	Switch image information on or off
CTRL + R	Original viewing settings are applied again
CTRL + C	The selected measurement and its length indicator are copied to the clipboard
CTRL + X	The selected measurement and its length indicator are removed
CTRL + V	The selected measurement and its length indicator are shown on the new image
SHIFT + F6	Previous Patient
ALT + F4	Close the application
Esc	Exit full-screen mode
F6	Next patient
F9	DICOM attributes
F11	Start full-screen mode
F12	Switch fusion on or off

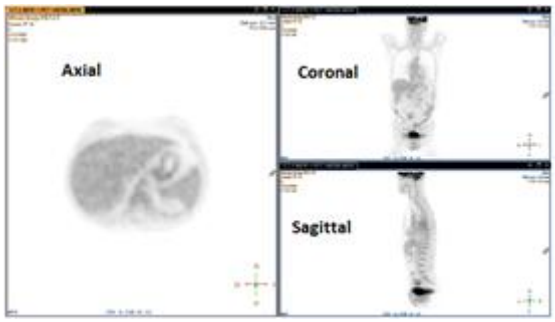
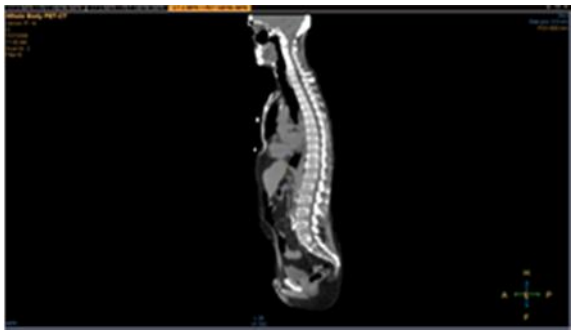
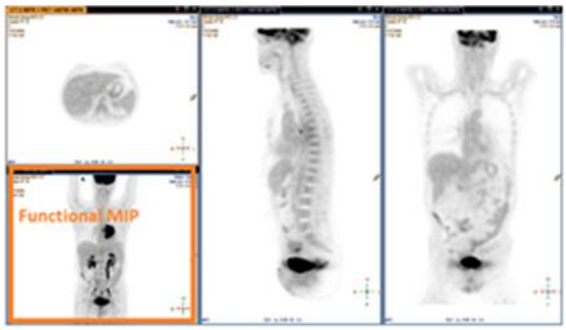
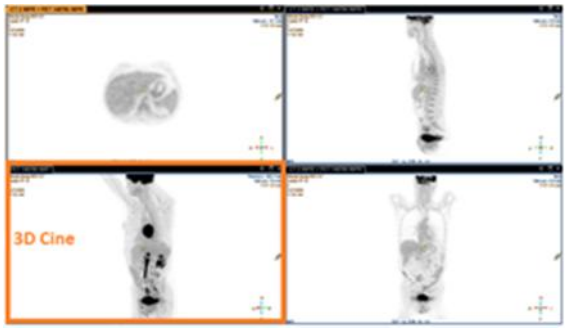
13 ABBREVIATIONS

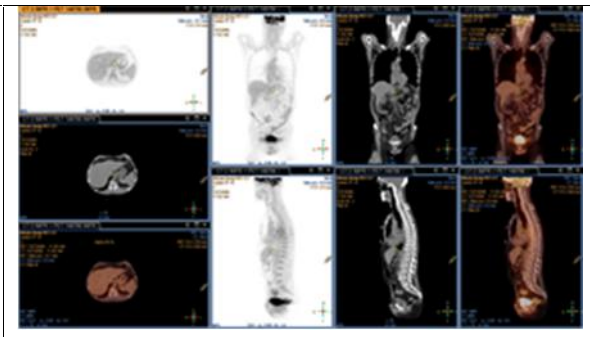
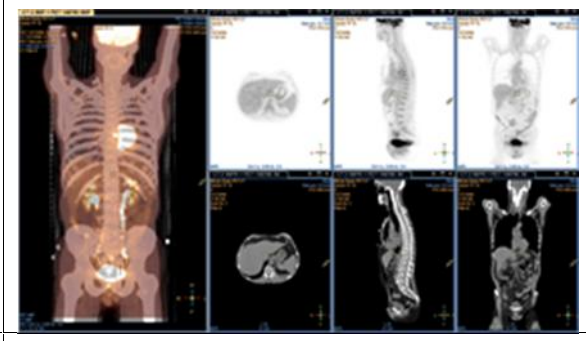
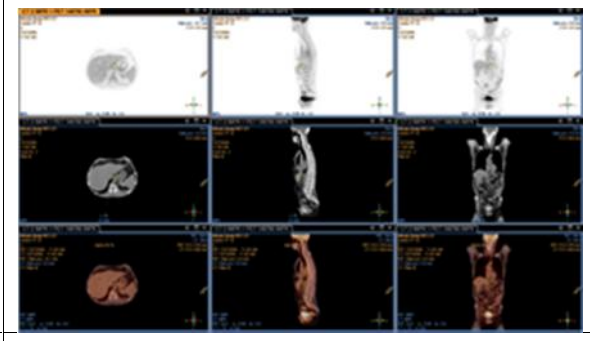
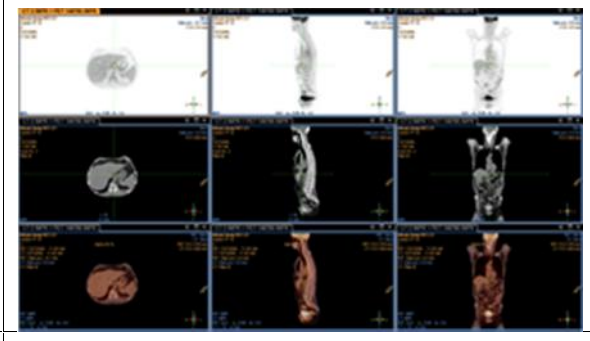
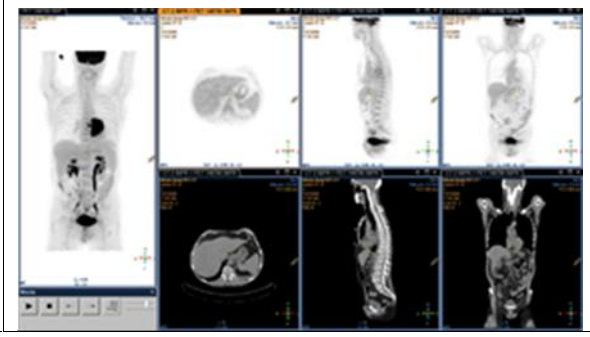
Abbreviation	Description
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
MIP	Maximum Intensity Projection
MR	Magnetic Resonance
NM	Nuclear Medicine
PET	Positron Emission Tomography
PIIM	PMS Image Information Model
US	Ultrasonography
SPECT	Single Photon Emission Computed Tomography
SAX	Short Axis
HLA	Horizontal Long Axis
TSC	Transverse Sagittal Coronal
VLA	Vertical Long Axis

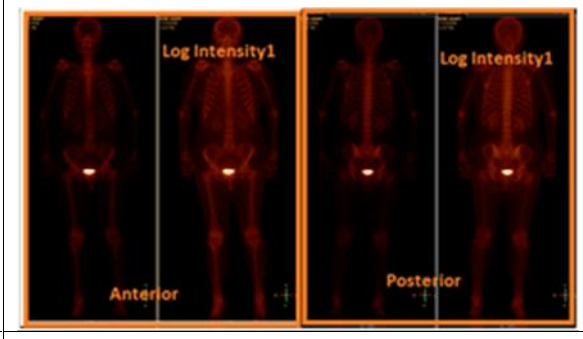
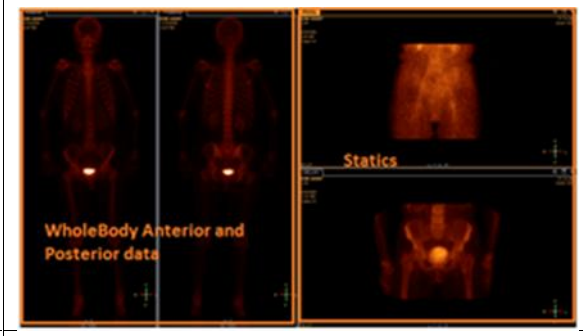
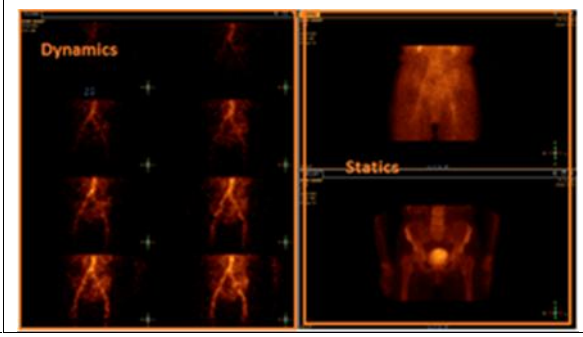
Definition	Description
DICOMDIR	A file administering a directory (listing) of all DICOM instances stored in a DICOM repository.
Viewer	A component that can show images or data on the screen.

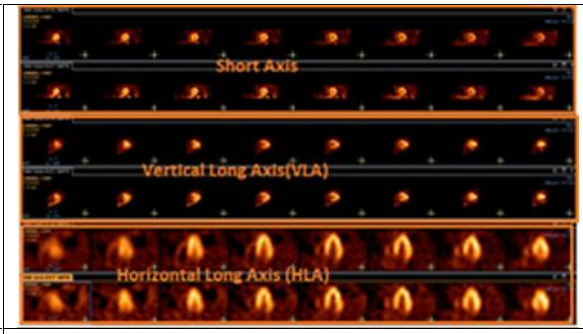
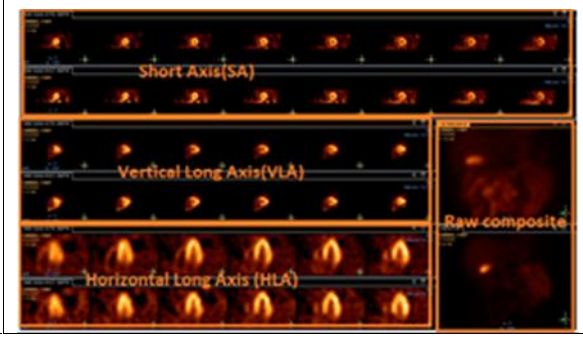
APPENDIX A

The following **3D Fusion Protocols** are available for PET/CT, PET/MR and NM/CT datasets.

Single series TSC	
Single series N-on-1	
Single series TSC + MIP	
Dynamic TSC + Cine	
TSC + Fusion	

	
TSC + Fusion Rendering	
TSC + Fusion 3 Rows	
Slab TSC + Fusion 3 Rows	
2 Series TSC + MIP	

Slab Anatomical TSC	
NM Planar protocols WholeBody Dual Intensity compare	
NM Planar protocols WholeBody + Statics	
NM Planar protocols WholeBody + Volume	
Dynamics + Statics	

NM Cardiac protocols Stress rest layout	
NM Cardiac protocols Stress rest raw composite	

APPENDIX B

The table below defines the default CT Window Presets as provided by Philips DICOM Viewer.

Name	Window 1		Window 2	
	Level	*Width*	*Level*	*Width*
Abdomen	60	360	100	200
Bone	800	2000	600	1600
Brain	35	70	800	2000
IAC	600	4095	800	2000
Liver	100	200	80	150
Lung	-600	1600	-500	1400
P. F.	35	150	35	70
Pelvis	300	1200	40	400
Spine	60	300	800	2000