



eUnity™
by client outlook INC

eUnity 6.7

Enterprise Viewing, Integration, and Collaboration Platform

User Guide

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Revision history

Revision number	Date	Author	Description of change
1.0	June 5, 2019	A. Newell	Initial release for eUnity™ 6.7

Regulatory information

Solution overview

eUnity™ enables health care professionals to access, manipulate, and collaborate in real-time over full quality medical images using any web browser without installing client software. eUnity is a server-based solution that integrates with your existing hospital infrastructure. Once the eUnity server is installed, it connects to multiple PACS, VNA, Report, and other systems and displays DICOM images and other clinical content within and across the hospitals, securely from remote locations, or as an integrated part of an EHR or portal system.

Features

One viewer for the enterprise

eUnity is an enterprise-scale solution that gives everyone equal access to images with contextual performance for enterprise viewing, diagnostic radiology reading and breast imaging through one common zero-footprint platform. Image viewing can be accommodated from any location, on any device.

Powerful integration

eUnity integrates with your existing hospital infrastructure and performs federated queries to disparate systems, multiple PACS, or VNAs, to provide immediate access to the most recent studies available.

User concurrency

Thousands of users can be supported by a single eUnity server, eliminating complex hardware configurations and maintenance.

Security

eUnity does not store any image data or patient information on any device. All communication containing patient information is secure and encrypted.

Business continuity / disaster recovery

eUnity can be used as:

- your primary enterprise and diagnostic viewing platform
- your PACS backup

- your method of redundancy during down times or for disaster recovery

Multi-Platform

Using your favorite web-browser and OS, eUnity™ runs on Microsoft Windows®, Mac OS® and Linux® in Microsoft Internet Explorer, Microsoft Edge, Mozilla Firefox, Google Chrome, Apple Safari and more

Customer requirements

This documentation for use is intended to assist users in the safe and effective use of eUnity™. This documentation is primarily intended to describe the software supporting eUnity and does not describe the use of the IT equipment on which the eUnity software product solution is installed.

Before using eUnity, users must read this documentation thoroughly, paying particular attention to the warnings, cautions, and notes it contains.

Customer content requirements

DICOM waveform ECG review

eUnity has partial support of DICOM Waveform SOP class 1.2.840.10008.5.1.4.1.1.9.1.2 (General ECG Waveform Storage). For this reason, a site review must be made of this object type prior to clinical use within eUnity. The Client Outlook Inc. support & maintenance team can work with your site administrator to validate this SOP class for your site.

DICOM Basic Text Structured Report and encapsulated PDF review

Due to the broad scope of the underlying formats and wide applicability in clinical workflow of DICOM Structured Reports and DICOM-encapsulated PDFs, a site review must be made of these object types prior to clinical use within eUnity. The requirement to do this is included in the documentation to highlight the risk associated with not maintaining these reviews.

Encapsulated PDF constraints

Lossy presentation

All encapsulated PDF objects are presented as lossy regardless of the underlying format type. eUnity communicates this to the clinician via the "lossy indicator."

Support for subset of PDF object types

PDF objects can contain a wide variety of formats, including image formats such as PNG, JPEG, JPEG2K, as well as vector text and other vector objects. Certain formats, such as JPEG2K, are not supported if embedded in a PDF document.

Structured reports constraints

In case of multiple associated reports with a given study, only the newest report will be displayed. This determination is based on comparing the Content Date (0008,0023), Content Time

(0008,0033), Verification DateTime (0040,A030), and Observation DateTime (0040,A032) tags to derive the latest report.

Measurement, markup, and annotation

Accuracy of measurements

The user must be aware and account for the effects to the accuracy of measurements due to image quality, including, but not limited to:

- the accuracy of patient positioning and fixation
- patient motion
- the modality type and acquisition protocol
- image acquisition and reconstruction distortions
- image resolution: both spatial and contrast resolution

DICOM image calibration review

The methods used by existing modalities and new modalities (including any modality software updates) to determine medical image calibration values for subsequent measurements must be reviewed prior to clinical use within eUnity. While this is a standard operating procedure for most hospitals, the requirement to do this is included in the documentation to highlight the risk of incorrect measurement values which is associated with not maintaining these reviews. See the table within the [Calibration](#) section for how calibration is determined based on the source data from the DICOM header of an image.

Measurement use

The ability of the user to place measurement control points on an image displayed within a viewport is also one of the factors determining the accuracy of measurements. The user must take care when placing measurements. Settings such as zoom factor may affect how accurately users can place measurements. The user is responsible for determining the accuracy of the measurements.

Viewing

Collaboration

While the collaboration server attempts to synchronize all clients there may be issues related to networking that prevent the same image from being displayed to all users, or the cursor location being represented equally to all clients. If using collaboration for a diagnostic consultation, always verify which image and feature is being discussed.

Hanging protocols

Hanging protocols allow a rotation to be applied to the images within a series. Therefore, the images displayed may have a rotation applied. Check with your system administrator to see which hanging protocols with image rotations, if any, are configured.

Quality of reformatted (MPR/MIP) and volume rendered stacks

All reformatted and volume rendered views (MPR and 3D) are treated as 'Lossy' and will display a 'Lossy' indicator in the upper-right corner of the view

CINE module

When a DICOM Cine Module is present, eUnity attempts to play back the DICOM Series at the Frames Per Second (FPS) specified in the DICOM Cine module. In the absence of a DICOM Cine module, eUnity defaults to 30 FPS. eUnity presents a label during playback that describes, "currently presented fps / selected FPS (selected FPS as a percentage of the DICOM specified or default FPS)" e.g. 28 / 30fps (100%). If the FPSs cannot be achieved, the FPS label will update to show how many FPS are being presented (e.g. 28 / 30 FPS (100%)). If frames are dropped, a yellow CINE icon will be displayed to communicate this to the user.

Images viewed

The user is responsible for ensuring they have viewed all relevant images for each study they view. When viewing a study, eUnity does not auto populate the study when new images as they arrive.

Third-party software

Antivirus software

Antivirus software or equivalent mitigation must be used to protect eUnity from downtime as a result of a virus or other malicious software.

Unauthorized third-party software

Do not install unsupported software on the eUnity servers. This could interfere with, or cause loss of or damage to patient-related data, introduce instability, or introduce computer viruses.

Network requirements

Network redundancy

eUnity is not a primary storage system and may be sold as software only. Network redundancy, manual workflows, back-up systems and other risk mitigation are recommended and are the

responsibility of the customer to implement and manage.

For example:

- for longer or planned delays, users may use the PACS, modality or film to review medical images.
- daily backup procedures and or automated off site back-ups are the responsibility of the customer.

Privacy and security

Server SSL certificate

For privacy and security reasons eUnity must be run in HTTPS mode with a signed SSL certificate. The customer is responsible for obtaining a signed certificate from an authorized signing authority. The customer is responsible for ensuring all eUnity client communications with the eUnity server are over HTTPS connections.

Browser policies

For convenience some browsers store user names and passwords. eUnity does not limit this option as it may interfere with password managers, but when using any computer best practices and judgment should be followed before storing or remembering any authentication information.

Sale requirements

US federal law restricts this device to sale by or on the order of a physician (or properly licensed practitioner). For all other regions, customers must identify and adhere to their applicable laws.

Compatibility

Hardware requirements

The equipment is used according to the intended use and instructions provided in the Installation Guide and help documentation.

Software requirements

No software other than that which is distributed with this package or is sanctioned by Client Outlook Inc. will reside on the eUnity server.

eUnity has many configurations, settings, and other files (settings) that can be edited by users with access to the server(s) The settings are critical to proper functioning of the solution, editing the

setting must only be edited by trained experienced users. Never make any changes without consulting the manufacturer. If you have any questions about making changes contact the manufacturer.

Environment requirements

eUnity must be operated in an environment where the minimum specified requirements for software, hardware and network performance are met.

Software updates

As updates for eUnity become available, customers should work with their appropriate support contacts to update their installation of eUnity. These software updates are essential to keep eUnity operating safely, effectively, and reliably.

Intended use

Overview

Supported modalities are listed in the DICOM Conformance Statement.

Legal information

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United States

eUnity™ is a software application that displays medical image data and associated clinical reports to aid in diagnosis for healthcare professionals. eUnity™ performs operations relating to the transfer, storage, display, and measurement of image data.

eUnity™ allows users to perform image manipulations, including Window / Level, rotation, zoom, measurement, and markup. eUnity™ provides 2D display, multi-planar reformatting, and 3D visualization of medical image data, and mobile access to images.

eUnity™ displays both lossless and lossy compressed images. For lossy images, the medical professional user must determine if the level of loss is acceptable for their purposes. Display monitors used for reading medical images for diagnostic purposes must comply with applicable regulatory approvals and with quality control requirements for their use and maintenance. For mobile diagnostic usage when a full workstation is not available.

Mobile usage for mammography is for reference and referral only.

Canada

eUnity™ is a software application that displays medical image data and associated clinical reports. eUnity™ performs operations relating to the transfer, storage, display, and measurement of image data.

eUnity™ allows users to perform image manipulations, including Window / Level, rotation, measurement, and markup. eUnity™ provides 2D display, MPR and 3D visualization of medical image data, and mobile access to images.

The communication and storage components of the eUnity™ system are primarily DICOM communication over TCP/IP networks, digital image storage on computer hard disk drives.

It is the user's responsibility to ensure that eUnity™ is used with appropriate display hardware and that image type and quality are suitable for their intended clinical application based on the regulations and / or their professional association's guidelines pertaining to the anatomy and pathology being studied. When using on a mobile device, it is not intended to replace a full workstation images and mammography, or digital breast tomography images must not be used for diagnostic interpretations.

eUnity™ supports the following modalities: CR, CT, DX, ECG, MR, MG, NM, OP, PR, PT, RF, SC, SR, US, XA, VL.

Europe and Australia

eUnity™ is a software application that displays medical image data and associated clinical reports. eUnity™ performs operations relating to the transfer, storage, display, and measurement of image data.

eUnity™ allows users to perform image manipulations, including Window / Level, rotation, zoom, measurement, MIP/MPR/3D, and markup.

eUnity™ displays both lossless and lossy compressed images. For lossy images, the medical professional user must determine if the level of loss is acceptable for their purposes.

Display monitors used for reading medical images for diagnostic purposes must comply with applicable regulatory approvals and with quality control requirements for their use and maintenance.

Other

Certification for other regions is pending. Please contact Client Outlook Inc. for more information.

Document conventions

Quick reference

Many of the topics in the Tools section of the user guide have a "quick reference" at the top of the topic. This shows the tool icon, tool name, and a brief description of the tool's behavior so that you can quickly find the tool you're looking for.

Example:



Eraser

Click the Eraser tool to enable Eraser mode, and then left-click a measurement or annotation to erase it.

Notes

Where applicable, key notes are provided in the documentation as follows:



NOTE

A key note of interest for the reader.

Caution

Where applicable, cautions are provided in the documentation as follows:



CAUTION

This is a caution statement.

Warning

Where applicable, warnings are provided in the documentation as follows:



WARNING

This is a warning statement.

Documentation warranty statement

Characteristics of the products described in this publication can be changed at any time without notice.

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The information in this documentation is subject to change without notice.

Hardware and platform requirements

Minimum requirements for web client for enterprise and cloud

When eUnity™ is used as an Enterprise or Cloud Viewer, the following are minimum PC requirements:

	HTML5	Adobe Flash (Legacy)
Operating system	Windows® 7, Windows® 8/8.1, Windows® 10, macOS® X 10.9+ (Intel)	Windows® 7, Windows® 8/8.1, Windows® 10, macOS® X 10.9+ (Intel)
Supported browsers While eUnity™ stores no patient information on the client machine, we do recommend closing the browser when finished viewing images.	Safari 10+, IE11*+, Firefox 42+, Chrome 53+, Edge 44+	Browser running Flash Player v11.3+ (Note: Using the most recent Flash Player release is recommended.) Safari 10+, IE9*+, Firefox 42+, Chrome 53+, Edge 44+
Hardware	• Modern x64 Consumer CPU • Intel i3 or equivalent • 2+ Cores @1.5Ghz+ • 4096 MB of RAM • 512MB+ of graphics memory • 10Mbit or higher network speed • 4G/LTE+ (cell network speed)	• Modern x64 Consumer CPU • Intel i3 or equivalent • 2+ Cores @1.5Ghz+ • 4096 MB of RAM • 512MB+ of graphics memory • 10Mbit or higher network speed • 4G/LTE+ (cell network speed)

* On Windows 7, only IE11 with KB2929437 update is supported. For more information, see:

<https://support.microsoft.com/en-us/help/2929437/description-of-the-security-update-for-internet-explorer-11-on-windows>

Note: Some default browser configurations are known to improperly handle the HTTP/1.1 no-store cache directive and cache information to the local disk. During site validation the enterprise browsers and configurations should be validated to ensure patient data is not unexpectedly cached.

Note: Mobile or low voltage class CPUs require on-site validation to be performed by customer prior to use.

Recommended hardware and platform requirements for rad-reading

When eUnity is used as a radiology workstation (rad-reading), the following are **recommended** workstation requirements:

	HTML5
Operating system	Windows® 10, macOS® X 10.9+ (Intel)
Supported browsers While eUnity™ stores no patient information on the client machine, we do recommend closing the browser when finished viewing images.	Chrome 70+
Hardware	• Modern x64 Consumer or Business CPU • Intel i7/i9 or equivalent • 4+ Cores @ 3.6Ghz+ • 16GB+ of RAM • Dedicated Graphics Card (Nvidia or ATI) • DirectX 12 Compatible • 3GB+ of dedicated graphics memory • 200Mbit+ or higher network speed

Mobile

	iOS	Android
Operating system	iOS 10+	Android™ 6+
Hardware	iPhone® 6+, iPad Air+	ARMv7 processor with Vector FPU, Minimum 550MHz, ES2.0, H.264 & AAC H/W Decoders
App store	Apple App Store	Google Play Store

Platform differences

There are a number of differences in supported features between eUnity clients on different platforms.

Feature	Desktop web browsers		Mobile (iOS & Android™)		
	HTML5	Adobe Flash	Tablet	Phone	HTML5
Navigate	✓	✓	✓	✓	✓
Zoom Tool/Pan	✓	✓	✓	✓	✓
Invert	✓	✓	✓	✓	✓
Flip and Rotate	✓	✓	✓	✓	✓
Image Sharpening	✓	✓			✓
Toggle Demographics	✓	✓	✓	✓	✓
Linear Measurements	✓	✓			✓
Ellipse ROI	✓	✓			✓
Angle Measurement	✓	✓			✓
Freeform ROI	✓	✓			✓
Cobb Angle Measurement	✓	✓			✓
Line Annotation	✓	✓			✓
Arrow Annotation	✓	✓			✓
Freehand Annotation	✓	✓			✓
Text Annotation	✓	✓			✓

Feature	Desktop web browsers		Mobile (iOS & Android™)		
	HTML5	Adobe Flash	Tablet	Phone	HTML5
Spine Labeling	✓	✓			
Eraser	✓	✓			✓
Revert to Original	✓	✓	✓	✓	✓
Study Information	✓	✓	✓	✓	✓
Report View	✓	✓	✓	✓	✓
View Format	✓	✓	✓	✓	✓
Cine	✓	✓	✓	✓	✓
Export	✓	✓			
Scout/Reference Lines	✓	✓			✓
Triangulation Mode	✓	✓			✓
Link Series	✓	✓			✓
Paper Printing	✓	✓			
Collaboration	✓	✓	✓		✓
Keyboard shortcuts	✓	✓			
Vertical Series Tray Position	✓				

Feature	Desktop web browsers		Mobile (iOS & Android™)		
	HTML5	Adobe Flash	Tablet	Phone	HTML5
Horizontal Tray Position	✓	✓			
Multi-Study Display	✓	✓			
Multi-Monitor Split Screen	✓	✓			
MPR / 3D	✓	✓			✓

Trademark legal notice

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Calibration and compression information

Calibration

The following table details how calibrations are determined based on the source data from the DICOM header of an image.



CAUTION

Users must consider the measurement types, units, and values and the source of a measurement's calibration. For example, with X-Ray-based modalities, the user must consider if the calibration takes magnification into account.

Calibration type	Used (Yes/No)	Description
(3D)	Yes	Calibration for a 3D modality (like CT and MR), using the Pixel Spacing field. This should be a correct calibration for all patient anatomy.
(fiducial)	Yes	For an X-Ray projection modality (like CR or XA), the Pixel Spacing field has been used, along with a Pixel Spacing Calibration Type field which describes this calibration as "FIDUCIAL". This means that a calibration has been done on the modality to some fiducial marker within the X-Ray image.
(geometry)	Yes	For an X-Ray projection modality (like CR), the Pixel Spacing field has been used, along with a Pixel Spacing Calibration Type field which describes this calibration as "GEOMETRY". The beam geometry has been used by the modality to get an approximate calibration for anatomy in the view. Alternately, for Enhanced XA SOP Classes, the Object Pixel Spacing In Center Of Beam may have been used, which is also an automatic geometry-based calibration.
(imager)	Yes	For an X-Ray projection modality (like CR or XA), Imager Pixel Spacing (the detector plate pixel spacing) has been used. No Estimated Radiographic Magnification Factor has been found to correct it. It is possible that a Pixel Spacing field also exists, but if it does, it was found to be the same as Imager Pixel Spacing. Pixel Spacing is then ignored as just being a duplicate of Image Pixel Spacing.

Calibration type	Used (Yes/No)	Description
(imager/ERMF)	Yes	For an X-Ray projection modality (like CR or XA), both the Imager Pixel Spacing and the Estimated Radiographic Magnification Factor fields have been used. The calibration divides out the Estimated Radiographic Magnification Factor, providing a measurement that is closer to correct for the anatomy in the image, compared to the Imager Pixel Spacing (the plate dimensions) alone. It is possible that a Pixel Spacing field also exists, but if it does, it was found to be the same as Imager Pixel Spacing. Pixel Spacing is then ignored as just being a duplicate of Image Pixel Spacing.
(nominal scanned)	No	Nominal Scanned Pixel Spacing (pixel dimensions on a piece of scanned film) is not based on any anatomy or detector calibration and is therefore not used by the viewer. The text (unknown) will be displayed with measurements in pixels.
(unknown)	Yes	The calibration type is unknown, and the modality is not a known 3D modality (like CT and MR), nor a projection modality with Imager Pixel Spacing information (like CR). If measurements are in mm, a Pixel Spacing field was found, but without any Pixel Spacing Calibration Type field to explain it. This often happens for Secondary Capture images. If the measurements are in pixels, then no calibration information exists.
(unknown recalibration)	Yes	For an X-Ray projection modality (like CR), the Pixel Spacing field has been used, but it doesn't match the Imager Pixel Spacing field. This indicates a recalibration in the modality, but there is no Pixel Spacing Calibration Type field to explain why this recalibration occurred.
(US region)	Yes	The Calibration comes from an Ultrasound Calibration Region in the DICOM object. These are usually set by the modality and should be correct.
(CW Doppler)	Yes	A subtype of US Region calibration representing Continuous Wave Doppler.
(PW Doppler)	Yes	A subtype of US Region calibration representing Pulsed Wave Doppler.
(presentation state)	Yes	The currently-used presentation state for the image has a calibration value in the Presentation Pixel Spacing field, for a non-3D modality. Note: Whether this is calibrated to a fiducial marker, the dimensions on the plate, or includes a geometric Estimated Radiographic Magnification Factor is unknown. This will be displayed in cases where

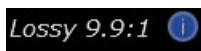
Calibration type	Used (Yes/No)	Description
		the calibration in the presentation state does not match the calibration in the image header.
(presentation state 3D)	Yes	The currently-used presentation state for the image has a calibration value for a 3D imaging modality (like CT, MR, and NM) value in the Presentation Pixel Spacing field. This should be a correct calibration for all patient anatomy. This will be displayed in all cases where the calibration is (3D) and a presentation state is applied.

Lossy image display

Lossy images are displayed with an indicator in the demographics that identifies the image data as lossy compressed.

Lossy compression indicator

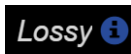
Shown in the viewport to identify the image data as lossy and summarize the compression ratio. Hover the cursor over the  to display the following information:



- the type of image compression
- the compression ratio
- derivation description, if one exists

If the image has multiple compression types and ratios, the tooltip displays all known type / ratio combinations.

Lossy compression indicator (reformatted and rendered views)



WARNING

All reformatted and volume rendered views (MPR and 3D) are treated as Lossy and will always display a Lossy indicator.

In MPR, 3D, and Fusion modes, hover the cursor over the  to display the final JPEG render quality.

Getting started

Indicators overview

Indicators are displayed in the viewports to provide feedback on the state of the image.

Flip and Rotate

Rotate 90°	Rotated 90° indicator Shown in the viewport to indicate that the image has been rotated 90°.
Rotate 180°	Rotated 180° indicator Shown in the viewport to indicate that the image has been rotated 180°.
Flip	Flipped indicator Shown in the viewport to indicate that the image has been flipped.

Fusion

Limited Measurements	Limited Measurements indicator Shown in the viewport to indicate that not all measurement types are available for the series. ROI measurements for the average and standard deviation of pixel values can only be performed on series that match the acquisition plane (typically axial). Click the  for more information.
Partial Volume	Partial Volume indicator Shown in the viewport to indicate that the complete 3D volume cannot be rendered. A partial volume occurs when the original 2D data does not provide contiguous 2D slices.

SUV not available

SUV not available indicator

Shown in the viewport to indicate that there is not sufficient data to perform SUV measurements. Click the  for more information.

Image loading



Image loading indicator

Shown in the viewport to indicate that data is being loaded.



CAUTION

When you load an image or zoom further into an image, eUnity will typically need to load more data. Once loaded, the indicator will disappear. If the indicator is visible, you must wait for the full data to be loaded.

Image Sharpening



Image Sharpening indicator

Shown in the viewport to indicate that image sharpening is applied.

Key Images



Key Image indicator

Shown in the viewport to indicate that it is a Key Image.



Source image indicator

Shown in the viewport on the source image from which a Key Image was created. The number represents the number of derived Key Images.



Unsaved Key Image indicator

Shown in the viewport on a Key Image when Key Images are created in Review mode.

Linking



Not linked

Shown in the viewport, a broken link indicator means that no matching slice could be found between the series. By default, the slices in linked series need to be within 5mm of each other to be considered for linking. If slices exceed the maximum deviation angle, the series will not be linked, and the broken link indicator will be displayed.



Series linked

Shown in the viewport, a link indicator means the series is successfully linked.

Lossy compression

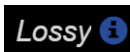


Lossy compression indicator

Shown in the viewport to identify the image data as lossy and summarize the compression ratio. Hover the cursor over the  to display the following information:

- the type of image compression
- the compression ratio
- derivation description, if one exists

If the image has multiple compression types and ratios, the tooltip displays all known type / ratio combinations.



Lossy compression indicator (reformatted and rendered views)



WARNING

All reformatted and volume rendered views (MPR and 3D) are treated as Lossy and will always display a Lossy indicator.

In MPR, 3D , and Fusion modes, hover the cursor over the  to display the final JPEG render quality.

Mammography

	CAD markers displayed
CAD: Calc: 2 Mass: 1	Shown in the viewport to indicate that CAD markers are displayed. The numbers represent the count for every type of displayed marker.
	No CAD findings
CAD: No Findings	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, CAD exists, but there are no findings to display for the image.
	Error with CAD information
CAD: FAIL	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, a fatal error with CAD information.
	Image not related to CAD
No CAD for Image	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, the image is not related to CAD.
	No CAD in study
No CAD for Study	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, there is no CAD in the study.



Quadrant View indicator

When in Quadrant View mode, this indicator is shown in the viewport on the non-breast wall side to indicate which quadrant of the breast is currently visible.



Related series indicator

In mammography studies, if the hanging protocol is set to Navigate Related Series, images of the same view type are stacked in the same viewport. This indicator is shown in the viewport to indicate how many images are stacked in the viewport and where you are in the stack.

System administrators can configure eUnity to include tomosynthesis images with the same view type in related series stacks.



Tomosynthesis indicator

Shown in the viewport for breast tomosynthesis studies to show the location of the current slice in relation to the other images in the series. The indicator shows directional markers to indicate whether you are scrolling in a caudal / cranial, or a medial / lateral direction.

Presentation States



Presentation State Applied indicator

Shown in the viewport to indicate that a presentation state is applied.

Keyboard and mouse shortcuts

The following list shows the default keyboard and mouse shortcuts in eUnity™.

Modes

Keyboard / mouse combination	Description
W	Toggle Window-Level Mode
Z	Toggle Pan / Zoom-Level Mode
N	Toggle Navigate Mode
T	Toggle Triangulation / Cursor Mode
L	Toggle Linear Measurement Mode
E	Toggle Elliptical ROI Measurement Mode
F	Toggle Free-form ROI Measurement Mode
A	Toggle Angle Measurement Mode
B	Toggle Cobb Angle Measurement Mode
C	Toggle Circle Measurement Mode
Y	Toggle Arrow Annotation Mode
G	Toggle Freehand Annotation Mode
Q	Toggle Series Repositioning Mode
V	Toggle Spine Labeling Mode

Flips and rotations

Keyboard / mouse combination	Description
C + Shift	Rotate Series Clockwise
W + Shift	Rotate Series Counter-clockwise
H + Shift	Series Horizontally
V + Shift	Flip Series Vertically

Image navigation tools

Keyboard / mouse combination	Description
Cursor Key Up	Scrolls images from a higher number image to a lower number image
Cursor Key Down	Scrolls images from a lower number image to a higher number image
Home	Returns the active ViewBox to the first image (lowest number image)
End	Returns the active ViewBox to the last image (highest number image)

Series navigation tools

Keyboard / mouse combination	Description
Cursor Key Left	Place the previous series, which is not currently displayed, into the active viewport
Cursor Key Right	Place the next series, which is not currently displayed, into the active viewport

Mouse actions

Keyboard / mouse combination	Description
Mouse Right Drag	Window Level Adjust
Mouse Middle Drag	Zoom with Mouse
Mouse Left Drag	<<current toolbar mode>>
Mouse Left Drag + Ctrl	Temporarily unlink series and scroll images
Mouse Right Drag + Ctrl	Pan with Mouse
Mouse Middle Drag + Ctrl	Triangulate with Mouse
Mouse Left Drag + Ctrl + Shift	Series reposition
Mouse Right Click	Show Context Menu

Study Tools

Keyboard / mouse combination	Description
O	Revert study to original Window-Level and remove all markup
P	Toggle Cine Mode
D	Toggle Demographics
S	Toggle Reference Lines
K	Toggle Link Series
R	Show Report (if available)
M	Toggle Show / Hide Markup

Keyboard / mouse combination	Description
SPACE	Toggle Cine Play / Pause
SPACE + Ctrl	Capture Key Image

Window Level Presets

Keyboard / mouse combination	Description
0 (zero)	Revert study to original Window Level
1... 9	Apply Window Level preset

Image Sharpening presets

Keyboard / mouse combination	Description
0 (zero)	Revert sharpening level to original
1... 9 + Shift	Apply Window Level preset
S + Shift	Toggle Sharpening preset

Zoom tools

Keyboard / mouse combination	Description
+	Zoom in on the active viewport
-	Zoom out on the active viewport

Markup

Keyboard / mouse combination	Description
Delete	Deletes the selected markup

MPR / 3D

Keyboard / mouse combination	Description
O + Shift	Create oblique
B + Shift	Create curved MPR
I + Shift	Toggle MPR curve orientation indicator
L + Shift	Toggle linked MPR curve orientation indicators
R + Shift	Reset MPR curve rotation angle
C + Shift	Toggle clip box
P + Shift	Cut plane mode
F + Shift	Scalpel mode
Esc	Cancel segmented area
W + Shift	Settings panel

Mammography

Keyboard / mouse combination	Description
A + Shift	Fit to window

Keyboard / mouse combination	Description
Q + Shift	Quadrant view
Down + Shift	Quadrant view forward
Up + Shift	Quadrant view backward
D + Shift	Same size
J + Shift	Toggle 2D / 3D

Log in and log out (desktop client)

For information on logging in and logging out on the mobile application, see [Log in or log out \(mobile\)](#)

Log in to eUnity™

To access the eUnity login screen, type the eUnity address in a web browser. For example: `http://localhost`

At the eUnity login screen, do the following:

1. Type your username and password. Note that both fields are case-sensitive.
2. Click Log In. If the login is successful, the Search screen is displayed.

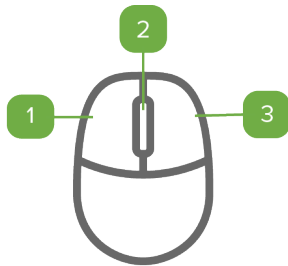
eUnity supports secure LDAP, RADIUS, and local authentication so that users can log in with their enterprise username and password. As well, some sites that use LDAP integration allow users to change their enterprise password from the eUnity Search screen. For more information on configuring external authentication such as LDAP, see the eUnity™ Administration Guide.

Log out of eUnity

To log out of eUnity, click  in the upper-right corner of the Search screen.

Mouse actions

This section describes the default mouse button behaviors. Note that these behaviors may have been modified by your system administrator.



Left-click

1

- Drag up and down to scroll images
- Drag + Ctrl + Shift to reposition series
- Double-click to enlarge viewport

Scroll wheel

2

- Roll up and down to scroll images
- Drag to zoom
- Drag + Ctrl to triangulate

Right-click

3

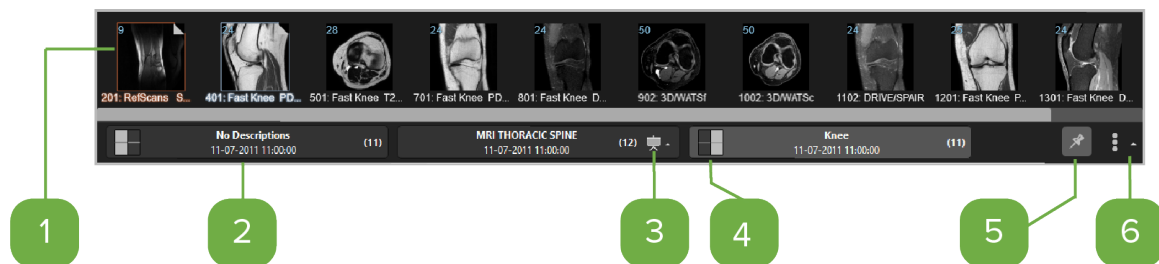
- Drag left and right to change Window Width or drag up and down to adjust Window Level
- Drag + Ctrl to pan
- Click to show context menu

Series Tray

If you are using the HTML5 eUnity™ client, the Series Tray can be positioned horizontally or vertically. There are slight differences in functionality depending on how the Series Tray is positioned.

Horizontal Series Tray

When the Series Tray is positioned horizontally, it shows series in thumbnail view.



Thumbnail view

Each series is represented with a thumbnail image. To open a series, drag it into a viewport or click it to open it in the active (selected) viewport.

1

- the number of images in the series is shown in the upper-left corner of the thumbnail
- the folded corner on the thumbnail indicates that at least one image in the series has been viewed
- the series that is in the active viewport has an orange border around the thumbnail and an orange glow around the description text
- the series that are currently open in the viewer have a blue border around the thumbnail and a blue glow around the description text

Study pill

Each rectangular pill represents a study that is available for the patient. Click a study pill to see its series.

2

- the number in brackets on the right indicates how many series the study has
- the study pill with the lighter gray background is the study that is currently active in the Series Tray
- the study pills with the darker gray background are the studies that are not currently active in the Series Tray

3

Presentation States indicator

Indicates that there are Presentation States available for the study. Click to select a Presentation State.

4

Study position indicator

Indicates the study position on the screen. If no screen position indicator is shown on the study pill, then the study is currently not shown in the viewer.

5

Pin the Series Tray

Pin the Series Tray so that it is always shown or unpin it so that it is hidden when it is not active.

6

Reposition the Series Tray horizontally or vertically

Reposition the Series Tray at the top, bottom, left, or right of the screen. Note that repositioning is available for HTML5 clients only.

Vertical Series Tray

When the Series Tray is positioned vertically, it can show series in thumbnail view or text view. The image below shows the Series Tray in text view.



Text view

1

In the Series Tray, show the available series as a text list instead of thumbnail images. This option is available only for the vertical Series Tray. For information on thumbnail view in the Series Tray, see [Thumbnail view](#) above.

Collapse

2

Click the arrow to collapse or show the Series Tray.

Study pill

3

Each rectangular pill represents a study that is available for the patient. Click a study pill to see its series.

- the number in brackets on the right indicates how many series the study has
- the study pill with the lighter gray background is the study that is currently active in the Series Tray
- the study pills with the darker gray background are the studies that are not currently active in the Series Tray

Series list

4

In text view, the series are shown as text instead of thumbnails. To open a series, drag it into a viewport or click it to open it in the active (selected) viewport.

- the number of images per series is shown to the right in blue text
- the series that is in the active viewport has an orange glow around the description text
- the series that are currently open in the viewer have a blue glow around the description text

5

Study position indicator

Indicates the study position on the screen. If no screen position indicator is shown on the study pill, then the study is currently not shown in the viewer.

6

Reposition the Series Tray horizontally or vertically

Reposition the Series Tray at the top, bottom, left, or right of the screen. Note that repositioning is available for HTML 5 clients only.

7

Viewed image indicator

The folded corner indicator means that the series has had at least one image viewed.

8

Number of images

The number in brackets shows the number of images in the series.

9

Presentation States indicator

Indicates that there are Presentation States available for the study. Click to select a Presentation State.

Tools overview

3D

See [3D tools](#) for more information.



Clip Box

The clip box can be adjusted by dragging within a specific side. Drag down to move the plane into the volume (cut more). Drag up to move the plane out of the volume (cut less). Selecting one of the edges of the clip box the orientation of the clip box can be changed without changing its size or the orientation of the volume.



Cut Plane

Rotating the 3D volume to a desired view and click the Cut Plane icon. A cut plane normal to the current 3D view will be created. While in the cut plane mode, the cut plane can be moved into the volume by dragging the mouse down or out of the volume by dragging the mouse up.



Scalpel Tool

Remove or isolate a section of an image by dragging the mouse along the border of the area to segment then clicking on the region you would like to keep.

Advanced MPR

See [Advanced MPR tools](#) for more information.



Curved MPR

In Advanced MPR mode, click along the anatomy in one of the viewports and the curved MPR is created in the lower-right viewport. Each point in the curve is along the center axis of the curved MPR view.



Create oblique

Every viewport is annotated with a color that directly corresponds to the reference line on other intersecting images in other viewports. To generate new planes, drag the controls corresponding to the color of the viewport you wish to change until desired orientation is achieved.

Advanced visualization

See [MPR / 3D](#) or [PET /CT Fusion](#) for more information.



Advanced Visualization modes

Select Advanced Visualization modes such as 3D, MPR, Advanced MPR, and Fusion. Note that the options in this menu are enabled / disabled depending on the active study or series type.

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.



Advanced Visualization Parameters

View or change render types, render parameters, or SUV parameters. The tabs / options that are available in the panel depend on the visualization mode (i.e. Fusion vs 3D) and the series type (i.e. PET vs CT) or series orientation (i.e. same plane as the original series or not) that is selected in the viewer.

Annotations

See [Annotation tools](#) or [Annotations and measurements in MPR / 3D view modes](#) for more information.



Arrow

To add an arrow annotation, left-click to start the arrow and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Freehand

To add a freehand annotation, left-click and drag the mouse. Let go of the mouse button to end the annotation. The freehand annotation cannot be edited.



Line

To add a line annotation, left-click to start the line and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition.



Polygon

To add a polygon annotation, left-click to start the polygon. Each additional left-click adds another point to the polygon. To end the polygon, double-click or left-click on the polygon start point. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Rectangle

To add a rectangle annotation, left-click to start the rectangle and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Spine Labeling

Add spine-related labels to images. In Spine Labeling mode, the Spine Labeling tab is activated to provide access to other spine labeling tools.

For more information, see [Spine Labeling](#).



Text Annotation

Click the location that the text should start. A text box is displayed to enter up to 35 characters. To edit the text, double-click the annotation to select it and change the text. To move the annotation, drag it to a different location. Note that the Text Annotation tool cannot be used in Full Screen mode.

Cine

See [Cine](#) for more information.



Toggle Cine Mode

Play a series of images in succession (like a movie). When Cine mode is activated, the Cine toolbar is displayed in the active viewport. The default location of the Cine toolbar can be configured by the system administrator.



Collaborate

See [Collaboration](#) for more information.



Share this Session

Share your screen with other participants across all supported eUnity™ platforms (desktop web browser and mobile devices).

Demographics

See [Demographics](#) for more information.



Toggle Demographics

Hide or show demographics in the viewport.

Export

See [Export](#) for more information.



Export image to JPEG / PNG

Export an image to your local device in JPEG or PNG format.

Flip and rotate

See [Flip and rotate](#) for more information.



Flip (Horizontally)

Click to flip the image horizontally in the viewport.



Flip (Vertically)

Click to flip the image vertically in the viewport.



Rotate Left

Click to rotate the image counter-clockwise in the viewport. The image is rotated by 90 degrees each click.



Rotate Right

Click to rotate the image clockwise in the viewport. The image is rotated by 90 degrees each click.



Free Rotate by Drawn Angle

Rotate the image by a custom amount in the viewport.

Fusion

For more information, see [Advanced Visualization Parameters for Fusion](#), [Fusion Blending](#), [Fusion Presets](#), [SUV measurement tools](#)



Advanced Visualization Parameters

View or change render types, render parameters, or SUV parameters. The tabs / options that are available in the panel depend on the visualization mode (i.e. Fusion vs 3D) and the series type (i.e. PET vs CT) or series orientation (i.e. same plane as the original series or not) that is selected in the viewer.



Fusion Blending

Left-click and drag the mouse up or down to increase or decrease the PET opacity. Increasing the opacity shows more of the functional (metabolic) data from the PET. Decreasing the PET opacity shows more of the anatomical data from the CT.



Fusion Presets

Apply presets such as Hot Iron to fused PET / CT studies so that the metabolic data of the PET information is assigned a preset pseudo color value from the Color Look Up Table (CLUT).



Point Tool

Measures the exact value for a specific point. The unit of measure depends on the modality type. For example, in PET images it provides the SUV value, and in CT images it provides the Hounsfield units.

Note that when using the Point Tool on reconstructed series, measurements can be made only on series that match the acquisition plane (typically axial).



Circle ROI

A single left-click starts the measurement and a second left-click ends the measurement. To edit, select the measurement to be active and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.

Hanging protocols

For more information, see [Hanging protocols overview](#)



Settings - Hanging Protocols

Open the Hanging Protocol Settings panel to add, edit, or delete hanging protocols.



Add Hanging Protocol

Create a new hanging protocol.



Edit Hanging Protocol

Edit the active hanging protocol. This icon is available only when there is an active hanging protocol. Access non-active hanging protocols in the Hanging Protocol Settings panel.



Select Hanging Protocol

This dropdown provides a list of "close match" hanging protocols. Choose a hanging protocol to apply to the current study in the viewer.



Presentation Steps

Click the dropdown arrow to show the available Presentation Steps for the active hanging protocol. Click a Presentation Step to jump to it.

Hover the cursor over the icon to show which hanging protocol is currently applied.



Backward

Move to the previous Presentation Step in the hanging protocol.



Forward

Move to the next Presentation Step in the hanging protocol.

Image sharpening

See [Image sharpening](#) for more information.



Image Sharpening Presets

Click to apply a preset sharpening algorithm on an image in a viewport. Presets are configurable by the system administrator.

Invert

See [Invert](#) for more information.



Invert Brightness

Click to apply a monochrome inversion to the selected series. Note that for mammography images, the viewport background retains its color when the image is inverted.

Link

See [Link series](#) for more information.



Link Series

Link series together to use zoom, pan, scroll, and optionally Window Level across multiple series. Window Level linking must be enabled by the system administrator.

Magnifying glass

See [Magnifying glass](#) for more information.



Magnifying Glass

Click to enable the Magnifying Glass tool and magnify an area of an image. You can have up to four magnifying glasses open at a time.

Mammography

See [Mammography CAD objects](#), [Navigate Relevant Priors and Navigate Study List](#), [Quadrant View and Fit to Window](#), or [Toggle 2D and 3D views](#) for more information.



Fit to Window

Zoom the identified breast bounding box to fit the viewport and maintain "same size" on each viewport.



Quadrant View

Divide the mammography image into four equally sized quadrants of "same size" to evaluate the entire breast in four separate sections.



Quadrant View Backward

Step through the four quadrants of the image moving backward (counter-clockwise).



Quadrant View Forward

Step through the four quadrants of the image moving forward (clockwise).



Navigate Relevant Priors (Previous)

Open the previous relevant prior for the patient.



Navigate Relevant Priors (Next)

Open the next relevant prior for the patient.



Navigate Study List (Previous)

Open the previous study for the patient.



Navigate Study List (Next)

Open the next study for the patient.



Toggle between 2D and 3D views

Switch between a tomosynthesis slice and the 2D reconstructed view for the selected series in a mammography study.



Toggle CAD

Show or hide CAD data in mammography images.

Measurement tools

See [Measurement tools](#) for more information.



Toggle Markup

Hide or show markup on images. This action will also hide or show Presentation State markup.



Linear Measurement

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and drag the measurement handles. Values are shown in mm and the source of the calibration is shown in brackets.

For more information on linear measurements in ultrasounds, see the [Ultrasound measurements](#) table below.



Ellipse ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Circle ROI

A single left-click starts the measurement and a second left-click ends the measurement. To edit, select the measurement to be active and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Rectangle ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Freeform ROI / Doppler Envelope

Left-click to start the measurement and left-click on the first point selected or double-click to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.

See Ultrasound measurements below for information on using the Freeform ROI tool with ultrasound studies.



Angle Measurement

Left-click to create the vertex. The next two left-clicks set the other points of the angle. To edit, click the measurement to select it and then drag the measurement handles. Values are shown in degrees.



Point Tool

Measures the exact value for a specific point. The unit of measure depends on the modality type. For example, in PET images it provides the SUV value, and in CT images it provides the Hounsfield units.

Note that when using the Point Tool on reconstructed series, measurements can be made only on series that match the acquisition plane (typically axial).



Cobb Angle Measurement

A Cobb angle is the angle formed at the intersection of the two lines, which typically intersect off-screen. The first pair of left-clicks draws the initial line segment and the second pair of left-clicks draws the secondary line segment. A dashed line connects the two segments and the Cobb angle, presented in degrees, is anchored to the connecting line. To edit a measurement, click the measurement to select it and then drag the measurement handles.



Eraser

Click the Eraser tool to enable Eraser mode, and then left-click a measurement or annotation to erase it.

MPR / 3D

For more information, see [MPR / 3D](#).



Clip Box

The clip box can be adjusted by dragging within a specific side. Drag down to move the plane into the volume (cut more). Drag up to move the plane out of the volume (cut less). Selecting one of the edges of the clip box the orientation of the clip box can be changed without changing its size or the orientation of the volume.



Cut Plane

Rotating the 3D volume to a desired view and click the Cut Plane icon. A cut plane normal to the current 3D view will be created. While in the cut plane mode, the cut plane can be moved into the volume by dragging the mouse down or out of the volume by dragging the mouse up.



Scalpel Tool

Remove or isolate a section of an image by dragging the mouse along the border of the area to segment then clicking on the region you would like to keep.

Navigation



Navigate

Navigate study images using the mouse wheel, a left-click drag, touch drag, touch pad drag, or the up and down cursor keys on the keyboard.



Triangulation

Navigate to a selected point in orthogonal series.

Paper Print

See [Paper Print](#) for more information.



Paper Print

Print study reports, images, or a set of images.

Reference lines

See [Reference / Scout Lines](#) for more information.



Toggle Reference Lines

Show or hide overlay lines when using triangulation or scout images.

Revert to original



Revert to Original

Revert a series to its original presentation.

Screen layout

See [Screen Layout](#) for more information.



Screen Layout

Access Study Compare mode or change the monitor or viewport layout.

Series Reposition



Series Reposition

Swap series between viewports.

Spine labeling

See [Spine Labeling](#) for more information.



Spine Labeling

Add spine-related labels to images. In Spine Labeling mode, the Spine Labeling tab is activated to provide access to other spine labeling tools.



Toggle Spine Labeling Markup

Hide or show spine labels. Note that Toggle Markup  also hides / shows spine labels.



Delete All Spine Labels

Delete all spine labels in the study.

Study Information

See [Study Information](#) for more information.



Study List

Open a panel containing information grouped into the following tabs: Study List, Study Details, Report, and Notifications.



Report / Comments

Open the study report in the Study Information panel, if available.

Ultrasound measurements

See [Ultrasound measurements](#) for more information.



Linear measurements in ultrasounds

Calibrated ultrasound images can use standard linear measurements. A single left mouse click starts the measurement and a second left click ends the measurement. To edit a measurement, drag the measurement handles.

When a linear measurement is placed within a region that has two different axes (i.e. units like time and velocity), it will show both units unless the measurement is parallel to one of

the axes. See image below.

A special case exists for velocity-time Doppler Ultrasound regions. In this case, a single click will create the measurement by automatically snapping the other end-point to the zero-velocity axis. See image below.

- Moving the automatic end-point off the zero-velocity axis will transition the measurement into a standard Ultrasound linear measurement.
- Moving the user selected point will keep the automatic end-point locked, sliding it along the zero-velocity axis.



Freeform ROI in ultrasounds

The Freeform ROI tool can be used to calculate the Doppler Envelope for velocity-time regions. ROIs will be locked to the zero-velocity axis and points can be added along the envelope. A double-click will end the ROI creation. See image below.

Window Level

See [Window Level](#) for more information.



Window Level

Change the Window Level for the selected image. Note that for mammography images, the viewport background retains its color when the Window Level is changed.



Reset Window Level

Reset the images to their original Window Level settings.



Window Level Presets

Select a predefined Window Level. Window Level presets are configurable by the system administrator.



Window Level Scope

This feature must be enabled by the system administrator.

Change Window Level to apply to the study, the series stack, or only the image. By default, Window Level operations apply to the series stack.

Zoom / Pan

See [Zoom / Pan](#) for more information.

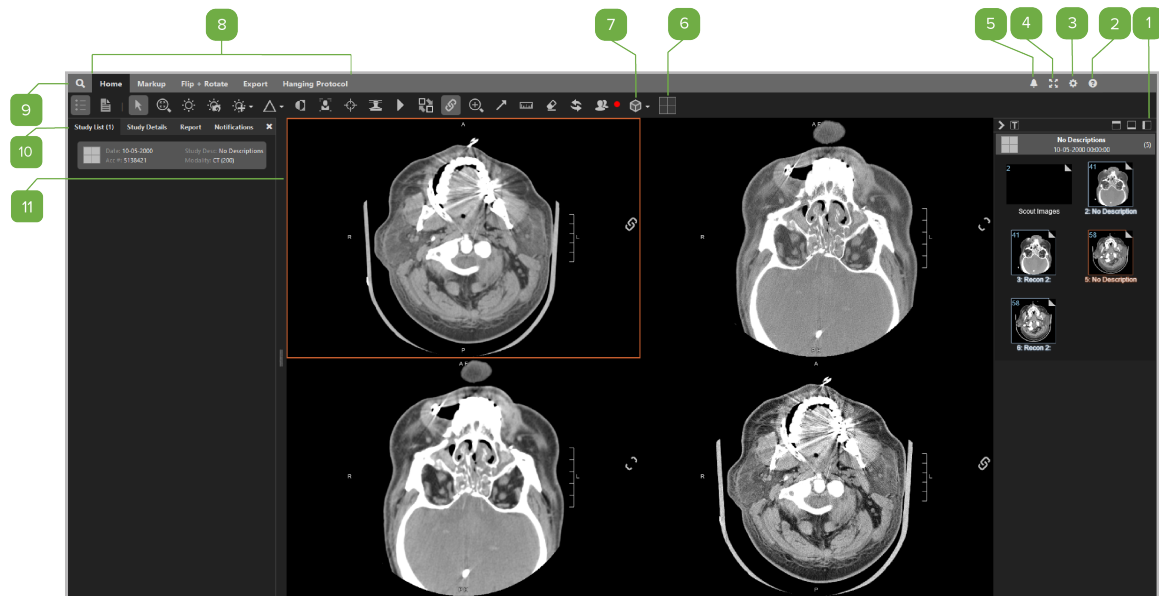


Zoom / Pan

Zoom in on or pan an image in the selected viewport. When series are linked, zoom/pan is applied across all linked series.

Viewer overview

The following section provides an overview of the viewer in eUnity™. Note that all features may not be available. Some features are enabled or disabled by your system administrator.



1

Series Tray

The Series Tray shows the available series for a study. From here, the series can be opened in the viewing area.

Series Tray

2

Documentation

Click to open the eUnity User Guide.

Document
conventions

3

Settings panel

Click to open the Settings panel. Note that the Settings panel and each tab within the panel must be enabled by the system administrator.

- General tab: Select options for saving presentation states (Annotations / Markup, Window / Level, Spine Labels) and Key Images.
- Hanging Protocol tab: Edit hanging protocols
- Toolbar tab: Edit the toolbar
- Context Menu tab: Edit the context menu

Presentation
States

Toolbar

Context menu

4	Full Screen mode Expand the viewer to fill all available monitor space.	Screen Layout
5	Notifications When a study is updated, the bell displays a red indicator to alert you that the study has changed.	Content change notifications
6	Screen Layout Change to Study Compare mode, or change the number or monitors and viewports.	Screen Layout
7	Advanced Visualization Workflows Access Advanced Visualization workflows such as 3D, MPR, MPR Advanced, and Fusion. Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.	MPR / 3D
8	Tool tabs Tools are categorized into different tabs. Tabs such as Spine Labeling, Mammography, and Advanced Visualization become available when these modes are activated.	Tools overview
9	Search screen Access the eUnity Search screen.	Search in eUnity™
10	Study Information panel This panel contains information grouped into the following tabs: Study List, Study Details, Report, and Notifications. These panels can be enabled or disabled by the system administrator.	Study Information
11	Viewport Viewports are the individual partitions in the viewer. If a viewport is selected, it is outlined in orange. Double-click a viewport to enlarge the image and show it in one-up layout. Double-click again to return the viewport to its previous layout.	Screen Layout

Search

Search screen overview

The following section provides an overview of the Search screen in eUnity™. Note that all features may not be available. Some features are enabled or disabled by your system administrator or, if you are using an older browser (Internet Explorer 8 and earlier) or if you have Compatibility Mode turned on in IE, you can access only the legacy Search screen.

The legacy search has all the functionality of the current search, with the exception of search templates, sort columns, collapse columns, hide / pin Search panel, or change theme.

Note: If the legacy Search screen is displayed and you are on a modern browser, it is most likely due to a site configuration setting. Contact your site administrator to enable the non-legacy search.

The screenshot shows the eUnity Search interface. On the left is a search panel with various filters and a search button. On the right is a table of search results. Numbered callouts point to specific elements:

- 1: Log out button
- 2: Search panel toggle
- 3: Search panel toggle
- 4: Search panel toggle
- 5: Search panel toggle
- 6: Search panel toggle
- 7: Search panel toggle
- 8: Search panel toggle
- 9: Search panel toggle
- 10: Search panel toggle
- 11: Search panel toggle
- 12: Search panel toggle
- 13: Search panel toggle
- 14: Search panel toggle
- 15: Search panel toggle
- 16: Search panel toggle

1

Log out

Log out of eUnity.

See [Log in and log out \(desktop client\)](#) for more information.

2

Documentation

Click to open the eUnity User Guide.

See [Document conventions](#) for more information on the User Guide.

3

Change password

Change your system password. This feature must be enabled by the system administrator.

4

Change Search screen theme

Note: Search screen themes are not supported in legacy search.

Change the Search screen from dark to light.

5

Sort by column

Click a column to sort the Search list by that column. Click once to sort in ascending order. Click a second time to sort in descending order.

The column order is represented by the arrow in the column header.

-  ascending
-  descending

6

Pin the Search panel

Note: Hiding / pinning the search panel is not supported in legacy search

The search panel shows all of the search fields, and saved search templates.

- To pin the Search panel so that it is always visible, click 
- To unpin the Search panel, so that it isn't visible when you navigate away from it, click 
- To access the Search panel when it is hidden, click 

7

Search templates

Your administrator may have defined a number of search templates. Click  to access predefined

searches. Note that Search templates are not available in legacy search.

8

Hide or show the Search panel

Click to hide or show the Search panel.

9

Select a data source

System administrators can configure eUnity™ to search remote data sources like a PACS. When remote data sources are available, they are shown in the Data Source dropdown list.

See [Search in eUnity™](#) for more information.

10

Search fields

Enter search criteria in any combination of the search fields. Use the asterisk (*) wildcard character in search fields to broaden search results. For example, entering 123*5 in the Patient ID field returns all patients whose ID begins with 123 and ends in 5. The wildcard character can be at the start or middle of the string.

The search automatically puts an asterisk at the end of Patient Name and Patient ID searches.

See [Possible search fields](#) for more information.

11

Modality filter

Filter the search results by modality type.

12

Search and Reset

After you have filled in the search fields, click Search to perform the search. Click Reset to clear all of the search fields.

13

Partially loaded in cache indicator

A half-filled circle indicates that the study is partially loaded in the cache.

14

Fully loaded in cache indicator

A filled-in circle indicates that the study is fully available in the cache.

15

Multi-study selection

Click the checkboxes to select multiple studies for a patient. Then, click any of the selected studies to open them.

16

Search list pages

If there are multiple pages of results in the Search list, move backwards or forwards through the pages using the arrows.

Collapse columns (not shown)

Note: Column collapse is not supported in legacy search

If all columns cannot fit on a display, the search list will collapse the columns accordingly. To view the collapsed column, press the caret down character located on the right-most edge of the individual result. To hide those columns, press the caret again.

Search in eUnity™

To search from the eUnity Search screen, do the following:

1. Enter applicable criteria in the Search panel using any combination of the available search fields. If needed, you may use the asterisk (*) wildcard character in search fields to broaden search results. For example, entering 123*5 in the Patient ID field returns all patients whose ID begins with 123 and end in 5. The wildcard character can be at the start or in middle of the string. For more information, see the [Possible search fields](#) table.
2. To filter results by modality type, click a modality in the Modality dropdown.
3. Click Search.

The results of the query are shown in the Search list. If there are multiple pages of information, page through the results using the Previous and Next buttons at the bottom of the screen.

There are configurable constraints that can be set by the system administrator. If the search does not meet the constraints, a validation dialog will be displayed to indicate what properties are required for a valid search.

Possible search fields

Note that site administrators can set constraints on search fields. If a search does not meet the constraints, a validation dialog will be displayed to indicate what properties are required for a valid search.

Search field	Notes
Date range	Search by study date or by using a date range in the following format: DD/MM/YYYY. Invalid formats will turn the box red. Alternatively, click the date field to select a pre-configured default or choose a range using the date picker.
Patient Name	Search by Patient Name. The search automatically places an asterisk (*) at the end of the string.
Patient ID	Search by Patient ID. The search automatically places an asterisk (*) at the end of the string.

Search field	Notes
Accession Number	Search by Accession Number.
Modality	Search by modality. The list of searchable modalities is configured by the system administrator.
Referring Physician*	Search by Referring Physician Name.
Patient Birth Date*	Search by Patient Birth Date in the following format: DD/MM/YYYY. Invalid formats will turn the box red. Alternatively, click the date field to choose a date using the date picker.

*Not available by default. Must be configured by the system administrator.

By default, the search list shows the following information for each study.

- Patient
 - Name
 - Patient ID
 - Patient Location
- Study
 - Accession Number
 - Date
 - Modalities in Study
 - Study Description
 - Referring Physician
 - Requesting Physician

Open a study

From the results in the search list, launch a single study or compare two studies from the same patient .

- To quick launch a study, click on any row in the search list. This will immediately load the selected study into eUnity.
- To compare multiple studies, click on the empty checkbox that appears on the left side of each search result row. Selecting a row in this manner will add the study to the launch list. To launch the selected studies, click on any selected row. By default, the maximum number of studies that can be selected is 4.

By default, loading studies from different patients is not supported. If you select a study from a different patient, the launch list is reset.

Open a remote study

Search for remote studies

In some cases, eUnity™ is configured to search beyond the local system to a remote data source like a PACS. When multiple data sources are configured, the Data Source field in the Search panel has a dropdown to select the desired source for searching. If only one data source is available, the dropdown will not be visible.

Open remote studies

Depending on the eUnity integration with your DICOM archive, a full DICOM retrieve may be required before viewing a remote study. When this is the case, eUnity will display a "Downloading images" dialog. This dialog provides feedback on the state of the retrieve job. As images for the study arrive, the progress bar will approach 100%. When the retrieve job is complete, the dialog is closed and the full study is displayed. The dialog provides the following options:

- Click Cancel to return to the worklist
- Click View Partial Study to display the study data that has already been transferred. The Partial study dialog will be displayed to warn that not all images will be displayed. Click Yes to continue or No to finish downloading the images.

Tools

Annotation tools

Annotation tools allow users to apply markup to an image but do not supply any measurement information. These markups are added, removed, and edited in the same manner as the measurement tools. For information on using annotation tools in MPR / 3D, see [Annotations and measurements in MPR / 3D view modes](#).



Arrow

To add an arrow annotation, left-click to start the arrow and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Freehand

To add a freehand annotation, left-click and drag the mouse. Let go of the mouse button to end the annotation. The freehand annotation cannot be edited.



Line

To add a line annotation, left-click to start the line and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition.



Polygon

To add a polygon annotation, left-click to start to start the polygon. Each additional left-click adds another point to the polygon. To end the polygon, double-click or left-click on the polygon start point. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Rectangle

To add a rectangle annotation, left-click to start the rectangle and left-click again to end it. To edit, click the annotation to select it and then drag the annotation's handles to reposition it.



Spine Labeling

Add spine-related labels to images. In Spine Labeling mode, the Spine Labeling tab is activated to provide access to other spine labeling tools.

For more information, see [Spine Labeling](#).



Text Annotation

Click the location that the text should start. A text box is displayed to enter up to 35 characters. To edit the text, double-click the annotation to select it and change the text. To move the annotation, drag it to a different location. Note that the Text Annotation tool cannot be used in Full Screen mode.

Cine

Use the Cine tool to play a series of images like a movie. When Cine is activated, you can select the target frame rate to control how quickly the Cine tool plays through the images. If the Cine module is present, eUnity™ attempts to play the series at the frame rate specified in the DICOM header.

A series must contain more than one image to activate the tool. By default, only one series at a time can display a Cine movie. When another series is selected, Cine plays the new series.



Toggle Cine Mode

Play a series of images in succession (like a movie). When Cine mode is activated, the Cine toolbar is displayed in the active viewport. The default location of the Cine toolbar can be configured by the system administrator.



Play / Pause button

Located on the Cine toolbar, click to play or pause the Cine loop.



Rock loop button

Toggle between looping through the images or rocking back and forth (that is, play from start to finish and finish to start).



Actual frame rate

The actual frame rate is displayed in the upper-right corner of the viewport. The actual frame rate is affected by a number of factors including the power of the client machine, memory, and data transfer rates.



Target frame rate

Select the target frame rate for playing through images.



Trim slider

Manually slide through the start and end points of the series.



Current position

Visual position of the current frame on the display slider.



Current frame

Textual identification of current frame position within the displayed series.

Dropped frames indicator

The drop frames option can be optionally enabled by the site administrator. When enabled, it allows the Cine player to drop frames to achieve the desired frame rate.



CAUTION

If the frame rate cannot be achieved, the frame rate label will show the actually achieved frame rate. If frames are dropped, a yellow Cine indicator is shown beside the frame rate label.

Collaboration

Share your screen with other participants across all supported eUnity™ platforms (desktop web browser and mobile devices). As no patient data (including images) pass through Collaboration services, each participant must independently log in to eUnity in order to start or join a collaborative session. Guest access is currently not supported.



Share this Session

Share your screen with other participants across all supported eUnity™ platforms (desktop web browser and mobile devices).



CAUTION

While the collaboration server attempts to synchronize all clients, there may be issues related to networking that prevent the same image from being displayed to all users or the cursor location being represented equally to all clients. If using collaboration for a diagnostic consultation, always verify which image and feature is being discussed.

When collaborating, changes made to your view will be sent across to other participants. Similarly, changes made by other participants will be applied to your view. This includes cursors, markup, layout, thumbnail bar up / down and image manipulation such as Window Level and Invert. See below for the full list of shared actions.

The following actions are shared to (and from) other participants:

2D

- Navigate
- Pan / Zoom
- Window / Level
- Invert
- Flip / Rotate
- Triangulate
- Reference Lines on / off
- Link Series

- Cine
- All markup*
- Report & Study Info on / off
- Revert
- Layout
- Current on-screen studies /series / images
- Thumbnail tray up / down / pinned
- Cursors
- Fit to Window (Mammography)
- Quadrant View (Mammography)

*On mobile devices, markup creation is disabled, but mobile-based participants can still see markup created by desktop-based participants.

3D

- MPR / 3D Actions
- MPR Navigation
- MPR Oblique tool
- Curved MPR
- 3D Scalpel tool (segmentation)
- 3D Slice tool
- 3D Clip box
- Presets

Session indicators



Not connected

Collaboration is not yet connected or has failed to connect.



Attempting to connect

Collaboration is attempting to connect to the collaboration server.



Connected

Collaboration is connected and working

Start a new session

1. Log in to eUnity.
2. Open desired study or studies
3. Click . When the connection indicator has turned to green , the session has started and any changes made to the study are shared with collaborators.
4. To quickly share the session with other users, copy the session URL and send it to other users.

Join an existing session

1. Log in to eUnity. Do either of the following:
 - Open the study or studies that are being viewed by other participants. Click .
 - Click . Paste the URL that another user has shared with you in to the browser address bar.

When the collaboration indicator has turned green , you have joined the session and your view should synchronize to match the other participants.

When the connection indicator has turned to green, you have joined the session and your view should synchronize to that of the other participants

Leave a session

1. Click . When the collaboration indicator turns red , you have left the session. Anything you do from that point forward is not shared with other participants.

Content change notifications

This feature must be enabled by the system administrator.

Content change notifications alert you when a study has changed outside the viewer and presents you with the option of loading the changed study into the viewer.



Content change notifications enabled

When enabled, a bell icon is displayed in the upper-right corner of the toolbar in the viewer.

Study update available

Depending on your site's configuration, content change notifications are shown in one of two ways:

- in a text notification on the toolbar and in the Study Information panel
- only in the Study Information panel



When a study update has occurred, the bell icon displays a red mark () to indicate a change was detected. Click the bell icon to open the Notifications tab in the Study Information panel. This panel displays additional information about the updated study. As well, the following options are presented on the toolbar:

-  Apply the change to the view
 -  Dismiss the notification
-

Context menu

Use the Context Menu tab in the Settings panel to add, remove, or reorder context menu items or to make menu items available only for specific modalities. The context menu can be configured at a site, group, or user-level by the system administrator, or an individual user can configure their own context menu.

Add, edit, or delete menu items



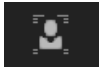
NOTE

Clicking Reset will reset all context menu changes back to the defaults that were set by your system administrator. That is, all of your custom context menu settings will be reset.

1. In the upper-right corner of the viewer, click  to open the Properties panel.
2. In the Properties panel, click the Context Menu tab.
 - To add a menu item, click  beside Context Menu Items. Select the item that you want to add and click OK. Note that tools that use a dropdown menu (such as Window Level Presets) cannot be added to the context menu.
 - To make a menu item available only for certain modalities, click . Choose the modality types and click OK.
 - To reorder a menu item, click the  handle and drag it to the desired position. The order of the menu items in the dialog is the order in which they appear in the context menu from top to bottom.
 - To remove an item from the context menu, click . If a menu item is removed, it can always be re-added.
3. If you are satisfied with your changes, click Save. To revert any changes you made since your last save, click Cancel.

Demographics

The content and location of demographics in the viewer are controlled by the system administrator.



Toggle Demographics

Hide or show demographics in the viewport.

Export

Export an image in PNG or JPEG format. Only demographics that are burned in to the image are exported. That is, demographic overlays and user-added annotations are not exported.



Export image to JPEG / PNG

Export an image to your local device in JPEG or PNG format.

Export an image



CAUTION

Exported files are not diagnostic quality images.

1. Click the image to export.
2. On the Export tab, click 
3. In the Export Image dialog, click either JPEG or PNG. If you choose JPEG, adjust the quality slider to increase or decrease the image quality.
4. Click Export. The file is exported to your default Download folder.

External viewers

Administrators can configure eUnity™ to launch an external viewer from the right-click menu. The external viewer will be launch using the study that is currently loaded in eUnity.

Launch an external viewer

1. To launch an external viewer, right-click in the viewing area.
2. Select the desired viewer from the right-click menu. The external viewer launches the currently loaded study.

Related

- [Context menu](#)

Flip and rotate

The flip and rotate tools can be accessed on the Flip + Rotate tab. Toggling a presentation state on or off will revert an applied rotate.



Flip (Horizontally)

Click to flip the image horizontally in the viewport.



Flip (Vertically)

Click to flip the image vertically in the viewport.



Rotate Left

Click to rotate the image counter-clockwise in the viewport. The image is rotated by 90 degrees each click.



Rotate Right

Click to rotate the image clockwise in the viewport. The image is rotated by 90 degrees each click.



Free Rotate by Drawn Angle

Rotate the image by a custom amount in the viewport.

Free rotate an image

1. On the Flip + Rotate tab, click 
2. Left drag the mouse across the image.
3. Move the mouse left or right to create an angle to the perpendicular of the image. This angle corresponds to how the image will be rotated.
4. Once the desired angle is achieved, let go of the mouse button. The image is rotated to the desired orientation.

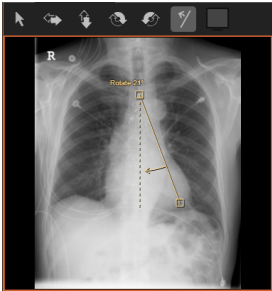


Figure 1: Left drag to set the free rotate angle

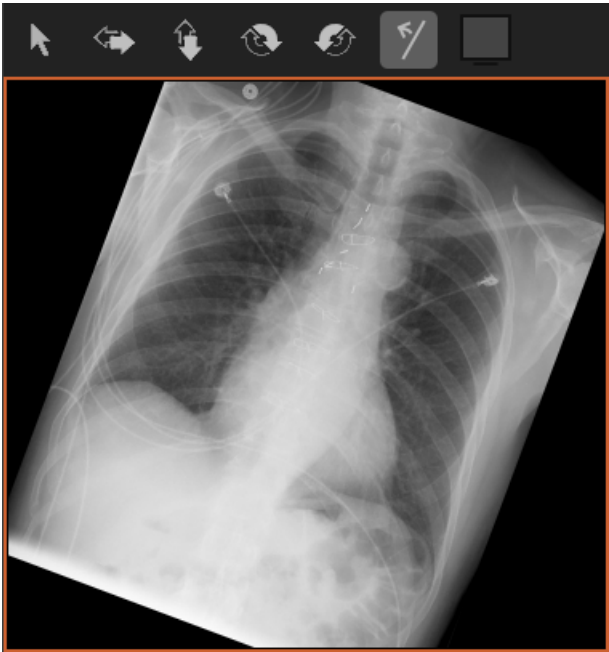


Figure 2 : Release the mouse button to rotate the image to the set angle

Image sharpening

The image sharpening tool contains a number of preset sharpening algorithms that are defined by the site administrator. In the case where a study contains multiple modalities, the image sharpening dropdown shows only the presets for the modality of the currently selected series. If the selected series has no presets, image sharpening is disabled.



Image Sharpening Presets

Click to apply a preset sharpening algorithm on an image in a viewport. Presets are configurable by the system administrator.



Image Sharpening indicator

Shown in the viewport to indicate that image sharpening is applied.

Apply or remove image sharpening

1. Click a series to select it.
2. Click  and select a preset from the dropdown. The image sharpening indicator appears in the viewport.
3. To remove image sharpening, click  and click none in the dropdown.

Invert

Use the Invert tool to invert image channels. When applied to a waveform, the invert tool will toggle the color scheme between light and dark themes. In mammography studies, the viewport background retains its color when an image is inverted.



Invert Brightness

Click to apply a monochrome inversion to the selected series.

Invert an image

1. Click the series to invert.
2. Click  The images in the series are inverted.
3. To revert inversion, click  again. The Reset Window and Level tool will not reset the invert state of an image.

Key Images

Key Images are shown in a dedicated series in eUnity™. The site administrator can configure Key Images to be saved in one of two ways: Immediate mode and Review mode. In Immediate mode, the Key Image is saved right away. In Review mode, you create the Key Image, and then save all Key Images in a later step. In Review mode, images are temporarily marked as Key Images which gives you the chance to remove Key Images from the Key Image series before you save it.

This section includes the following information:

- [Key Image indicators](#)
- [View Key Images](#)
- [Save Key Images in Immediate mode](#)
- [Save Key Images in Review mode](#)
- [Disable the Save Key Image confirmation dialog](#)

Key Image indicators



Key Image indicator

Shown in the viewport to indicate that it is a Key Image.



Source image indicator

Shown in the viewport on the source image from which a Key Image was created. The number represents the number of derived Key Images.



Unsaved Key Image indicator

Shown in the viewport on a Key Image when Key Images are created in Review mode.

View Key Images

Key Images in eUnity are stored in a dedicated series that can be viewed from the Series Tray. The Key Images series is at the end of the thumbnail list and is marked with a key icon. The number of images in the series is shown in the upper-left corner. The demographic overlay on a Key Image shows the original image number, frame number (if applicable), and series number.



Figure 3: Key images series in the Series Tray

1. To view Key Images, open the Series Tray.
2. Click the Key Images series.

Save Key Images in Immediate mode

In Immediate mode, Key Images are saved to the Key Image series immediately.

1. To save a Key Image, right-click the image > Save as Key Image.
2. In the Save Key Image dialog, click Yes to save or click No to cancel.

The Key Image is saved to the Key Image series and the image is marked with the Key Image indicator.

Save Key Images in Review mode

In Review mode, new Key Images are added to the Key Images series as unsaved, temporary images. Because the changes are temporary, Key Images must be saved before the session ends, otherwise, the changes are lost.

When you create Key Images, the Key Images series thumbnail in the series tray indicates that it has unsaved Key Images with the floppy disk icon with the vertical arrow. The upper-left corner of the icon shows the total number of Key Images and the number of unsaved Key Images, which is marked with an asterisk (*).

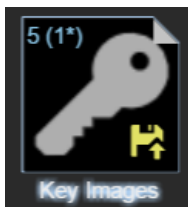


Figure 4: Key Images series thumbnail with unsaved Key Images indicators

1. To create a Key Image, right-click the image > Create Key Image.
The image is marked with the unsaved Key Image indicator.

2. Do either of the following:

- To remove the image from the Key Image series, right-click the image and click Remove Key Image.
- To save all Key Images, click  in the Study List. If the Study List is not visible, click .

3. In the Save dialog, select all applicable options and click Save.

Note: Unselected options will be reverted. That is, if you select only Key Images and you do not select Annotations / Measurements / Text, only Key Images are saved and annotations, measurements, and text are removed.

Disable the Save Key Image confirmation dialog

When saving in Immediate mode, eUnity displays a confirmation dialog, by default. To disable the dialog, do the following:

1. Click  to open the Settings menu. Note that the Settings menu must be enabled by a system administrator.
2. Select Disable Prompts in the KEY IMAGE NOTE DEFAULTS section.

Link series

Link series so that you can perform common operations (navigate, zoom / pan, and Window Level) on all series that are in the same plane. Series can be linked both within and across studies (that is, you can link series in a current and a prior study). When you turn on Link mode, series are automatically linked by image plane (that is, all axial series are linked, all coronal series are linked, and all sagittal series are linked). When you scroll to navigate in one series, you do so in all series that are part of the same link group.



Link Series

Link series together to use zoom, pan, scroll, and optionally Window Level across multiple series. Window Level linking must be enabled by the system administrator.

Indicators



Not linked

Shown in the viewport, a broken link indicator means that no matching slice could be found between the series. By default, the slices in linked series need to be within 5mm of each other to be considered for linking. If slices exceed the maximum deviation angle, the series will not be linked, and the broken link indicator will be displayed.



Series linked

Shown in the viewport, a link indicator means the series is successfully linked.

Navigation

For series that share frames of reference (that is, when the series contain information about the current anatomical position), the linked series will jump to the same slice position as the selected series. If a linked series does not have a slice within 5mm of the selected series location, the link is broken and the  indicator is displayed in the viewport.

Series that do not share frames of reference will simply navigate from whatever starting position they are at. If the series are out of sync, you can temporarily disengage linking by pressing the Alt key and scrolling the mouse wheel to manually re-sync them.

If a series contains multiple planes, eUnity tries to find the closest slice that is the same orientation to the navigating series. If none is found, the link is broken and the  indicator is displayed in the viewport.

Images without a plane will be linked under a separate linking group.

Zoom and pan

In Link mode, the current zoom factor and panning position is used from each on-screen image. Zooming and panning of the images is then relative to the selected image. That is, if you have already zoomed in or panned one image, that zoom / pan will not reset to its original state once linked. It will keep zooming and panning from its current state.

Window Level

For Window Level operations, series are linked by image plane and modality. That is, Window Level adjustments are only applied to series if they are both the same image plane and the same modality type. Note that Window Level linking is not turned on by default. It must be enabled by an administrator.

Magnifying glass

The magnifying glass magnifies an area of an image without markups and overlays. When activated, the magnifying glass is initially applied to the image in the currently selected viewport, but can be dragged into any other viewport. You can have up to 4 magnifying glasses open at a time.

Note: If you change layouts, magnifying glasses are removed from any viewports that are removed by the layout change.



Magnifying Glass

Click to enable the Magnifying Glass tool and magnify an area of an image. You can have up to four magnifying glasses open at a time.

Turn on the magnifying glass

1. Select the viewport that contains the image to magnify.
2. Click  to turn on the magnifying glass tool and drag the magnifier to the desired location.
3. Place your cursor over the magnifier and roll the scroll wheel to zoom in on the area.

Add additional magnifying glasses

1. To add another magnifying glass (up to 4), click  on the magnifier. Drag additional magnifiers to their desired locations.

Remove magnifying glasses

1. To remove all magnifying glasses, click  again. To remove only one, click  on the magnifier.

Mammography

Mammography overview

eUnity™ supports the display of mammography images / exams with modality type as MG or CR and one of the following SOP class UIDs:

- Digital Mammography X-Ray Image Storage for Presentation (1.2.840.10008.5.1.4.1.1.1.2)
- Breast Tomosynthesis Image Storage (1.2.840.10008.5.1.4.1.1.13.1.3)
- Computed Radiography Image Storage and other DICOM elements, Organ Exposed=Breast, Body Part Examined=Breast (1.2.840.10008.5.1.4.1.1.1)

Mammography images with the following SOP class UID are not displayed by default. If desired, contact your system administrator to have this SOP class configured to be viewable.

- Digital Mammography X-Ray Image Storage - for Processing (1.2.840.10008.5.1.4.1.1.1.2.1)

Mammography tools

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

This section provides an overview of the mammography tools. See [Mammography CAD objects](#), [Navigate Relevant Priors](#) and [Navigate Study List](#), [Quadrant View](#) and [Fit to Window](#) , or [Toggle 2D and 3D views](#) for more information.



Fit to Window

Zoom the identified breast bounding box to fit the viewport and maintain "same size" on each viewport.



Navigate Study List (Previous)

Open the previous study for the patient.



Navigate Study List (Next)

Open the next study for the patient.



Navigate Relevant Priors (Previous)

Open the previous relevant prior for the patient.



Navigate Relevant Priors (Next)

Open the next relevant prior for the patient.



Toggle between 2D and 3D views

Switch between a tomosynthesis slice and the 2D reconstructed view for the selected series in a mammography study.



Toggle CAD

Show or hide CAD data in mammography images.



Quadrant View

Divide the mammography image into four equally sized quadrants of "same size" to evaluate the entire breast in four separate sections.



Quadrant View Backward

Step through the four quadrants of the image moving backward (counter-clockwise).



Quadrant View Forward

Step through the four quadrants of the image moving forward (clockwise).

Mammography indicators

The following indicators may be displayed in the viewport when viewing mammography studies:

CAD: Calc: 2 Mass: 1

CAD markers displayed

Shown in the viewport to indicate that CAD markers are displayed. The numbers represent the count for every type of displayed marker.

	No CAD findings
CAD: No Findings	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, CAD exists, but there are no findings to display for the image.
	Error with CAD information
CAD: FAIL	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, a fatal error with CAD information.
	Image not related to CAD
No CAD for Image	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, the image is not related to CAD.
	No CAD in study
No CAD for Study	Shown in the viewport to indicate that CAD markers are NOT displayed. That is, there is no CAD in the study.
	Quadrant View indicator When in Quadrant View mode, this indicator is shown in the viewport on the non-breast wall side to indicate which quadrant of the breast is currently visible.
	Related series indicator In mammography studies, if the hanging protocol is set to Navigate Related Series, images of the same view type are stacked in the same viewport. This indicator is shown in the viewport to indicate how many images are stacked in the viewport and where you are in the stack. System administrators can configure eUnity to include tomosynthesis images with the same view type in related series stacks.



Tomosynthesis indicator

Shown in the viewport for breast tomosynthesis studies to show the location of the current slice in relation to the other images in the series. The indicator shows directional markers to indicate whether you are scrolling in a caudal / cranial, or a medial / lateral direction.

Mammography base view



WARNING

When the zoomed breast to fit feature is applied on a series basis, the resulting zoom to fit action on the images with different orientation may zoom the anatomy of any of the images out of the field of view.

To avoid this, create a hanging protocol to split out the images of the series into single series so each series consists of a single orientation.

When a mammography study is first opened, eUnity automatically presents a consistent layout for evaluation and interpretation. This default layout is referred to as base view. eUnity will not apply the base view to mammography studies if the following required DICOM attributes are missing, and the Orientation Marker is set as an Unknown View.

- Patient Orientation (0020,0020)
- Image Laterality (0020,0062)
- View Code Sequence (0054,0220)
- View Code Modifier Sequence (0054,0222), when present

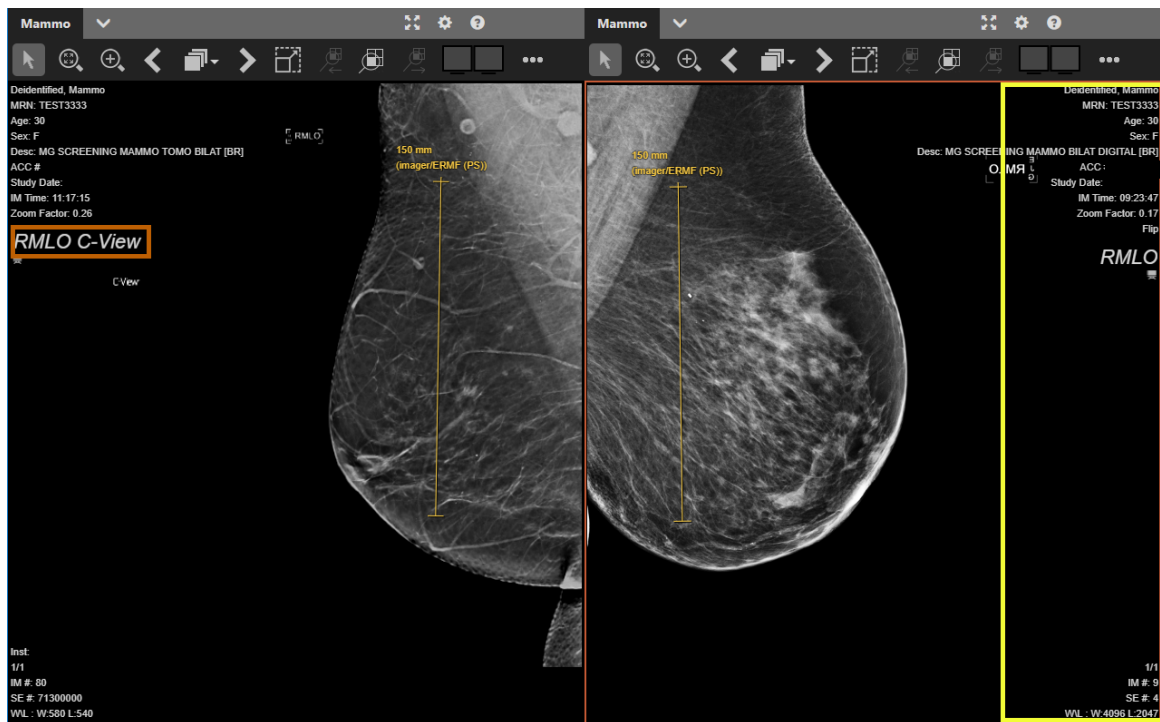


Figure 5 : eUnity mammography base view

Ventral view

The viewer displays the left breast with the nipple pointing to the right of the viewport and a right breast displays the nipple pointing to the left of the viewport.

Chest wall alignment

The chest walls are aligned to the viewport edge.

Same size

Images are scaled in the viewport so that images from the same patient, performed at different times on different detectors can be displayed at the same size.

This allows for evaluation of developing densities and allows the radiologist to evaluate for a change in size of known lesions during temporal comparison with prior digital images or even film mammograms. See the yellow measurement lines in the above image.

Demographic overlay

The viewer shows the demographic overlay opposite the chest wall by default so it does not cover the relevant anatomy.

The demographic overlay is outlined in yellow in the above image.

Orientation marker

The orientation marker is always shown opposite the chest wall and it cannot be turned off. If C-View (Hologic : Synthesized 2D Mammographic Imaging) is present, it is added to the orientation marker so that the user is always aware that they are viewing a synthesized image (for example, RCC C-View).

The orientation marker is outlined in orange in the above image.

Flip images

eUnity always flips images that would otherwise present upside down. When an image is flipped, the viewer shows the rotate indicator in the viewport.

Breast tomosynthesis viewing

eUnity shows a breast tomosynthesis indicator in the viewport to show the type of breast tomosynthesis and location of the current slice in relation to the other images in the series.

Air gap suppression

eUnity uses air gap suppression so that the air gap area (the viewport background) retains its color when the Window Level is changed or an image is inverted in a mammography study.

For air gap suppression to work, the image cannot be a secondary capture, color, or lossy and the Pixel Padding Value (0028,0120) and Pixel Padding Range Limit (0028,0121) tags must be populated in the DICOM header. If these values are missing or incorrect, air gap suppression may not work as expected. Note that air gap suppression can be disabled by a system administrator.

Mammography CAD objects

eUnity™ supports the display of Mammographic Computer-Aided Detection objects.

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.



Toggle CAD

Show or hide CAD data in mammography images.

Turn on CAD objects

Note: Mammo CAD markers are not displayed under the Magnifying Glass.

1. To turn on CAD objects, on the Mammo tab, click



CAD markers are displayed on the image. See the [Mammo CAD markers and outlines](#) table below for information on what each marker means.

Mammo CAD markers and outlines

Note that CAD outlines can be enabled or disabled by administrators. Certain vendors may not display markers or outlines for CAD objects. See [Vendor-specific display](#) below for more information.

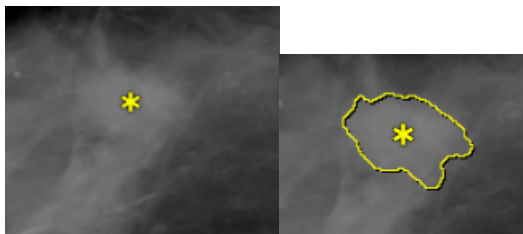


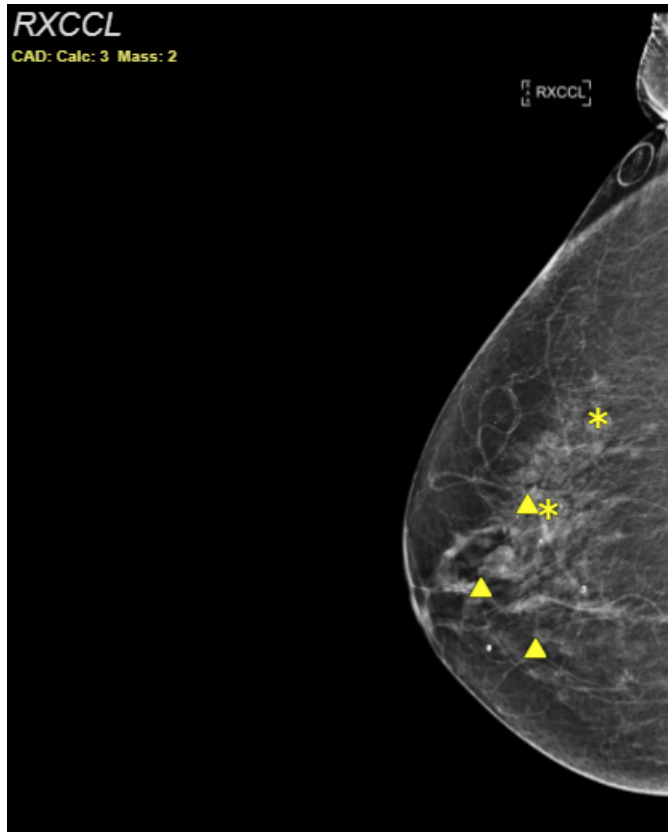
Figure 6 : CAD marker (left) and CAD outline (right)

	Calcification cluster
	Individual calcification
	Mass (density)
	Mass with calcifications

Vendor-specific display

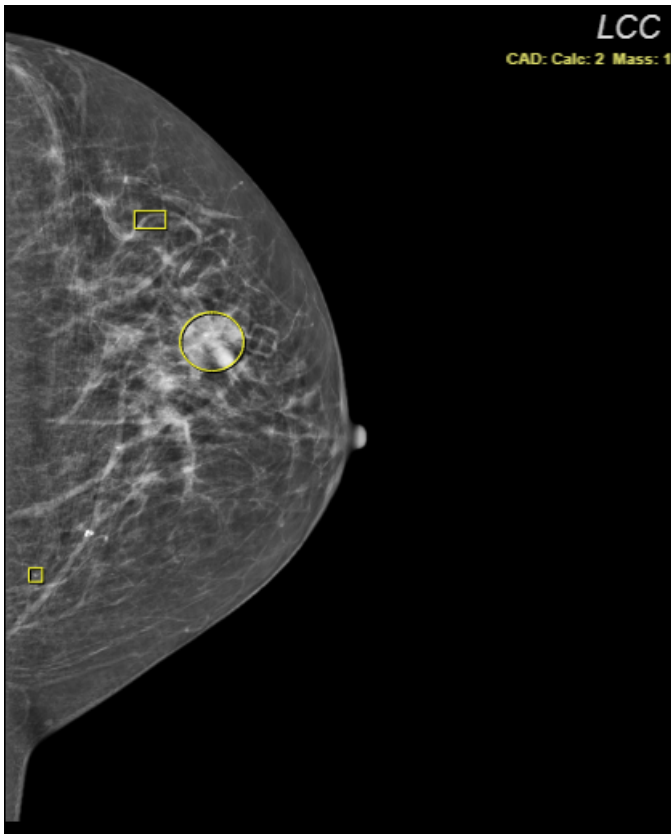
Hologic R21

No outlines are displayed by default (that is, only markers are shown)



iCAD2

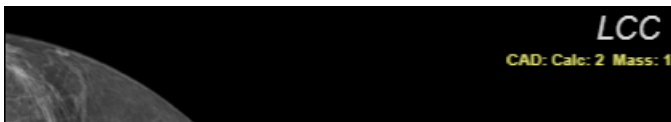
Only outlines are displayed for mass and calcification clusters (that is, markers are not shown).



Other vendors

Both outlines and markers are displayed.

Mammo CAD indicators



CAD markers displayed

CAD: Calc: 2 Mass: 1

Shown in the viewport to indicate that CAD markers are displayed. The numbers represent the count for every type of displayed marker.

No CAD findings

CAD: No Findings

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, CAD exists, but there are no findings to display for the image.

CAD: FAIL

Error with CAD information

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, a fatal error with CAD information.

No CAD for Image

Image not related to CAD

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, the image is not related to CAD.

No CAD for Study

No CAD in study

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, there is no CAD in the study.

Quadrant View and Fit to Window

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

**Fit to Window**

Zoom the identified breast bounding box to fit the viewport and maintain "same size" on each viewport.

**Quadrant View**

Divide the mammography image into four equally sized quadrants of "same size" to evaluate the entire breast in four separate sections.

**Quadrant View Backward**

Step through the four quadrants of the image moving backward (counter-clockwise).

**Quadrant View Forward**

Step through the four quadrants of the image moving forward (clockwise).

About Quadrant View and Fit to Window



WARNING

While the Fit to Window and Quadrant View tools can be used to view images, it is not intended to be the default and only method to view images. Never view an entire study in these modes as it risks not seeing the entire original image.

The Quadrant View and Fit to Window tools are available in Mammography mode to zoom in on a breast image for diagnostic reading. These tools can be turned on after initial load or invoked as an action of a hanging protocol. Quadrant View and Fit to Window maintain the "same size" property, so images in different viewports may be updated with a new zoom factor whenever the screen layout is changed, the series is navigated, or a new series is dragged in.

The Fit to Window and Quadrant View tools calculate the area that contains anatomical content for each image in a mammography study. The output of these tools' calculation creates a Breast Bounding Box for each image that is zoomed to fit whole breast area or breast quadrant area to each viewport when the tool is activated.

Note: Fit to Window and Quadrant View cannot be applied if any of the following conditions are met. In any of these cases, these images are reverted to "image fit to viewport" and the tools are disabled.

- The DICOM object does not contain pixel spacing.
- The image contains an invalid MammoView marker.
- A presentation state (GSPS) with a zoom factor or rotation is applied to images. Note that if the presentation state is unselected (or set to None), these tools should be enabled.
- The breast bounding box cannot be identified (ex. image contains spot compression device or biopsy needle).

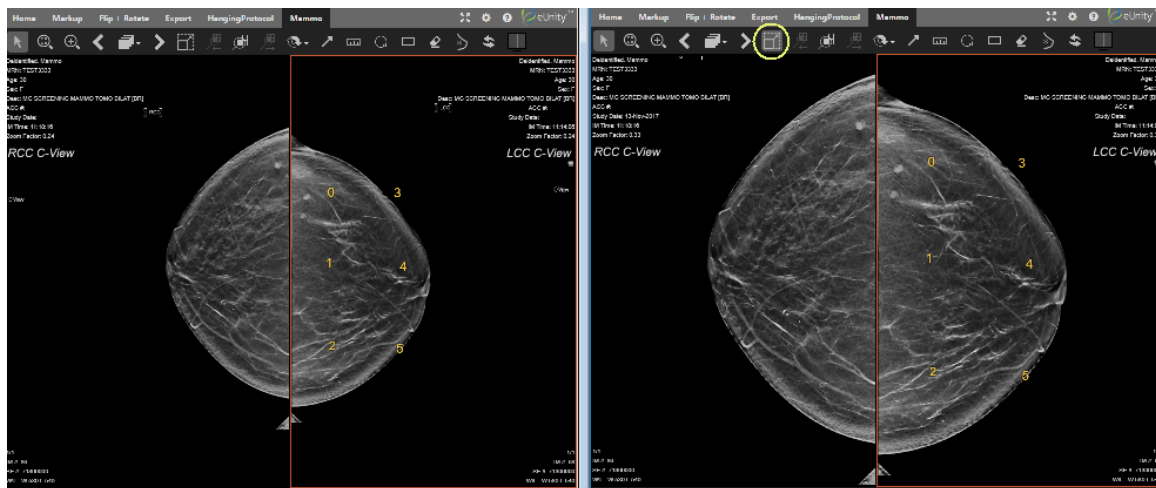
Fit to Window

In Fit to Window mode, eUnity zooms in on the breast bounding box to fit the viewport and maintains "same size" on each viewport.

1. Select an image in the viewing area.

2. On the Mammo tab, click





Quadrant View

In Quadrant View mode, eUnity divides the mammography image into four equally sized quadrants of "same size" so you can evaluate the entire breast in four separate sections. The first quadrant is displayed in the active viewport.



Quadrant View indicator

When in Quadrant View mode, this indicator is shown in the viewport on the non-breast wall side to indicate which quadrant of the breast is currently visible.

1. Select an image in the viewing area.

2. On the Mammo tab, click 

- Click  to step forward (clockwise) to the next quadrant.
- Click  to step backward (counter-clockwise) to the previous quadrant.

Toggle 2D and 3D views



Toggle between 2D and 3D views

Switch between a tomosynthesis slice and the 2D reconstructed view for the selected series in a mammography study.

Toggle between 2D and 3D view

When viewing a breast tomosynthesis slice, quickly switch between the current slice and the 2D reconstruction in the selected series.

1. In a tomosynthesis stack, click . The 2D reconstruction is shown.
2. Click  again to switch back to the tomosynthesis slice you were previously viewing.

Measurement tools

Use measurement tools to apply measurements to an image.

Multi-modality measurement tools



Toggle Markup

Hide or show markup on images. This action will also hide or show Presentation State markup.



Linear Measurement

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and drag the measurement handles. Values are shown in mm and the source of the calibration is shown in brackets.

For more information on linear measurements in ultrasounds, see the [Ultrasound measurements](#) table below.



Ellipse ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Circle ROI

A single left-click starts the measurement and a second left-click ends the measurement. To edit, select the measurement to be active and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Rectangle ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Freeform ROI / Doppler Envelope

Left-click to start the measurement and left-click on the first point selected or double-click to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.

See Ultrasound measurements below for information on using the Freeform ROI tool with ultrasound studies.



Angle Measurement

Left-click to create the vertex. The next two left-clicks set the other points of the angle. To edit, click the measurement to select it and then drag the measurement handles. Values are shown in degrees.



Point Tool

Measures the exact value for a specific point. The unit of measure depends on the modality type. For example, in PET images it provides the SUV value, and in CT images it provides the Hounsfield units.

Note that when using the Point Tool on reconstructed series, measurements can be made only on series that match the acquisition plane (typically axial).



Cobb Angle Measurement

A Cobb angle is the angle formed at the intersection of the two lines, which typically intersect off-screen. The first pair of left-clicks draws the initial line segment and the second pair of left-clicks draws the secondary line segment. A dashed line connects the two segments and the Cobb angle, presented in degrees, is anchored to the connecting line. To edit a measurement, click the measurement to select it and then drag the measurement handles.



Eraser

Click the Eraser tool to enable Eraser mode, and then left-click a measurement or annotation to erase it.

Ultrasound measurements

The following tools can be used to make ultrasound measurements on images with the appropriate calibration information.

Linear measurements in ultrasounds

Calibrated ultrasound images can use standard linear measurements. A single left mouse click starts the measurement and a second left click ends the measurement. To edit a measurement, drag the measurement handles.

When a linear measurement is placed within a region that has two different axes (i.e. units like time and velocity), it will show both units unless the measurement is parallel to one of the axes. See image below.



A special case exists for velocity-time Doppler Ultrasound regions. In this case, a single click will create the measurement by automatically snapping the other end-point to the zero-velocity axis. See image below.

- Moving the automatic end-point off the zero-velocity axis will transition the measurement into a standard Ultrasound linear measurement.
- Moving the user selected point will keep the automatic end-point locked, sliding it along the zero-velocity axis.

Freeform ROI in ultrasounds

The Freeform ROI tool can be used to calculate the Doppler Envelope for velocity-time regions. ROIs will be locked to the zero-velocity axis and points can be added along the envelope. A double-click will end the ROI creation. See image below.

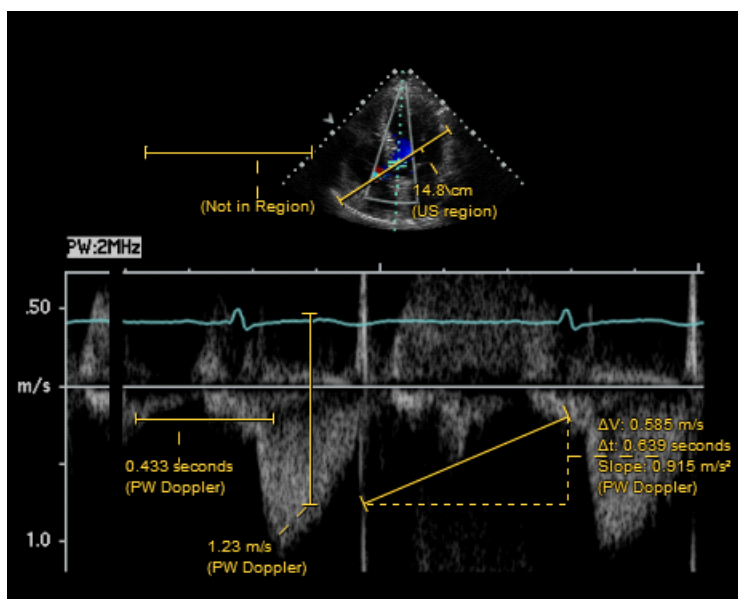


Figure 7 : Linear measurements in ultrasound

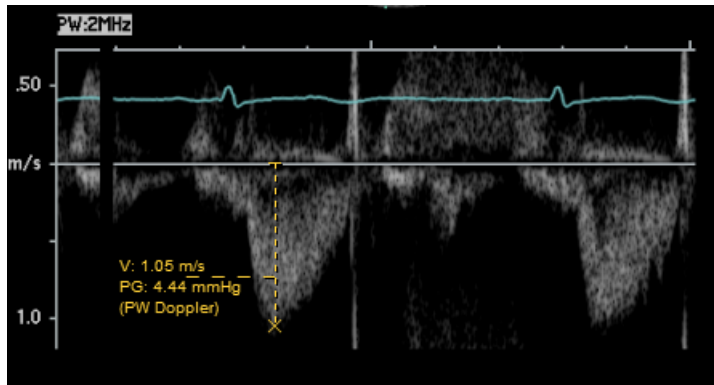


Figure 8 : Linear measurements in velocity-time doppler ultrasound regions

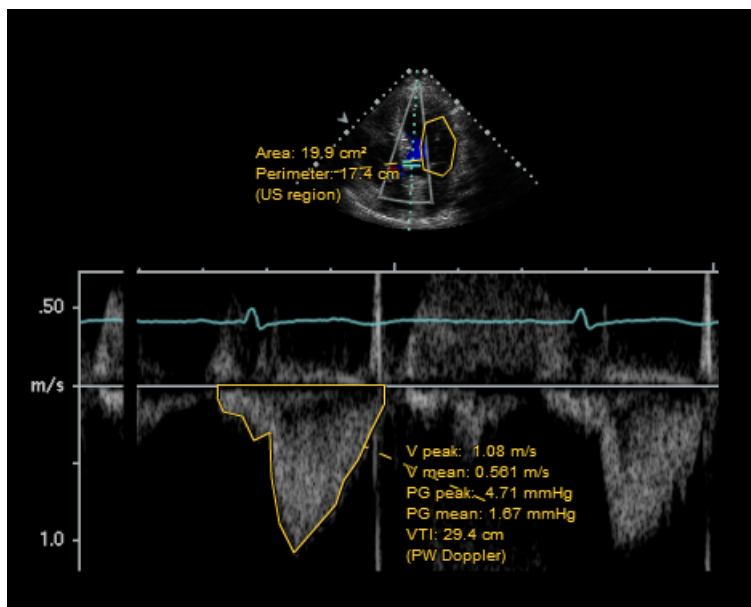


Figure 9 : Freeform ROI to calculate doppler envelope for velocity time regions

MPR / 3D

MPR, Advanced MPR, and 3D overview

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

If enabled in eUnity™, the Advanced Visualization menu is available to create MPR, Obliques, Curved MPR, and 3D Volume Rendered views.



WARNING

All reformatted and volume rendered views (MPR and 3D) are treated as Lossy and will display a Lossy Indicator in the upper-right corner of the viewport. For more information, see [Lossy image display](#)



1. Click  and select the desired view mode. The differences between the modes is explained below.
 - MPR
 - Advanced MPR
 - 3D

MPR

These layouts will generate axial, sagittal, and coronal planes from the selected series and display them in 3 horizontal or 3 vertical views. Slice navigation in this mode is similar to 2D stack navigation (e.g. mouse wheel and drag advances by the slice thickness).

Advanced MPR

These layouts will generate axial, sagittal, and coronal planes from the selected series, and also provide advanced features such as change slice thickness, change rendering type, and create oblique / non-orthogonal stacks, or create a curved MPR.

3D

These layouts will generate axial, sagittal, and coronal planes from the selected series, and will also show a 3D volume rendered stack in one of the viewports.

Interactive mode in MPR / 3D view modes

Interactive mode is a special low-latency mode that prioritizes frame-rate and is enabled in fast operations such as adjusting Window Level on the fly, navigating the stack, or adjusting the 3D image render function or volume orientation on volume rendered stacks.

Note: Viewports in Interactive mode will display  in the upper-right corner of the viewport to indicate that higher quality images are in progress.

For information on adjusting the quality of interactive or final images, see [Advanced Visualization Parameters for 3D and MPR](#).

Annotations and measurements in MPR / 3D view modes

Annotations and measurements can be made in MPR, Advanced MPR, and 3D modes, however, they cannot be made on 3D MIP, 3D, and curved MPR series.

To avoid incorrect measurements in rendered volumes, images that contain nonsquare pixels will not be rendered in Advanced Visualization modes. In this case, eUnity will display the following error message: "MPR not supported on this series. The image pixels are nonsquare."

Annotations and measurements that you make in MPR, Advanced MPR, 3D modes are available only for your session. That is, annotations and measurements on reconstructed series cannot be saved as a Presentation State.

Navigating in reconstructed stacks

When you hold down the left mouse button and drag to navigate through a reconstructed stack (for example, an MPR stack), navigation will jump dynamically based on the length of the drag action. That is, images will be skipped so that you can quickly find the general location you are looking for. To move through images one at a time, use the mouse wheel or arrow keys.

Advanced Visualization Parameters for 3D and MPR



Advanced Visualization Parameters

View or change render types, render parameters, or SUV parameters. The tabs/options that are available in the panel depend on the visualization mode (i.e. Fusion vs 3D) and the series type (i.e. PET vs CT) or series orientation (i.e. same plane as the original series or not) that is selected in the viewer.

Render Parameters tab

Change the quality of interactive or final images

The Interactive Quality and Final Quality options scale up or scale down the quality of interactive images (images generated during on-the-fly rendering) and final images (images generated at rest, when no user commands are applied to the volume stack).

1. Click  and click the Render Parameters tab.
2. Click and drag the handle on the Interactive Quality or Final Quality scales.

Change the slice thickness

1. Click a volume rendered image.
2. Click  and click the Render Parameters tab.
3. Click and drag the handle on the Slice Thickness slider.

Render Types tab

The Render Types tab is available when you select an axial, sagittal, or coronal reconstruction in an MPR, Advanced MPR, or 3D layout.

Change the render type

1. Click  and click the Render Types tab.
2. Select one of the following render types:
 - Maximum Intensity Projection (MIP)
 - Minimum Intensity Projection (MinIP)
 - Faded Maximum Intensity Projection (Faded MIP)
 - Average Intensity Projection (Average)

Advanced MPR tools

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.



Curved MPR

In Advanced MPR mode, click along the anatomy in one of the viewports and the curved MPR is created in the lower-right viewport. Each point in the curve is along the center axis of the curved MPR view.



Create oblique

Every viewport is annotated with a color that directly corresponds to the reference line on other intersecting images in other viewports. To generate new planes, drag the controls corresponding to the color of the viewport you wish to change until desired orientation is achieved.

Turn on Advanced MPR mode

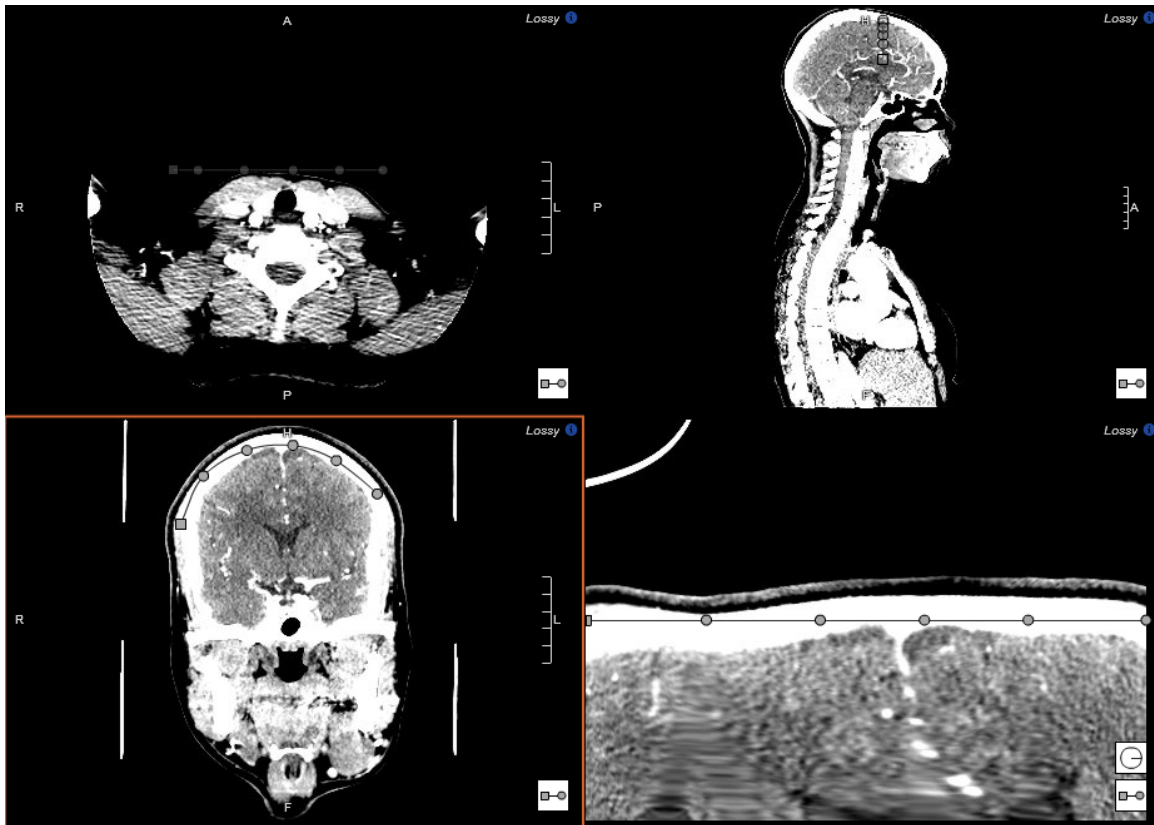
1. Click  and click Advanced MPR.
2. On the MPR / 3D tab, click an Advanced MPR layout:

-  - Advanced MPR with oblique 2 x 2 layout
-  - Advanced MPR with oblique custom layout

Create a curved MPR view

The curved MPR view is created in the bottom right cell. The current orientation angle is shown by the  icon. Click this icon to reset the orientation angle back to the original. Click  to toggle the points and line on and off.

1. Click .
2. Click in any of the other views along the desired anatomy. Each point will be along the center axis of the curved MPR view.
3. Click in the curved MPR view to synchronize the three orthogonal views to the selected point.
4. Drag the mouse in the curved MPR view to rotate the image about the axis of points.



Create non-orthogonal / oblique reformatted stacks

When reference lines are turned on, every viewport is annotated with a color that directly corresponds to the reference line on other intersecting images in other viewports. To generate new planes, drag the controls corresponding to the color of the viewport you wish to change until desired orientation is achieved.

Create Oblique

1. On the MPR / 3D tab, click 
2. Draw an additional reference line to draw a second oblique in the lower-right viewport.

3D tools

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.



Clip Box

The clip box can be adjusted by dragging within a specific side. Drag down to move the plane into the volume (cut more). Drag up to move the plane out of the volume (cut less). electing one of the edges of the clip box the orientation of the clip box can be changed without changing its size or the orientation of the volume.



Cut Plane

Rotating the 3D volume to a desired view and click the Cut Plane icon. A cut plane normal to the current 3D view will be created. While in the cut plane mode, the cut plane can be moved into the volume by dragging the mouse down or out of the volume by dragging the mouse up.



Scalpel Tool

Remove or isolate a section of an image by dragging the mouse along the border of the area to segment then clicking on the region you would like to keep.

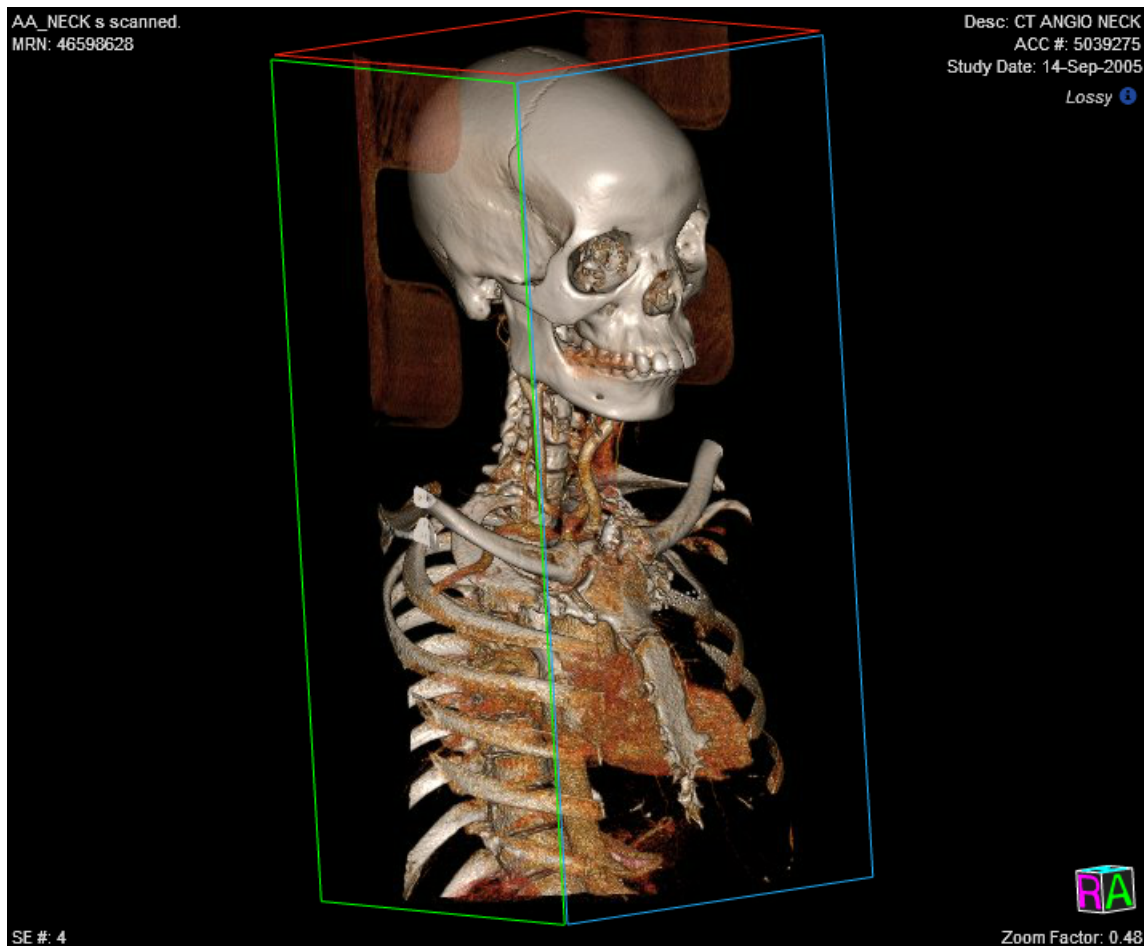
Turn on 3D mode

1. Click  and click 3D.
2. On the MPR / 3D tab, click a 3D layout:
 -  - 3D with 3 MPR views
 -  - 3D with custom layout

Clip Box

Use the Clip Box tool to cut away some of the volume so that you can better see underlying anatomy. Each plane is represented with a colored border. Click outside the edges of the clip box and drag to change the orientation of the clip box without changing its size or the orientation of the volume.

1. On the MPR / 3D tab, click .
2. Click within one of the sides and do either of the following:
 - Drag into the volume (cut more).
 - Drag out of the volume (cut less).



Cut Plane

Use the Cut Plane tool to cut away some of the volume at a custom rotation.

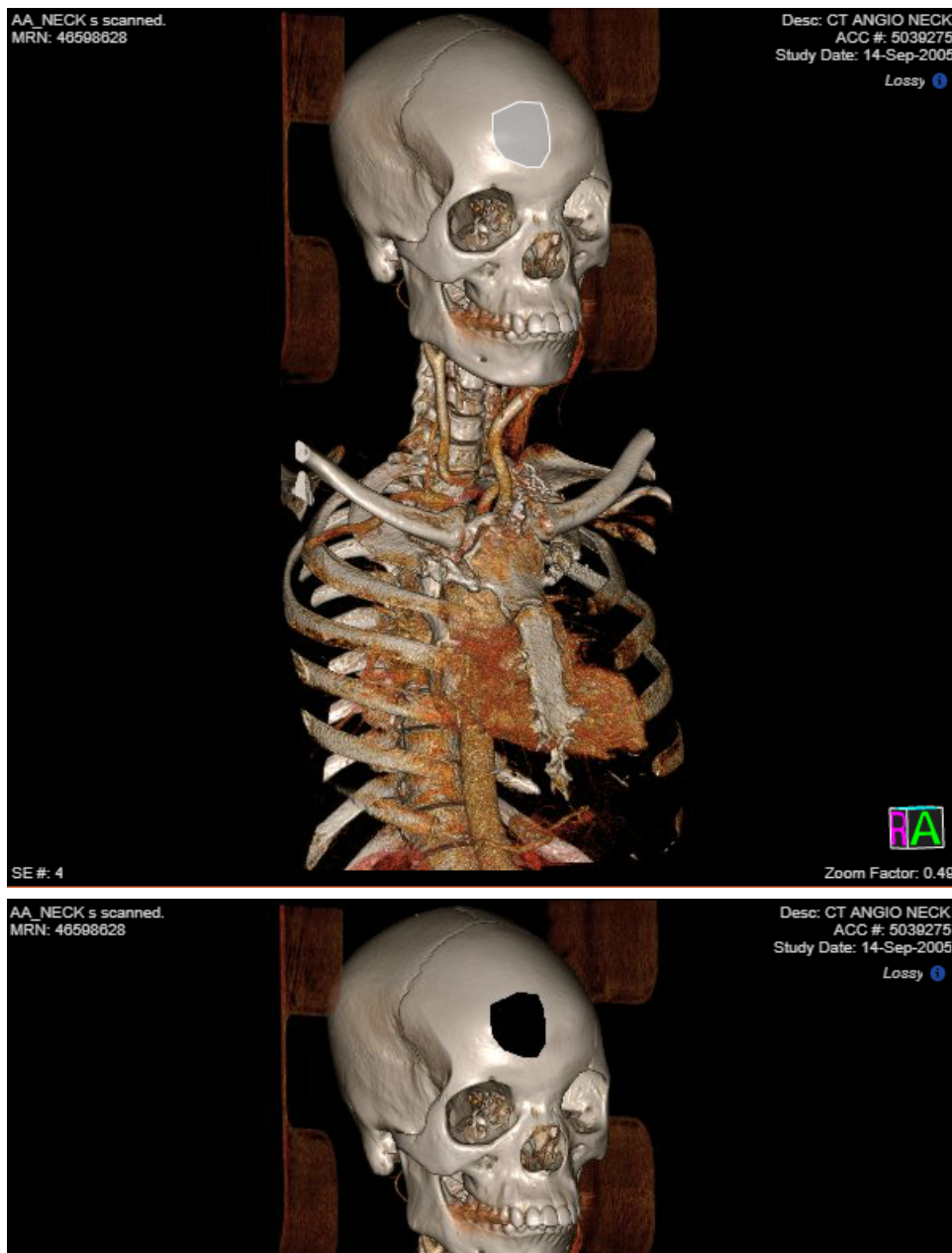
1. Rotate the 3D volume to a desired angle.
2. On the MPR / 3D tab, click . A cut plane normalized to the current 3D view is created.
 - Drag the mouse down to move the cut plane into the volume.
 - Drag the mouse up to move the cut plane out of the volume.

Scalpel

Use the Scalpel tool to remove or isolate a segment of the image.

1. On the MPR / 3D tab, click .
2. Drag the mouse along the border of the area you wish to segment. Once the desired region has been selected you should see the selection similar to the first image below.
3. Click on the region you would like to keep. For example, clicking outside of the segment will remove the selected region and the result will be similar to the second image below.

This process can be repeated for multiple regions. The reset tool will revert all segments.



Adjust the rendering presets

The rendering preset can be adjusted on-site and may differ from the default. Changing the presets will re-render the volume, highlighting different features, or even completely changing the method or type of rendering.

1. Select the 3D view.
2. Click  and click the Presets tab.
3. Click a rendering preset.

Navigate

Navigate is the default mode in eUnity™, however, some browsers do not automatically give their content focus, and the mouse and keyboard interaction do not apply. In these cases, click anywhere on eUnity™ and the mouse and keyboard will interact with your selections.

See [Keyboard and mouse shortcuts](#) for more information on keyboard commands.



Navigate

Navigate study images using the mouse wheel, a left-click drag, touch drag, touch pad drag, or the up and down cursor keys on the keyboard.

Navigate images

The default behavior is navigating all of the images within a series within a single drag from the top to the bottom of the viewport.



CAUTION

The default scroll behavior will skip images. If this is not desired, contact your site administrator. The default behavior can be changed to not skip images (for non-reconstructed stacks). Reconstructed stacks (for example, MPR) will always skip images when you drag to navigate. To move through reconstructed stacks one image at a time, use the mouse wheel or arrow keys.



1. To navigate through a stack of images, click  and do any of the following:
 - Mouse Wheel Up: Scrolls images from a higher number image to a lower number image.
 - Mouse Wheel Down: Scrolls images from a lower number image to a higher number image.
 - Left-Click Drag Up : Scrolls images from a higher number image to a lower number image.
 - Left-Click Drag Down: Scrolls images from a lower number image to a higher number image.

Navigate Relevant Priors and Navigate Study List

By default, the Navigate Relevant Priors and Navigate Study List tools are available on the Mammo tab, but they can be used for any modality type. See [Toolbar](#) for information on customizing the toolbar.



Navigate Relevant Priors (Previous)

Open the previous relevant prior for the patient.



Navigate Relevant Priors (Next)

Open the next relevant prior for the patient.



Navigate Study List (Previous)

Open the previous study for the patient.



Navigate Study List (Next)

Open the next study for the patient.

Navigate Relevant Priors

Depending on your site's configuration, when you open a study from your worklist, the worklist may choose a number of relevant priors for eUnity™ to open along with it. Relevant priors are typically studies that provide meaningful context to the current study (for example, for a mammography study, relevant priors may be older or newer mammography, breast ultrasound, or breast MR studies).

When you navigate through relevant priors, the newest study will always be displayed on the left side of the viewing area. That is, assuming that you have opened the newest study for a patient, that study will remain in view on the left and the relevant priors will cycle through the viewing area on the right. When there are no more relevant priors to move through, the buttons are disabled.

- On the Mammo tab, click  to open the previous relevant prior (newer than the currently loaded relevant prior).

- On the Mammo tab, click  to open the next relevant prior (older than the currently loaded relevant prior).

Navigate Study List

Depending on your site's configuration, all of a patient's historical studies may be shown in the eUnity Study List.

When you navigate through the studies in the Study List, the newest study will always be displayed on the left side of the viewing area. That is, assuming that you have opened the newest study for a patient, that study will remain in view on the left and the other studies will cycle through the viewing area on the right. When there are no more studies to move through, the buttons are disabled.

- On the Mammo tab, click  to open the previous study (newer than the currently loaded study).
- On the Mammo tab, click  to open the next study (older than the currently loaded study).

Presentation States

eUnity™ supports display of DICOM Greyscale Softcopy Presentation State (GSPS) and Color Softcopy Presentation State (CSPS) objects. These objects can alter the display of an image by changing Window Level, zoom factor, shutters, or markup.



Presentation State Applied indicator

Shown in the viewport to indicate that a presentation state is applied.



Presentation State Available indicator

Shown in the study pill in the Series Tray to indicate that presentation states are available. Click the arrow to show the available presentation states.

Apply a Presentation State

By default, the newest Presentation State will automatically be applied to a study. When a Presentation State exists for a study, the study pill in the Series Tray will include a Presentation State context menu . The label displayed in the menu comes from the presentation name and may include one or more related Presentation State instances.

1. Open a study that has available Presentation States in the viewer.
2. To activate or disable Presentation States, click  in the Series Tray.
3. Click the Presentation State that you want to apply. To remove all Presentation States, click None .

When an image has a Presentation State applied, the  indicator appears in the viewport. As well, the indicator on the study pill in the Series Tray changes from  to .

Note: When exporting images, any Presentation State-related markup will not appear on the image.

Save Presentation States (markup-only)

If this feature is enabled by the system administrator, markup can be saved to the PACS. If your administrator has enabled saving Presentation States, a grayed out save icon  is shown in the study pill in the Series Tray. The icon will be enabled once you add markup.

1. To save a DICOM presentation state, click  on the study pill in the Series Tray.
2. In the confirmation dialog, select the markup that you want to save and click Yes.

Configure Presentation State save options

If available, a number of Presentation State save defaults can be set in the Settings menu. Note that the Settings menu must be enabled by the system administrator.

1. Click  to open the Settings menu.
2. On the General Settings tab, select any of the options described below. Note that the system administrator may not make all of these options available in the Settings menu.

Configuration options for saving Presentation States

Annotations / Markup	Have annotations and markup selected by default in the Save Presentation State confirmation dialog. If this dialog is disabled, (see below) annotations and markup will always be saved.
Window / Level	Have Window / Level selected by default in the Save Presentation State confirmation dialog. If this dialog is disabled, (see below) Window / Level will always be saved.
Spine Labels	Have spine labels selected by default in the Save Presentation State confirmation dialog. If this dialog is disabled, (see below) spine labels will always be saved.
Disable Prompts	When selected, clicking  will no longer cause a Save Presentation State confirmation dialog to display and the save will proceed automatically. Note: The Save Presentation State confirmation dialog also contains the option to hide the dialog.
Auto save presentation on patient close	When selected, eUnity will attempt to automatically save markup when the patient is closed. This can happen when a user navigates to another page without saving applied markup.

Paper Print

Use the Paper Print tool to print the study report (if available), the selected image, or up to 24 images.



Paper Print

Print study reports, images, or a set of images.

Print images



CAUTION

Printed images are not intended for diagnostic reading.

1. Select a viewport. Selected viewports are indicated by an orange border around the image.
2. On the Export tab, click 
3. Select the desired settings. Use the information in the [Print settings](#) table below.
4. Click Print.

Print settings

Study Report	Select this option to print the report for the selected study. The study that is currently selected is shown below the checkbox.
Image Print Options	• Print with demographics : When selected, the printed image includes the demographic information. • Print with markup : When selected, the printed image includes all annotation and measurement markups.
Image Print Layout	• Layouts are presented in a per-page format with the option to print 1, 2, 4, 6, 8 or 12 images per page. When using the Current View option in the Images to Print options, the print layout will automatically be assigned to match the current screen layout. • Select Portrait or Landscape orientation (HTML5 clients only). After clicking Print, the browser's Print dialog will appear so that you can select a

printer and other print options.



NOTE

Some older browsers will overwrite the Portrait or Landscape setting. You may have to reset the orientation setting in the the browser's Print dialog.

Images to Print

- Set which image(s) will be printed. A maximum of 24 images can be included in a single print job.
- **Current View :** The current view option prints images as they are currently laid out on screen. A short description will appear next to this option indicating the number of images and layout.
 - **Marked Images :** When images have been marked within the viewer, users have the option to print the set of marked images. In the event that more than 24 images are marked, the first 24 images selected will be printed. To mark an image, right-click on an image and click Mark Image. Marked images have a star indicator.
 - **Selected Series:** Print images from the currently selected series. The range selector can be used to choose the subset of images (up to 24 images) to be printed.

Reference / Scout Lines

All scout images in a study are combined into a single series and placed at the start of the [Series Tray](#). If the Scout series exists, there are scout images to be viewed.



Toggle Reference Lines

Show or hide overlay lines when using triangulation or scout images.

Turn on Reference Lines

1. To display scout images, load a multi-series view format and drag the scout series into the viewing area.

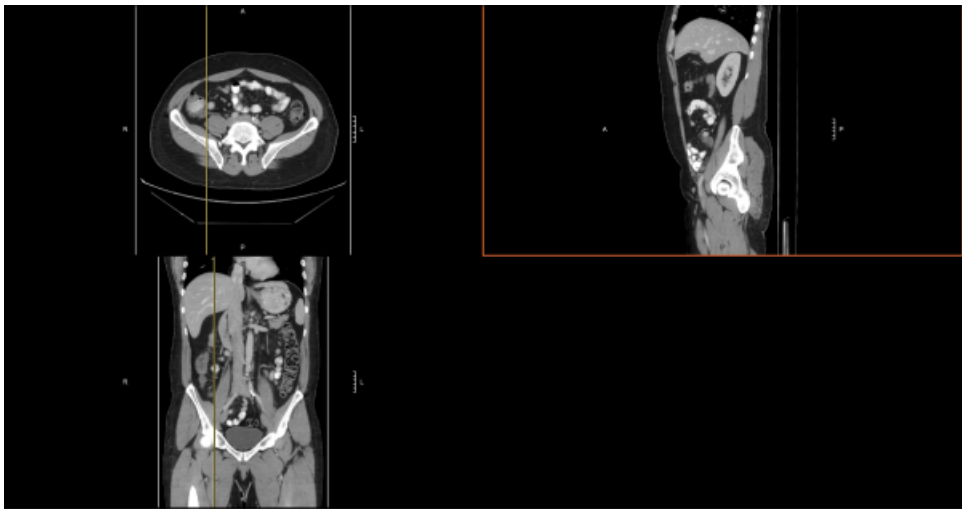
2. Click

If another series in the study corresponds with the displayed scout, three lines will appear on scout image.

- two white lines indicate the intersection of the first and last image of the series
- a single yellow line represents the currently displayed image in the series

If a series is selected, the lines on the scout represent the selected series (orange highlighting). If no lines appear, then the selected series does not correspond with the displayed scout.

To navigate series, click on the scout and the corresponding series will navigate to the selected point. If there are multiple scout images, navigate through the series using the standard [Navigate](#) commands.



PET /CT Fusion

PET /CT Fusion overview

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

If the PET /CT Fusion module is enabled in eUnity™, Fusion is available in the Advanced Visualization menu so that you can generate fused PET and CT stacks.



WARNING

All reformatted and volume rendered views (PET /CT Fusion) are treated as Lossy and will display a Lossy Indicator in the upper-right corner of the viewport. See [Lossy image display](#) for more information.

Turn on PET /CT Fusion

1. Open a PET /CT study.
2. Click  and click Fusion.
3. Drag the CT or PET into the viewer from the Series Tray.
4. On the Fusion toolbar, click the desired Fusion layout.

These layouts will generate axial, sagittal, and coronal fusion planes from the selected series and display it in the following layout formats. Note that the tiling (i.e. 3x3) is drawn on the icon.

-  - 3x3 basic fusion layout with CT(non-fused), PET(non-fused), and fused views
-  - 3x1 fused axial, sagittal, coronal views
-  - 3x1 fused axial, sagittal, coronal views + 3D MIP
-  - 3x1 axial only
-  - 3x1 sagittal only
-  - 3x1 coronal only

PET / CT Fusion Tools



Advanced Visualization Parameters

View or change render types, render parameters, or SUV parameters. The tabs / options that are available in the panel depend on the visualization mode (i.e. Fusion vs 3D) and the series type (i.e. PET vs CT) or series orientation (i.e. same plane as the original series or not) that is selected in the viewer.



Fusion Blending

Left-click and drag the mouse up or down to increase or decrease the PET opacity. Increasing the opacity shows more of the functional (metabolic) data from the PET. Decreasing the PET opacity shows more of the anatomical data from the CT.



Fusion Presets

Apply presets such as Hot Iron to fused PET / CT studies so that the metabolic data of the PET information is assigned a preset pseudo color value from the Color Look Up Table (CLUT).



Point Tool

Measures the exact value for a specific point. The unit of measure depends on the modality type. For example, in PET images it provides the SUV value, and in CT images it provides the Hounsfield units.

Note that when using the Point Tool on reconstructed series, measurements can be made only on series that match the acquisition plane (typically axial).



Circle ROI

A single left-click starts the measurement and a second left-click ends the measurement. To edit, select the measurement to be active and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.

PET / CT Fusion indicators

Image loading indicator

Shown in the viewport to indicate that data is being loaded.



CAUTION

When you load an image or zoom further into an image, eUnity will typically need to load more data. Once loaded, the indicator will disappear. If the indicator is visible, you must wait for the full data to be loaded.

Lossy compression indicator (reformatted and rendered views)



WARNING

All reformatted and volume rendered views (MPR and 3D) are treated as Lossy and will always display a Lossy indicator.

In MPR, 3D, and Fusion modes, hover the cursor over the  to display the final JPEG render quality.

Limited Measurements indicator

Limited Measurements

Shown in the viewport to indicate that not all measurement types are available for the series. ROI measurements for the average and standard deviation of pixel values can only be performed on series that match the acquisition plane (typically axial). Click the  for more information.

Partial Volume indicator

Partial Volume

Shown in the viewport to indicate that the complete 3D volume cannot be rendered. A partial volume occurs when the original 2D data does not provide contiguous 2D slices.

SUV not available indicator

SUV not available

Shown in the viewport to indicate that there is not sufficient data to perform SUV measurements. Click the  for more information.

Interactive view mode in PET / CT Fusion



CAUTION

The images presented in eUnity PET / CT Fusion Display Layouts are derived from a continuous-space volume which is constructed from the original 2D images. As a result, the user-presented 2D images may not have a direct spatial mapping to the original 2D images. More specifically, navigating in volume space is different from navigating the original 2D slices.

As the user-presented 2D images are derived from a different location and may be rendered with different thickness, the applied pseudo color palette may be different from the intensity values on the original 2D PET images as they are subject to interpolation algorithms used in the rendering process.

If there is ever any doubt concerning the fusion image(s), users should always reference the closest images from the original 2D PET images.

Interactive mode is a special low-latency mode that prioritizes frame-rate and is enabled in fast operations such as adjusting Window Level on the fly, navigating the stack, or adjusting the 3D image render function or volume orientation on volume rendered stacks.

Note: Viewports in Interactive mode will display  in the upper-right corner of the viewport to indicate that higher quality images are in progress.

For information on adjusting the quality of interactive or final images, see [Advanced Visualization Parameters for Fusion](#).

Annotations and measurements in Fusion mode

Annotations and measurements that you make in Fusion are available only for your session. That is, they cannot be saved as a Presentation State.

However, in Fusion mode, if an ROI measurement is made on the 2D axial PET image, it can be saved as a Presentation State. Note that if any of the SUV parameters were changed, they will be saved along with the Presentation State. For information on using ROI tools in Fusion mode, see [SUV measurement tools](#).

Advanced Visualization Parameters for Fusion



Advanced Visualization Parameters

View or change render types, render parameters, or SUV parameters. The tabs/options that are available in the panel depend on the visualization mode (i.e. Fusion vs 3D) and the series type (i.e. PET vs CT) or series orientation (i.e. same plane as the original series or not) that is selected in the viewer.

Render Parameters tab

Change the quality of interactive or final images

The Interactive Quality and Final Quality options scale up or scale down the quality of interactive images (images generated during on-the-fly rendering) and final images (images generated at rest, when no user commands are applied to the volume stack).

1. Click  and click the Render Parameters tab.
2. Click and drag the handle on the Interactive Quality or Final Quality scales.

Change the slice thickness

1. Click a volume rendered image.
2. Click  and click the Render Parameters tab.
3. Click and drag the handle on the Slice Thickness slider.

Render Types tab

Change the render type

The Render Types tab is available when you select a non-fused, reconstructed image in a fusion layout. For fused images, the render type is always MIP.

1. Click  and click the Render Types tab.
2. Select one of the following render types:
 - Maximum Intensity Projection (MIP)
 - Minimum Intensity Projection (MinIP)
 - Faded Maximum Intensity Projection (Faded MIP)
 - Average Intensity Projection (Average)

SUV Parameters tab

See [SUV measurement tools](#).

Fusion Blending

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.



Fusion Blending

Left-click and drag the mouse up or down to increase or decrease the PET opacity. Increasing the opacity shows more of the functional (metabolic) data from the PET. Decreasing the PET opacity shows more of the anatomical data from the CT.

1. Select a fused image. Do either of the following:
 - On the Fusion tab, click . Left-click and drag the mouse up or down to increase or decrease the PET opacity.
 - Click  > Render Parameters. Drag the handle in the PET Blending slider.

Fusion Presets

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

CT and PET modalities acquire and natively display the resulting images using grayscale. When fusing the two data sets together, eUnity™ applies a pseudo color from the Color Look Up Table (CLUT) to the PET data so that the metabolic data of the PET information has a pseudo color value.



Fusion Presets

Apply presets such as Hot Iron to fused PET / CT studies so that the metabolic data of the PET information is assigned a preset pseudo color value from the Color Look Up Table (CLUT).

Change the color preset

1. On the Fusion tab, click .
2. In the dropdown, select a color preset.

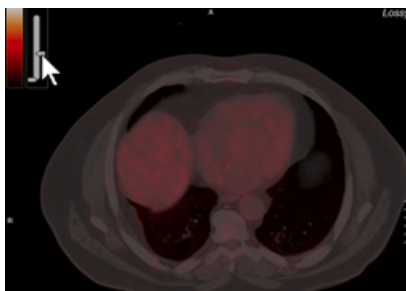
Alternately,

1. Hover the cursor over the vertical color palette in the upper-left corner of the fusion viewport.
2. Left-click the color palette to cycle through the available presets. Press and hold the Shift key during the mouse clicks to cycle through the fusion presets in opposite order.

Filter grayscale range

Use the slider control in the upper-left corner of the fusion viewport to filter out (trim) the hottest (high-end) or coldest (low-end) grayscale values from the PET data displayed in the fused viewport. Once the filter range has been adjusted, the entire color palette in the viewer is reassigned to the filtered range set by the user.

Note: The entire color palette in the viewer will be reassigned across the filtered range that you set.



Link color palette to PET Window Level

Link the color palette in fused PET /CT images with the Window Level in PET images. When this switch is toggled on, if you change the Window Level in a PET image, the color palette range in the

fused PET / CT is also changed, and vice versa. For example, if you increase the Window Width, you also increase the color palette range.

1. Select a fused image.
 - Toggle the Link Palette with Pet W/L switch to the on position to link the color palette to the PET Window Level.
 - Toggle the Link Palette with Pet W/L switch to the off position so that changes to the Window Level do not affect the color palette, and vice versa.

SUV measurement tools

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

SUV can be measured in a PET study in 2D mode or in Fusion mode. In Fusion mode, SUV measurements can be performed only on series that match the acquisition plane (typically axial). In eUnity™, SUV can be measured only for BQML (becquerel / milliliter) units using any of the following measurement methods: body weight (bw), lean body mass (lbm), and body surface area (bsa). For more information on how these measurements are calculated, see [SUV measurement methods](#).

Note that some essential data must be available in the DICOM header to perform SUV measurements (see [Required DICOM attributes to calculate uptake values](#)). If essential data is missing, the SUV measurement cannot be performed and the "SUV not available" indicator will display in the viewport with a tool tip that provides details about the missing information. If necessary, non-essential data such as sex, weight, height, dose, half life, radiopharmaceutical, and time of administration can be manually edited in the Advanced Visualization Parameters panel.



IMPORTANT NOTE ON SUV CALCULATIONS

SUV calculations in eUnity are based on industry-accepted standards and equations. They may differ from the methods of the customer. The customer is responsible for evaluating and approving the use of SUV measurements in their facility before the tool is approved for widespread use.

This section contains the following information:

- [Overview of SUV measurement tools](#)
- [Change SUV parameters](#)
- [Change the SUV measurement method](#)
- [Measure SUV using an ROI tool](#)
- [Measure SUV using the Point Tool](#)

- [Save SUV measurements](#)
- [SUV measurement methods](#)

Overview of SUV measurement tools



Circle ROI

A single left-click starts the measurement and a second left-click ends the measurement. To edit, select the measurement to be active and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Ellipse ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Rectangle ROI

Left-click to start the measurement and left-click again to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Freeform ROI

Left-click to start the measurement and left-click on the first point selected or double-click to end the measurement. To edit a measurement, click the measurement to select it and then drag the measurement handles. The source of the calibration is shown in brackets at the bottom of the overlay.



Point Tool

Measures the exact value for a specific point. The unit of measure depends on the modality type. For example, in PET images it provides the SUV value, and in CT images it provides the Hounsfield units.

Note that when using the Point Tool on reconstructed series, measurements can be made only on series that match the acquisition plane (typically axial).

Change SUV parameters

If non-essential parameters such as patient weight or administration time are entered incorrectly at the time of acquisition, you can manually update these parameters in the Advanced Visualization Parameters panel and optionally save them as a Presentation State.

1. On the Fusion tab, click  to open the Advanced Visualization Parameters panel.
2. In the panel, click the SUV Parameters tab.
3. Change any of the non-essential parameters such as sex, weight, height, dose, half life, radiopharmaceutical, and time of administration.
 - Click Apply to apply your changes to the current view.
 - Click Cancel to discard any un-applied changes.
 - Click  on the Home tab to reset all parameters back to the values you started with (if it is the original study, the values are set back to the DICOM values, and if it is a Presentation State, the values are set back to the original Presentation State values).
 - Click Reset (to the right of the associated parameter) to reset the parameter's value back to the original DICOM value (even in a Presentation State, this will revert to the original DICOM value).
4. To save the parameters that you have changed, click Apply to apply the changes and then save the study as a Presentation State. Note that the study must also contain markup on the 2D PET (for instance an ROI measurement) to be able to save it as a Presentation State. For more information, see [Save SUV measurements](#).

In the Advanced Visualization Parameters panel, a missing parameter displays a yellow warning marker and a modified parameter displays a checkmark beside it. Updated parameters are also shown in the SUV measurement overlay as shown in the image below. The units of measure, shown on the first line of the SUV overlay, indicate that they are based on "updated" parameters and the changed parameters are listed in the last line of the SUV overlay.

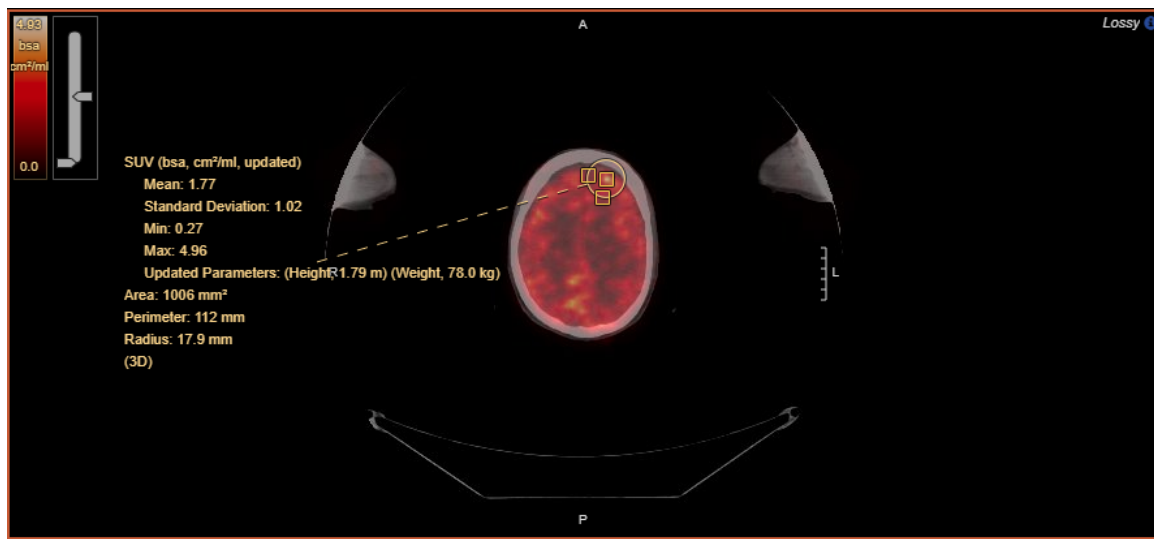


Figure 10 : Updated height and weight parameters in SUV measurement overlay

Change the SUV measurement method

The measurement method and the units are shown in the SUV measurement overlay. The available measurement methods and units are:

- gram per milliliter (g/ml) for body weight (bw) and lean body mass (lbm)
- centimeter-squared per milliliter (cm²/ml) for body surface area (bsa)

1. On the Fusion tab, click  and click the SUV Parameters tab.
2. Select a measurement method.
3. Click Apply.

Measure SUV using an ROI tool

When you measure SUV using an ROI tool, the SUV overlay shows the average and standard deviation as well as the minimum and maximum pixel values within the boundaries of that ROI. System administrators can configure what is shown in the overlay.

1. On the Markup tab, click any of the ROI measurement tools or click the Circle ROI tool from the Fusion tab.
2. Click and drag to outline the region of interest. (In the case of the polygon ROI, double-click to end the measurement.) Note that in Fusion mode, SUV measurements can be made only on series that match the acquisition plane (typically axial).
3. The SUV values are displayed in the measurement overlay.

Measure SUV using the Point Tool

The Point Tool measures the exact SUV value for a specific point.

- 1. On the Fusion tab, click 
- 2. Click the location that you want to measure. Note that in Fusion mode, SUV measurements can be made only on series that match the acquisition plane (typically axial).

Save SUV measurements

SUV measurements that are made on the original 2D axial PET images can be saved as a Presentation State. If any SUV parameters have been changed and those changes have been applied to the study, they will be saved as part of the Presentation State.

- 1. On a 2D axial PET image, measure SUV using an ROI tool.
- 2. To save a Presentation State, click  on the study pill in the Series Tray.
- 3. In the confirmation dialog, select the markup that you want to save and click Yes.

SUV measurement methods

As mentioned earlier, eUnity supports the following measurement methods: body weight (bw), lean body mass (lbm), and body surface area (bsa). This section explains the calculation details for each of these methods.



NOTE ON SUV MEASUREMENTS IN FUSION IMAGES

Since fusion images are constructed from a volume, SUV computation is subject to interpolation algorithms.

Required DICOM attributes to calculate uptake values

The following DICOM attributes are required to calculate uptake values.

DICOM attribute	Alternative Name Used in This Documentation	Tag
Corrected Image		(0028,0051)

DICOM attribute	Alternative Name Used in This Documentation	Tag
Decay Correction		(0054,1102)
Radiopharmaceutical Information Sequence • Radionuclide Total Dose (in Becquerel) • Radionuclide Half-Life (in Second) • Radiopharmaceutical Start Time • Radiopharmaceutical Start Date Time	Radiopharmaceutical Injected Dose Radiopharmaceutical Administration Time	(0054,0016) (0018,1074) (0018,1075) (0018,1072) (0018,1078)
Series Date	Scan Time	(0008,0021)
Series Time		(0008,0031)
Acquisition Date	Frame Acquisition Start Time	(0008,0022)
Acquisition Time		(0008,0032)
Frame Reference Time		(0054,1300)
Actual Frame Duration	Frame Duration	(0018,1242)
Patient's Weight (in Kilogram)		(0010,1030)
Patient's Size (in Meter)	Patient's Height	(0010,1020)
Patient's Sex		(0010,0040)
Philips SUV Scale Factor	Philips Body Weight SUV Scale Factor	(7053,1000)
Philips Activity Concentration Scale Factor		(7053,1009)
GE Scan Date and Time		(0009,100d)

PET exam background information

A PET exam starts by administering a certain dose of a radiopharmaceutical to a patient. A delay is necessary for patient's metabolic processes to deliver the radiopharmaceutical to the target of the study. After this delay, the PET scan is performed. The result of the scan is a series of PET images. A scan is divided into multiple frames (or bed positions) and the data acquired in each frame is used to generate several slices which belong to that frame.

Decay correction calculation

The radiopharmaceutical decay is a continuous process throughout the exam. As a result, the pixel data obtained at different times during the exam may have different interpretation. A correction is necessary to unify this interpretation across the series; this correction is usually applied in two steps, one at the modality and one in the viewer application.

eUnity allows the calculation of SUV if the underlying series is corrected for decay with respect to the scan time at the modality. This condition is satisfied if (a) corrected image attribute contains the value DECY, and (b) decay correction attribute has the value START. Note that this correction does not account for the decay from the radiopharmaceutical administration time to the scan time. eUnity does correct for that decay as described below.

Denote by ***D*** the radiopharmaceutical injected dose at the administration time, and by ***H*** the half-life of the radionuclide used in the radiopharmaceutical. The values of ***D*** and ***H*** have the units Becquerel (Bq) and second, respectively. Also, denote by ***ΔT*** the time interval from the radiopharmaceutical administration time to the scan time. If the scan time is valid, the corrected dose at the scan time is given by:

$$C = D2^{-\frac{\Delta T}{H}}$$

Scan time calculation

The scan time is valid if it has a value in compliance with the DICOM specification, and if it precedes the acquisition time of any frame in the exam. When the series is post-processed after acquisition, the scan time is overwritten and hence no longer valid. The actual scan time can still be indirectly calculated if the following information is available:

1. Acquisition date and time – The combination of acquisition date and time denote the frame acquisition start time
2. Frame reference time – The time interval from the actual scan time to the average activity time. The average activity time for a frame is defined as the time instant within that frame where the instantaneous rate of radionuclide disintegration (or activity) is equal to the average activity over the frame.

3. Frame duration – The time interval from the frame acquisition start time to the frame acquisition end time.

The procedure to indirectly calculate the scan time is as follows:

1. Calculate the time interval from the frame acquisition start time to the average activity time as follows. Let the frame acquisition start time coincide with the time origin $t = 0$. Denote by N_t the number of radionuclides at time t . We have

$$N_t = N_0 2^{-t/H} = N_0 e^{-\lambda t}$$

where $\lambda = \ln 2 / H$ is known as the decay constant. The disintegration rate (or activity) at time t is given by $-\frac{dN_t}{dt}$. From the definition of the average activity time, the interval of interest is the solution for t of the following equation:

$$-\frac{d}{dt} N_t = \frac{1}{T} \int_0^T -\frac{d}{d\tau} N_\tau d\tau$$

where T is the frame duration. The solution is given by:

$$t = \frac{1}{\lambda} \ln \frac{\lambda T}{1 - e^{-\lambda T}}$$

2. Subtract the value calculated in Step 1 from the frame reference time; the result is the length of the time interval from the actual scan time to the frame acquisition start time.
3. Subtract the value calculated in Step 2 from the frame acquisition start time; the result is the actual scan time.

SUV measurement calculations

The SUV is a normalized measure of radioactivity concentration and has the following generic form:

$$SUV = fP$$

In the above formula, f is the normalization factor and P is the activity concentration. P is replaced with either the minimum or maximum pixel value within the boundaries of an ROI drawn over a PET or PET / CT fusion image, or the average value of all pixels within that ROI. The pixel values are directly read from the original full-resolution DICOM images before any transformation (such as Window Level) is applied.

We first consider a case where P has the unit BQML (Bq / Milliliter). In this case, the normalization factor can be defined in several ways.

Body weight SUV calculation

For body weight SUV, the normalization factor is the ratio of the patient's weight W in gram to the corrected dose C in Bq, i.e.,

$$SUV_{bw} = \frac{W}{C} P$$

The SUV unit for body weight is gram / milliliter.

Lean body mass SUV calculations

For lean body mass SUV, the normalization factor is the ratio of the patient's lean body mass in gram to the corrected dose C in Bq, i.e.,

$$SUV_{lbm} = \frac{LBM}{C} P$$

The lean body mass in kilogram is calculated from the patient's weight W in kilogram, height H in centimeter and sex using James formula for females and Morgan formula for males:

$$LBM_{male} = 1.10 W - 120 \left(\frac{W}{H} \right)^2$$

$$LBM_{female} = 1.07 W - 148 \left(\frac{W}{H} \right)^2$$

The SUV unit for lean body mass is gram / milliliter.

Body surface area SUV calculations

For body surface area SUV, the normalization factor is the ratio of the body surface area in centimeter-squared to the corrected dose C in Bq, i.e.,

$$SUV_{bsa} = \frac{BSA}{C} P$$

The body surface area in centimeter-squared is calculated from the patient's weight W in kilogram and height H in centimeter using Du Bois formula:

$$BSA = 71.84 H^{0.725} W^{0.425}$$

The SUV unit for body surface area is centimeter-squared / milliliter.

Remarks

1. Radiopharmaceutical administration date is implicitly inferred from radiopharmaceutical administration time, scan date and scan time. If the radiopharmaceutical administration time is before the scan time (e.g., radiopharmaceutical administration time = 14:27:00:000000 and scan time = 15:27:00:000000), it is assumed that the radiopharmaceutical administration date is the same as the scan date. If the radiopharmaceutical administration time is after scan time (e.g., radiopharmaceutical administration time = 23:29:00:000000 and scan time = 00:29:00:000000), it is assumed that the radiopharmaceutical administration date is one day before the scan date, i.e., the PET exam crosses midnight.
2. Radiopharmaceutical start date time attribute is ignored. This DICOM attribute, if present, provides the explicit date on which the radiopharmaceutical is administered.
3. We do not support GE private tag for scan date and time.

References

<https://dicom.innolitics.com/ciods/pet-image/pet-image/00541300>

http://qibawiki.rsna.org/images/8/86/SUV_vendorneutral_pseudocode_20180626_DAC.pdf

Revert to original



Revert to Original

Revert a series to its original presentation.

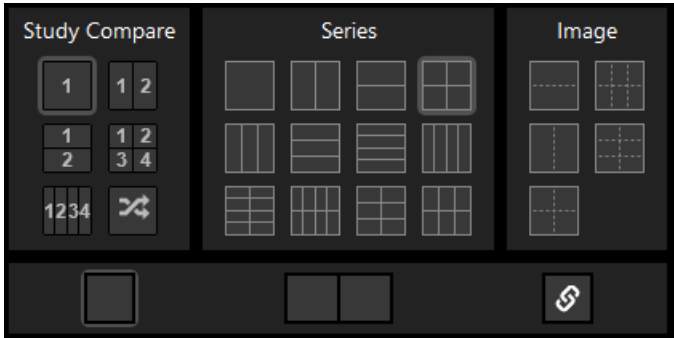
Screen Layout

Screen Layouts are accessed by pressing the Screen Layout button on the toolbar.



Screen Layout

Access Study Compare mode or change the monitor or viewport layout.



Screen layouts are grouped into the following categories:

Study Compare	These layouts control layout behavior when prior studies are in-view in single or multi-monitor modes.
Series	These layouts display more than one series from a single study. The gray lines represent series within a single study.
Image	These layouts display one or more images from a single series and are also referred to as image tile layouts. The dotted lines represent images within the same series.

Monitor layouts



If Multi-Monitor mode is enabled by the system administrator, the screen layout drop-down will provide three additional display options: Single Monitor, Dual Monitor, and Linked Dual Monitor. When Dual Monitor or Linked Dual Monitor are selected, eUnity will enter Multi-Monitor mode.

Single Monitor	In Single Monitor mode there is one toolbar and one Series Tray.
Dual Monitor	Split the view between two monitors. This mode can be used even if there is only one physical monitor. In this case, eUnity splits the view into two virtual monitors. Each monitor or virtual monitor can have its own layout and view mode and the toolbar and Series Trays are shown on each monitor.
Linked Dual Monitor	Similar to Dual Monitor mode, but in this case, the views are linked so that they both use the same layout or view mode.

Study Compare, Structured Layouts, and Shuffle Layout

In all Multi-Monitor modes (Single Monitor, Dual Monitor, and Linked Dual Monitor) the Study Compare Display options include Structured Layouts and a Shuffle Layout. The Shuffle Layout is only available if it is configured by the system administrator.

Typically, PACS Workstations either present studies in a prescribed manner to help users keep an organized view of what series belongs to what study. Some users find this too restrictive and prefer PACS workstations that allow the user to drag any series to any viewport on any monitor. Through the use of both Structured Layouts and Shuffle Layout, eUnity supports both scenarios.

The Shuffle Layout, if selected by the user, will allow the user to drag any series from any study to any available viewport.

Structured Layouts define Study Views to prevent series from different studies being mixed together. For example, the Structured Layout icon showing two monitors with two studies (e.g. 111 121) will keep all the series from study 1 on monitor 1 and all the series from study 2 on monitor 2.

Multi-study ordering

System administrators can set either of the following modes of behavior when displaying more than one study in Structured Layouts (that is, the time ordering described below does not apply to the Shuffle Layout).

- **Strict Time Ordering On:** Studies displayed in a multi-study layout are always ordered from newest study date to oldest from left to right. This time-based ordering is always maintained when new studies are brought into view.
- **Strict Time Ordering Off:** Studies can be displayed in any order.

Study cells



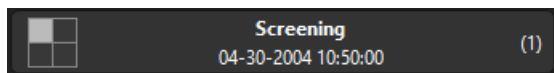
Multi-study layouts are identified by black boxes on the layout icon, which indicate a study cell. A study cell can only contain a single study. If a series is dropped into a cell containing a different study, the entire study cell, including all enclosed series cells, will be changed to the dropped study.

The same study cannot be displayed in two different study cells. This restriction causes different behavior depending on the time ordering configuration. If Strict Time Ordering is on, attempting to drag-and-drop a series for a study already on screen will only permit dropping into the existing study cell. When Strict Time Ordering is off, a series can be dropped into any study cell with the result that, if the study is elsewhere on screen, the studies will be swapped.

Load studies from the Study List

Clicking on an item from the Study List will display that study in the first empty study cell. If there are no empty study cells, then the currently selected study will be replaced. If the selected item is not currently loaded into the viewer (i.e. available from the Series Tray) it will be loaded. When the maximum loaded studies limit is reached, the currently selected study will be unloaded.

When a study is displayed, the on-screen location is indicated using an icon on the Study List item with a corresponding icon in the Series Tray for the matching study. For example, the icon below from the Study List indicates that the study is displayed in the upper-left quadrant of the screen.



Series Reposition



Series Reposition

Swap series between viewports.

Series Reposition on desktop



1. To reposition series in the viewports click  to turn on Series Reposition mode.
2. Click a series to select it and drag it to another viewport.

Series Reposition on mobile

1. Long press the screen to pick-up the series and drag it to another viewport.

Spine Labeling



Spine Labeling

Add spine-related labels to images. In Spine Labeling mode, the Spine Labeling tab is activated to provide access to other spine labeling tools.



Toggle Spine Labeling Markup

Hide or show spine labels. Note that Toggle Markup  also hides / shows spine labels.



Delete All Spine Labels

Delete all spine labels in the study.

About spine labels



CAUTION

The Spine Labeling tool does not perform any automatic detection of the individual vertebra in DICOM images. It uses the 3D spatial information within the DICOM images to apply spine label annotations to other spatially related series within the same DICOM study. This tool is intended only to assist a user to more easily add spine label annotations - it is the responsibility of the user to ensure that the labels are presented on the appropriate vertebrae within the study.

Annotations on vertebral bodies can help you to more easily understand the approximate position an image within a patient's body. Typically, spine labeling should be used on studies with multiple views such as CT and MR so that eUnity™ can use the 3D information contained within the DICOM header of an image to automatically apply spine label annotations to other spatially related images. That is, if you apply labels to a sagittal series, eUnity automatically adds those labels to the corresponding vertebrae in the associated axial series.

Studies such as CR do not have DICOM information within the DICOM header that spatially relates multiple series. For these types of studies, the Spine Labeling tool can still be used to manually annotate a single image at a time. Images from such modalities are treated as sagittal views with the assumption that the top of the spine is at the top of the image. There is no automatic labeling of images in these non-spatially related modalities.

When you start labeling, eUnity will use the information in the DICOM header and the cursor position relative to the other spine labels to determine whether you are labeling ascending or descending order. The tool icon on the toolbar changes to display the vertebra that will be added on the next click. For example, the Spine Labeling icon () will change to  and continue to increase or decrease as the mouse position changes.

For DICOM studies with multiple views, such as CT and MR studies, spine labels can only be applied to sagittal and axial images. Sagittal views display the spine labels to the side of the image with a dashed indicator line and axial views display a text label centered at the top of the image. Text labels and indicator lines can be repositioned in any of the views.

For more information on spine labeling in different series and study types, see [Spine labeling workflows](#) below.

Add spine labels



CAUTION

The precision of the system placing spine labels depends on the user placing labels as close as possible to center of the vertebrae.

To add spine labels, do the following:

1. Click the series that you want to label. For CT and MR studies, this will typically be a sagittal view.
2. On the Markup tab, click  to turn on Spine Labeling mode and display the Vertebral Bodies menu. Once Spine Labeling mode is turned on, the Spine Labeling tab is activated and it is available until the end of the session.
3. In the Vertebral Bodies menu, click the vertebra that you want to start with.
4. In the image, left-click on a vertebra center to add a spine label. If necessary, click and drag the text label to reposition it. Alternately, to add and reposition the label in one step, click and hold the vertebra centre and then drag the cursor to position the text label (note that this behavior does not apply to axial series).
5. Move your cursor to the next vertebra. The Spine Labeling icon on the toolbar indicates which label will be added on next. In case the toolbar displays no vertebra label or a vertebra label different from what you want to add, click the Spine Labeling icon again and select the desired vertebra from the Vertebral Bodies menu. See below for how to [Add C8, T13, or L6 labels](#).

To turn off spine labeling, and return to Navigation mode, click



Add C8, T13, or L6 labels

To apply C8, T13, and L6, simply skip those vertebrae and apply the labels immediately before and after them. When you return your cursor to the skipped vertebra, eUnity will automatically switch to the missing label so you can apply it.

For example, to add the C8 vertebra, do the following:

1. Add the C7 label, skip C8, and apply T1.
2. Move your cursor between the C7 and T1 labels. The Spine Labeling tool icon on the toolbar changes to C8.
3. Left-click the image to apply the C8 label.
4. Move the mouse to the vertebra below T1. The Spine Labeling tool icon will change to T2.

Edit or delete spine labels

To edit a spine label, do any of the following:

- On sagittal views drag the text label or indicator line to a new location. Ensure that you keep the end point of the indicator line as close as possible to vertebra center.
- For non-spatially related studies, drag the text label or indicator line to a new location.
- On axial views, drag the label anywhere in the image.

To delete spine labels, do any of the following:

- Click  to show the Vertebral Bodies menu. Clear the vertebra that you want to remove.
- Click the spine label that you want to remove and press the Delete key on your keyboard.
- On the Spine Labeling tab, click  to turn on the Eraser tool. Click the spine label to remove. Note that the Eraser tool cannot be used to remove spine labels on axial series.
- To remove all spine labels in the study, on the Spine Labeling tab, click .

Navigate using spine labels

1. Double-click the spine label on a sagittal series to display that vertebra in all series.

Spine labeling workflows

The typical scenarios where spine labeling is used are:

- Labeling a sagittal series (e.g. a CT or MR)
- Labeling an axial series (e.g. a CT or MR)
- Labeling an image (e.g. a CR or DX)

Labeling workflow for sagittal series

The most common use of spine labeling is to label images within a sagittal series of a DICOM study.

In this scenario, the common steps are:

Left-click a vertebra on a sagittal image to apply a spine label. For example, C2. The Spine Labeling tool will do the following:

- Apply a spine label of C2 to every image in the selected image's series.
- Copy a matching spine label of C2 to every image in any spatially related sagittal images within the same study.
- Apply a spine label of C2 to any spatially related axial image within the same study that are near the point selected in the sagittal image.
- Apply a spine label of - / C2 to any spatially related axial image within the same study that are anatomically above the image labeled C2.
- Apply a spine label of C2 / - to any spatially related axial image within the same study that are anatomically below the image labeled C2.

Note: If you move your mouse above and below the C2 spine label annotation, you can see that the spine label tool icon will update its spine label vertebra to C1 and C3, respectively.

Select a second vertebra on a sagittal image to apply another spine label of below the first spine label of C2. The Spine Labeling tool will do the following:

- Apply a spine label of C3 to every image in the selected image's series.
- Copy a matching spine label of C3 to every image in any spatially related sagittal images within the same study.
- Update the spine label(s) of C2 / - to C3 to the images within the selected series and any spatially related axial image within the same study that are near the point selected in the sagittal image.

- Update the spine label(s) of C2 / - to C2 / C3 to the images within the selected series and any spatially related axial image within the same study that are between the images identified as C2 and C3.
- Update the spine label(s) of C2 / - to C3 / - to the images within the selected series and any spatially related axial image within the same study that are below the images identified as C3.
- This process continues for each spine label the user selects to apply.

Labeling workflow for axial series

This workflow is similar to labeling a sagittal series. It is used when the study does not contain

spatially related sagittal images. Reference lines  are useful for adding spine labels on studies that do not have sagittal images.

In this scenario, the user selects the axial image they would like to apply a spine label on (for example, C2) and click to apply the spine label. The Spine Labeling tool does the following:

- Apply a spine label of C2 to the selected image and any spatially related axial image within the same study that are near the point selected in the axial image.
- Apply a spine label of - / C2 to any spatially related axial image within the same study that are anatomically above the image labeled C2.
- Apply a spine label of C2 / - to any spatially related axial image within the same study that are anatomically below the image labeled C2.

The user navigates to the image that has the vertebra C3 and clicks to apply a spine label. The Spine Labeling tool does the following:

- Update the spine label(s) of C2 / - to C3 to the selected image and any spatially related axial image within the same study that are near the point selected in the axial image.
- Update the spine label(s) of C2 / - to C2 / C3 to the images within the selected series and any spatially related axial image within the same study that are between the images identified as C2 and C3.
- Update the spine label(s) of C2 / - to C3 / - to the images within the selected Series and any spatially related axial image within the same study that are below the images identified as C3.

Labeling workflow for non-spatially related studies

Spine labels can be applied to modalities that have no image orientation and position information, (that is, studies other than CT and MR). Images from such modalities are treated as sagittal views

with assumption that the top of the spine is at the top of the image. There is no automatic labeling of images in these non-spatially related modalities.

Study Information

The Study Information panel is displayed on the left side of the viewer. It contains various tabs that provide information about the study. Each of the tabs are made available based on configuration settings and the availability of systems integrated to the eUnity™ server. If none of the tabs are available, the Study Information button is not displayed.



Study List

Open a panel containing information grouped into the following tabs: Study List, Study Details, Report, and Notifications.

Study List

The Study List tab displays a list of other studies for the patient currently in view. Click any of the studies in the Study List to view it. The study will replace the study in the currently active viewport. Note that only 4 studies can be loaded at a time.

For more information, see [Screen Layout](#)

Study Details

The Study Details tab displays basic information and study comments for the currently selected study. Note that the availability of Study Comments depends on a source system being available for, and integrated to, the eUnity server.

Report

If eUnity has been configured to retrieve report information from a report system / archive, the report text for the currently selected study appears in this panel. Note that you can launch directly into the report panel by clicking 

Note: If there are multiple DICOM SR reports associated with the study, eUnity will only display the most current by date.

Notifications

See [Content change notifications](#)

Toggle Markup



Toggle Markup

Hide or show markup on images. This action will also hide or show Presentation State markup.

Toolbar

Use the Toolbar tab in the Settings panel to add, remove, or move tools. Toolbars can be configured at a site, group, or user-level by the system administrator, or an individual user can configure their own toolbars.

Add, edit, or delete tools



NOTE

Clicking Reset will reset all toolbars back to the default settings that were set by your system administrator. That is, all of your custom toolbar settings will be reset.

1. In the upper-right corner of the viewer, click  to open the Properties panel.
2. In the Properties panel, click the Toolbar tab.
3. Select the tab that you want to configure from the Toolbar Tab dropdown.
 - To add a tool, click  beside Tools. Select the tools you want to add and click OK.
 - To move a tool to a new spot, click the  handle and drag the tool to the desired position. The order of the tools in the dialog is the order in which they appear on the toolbar from left to right.
 - To remove a tool from the toolbar, click . If a tool is removed it can always be re-added.
4. If you are satisfied with your changes, click Save. To revert any changes you made since your last save, click Cancel.

Triangulation

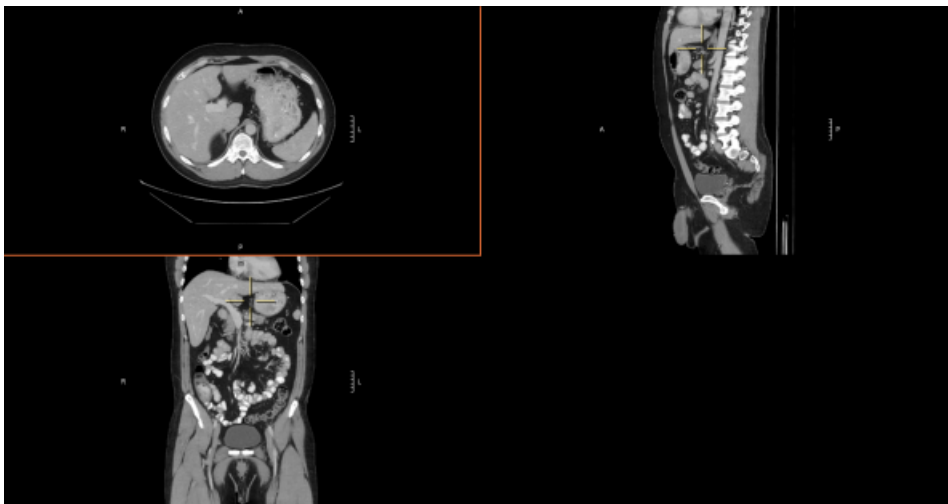


Triangulation

Navigate to a selected point in orthogonal series.

The triangulation and [Reference / Scout Lines](#) tools work together to help you navigate orthogonal series.

1. Click  to turn on Triangulation.
2. Left-click and drag the mouse over a series to display the crosshair indicator on the other series in the view. The crosshair indicates the corresponding point on the different planes.



Window Level

In mammography studies, the viewport background retains its color when the Window Level is changed. For more information, see [Air gap suppression](#).



Window Level

Change the Window Level for the selected image.



Reset Window Level

Reset the images to their original Window Level settings.



Window Level Presets

Select a predefined Window Level. Window Level presets are configurable by the system administrator.



Window Level Scope

This feature must be enabled by the system administrator.

Change Window Level to apply to the study, the series stack, or only the image. By default, Window Level operations apply to the series stack.

Manually change the Window Level

The Window Level operation can be mapped to middle-mouse button or right-mouse button by the system administrator.



1. Click  to turn on the Window Level tool.
2. Click and hold the left mouse button in the viewport.
 - Drag the cursor up and down to adjust Window Level.
 - Drag the cursor left and right to adjust Window Width.

To get fine Window Level control, press and hold the CTRL key while you drag. The Window Level will be adjusted in smaller increments.

3. To reset the Window Level to its initial presentation, click 

Apply a Window Level preset

The Window Level Presets dropdown provides access to site-level, modality-specific Window Level presets. The Window Level Presets button is shown only if there are presets available for the study being displayed. If a study contains multiple-modalities, the dropdown will be populated with the presets matching the modality of the selected series. If the selected series has no presets, the icon is disabled.

Note that additional presets can be defined by the system administrator.

1. Click  and select a preset.

Change the Window Level Scope

Note: This feature must be enabled by the system administrator.

By default, Window Level operations apply to all of the images in a series. To instead apply Window Level changes at the study or image level, do the following:

1. Click  and select any of the following options:
 - W/L Image Scope
 - W/L Series Scope
 - W/L Study Scope

When the Window Level scope is changed, the icon on the toolbar changes to reflect the current selection:



Window Level Image Scope



Window Level Series Scope



Window Level Study Scope

Zoom / Pan



Zoom / Pan

Zoom in on or pan an image in the selected viewport. When series are linked, zoom / pan is applied across all linked series.

1. Select an image.

2. Click 

- To zoom in, roll the mouse wheel forward. To zoom out, roll the mouse wheel backward.
- To pan, left-click and drag the mouse left or right.

The zoom factor in the demographic overlay details the amount of zoom.

Hanging protocols

Hanging protocols overview

Note: This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

Hanging protocols (HPs) are a set of instructions that are used to position and manipulate images in the eUnity™ viewer. Users can create HPs that are available only for themselves, and administrators can create HPs for entire groups or for an entire site.

In eUnity, you create an HP by manually arranging series in the viewer and then "capturing" the viewer state as a new HP. In order to capture the viewer state, eUnity needs to be able to tell what it is looking at (i.e. what kind of study it is and what type of series is in what viewport). eUnity determines study type and series type using **Study Selectors** and **Series Selectors**.

Selectors take the manual work out of creating an HP. Instead of the HP author telling eUnity what series to put where, eUnity intelligently determines what is on the screen by comparing the study and series DICOM attributes against the HP selector library. The more robust your selector library, the less you have to manually edit the HP.

Study Selectors

Study Selectors define what content will trigger a specific hanging protocol to be applied. These answer the question, what kind of study is it? eUnity comes with a broad set of Study Selectors (for example, the "CT" Study Selector which will match any kind of CT). It is up to administrators to define more specific Study Selectors for the site (for example, CT chest).

Series Selectors

Series Selectors evaluate the DICOM attributes in a series to define what is unique about each series. Is it an AXIAL? An AXIAL T2? When you identify the unique pieces information about a series, that series type can be consistently mapped to the desired location on the screen. The more detailed the selector, the more precise you can make the hanging protocol. eUnity comes with a basic set of Series Selectors (for example, view position is PA or AP). It is up to administrators to expand the Series Selector library with data that is specific to your site. For example, with a basic set of Series Selectors, the hanging protocol can perhaps identify that you have a CORONAL series is in the upper-left viewport. If you have more detailed Series Selectors, the hanging protocol could identify that you have a CORONAL PD FAT-SAT in the upper-left viewport. With the more detailed selector, the next time the hanging protocol is applied, the CORONAL PD FAT-SAT series will be in the upper-left viewport instead of just any CORONAL series.

Display Set

The Display Sets are a list of the series in the study. They are listed so that you know what series are available to be arranged in the viewer. Display Sets identify the series that are available in the study by matching Series Selectors to the attributes in the series. If no Series Selectors are defined, the viewer creates Display Sets based on series descriptions. If no series descriptions are defined, the viewer creates Display Sets based on series number.

Presentation Steps

Presentation Steps are the views that you step through in a hanging protocol. For example, step one of a mammography hanging protocol may be to read the CC views (LCC, RCC) and step two is to read the MLO views (LMLO, RMLO) and step three may be to view all images with CAD markers turned on. Each of these states is captured as a Presentation Step.

Note on strict hanging of Display Sets

When Display Sets are mapped to viewports in a hanging protocol, you have the option to enable strict hanging. When strict hanging is enabled, if a study does not contain the Display Set that is defined for the view, the viewport will be left blank. When strict hanging is not enabled, the next available series will be shown in the viewport.

For information on enabling strict hanging for Display Sets, see [Edit the Presentation Step view](#).

Putting it together

- ▼ Study Selectors connect the study to the hanging protocol
- ▼ Series Selectors connect the series to the Display Set.
- ▼ Display Sets are mapped to viewports as Presentation Steps.

Example

Dr. Smith wants to create a new HP that she will use to read MR studies of the brain. She opens a brain MR, sets the screen layout to 2 x 2, and then drags the series into the viewports. In the first step of the read, she wants to look at the SCOUT, AXIAL, SAGITTAL, CORONAL, in that order.

Dr. Smith drags each series to the desired viewport and clicks  on the Hanging Protocol tab.

eUnity does the following:

- ▼ identifies the study type by comparing the study metadata to the **Study Selectors**: in this case, an MR study of the brain
- ▼ identifies the device type and number of screens: in this case, a web viewer with one monitor
- ▼ identifies the series types using **Series Selectors**: in this case, a SCOUT, AXIAL, SAGITTAL, CORONAL, AXIAL T1 FLAIR, and CORONAL T1 FLAIR
- ▼ maps the series to **Display Sets**: in this case a SCOUT, AXIAL, SAGITTAL, CORONAL, AXIAL T1 FLAIR, and CORONAL T1 FLAIR
- ▼ identifies the location of the series on the screen as a **Presentation Step**: In this case, the SCOUT: upper-left, AXIAL: upper right, SAGITTAL: lower-left, and CORONAL: lower-right, and AXIAL T1 FLAIR and CORONAL T1 FLAIR: not shown

In the next step of her read, Dr. Smith wants to look at the same kinds of images, but with reference lines turned on. Dr. Smith adds a new Presentation Step named "Reference Lines". In the Presentation Step properties, she selects Reference Lines and saves the Presentation Step.

- ▼ eUnity makes a new Presentation Step where the layout is the same, but the reference lines are on

In the next step, Dr. Client wants to look at all of the FLAIR images. Dr. Smith adds a new Presentation Step named "FLAIR". In the viewer, she drags all of the FLAIR series onto the screen and then in the Presentation Step editing panel of the Hanging Protocol editor, she clicks Get Viewer State.

- ▼ eUnity creates a new Presentation Step where only the FLAIR series are shown on the screen.

Once finished, Dr. Client saves the hanging protocol. Since she is not an administrator, it will be available only for her. The next time she opens an MR study of the brain, her MR - BRAIN hanging protocol will be automatically applied.

- When the study opens, the viewer shows the SCOUT, AXIAL, SAGITTAL, and CORONAL series, in that order.
- Clicking  on the Hanging Protocol tab moves to the next Presentation Step. The viewer shows the same series, but with reference lines on.
- Clicking  on the Hanging Protocol tab moves to the next Presentation Step. The viewer shows the FLAIR series.

Create a hanging protocol

Before reading this section, see [Hanging protocols overview](#). It contains explanations of hanging protocol concepts and terms that are used in these instructions. If you are an administrator, see the hanging protocol section in the eUnity™ Administration Guide.

Quick guide

The following is a set of basic instructions so you can quickly get started with hanging protocols. To learn more about the more advanced fields in the Hanging Protocol editor, see the [Advanced guide](#) below.

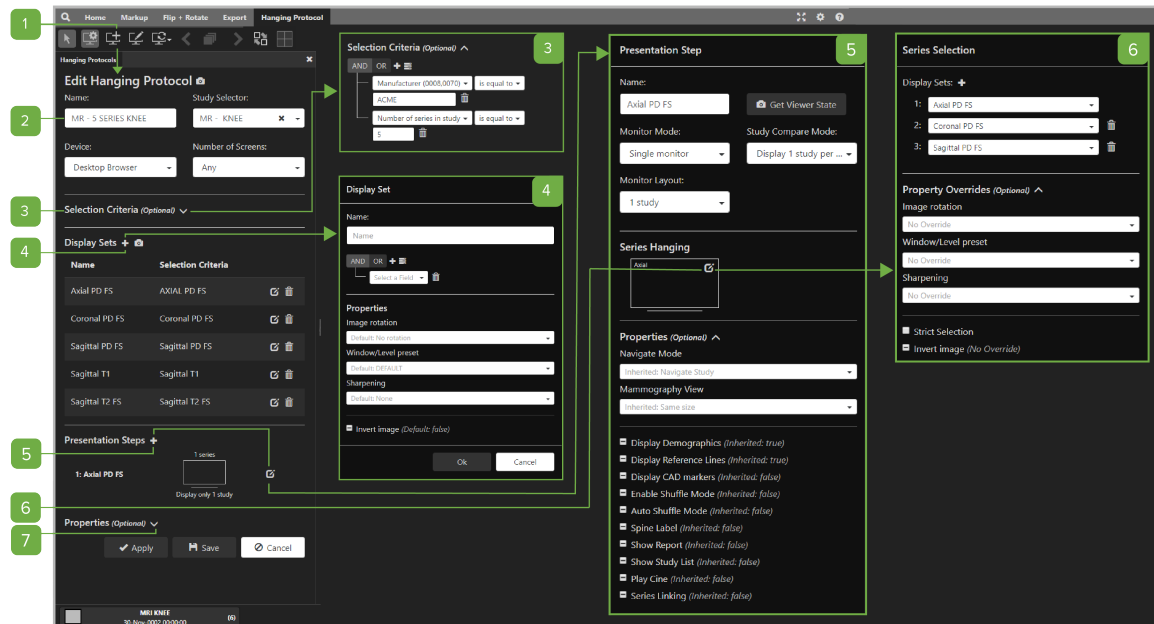
1. Open a study and arrange the series in the viewports as you'd like them to be seen in the first step of the hanging protocol.
2. On the Hanging Protocol tab, click . eUnity opens the hanging protocol editor. The viewer state is captured as the first Presentation Step in the hanging protocol.
3. In the Name field, add a descriptive name for the hanging protocol.
4. To add a new Presentation Step, click  in the Presentation Steps section.
5. To edit the Presentation Step, click  in the new step. The Presentation Step dialog opens.
6. In the Presentation Step dialog, in the Name field, add a name for the new Presentation Step.
7. Rearrange the series in the viewer and click Get Viewer State. The viewer state is captured as a new Presentation Step.
8. If necessary, edit the individual viewports in the Series Hanging section by clicking .
9. Click OK.
10. Repeat steps 4-10 for each Presentation Step that you want to add.
 11. Click Apply at the bottom of the Hanging Protocol editor to apply the changes to the current view.
12. Click Save to save the changes.

Advanced guide

The number of steps that it takes to create a hanging protocol depends on the quality and quantity of your system's Study Selectors and Series Selectors. After you lay out the study in the viewer, if your selector library is detailed enough, eUnity™ should be able to precisely identify study types and series types. If your selectors need a little more detail, there may be a few extra steps needed to create a hanging protocol.

The following table represents two possible hanging protocol workflows. Detailed instructions for each step of the workflow are available below.

Selectors identify study and series generally	Selectors identify study and series precisely
1 Arrange series and capture the viewer state 2 Name the hanging protocol 3 Refine the selection criteria for the study 4 Add or edit Display Sets 5 Add Presentation Steps, if necessary 6 Define the view for the Presentation Step 7 Add viewer-level properties, if necessary	1 Arrange series and capture the viewer state 2 Name the hanging protocol 5 Add Presentation Steps, if necessary 6 Define the view for the Presentation Step 7 Add viewer-level properties, if necessary



Hanging Protocol tab overview

The following buttons are available for managing, adding, and editing hanging protocols. For information on navigating through a hanging protocol after it is applied, see [Step through a hanging protocol](#).



Settings - Hanging Protocols

Open the Hanging Protocol Settings panel to add, edit, or delete hanging protocols.



Add Hanging Protocol

Create a new hanging protocol.



Edit Hanging Protocol

Edit the active hanging protocol. This icon is available only when there is an active hanging protocol. Access non-active hanging protocols in the Hanging Protocol Settings panel.



Select Hanging Protocol

This dropdown provides a list of "close match" hanging protocols. Choose a hanging protocol to apply to the current study in the viewer.

Lay out the study in the viewer and capture the viewer state

Arrange series and capture the viewer state

1

1. Open a study and arrange the series in the viewports as you'd like them to be seen in the first step of the hanging protocol.



2. On the Hanging Protocol tab, click . eUnity uses Study and Series Selectors to capture the details about the study and series and displays these details in the Hanging Protocol panel.

2

Name the hanging protocol

1. In the Name field, add a descriptive name for the hanging protocol.

Refine the selectors

If the Selectors identify the study and series at a general level, but you would like something more specific, you can manually add your own study selection criteria (to further refine the Study Selector) or edit the Display Sets (to further refine the Series Selectors).

For example, if the Study Selector is "MR", but you want this hanging protocol to apply to MR studies from a specific manufacturer, you can add a selection criterion that says Manufacturer is equal to ACME. You can also use Study Selectors to set selection criteria for studies with priors or without priors so that they each have a different hanging protocol.

Or, for example, the Series Selectors identifies an AXIAL series, but you were actually interested in that series because it was an AXIAL T2, you can add additional selection criteria to the AXIAL Display Set. For example, MR repetition time is greater than 2000 AND MR echo time is greater than 80 AND Flip angle is equal to 90.

Refine the selection criteria for the study

3

1. In the Selection Criteria section, select AND or OR. If the all selection criteria must be true to match a study, select AND. If any of the expressions can be true to match a study, select OR.
2. Click  to add a selection criterion field.
3. For each selection criterion, select the DICOM attribute, the operator, and the value. For example, to use the hanging protocol for a study without priors, add "AND Number of studies is equal to 1". To use the hanging protocol for a study with priors, add "AND Number of studies is greater than or equal to 2".

For information on creating more advanced expressions, see the eUnity™ Administration Guide.

Note: Selection criteria is appended to the Study Selector (shown beside the hanging protocol name). So, if the Study Selector is MR and you add selection criteria of Manufacturer is equal to ACME, then the hanging protocol will apply to studies where Modality is equal to MR **AND** Manufacturer = ACME.

Add or edit Display Sets

4

1. To add a Display Set, click  in the Display Set section. To edit a Display Set, click  on the Display Set.
2. In the Name field, add or edit the Display Set name,
3. Select AND or OR. If the all selection criteria must be true to match a series, select AND. If any of the expressions can be true to match a series, select OR.
4. Click  to add a selection criterion field.
5. For each selection criterion, select the DICOM attribute, the operator, and the value. For example, Series description contains PD.
6. Apply any desired properties to the Display Set. For more information, see [Display Set](#)

properties.

For information on creating more advanced expressions, see the eUnity™ Administration Guide.

Add Presentation Steps and define the Presentation Step view

Presentation Steps are the views that you step through in a hanging protocol. For example, step one of a mammography hanging protocol may be to view the left breasts (LCC, LMLO) and step two is to view the right breasts (RCC, RMLO) and step three may be to view all images with CAD markers turned on. Each of these states is captured as a Presentation Step.

Add a Presentation Step

5

1. To add a new Presentation Step, click  in the Presentation Steps section.
2. Click  in the newly added step.
3. In the Name field, add a name for the new Presentation Step.
4. Select the Monitor Mode, Study Compare Mode, and Monitor layout.
5. If there are any properties that should be applied to all of the Display Sets in the Presentation Step, set those properties. For more information, see [Presentation Step properties](#)

Edit the Presentation Step view

Set which Display Set is shown in which viewport and optionally override some of the properties that are set on the Presentation Step. To do this, you can either change the layout and properties in the viewer and click Get Viewer State in the Presentation Step dialog, or manually configure the view. These instructions explain manual configuration. Note that properties are not captured when you click Get Viewer State. They must be set manually.

6

1. In the Presentation Step dialog, click .
2. In the Series Selection dialog, choose the Display Set that you want to display in the viewport.
3. To add alternate Display Sets, click  beside Display Sets. Alternate Display Sets are useful for studies that are missing series. If, for example, your first choice for the view is a Sagittal PD FS, but if that wasn't available, you would prefer to see any Sagittal instead, you add a Sagittal PD FS Display Set first and then Sagittal Display Set after that.
4. If necessary, select property overrides for the view. For more information, see [View properties](#).
5. Click OK.

Set viewer-level properties



- 1. Select any properties that should apply at the viewer / study level. For more information on the available properties, see [Viewer properties](#).

Note: Most viewer-level properties can be overridden at the Display Set-level, Presentation Step-level, or the view-level.

Hanging protocol properties

Hanging protocols, use properties to control what tools or modes are enabled or disabled, what panels or tools are shown in the viewer, and what kind of effects (such as inversion, rotation, Window Level etc.) are applied to the series. Properties are inherited, so most can be set at the viewer-level and then overridden in the Display Set, Presentation Step, or the individual views in the Presentation Step.

- [Viewer properties](#)
- [Display Set properties](#)
- [Presentation Step properties](#)
- [View properties](#)

Viewer properties

With the exception of Breakout modality images and Combine series modalities, any of the properties that are set at the viewer-level can be overridden at another stage of the hanging protocol.

For example, if you want a mammography hanging protocol to have CAD markers turned on only for the first 2 steps of the hanging protocol, you can select CAD markers in the viewer properties and then deselect CAD markers in the third Presentation Step.

Toolbar Mask	Hide unused tools from the toolbar. All tools are available to hide.
Navigate Mode	Change the series navigate mode to one of the following options: • Navigate through images– scroll only the selected series • Navigate through Series– scroll to the next series in the study when you reach the end of the series (i.e. scroll across series stacks) • Navigate Related Series (Mammo only)- In mammography studies, stack

	images that are the same view type together (for example, stack all CC views together). When images are stacked, a indicator (such as 1/2) shows in the viewport to indicate that multiple images are stacked. Note that Key Images are not included in related series.
Mammography View	Select of the following display modes for mammography images: • Same size – show the images on screen with a similar pixel size • Quadrant – breaks the images in 4 quadrants and allows the user to step through each quadrants • Fit to window – zooms in on the breast bounding box to fit the viewport and maintains "same size" on each viewport
Breakout modality images	Set which modalities should separate each image into a separate series. For example, if this property is set to DX, each image in a DX series will be broken out into its own series. Separate multiple values with a comma.
Combine series modalities	Set which modalities should combine all series into a single series. For example, if this property is set to CR, all series in CR studies will be combined into a single series. Separate multiple values with a comma.
Display Demographics	Show or hide demographics
Display Reference Lines	Show Reference Lines on initial display
Display CAD markers	Show the CAD markers for mammography studies by default
Enable Shuffle Mode	Enable shuffle mode which allows series to be dragged without restriction
Auto Shuffle Mode	Automatically switch to shuffle mode if a series is dragged to a restricted location (for example, series from study 1 dragged to study 2 cell)
Spine Label	Toggle Spine Labels on or off.
Show Report	Show Report panel on initial display.
Show Study List	Show the Study List on initial display.
Play Cine	Start playing Cine on initial display
Series Linking	Toggle series linking.

Display Set properties

The Display Set properties apply to any matching series even if it is not hung in the Presentation Step view. The Display Set view properties are mainly used to set the desired default presentation of the series. For example, if a study contains a scanned document which is usually white and very bright, it is nice to invert the series with the associated Display Set even if it is not hung in one of the Presentation Steps. It will be inverted when it is dragged into view from the available series.

These properties can be overridden in the view properties.

Rotation	Apply a rotation to the images in the series: • No rotation • Rotate 90° • Rotate 180° • Rotate 270° • Flip horizontal • Flip horizontal + rotate 90° • Flip vertical • Flip horizontal + rotate 270°  WARNING Since this option will change the orientation of the image it is critical that the images have pre-existing orientation markers either burned into the pixel data or the annotation indicator in the demographic overlay. In the absence of these indicators, the system administrator should configure the annotation overlay to include the image rotation indicator.
WindowLevelPreset	Select a WindowLevel preset to apply to the series.
Sharpening	Apply a sharpening preset of High, Medium, or Low to the series.

Presentation Step properties

The Presentation Step view properties would be configured to step through different views of the series. For example: first show a series with a BONE Window Level then a SOFT TISSUE Window Level. If the Window Level of the series was just wrong, it would be best to correct it in the Display Set view properties.

Note that Presentation Step view properties are only applied if a specific Display Set matches the viewport. For example, if the view is not strict and the next available series is placed in the viewport, the Presentation Step view properties for the viewport will not be applied to the series.

The Presentation Step view properties are usually specific to the series, so it normally would not make sense to apply them.

The Presentation Step properties are the same as the Viewer properties except for Breakout modality images and Combine series modalities.

View properties

Set properties that will apply at the view-level (that is, the individual Display Sets in the viewport). In the view properties, you can override the image rotation, Window Level presets, or sharpening properties. You can also set two additional properties:

Strict	If a study does not contain the Display Set that is defined for the view, the viewport will be left blank, when this option is selected. If this option is not selected, the next available series will be shown in the viewport. For example, in a mammography study, if there is no LCC, you may want to select "Strict" to leave the viewport blank rather than show the next available series.
Invert image	Select to invert the image.

Step through a hanging protocol



Presentation Steps

Click the dropdown arrow to show the available Presentation Steps for the active hanging protocol. Click a Presentation Step to jump to it.

Hover the cursor over the icon to show which hanging protocol is currently applied.



Backward

Move to the previous Presentation Step in the hanging protocol.



Forward

Move to the next Presentation Step in the hanging protocol.

Mobile app

Mobile regulatory information and safety guidelines

Adhere to the safety guidelines in this section for the use of this software on mobile devices.

- For diagnostic display mode, the light test must be performed.
- For mobile diagnostic usage when a full workstation is not available.
- This software is not intended for use with high native resolution diagnostic radiology images (if applicable).
- Mammography images and digitized film screen images must not be used for diagnostic interpretations.

Recommended viewing conditions

Contrast of the display can be significantly reduced under improper ambient lighting. Degraded contrast leads to reduced ability of perceiving subtle image features. The device should be used under the following recommended viewing conditions for diagnostic viewing:

Recommended viewing lighting conditions for diagnostic display are in a dimly lit office environment, away from overhead fluorescent lights and exterior windows. This is an environment similar to a radiology reading room.

It is the responsibility of the user to verify the viewing environment by performing the light test.

Screen adjustments recommendations

The screen should be clean (make sure the screen is free of dust, dirt, smudges and fingerprints) before using the viewer.

The screen should be viewed straight on (perpendicularly). The screen should not be tilted, as tilting degrades image quality.

In order to avoid specular reflections, the screen should be viewed in a location away from bright light sources (such as windows, bright walls, light boxes, and overhead lighting).

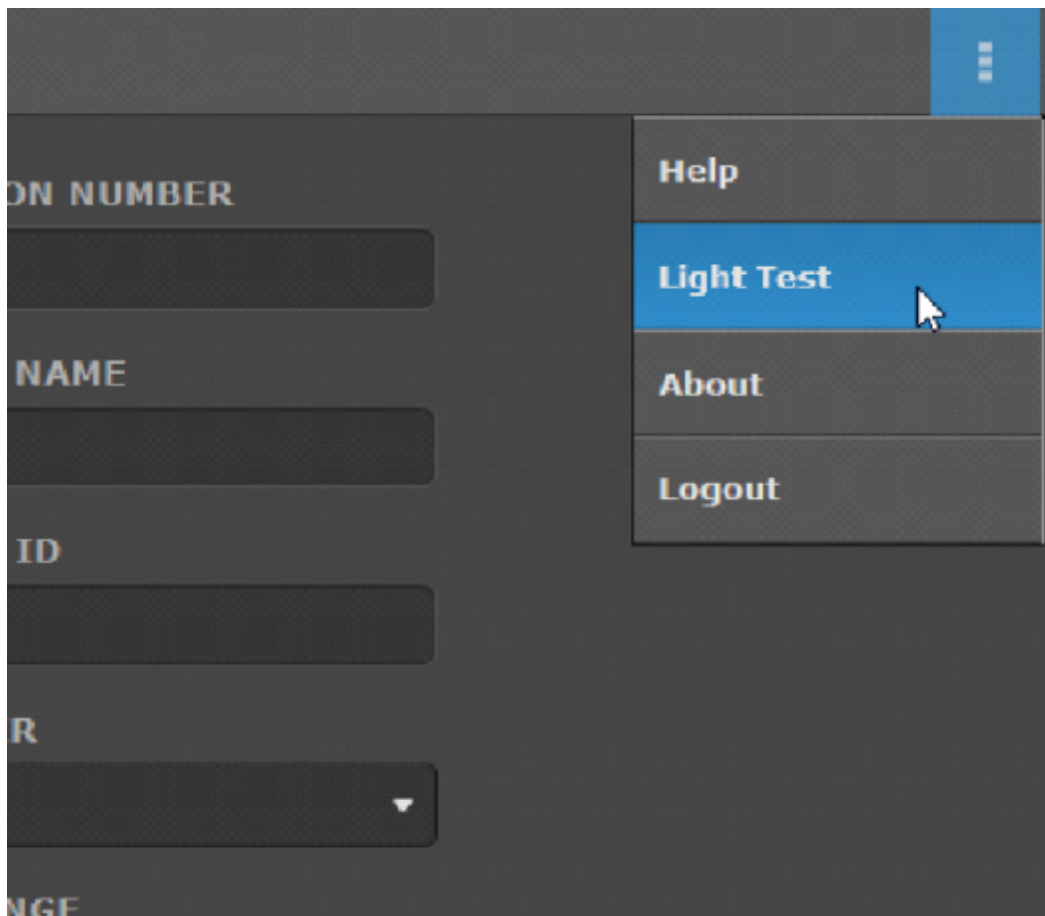
Screen brightness settings

Automatic brightness should be off and the brightness of the screen display should be set to maximum. The light test should be performed so that the environment is close to the ideal radiology reading area.

Perform the light test

1. To start the light test, do either of the following:
 - On the Mobile HTML app, in the viewer click the bulb icon () and click Light Test.
 - On the mobile app, click the Options menu and click Light Test.





Lighting environment user assessment

TG18-CT and TG18-MP standard test patterns will be displayed for subjective visual evaluation of screen luminance and lighting conditions. The user is responsible for validating the viewing environment by performing the light test. The user must verify that:

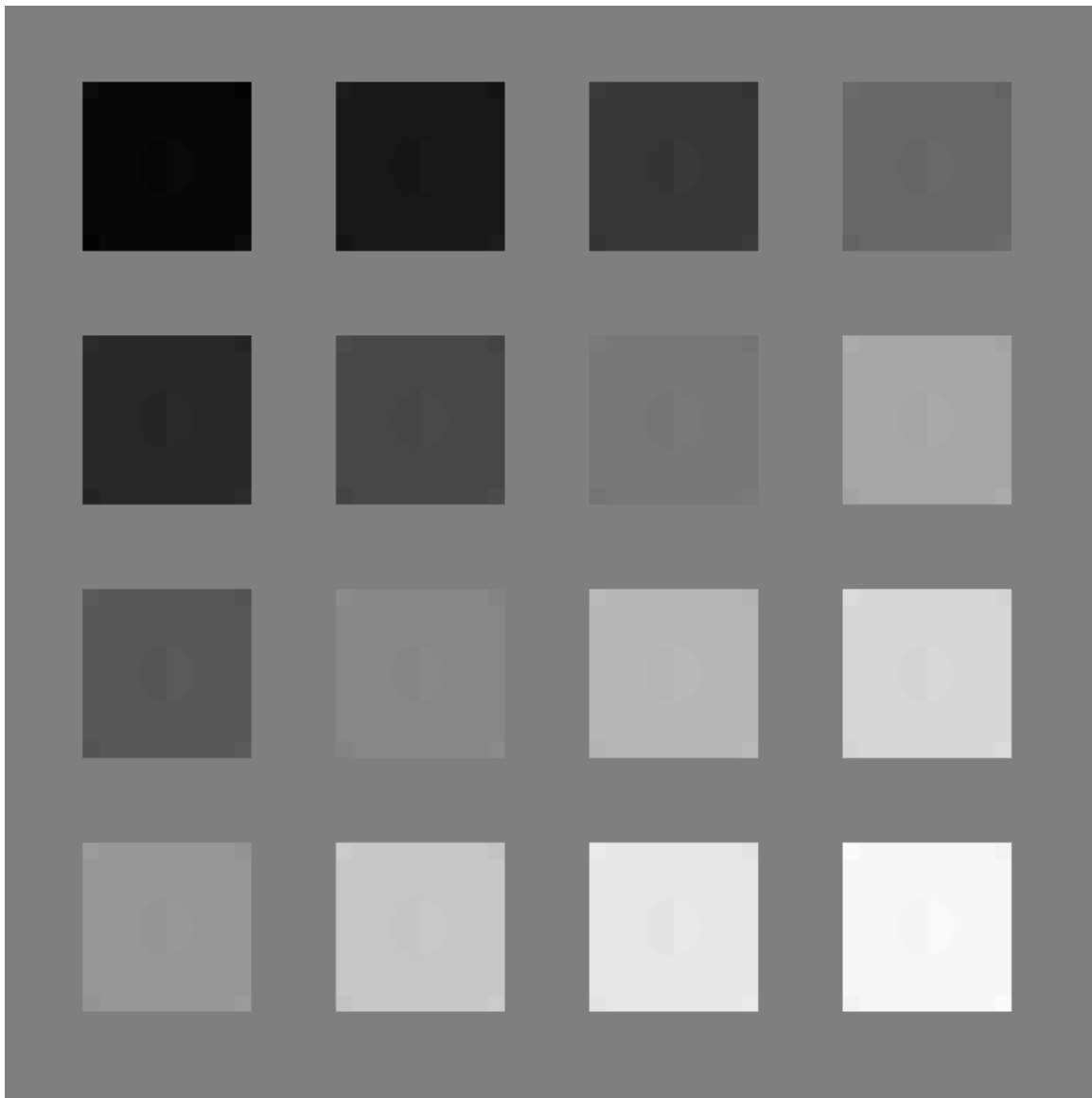
1. The device is set to a maximum brightness.
2. The recommended viewing conditions are present.

Please refer to the [Mobile regulatory information and safety guidelines](#) in the User Guide for optimal settings recommendations.

Note: Once the test is performed, the user may accept that the lighting conditions in the viewing environment are ideal for making a diagnostic decision. If the user declines the current viewing environment, then it is recommended the user finds an environment with more appropriate lighting conditions and repeat the test, before making a diagnostic decision.

TG18-CT Test pattern

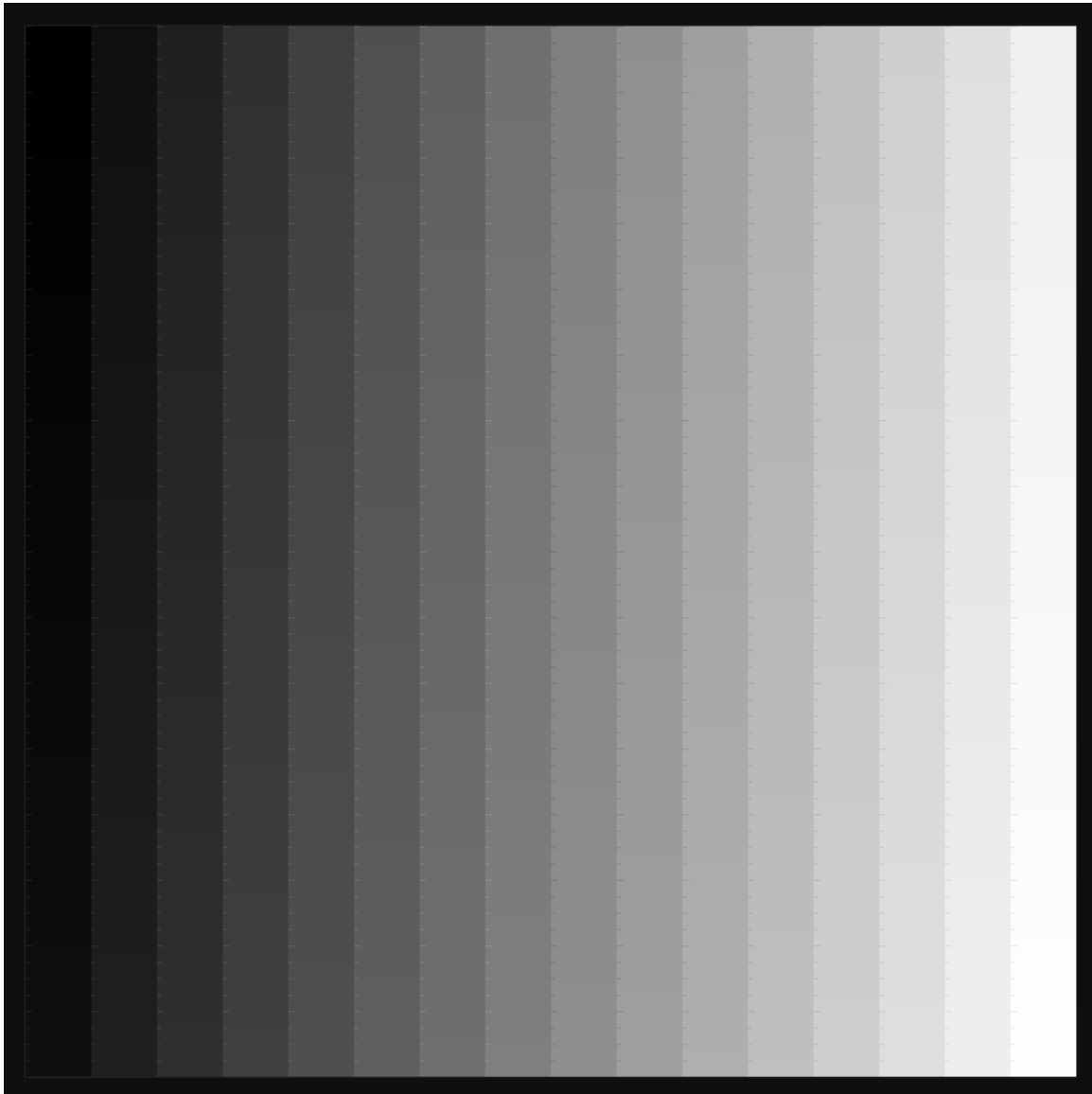
The luminance response of the display should be evaluated using the TG18-CT test pattern. This pattern contains 16 zones with differing luminance levels upon a uniform background. The pattern should be examined from a viewing distance of 30 cm. Please verify that all squares and inner half-moons are visible.



TG18-MP test pattern

The bit-depth resolution of the display should be evaluated using the TG18-MP test pattern. This pattern contains vertical grayscale ramps. The pattern should be examined from a viewing

distance of 30 cm. Please verify the continuous luminance level variations of the vertical contouring bands and the diagonal inverse grayscale is symmetrical.



Log in or log out (mobile)

The mobile login requires three pieces of information:

- server
- username
- password

The username / password are your standard eUnity™ login credentials.

Since the installed mobile application might connect to different eUnity instances, the server must be specified. The server can be entered a number of ways and resolves to the following:

- hostname → https://hostname:443
- hostname:8443 → https://hostname:8443

When left unspecified, the default access will always resolve to https on port 443.



CAUTION

Always use https for communications; never use http. http is not encrypted, which risks exposing patient and personal information.

Search (mobile)

The mobile search provides many of the same options found in the desktop search. It is also subject to the same constraints that provide for a more targeted results set. When a search is performed, the 50 results will be displayed per page. Users can swipe up and down to scroll through the list. Tapping the Next or Prev will advance to the next page of results.

When a tablet is held in landscape mode, the search fields are shown. When held in portrait mode, only the results are shown.

Display A Study

To display a study, tap on any row in the results.

Log out

Tap the Logout button available in dropdown at the top-right of the application. This will return you to the login screen.

Mobile navigation

Once the study is launched in the viewing portion of the application, tools are presented across the top and the Series Tray is displayed on the bottom. Users can single tap in the middle of the screen to bring up, or hide, more options. On the tablet this will include the top toolbar and the Series Tray. On the phone this displays Pan and Window Level mode selection.

In all modes there is a special, one inch, navigation zone on the left and right border of the viewing area. These zones are not visible but remain active at all times when viewing a study. Inside these zones certain touch commands will perform navigation functions instead of their regular operations. This is to provide easy access to navigation no matter what mode is active. When viewing multiple images or series on the screen (see [Display layouts \(mobile\)](#)), each viewport has it's own navigation zone. When viewing multiple images from the same series, navigation is performed in one of the viewport navigation zones will be applied to both images. When viewing multiple series, navigation performed within one viewport will apply only to that series.

	One finger tap • on the top toolbar, selects a tool • in the viewing area, hides / shows Series Tray and toolbar • in the Series Tray, swap series in display • at the bottom of a navigation zone, move forward one image; in the top, backward one image
	Double-tap In a viewport, the double-tap gesture will toggle between the currently selected viewport layout and a 1 x 1 up viewport layout.
	Touch drag up / down In a navigation zone this motion navigates forward and backward through the image stack.
	Pinch zoom In the viewing area these motions will zoom in on or out from the displayed image.
	Touch drag multi-direction When Window Level mode is active, pressing and dragging will modify Window Level values. When Zoom mode is enabled, pressing and dragging will pan the image around the viewport.



Two finger drag

The two finger drag, in a left or right direction on a viewport, will move to the previous or next series.

Display layouts (mobile)

Mobile layouts are available for tablet versions only. When run on a phone, eUnity™ will always display in the Image 1 x 1 format.

eUnity has a number of pre-defined view formats which consist of one or more viewports.

Image view formats

When applying tools (e.g. zoom, pan, rotate, etc.), the tool will be applied to all viewports.

Layout	Description
1 x 1	View one image or one series on the screen.
2 x 1	Two images from the selected series are displayed side by side in two separate viewports. The image on the right of the screen is one image or one frame higher than the image on the left of the screen. As you scroll through an image stack, both images will increment.
1 x 2	Two images from the selected series are displayed on the top and bottom of the screen in two separate viewports. The image on the bottom of the screen is one image or one frame higher than the image on the top of the screen. As you scroll through an image stack, both images will increment.
2 x 2	Four images from the selected series are displayed on the top and bottom of the screen in four separate view ports. The image on the bottom of the screen is one image or one frame higher than the image on the top of the screen. As you scroll through an image stack, both images will increment.

Series view formats

There are two ways to view a series:

- Tap to highlight the desired viewport and then tap the series that you want to view in the in the Series Tray.
- Press the series in the Series Tray and drag it to the desired viewport.

When applying tools (e.g. zoom, pan, rotate, etc.), the tool will be applied only to the selected (highlighted) viewport.

Layout	Description
2 x 1	Two different series from the Series Tray can be displayed side by side in two separate viewports.
1 x 2	Two different series from the Series Tray can be displayed on the top and bottom of the screen in two separate viewports.
2 x 2	Four different series from the Series Tray can be displayed on the top and bottom of the screen in four separate viewports.
4 x 2	Four different series from the Series Tray can be displayed on the top and bottom of the screen in eight separate viewports.

Contact us / regulatory

Viewer powered by eUnity™

- Product name: eUnity™
- Product version: 6.7

For the specific release version number click the logo located in the upper-right corner of the image viewer.



CAUTION

Federal law restricts this device to sale by or on the order of a physician

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About

At Client Outlook we build innovative IT solutions that provide Health Professionals with secure access to the information they need at the point of care. eUnity provides clinicians access to medical images through their favorite web-browser, regardless of their location and with no client software to manage. eUnity does all this real-time and keeps medical images where they belong, with the PACS they reside on. This ensures clinicians are viewing the most up to date medical data.

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