

ConnectingOntario

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ClinicalViewer: DI (Diagnostic Imaging) Image Viewer

User Guide

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Ontario Health
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Contents

- Getting Started 1
 - Introduction 1
 - DI Common Service 1
 - Security/Privacy..... 2
 - Requirements for Use 2
 - Supported Operating System 2
 - Supported Web Browsers..... 2
- Accessing the Image Viewer..... 3
- Log Out and Time Out 6
 - Time Out 6
- Basics of Viewing Images and Studies 7
 - Image Display Overview 7
 - Display Layout..... 8
 - Image Toolbar..... 9
 - Understanding Patient Orientation Indicators..... 9
- Viewing Studies, Series and Images..... 11
 - Studies, Series and Images: How They Are Related 11
 - Navigating Between Series..... 11
 - Prerequisites..... 11
 - Navigating Through Automatically-Linked Series..... 13
 - Manually Linking Series 14
- Navigating and Viewing Images 15
 - Navigating Through Stacked Images 15

Playing a Series of Images.....	16
Comparing Studies within an Accession.....	19
Manipulating Images in Display	19
Image Toolbar.....	20
Adjusting Image Brightness	20
Adjusting Image Contrast	21
Adjusting Image Brightness and Contrast Simultaneously.....	22
Applying Brightness/Contrast Presets	22
Inverting Image Polarity	23
Flipping an Image.....	24
Rotating an Image.....	24
Moving an Image on the Display Device Screen.....	25
Zooming In or Out On Images.....	26
Magnifying Part of an Image	27
Performing Measurements on Images.....	27
Measuring Distances on Images.....	27
Performing Angle Measurements	29
Performing Ultrasound Measurements.....	30
Measuring an Object Using an Ellipse	30
Measuring Image Density	32
Calibrating Images.....	33
Extended (Advanced) Viewing Tools	35
Accessing Extended Viewing Tools.....	35
Understanding Slice Reference Lines	36
Body Planes	37
Showing and Hiding Demographic Information, Markups, or CAD Markers	37

Extended Viewing Tools List.....	38
Extended Viewing Generic Tools	38
Extended Viewing Basic Measurements.....	39
Region of Interest (ROI) tools	40
Ultrasound Viewing Tools.....	40
Orthopedic Viewing Tools	42
Shortcuts for Working Efficiently with the DI Image Viewer	45

Getting Started

Introduction

The ConnectingOntario ClinicalViewer displays content from sources across Ontario in a single web browser window, on tabs and pages. Included in the ClinicalViewer is a Diagnostic Imaging (DI) portlet that sources its data from the provincial DI Common Service and provides access to images as well as reports. Images display in the Image Viewer. Ontario Health selected the XERO Viewer, from Agfa HealthCare, for use within the ClinicalViewer.

This guide outlines the functionality available in the Image Viewer only and is an adjunct to the ConnectingOntario ClinicalViewer User Guide. For details on the DI portlet as well as on all other parts of the ClinicalViewer, please refer to the *ConnectingOntario ClinicalViewer User Guide*.

All examples and screenshots contained within this guide are simulated with fabricated data.

DI Common Service

DI Common Service enables the sharing of images and reports from the province's three regional Diagnostic Imaging Repositories (DI-Rs):

- Hospital Diagnostic Imaging Repository Services (HDIRS) * includes GTA West
- Northern and Eastern Ontario Diagnostic Imaging Network (NEODIN)
- South West Ontario Diagnostic Imaging Network (SWODIN)

DI Common Service provides access to, and sharing of, diagnostic imaging information from across the province rather than just from the region in which the health care provider practices. It enhances the delivery of patient care by putting more information into the hands of health care providers when and where they need it to inform sound treatment decisions. It also provides secure access to patients' provincial longitudinal DI record, ensuring privacy is maintained.

Patients' DI information is available on a go forward basis as per the start date of contributions from the organizations (as early as 2013).

For more information on DI, visit [Ontario Health – Diagnostic Imaging](#) and for a list of data contributors, visit [Ontario Health - Diagnostic Imaging Common Service Data Contributors](#).

Security/Privacy

Use of the Image Viewer is included in users' privacy and security obligations as outlined in the End User Agreement, which users must accept before accessing the ConnectingOntario ClinicalViewer.

ConnectingOntario
ClinicalViewer

You have been authorized to access the electronic health records ("EHR") maintained by eHealth Ontario as a representative of and under the authority of a health care provider that has entered into an agreement with eHealth Ontario. Access to the EHR is provided through a provider portal for clinicians and others providing health care, and a site administration portal, for privacy officers and others to support operations and administration of the EHR. The agreement gives your health care provider the right to authorize you to access the EHR, and the agreement obligates your organization and you to access the EHR in compliance with the terms and conditions of that agreement which governs the use of all EHRs operated by eHealth Ontario.

As a condition of your access to the EHR, you acknowledge that you have read the eHealth Ontario agreement and you agree to:

1. Comply with the terms of the eHealth Ontario agreement signed by the health care provider that has authorized your access, including the EHR policies and Health Care Provider Guide associated with that agreement.
2. Only collect or use the information you access through the EHR for a purpose you have been authorized to do so by the health care provider that has authorized your access.
3. Comply with the internal policies of the health care provider that has authorized your access.
4. Access the EHR you have been authorized to access only for the purpose(s) associated with your role as follows:
 - o If authorized to use the provider portal, only access personal health information ("PHI") for the purpose of providing or assisting in the provision of health care to the individual to whom the PHI relates, in compliance with all policies governing your access. *mrtst 1*
 - o If authorized to use the site administration portal, only use the site administration portal for the purpose of applying, amending or removing a consent directive given by a patient of the health care provider that has authorized your access, or performing audits of the access to PHI of such patients and other privacy or security related functions assigned to you by that health care provider.
5. Direct your questions to the privacy officer of the health care provider that has authorized your access if you require clarification of any conditions of your access or of the use of information you access.
6. Be held accountable for actions performed in connection with the EHR under your ID and password regardless of whether a third party carried out the actions or whether you authorized such third party actions.
7. Consent to the logging and auditing of actions you take in relation to your use of the EHR and the collection, use, disclosure and retention of your personal information for such logging and auditing.

eHealth Ontario and the health care provider that has authorized your access will monitor your access to ensure compliance with the terms of your access to the EHR. Instances of non-compliance by you may result in the restriction, suspension or termination of your access to the EHR. In addition, any instances of non-compliance on your part may be reported to other health care providers, a regulator or regulatory body, to individuals whose PHI has been compromised by your non-compliance and to other affected individuals.

By clicking the "Agree" button below, you are representing and warranting that you have read, understand and agree to comply with the terms and conditions of this EUA.0410

Accept Reject

End User Agreement Screen

Note: All user activity is logged and monitored.

Requirements for Use

The requirements for optimal performance of the Image Viewer within the ConnectingOntario Clinical Viewer are listed below.

Supported Operating System

- Microsoft Windows 10

Supported Web Browsers

- Google Chrome, v76 or higher
- Microsoft Internet Explorer 11 or higher

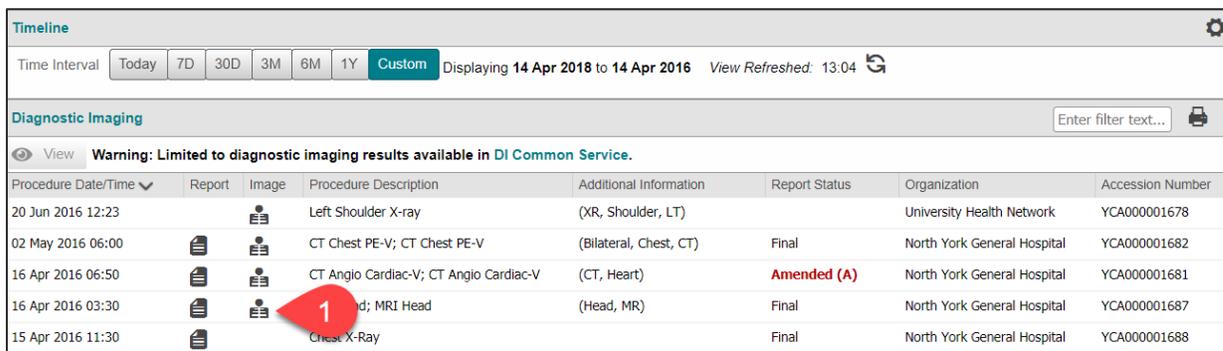
Important: Your desktop or laptop monitor may not produce the same viewing quality as a Picture Archiving and Communication System (PACS) viewer.

Accessing the Image Viewer

The Image Viewer can only be accessed from within the ClinicalViewer, Patient Care tab, DI portlet. Prior to accessing the Image Viewer, the user must be viewing a patient within the ClinicalViewer and diagnostic images must be available in the DI portlet for the selected interval on the timeline.

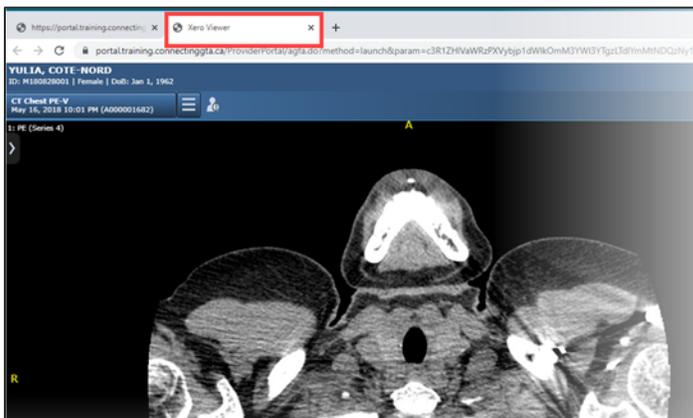
To view diagnostic images with the Image Viewer:

1. Select the **Image icon** in the appropriate row of the DI portlet



Procedure Date/Time	Report	Image	Procedure Description	Additional Information	Report Status	Organization	Accession Number
20 Jun 2016 12:23			Left Shoulder X-ray	(XR, Shoulder, LT)		University Health Network	YCA000001678
02 May 2016 06:00			CT Chest PE-V; CT Chest PE-V	(Bilateral, Chest, CT)	Final	North York General Hospital	YCA000001682
16 Apr 2016 06:50			CT Angio Cardiac-V; CT Angio Cardiac-V	(CT, Heart)	Amended (A)	North York General Hospital	YCA000001681
16 Apr 2016 03:30			Head; MRI Head	(Head, MR)	Final	North York General Hospital	YCA000001687
15 Apr 2016 11:30			Chest X-Ray		Final	North York General Hospital	YCA000001688

2. The Image Viewer launches in a new tab or window within the browser (depending on the user's internet browser and pop up blocker settings) and automatically logs the user in. The image or images associated with the procedure display



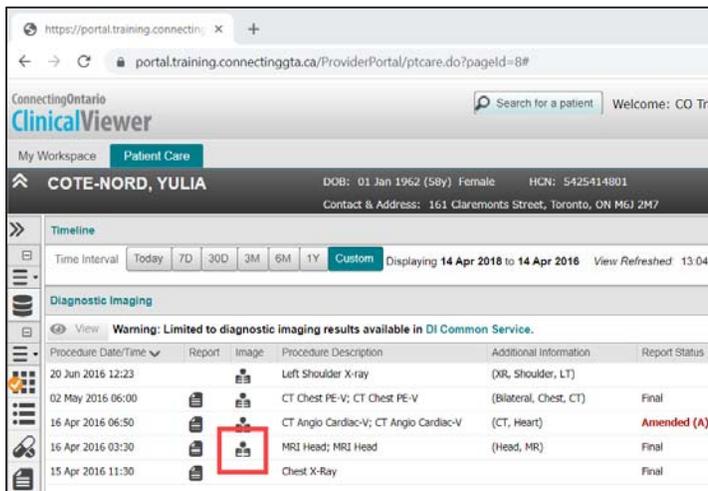
Notes:

1. After the Image Viewer opens and the image(s) load, the message “Unvalidated platform” may display briefly in the top right corner. This indicates that the Image Viewer is performing some internal tasks and can be safely ignored.
2. Only the image(s) of one accession number (or row) can be viewed at a time. Selecting the Image icon for another row, or another patient, closes the current Image Viewer browser window and opens a new one, displaying the image(s) associated with the new accession number.

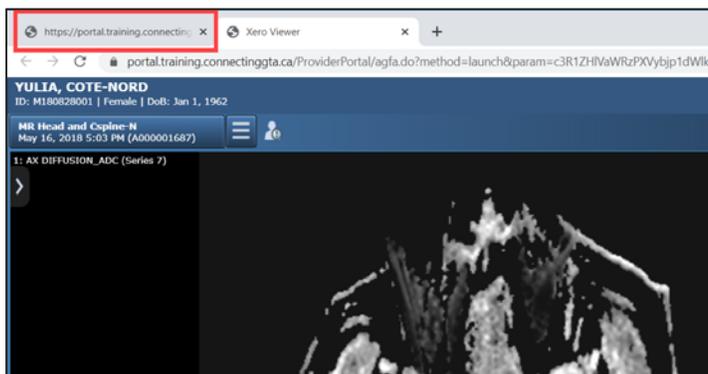
However, it is possible to view the image(s) of one accession number and the related DI report, or any other report.

To view a report simultaneously on screen with the DI image(s) of an accession number:

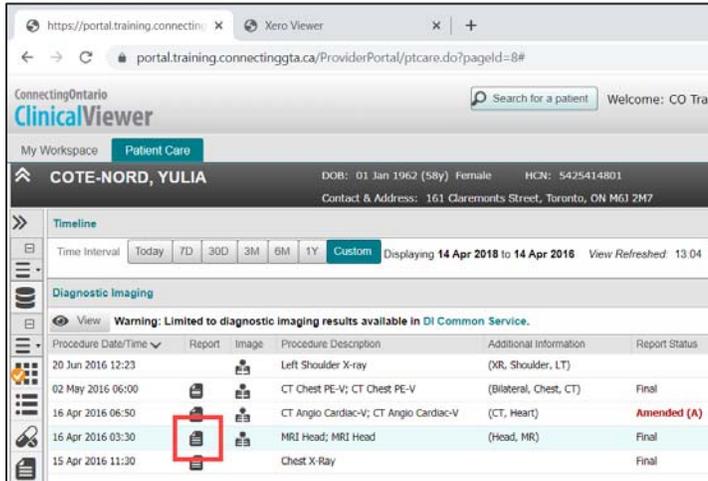
- a) Select the **Image icon** in the appropriate row of the DI portlet



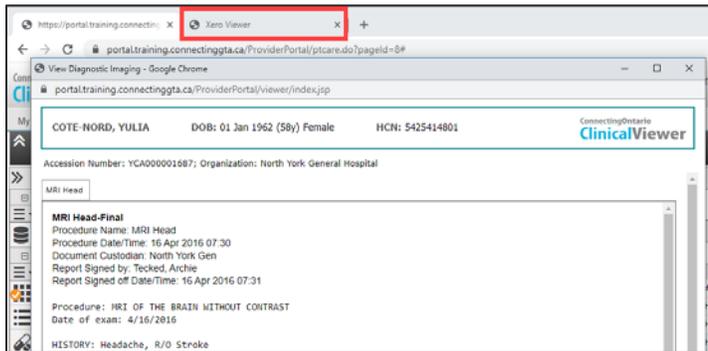
- b) Return to the ClinicalViewer by selecting its browser tab or window



c) Select the **Report icon** in the appropriate row within any portlet of the ClinicalViewer

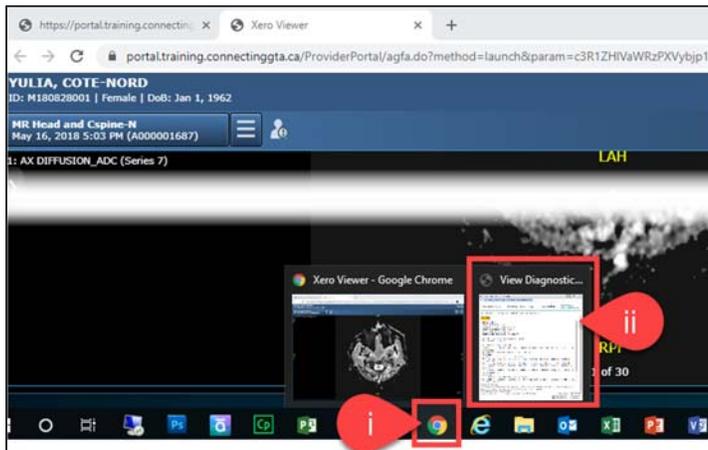


d) Return to the Image Viewer by selecting its browser tab or window



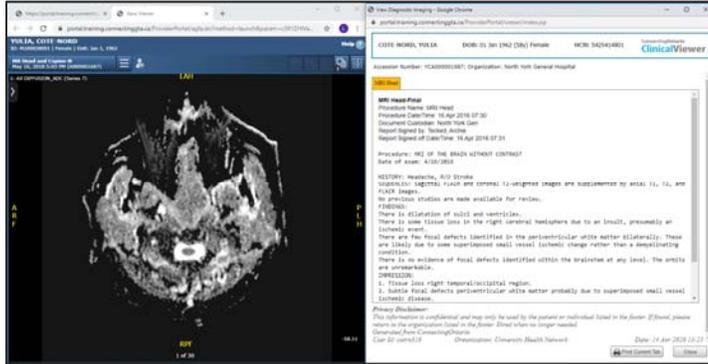
e) Select the report's document viewer by*:

- i) hovering over the browser icon on the taskbar, and
- ii) selecting the report's window



* The specific steps to follow are dependent on the configuration of the internet browser. If assistance is required, contact the local IT resource.

- f) Resize and reposition the windows so that both display on screen



Log Out and Time Out

When finished reviewing the images associated with the procedure, it is recommended that the user close the browser tab/window that the Image Viewer displays in.

It is also possible to return to the ClinicalViewer, without closing the Image Viewer's browser tab/window, by clicking the ClinicalViewer's tab. In this case, the Image Viewer tab/window will automatically close if the user:

- Clicks the Image icon on another row in the DI portlet, or

Timeline											
Time Interval		Today	7D	30D	3M	6M	1Y	Custom	Displaying 14 Apr 2019 to 14 Apr 2016	View Refreshed: 10:25	🔄
Diagnostic Imaging							Er				
View Warning: Limited to diagnostic imaging results available in DI Common Service.											
Procedure Date/Time	Report	Image	Procedure Description	Additional Information	Report Status	Organization					
19 Jul 2018 10:14	📄	👤	Mammogram Tomography; Mammogram To...	(LT, Tomo, MG); (MG, LT, Tomo)	Final	University Health Network					
20 Jun 2016 12:23	📄	👤	Left Shoulder X-ray	(XR, Shoulder, LT)		University Health Network					
02 May 2016 06:00	📄	👤	CT Chest PE-V; CT Chest PE-V	(Bilateral, Chest, CT)	Final	North York General Hospital					
16 Apr 2016 06:50	📄	👤	CT Angio Cardiac-V; CT Angio Cardiac-V	(CT, Heart)	Amended (A)	North York General Hospital					
16 Apr 2016 03:30	📄	👤	MRI Head; MRI Head	(Head, MR)	Final	North York General Hospital					
15 Apr 2016 11:30	📄	👤	Chest X-Ray		Final	North York General Hospital					

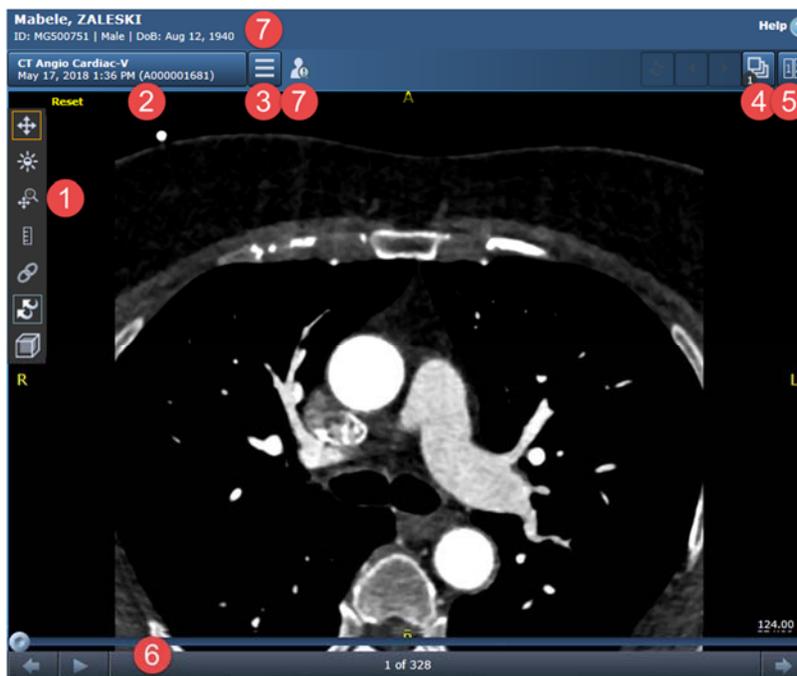
- Selects/searches for another patient

Time Out

The Image Viewer will time out after 15 minutes of inactivity.

Basics of Viewing Images and Studies

Image Display Overview



1	Image Toolbar	Access tools for image manipulation
2	Study Information Bar	Study information and study selection
3	Options Button	Select display layout
4	Display Series Tray	Display and navigate available series
5	Compare Studies Icon	View images from the same study in a side-by-side dual viewport
6	Cine Viewer Tools	Cine playback with tools for navigation (displays when mouse is hovered over bottom of the image)
7	Patient Demographic Information	Displays demographic details for the patient

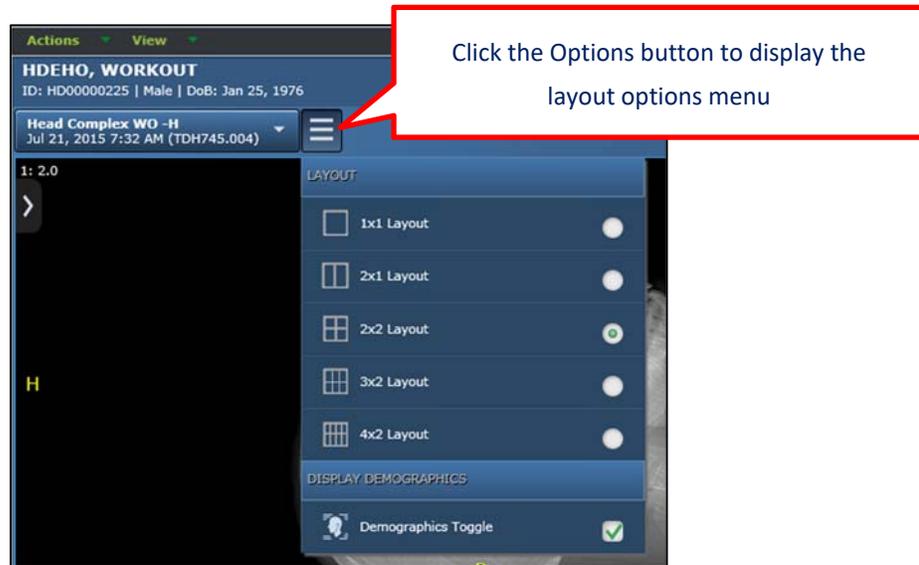
Display Layout

A study can contain one or more series of images. When the user selects a study to view, the layout is determined by the number of series in the study. Based on the number of series in a study, the default layout aims to display as many series as possible. For example, if a study consists of seven series, they are displayed in the 4x2 layout with one blank image pane.

Changing Display Layout

To change the layout of images:

1. Click the **Options** button to view the available layout options. The available layout options will appear in the list. These options are limited by the number of images included in the study
2. Select the required layout. The study images display in the layout format you select



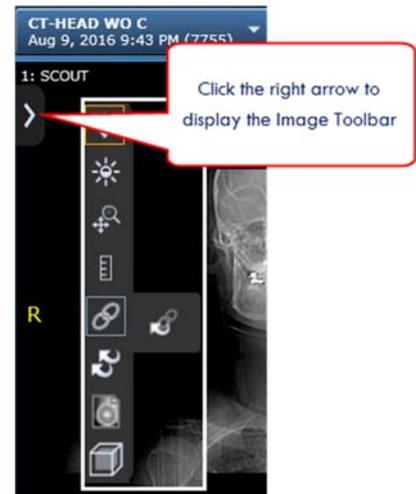
Tip: Double-click an image or series in a multiple layout format to display it in a 1x1 layout. Double-click it again to return to the previous layout.

Image Toolbar

The user can manipulate each image by changing its brightness, contrast, position, and magnification settings using the Image Toolbar. The user can also take measurements on the image. Each image in the study has its own toolbar. The user can undo any of the manipulations made to the image. The user can also reset the specific type of manipulation being worked on or perform a global reset that returns the image to its original state. The toolbar can be displayed or hidden but is always docked in the top left corner of the image pane.

Depending on the type of modality being viewed, a different toolbar button is selected by default when the user first views the image to help the user perform the most common image manipulations efficiently.

See [Manipulating Images in a Display](#) for details on using the tools on the Image Toolbar.



Understanding Patient Orientation Indicators

The Image Viewer enables you to rotate, flip, and move images on your display screen. To help keep track of the patient's orientation when manipulating the image, use the patient orientation indicators as guides. The patient orientation indicators can also be displayed as composite values. For example, AH represents anterior head; AHL represents anterior head left.

Important: Patient orientation indicators are not translated from English into other languages.



Image showing anterior (A), posterior (P), head (H), and foot (F) orientation indicators



Image showing composite orientation indicators: Anterior foot (AF), posterior head (PH), right (R), and left (L)

Orientation Indicator	Meaning
A	Anterior
P	Posterior
H	Head
F	Foot
L	Left
R	Right

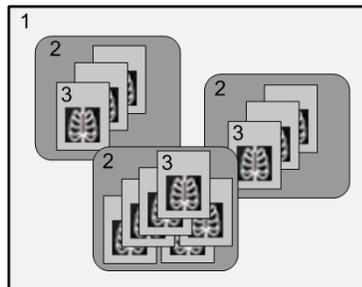
Viewing Studies, Series and Images

Studies, Series and Images: How They Are Related

An image is a single frame taken by a modality. Certain modalities such as CT, MRI, and PET take consecutive sets of images called series. One study can consist of several series. Studies are combinations of series or images for a single patient. Images in a study are usually from a single modality, but can also originate from multiple modalities.

The following illustration shows a patient's study with three series, each containing multiple images. This illustrates the relationship between:

1. A study
2. The series within the study
3. The images contained within each series



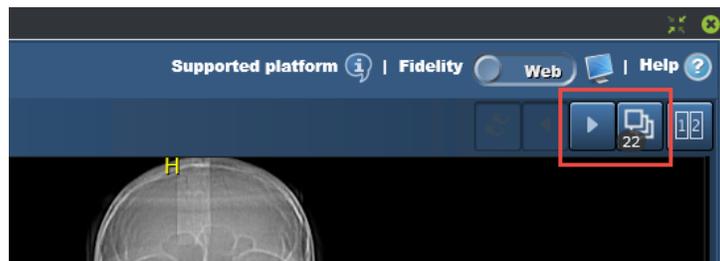
Note: It is also possible for a series to contain only one image. The example above does not include this option.

Navigating Between Series

The Image Viewer enables you to navigate between series in a study.

Prerequisites

- Ensure that the patient's study has multiple series. The top right corner will display an arrow and a “tray” icon with the number of series when multiple series are available:



To navigate between series in a study:

1. In the displayed study, optionally select the image layout to display by clicking on  button next to the study name. Refer to [Changing Display Layout](#) for more information about layouts

The user has two options for navigating:

- A. To navigate using navigation buttons:
 - i. Click on the navigation buttons at top right corner of display



Navigation Button	Function
	Move back to the previous series
	Moves ahead to the next series (not shown)

Note: Depending on the study layout that you choose, the navigation buttons may be disabled at some points in the series. For example, when a study with fewer than four series displays in 2 x 2 layout, the forward and backward buttons are disabled.

- A. To navigate using the series tray:
 - i. Click the **Display Series Tray** icon. The icon will indicate the number of available series. For example,  indicates 10 available series
 - ii. The Series Tray expands, showing thumbnail versions of all available series for that study. Drag the scroll bar on the right of the Series Tray, to scroll through all available series. The series that is being displayed in the Series Tray is outlined in white
 - iii. To display the series you would like to view:
 - a. Drag the series into the image area or box to be replaced
 OR
 - b. Click on the displayed imaged box to be replaced and then click on the new series to be displayed



2. To rest the series layout, click the **Reset Series Layout** icon 
3. To hide the series tray, click the **Display Series Tray** icon 

Navigating Through Automatically-Linked Series

The Image Viewer may automatically link a study's series so that when you start to navigate through one series, the linked series also navigate in synchronicity.

Note: Auto linking occurs when a specific set of parameters are met.

Prerequisites

- Ensure the study contains more than one series
- Series are automatically linked only under the following conditions:
 - Series that are in the same plane (20 degrees or less)
 - Series that refer to the same anatomical area of the body

To navigate through automatically linked series:

1. In the displayed patient study, click on  to select the image layout
2. Use the mouse wheel to scroll through the series

Automatically linked series navigate synchronously. A corresponding reference line will appear on the other series as you scroll allowing you note the position of each slice you are viewing. Refer [to Understanding Slice Reference Lines](#).

Manually Linking Series

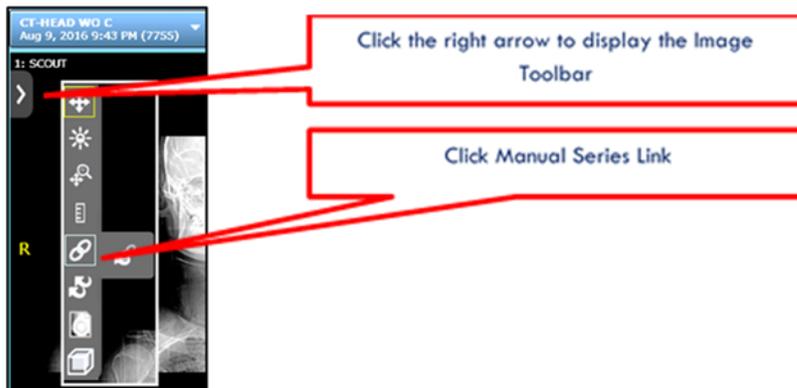
Manual series' linking is normally used with CT and MR images. A clinician typically chooses to manually link series when a patient has a new study to compare against previous ones to detect changes, such as the growth of a tumour.

Prerequisites

- Ensure that the patient's study has more than one series within the same accession

To manually link series:

1. Identify the first series to link
 - a. Expand the Image Toolbar in the series viewport

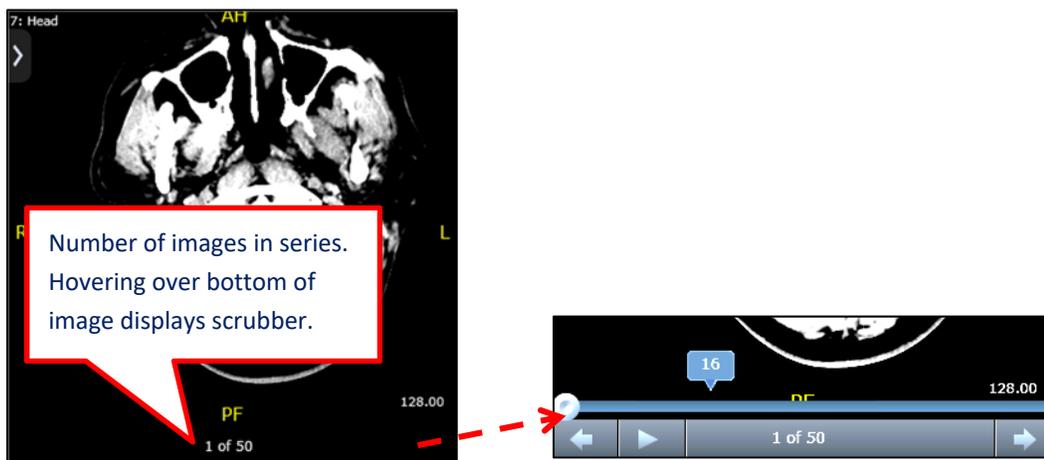


2. Click the **Manual Series Link** icon . The link icon will display in the top right corner of that series to indicate that it has been selected to be linked to another series
3. Identify the second series you would like to link
 - a. From the image toolbar in that series viewport, click the **Manual Series Link** icon . The link icon will display on the top right hand corner of that series to indicate that it has been selected to be linked to another series
4. Navigate through the stacked images of one of the series. The second series navigates in synchronicity with the first series
5. To disable the manual linking, click **Reset Manual Series linking** icon 

Navigating and Viewing Images

Navigating Through Stacked Images

Numbers displayed at the bottom of an image and in the scrubber indicate the number of images in the series. The user can navigate through images using a mouse, the scrubber at the bottom of each image series, or using the arrow keys on the keyboard.



Three methods are available for navigating through stacked images:

A. To navigating using the scrubber:

1. To navigate one image at a time, click the arrow buttons on the scrubber
2. To jump to a specific image in the stack, click the **Scrubber Bar**. The system displays the image from that position in the stack
3. To move ahead or back in the series, the user can also drag the scrubber knob



B. To navigate using the mouse:

1. Move the mouse pointer to the series to be scrolled
2. To navigate to the next or previous image, move the mouse wheel forward or backward
3. To navigate through the series with variable speed, drag the scrubber knob left or right. The user can control the scrolling speed with speed of the dragging motion

 **CAUTION!** If images are scrolled through too quickly, some images may not display due to limitations of your hardware

C. To navigate using the keyboard:

Action	Keyboard
To move ahead one image, hover the mouse over the series to navigate	Right Arrow
To move back one image, hover the mouse over the series to navigate	Left Arrow
To scroll ahead 10 images in the series at a time, hover the mouse over the series to navigate	Page Down
To scroll back 10 images in the series, hover the mouse over the series to navigate	Page Up
To move to the first image in the stack, hover the mouse over the series to navigate	Home
To move to the last image in the stack, hover the mouse over the series to navigate	End

Playing a Series of Images

Some modalities, such as CT and US, obtain multiple images that are included as a series. These images can be viewed using the auto-play feature (also referred to as cine viewing). The Cine Playback tools feature a scrubber with speed controls, scrolling navigation, and loop and rocker controls.



Playing a Series of Images

Note: Cine Playback is available only with CT and US images

To play a series of images:

1. Navigate to the image series to be automatically played
2. Hover the pointer at the bottom of the image to display the Cine Viewer
3. To play the series, click **Play** . The Cine Playback tools (i.e., controls for playback motion and speed) are displayed once the series is played
4. To increase or decrease the auto-play speed, click the **Accelerator** icon 
5. The speed slider will display:
 - a. To increase the speed of the auto-play, move the slider control up
 - b. To decrease the speed of the auto-play, move the slider control down

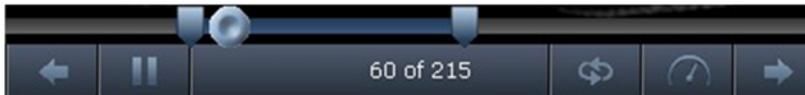


Note: When the playback speed is slower than expected, a warning icon  appears next to the speed slider.

Setting a Cine Trim Region

To focus on a subset of images in the series, the user has the ability to set a trim region. Setting a trim region can also improve cine playback speed as the browser can cache only a limited number of images. Setting a smaller trim region may allow the entire region to be cached.

The following example shows the Cine Viewer tool with a trim region set up. The player is limited to a reduced number of images in the series by the left and right trim guides.



To set a Cine Trim Region:

1. Start Cine Playback
2. Drag the left trim guide  to the starting point. To assist in finding an accurate starting point for the series playback, a popup appears indicating the frame number 
3. Drag the right trim guide  to the ending point
4. To play the series in a continuous loop, ensure that the loop icon is displayed 
5. To play the series in a forwards and backwards motion between the trim guides, ensure that the rocker icon is displayed 

Note: If the playback speed is slower than expected, a caution icon displays 

Playing a Series Using a Continuous Loop

The user can navigate through a series using a continuous loop. Loop mode allows you to see images in repeating successive order. This mode is useful for cardiology applications, like ultrasound and X-ray angiography. For studies that contain relevant information, loop mode is the default.

Prerequisites

To use this feature, the study must have a series of images to play.

To play a series using a continuous loop:

1. Navigate through the stacked images to find the image series to automatically display
2. Hover the pointer at the bottom of the image to display the Cine Viewer

3. Click **Play**  . The Cine Playback tools (i.e., controls for playback motion and speed) are displayed once the series is played. If no controls are shown on your screen, the screen might be too small. Try switching to a larger screen format
4. Click **Rock/Loop** 
5. To play the series in a continuous loop, ensure that the  icon is displayed in the Cine Viewer
6. To increase or decrease the auto-play speed, click the **Accelerator** icon to display the speed slider 
 - a. To increase the speed of auto-play, move the slider control up
 - b. To decrease the speed of auto-play, move the slider control down

Changing Direction during Auto-Play of a Series

The user can navigate through a series by forcing it to play forwards and backwards through the same Cine Trim Region. Rocker mode causes the playback to change direction at the ending point. This is useful for viewing an area of interest within a spatial span, like a CT or MR study.

Prerequisites

To use this feature, the study must have a series of images to play.

To change direction during auto-play of a series:

1. Navigate through the stacked images to find the image series to automatically display
2. Hover the pointer at the bottom of the image to display the Cine Viewer
3. Click **Play**  . The Cine Playback tools (i.e., controls for playback motion and speed) are displayed once the series is played. If no controls are shown on your screen, the screen might be too small. Try switching to a larger screen format
4. Click **Rock/Loop**  . The direction will change at the ending point of the series
5. To play the series in a continuous loop, ensure that the  icon is displayed in the Cine Viewer
6. To increase or decrease the auto-play speed, click the **Accelerator** icon to display the speed slider 
 - a. To increase the speed of auto-play, move the slider control up
 - b. To decrease the speed of auto-play, move the slider control down

Comparing Studies within an Accession

The Image Viewer enables the user to compare a patient's images from the same study or from different studies, as long as all studies are from the same accession (i.e., row in the DI Portlet).

The user has the ability to view images from the same study in a side-by-side dual viewport. Images can also be compared from the same patient as long as the patient has multiple studies available for viewing in the same accession.

To compare images from the same study in a dual viewport:

1. In the displayed, study, click Compare Studies  in the upper right corner of the display area for a 2 up (i.e., display two studies side by side)



1. In each viewport, select the desired image layout (refer to [Changing Display Layout](#))
2. In each viewport, navigate to the desired image to view
3. To return to a single viewport, click on Switch to Single Study View (i.e., 1 up)

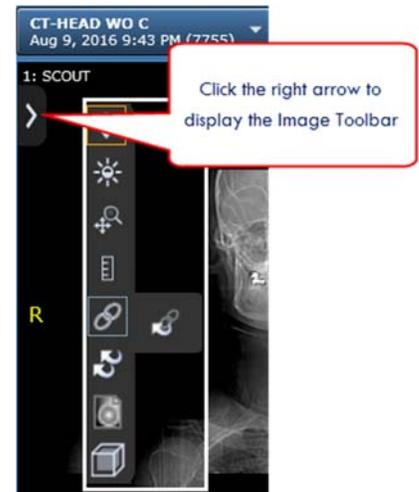
Tip: To maximize the amount of screen space for viewing on a desktop computer or laptop, press **F11** to switch to full screen mode

Manipulating Images in Display

The Image Viewer can be used to manipulate images for better viewing by changing the brightness, contrast, polarity, position, and magnification or by measuring distances. The user can make multiple types of changes to manipulate how an image displays on the screen. These manipulations can be deleted one- by-one or universally.

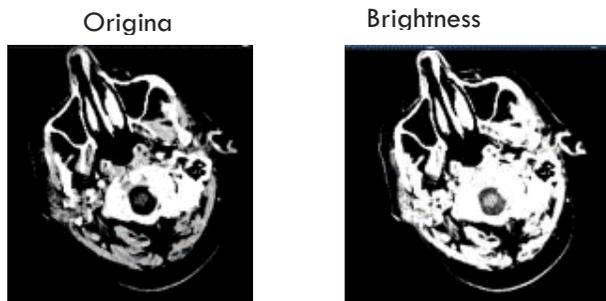
Image Toolbar

Image manipulations are performed using the Image Toolbar. Each image in the study has its own toolbar. The toolbar can be displayed or hidden but is always docked in the top left corner of the viewport. Depending on the type of modality being viewed, a different toolbar button is selected by default when the user first views the image to help the user perform the most common image manipulations efficiently.



Adjusting Image Brightness

Images can be made to appear brighter or darker. Any changes made to one image apply only to that group of images (also known as a series).



Tip: To maximize the amount of screen space for viewing on a desktop computer, press **F11** to switch to full screen mode.

To adjust image brightness:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Adjust Brightness/Contrast (Window Level)** icon 
4. To make an image brighter:
 - a. Left mouse click and hold
 - b. Drag the mouse pointer **downward** to the bottom of the image
5. To make an image darker:
 - a. Left mouse click and hold

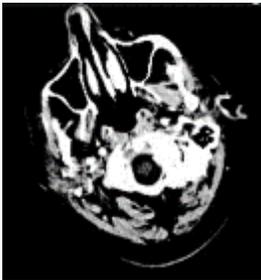
- b. Drag the mouse pointer **upward** to the top of the image
6. To undo all brightness or darkness changes, click the **Original Window Level** icon . The image resets to the original window level

Tip: To undo all changes made to an image, from the toolbar, click the **Reset** icon 

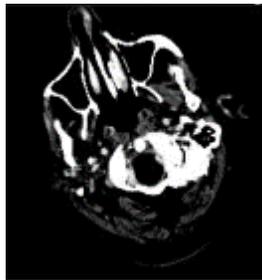
Adjusting Image Contrast

Adjusting image contrast means changing the difference between lightness and darkness. Any changes made to one image apply only to that group of images (also known as a series).

Original



Contrast Increased



Tip: To maximize the amount of screen space for viewing on a desktop computer, press F11 to switch to full screen mode.

To adjust image contrast:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Adjust Brightness/Contrast (Window Level)** icon 
4. To increase the image contrast
 - a. Left mouse click and hold
 - b. Drag the mouse pointer to the right
5. To decrease the image contrast
 - a. Left mouse click and hold
 - b. Drag the mouse pointer to the left
6. To undo all contrast changes, from the toolbar, click the **Original Window Level** icon . The image resets to original window level

Tip: To undo all changes made to an image, from the toolbar, click the **Reset** icon 

Adjusting Image Brightness and Contrast Simultaneously

The user can adjust an image's brightness and contrast simultaneously. Any changes made to one image apply only to that group of images (also known as a series).

Original Window



Brightness and Contrast Adjusted Simultaneously



To adjust image brightness and contrast simultaneously:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Adjust Brightness/Contrast (Window Level)** icon 
4. Drag the mouse pointer diagonally across the image
5. To undo all brightness or contrast changes, from the toolbar, click the **Original Window Level** icon . The image resets to original window level

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon .

Applying Brightness/Contrast Presets

For MR and CT studies, brightness and contrast presets can be applied automatically to adjust the window level and width settings. Any changes made to one image apply only to that group of images (also known as a series).

To apply brightness/contrast presets:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Adjust Brightness/Contrast (Window Level)** icon 
4. For MR studies, choose one of the following brightness/contrast presets:
 - T1
 - T2
 - PD

The image display adjusts to the preset brightness and contrast settings.

Note: The list of presets available may vary based on system configuration and are not adjustable at the user level.

5. For CT studies, choose one of the following brightness/contrast presets:

- BONE
- SOFT
- BRAIN
- LUNG
- LIVER

The image display adjusts to the preset brightness and contrast settings.

Note: The list of presets available may vary based on system configuration and are not adjustable at the user level.

6. To undo all brightness or contrast changes, from the toolbar, click the **Original Window Level** icon  .
The image resets to original window level

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Inverting Image Polarity

The user can invert an image's polarity to exchange the light and dark areas (polarity) in an image. Any changes made to one image apply only to that group of images (also known as a series).

Original



Inverted



To invert image polarity:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click on the arrow in the left corner of the viewport to expand the Image Toolbar

3. Click the **Adjust Brightness/Contrast (Window Level)** icon .
4. On the sub toolbar, click the **Invert** icon . The black and white areas of the image are inverted. Colour images are also inverted
5. To undo polarity inversion, click the **Original Window Level** icon . The image resets to original window level

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon .

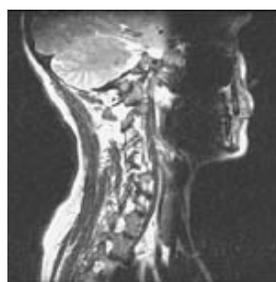
Flipping an Image

The user can flip study images horizontally. Use the patient orientation indicators to keep track of the original orientation of the image. Any changes you make to one image apply only to that group of images (also known as a series).

Original position



Flipped position



To flip an image:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Image Navigate/Flip/Rotate** icon .
4. To flip the image horizontally, from the sub toolbar, click the **Flip Horizontal** icon . The image is flipped from its current position
5. To undo the image flip and return it to its original position, click the **Reset Flip/Rotate** icon .

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon .

Rotating an Image

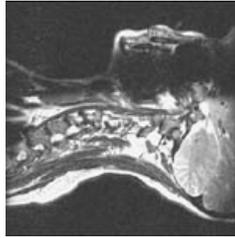
Images can be rotated 90 degrees at a time to the right. If *Rotate Right* is applied more than once, the image is rotated from the current position, not the original position. Use the patient orientation indicators to keep track

of any rotations you make. Any changes made to one image apply only to that group of images (also known as a series).

Original position



Rotated position



To rotate an image:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate.
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Image Navigate/Flip/Rotate** icon 
4. To rotate the image to the right, from the sub toolbar, click the **Rotate Right** icon . The image is rotated 90 degrees at a time from its current position
5. To undo all rotations, click the **Reset Flip/Rotate** icon 

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Moving an Image on the Display Device Screen

Images can be moved on the screen (also called panning) for better viewing. Consider using this feature when zooming into a specific area of the image.

To move an image:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click either the **Zoom/Pan** icon  or the **Image Navigate/Flip/Rotate** icon 
4. Left mouse click and hold and drag the image to the desired location
5. To undo all moves:
 - Hold the **Ctrl** button and click
 - OR
 - Click the **Reset Flip/Rotate** icon . The image returns to its original position

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

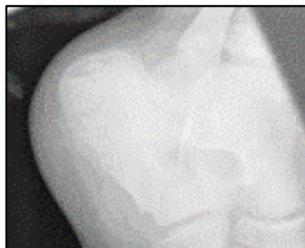
Zooming In or Out On Images

The user can increase (zoom in) or decrease (zoom out) the magnification on images that are viewed. Part of an image can also be viewed in a magnifying glass. Any changes made to one image apply only to that group of images (also known as a series).

Original



Magnified



To zoom in or out on images:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate.
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Zoom/Pan** icon 
4. To zoom an image, on the sub toolbar, do one of the following:

- Click the **Zoom In** icon 

OR

- Scroll the mouse wheel up

If necessary, move the image on your screen to get a better view of the magnified area

5. To zoom out an image, on the sub toolbar that appears, do one of the following:

- Click the **Zoom Out** icon 

OR

- Scroll the mouse wheel down

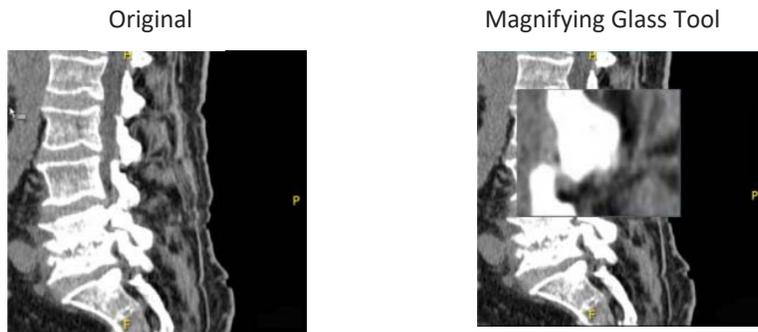
6. To undo all zoom changes, do one of the following:

- Press the Ctrl button and click
- Click the **Magnify/Pan Reset** icon 

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Magnifying Part of an Image

The Magnifying Glass tool enables you to display part of an image at an increased magnification. Even if an image is already zoomed in, the Magnifying Glass continues to magnify beyond the current zoom settings.



To magnify part of an image:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the image toolbar
3. Click the **Zoom/Pan** icon 
4. Click the Magnify Glass icon 
5. Move the mouse pointer onto the image
6. Click and hold to display the **Magnifying Glass** tool. A viewing window appears displaying the selected area in an increased magnification
7. Drag the mouse pointer to move the Magnifying Glass to different parts of the image that you want to view

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Performing Measurements on Images

Measuring Distances on Images

The user can measure the distance between two points on an image. Distances are measured using a straight line. More than one measurement can be added to any image.



CAUTION! Markups cannot be saved. They are available only during the active viewing session.

For calibrated images, measurements display in millimetres (mm). The accuracy is limited by the calibration provided with the image and by the position of the start and end points of the line drawn, which may vary by

one pixel at each end. Based on the calibration provided, pixels are converted into millimetres and rounded to the nearest millimetre.

For non-calibrated images, measurements are displayed in pixels (px) and the accuracy of the measurement is limited by the pixel position at each end of the caliper measurement.



Markup Applied with the Markup Caliper Tool

Important: When “projected” appears beside a measurement as in the image below, it indicates that the measurement is performed on an image that does not contain calibration information. The measurement value provided is a projected value only, and may not reflect the exact dimensions of the patient under examination.



To measure distances on images:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Markup Caliper** icon . If necessary, magnify the area that you want to measure
4. On the image, do one of the following to select the distance to measure:
 - Click the start and end points of the distanceOR
 - Click and drag to select the distance

5. To remove the measurement, click the **Remove Markup** icon 

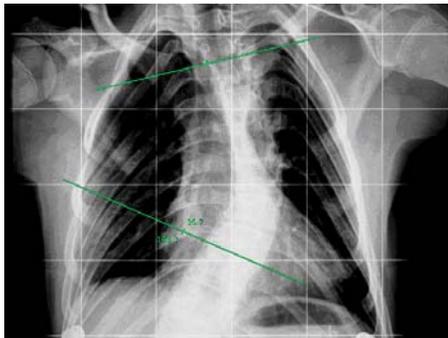
Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Performing Angle Measurements

The user can perform angle measurements on any image in display. Angle measurements are displayed in degrees with an accuracy of +/- 0.5 degrees and precise to the nearest 0.1 degree. This is especially useful for orthopedic specialists in measuring curvatures of the spine.

Note: Angle measurements are not available with ultrasound studies.

 **CAUTION!** Markups cannot be saved. They are available only during the active viewing session.



To perform angle measurements:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. If necessary, magnify the area that you want to measure
3. Click the arrow in the left corner of the viewport to expand the Image Toolbar
4. Click the **Markup Caliper** icon 
5. On the sub toolbar, click the **Markup Angle** icon 
6. On the image, click the start and end points of the distance to measure for the first line
7. Click the start and end points of the distance to measure for the second line or click and drag to select the distances to measure. The angle of the two line measured will be displayed
8. To remove the measurement, click the **Markup Reset** icon 

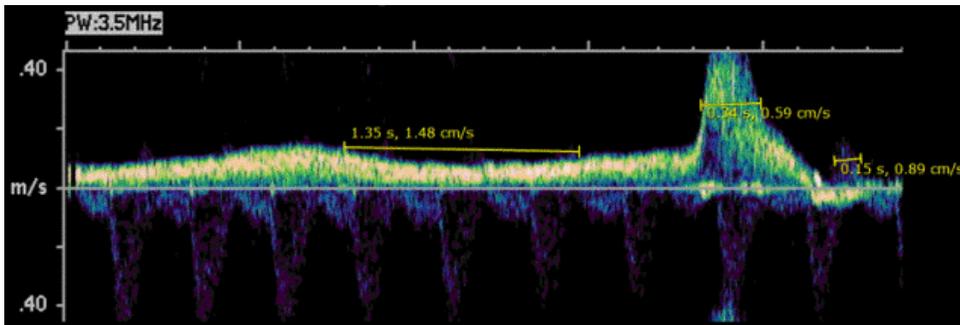
Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Performing Ultrasound Measurements

When measuring ultrasound images, units are provided in distance, for example, cm, Hz, time, and cm/s (velocity).



CAUTION! Markups cannot be saved. They are available only during the active viewing session.



To perform ultrasound measurements:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Markup Caliper** icon
4. If necessary, magnify the area that you want to measure
5. On the image, click the start and end points of the distance to measure or click and drag to select the distance to measure
6. To remove the measurement, click **Remove Markup**

Tip: To undo other changes you made to the image, from the toolbar, click the **Reset** icon

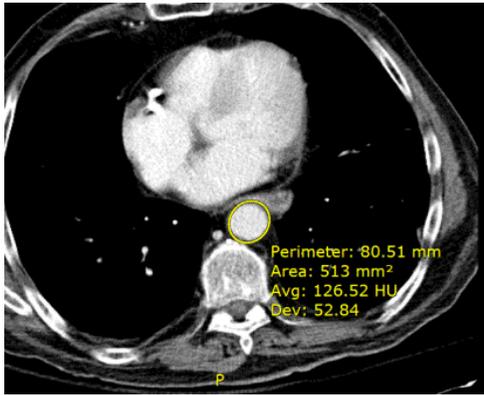
Measuring an Object Using an Ellipse

The user can measure the perimeter or area of an ellipse. Additionally, the average and standard deviation are also provided. More than one measurement can be added to any image.



CAUTION! Markups cannot be saved. They are available only during the active viewing session.

For calibrated images, measurements are displayed in millimetres (mm). For non-calibrated images, measurements are displayed in pixels (px). The average is reported in either HU (Hounsfield Units) or GY (Gray, representing 100 Rad or radiation absorbed dose) units.



Tip: To maximize the amount of screen space for viewing on a desktop computer, press **F11** to switch to full screen mode.

To measure an object using an ellipse:

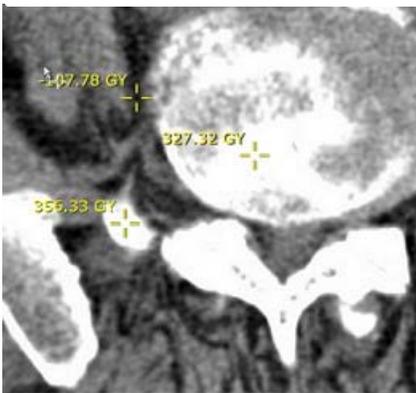
1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Markup Caliper** icon 
4. If necessary, magnify the area that you want to measure
 - a. On the sub-toolbar, click the Markup Ellipse ROI icon 
5. Use one of the following methods to set the axes of the ellipse:
 - A. Click and drag
 - i. On the image, click and drag to insert the first axis of the ellipse
 - ii. Click and drag to set the secondary axis of the ellipse
 - B. Click start and end of axis
 - i. Click to set where one end of the first axis starts, click to set the other end of the axis
 - ii. Click again to set the secondary axis
6. To remove the measurement, from the sub-toolbar, click Remove Markup 

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

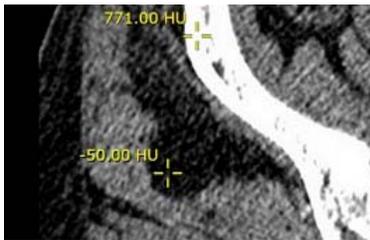
Measuring Image Density

The user can measure the density of a selected point on an image. Density displays in units that depend on the type of image being shown: Hounsfield Units (HU) for CT images; greyscale (intensity) values for DX, CR, and MG images where units are not specified. You can add more than one measurement to any image.

Markup applied with the pixel value (density) tool showing Grayscale (GY)



Markup applied with pixel value (density) tool showing Hounsfield Units (HU)



⚠ CAUTION! Markups cannot be saved. They are available only during the active viewing session.

To measure image density:

1. In the displayed study, move the mouse pointer to the viewport that contains the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Markup Caliper** icon 
4. If necessary, magnify the area that you want to measure
5. On the sub toolbar, tap the **Pixel Value** icon 
6. Click the area of the image to see the pixel density
7. To remove the measurement, from the sub-toolbar, click Remove Markup 

Tip: To undo other changes made to the image, from the toolbar, click the **Reset** icon 

Calibrating Images



Due to limitations of the modality or the interpretation of the modality data, some images do not contain sufficient information to accurately translate dimensions from pixels to real-world measurements. Before measuring areas on such images, a calibration must be completed. This can be done by drawing a line of known length on the image and entering its value. Future measurements are then based on this entered value.

CAUTION! Measurements are projections only. A number of factors influence the accuracy of the measurement:

- The accuracy of the user doing the calibration
- The perspective of the camera to the image (for example, whether it was taken on an angle)
- The focus of the camera when the image was taken
- The magnification used when calibrating (zooming in provides more accuracy)
- The accuracy of the pointing device used
- The length of the calibration artifact (a longer distance gives more accuracy)
- The number typed in the dialogue box to represent the length of the calibration artifact in millimetres (user errors here cause inaccuracies in subsequent markup measurements)
- Calibrations are applied on a user basis, meaning that your calibrations do not affect measurements made by other individuals

Given these factors, the measurement is only an approximation.

Some DICOM images are already calibrated. If you attempt to calibrate an image that is already DICOM calibrated, an icon  displays on the cursor when you try to use the tool.

To calibrate images:

1. In the Display window, navigate to the image to manipulate
2. Click the arrow in the left corner of the viewport to expand the Image Toolbar
3. Click the **Markup Caliper** icon 
4. On the sub-toolbar, click the **Calibrate** icon 
5. On the image, click the start and end points of the image with the known distance
 - **Best practice:** include a metric ruler in the image to help provide the known distance. Place the ruler close to the part being measured
6. In the **Markup Calibration** dialogue box, type a value in millimetres to represent the distance between the two points on the image

7. Click **OK**
8. Add markup using the other markup caliper tools
9. To calibrate the image again, repeat these steps

Extended (Advanced) Viewing Tools

Extended tools provide advanced image viewing functionality in the Image Viewer.

Accessing Extended Viewing Tools

The Image Viewer provides access to advanced image viewing tools including 3D viewing. These advanced tools, called Extended Tools, can be viewed in several different methods.

Viewing Method	Description
Image toolbar	Advanced tools can be accessed from the Image Toolbar of a study. The type of study determines the options that are available
Search results	Advanced tools can be accessed from the search results by selecting a study and clicking an option in the drop-down menu

Note: When extended viewing is accessed in compare mode, the other study closes.

To access advanced viewing tools from patient studies:

1. In the study, display the Image Toolbar
2. On the Image Toolbar, hover downwards to the Extended Tools icon that displays at the bottom of the toolbar. The type of study determines the icon or option that displays as listed below:



Show 3D/4D (not available by default)



Show mammography tools



Show nuclear medicine tools



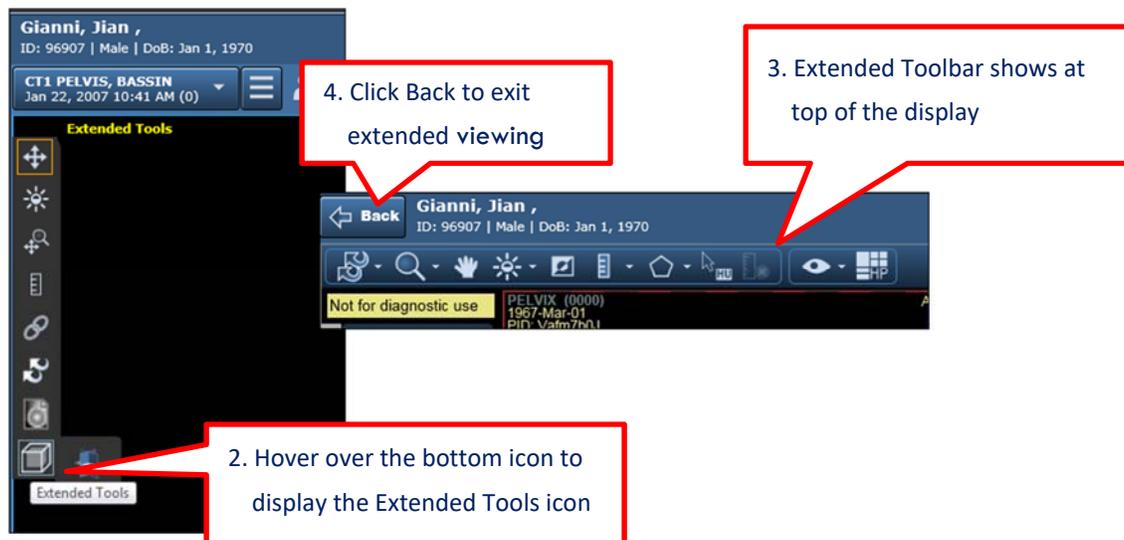
Show orthopaedic tools



Show ultrasound tools

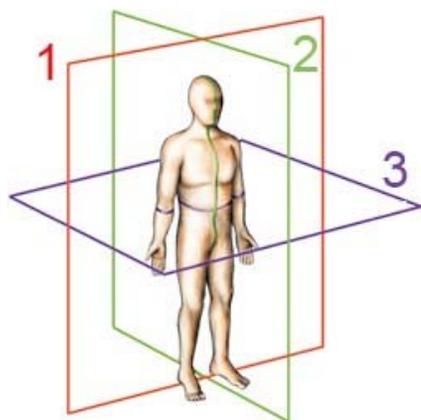
3. Click on the extended tool icon. The window will refresh with an extended tool bar displayed in the upper left corner of the display
4. Click **Back** to exit from extended viewing

Important! Not all options are available for all studies. Availability is determined by the modalities included in the study. For example, only studies containing a nuclear medicine study have access to the Show Nuclear Medicine Tools option.



Understanding Slice Reference Lines

Various modalities (e.g., CT, MRI) can capture images of the human body in three different planes: coronal, sagittal, and axial. The three planes are represented in the diagram below:

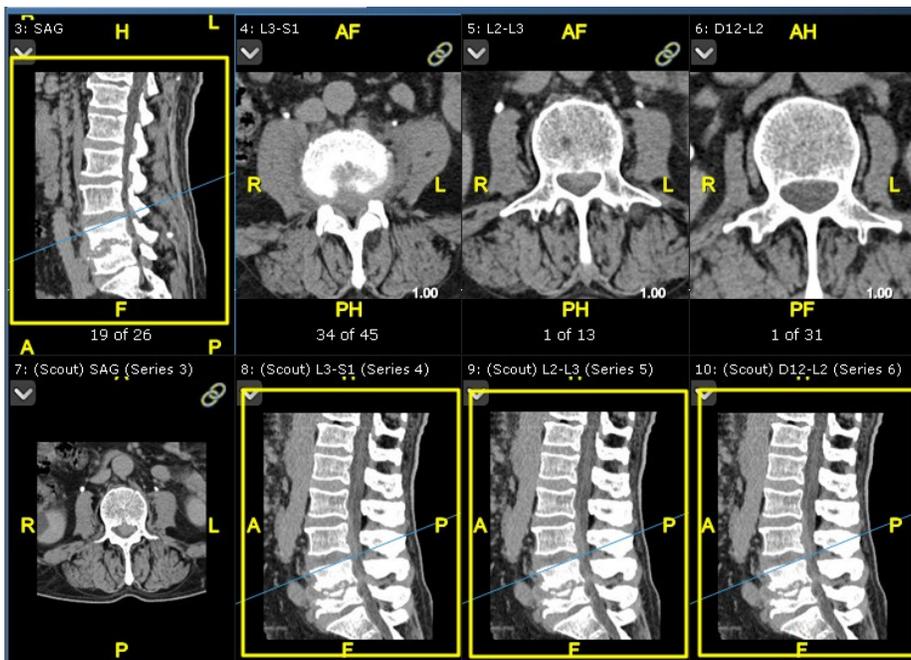


Body Plane Description	
Callout	Corresponding Plane
1 (Red)	Coronal
2 (Green)	Sagittal
3 (Purple)	Axial

Body Planes

To assist with cross-sectional navigation, the Image Viewer automatically displays a coloured line on all non-coplanar linked series in a single study within the same frame of reference that intersects with the 3D centre slice position of the active series.

Below is a study showing four series that have the same frame of reference. Refer to the line intersecting the images (highlighted).



Showing and Hiding Demographic Information, Markups, or CAD Markers

In extended viewing, the user has an option to show or hide demographics, existing markups, or CAD markers (when present) from the image. Hiding this information can provide more room on the display screen.

To show and hide demographic information, markups, or CAD markers:

1. On the extended toolbar, click Show/Hide 
2. From the list, choose any of the following:
 - a. Demographics
 - b. Markups

- c. CAD Markers (annotations that are usually small squares or triangles)

The selected information type is displayed or hidden from the image

Extended Viewing Tools List

The following tables list the toolbars and tools available when working in extended viewing. Icons/options will change according to modality.

Extended viewing tools are available for the following modalities:

- CR (this modality also has access to Orthopaedic tools)
- CT (this modality also has access to MIP/MPR/3D Viewing tools)
- DX (this modality also has access to Orthopaedic tools)
- MG
- MR (this modality also has access to MIP/MPR/3D Viewing tools)
- NM
- XA



Extended Viewing Generic Tools

Listed below are the generic tools which always display when working in extended viewing.

BUTTON	DESCRIPTION	PURPOSE
	Reset	Remove all changes and return image to its original state
	Zoom	Change the magnification of an image
	Pan	Move around the image inside the viewport
	Window Level	Change the brightness and contrast of an image
	Invert	Reverse the greyscale values of an image
	Distance Measurement	Measure the distance between two points in an image
	Angle	Draw two lines in an image and measure the angle between the lines

BUTTON	DESCRIPTION	PURPOSE
	Arrow	Draw an arrow in an image to identify a region of interest
	Pixel Value	Measure the interpreted pixel value in an image
	Show/Hide	Show and hide demographic information, markups, or CAD markers
	Hanging Protocol	Change display layout. <i>Note: for MIP/MPR/3D refer to online help in the viewer</i>

Extended Viewing Basic Measurements

Click the Measurement icon  on the extended toolbar to access the advanced measurement tools.

BUTTON	DESCRIPTION	PURPOSE
	Length/Distance Measurement	Measure the distance between two points in an image
	Angle	Draw two lines in an image and measure the angle between the lines
	Arrow	Draw an arrow in an image to identify a region of interest
	Curve	Draw a curved line and measure the distance defined by that line
	Length Ratio	Measure the ratio of the lengths of two lines in an image
	Polyline	Draw a segmented line and measure the distance defined by that line

Region of Interest (ROI) tools

Click on Polygon tool  on the extended toolbar to access the region of interest (ROI) tools. ROI tools are available for CT and MR.

BUTTON	DESCRIPTION	PURPOSE
	Polygon	Draw a polygon and measure the area of the polygon
	Circle	Draw a circle (using the center point and a point on the circumference) and measure the diameter and area of the circle
	Circle 2 Points	Draw a circle using two points on the circumference) and measure the diameter and area of the circle
	Circle 3 Points	Draw a circle (using 3 points on the circumference) and measure the diameter and area of the circle
	Ellipse 2 Points	Draw an ellipse (using the center point and one other point) and measure the area of the ellipse
	Ellipse 3 Points	Draw an ellipse (using the center point and two other points) and measure the area of the ellipse
	Rectangle	Draw a rectangle and measure the area, width, and height of the rectangle
	Shutter	Draw a rectangle and obscure the part of the image outside of the rectangle

Ultrasound Viewing Tools

Ultrasound Standard Tools

Click on Ultrasound tools icon  to access the ultrasound standard tools. These will display in the upper left corner of the display.

BUTTON	DESCRIPTION	PURPOSE
	Reset	Remove all changes and return image to its original state
	Zoom	Change the magnification of an image
	Pan	Move around the image inside the viewport
	Window Level	Change the brightness and contrast of an image
	Invert	Reverse the greyscale values of an image
	Distance Measurement	Measure the distance between two points in an image
	Angle	Draw two lines in an image and measure the angle between the lines
	Arrow	Draw two lines in an image and measure the angle between the lines
	Time	Access to ultrasound specific time measurements
	Pixel Value	Measure the interpreted pixel value in an image
	Delete Selected Markups	Remove a selected markup from an image

Ultrasound Measurements

Click on Time icon  on the extended toolbar to access ultrasound specific time measurements.

BUTTON	DESCRIPTION	PURPOSE
	Chamber Value	Define the perimeter of a chamber to measure the length and circumference of the chamber, and to extrapolate the volume of the chamber in an image
	LV Distance	Draw a line with four points to measure the interventricular septum (IVS), left ventricular internal dimension (LVID), and left ventricular posterior wall (LVPW) in an image
	Mode distance	Draw a vertical line to measure distance in an image
	PHT	Draw a line to measure the pressure half time pressure in a Doppler ultrasound image
	Velocity	Draw a horizontal line to measure the velocity of structures in a Doppler ultrasound image
	VTI	Draw a line to measure the velocity time integral in a Doppler ultrasound image

Orthopedic Viewing Tools

Orthopedic tools are available with CR and DX studies.

Orthopedic Standard Tools

BUTTON	DESCRIPTION	PURPOSE
	Reset	Remove all changes and return image to its original state
	Zoom	Change the magnification of an image
	Pan	Move around the image inside the viewport
	Window Level	Changes the brightness and contrast of an image
	Invert	Reverse the greyscale values of an image

BUTTON	DESCRIPTION	PURPOSE
	Pixel Value	Measure the interpreted pixel value in an image
	Delete Selected Markups	Remove a selected markup from an image

Basic Measurements

BUTTON	DESCRIPTION	PURPOSE
	Length/Distance Measurement	Measure the distance between two points in an image
	Angle	Draw two lines in an image and measure the angle between the lines
	Arrow	Draw an arrow in an image to identify a region of interest
	Curve	Draw a curved line and measure the distance defined by that line
	Length ratio	Measure the ratio of the lengths of two lines in an image
	Polyline	Draw a segmented line and measure the distance defined by that line.

Orthopedic Measurements

BUTTON	DESCRIPTION	PURPOSE
	Center line	Define two pairs of points on an image to draw a line through the center of each pair of points
	Cobb Angle	Draw two lines to measure the angle between the two lines
	Hip-Knee-Ankle Angle	Draw a circle (around the femoral head) and two lines to measure the hip-knee-ankle angle in an image

BUTTON	DESCRIPTION	PURPOSE
	Horizontal Parallel Measurement	Draw horizontal parallel lines to measure the distance between the lines in an image
	Mean Length Measurement	Draw multiple lines to calculate the average length of the lines in an image
	Pelvis Schmid	Draw multiple lines to perform a set of coxometry measurements in an image
	Vertical Parallel Measurement	Draw vertical parallel lines to measure the distance between the lines in an image

Shortcuts for Working Efficiently with the DI Image Viewer

Below are shortcuts that can assist in completing frequently performed tasks more efficiently.

ACTION	SHORTCUT
Reset only the brightness and/or contrast without resetting other modifications such as zoom	Press SHIFT + Click
Zoom into the image	Select the Zoom icon then scroll mouse wheel up
Zoom out of the image	Select the Zoom icon then scroll mouse wheel down
Pan an image	Press CTRL + Drag
Reset image zoom or pan without resetting other modifications such as brightness and contrast changes	Press CTRL + Click
Fast navigation of a group of images	Press SHIFT + scroll mouse wheel
Toggle display of an image between a 1x1 layout and the previously selected layout	Double-click the image
Measure a distance on an image using the Markup Caliper	Press ALT + Drag

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