



# NilRead

## Patient Portal User Guide

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## Contact Us

U.S. (toll free): 1-877-201-0001

Direct: 913-227-7030

Customer Portal: <https://community.hyland.com>

## Manufacturer

Hyland Software Canada ULC

111 Peter Street, Suite 540

Toronto, Ontario, M5V 2H1

Canada

NilRead\_info@hyland.com (for Vigilance reporting only)



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## Intended use

### About NilRead Patient Portal

Access NilRead Patient Portal using your mobile device or desktop computer. NilRead Patient Portal runs on all major browsers and supports multi-touch gestures on mobile devices (for details, see **Device specifics**). For hardware requirements and supported browsers, see **Hardware requirements**. Please also review the **Warnings and precautions**.

NilRead Patient Portal uses industry standard security mechanisms (HTTPS, SSL) and does not transfer any patient data to the client device running the viewer. NilRead Patient Portal supports many modalities (see **Supported modalities**).





View additional regulatory information including warnings and precautions.

### Version number

The NilRead Patient Portal version number can be viewed at **Setting -> Product information -> NilRead**.

## Warnings and precautions

Before attempting to use NilRead Patient Portal, you must read this manual thoroughly, paying particular attention to all Warnings and Cautions incorporated in it.

<b>WARNING</b>		Directions, which if not followed, could cause fatal or serious injury to an operator, patient or any other person, or could lead to a misdiagnosis or mistreatment.
<b>CAUTION</b>		Directions, which if not followed, could cause damage to the equipment described in this Instructions for Use and/or any other equipment or goods, and/or cause environmental pollution.

## General usage



Users are to ensure that the appropriate study is loaded based on the identification on the timeline and in the viewport.



It is recommended that NilRead Patient Portal be installed on the minimum hardware requirements (see **Hardware requirements**). Users are to ensure guidelines and warnings (including maintenance provisions) provided by the hardware manufacturer are adhered to, and that hardware is used under safe operating conditions. Users shall not install any additional third party software on the NilRead Patient Portal server to prevent compromising the software performance.



A user's access to the NilRead Patient Portal software is dependent upon the connectivity of their computer or mobile device to the NilRead Patient Portal server. A NilRead Patient Portal site should maintain the network integrity since the network is a critical part of the distributed image viewing system.



NilRead Patient Portal uses compressed images during interactive manipulation. The diagnostic quality image is presented at the end of the manipulation, as part of a progressive refinement display. Lossless images are marked with an HD label.



NilRead Patient Portal has been qualified on a variety of operating system and browsers (see **Device specifics**). However, operating system and browser version updates may affect the NilRead Patient Portal software. We recommend verifying the NilRead Patient Portal functionality after a modification to the operating system or browser.

## Use on mobile devices



Users are to ensure guidelines and warnings provided by the mobile device manufacturers are adhered to regarding care and operation of the mobile devices.

## Measurements



On MPR and 3D views, interpolation may be done depending on the spacing between the original slices (as the spacing increases, the amount of interpolated data increases). For any image, when displaying images on the monitor at a scale other than 100%, data is interpolated. Measurement results are affected when interpolation is done. Interpolation always implies a certain inaccuracy.



Do not perform pixel value measurement on compressed images. Compressed images are marked as “Compressed” on the screen.



NilRead Patient Portal allows 3D measurements to be performed. 3D measurements can change significantly with small changes in a line’s location or with changes in opacity.



The accuracy of any measurement also depends on the user’s ability to select appropriate measurement points on the display device.



The accuracy of calibrated measurements should be visually verified with the size of an anatomical object.

## Intended use within the USA

The NilRead Patient Portal is intended to provide a patient/provider-tethered application that allows patients to review and upload patient-specific healthcare information and medical images. NilRead Patient Portal gives patients the ability to perform simple image review and processing functions, such as grayscale window and level, zoom and pan, user delineated geometric measurements, compression, or user added image annotations. NilRead Patient Portal is not intended to enable patients to control or perform any actions for diagnostic medical purposes.

## Supported modalities

NilRead Patient Portal provides imaging data to physicians in many different specialties. Modalities such as MR, CT, Xray, fluoroscopy, ultrasound, mammography, and many more are supported by NilRead Patient Portal.

For a full list of supported modalities, see the **NilRead DICOM Conformance Statement**.

## Hardware requirements

The computer or device used for NilRead Patient Portal must meet the following hardware requirements.

### Desktop computers

The minimum hardware requirements for desktop computers running NilRead Patient Portal are:

- CPU: 1GHz Intel processor
- Available Memory: 500MB

The minimum network connection speed for a desktop computer is 1Mbps download, 256Kbps upload.

NilRead Patient Portal functions on any browser that supports JavaScript but has only been formally verified on the following browsers:

- Microsoft® Edge
- Mozilla® Firefox® (3.0 and higher)
- Google Chrome™ (3.0 and higher)
- Apple® Safari® (4.0 and higher)

### Mobile devices

NilRead Patient Portal is verified to work on the following mobile devices:

- Apple® iPhone® (iOS 3.0 and higher)
- Apple® iPad®
- Android™ devices (2.3 and higher)
- Microsoft® Surface™
- Windows® Phone (8.0 and higher)

NilRead Patient Portal requires mobile devices to have a minimum network connection of 3G or WiFi.

Multi-touch gestures are supported (tap, double-tap, drag, swipe, pinch, flingable toolbar). Collaboration is not supported on smartphones.

## Touch gestures

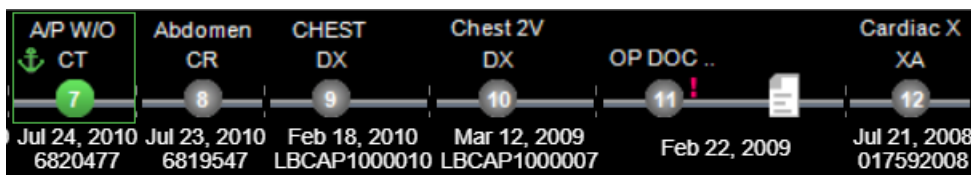
You can use touch gestures in the image viewer. The default actions for each gesture are shown below.

- **Pan and Zoom** Pinch-to-zoom.
- **Scroll** Touch and drag.
- **Window Level** Three finger drag.
- **Reset** Shake the device.
- **Maximize a viewport** Double-tap.

## Studies

### Use the patient timeline

When you open a study, a timeline with additional studies and reports for the patient is shown at the top of the image viewing area.



#### Note

The timeline is only shown if enabled by the system administrator.

The following information is shown on the timeline:

- Prior studies and DICOM embedded PDF reports are shown in chronological order.
- Anchor indicating this is the current study.
- If the **Auto-load and visually merge with the same Accession Number** option is active, a plus sign next to the number indicates that the studies are displayed merged.



- Exclamation mark to identify if a warning exists for a study or report.
- Number of studies including the modality.
- Date of the report
- Accession number
- Study description

## View study or report details

Hover over a study or report in the timeline to view more detailed information.

Study Title:	PET CT SKULL TO THIGH AREA INITIAL
Accession Number:	E103859400
Modality:	PT CT PR SR
Time:	4/1/2016 2:08 PM
Number Of Series:	8
Number Of Images:	596
Study Description:	PET CT SKULL TO THIGH AREA INITIAL
Referring Physician:	GREENBERG, ALISSA
Device:	Local
Availability:	Local
Report Status:	Created

If the **Auto-load and visually merge with the same Accession Number** option is active, the tool-tip displays all studies with the same accession number in chronological order.

XR PELVIS 1	XR FEMUR LEF	<b>US GUIDANCE</b>	XR FEMUR LEF
Study Title:	US GUIDANCE FOR ANESTHESIA BLOCK (GH YH)		
Accession Number:	E103859499		
Modality:	SR US		
Time:	4/12/2016 2:07 PM		
Number Of Series:	2		
Number Of Images:	5		
Study Description:	US GUIDANCE FOR ANESTHESIA BLOCK (GH YH)		
Referring Physician:	GREENBERG, ALISSA		
Device:	Local		
Availability:	Local		
Report Status:	Created		

### View a study

Select a study in the timeline to load it in all viewports. The study is opened using the default hanging protocol for the study.

or

Drag a study from the timeline to a viewport. This allows you to place different studies in different viewports. A warning appears near the top of the image viewing area stating that multiple studies are displayed.

### View a report

Select a report in the timeline. The report opens below the timeline. The following options are available when viewing reports:

- **Save** Save a PDF copy of the report.
- **Print Report** Print the report from your browser.
- **Vert/Horiz** Place the report area on the right side (Vert) or bottom (Horiz) of the screen.
- **Maximize/Restore** View the report area only and hide the image viewing area (Maximize) or view both the report area and the image viewing area (Restore).
- **Close** Close the report.

#### Note

To resize the image viewing and report areas, drag the divider between the two areas.

### Select priors to include in the timeline

You can select the priors to include in the timeline.

1. Select the **Filter icon** located at the right side of the timeline. The number under the icon indicates how many studies are displayed in the timeline (for example, All or 2/3).



The **Extended Patient Timeline** dialog box is displayed.

**Extended Patient Timeline**

Show priors:  All  Manual Selection  Filtered  View:  Studies  Series

#	Reports	Source	Newer	Performed On	Modality	Acc. No.	# Images	Description	Keywords
			<input type="checkbox"/>	Age <input type="text" value="60"/> months	<input type="text"/>			<input type="text"/>	<input type="text"/>
7	Load	Local	-	Jul 24, 2010 10:56:48 AM	CT	6820477	360	A/P W/O	

[1] Sagittal Abdomen 81 [2] Dose Report 1 [3] CT Abdomen1 Cor 3 Avg 93 [4] ABD/PELVIS 183 [5] SCOUT 2

2. Select **Set as relevant**. The selected prior studies are shown in the timeline.
3. To filter the available priors, select one of the following options beside **Show priors**:

**All.** Include all priors.

**Manual Selection.** Select the check box for the prior to include.



**Filtered.** Enter search information in the blank row below the column headings. You can select priors based on **Age, Modality, Description** and **Keywords**.

4. To load a prior in the image viewer, select the prior study, then select **Load** link.



### Filter the timeline using one-click

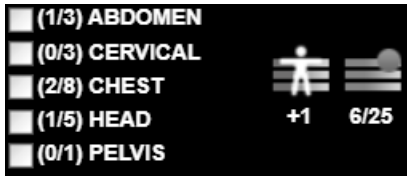
When viewing a patient's timeline, you can filter the studies according to keyword(s) associated with that study.

In order to see keywords, you must have the following options enabled:

- **Enable study keyword tagging** enabled through **Settings | System | Timeline** (option available to system administrators only).
- Matching Hanging Protocols Templates configured through **Settings | Hanging Protocols | Rules Templates**.

To filter the timeline using one or more keywords:

1. At the far right of the timeline, select the checkbox(es) for the applicable keyword(s). The number in parentheses indicates the number of studies shown, All matching studies are displayed in the timeline.



If no keywords have been associated with a study, the text "no keywords found" is displayed inside of the keyword list.

2. To see what keywords are associated with a particular study, hover over the study to display the keyword information.
3. To update the timeline and remove any previously selected keywords, select the checkbox for the applicable keyword(s).

**Note**

It is possible to filter the timeline entries only by keywords, ignoring any other existing timeline filters. This option is available by enabling the **Available Keyword Matching Only** option through **Settings | User Preferences | Patient History**.

**Filter the timeline using Plus One (+1)**

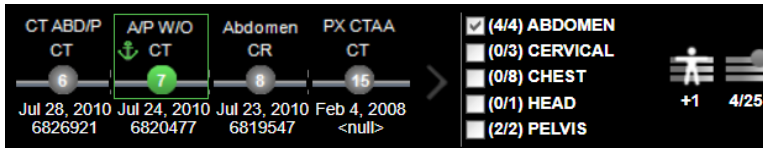
The Plus One (+1) feature expands the studies in the timeline based upon the adjacent keyword relationship as defined in the **Rules Templates**. This allows you to append the current study type with other relevant studies, allowing for easier and quicker viewing of related material.

**Example scenario**

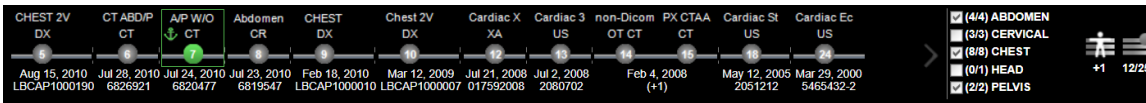
- The Rules templates for **ABDOMEN** includes the adjacent templates **PELVIS, LUMBAR and CHEST** (as these are body parts adjacent to the ABDOMEN).

Protocols		Rules templates			
<input type="checkbox"/>	Name	Modality	User Name	Used as Keyword for Timeline	Adjacent Templates for +1 Timeline Filter
<input type="checkbox"/>	<name>		cindyKB	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	ABDOMEN		admin	<input checked="" type="checkbox"/>	PELVIS,LUMBAR,CHEST

- On the timeline, the **ABDOMEN** keyword is selected, and the timeline looks like this:



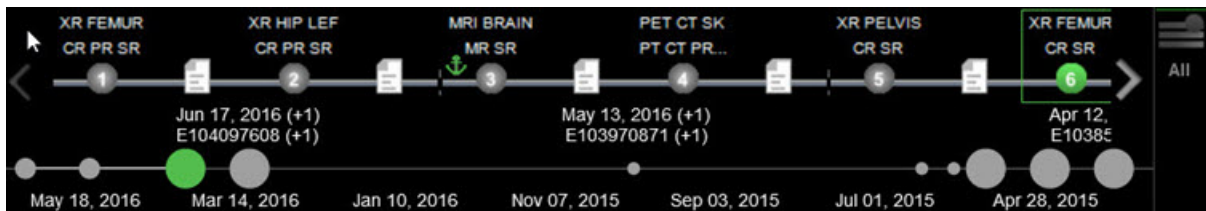
- When the **+1 icon** is selected, the keyword(s) defined as adjacent to the ABDOMEN in the Rules templates are automatically selected; for example, CHEST and PELVIS. The timeline is updated and shows all the relevant studies by date.




- If you continue to click the **+1 icon**, more adjacent keywords are selected, and more studies are shown based. For example: The ABDOMAN, CHEST and PELVIS keywords are selected. When you select **+1 icon**, the adjacent keywords for CHEST - CERVICAL and HEAD - are selected, and the timeline is appended with the relevant studies.
- If all keywords are selected and you select the **+1 icon**, all the keyword selections are cleared.

### Use the timeline heatmap

The timeline heatmap is displayed below the patient timeline and shows the entries on a proportional time scale to provide a better overview of the patient's history.

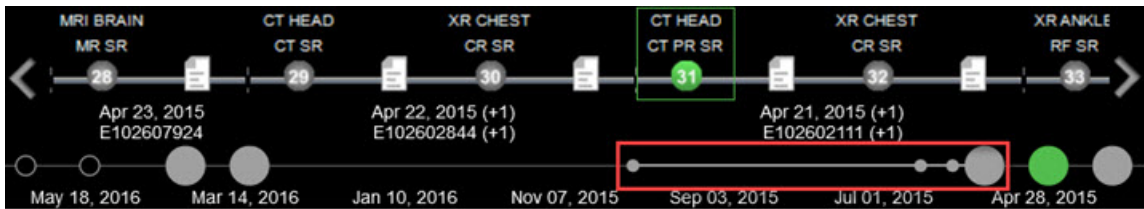


The heatmap provides the following information:

- Each circle on the heatmap represents a set of studies, where the size of the circle is proportional to the number of studies in the time slot - 1, 2, 3, and 4 or more studies.
- The currently selected set is displayed as a green circle.
- Sets containing only filtered out studies are displayed as hollow circles: 
- In contrast to the patient timeline, the timeline heatmap is always displayed entirely and adjusts to fit the available space.

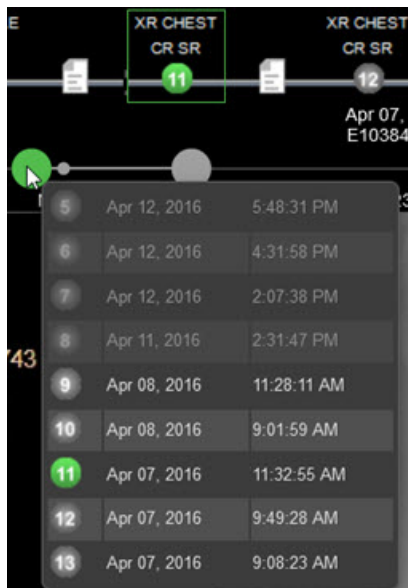
The currently displayed part of the patient timeline is represented by a slightly thicker line on

the heatmap.



To view the set of studies represented by a circle:

1. Hover over the circle. The list of studies appears as a tooltip, with filtered out studies grayed out.



2. To open a study, select it in the tooltip list.

## Display the timeline heatmap

To display the timeline heatmap for all instances of the system:

1. Select **Settings**.
2. Under **System**, select **Timeline**.
3. In the **System - Timeline** pane, select **Show heatmap**.
4. Click **Save**.

**Note**

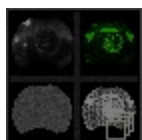
This setting is available to administrators only.

Users who do not have administrator privileges can display the timeline heat map for their own account:

1. Select **Settings**.
2. Under **Preferences**, select **Viewer Preferences**.
3. In the **Preferences - Viewer Preferences** pane, below **Patient History**, select **Show heatmap**.
4. Click **Save**.

## Create a series with all images

NilRead Patient Portal can automatically create a “virtual series” that contains all images in a study in the order they were acquired. The virtual series is added to the side panel and the series icon shows four images side-by-side. For example:



When you hover over the series, the description is **All images**.

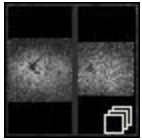
You can control whether virtual series are created automatically. You can also choose whether virtual series are created only for studies containing a specific modality.

1. Select **Settings**.
2. Under **Preferences**, select **Modality Preferences**.
3. Enter the following information:
  - **Modality** Select the modality for which you want to set the virtual series preference.
  - **Virtual Series** Select **Yes** to automatically create virtual series for the modality you selected. Select **No** if you do not want to create virtual series for the modality you selected.

4. Select **Save**.

### View stereometric images

If a study contains stereometric images, NilRead Patient Portal automatically creates a series containing all stereometric pairs of images in the study. The series is added to the side panel and the series icon shows two images side-by-side. For example:



- When you hover over the series, the series description is “All stereometric images”.
- When you view images from the series, the 1x2 view is automatically applied and the images in each stereometric pair are shown side-by-side.
- Scrolling through the series will scroll through each pair of images.

### View CAD marks

If a study has an associated computer-aided detection (CAD) report, you can view the CAD marks on the relevant mammography images. CAD marks are also available for DBT mammography images produced by Hologic (if CAD marks are provided by the manufacturer).

#### Important

Users are instructed to review all images in the study before enabling CAD marks.

1. Select **View Tools** (side panel). An icon for the CAD report is shown. For example:



2. Hover over the icon to view the following information:
  - **Manufacturer** CAD report manufacturer.
  - **Algorithms** Algorithms used by the CAD software.



- **Calc** Number of calcification marks.
  - **Mass** Number of mass marks.
  - **Total** Total number of CAD marks in the report.
3. Select **Show CAD** to enable CAD marks on the study images. If an image contains CAD marks, the number of marks is shown on the image.
  4. Deselect **Show CAD** to hide CAD marks.

### Use implant masks to reduce brightness

NilRead Patient Portal applies a mask to implants in mammography images to reduce their brightness. You can choose to remove this mask when viewing an image.

- To remove implant masks for the current image, select **Titles** (toolbar), then deselect **Implant Masks**.
- To reapply implant masks for the current image, select **Titles** (toolbar), then select **Implant Masks**.

### View DBT slice position

When scrolling through slices in a DBT series, an indicator appears in the bottom-left corner:



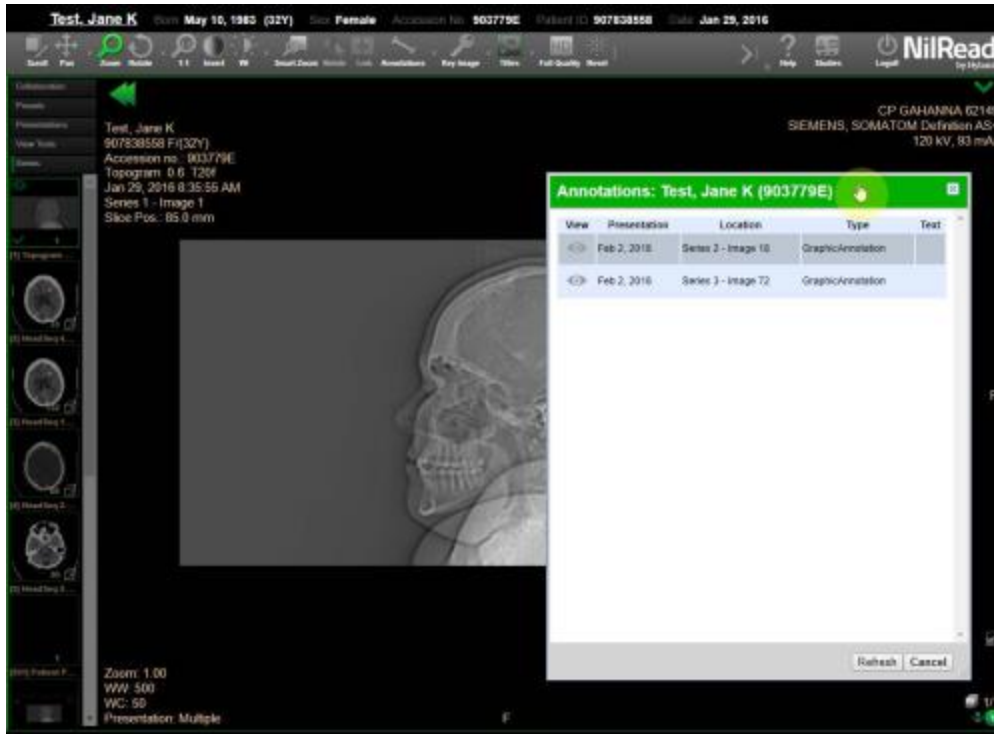
The indicator shows the current slice, total number of slices, and an orientation marker (F = feet, H = head).

### View study annotations

You can quickly find the annotated images in a study (these are annotations added to the source image, not annotations added in NilRead Patient Portal).

1. Select **Annotations** (toolbar), then select **View**.
2. A list of the annotated images in the study appears. You can leave the window open as you work

with the study. To move the window to a different location on the screen, drag the title bar.



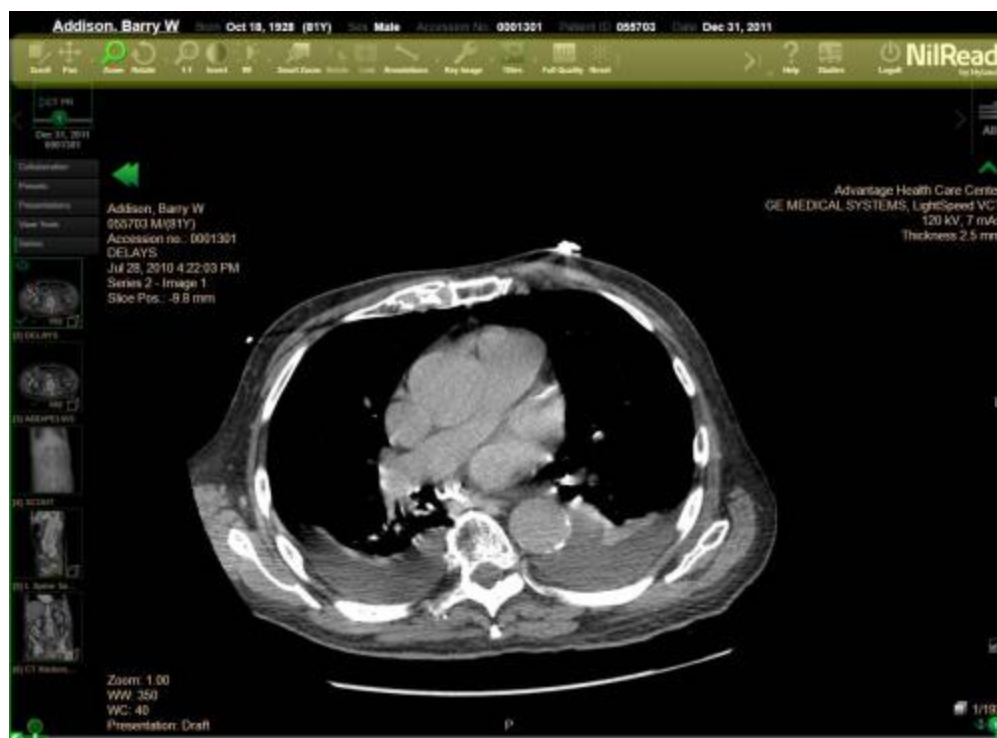
3. Click (or tap) **View** beside an image. The image is loaded in the viewer.



4. To check for any new annotated images in the study, select **Refresh**.
5. To close the window, select **Cancel**.

## Use image visualization tools

The NilRead Patient Portal toolbar provides quick access to the most important commands for working with images. To move through the tools, use the arrows at the ends of the toolbar. On touch devices, fling the toolbar.



You can use the tools in any viewport. Changes to one viewport affect all viewports displaying the same series. If the Link feature is active, then changes to one series will affect all series in all viewports.

### Note

You can right-click (or touch and hold) a viewport to access the tools. You can also customize the toolbar and assign tools to mouse buttons, keyboard shortcuts and touch gestures.

After using a tool, your changes are saved unless you select **Reset** (to remove changes from all images in the series), **Reset Current** (to remove only the changes for the interaction currently selected) or **Annotations > Delete Last/Delete All** (to remove changes from current image) before closing the study.

**Note**

Some tools are only available for specific modalities and views.

**Scroll**

Drag or use the mouse wheel to scroll through images.

- **2D** Drag to scroll forwards or backwards through the images in a series.
- **MPR** Drag to navigate forwards or backwards through the stack of images. The navigation step depends on the slice thickness that is currently selected.
- **3D** Drag to rotate an image with a full three degrees of freedom.
- **Sculpting** Drag to navigate forwards or backwards through the stack of images. The navigation step depends on the slice thickness that is currently selected.
- **ECG** Drag to navigate forwards or backwards in time.

You can also scroll through images using the arrow keys on your keyboard, the arrows at each end of the scroll bar below an image, or by dragging the scroll bar.

**Pan**

Drag to move an image within a viewport. Panning is applied to all images in the series.

- **Oblique** Drag to move an image in any direction within a viewport.
- **Constrained** Drag to move an image vertically or horizontally within a viewport.

**Note**

To move an image at any time, hold ALT while dragging the image.

**Note**

To focus on a specific area, pan the image so the area is centered in the viewport, then zoom in. On mobile devices, use pinch-to-zoom to pan and zoom simultaneously.

**Zoom**



Drag up to zoom in on an image; drag down to zoom out. Zooming is applied to all images in the series.

When mammography images are linked, the zoom remains consistent between the viewports and is based on physical distance (not the magnification factor).

**Note**

To zoom an image at any time, hold CTRL while dragging on the image.

**Note**

To focus on a specific area, pan the image so the area is centered in the viewport, then zoom in. On mobile devices, use pinch-to-zoom to pan and zoom simultaneously.

**Rotate**

- **MPR** Drag to rotate an image in any direction. Rotation is applied to all images in the series.
- **3D** Drag to rotate an image with a full three degrees of freedom.
- **Sculpting** Drag to rotate an image in any direction. Rotation is applied to all images in the series.
- **Fusion 3D** Drag to rotate an image with a full three degrees of freedom.

**Note**

The orientation figure and orientation information is updated when you rotate an image (see [View image orientation](#)).

**1:1 display mode**

You can choose to view images using a 1:1 display mode where 1 image pixel equals 1 monitor pixel. This allows you to view all pixels as they were acquired, without any interpolation. You may

also want to use the 1:1 display mode for monitor quality control when using synthetic images such as AAPM test patterns.

Before using the 1:1 display mode, you must configure your monitor and browser. You must also enable the 1:1 toolbar icon in your tool preferences.

### Configure your environment to use the 1:1 display mode

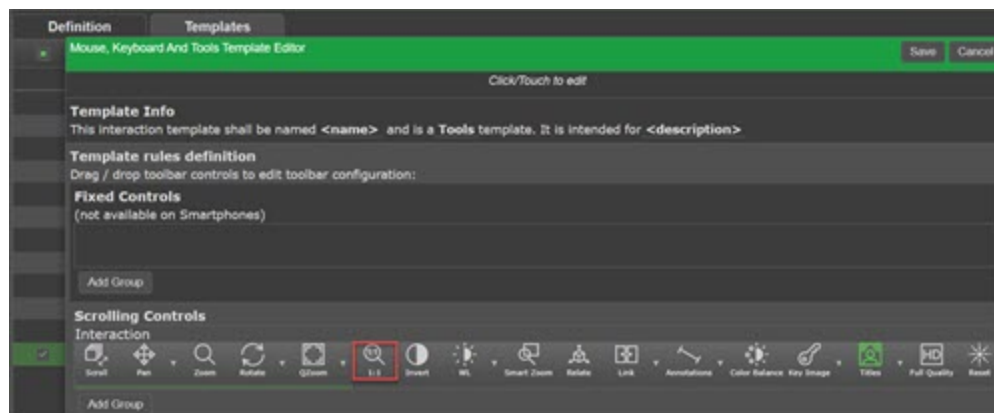
Check the following display settings for your monitor.

1. Use the recommended screen resolution.
2. Use a 100% display scale.
3. Use a 100% text DPI scale.

In your browser settings, set the zoom to 100%.

### Enable the 1:1 display mode

Create a **Tools** template that includes the 1:1 tool.






### Apply the 1:1 display mode

1. Select **1:1** (toolbar).
2. To remove the 1:1 display mode, select **Reset** (toolbar). The 1:1 display mode will also be removed if the image zoom factor is changed.

### Quadrant Zoom



For mammography images, Quadrant Zoom presents a magnified view of the four quadrants.

- To switch quadrants, select .
- To select a specific quadrant, select the arrow beside  and select a quadrant.
- To exit quadrant zoom, select the arrow beside  and select **Zoom to Fit**.

### Invert



Invert grey images. Will be applied to all images in the series.

### Window Level



You can adjust the window level based on the entire image or based on a region of interest.

- **Overall window level** Select the **WI** tool. Drag to adjust the window level. Window level changes are applied to all images in the series. (To change the window level for an image at any time, hold SHIFT while dragging on the image.)
- **Region of interest** Select the **Box WL** tool. Click (or tap) and drag to highlight a region of interest. The window level is adjusted to maximize the contrast of the area you selected.

#### Note

Use **presets** (side panel) to apply common window levels.

### Gamma





Drag up or down to adjust the gamma correction. You can adjust the gamma correction for both color and monochrome images.

The gamma value is shown in the lower-left corner of the image.

### Enhance



Drag up to sharpen the image. Drag down to blur the image.

The enhancement level is shown in the lower-left corner of the image. A negative value is shown if the image is blurred (maximum is -3); a positive value is shown if the image is sharpened (maximum is +3).

### Smart Zoom



To use the Smart Zoom box:

- Using the handles on the sides of the box, drag the box to an area on an image.
- To resize the box, drag the handles on the corners of the box.
- Select **Reset** to reset the Smart Zoom box to the default settings. You can change the Smart Zoom default settings in your user preferences.
- To remove the Smart Zoom box, select the **Smart Zoom** icon in the toolbar.

### Zoom In on a Portion of an Image

You can use Smart Zoom to increase the magnification and window level for a selected area.

Place the Smart Zoom box on the area you want to magnify. Select the box, then use the **Zoom** tool to change the magnification within the box. You can also change the **Window Level** within the Smart Zoom box.

## **Compare Images**

You can use Smart Zoom to compare two series. To overlay a series on top of another series, drag a series from the Series panel or the patient timeline into the Smart Zoom box. You can also drag a **preset** into the Smart Zoom box.

You can use the following tools on an overlay series. Select the Smart Zoom box, then select the tool.

## **Zoom**

Change the magnification factor for the overlay series. Note that if you change the magnification factor for the underlay series, the overlay series will also be affected.

## **Window Level**

Change the window level for the overlay series. Note that if you change the window level for the underlay series, the overlay series will also be affected.

## **Scroll**

Change the overlay image by scrolling through the images in the series.

## **Pan**

Pan the overlay series.

## **Rotate**

Rotate the overlay series.

## **Gamma**

Adjust the gamma correction.

## **Rendering**

Change the rendering mode for the overlay series.

## Thickness

Change the plane thickness for the overlay series.

### Relate



Not available for 2D views. Modify the reference lines. Reference lines are shown on all series on the current screen that are in the same frame of reference. The intersection of the reference lines represents the corresponding position in all viewports.

Click (or tap) an image where you want to place the intersection of the reference lines. You can also drag the horizontal and vertical lines individually, or drag the intersection to move both lines simultaneously.

### Note

Use **Reference** to show or hide the reference lines.

### Link



Link or unlink all currently open series. This allows you to scroll through the linked series in a synchronized manner. Changes (such as Rotation and Zoom) applied to one series are also applied to the other series.

When mammography images are linked, the zoom remains consistent between the viewports and is based on physical distance (not the magnification factor).

### Annotations and measurements



Use these tools during image analysis to mark and measure features on an image. Use the arrow beside **Annotations** to select a tool.

**Note**

A draft presentation is automatically saved when you add annotations and measurements to an image.

**Note**

Measurement units are set in your user preferences.

**Propagate annotations and measurements**

For cross-sectional images, you can propagate an annotation or measurement across all images in the series.

1. Add an annotation or measurement to a cross-sectional image.
2. Right-click (or touch and hold) the annotation or measurement, then select **Propagate**.


Note that when an annotation or measurement is applied to a multiframe image while a cine is playing, the annotation or measurement is automatically propagated across all images in the series. If a propagated measurement cannot be calculated for all images in the series, the measurement value will be \*\*\*.


**Annotations****Arrow**

Add a arrow pointing to a feature of the image.

1. Click (or tap) and drag to add an arrow.
2. Add a note, then select **OK**. Select **Cancel** if you do not want to add a note.

To adjust an arrow:

- To move the arrow, drag the arrow to a new position.
- To adjust the arrow length, drag  at either end of the arrow.


- To move the note, hover over the note until  appears, then drag the note to a new position.
- To edit the note, click (or tap) the note. Edit the text, then select **OK**.

### Text

Add a note to an image.

1. Click (or tap) where you want to add the note.
2. Add text and select **OK**.

To adjust the note:

- To move the note, hover over the note until  appears, then drag the note to a new position.
- To edit the note, click (or tap) the note. Edit the text, then select **OK**.

### Plumblines

Add plumblines to an image. The angle where the lines intersect is shown.

1. To create vertical lines, click (or tap) and drag up or down.
2. To create horizontal lines, click (or tap) and drag left or right.

To adjust a line:


- Drag a line to move it to a new position.

### Curvature

Measure the radius between two points.

1. Click (or tap) and drag to draw a line between two points.
2. Move the mouse to define the curve radius, then click (or tap) to set the radius.

To adjust the curve:

- To adjust the curve radius, drag  in the center or on an end of the curve.
- Drag the curve to move it to a new position.

### Spine Labels

Label spinal vertebrae in an image.

1. Click (or tap) on the first spinal vertebra, then select a label.
2. Click (or tap) on the remaining vertebrae to apply consecutive labels. When done, right-click + beside a label, then select **Complete Labeling**.
3. To display the labels across all views of this body location in the current study, select **Study**. Select **Not Shared** to display the labels on the current viewport only.
4. If sharing labels across views, set the **Display Threshold** to indicate how many neighboring slices the label should be displayed on. Labels are displayed on consecutive slices up to the **Display Threshold** (in mm).

To adjust the labels:

- To change a label, right-click + beside the label, then select **Edit**.
- To delete a label, right-click + beside the label, then select **Delete**. To delete the last label added to the image, select **Delete Last**. To delete all labels, select **Delete Annotation**.

### Grease Pen

Highlight a region of interest using a freeform shape. No measurements are shown.

1. Click (or tap) and drag to create a shape.
2. Drag the shape to move it to a new position.

### Linear Measurements

#### Cursor

Click (or tap) to display a point intensity measurement. The value is shown in measurement units appropriate for the study type. You can also choose to show the cursor position.

#### Ruler

Click (or tap) and drag to create a linear measurement. After the line is drawn, the line length is calculated and displayed. Measurements are not shown on uncalibrated images.


If two lines intersect, the angle between the lines is shown. You can turn off the angle measurement.

### **Contour**

Click (or tap) and drag to create a free hand curve and measure its length. Measurements are not shown on uncalibrated images.

### **Polyline**

Use to create a multi-segment line.



- Click (or tap) to create each point in the line. Right-click (or touch and hold) after creating the final point.
- Drag  on a point to move the point to a new position.

### **Ratio**

Use to measure the ratio between two lines. Two ratios are shown: from the shorter line to the longer line, and from the longer line to the shorter line.

1. Click (or tap) and drag to draw the first line.
2. Drag to draw the second line. The ratio is shown between the lines.

To adjust the lines:

- Drag  at the end of a line to adjust a line's length.
- Drag  in the center of a line to adjust the line's position.
- Drag the dashed connecting line to move the entire measurement to a new position.

### **Calibrate**

Enabled for images that need to be calibrated due to missing size attributes in the image (for example, an analog image that has been scanned). The **Calibrate** tool should only be used when a scale or an object of known size is present on the image.

Drag to draw a line between scale marks on the image or to cover a known object, then enter the distance. After this calibration, the measurement tools are available for the image.

## Area Measurements




You can define patterns for area measurement tools in your user preferences.

### ROI-Free

Create a border around a region of interest using a freehand shape. Statistics for the area are shown as appropriate for the study type (for example: average intensity, standard deviation, area and main diameters).

- Click (or tap) and drag to create a border around the region of interest.

To adjust the measurement:

- Drag a  to move the measurement to a new position.
- To increase the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line outside the border that connects to another point on the border. This area is added to the measurement.
- To decrease the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line inside the border that connects to another point on the border. This area is removed from the measurement.

#### Note

To increase or decrease the measurement area, the ROI-Free tool must be selected.



### ROI-Ellipse



Create a border around a region of interest using an elliptical shape. Statistics for the area are shown as appropriate for the study type (for example: average intensity, standard deviation, area and main diameters).

- Click (or tap) and drag to draw an ellipse.

To adjust the measurement:




- Drag the center  to move the measurement to a new position.
- Drag an outer  to adjust the length of the corresponding axis of the ellipse.

### Circle

Create a circular border around a region of interest. Statistics for the area are shown as appropriate for the study type (for example: average intensity, standard deviation, area and main diameters).

- Click (or tap) and drag to draw a circle.

To adjust the measurement:


- Drag an outer  to adjust the measurement size.
- Drag the center  to move the measurement to a new position. You can also drag anywhere on the circumference of the circle (except on an outer ).

### Polygon

Create a border around a region of interest using a polygon shape. Statistics for the area are shown as appropriate for the study type (for example: average intensity, standard deviation, area and main diameters).

1. Click (or tap) to create each point in the line.
2. Right-click (or touch and hold) after creating the final point.

To adjust the measurement:


- Drag a  to adjust the measurement size.
- Drag the measurement to move it to a new position.

## Square and Rectangle

Create a square or rectangle around a region of interest. Statistics for the area are shown as appropriate for the study type (for example: average intensity, standard deviation, area and main diameters).

1. Click (or tap) to create the first corner of the square or rectangle.
2. Click (or tap) to create the opposite corner.

To adjust the measurement:

- Drag a  to adjust the measurement size.
- Drag the measurement border to move it to a new position.
- Drag a circle to rotate the measurement.

## ROI - Threshold

Available for PET images. Highlight areas above a certain threshold within a region of interest.

To apply a threshold:



1. Click (or tap) and drag to create a border around a region of interest.
2. Enter a threshold, then select **OK**. Any areas within the region of interest that are above the threshold are circled.


### Note

The default threshold is 2.5 SUV.

3. To apply the ROI threshold measurement to all images in the series, right-click (or touch and hold) the measurement, then select **Propagate**.

To adjust the measurement:

- Drag a  to move the measurement to a new position.
- To increase the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line outside the border that connects to another point on the border. This area is added to the measurement.




- To decrease the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line inside the border that connects to another point on the border. This area is removed from the measurement.

### Area Ratio

Available for OP images. Measure the area ratio between two regions.

1. Click (or tap) and drag to create a border around the first region.
2. Click (or tap) and drag to create a border around the second region. The area of the two regions are shown. The ratio of the smallest area to the largest area is also shown.

To adjust the measurement:

- Drag  to move the measurement to a new position.
- To increase the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line outside the border that connects to another point on the border. This area is added to the measurement.
- To decrease the measurement area, click (or tap) anywhere on the border (do not select ). Draw a line inside the border that connects to another point on the border. This area is removed from the measurement.

#### Note

To increase or decrease the measurement area, the Area Ratio tool must be selected.

### Angle Measurements

#### Angle

Click (or tap) and drag to create the first side of the angle (the start of this side will be the vertex). Click (or tap) where you want to place the bottom of the second side of the angle. The two sides are automatically connected. The angle between the two sides is shown.

#### Cobb Angle

Click (or tap) and drag to create the first side of the Cobb angle, then drag to create the second side. The two sides are automatically connected. The angle between the two sides is shown.

### **Cobb Multi-Angle**

Click (or tap) and drag to create the first line of the Cobb angle, then drag to create each additional line. When done adding lines, right-click (or touch and hold) the image. The angle between each set of lines is shown.

### **Color**

Select the color to use for annotations.

### **Manage**

#### **Delete Last, Delete All**

Remove the last change or all changes from the current image.

#### **Note**

Use **Reset** to remove changes from all images in the series.

### **Editing Annotations**

You can edit annotations. For example, you can drag to change the annotation's position or size. You can also double-click (or touch and hold) the text in an arrow or text annotation to modify it.

### **Deleting Annotations**

To remove an annotation, right-click (or touch and hold) the annotation, then select **Delete**.

### **Measurements for wide field ophthalmic photography images**

NilRead Patient Portal calculates linear and area measurements on wide field ophthalmic photography images. The calculations are done using a 3D geometric model of the eye.

When you apply a linear measurement to a wide field ophthalmic photography image using the ruler tool, the measurement is calculated as the length of the curve representing the line on the 3D surface of the eye. Area measurements are performed on a 3D model of the eye by projecting the

2D shape (ellipse or ROI) from the image to the 3D model. The area measurement is calculated from the enclosed pixels on the 3D model.

If the distance or area cannot be measured, the measurement value will be **\*\*\***. If you move a linear or area measurement to a different location on the image, the measurement will be recalculated based on the measurement's new location.

## Titles



Show or hide information such as image details, image orientation and annotations. This affects all viewports.

To show or hide all information, select **Titles**. Use the arrow beside **Titles** to select specific information to show or hide.

- **Hide All** Show/hide all information.
- **Image Titles** Show/hide **image details**.
- **Image Orientation** Show/hide **image orientation information**.
- **Annotations** Show/hide **annotations**.
- **Dicom Overlays** Show/hide DICOM overlays.
- **Image Shutters** Show/hide image shutters.
- **Reference Lines** Show/hide **reference lines**.
- **CAD Overlay** Show/hide **CAD marks** on mammography studies.
- **Implant Masks** Show/hide implant masks.
- **Image Rulers** Show/hide image rulers. Rulers can only be displayed when the underlying meta-data provides known and consistent pixel spacing and image geometry is flat.

## Full Quality



View the original, uncompressed image.

## Reset



Remove changes from all images in the series. Changes will only be removed from the current view.

### Note

Use Annotations > Delete Last/Delete All to remove changes from the current image only.

## Reset Current



In contrast to **Reset**, this tool removes only the changes for the interaction currently selected on the toolbar.

### Example

You have used various tools in the current view, such as **Zoom**, **Pan**, and **Rotate**, and now you want to reset only the changes you made with the **Pan** tool.

- On the toolbar, select **Pan**, then select **Reset Current**.  
Only the changes you made with the **Pan** tool are reset, while the changes you made with the **Zoom** and **Rotate** tools are preserved.

This feature is available for the following interactions:

- Zoom
- Pan
- Rotate/Flip
- WL
- Color Balance
- Opacity (3D)
- Gamma
- Enhance
- Fusion Blend
- Color Balance

- RG/RGB Blend (optomap)
- Green Tint (optomap)
- Pan

### Keyboard Shortcut

The corresponding shortcut is **Reset Current Interaction**.

### Hanging Protocols



Use hanging protocols to customize the image viewing area.

### Study Layout



Use study layouts to customize the image viewing area (see **Arrange images**).

### View



Use views to customize the image viewing area (see **Arrange images**).

### Rendering



Select the rendering mode for the study. Options are MIP (maximum intensity projection), volume rendering and average.

#### Note

Use **presets** (side panel) to apply common rendering settings.

### Reference



Show or hide reference lines.

#### Note

Use **Relate** to change the position of the reference lines.

#### Thickness



Use the arrows to increase or decrease the plane thickness.

#### Clipper



Clippers are used to selectively remove portions of a study from a 3D rendering. This is generally used to expose a part of anatomy or a pathology. Several types of clippers are available: Plane, Box, Ellipsoid and Cylinder.

To use the clipper, select **View Tools** (side panel).

- **Plane** Front plane clipper. Click (or tap) on an image to enable the clipper. Drag to push the plane in and out.
- **Box** Rectangular clipper. Click (or tap) on an image to enable the clipper. Drag a handle on the corner of the box to change the box size. Drag the center of the box to move it.



- **Ellipsoid, Cylinder** Elliptical or cylindrical clipper. Click (or tap) on an image to enable the clipper. Drag the center of the shape to move it.
- **Clear** Remove all clipping from the image.
- **Reset** Reset the currently selected clipper to the default settings.
- **Pin, Unpin** Lock or unlock the clipping changes that have been made to an image. This allows you to retain the current clipping while working with an image (rotating, zooming, etc.). Further clipping cannot be performed until the image is unpinned. Pin is not available for the Plane clipper.

**Note**

You can perform other actions, such as rotating the image, while using a clipper. You can also save a clipped image as a bookmarked image (see [Share bookmarked images](#)).

**Curved MPR**

Curved MPR allows you to define a curve in the volumetric dataset and then view an image along this curve. This is useful for viewing structures such as blood vessels or the spine.

1. Select **View**.
2. Under **MPR Views**, select **Curved**. Three MPR views are shown on the left and a blank viewport is shown on the right.



3. Select **View Tools** (side panel). The curved reformat tools are shown.

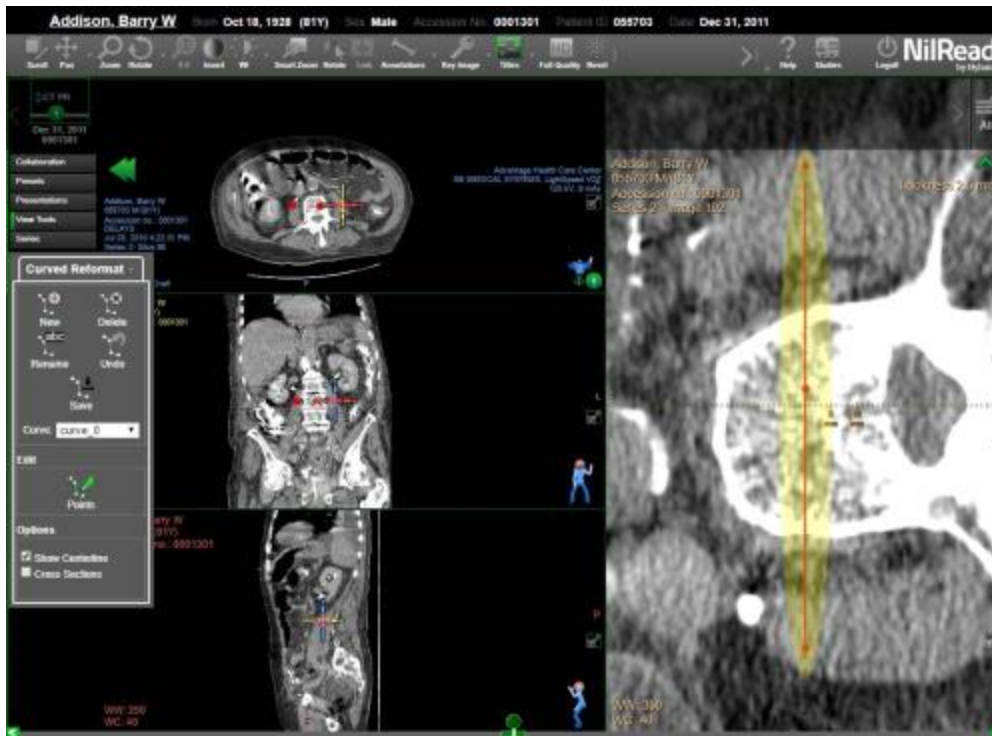


### Create a curved reformat

1. Select **New**.
2. Click (or tap) to add points to the curve reformat. Once you have added at least two points, the curved reformat view is shown in the viewport on the right.  
For MPR images, points are shown as filled circles if the corresponding point is visible in the current MPR or curvilinear view.  
On planar slabs, points are shown as filled circles (when the point is on the reformat plane), **^** (when there is a control point on a plane located closer to the current view) or **v** (when there is a control point on a plane located further away from the current view). The centerline is not displayed on planar slabs.
3. To set the focus point, right-click a seed, then select **Focus to this Seed**.
4. When done adding points, select **Save**. The curved reformat will be saved in the local database and will be available when the study is reloaded.

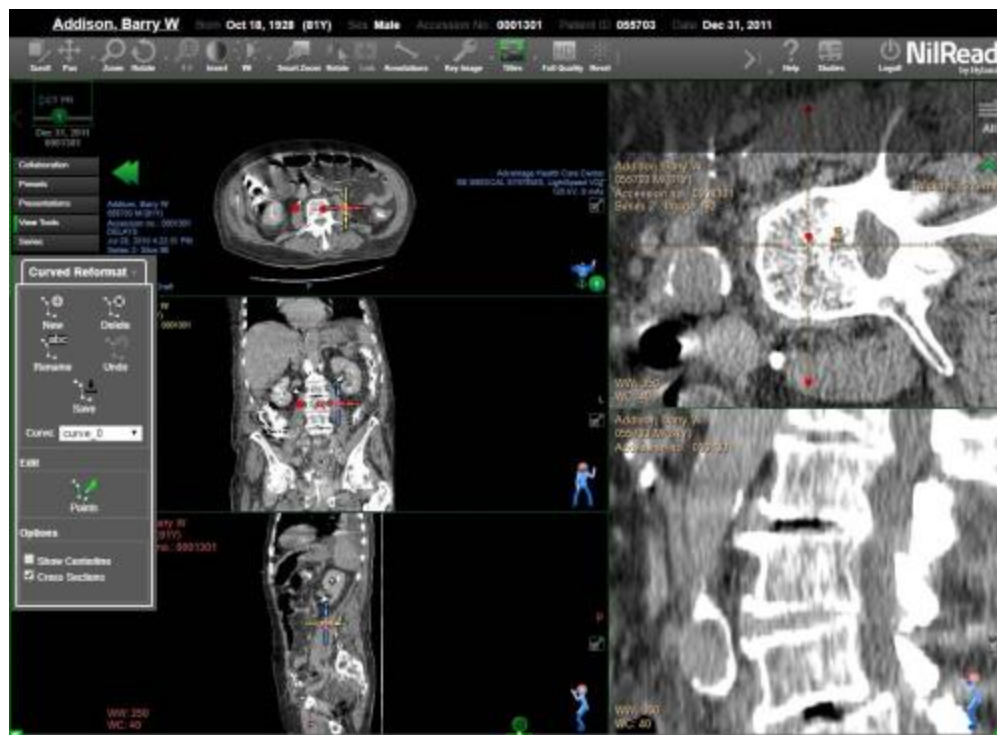
### Show Centerline

Applies to the curved reformat view (right viewport). Select this option to view a polyline connecting all of the points created for the reformat.



## Cross Sections

Select this option to view a cross-sectional reformatted view perpendicular to the centerline through the focus location. The cross-section is shown in the bottom-right viewport and is a reformat along the plane shown in the top-right viewport.



### Edit a curved reformat

1. In the **Edit** area, select **Points**.
2. To edit a point, click (or tap) on the point, then drag the point to a new location. Select **Undo** to remove the last action you performed.
3. To move through the points, right-click a point, then select **Previous Seed Point** or **Next Seed Point**.
4. To delete a point, right-click the point, then select **Delete Seed Point**.

### Rename a curved reformat

1. Select a curved reformat from the **Curve** list.
2. Select **Rename**. Enter a new name, then select **OK**.

### View a saved curved reformat

To view a different curved reformat, select a curved reformat from the **Curve** list.

### Delete a curved reformat

1. Select a curved reformat from the **Curve** list.
2. Select **Delete**. The curved reformat will be deleted from the local database.

### Segment



Available for 3D views. Use to view and edit tissues.


#### Note

Changes made with the Segment tool are not saved when you close the study. However you can save a static screenshot using a secondary capture image (see [Share secondary capture images](#)).

To view a tissue:

1. Select a 3D view.
2. Select **Tissue** (side panel). The Tissue panel contains part segmentation results by tissue.
3. Select a tissue from the panel. You can select multiple tissues to view simultaneously.

To edit a tissue:

1. In the Tissue panel, select  beside a tissue, then select **Segment**.  
The **Current Tissue** area shows the tissue you are currently editing. This area also contains rendering presets you can apply to the tissue.
2. You can use the **Segmentation** tool to edit the tissue. See the following section for details.
3. Select **Undo** to undo the last change made to the tissue.
4. Select **Reset** to remove all changes made to the tissue.

#### Note

If you do not select a tissue, any changes you make with the Segment tool will be saved as a new

tissue. You can also create a new tissue based on an existing tissue. If you edit an existing tissue then deselect the tissue in the Tissue panel, the edited tissue will be added as a new tissue. You can only create one new tissue.

### Segmentation Tools (Available on MPR viewports)

These tools select an area in close proximity to the tissue you select, then grow or shrink this area.

1. Select the type of tissue (**Tissue**, **Nodule**, **Lesion**, or **Vessel**).
2. To select an area, use of the following tools:



Hover over the area, then click (or tap) to select the area.



Drag to select the area. The tool will apply color to the area identified as part of the tissue.

#### NM Map



Assign a color map to nuclear medicine images.

#### Fusion Map



Assign a color map to fusion images.

#### Fusion Blend



Adjust the fusion blend level.

#### Cine



View the images in a study as a “movie”. Use the Cine controls to:

- **Run** Play the cine.
- **Sync Run** Synchronized play of all viewports.
- **Pause** Pause the cine.
- **Speed** Change the desired playback speed. The actual playback speed is shown while the cine is playing.
- **Range** Select the range of images from the series to include in the cine, based on the current image. For example, selecting 40 will include the 20 images before the current image and the 20 images after the current image. You can also choose to include all images in the series.
- **Replay/Yoyo/Next** Replay the cine continuously, yoyo (play forwards then backwards), or select **Next** to autoplay multiple cine runs (when the current cine run is finished, the next cine run will begin automatically).

**Important**

Users should pay attention to the screen while the cine is playing automatically.

**Note**

Cine **Replay/Yoyo/Next** settings can be specified in hanging protocols.

### RT Template



Apply a radiation therapy (RT) template to a study.

[First](#), [Previous](#), [Next](#), [Last](#)



Scroll through the series in a study.

### Use the image viewing area

#### Arrange images

When you open a study, the study is shown in the NilRead Patient Portal image viewing area. You can change the layout of the image viewing area using study layouts and views.



- **Study Layout** Apply a study layout to the image viewing area. This divides the area into multiple “screens”. You can drag a different series into each screen, allowing you to view multiple series simultaneously.
- **View** Apply a view to a screen. A view is a predefined viewport arrangement specific to a clinical scenario. Some views display a single viewport while others display multiple viewports, each with a different type of visualization. You can apply different views to each screen or apply the same view to all screens.

For common uses of layouts and views, see [Sample layouts and views](#).

### **Apply a study layout to the image viewing area**

1. Select **Study Layout** (toolbar).
2. Select a study layout. The study layout is applied, dividing the image viewing area into multiple screens.

### **Apply a view to a screen**

1. Click (or tap) a screen, then select **View** (toolbar).
2. To apply the same view to all screens, select **Apply View Mode to Whole Screen**.
3. Select a view. The view is applied to the selected screen (or all screens).

You can drag a different series into each viewport. You can also drag a study from the patient timeline into a viewport.

[Sample layouts and views](#)

The following examples show common ways to arrange images using study layouts and views. Available views depend on your NilRead Patient Portal implementation.

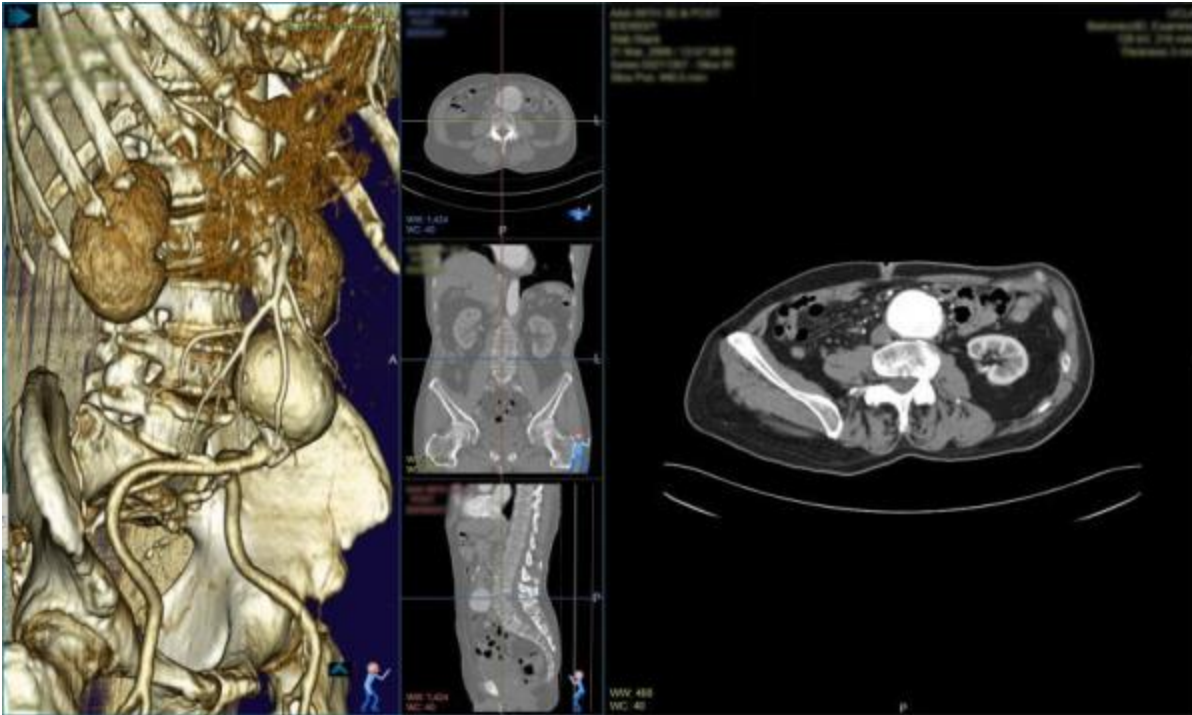
### **1x2 layout**

The following example shows a 1x2 study layout. This creates two side-by-side screens with a different series in each screen.



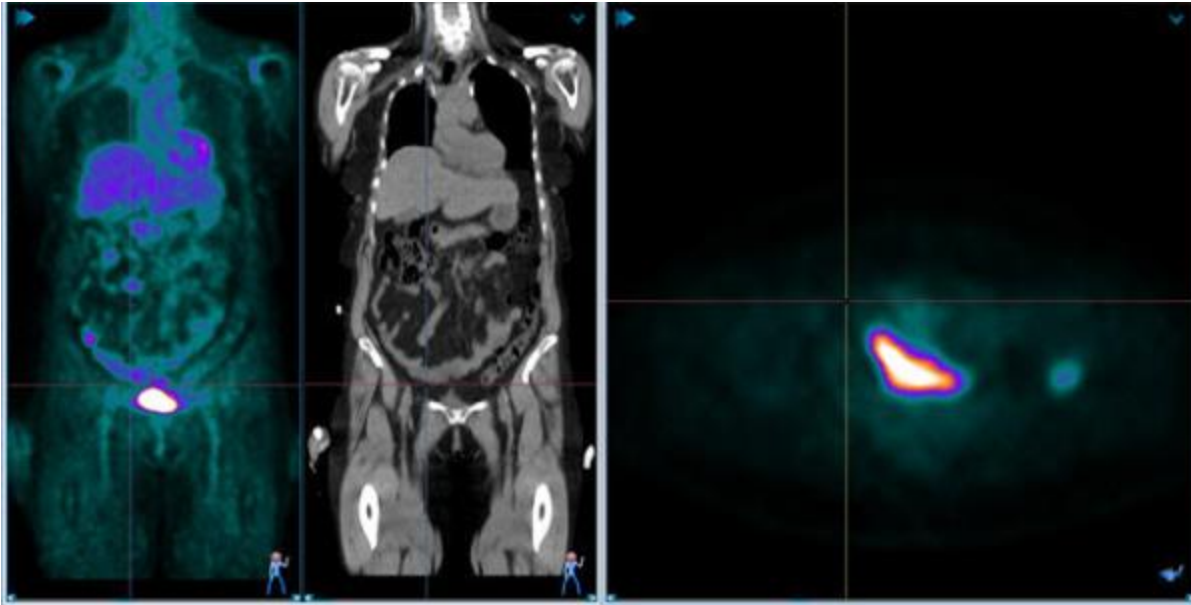
**Multiple viewports**

When a view is applied to a screen, the screen may be divided into multiple viewports. In the following example, the MPR 3D view has been applied to the first screen, dividing the screen into four viewports. Note that a different view (or the same view) could also be applied to the second screen.



## Multiple monitors

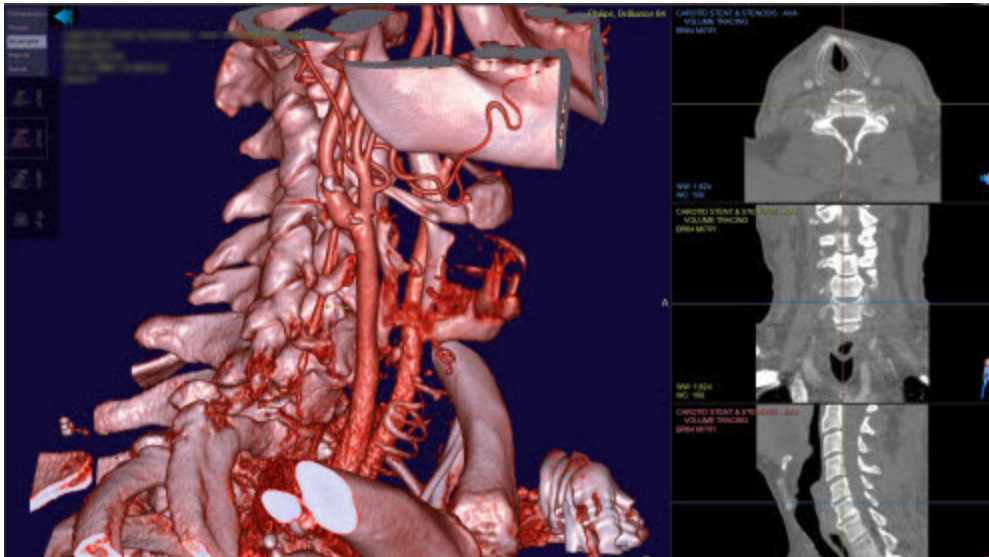
Each monitor can have its own study layout. In the following example, the first monitor displays two coronal MPR views and the second monitor displays an axial MPR.



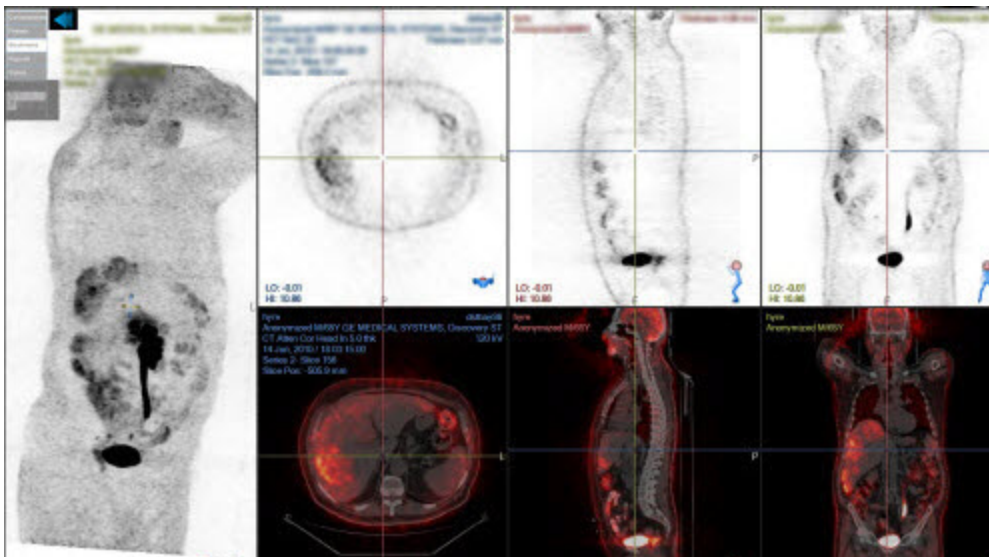
## Side-by-side series comparison (study layout)



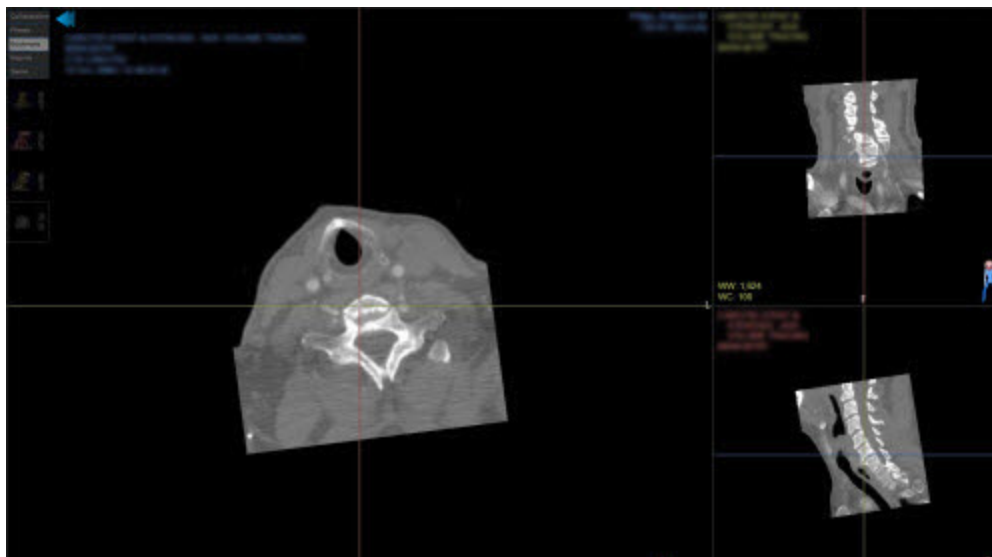
3D view



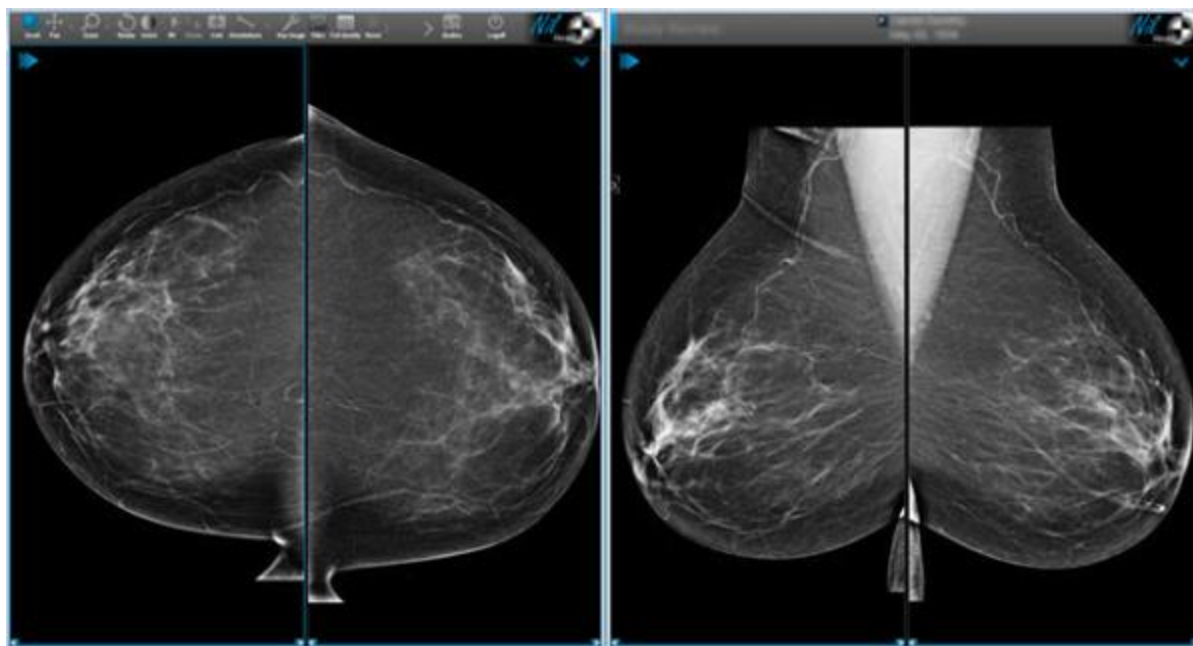
PET-C fusion view



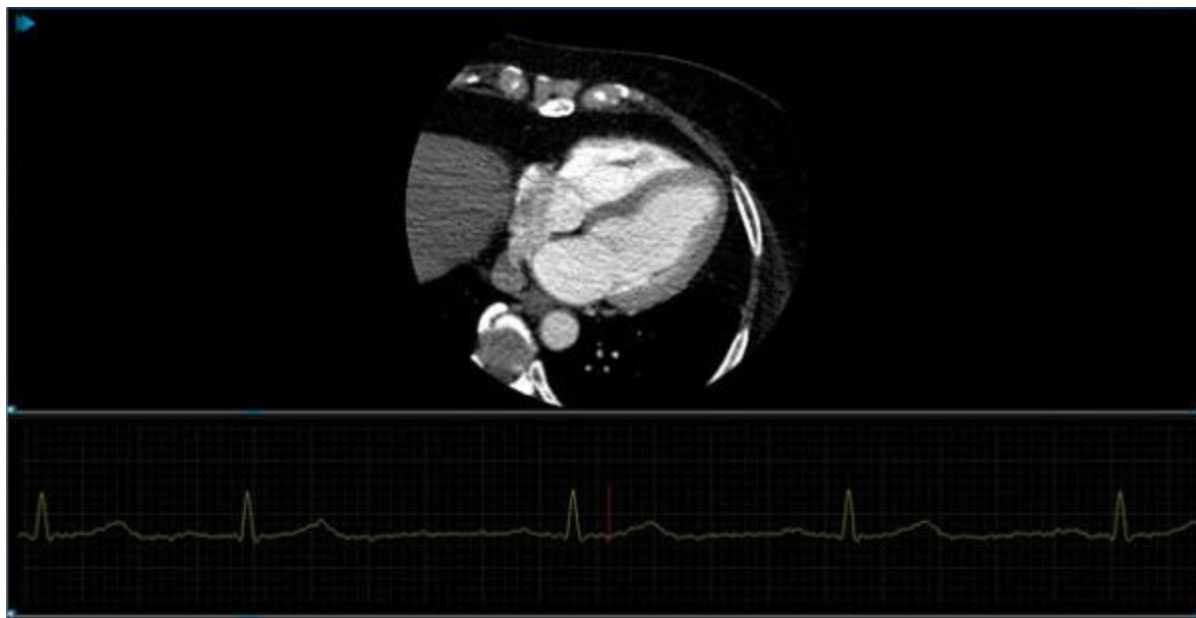
**Slab view**



**Multi-monitor auto-aligned mammography hanging protocol**



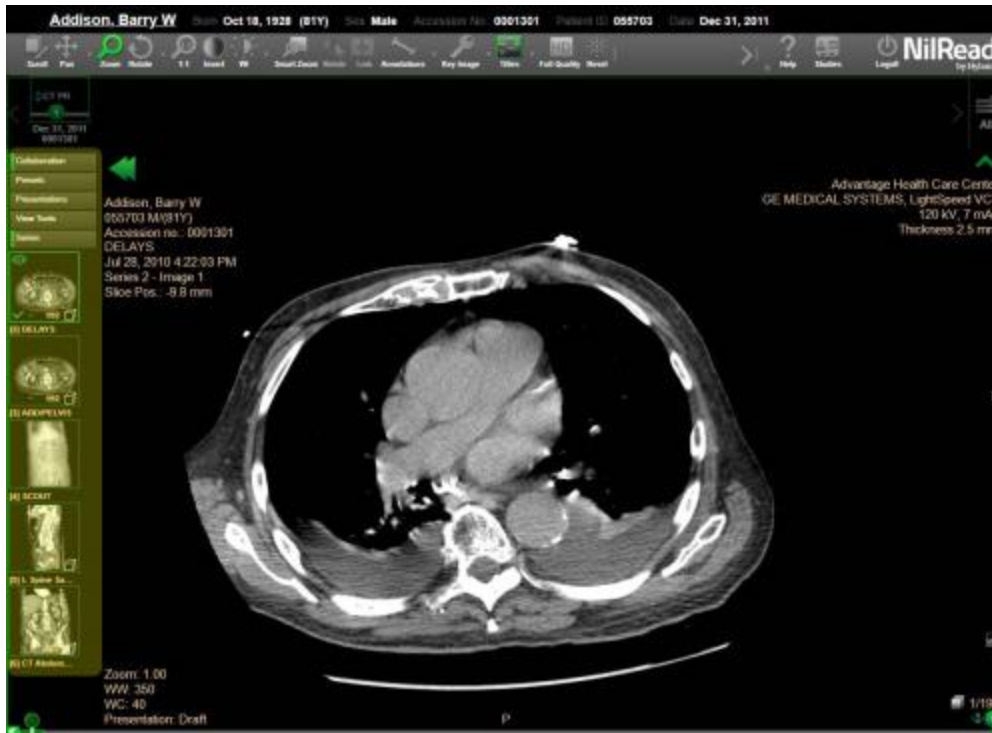
**Non-symmetric 2x1-1/3 study layout with ECG view**



[View the side panel](#)



The side panel provides quick access to NilRead Patient Portal features such as presentations and bookmarks. You also use the side panel to select a series.



Use the arrows to hide or view the side panel.




Select a series

You can view multiple series by dragging series into different viewports.

#### Note

For details on enabling multiple viewports, see [Arrange images](#).

1. Select **Series** (side panel). The series in the study are shown below the side panel. A filmstrip icon  is shown on series with a multiframe cine sequence.
2. Hover over a series thumbnail for information (series ID, image count, date, modality, description).





3. Select a series thumbnail to load the series in the viewer. The series is opened in all viewports.  
or

Drag a series into a viewport.

#### Use full screen view

You can view an image using the full screen. This hides the toolbar, side panel and other viewports. While in full screen, right-click (or touch and hold) the image to view a list of tools. You can also use keyboard shortcuts to select tools.

1. Select  on a viewport to display the image in full screen view.
2. Select  again to restore the original viewport layout.

#### Maximize a viewport

Double-click (or double-tap) a viewport to maximize it and hide other viewports. The toolbar and side panel are still available while the viewport is maximized. This can be useful for mobile devices with smaller screens. Double-click (or double-tap) again to restore the original viewport layout.

#### Use reference lines

Reference lines are shown on all series on the current screen that are in the same frame of reference. The intersection of the reference lines represents the corresponding position in all viewports.

#### View image details





Details about the study, series and image are shown on an image. The details shown depend on the view mode and image modality. You can hide this information by turning off the image titles (for details, see [Titles](#)).

## 2D Images

Modality	Top-Left	Top-Right	Bottom-Left
CT	Patient Name Patient Details Series Description Date and Time Series Number Slice Location Key Image Flag	Hospital Name Equipment Name Voltage And Amperage Slice Thickness Reconstruction Diameter	Window Center Window Width

### View image orientation

Applies to MPR and volume viewports. Each viewport contains information regarding the image orientation. The figure in the bottom-right corner of an image represents the image orientation:

	<b>Axial</b> Figure standing on head (feet up)
	<b>Sagittal</b> Figure standing sideways
	<b>Coronal</b> Figure facing forward
	Select the arrow above the orientation figure to change the cardinal orientation or flip the image 180 degrees.

The orientation is also indicated by the letters to the right of and below the image:

**F** foot

**H** head

**P** posterior

**A** anterior

**L** left

**R** right

[View study information](#)

While viewing an image, you can view details about the study.

1. Right-click (or touch and hold) a viewport, then select **View study info**. The study information appears in a new window.
2. Select **OK** to close the window.

## Manage studies

[Download studies, series or images](#)

You can download a copy of a patient study, series, or image.

1. In the Patient Study Directory, right-click (or touch and hold) a study, then select **Download Study**.  
or  
While viewing a study, right-click (or touch and hold) an image, then select **Download**.
2. You can select the following options.
  - **Download encapsulated documents in the original file format** Download non-DICOM files in their original format.
  - **Download as DICOM CD** Download an ISO CD image containing the studies and a DicomDir file which you can view with a DICOM viewer. You can burn this image to CD using standard CD burning software. You can also mount the CD image (for example, as a virtual clone drive) which allows you to view the files without creating a CD. Depending on your NilRead Patient Portal configuration, the CD image may also contain a DICOM viewer.

- **Create DicomDir file** Create a catalog of the downloaded studies to be used with a DICOM viewer.
- **Deidentify** Anonymize the study. Select a confidentiality profile (for more information, see **About anonymization**).

### 3. Select **Download**.

#### Export images

You can export a screenshot of the patient study currently loaded in the image viewing area. The screenshot can include one or all viewports and is saved as an image (JPG).

1. (Optional) If you want to export a screenshot of a single viewport, click (or tap) the viewport to select it.
2. Select **Save**, then select **Export** (toolbar).
3. Select the following options for the screenshot:
  - **Save: Viewport/Display** Create a screenshot of the selected viewport (**Viewport**) or all viewports (**Display**).
  - **Titles: Show/Hide** Include (**Show**) or exclude (**Hide**) the information shown on the image (patient name, series number, and so on).
4. Enter a filename in the **Save as** field in the bottom-left of the screen.
5. Select **Download**.
6. When done, select **Close**.

#### Print images

You can print the patient study currently loaded in the image viewing area. You can print one or all viewports.

1. (Optional) If you want to print a single viewport, click (or tap) the viewport to select it.
2. Select **Print** (toolbar).
3. Select the following options for the screenshot:
  - **Save: Viewport/Display** Print the selected viewport (**Viewport**) or all viewports (**Display**).
  - **Titles: Show/Hide** Include (**Show**) or exclude (**Hide**) the information shown on the image (patient name, series number, and so on).

4. Select **Print**.

or

To use a DICOM printer, select **DICOM Print**. Select a printer and the page layout options, then select **OK**.

**Note**

You must first configure a DICOM printer to use with NilRead Patient Portal.

5. When done, select **Close**.

[View reports](#)

If one or more reports exist for a patient study, a folder icon is shown in the study's Status column in the Patient Study Directory. Reports can be DICOM structured reports or can be provided through DICOM Detached Interpretation. NilRead Patient Portal also supports custom HL7 integration for obtaining reports from a RIS/HIS system.

**Note**

You can also access DICOM embedded PDF reports through the patient timeline when viewing a patient study.

1. (Optional) In the blank row at the top of the Patient Study Directory, select an option in the **Status** column.
  - **All** Show all patient studies.
  - **Available** Show patient studies containing at least one report.
  - **Approved** Show patient studies containing at least one approved report.
  - **Not Available** Show patient studies with no reports.
2. To view the reports for a study, select the folder icon beside the patient name. The reports in the study appear to the right of the directory. If the study contains multiple reports, use the **Previous** and **Next** arrows in the report area to scroll through the reports.
3. The following options are available when viewing reports:
  - **Delete** Delete the report.
  - **Save** Save a PDF copy of the report.

- **Print Report** Print the report from your browser.
- **Vert/Horiz** Place the report area on the right side (**Vert**) or bottom (**Horiz**) of the screen.
- **Maximize/Restore** View the report area only and hide the directory (**Maximize**) or view both the report area and the directory (**Restore**).
- **Close** Close the report.

**Note**

To resize the directory and report areas, drag the divider between the two areas.

## Review ECG studies

### About ECG paper

ECG graphs are presented on standard ECG paper. ECG paper speed is usually 25 mm/second.

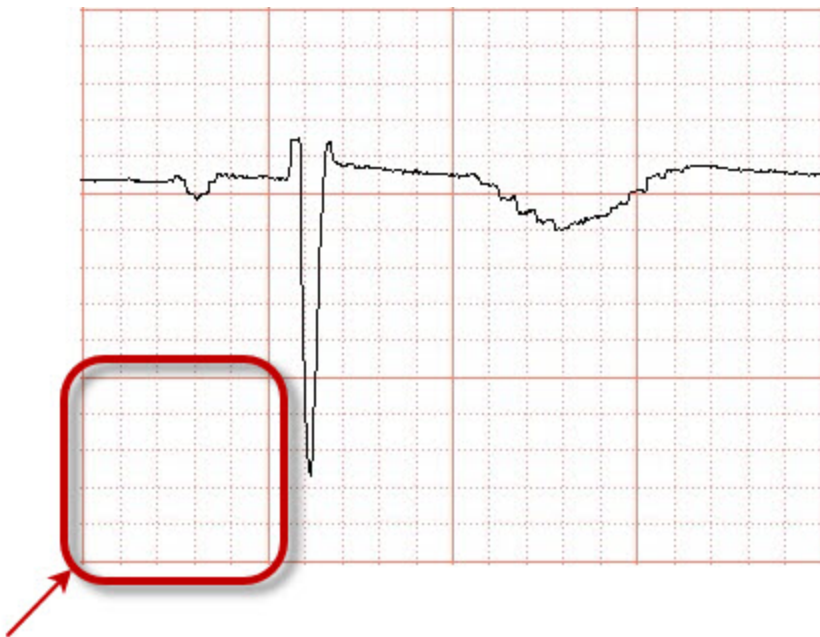
If you zoom in on a graph, you can see that the paper is divided into small boxes. Each box represents a 1 mm interval or 0.04 seconds (40 ms).



A group of 5 horizontal boxes, bordered by a thick line, represents a 5 mm interval or 0.2 seconds (200 ms).



A group of 25 boxes, bordered by a thick line, represents a 25 mm interval or 1 second.

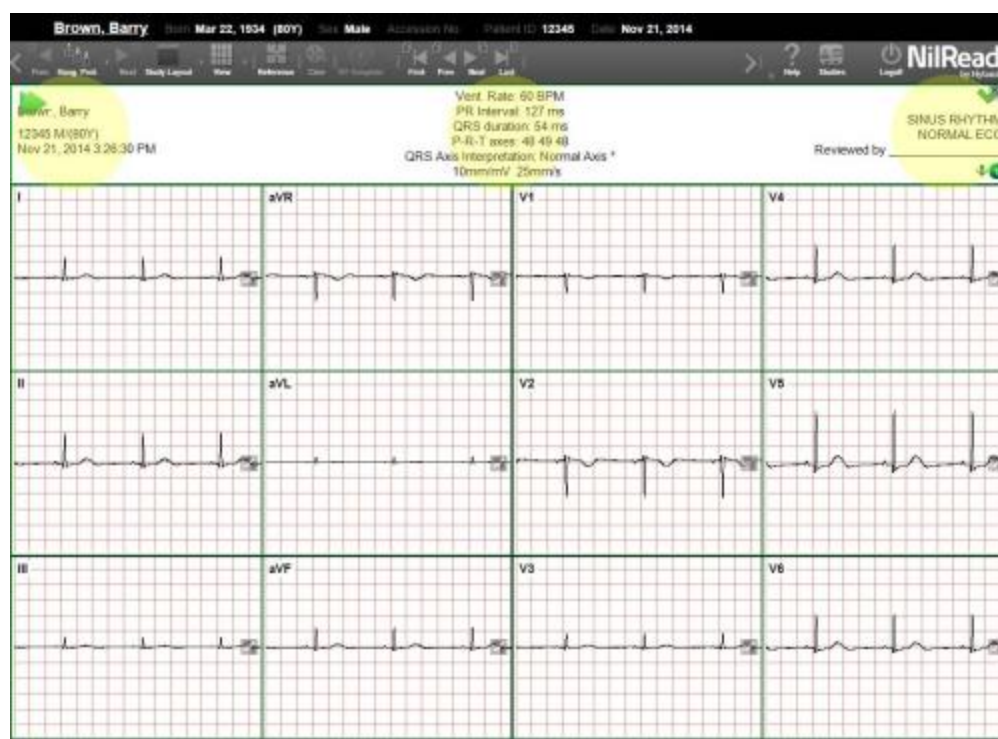


Use ECG views

NilRead Patient Portal provides several views that can be used to review 12-lead electrocardiogram (ECG) images.



1. Open an ECG study.
2. (Optional) In the **View** menu, select the ECG leads you want to view.
3. In the **View** menu, select an **ECG View**. You can choose from standard views such as Rhythm and 3x4.

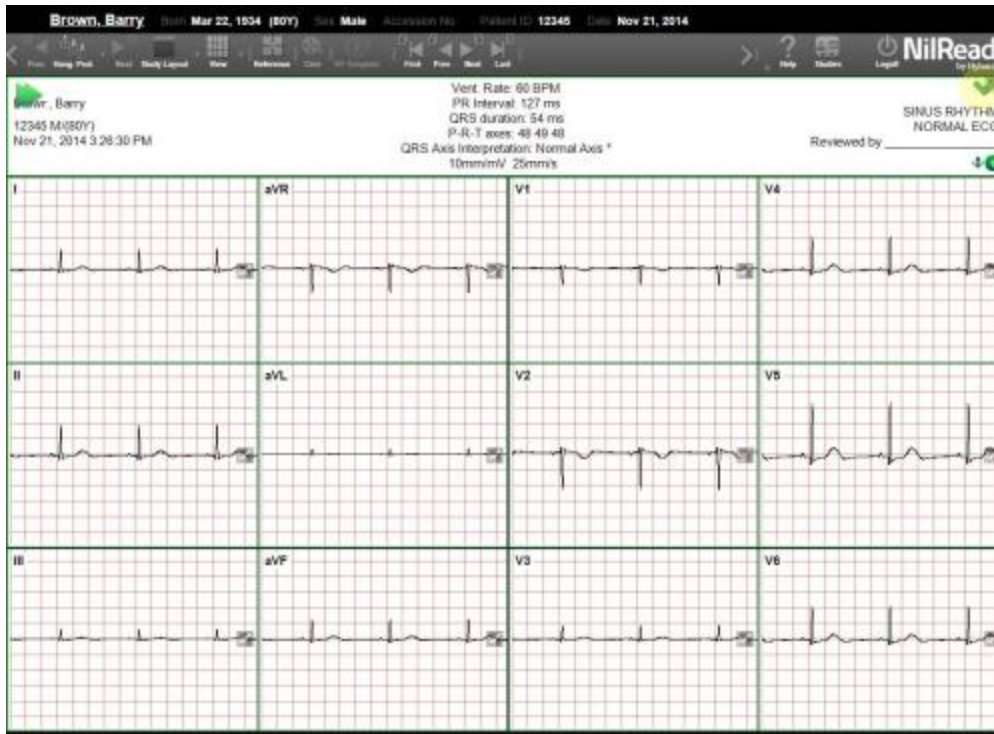
The following information is shown in the information bar above the image.



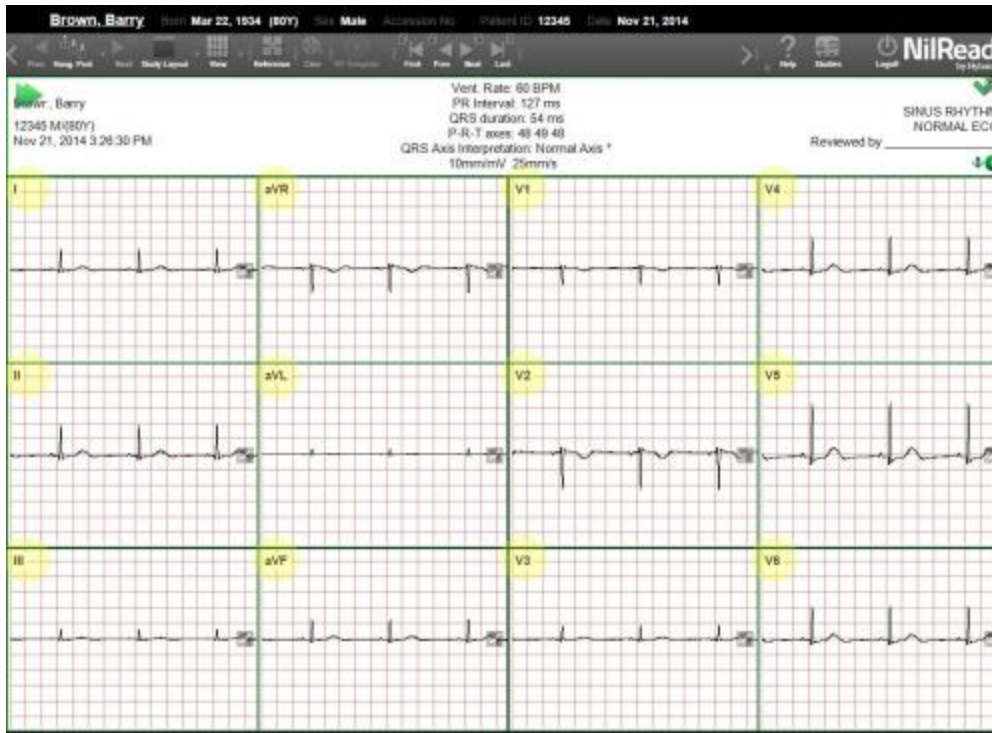
- Patient demographics (patient name, study date, etc.) are shown in the top-left corner.
- Metrics (ventricle rate, PR interval, etc.) are shown in the center. These metrics are taken from the study's DICOM attributes, with the exception of QRS Axis Interpretation, which is calculated by NilRead Patient Portal. For details, see [Understanding QRS Axis Interpretation](#).
- Any comments are shown in the top-right corner.



To expand the information bar, double-click the bar or click  in the top-right corner. To return the information bar to its original size, double-click the bar again or click .



The lead name is shown in the top-left corner of each graph.



### Understanding QRS Axis Interpretation

The QRS axis interpretation is calculated using the "Three Lead Analysis (Lead I, Lead II and aVF)" method of ECG axis interpretation. Using this method, the QRS axis is determined to be normal, LAD Physiological, LAD Pathological, RAD, Extreme Axis, or Indeterminate.

The following table summarizes how the QRS axis is calculated.

	Normal Axis 0 to +90°	LAD Physiological I 0 to -30°	LAD Pathological -30° to -90°	RAD 90° to 180°	Extreme Axis -90° to -180°	Indeterminate ?
<b>LEAD I</b>	POSITIVE	POSITIVE	POSITIVE	NEGATIVE	NEGATIVE	EQUIPHASIC
<b>LEAD II</b>	POSITIVE	EQUIPHASIC	NEGATIVE	POSITIVE	NEGATIVE	EQUIPHASIC
<b>LEAD III or aVF</b>	POSITIVE	NEGATIVE	NEGATIVE	POSITIVE	NEGATIVE	EQUIPHASIC

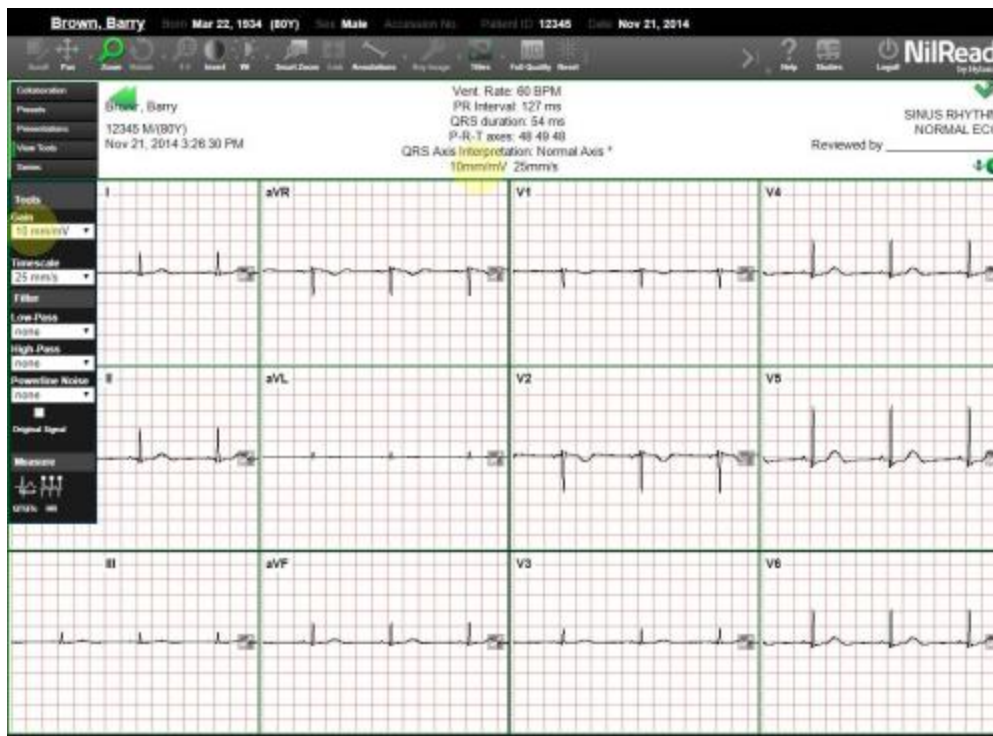
[Use the ECG view tools](#)

NilRead Patient Portal provides several tools that can be used to adjust the visualization of ECG images. To access these tools, select **View Tools** (side panel).

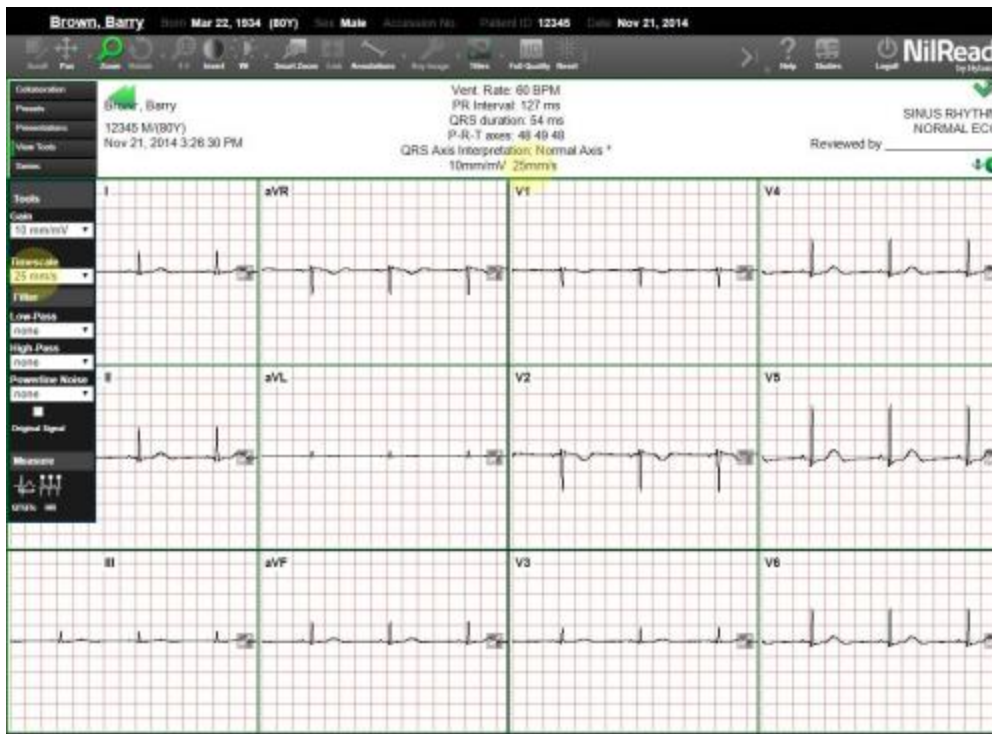
### Gain and Timescale

You can adjust the gain and timescale for the graph to better define the waveforms.

Use **Gain** to change the height (amplitude) shown on the vertical axis. The current **Gain** value is shown in the center of the information bar. (Standard calibration for an ECG is 10mm/mV.)



Use **Timescale** to adjust the timescale shown on the horizontal axis. The current **Timescale** value is shown in the center of the information bar. (Standard timescale for an ECG is 25 mm/s.)

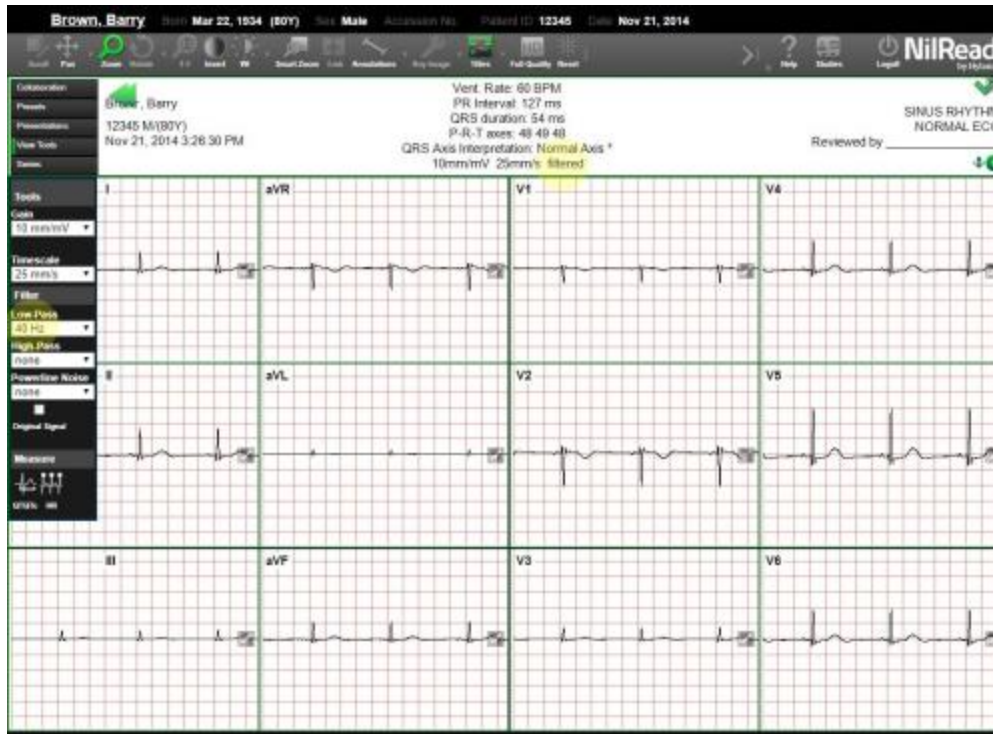


## Filter

Use **Filter** to remove unwanted artifacts and noise from the ECG recording. You can use the following filters:

- **Low-Pass** Remove high frequency interference.
- **High-Pass** Remove lower frequency interference.
- **Powerline Noise** Remove powerline interference. Powerline interference may result from factors such as electromagnetic interference by power lines or nearby machinery.
- **Original Signal** Show the original signal and the filtered signal at the same time.

If a filter is applied, this is stated in the center of the information bar.



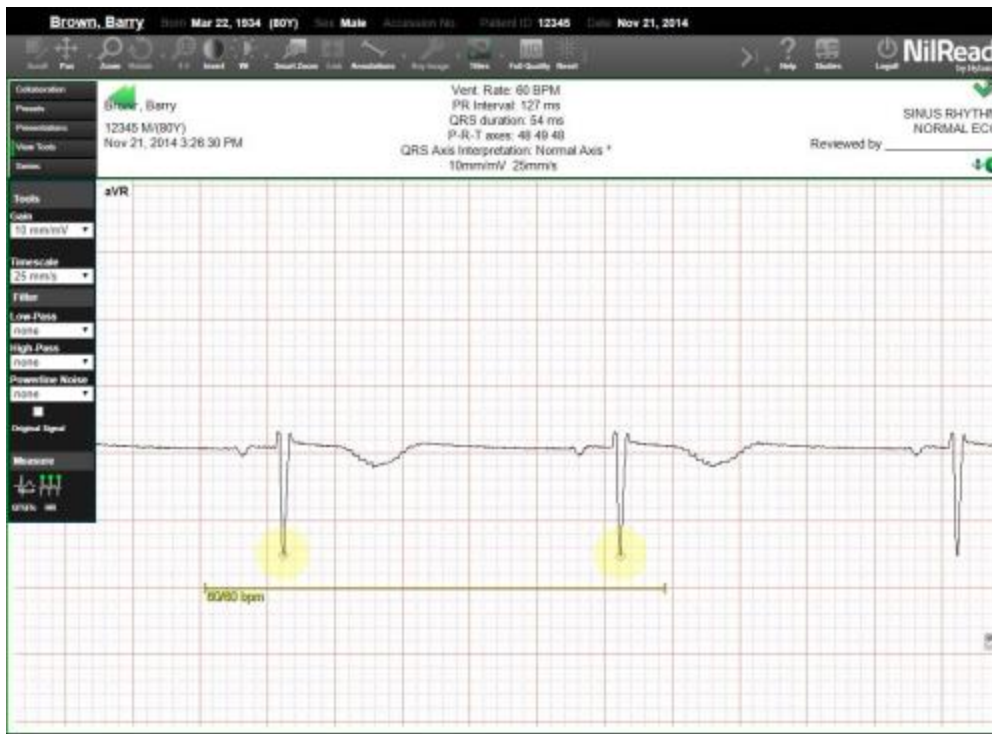
## HR

Use the **HR** tool to calculate the number of heart beats per minute (bpm) between two points on a graph.

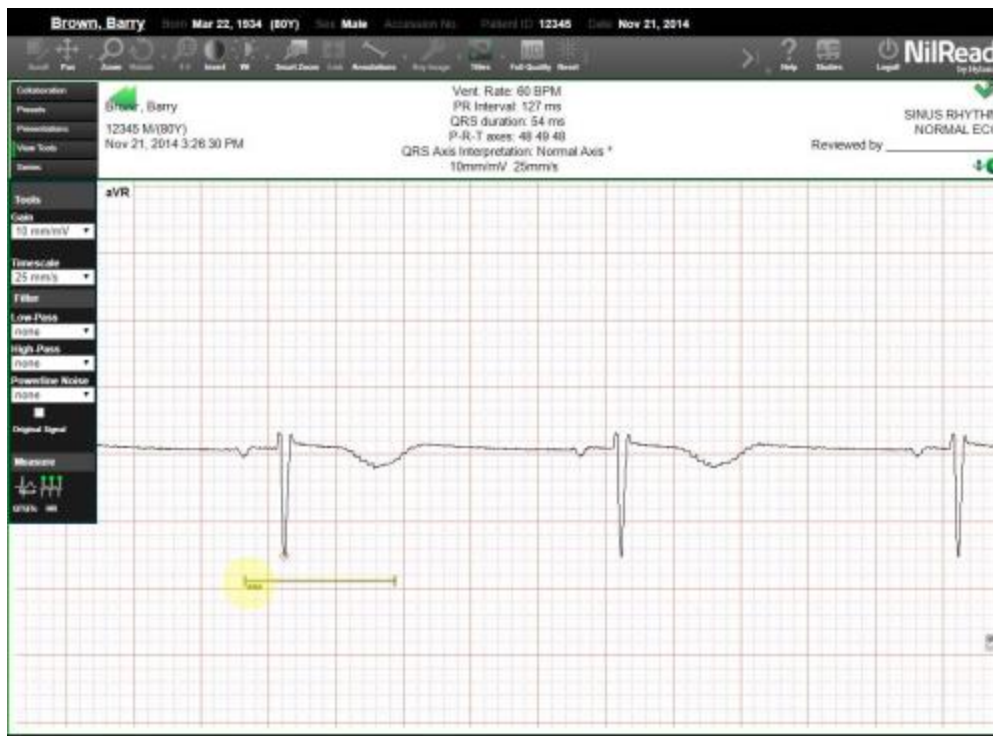
Click (or tap) and drag to create a line. After the line is drawn, the bpm is calculated and displayed. This calculation is based on the wave peaks included in the interval covered by the line. The peaks included in the calculation are circled.



The first number in the calculation represents the number of heart beats in the interval covered by the line. The second number represents the number of heart beats for the entire signal. A regular heartbeat will have the same values for the interval time and total time (for example: 80/80). An irregular heartbeat will have different values.



At least two peaks are required to calculate the heart rate for an interval. If less than two peaks are included in the interval, \*\*\* will be shown, indicating that the heart rate could not be calculated.



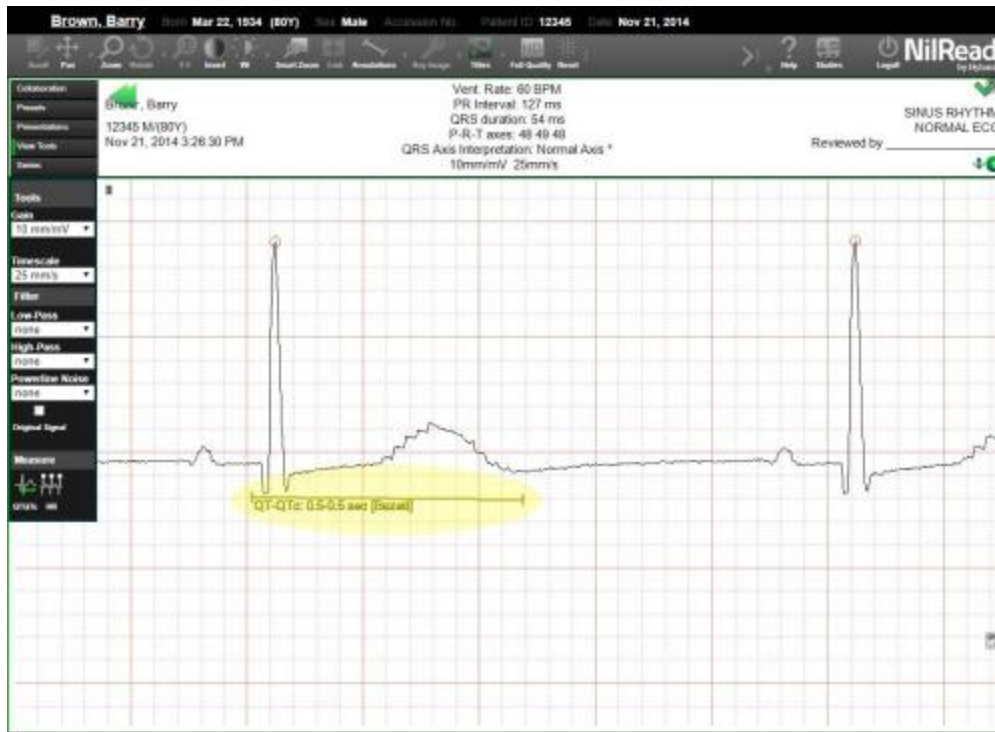
To delete a line, right-click the line, then select **Delete**.

### QTQTc

Use the QTQTc tool to measure the QT interval. NilRead Patient Portal also calculates the corrected QT interval (QTc). The QTc is calculated based on Bazett's formula.

1. Using lead II or V5-6, draw a line from the start of the Q wave to the end of the T wave. The QT and QTc are shown.





2. The two R peaks in the QT interval are circled. The first R peak is between the Q and P waves. The second R peak is used as a reference point.



If the line does not cover the required to calculate the QT interval, \*\*\* will be shown, indicating that the QT and QTc could not be calculated.

To delete a line, right-click the line, then select **Delete**.

### Annotation Tools

There are some differences in how measurements are shown when using regular annotation tools with ECG images.

### Linear and Area Measurements

For linear measurement tools (such as the ruler) and area measurement tools (such as the rectangle), horizontal measurements are shown in seconds and vertical measurements are shown in mV.

### Angle

The measurement for an angle shows the time and signal value between the two points.

[Change ECG preferences](#)

You can change the zoom tool behaviour and the image viewer color scheme for ECG images.

**Note**

If you access **Settings** while viewing a study, select **Back to Viewer** to return to the image viewing area.

1. Select **Settings**.
2. Under **Preferences**, select **Modality Preferences**.
3. Enter the following information, then select **Save**.

**Modality**

Select **ECG**.

**Zoom Policy**

Determines the zoom behavior.

- **Zoom at center** Zoom in or out from the center of the image.
- **Relative zoom at mouse position** Zoom in or out from the mouse position.

**ECG Color Scheme**

Select the color scheme to use when viewing ECG images (**Dark** or **Traditional**).

## Referential pathology studies

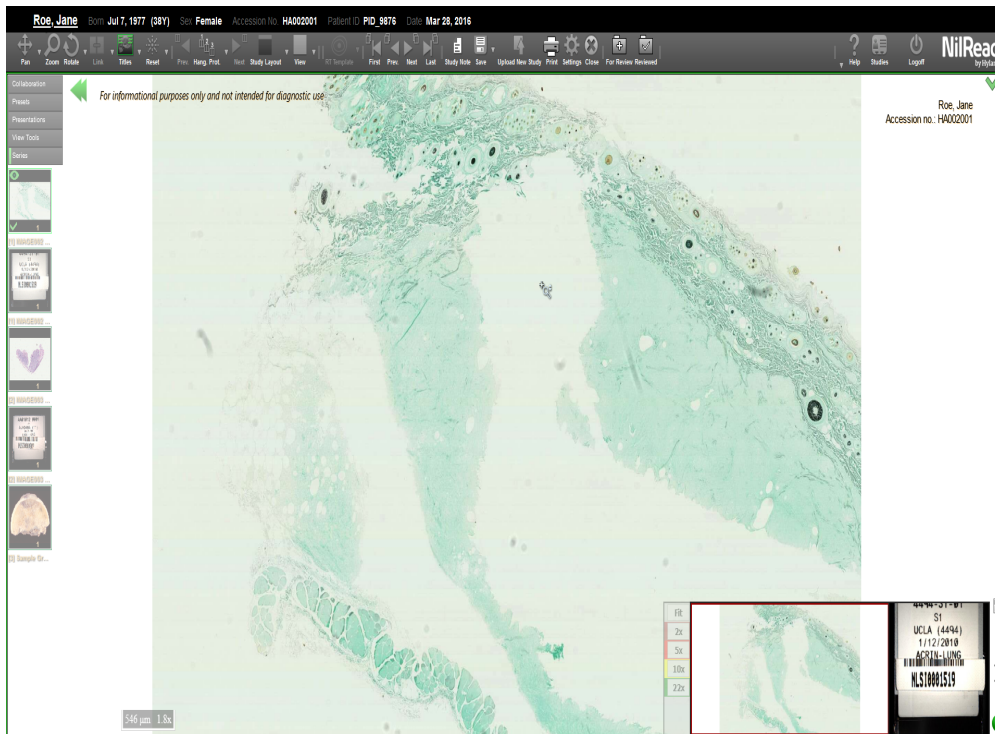
[View referential pathology studies](#)

Referential pathology studies automatically open in a specialized viewer. The viewer has a simplified layout to allow you to focus on the referential pathology workflow.

**Note**

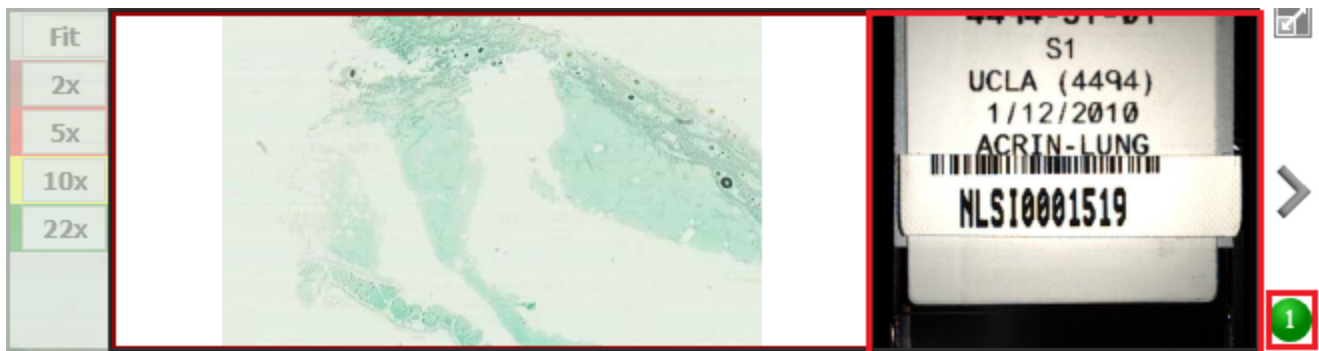
This functionality is only available if the *referentialPathology* license is present.

The viewer offers most of the typical tools available for the other modalities.

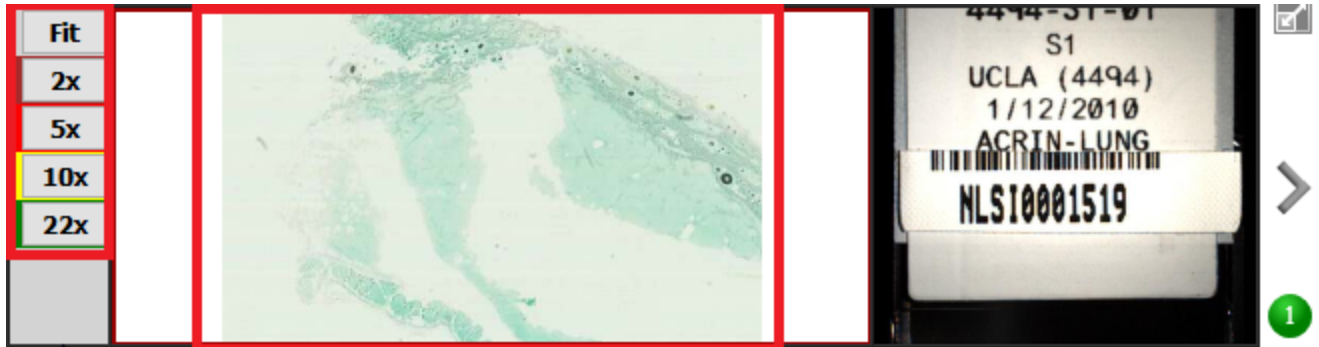


In addition, the viewer provides the following functionality:

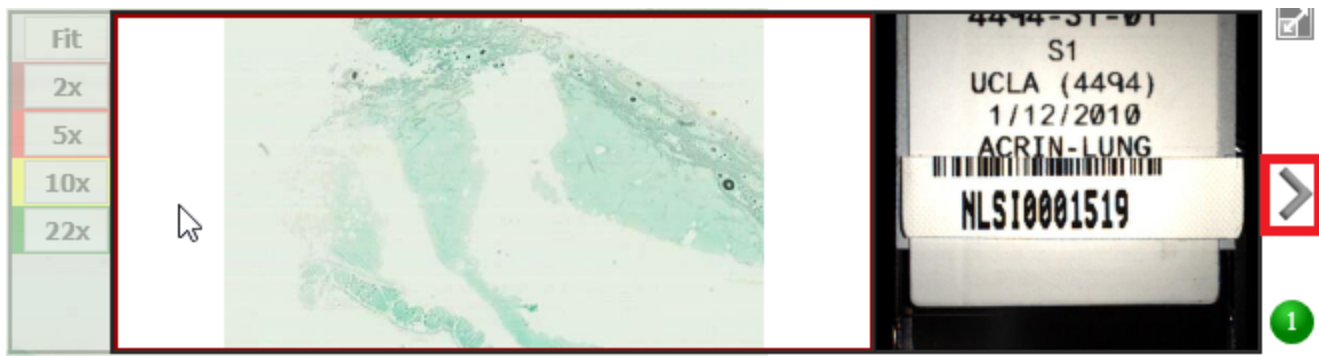
- The slide label is shown on the bottom-right corner of the image. The number of samples in the study is shown to the right of the slide label.



- Magnification options and a navigation map are shown to the left of the slide label.



- You can also hide the slide label, magnification options and navigation map using the arrow in the bottom-right corner.



### Use the navigation map and magnification options

The red rectangle in the navigation map indicates the area of the image currently shown in the view-port.



- To focus on a point of interest, click (or tap) in the navigation map with a regular or 3D mouse. You can also use the arrow keys on your keyboard to select an area. The image is repositioned in the viewer to focus on the selected area.
- To change the magnification for the image, select a magnification factor beside the navigation map. You can also use a 3D mouse to change the magnification. Select **Fit** to fit the entire sample in the image viewer.
- The navigation map is updated when you change the magnification or use tools such as pan and rotate.

The following example shows a sample with a 10x magnification factor applied. The Caliper tool on the bottom-left of the image shows the current magnification factor. You can move the Caliper to a different position on the screen. Double-click (or touch and hold) the Caliper to return it to its original position.



## Left Ventricle Ejection Fraction (LVEF)

The Left Ventricle Ejection Fraction (LVEF) function is used to estimate the volume of blood pumped out by the left ventricle of the heart.

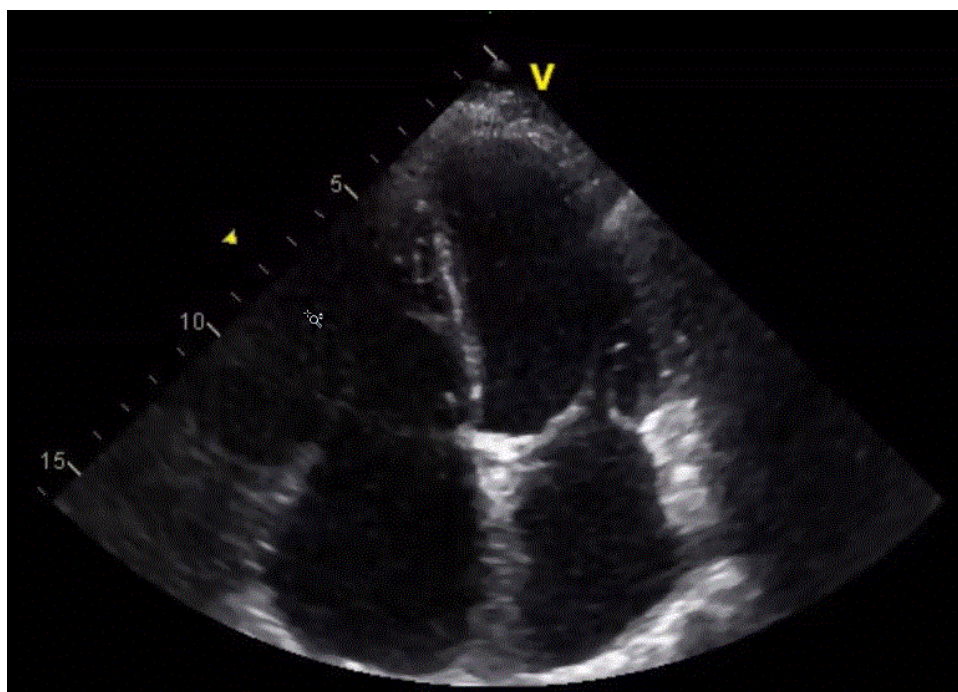
The LVEF measurement is based on estimation of the volume of left ventricle at two different states: End Diastole (when the left ventricle is at its maximum volume) and End Systole (when the left ventricle is at its minimum volume). The volume of the left ventricle is estimated using the Simpson method on cardiac ultrasound images in Apical 4 Chamber (A4C) and Apical 2 Chamber (A2C) views.

### Note

It is more convenient to perform this measurement in 1x1 view. Switch to 1x1 view if the current view is different.



1. Begin the measurement by loading an ultrasound series with an Apical 4 Chamber view of the heart.
2. If Cine is playing, stop it by selecting the **Cine Stop** button on the toolbar.



### Finding diastole

Find the image of end diastole inside the series by using the ECG signal as an aid, or visually locating the image with maximum relaxation of the left ventricle.

### Finding systole

With the current series still selected, locate and open the image of end systole by using the ECG signal as an aid, or visually locating the image with maximum contraction of the left ventricle.

## Collaborate

### Send secure study links

Share a patient study with others by sending them a secure link. The link is temporary and does not contain any identifying information about the study.

### Send a secure link by email

In the Patient Study Directory:

1. Right-click (or touch and hold) a study, worklist or folder, then select **Send Link**.
2. End users are responsible for complying with privacy regulations and ensuring that study links are only provided to authorized users. Users cannot disable a study link once it has been sent. To indicate that you understand this, select the checkbox beside **Note: authorization cannot be removed once the secure link is sent**.

#### Note

The site's NilRead Patient Portal administrator is able to revoke a study link. However, the recipient may receive and use the link before it is revoked.

3. Choose the security options you want to use. Depending on your organization's NilRead Patient Portal configuration, some of the following options may not be available.
  - **Send via email to** If you want to send an email with the study link, select this option and enter the user's email address.
  - **Limit number of uses to** To limit number of times the user can use the link to access the study, select this option and enter the number of uses.
  - **Link will expire in** To set an expiry date, select this option and enter the number of days and/or hours until the link expires.
  - **User must login to see images** Select this option if the user must login to their NilRead Patient Portal account before using the link. If this option is not selected, the user does not require a NilRead Patient Portal account to use the link.
  - **Require user to enter this password** If the user does not have a NilRead Patient Portal account and you want to create a password for the link, select this option and enter the password. You must give this password to the user; for security reasons, it is not sent to them automatically.



- **Display this password hint** Select this option to display a password hint to the user. Enter a password hint in the provided field.
  - **Require confirmation via email** Select this option to use a two-step verification process. The user will receive an email with a link to confirm they are the intended recipient. When the user clicks the link, they will be sent a second email with the study link. Note that this option is only available if your organization uses an IIS SMTP mail server.
4. Select **Get Link**.
  5. In the **Send Link** dialog box, choose how to send the link.
    - **Copy link to clipboard** Copy the link and paste it into an email or instant message.
    - **Click to send link by email** Automatically create a new email using your default email application. The user's email address is entered automatically. Add any additional information, then send the email.
    - **Show QR code to send the link** This option displays a QR code that you can scan with your cell phone.

Ensure that you have entered a valid email address in the **Send via email to** field and then complete the following substeps:

      1. Select **Show QR code to send link**.

The QR code is displayed on the screen.
      2. Scan the QR code using the camera application of your cell phone.

Your cell phone prompts you to send the email. The exact message depends on your phone type and operating system.
      3. Tap on the message on your cell phone.

An email is created using the previously entered email address and the URL link in the body.
      4. Send the email.

You can optionally add comments before sending or copy the URL to use it in another messaging application.
      5. Click anywhere on the screen to return to the previous dialog box.
  6. Select **Close**.

## Copy a link

In the Patient Study Directory:

1. Right-click (or touch and hold) a study, worklist or folder, then select **Copy Link**.
2. A box appears with the link. Copy the link and paste it into an email or instant message.

## Send series links

Share a series of images with another user by sending them a link. The series specified in the link will open by default; however the entire study is still available to the user. Note that when you send a series link, the user will see the default view of the series, not the view you are using.

### Note

Depending on your organization's NilRead Patient Portal configuration, users may require a login name and password for NilRead Patient Portal to view the study.

1. Open a patient study.
2. Right-click (or touch and hold) a series, then select **Send Series Link**.
3. End users are responsible for complying with privacy regulations and ensuring that study links are only provided to authorized users. Users cannot disable a study link once it has been sent. To indicate that you understand this, select the checkbox beside **Note: authorization cannot be removed once the secure link is sent**.

### Note

The site's NilRead Patient Portal administrator is able to revoke a study link. However, the recipient may receive and use the link before it is revoked.

4. Choose the security options you want to use. Depending on your organization's NilRead Patient Portal configuration, some of the following options may not be available.
  - **Send via email** If you want to send an email with the study link, select this option and enter the user's email address.
  - **Limit number of uses to** To limit number of times the user can use the link to access the study, select this option and enter the number of uses.

- **Link will expire in** To set an expiry date, select this option and enter the number of days and/or hours until the link expires.
  - **User must login to see images** Select this option if the user must login to their NilRead Patient Portal account before using the link. If this option is not selected, the user does not require a NilRead Patient Portal account to use the link.
  - **Require user to enter this password** If the user does not have a NilRead Patient Portal account and you want to create a password for the link, select this option and enter the password. You must give this password to the user; for security reasons, it is not sent to them automatically.
  - **Display this password hint** Select this option to display a password hint to the user. Enter a password hint in the provided field.
  - **Require confirmation via email** Select this option to use a two-step verification process. The user will receive an email with a link to confirm they are the intended recipient. When the user clicks the link, they will be sent a second email with the study link. Note that this option is only available if your organization uses an IIS SMTP mail server.
5. Select **Get Link**.
  6. Choose how to send the link.
    - **Copy link to clipboard** Copy the link and paste it into an email or instant message.
    - **Click to send link by email** Automatically create a new email using your default email application. The user's email address is entered automatically. Add any additional information, then send the email.
  7. Select **Close**.

## Share bookmarked images

Use a bookmark to tag an image in a patient study that you want to find again quickly or that you want to share with others.

### Create a bookmark

Select **Save**, then select **Bookmark** (toolbar). A bookmark is created for the current screen. Bookmarks are saved in the Presentations panel.

### View a bookmark

1. Select **Presentations** (side panel). Presentations and bookmarks for the study are shown below the side panel.
2. Select a bookmark thumbnail.
3. While viewing a bookmark, select **Series** (side panel) to see which series the image belongs to. The series is highlighted.

### Send a bookmark

Share a bookmarked image with others by sending them a link. Others will see the image as you do, including your annotations and visualization changes.

To send a bookmark:

1. Right-click (or touch and hold) a bookmark, then select **Email**.
2. End users are responsible for complying with privacy regulations and ensuring that study links are only provided to authorized users. Users cannot disable a study link once it has been sent. To indicate that you understand this, select the checkbox beside **Note: authorization cannot be removed once the secure link is sent**.

#### Note

The site's NilRead Patient Portal administrator is able to revoke a study link. However, the recipient may receive and use the link before it is revoked.

3. Choose the security options you want to use. Depending on your organization's NilRead Patient Portal configuration, some of the following options may not be available.
  - **Send via email** If you want to send an email with the study link, select this option and enter the user's email address.
  - **Limit number of uses to** To limit number of times the user can use the link to access the study, select this option and enter the number of uses.
  - **Link will expire in** To set an expiry date, select this option and enter the number of days and/or hours until the link expires.

- **User must login to see images** Select this option if the user must login to their NilRead Patient Portal account before using the link. If this option is not selected, the user does not require a NilRead Patient Portal account to use the link.
  - **Require user to enter this password** If the user does not have a NilRead Patient Portal account and you want to create a password for the link, select this option and enter the password. You must give this password to the user; for security reasons, it is not sent to them automatically.
  - **Display this password hint** Select this option to display a password hint to the user. Enter a password hint in the provided field.
  - **Require confirmation via email** Select this option to use a two-step verification process. The user will receive an email with a link to confirm they are the intended recipient. When the user clicks the link, they will be sent a second email with the study link. Note that this option is only available if your organization uses an IIS SMTP mail server.
4. Select **Get Link**.
  5. Choose how to send the link.
    - **Copy link to clipboard** Copy the link and paste it into an email or instant message.
    - **Click to send link by email** Automatically create a new email using your default email application. The user's email address is entered automatically. Add any additional information, then send the email.
  6. Select **Close**.

### Delete a bookmark

Right-click (or touch and hold) a bookmark, then select **Delete Bookmark**.

### Share secondary capture images

You can create a series of secondary capture images for a patient study. Secondary capture images are static screenshots and cannot be modified.

### Create a series of secondary capture images

Select **Save**, then select **Capture** (toolbar). A secondary capture image is created for the current screen and is added to a new series. Other secondary capture images created during this NilRead Patient Portal session will be added to the same series.

#### Note

If you create secondary capture images for the same study in a future session, the images will be saved in a new series.

### Share a series of secondary capture images

Share a series of secondary capture images with others by sending them a link.

1. Right-click (or touch and hold) a series thumbnail, then select **Send Series Link**.
2. End users are responsible for complying with privacy regulations and ensuring that study links are only provided to authorized users. Users cannot disable a study link once it has been sent. To indicate that you understand this, select the checkbox beside **Note: authorization cannot be removed once the secure link is sent**.

#### Note

The site's NilRead Patient Portal administrator is able to revoke a study link. However, the recipient may receive and use the link before it is revoked.

3. Choose the security options you want to use. Depending on your organization's NilRead Patient Portal configuration, some of the following options may not be available.
  - **Send via email** If you want to send an email with the study link, select this option and enter the user's email address.
  - **Limit number of uses to** To limit number of times the user can use the link to access the study, select this option and enter the number of uses.

- **Link will expire in** To set an expiry date, select this option and enter the number of days and/or hours until the link expires.
  - **User must login to see images** Select this option if the user must login to their NilRead Patient Portal account before using the link. If this option is not selected, the user does not require a NilRead Patient Portal account to use the link.
  - **Require user to enter this password** If the user does not have a NilRead Patient Portal account and you want to create a password for the link, select this option and enter the password. You must give this password to the user; for security reasons, it is not sent to them automatically.
  - **Display this password hint** Select this option to display a password hint to the user. Enter a password hint in the provided field.
  - **Require confirmation via email** Select this option to use a two-step verification process. The user will receive an email with a link to confirm they are the intended recipient. When the user clicks the link, they will be sent a second email with the study link. Note that this option is only available if your organization uses an IIS SMTP mail server.
4. Select **Get Link**.
  5. Choose how to send the link.
    - **Copy link to clipboard** Copy the link and paste it into an email or instant message.
    - **Click to send link by email** Automatically create a new email using your default email application. The user's email address is entered automatically. Add any additional information, then send the email.
  6. Select **Close**.

### Delete a series of secondary capture images

1. Select **Series** (side panel).
2. Right-click (or touch and hold) a series thumbnail, then select **Delete Series**.