

Intuition™ Enterprise Medical Viewer (iEMV)







User Guide

Version 4.4.14

Revision B



Symbols used in the label:

Symbol	Meaning
	Consult Instructions for Use. www.terarecon.com/user-manuals
	The CE mark applies to Intuition™ software. The CE mark is affixed onto the Intuition™ software.
	Manufacturer The name and address of the manufacturer are listed next to this symbol.
	Date of Manufacture The year of manufacture is listed next to this symbol.
	Prescription Only Caution: Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.
	Authorized Representative in the European Community The name and address of TeraRecon's authorized representative in the European Community are listed next to this symbol.

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A SYMPHONYAI GROUP COMPANY

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General Description

Intuition™ Client is a medical device comprised of two stand-alone software components: a server software backend (Intuition Server) which performs complex image post processing, and client viewer software (Intuition Client Viewers) that provides a user interface, enabling the user to view medical image data and associated derived metadata.

The Intuition Client is one of the Intuition Viewers with 2D/3D/4D (3D with dimension of time) image processing and advanced visualization capabilities to assist physician review of medical images. The base functionality of Intuition Client includes, but is not limited to, various tools for visualization and analysis, customizable workflow templates to deliver structured workflow, and support for the physician to write and store the report.

A fully-configured Intuition Client system is capable of a comprehensive suite of image processing and visualization functions, including full-color Volume Rendering, Calcium Scoring, Time-Dependent Analysis (TDA), Time Volume Analysis (TVA), Segmentation Analysis and Tracking (SAT), Vessel Analysis, Flythrough, Multi-phase review, CT/CTA Subtraction, Lobular Decomposition (LD), iGENTLE, Maxillo-Facial, Volumetric Histogram, Findings Workflow, Fusion CT/MR/PET/SPECT, MultiKV. Results from the Intuition Client Server module may be displayed in the viewer. Each of these features may vary by client viewer and offered as an independent upgrade option to the basic configuration.

Important! Based on published literature and TeraRecon's analysis, any derived value results, while using Intuition Client, have approximately 3% of uncertainties, depending upon the noises in the data, image acquisition and reconstruction techniques, and human interventions.

Indications for Use

To receive, store, transmit, post-process, display and allow manipulation of reports and medical images from acquisition devices, including optical or other non-DICOM format images, DICOM images with modality type XA, US, CR, DR, SPECT, NM and MG, and images from volumetric medical scanning devices such as EBT, CT, PET or MRI. To provide access to images derived data and derived images via client-server software, web browser and mobile technology.

Visualization in 2D, 3D, and 4D are supported for single or multiple datasets, or combinations thereof. Tools are provided to define and edit paths through structures such as centerlines that may be used to analyze cross-sections of structures, or to provide Flythrough visualizations rendered along such a centerline. Segmentation of regions of interest and quantitative analysis tools are provided, for images of vasculature, pathology and morphology, including distance, angle, volume, histogram, ratios thereof, and tracking of quantities over time. A database is provided to track and compare results using published comparison techniques such as RECIST and WHO. Calcium scoring for quantification of atherosclerotic plaque is supported.

Support is provided for digital image processing to derive metadata or new images from input image sets, for internal use or for forwarding to other devices using the DICOM protocol. Image processing tools are provided to extract metadata to derive parametric images from combinations of multiple input images, such as temporal phases, or images co-located in space but acquired with different imaging parameters, such as different MR pulse sequences, or different CT image parameters (for example, dual energy).

Intuition Client is designed for use by healthcare professionals and is intended to assist the physician in diagnosis.

Important! The physician is responsible for making all final patient management decisions.

Interpretation of mammographic images or digitized film screen images is supported only when the software is used without compression and with an FDA-approved monitor that offers at least 5M pixel resolution and meets other technical specifications reviewed and accepted by the FDA.

Intuition Mobile provides wireless and portable access to medical images. This device is not intended to replace full workstations and should be used only when there is no access to a workstation.

Important! Intuition Client is not intended for diagnostic when used via a web browser or mobile device.

Intuition Client-TDA, TVA, and Parametric Mapping Indications for Use

Intuition Client-TDA, TVA, and Parametric Mapping are software modules which supports assessment of time-dependent behavior of image intensity, density, dimensions or volume of regions of interest over time, for volumetric or planar dynamic image types such as CT or MR. Parametric mapping tools encode in color various parameters derived from the temporal or spatial characteristics of the planar or volumetric data.

Support is provided for digital image processing to derive metadata or new images from input image sets, for internal use or for forwarding to other devices using the DICOM protocol. Image processing tools are provided to extract metadata to derive parametric images from combinations of multiple input images.

Intuition Client-TDA, TVA and Parametric Mapping are Intuition Client-based software features with dedicated workflows and basic tools and thus support post-processing, displaying and manipulation of reports and medical images from acquisition devices and visualization in 2D, 3D and 4D for single or multiple datasets, or combinations thereof.

Intuition Client-TDA, TVA, Parametric Mapping are designed for use by healthcare professionals and are intended to assist the physician in diagnosis, who is responsible for making all final patient management decisions.

Intuition Client-T1 Mapping and T2/T2* Mapping Indication for Use

Intuition Client-T1 Mapping and T2/T2* Mapping are software modules that support the derivation and quantification of T1, T2, and T2* values from MR DICOM image pixel intensities and header information. The quantification of these parameters can be used to characterize tissues. Support is provided to overlay the T1, T2, and T2* values using color maps on related MR images.

Support is provided for using different color maps to overlay different ranges of T1, T2 or T2* values and restrict the overlay to region of interest on the images. The MR images can be of simple planar scan like a single slice or volumetric or 4D scans of a body part. Intuition Client-T1 Mapping and T2/T2* Mapping are Intuition Client software features that can be used in multiple workflows or be used as basic tools for cardiac functionality. Additionally, the overlaid images can be captured and forwarded to other systems using standards such as DICOM or http protocol. Quantitative analysis is derived and available as text and graphical display.

Intuition Client-T1 Mapping and T2/T2* Mapping qualitative results and visualization can be used in a clinical setting on MR images of an individual patient and can be used to support the clinical decision making for the diagnosis of the patient. Intuition Client-T1 Mapping and T2/T2* Mapping are designed for use by healthcare professionals and are intended to assist the physician in diagnosis, who is responsible for making all final patient management decisions.

Intuition Client-T1 Mapping and T2/T2* Mapping Accuracy Statement

Based on published literature and our analysis, the derived $t_1/t_2/t_2^*$ values have approximately 3% of uncertainties, depending on noises in the data.

Intuition Client-T1 Mapping and T2/T2* Mapping Supported Data

	T1 Mapping	T2/T2* Mapping
Modality	MRI	MRI
Series Type	Look-Locker or Modified Look-Locker	T2 or T2* with or without offset
Number of series supported	One or Two, multiple slices	One, multiple slices

Structural Heart Indications for Use - *Available only in the USA*

Intuition Client-Structural Heart is an optional image post-processing module using Intuition Client standard features.

TeraRecon Intuition Client-Structural Heart (TMVR) module is a software solution that is intended to assist Cardiologists, Radiologists and Clinical Specialists with the visualization and measurements of structures of the heart and vessels.

Intuition Client-Structural Heart modules support the visualization and quantification of cardiac, coronary and related structures for anatomic and pre- or post-operative evaluations through guided clinical workflows. TeraRecon Structural Heart enables assessment and measurement of different structures of the heart, for example, aorta, aortic valves, mitral valve, pulmonic valve, atria, and atrial appendages, and ventricles. It provides analysis of the feasibility of a transapical, transfemoral or subclavian approach to structures for replacement or repair procedures via 3D measurements.

TeraRecon Intuition Client-Structural Heart module enables the user to:

- Visualize and measure (diameters, lengths, areas, volumes, angles) structures of the heart and vessels for pre-operative planning and sizing for cardiovascular interventions and surgery, and for postoperative evaluation.
- Quantify calcium (volume, density) present in coronary arteries

TeraRecon Intuition Client CPR Workflows tool works with TeraRecon Intuition Client Structural Heart and enables the user to:

- Visualize and assess stenosis, calcifications, aneurisms and vascular structures

Structural Heart Accuracy Statement

Based on published literature and TeraRecon's analysis, the derived values for the structural heart values have approximately 3% of uncertainties, depending upon the noises in the data, image acquisition and reconstruction techniques, and human interventions.

Structural Heart Supported Data

Data Required for the Intuition Client-Structural Heart Module

The Intuition Client-Structural Heart Module consists of images of the heart function. The module works on heart images taken during the systolic phase of heart functioning. It guides you through determining annulus measurements required for valve replacement surgery. It also displays in 4D possible fittings of the replacement device.

Safety Notifications

The Intuition Client is part of a Class II medical device regulated by the Food and Drug Administration.

Warning! Not intended for diagnostic use when used via a mobile device.

CAUTION! U.S. Federal Law restricts use of this device to trained physicians, or other suitably qualified and trained personnel on the order of a physician.

If you require training, please contact TeraRecon or a suitably qualified trainer. Please always keep this documentation readily available near the Intuition Client, and please keep it updated with all corrections/addenda that may be released by TeraRecon.

Patient information is restricted, private, and extremely confidential, and subject to stringent legal regulations. You should control access to Intuition Client, and any patient data contained in Intuition Client should be protected accordingly. Devices integrated to this product must comply with their own applicable safety standards.

Precautions Relating to General Use

Please review the *Intuition Client User Guide* for all warning messages, notices, and precautions prior to using the software.

Rx Only

Caution: Federal law (USA) restricts this device to sale only by or on the order of a physician.

Intuition Client software may allow images to be generated in which parts of the original scan data are obscured, removed (including but not limited to, through use of lossy compression), hidden, or modified. Similarly, output images and reports can be produced, saved, and annotated, with elements of the original acquisition omitted, obscured, modified, or hidden. Careful and responsible use of the equipment and its output images requires that the user be aware of, and effectively communicate these important facts to, untrained or uninformed observers or recipients of the processed information.

Please ensure that all processing has completed (including completion of any final stage after an intermediate stage of processing) before formulating a final interpretative decision.

In certain situations, you may experience a delay in certain display processing. Please ensure that all processing has completed (including, for example, completion of any final stage after an intermediate stage of processing) before seeking to validate, or validating, a final interpretative decision.

Precautions Relating to Display Hardware

Intuition Client image display is limited in acuity and color or Grayscale depth to that of the display device used. Display hardware characteristics can vary widely. **Interpretation of mammographic images or digitized film screen images is supported only when the software is used without compression and with an FDA-approved monitor that offers at least 5M pixel resolution and meets other technical specifications reviewed and accepted by the FDA.**

If a monitor is not calibrated, image quality may vary. Monitors must be calibrated by the monitor vendor's calibration method. Image quality is subject to the quality of the monitor. An image displayed on a color monitor can appear different from the same image displayed on a Grayscale monitor.

A monitor may contain small defects on the surface, such as dust or scratches on the surface of the CRT, defects of LCD cell, and so on. A customer should understand this problem and not confuse the defects with a software problem.

The surrounding lighting conditions are critically important for optimal image viewing in Intuition Client. Lighting conditions can reduce the contrast of images being viewed and may hinder your ability to distinguish subtle changes in the image.

The judgment of the medical imaging professional is essential to reaching the appropriate conclusion from the results presented by Intuition Client.

Precautions Relating to Interpretation

Calculations relating to distances, measurements and other physical properties performed by Intuition Client are dependent in accuracy of the input DICOM images. It is the responsibility of the operator to ensure that the source DICOM images are correctly formatted and to heed any warnings that the software may display during operation relating to potential problems with the information supplied in those DICOM images.

In certain instances, there may be problems or inconsistencies in the image information, Intuition Client is unable to detect this, and erroneous image display will be unavoidable unless the user properly ensures the correctness of all input data in advance. Potential problems relating to errors in the DICOM information include incorrect dimensional readouts, incorrect orientation markings, and incorrect pixel value calibration. Three-dimensional imaging inherently offers a wide variety of different imaging views of any given dataset; it is an important responsibility of the operator to ensure that a proper visualization is achieved, and that a complete review of the data has been performed before reaching any diagnostic or interpretive conclusion relating to the dataset in question. Limitations present in the original input data (such as those relating to spatial and/or temporal resolution, pixel size, and slice thickness) remain valid even when Intuition Client processes the data, and these provisos should be considered when using the equipment for image review.

The image processing and display techniques offered by Intuition Client are only intended as an adjunct to, and not a substitute for, conventional diagnostic review of medical imaging data.

CAUTION! Intuition Client software should be used only by physicians and trained clinical users. All results should be validated by qualified physicians trained in the subject matter prior to diagnosis.

Intuition Client provides tools and protocols to quantify metrics and distances relating to structures in the CT, MR or other scans or images which are based upon the dimensions of the anatomy scanned or imaged at the time the images were originally acquired from the patient and based on the measurement calibrations provided by the acquiring device. The suitability for any particular purpose, especially monitoring the progression of disease, or the sizing or planning of a device to be implanted in a patient, is dependent upon many factors, including, but not limited to, the accuracy of the original acquisition, the extent to which the images acquired still represent the patient's anatomy, and the way in which the actual device deployment may modify the anatomy into which it is introduced.

TeraRecon does not represent that the Intuition products are suitable for such purposes. All such activities should always be cross-correlated with other techniques to ensure a complete understanding of the patient and contemplated procedure is obtained by the validating physician(s) in charge.

Precautions Relating to Magnetic Resonance Imaging Machines

Components of Intuition Client, including this document and its packaging or binding, may contain metallic or ferromagnetic components. Please ensure that no such component is introduced into the influence of magnetic fields from devices such as Magnetic Resonance Imaging Scanners, since injury or damage to equipment or property could occur.

Precautions Relating to Risk of Loss of Data

Neither Intuition Client nor Intuition Thin Client are intended to be used as a primary archive for medical imaging data. A secure copy of any data should be maintained in a location separate from this software, for example, in the scanner, in a PACS archive, or on archive media. Please do not rely on Intuition Client and/or Intuition Thin Client as your primary archive.

In addition, do not rely on Intuition Client and/or Intuition Thin Client. Thin Client to convey data from its acquisition point to your primary archive, because in this configuration, a failure in Intuition Client and/or Intuition Thin Client could compromise your primary archive. Your primary archive should be maintained in a manner independent of, and not relying on, Intuition Client and/or Intuition Thin Client.

Precautions Relating to Computer Software and Hardware

Note that the installation and use of any additional software or hardware component without the specific direction and approval of TeraRecon may impair the safety and effectiveness of the product. No additional software or hardware component should be added to Intuition Client and/or Intuition Thin Client, nor should the configuration be changed in any way, except under the express direction of TeraRecon personnel. Do not use the software if it is damaged, compromised, or if you in any way suspect that its safety may have been compromised; in such case, contact your customer service representative immediately.

Important! All results should be validated by qualified physicians trained in the subject matter.

Microsoft Windows Operating System Updates

Intuition EMV software relies on the integrity of the Microsoft Windows operating system to perform as documented by Microsoft. If a Microsoft Knowledge Base article is released that exposes a bug or defect adversely affecting specific hardware platforms documented for use with Intuition Client or Intuition Thin Client software, it is the customer's responsibility to remedy those defects using the steps outlined by Microsoft in its Knowledge Base Articles.

Intuition EMV is not accessible without a network, including LAN and WAN. The availability of a network is the customer's responsibility. This includes accessibility to other devices on the network including but not limited to authentication servers and storage locations.

Precautions Related to Image Output Option

Intuition Client allows for output of selected images and series to various computer standard file types. This technique does not maintain full image fidelity and may affect image quality. JPG, PNG, BMP and AVI files are not intended for diagnostic purposes.

Captured images for output may contain patient information and use and distribution must be controlled to ensure that secure access to PHI is maintained pursuant to all applicable U.S. and International Laws, including but not limited to, the Health Insurance Portability and Accountability Act ("HIPAA") and the Health Information Technology for Economic and Clinical Health Act ("HITECH Act").

Patent Information

U.S. patents apply to this product. For details, see <http://www.terarecon.com/patents>.

Cybersecurity

TeraRecon is committed to produce and distribute reliable image processing medical device software through capable processes. At every stage of development, from software qualified requirements through design and development, validation, verification and final deployment, the process has been tailored to effect quality and security considerations into the product. Information security is integrated into the company's software development life-cycle from system inception.

Scope

To demonstrate compliance to the requirements as stated in the FDA guidance document titled "Guidance for Industry and Food and Drug Administration Staff Document," issued on October 2, 2014.

Cybersecurity Functions

As part of the company's devices' basic functionality, appropriate cybersecurity controls are developed to assure medical device cybersecurity and maintain medical device functionality and safety. These controls are provided within the device with the intention to create a robust, reliable and efficient medical device; with the understanding that it is a shared responsibility between stakeholders, including health care facilities, cloud infrastructure providers and manufacturers of medical devices.

Identify and Protect

TeraRecon's software devices such as Intuition Client, Intuition APS, and standalone algorithms is are a prescription only medical device software intended to be used by medical practitioners who are trained in the software's function, capabilities and limitations. Appropriate supporting documentation with information related to functionality and security requirements are provided to the users; these include but are not limited to the Instructions for Use (IFU) and Customer Release Notes.

Limit Access to Trusted Users Only

This is achieved collaboratively between the manufacturer of the device and healthcare facilities or cloud infrastructure providers. Firewalls, anti-virus and other control measures are provided by the facility or infrastructure providers.

Notice: (If applicable) Standalone algorithms in a Docker container are deployed on a facility's authorized compute infrastructure with user controls or granted access with IP white-listing in the cloud deployment.

Shelf life and Software Lifecycle

Shelf-life is not applicable for software-only devices because there is a low likelihood of time-dependent product degradation. Hence, performance data is not needed to establish maintenance of device performance characteristics over a shelf-life period. However, obsolescence or retirement can occur during the end-of-life phase of a software's life cycle. The software life cycle refers to all the phases of a software product throughout its planning, development, and use, all the way through to its eventual obsolescence or retirement. In order to support obsolescence or retirement efforts, life cycle records retention is defined as 15 years from the last deployment of a retired software.

How to Use this Guide

It is recommended that you read all chapters to gain a complete understanding of the Intuition Client application. Use the table of contents to navigate to the desired information.

Pay special attention to all *NOTES*, *IMPORTANT*, *WARNING*, and *CAUTION* notifications, whether presented on-screen, or contained in this manual, including all precautionary statements and advisories in the Notice section, as these are essential to the effective and authorized use of the Intuition Client application.

Conventions used in this Manual

This manual uses the following conventions:

- The text that appears on buttons, menu items, dialog boxes, and other elements of the application are printed in a bold font. For example, “Select the **Save** button.”
- Screen names are capitalized. For example, Patient List, Viewer.
- The chapters are arranged based on the functions in the application.

A NOTE contains supplementary and important information about a topic. *Please do not ignore NOTES, IMPORTANT, TIP, WARNING, and CAUTION notifications. Read each one carefully.*

Page Numbering Conventions

Page numbers are formatted for ease of use at the bottom of each page in a position based on left and right pages. They contain the Chapter number and page number in this format:

IN-EMV-USER-US-4.4.14	Chapter Page → 3-1 ←
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This style indicates Chapter 3, page 1.

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Chapter 1 Introduction

The Intuition™ Enterprise Medical Viewer (iEMV) is a zero footprint viewer that provides access to medical images to be viewed in a web browser or mobile device. iEMV can display images from DICOM modalities and non-DICOM study data. iEMV can also be integrated into various Electronic Medical Record (EMR) systems, and does not require installation of software on client machines. iEMV has the ability to integrate other client viewer applications, providing access to advanced tools for volumetric medical imaging.

This viewer is for diagnostic use when used on a computer; however, it is not intended for diagnostic use when used on a mobile device.

Configuration

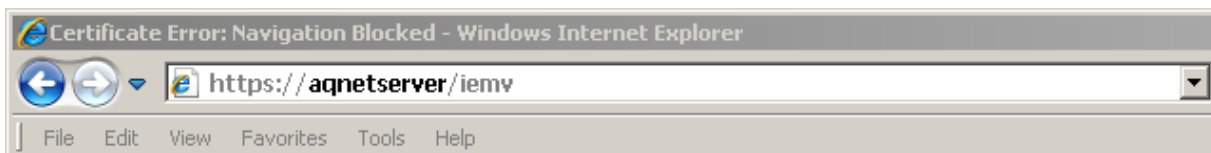
Many of the features in iEMV cannot be configured within the application, such as search filters, folders for saving data, displays, annotations, text appearance, keyboard shortcuts, synchronization of image manipulation, image capture settings and output options. These settings must be configured from iReview. When iEMV is opened it is displayed according to the settings that are current in your iReview login.

Note: If you do not have access to the Intuition™ Review (iReview) application, you will not be able to configure settings to be used in iEMV. In that case, iEMV will use the default settings.

There are local settings that can be changed using the menus and icons in the Patient List and Viewer. These are described in detail in this manual. However, these changes are not preserved between iEMV sessions. For detailed information about configuration in iReview, please see the *iNtuition Review* user manual.

Starting iEMV

Open a Web browser and enter the URL that connects to the iEMV application on the assigned Intuition server: `https://intuitionserver/iemv`.



In the example shown above, “**intuitionserver**” is the hostname of the Intuition™ Server. You will need to enter the actual hostname of the Intuition Server node you want to connect to. The gray text in the URL can be entered exactly as it appears here.

Internet Security

When you first connect to the Intuition Server, you might encounter an error message indicating a problem with the server’s security certificate. There are several possible reasons for this. For example:

- The server does not have an SSL certificate.

- The server's certificate was not issued by a trusted certificate authority.
- The certificate has expired.
- The certificate was not installed correctly.
- The certificate was issued to a different web address.

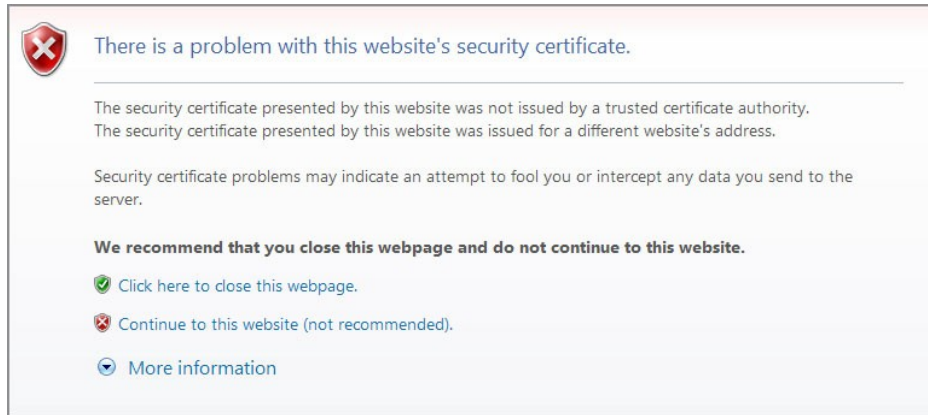


Figure 1-1: SSL Certificate Error Message in Internet Explorer 8

If you encounter this message, contact the IT department that manages the Intuition Server to report the error. Viewing confidential patient data over an unsecured Internet connection is not recommended.

Warning: Not having a valid SSL certificate results in unencrypted communications over the Internet.

The iEMV Login Screen

Enter your username and password in the **User name** and **Password** boxes (see [Figure 1-2 on page 1-3](#)). Click **Login** to log in, or **Exit** to quit.

Group Name

By default, the **Group name** input box (see image at right) is not shown in the Login Screen. This is a configurable setting in the AQNetConfig folder. If you need to include the group name in the login information at your site, please ask your system administrator to configure this field to show.

User name	<input type="text"/>
Password	<input type="password"/>
Group name	<input type="text"/>



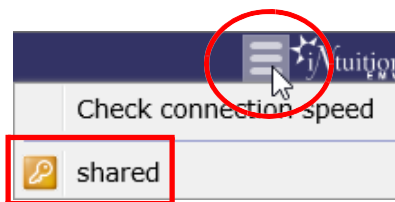
Figure 1-2 iEMV Login

Additional Information

Just above the **User name** box are two links that provide information about TeraRecon's patents and CE 0197 mark ([Figure 1-2](#)). Click the links to display the relevant information.

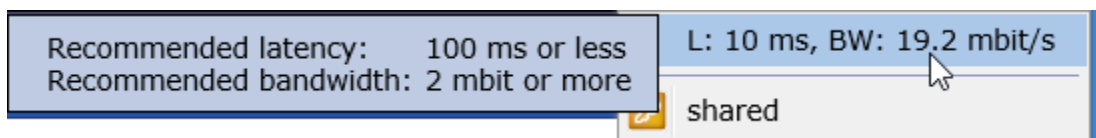
Logging Out and Disconnection

To log out of iEMV, hover the mouse over the connection icon in the upper-right corner of the screen and select the your login name from the menu (see image at right). You are disconnected from the server, and the login screen is opened so that you can log back in or log in using a different account.



Check Connection Speed

Click the **Check connection speed** menu item to see the current latency and bandwidth data for your connection. The recommended latency and bandwidth are displayed to the left of the menu.



There might be times when the Intuition Server needs to end your connection, for example, if you have been inactive on the client for a set amount of time (which is configured in iReview). When this happens, the server posts a message at the top of the screen to let you know that you are no longer connected, and why:



You have been logged out due to inactivity.

To log back in, type in your user name, password, and, if necessary, the group name.

Chapter 2 The Patient List

Topics in this chapter:

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- Study Management Icons 2-17
- Configuration Menu 2-21
- Viewing 3D Data with Intuition Client 2-22
- The Series List and Thumbnail Preview 2-26
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When you log into your local server, Intuition™ EMV (iEMV) opens to the Patient List ([Figure 2-1](#)).

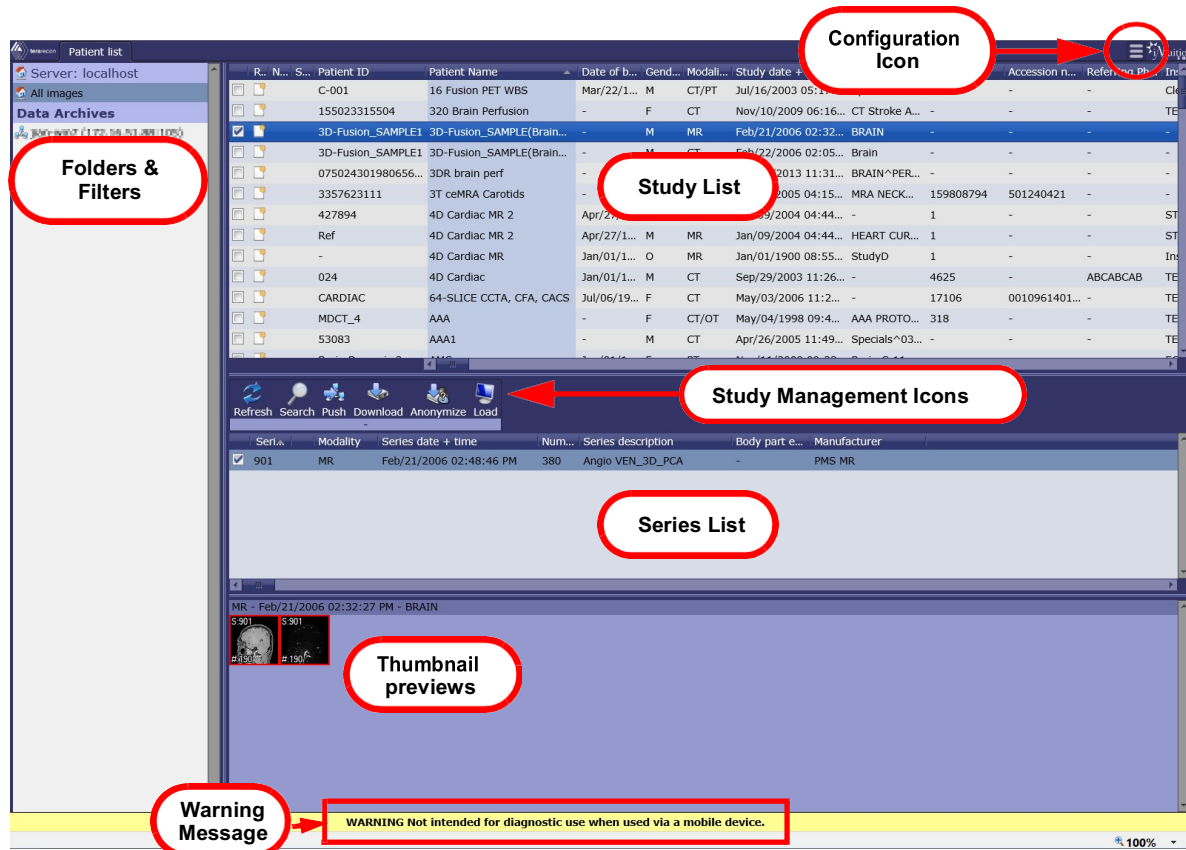


Figure 2-1 The Patient List Screen

Warning: The iEMV tool is not intended for diagnostic use when used via a mobile device.

The Study List

The Patient Information Row

The patient information row contains all the headers for each column in the Patient List, such as the Patient ID, Patient Name, and Study Date.

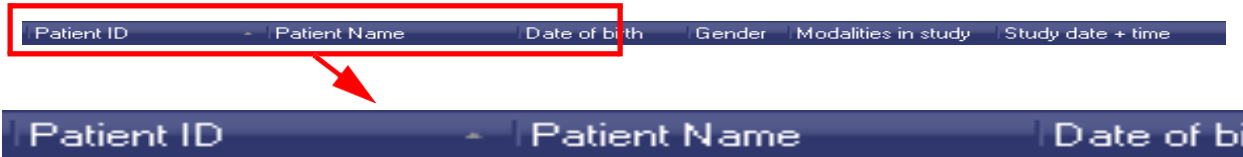
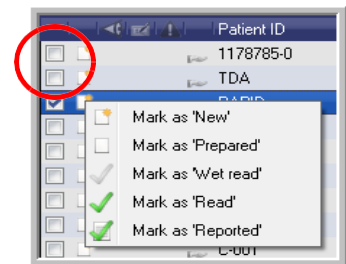


Figure 2-2 Patient Information Row (partial image)

Below is a description of each column in the Patient List.

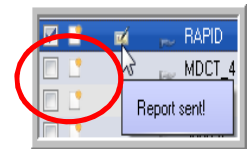
- Read status

The Read Status icon indicates the study's current state. To update the status, right-click the icon. A menu of options is opened, allowing you to update the status. The icon in this column will change accordingly.



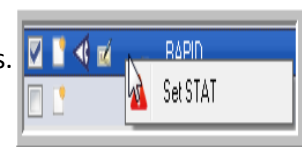
- Note

If a note has been added to a study, the Note icon appears in this column. You can view the notes by hovering the mouse over the icon.



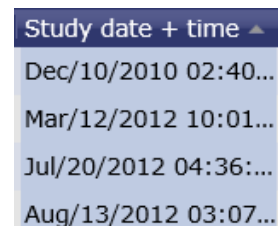
- STAT

Right-click on the STAT column in that row to set or remove the STAT status.



- Study Date + Time Range

The range of dates/times that are shown in this list must be configured as a default range in iReview. That value is saved on the server and is in effect when you connect to the server through iEMV.



Selecting Studies

To select a study, click anywhere on the row with the desired row. (Figure 2-3)

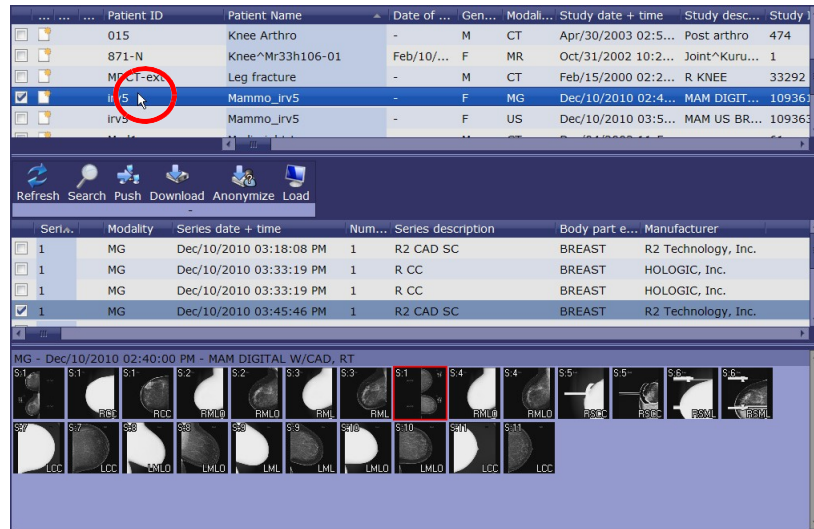


Figure 2-3 Highlighted Study Row

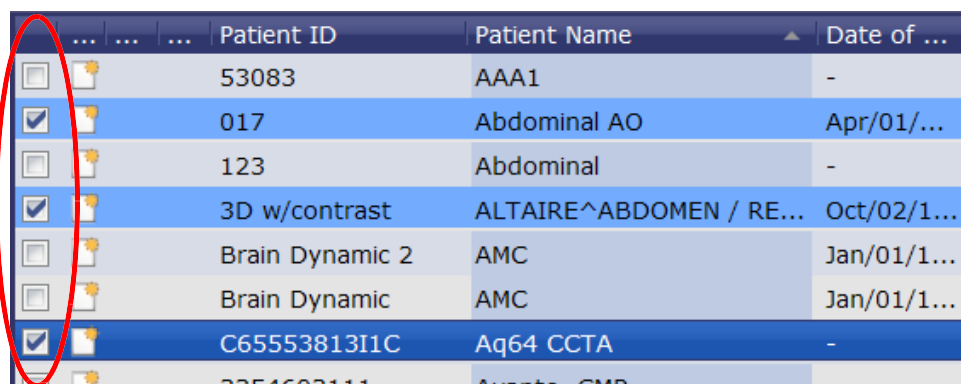
To deselect that row, hold down the **Ctrl** key and click on the row. Or click on another row (without using the keyboard).

Multiple Selections

You can select multiple rows at the same time. When more than one study is selected, all series associated with them are listed in the series list. This allows you to access multiple series from different studies within the same series list.

To select more than one study, hold down the **Shift** key while selecting consecutive rows. You can also select a group of rows all at once, by holding down the **Shift** key and clicking just the first and last row of the intended selection. All studies in between those two rows are automatically selected, too.

To select non-consecutive rows, hold down the Control (**Ctrl**) key and click each desired row one at a time. Or you can click the checkboxes (at the left end of each row) for those studies you want to select.



Deselecting Rows

To deselect a single row from a group of selected rows, hold down the **Ctrl** key and click on it.

Actions on Multiple Studies

There are several actions that can be performed on multiple studies:

- Push
- Download
- Anonymize
- Items on the right-click context menu
- Assigning studies to a folder

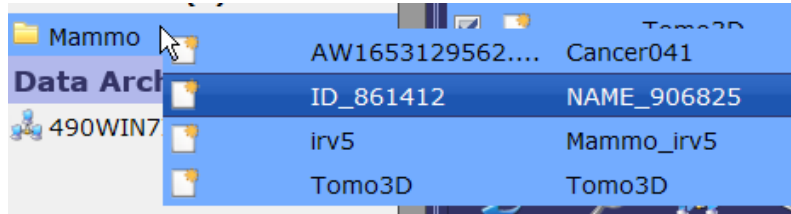


Figure 2-4: Assigning Group of Studies to Folder

Clicking in any row, without using either the **Shift** or **Ctrl** key, selects only that row. All other rows previously selected are then deselected. However, there are a few exceptions. If you right-click one of a group of selected rows in any of the following *columns*, the action will apply to all selected rows:

- Read status
- STAT



Figure 2-5: Set Stat on Multiple Selection

These functions are disabled when multiple rows are selected:

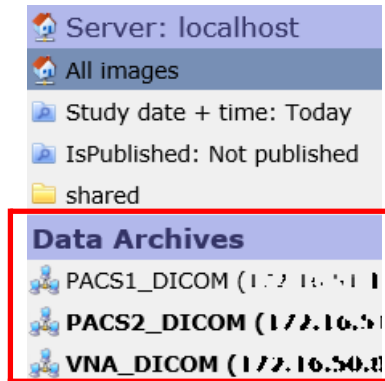
- Load icon
- Edit Notes column

Federated Query

Federated query is a mechanism that allows you to query multiple PACS and other systems in one request. It returns a list of all available studies from the connected datasources.

The Data Archives List

The **Data Archives** list is part of the datasource panel, located to the left of the Study List. To display studies from other connected datasources, select one or more items from the list that appears below the **Data Archives** header.



To show data from another source along with local data in the Study List, right-click on the source name and then choose **Add**. To remove the node from the federated query, right-click the node name and select **Remove**.

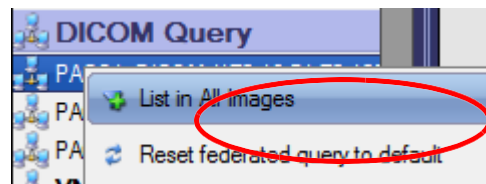
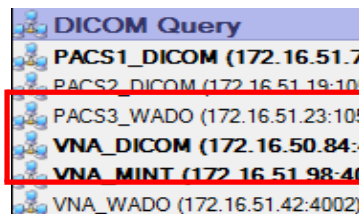


Figure 2-6: Change Federated Query

Sources whose data is combined with local data in the Study List are displayed in bold text. Studies appearing in the Study List can come from the local server or any of the selected remote sources. To see the complete study list, click **All Images**, just beneath the server name in the left panel.



To reset the federated query back to default, right-click on any datasources in the list and select **Default**. This will remove any changes you have made to the query.

Date and Time Range

The default date+time range for queries that include remote sources is **Last 7 days**. This can only be reconfigured on iReview.

Viewing Local and Remote Data in the Study List

When a remote query datasource in the Data Archives list is added to **All Images**, the Study List displays the combined studies from both local and remote sources.

If the same study is found in the local database and on a remote datasource, iEMV must decide which one to show in the Patient List. By default, the local study has priority over any remote data, and that is what is listed. Also by default, the StudyInstanceUID and number of series in each study are compared to determine whether they are the same study. Both must be equal for the studies to be considered the same.

Both the comparison mode and datasource priority are configurable on the Intuition Server. Please contact your system administrator if you want to change these settings.

When you load a study into the Viewer, and if set by the display protocol, priors (earlier studies on the same patient) are also loaded, regardless of whether the priors come from the local server or a remote server.

It might be helpful to determine easily where a study resides. There are two features that allow you to do this.

The DataSource Column

The **DataSource** column in the Study List shows where the data resides. In the example shown below, some of the studies listed reside on the local database, indicated by DB. Other studies are on a remote node, **T5500WIN7X64_AE**.

Study Instance UID	DataSource
1.2.840.113711.4700975.4.6632.2.10079816.26...	DB
2.16.840.1.113669.632.21.221701.3926.5400287...	DB
1.2.392.200036.9123.100.12.12.3.3952.9010092...	DB
1.2.410.200010.1142949.2435.28.722.405652.4...	490WIN2008R2_AE
2.16.840.1.113669.632.21.51839.07.538394424...	490WIN2008R2_AE
2.16.840.1.114053.1.4.20140428.64216	490WIN2008R2_AE
2.16.840.1.114053.1.4.20140423.20820	DB
2.16.840.1.114053.1.4.20140423.21136	DB
2.16.840.1.114053.1.4.20110110.44416	490WIN2008R2_AE
1.3.46.670589.11.20145.5.0.5440.20101221105...	490WIN2008R2_AE
1.2.276.0.48.10002.1.2010042218.701698000	490WIN2008R2_AE

Using Color to Distinguish DataSource

By default, the text is colored black for studies in the local database, and blue for studies from remote datasources (as shown in the previous figure).

It is possible to configure the appearance of the Patient List so that studies are listed in a different color for different remote datasources.

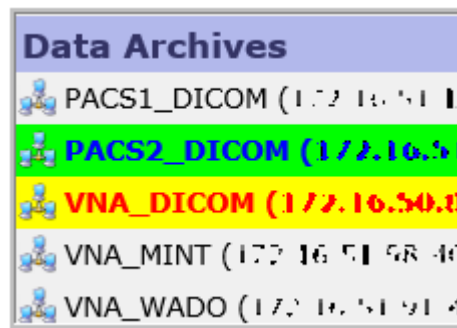
Note: Colorization can only be configured in iReview and requires administrative privileges.

In the following image, studies from one of the remote datasources have been configured to be displayed in blue text with a green background. Studies from the other remote source displays in red text over a yellow background. Studies in the local database do not have any special coloring configured.

Patient ID	Patient Name	Date of b...	Gend...	Modali...	DataSource
ARIZONA	GRAND^CANYON^^^	-	M	CR	DB
ARIZONA	GRAND^CANYON^^^	-	M	CR	EVERCORE_SCP
ARIZONA	GRAND^CANYON^^^	-	M	CR	EVERCORE_SCP
ARIZONA	GRAND^CANYON^^^	-	M	MR	EVERCORE_SCP
ARIZONA	GRAND^CANYON^^^	-	M	CT	EVERCORE_SCP
ARIZONA	GRAND^CANYON	-	M	MR	DB
ARIZONA	GRAND^CANYON^^^	-	M	CT	EVERCORE_SCP
ARIZONA	GRAND^CANYON^^^	-	M	CR	EVERCORE_SCP
ARIZONA	GRAND^CANYON	-	M	MR	DB
ARIZONA	GRAND^CANYON	-	M	MR	T5500WIN7X64_AE
ARIZONA	GRAND^CANYON	-	M	CR	DB

Figure 2-7: Color-Coded Federated Query

When a color scheme based on the datasource AE title (the name that appears in the **DataSource** column), is configured for the Patient List, the corresponding remote node names are also displayed in those colors (see figure below).



Preview Mode

Preview mode is activated automatically when you load a study from a remote datasource that is configured to use the WADO protocol.

When you load a study from a remote datasource configured for the WADO protocol, preview mode immediately begins to display the first available image from that study. At the same time, the retrieval of the complete study will continue in the background. This gives you access to images right away, without having to wait for all of the data to be retrieved and loaded.

Note: If you do not know whether any of the remote datasources you have available have been configured to use WADO, please contact your system administrator.

Retrieval from datasources that do not support WADO are as follows:

- DICOM datasource - A retrieve and load process is started. The patient list will show the progress status of the retrieve process. Data will be loaded into the viewer as soon as the retrieve process is completed.
- MINT datasource - The behavior is the same whether the data is local or remote.

Selecting Multiple Studies Simultaneously

When Federated Query is enabled, you will be able to select multiple studies, however some of the functions will not work. If one of the items selected causes a command to be disabled, then that command is disabled for the entire selection.

For example, the **Retrieve** function is not visible for local data selections, and the **Download** function is disabled when remote data is selected.

Therefore, if a multi-selection contains some remote studies and one local study, the **Retrieve** icon is disabled for all of the data. If a multi-selection contains one remote study, the **Download** icon is disabled for all selected studies, even if most of them are local.

If a multi-selection contains data from more than one patient, whether or not they are from the same source, the **Load** icon is disabled.

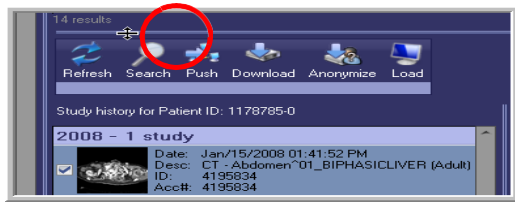
Resizing Components of the Patient List Screen

The width of individual columns in the Patient List can be changed. Hover the mouse over the boundary between two columns. The mouse cursor changes to the double-arrow icon. Click and drag the mouse to change the width of the column. Dragging leftward narrows the target column and dragging rightward widens it.

Example: The mouse is hovered over the boundary between the **Patient ID** and **Patient Name** columns. The cursor has changed to the double-arrow icon. Clicking and dragging the mouse to the left or right will affect the **Patient ID** column only.



To resize any component of the Patient List screen, hover the mouse over the double line that separates one component from another. The mouse cursor changes to the resize icon. You can then move the boundary line up or down (for components that are above/below each other), or left/right (for components that are beside each other).



Sorting

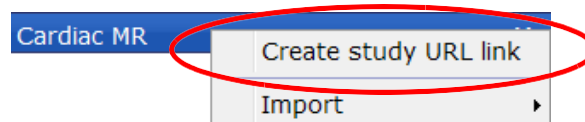
You can sort the Patient List based on the ascending or descending order of any column. Click the header of the column you want to use as a basis for sorting, and the Patient List will be ordered according to the values in the chosen column. Click the same header again to sort the list in reverse order.

Study URL Links

Creating a Study URL Link

Create a URL link for a study to be viewed with the Intuition Web viewer.

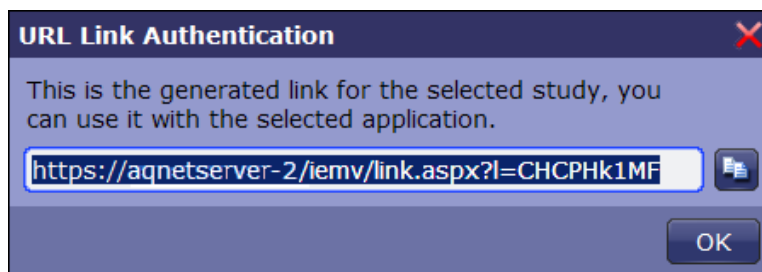
1. Right-click on the study and select **Create Study URL link**.



The **URL Link Authentication** dialog is displayed.

2. If authentication is required, enter a password here. The recipient of this link will need to enter that password to access the data.

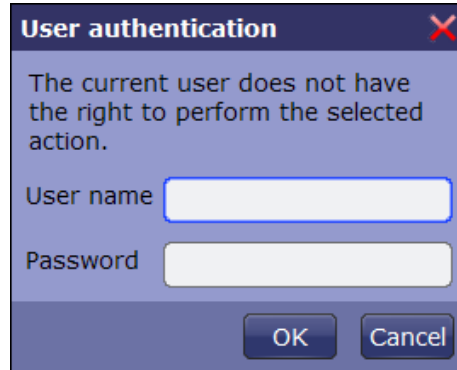
A URL is generated for the study:



To copy the link to the clipboard, click the copy icon located to the right of the URL. This link can be pasted into e-mail or other applications.

Authorization Error

If you try to create a URL link to a study and the following dialog is posted, this indicates that your user group is not authorized to create study URL links.



Opening a Study URL Link

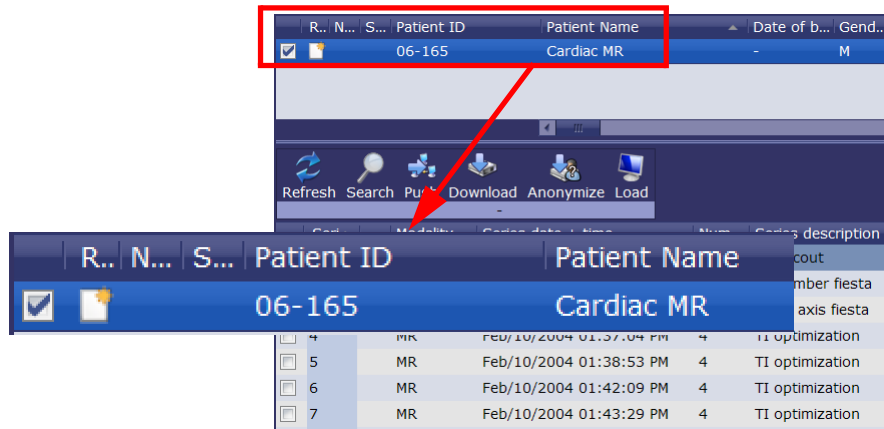
When you receive a URL to a remote server where the study is stored, you can enter the full link into your browser. iEMV is launched automatically, connecting you to the remote server. iEMV is launched automatically, connecting you to the remote server and opening the Patient List, which contains the desired study:



Enter the password to log in.

Note: If you do not have the password for the iEMV account, contact the colleague who sent you the link to the study. You will need a password to view the study.

When you are logged in, the Patient List is opened, showing the desired study:



Double-click the study to load it into the Viewer. Alternatively, you can click the **Load** icon in the middle of the iEMV screen.

iEMV Patient Portal Login

An additional method to access data from the server using iEMV is to use the iEMV patient portal. You can log into the patient portal, and use unique information about the patient or study to specify which images to retrieve.

1. Enter the following URL directly into your browser:

`http://<your-iEMV-server-IP>/iemv/portal`

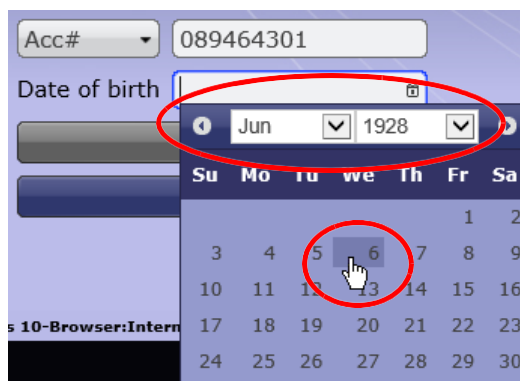
The iEMV Web Patient Portal page is launched and the login screen is displayed.

2. When using the patient's accession number, select **Acc#** from the drop-down menu. When using the patient's Patient ID, select **Patient ID**. Then enter the appropriate value in the text field.

Note: When you search using the accession number, the patient portal returns only the specific study matching that number. When you use the patient ID, the patient portal returns all studies related to the matching patient ID.

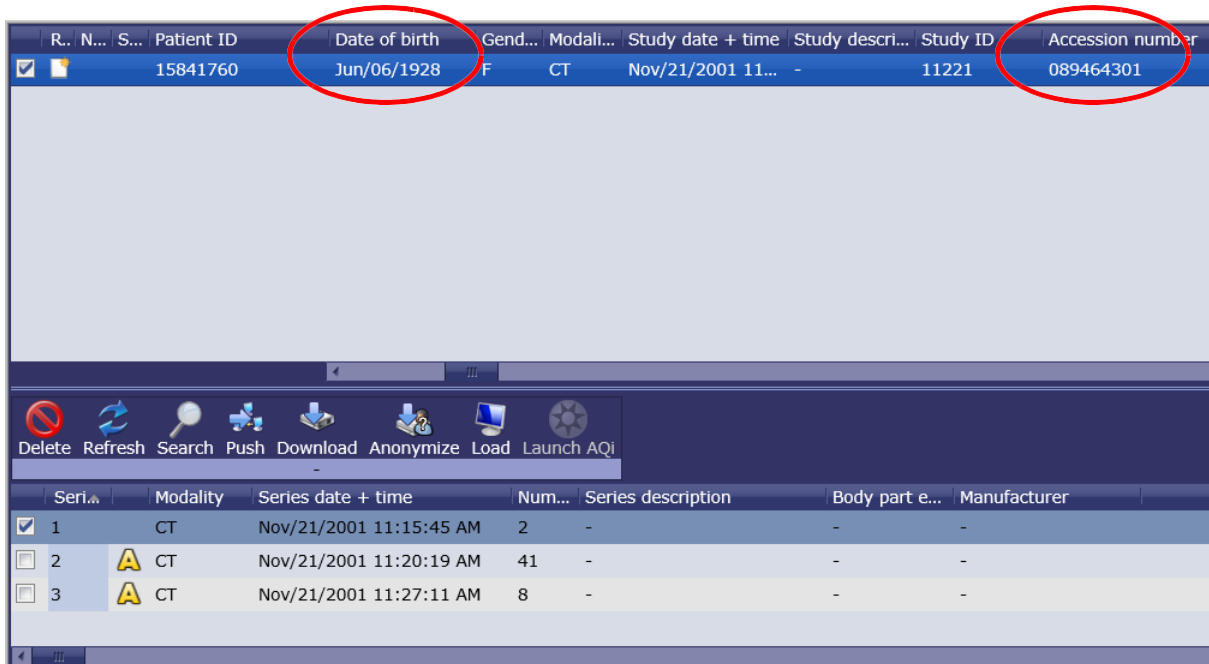


3. Click on the calendar symbol in the **Date of Birth** field to open the date picker.
4. Select the month and year from the drop-down menus, and then click on the date. The selected date is entered in the text field.

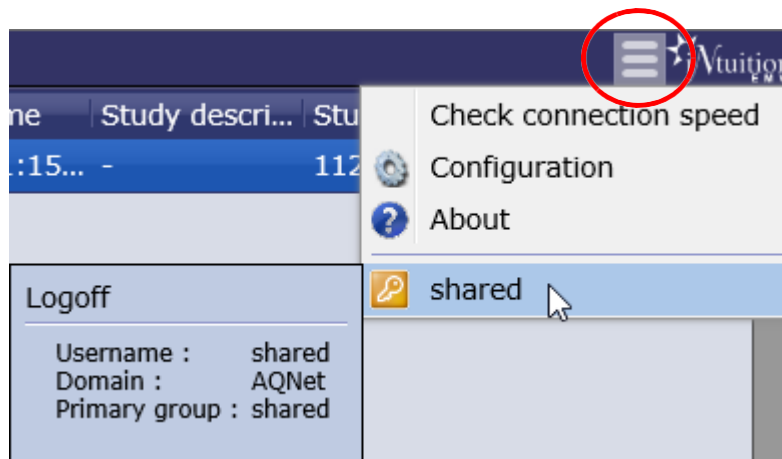


5. Click the login icon.

If the input is correct, you will see the requested Patient Study in the Patient List, and the series of the study in the Series List below. You can then load the study into the viewer.



- To log out of the iEMV patient portal, hover over the three-bar icon in the top-right corner of the Patient List, and select the logout icon from dropdown menu.



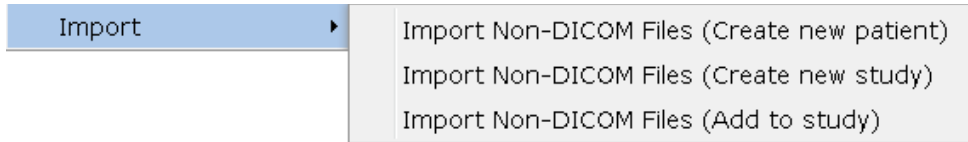
Once you are logged out of the patient portal, the iEMV login page is displayed.

Requirements for using the iEMV Patient Portal

Your account will need to access the patient portal. Ask your system administrator to configure the parameters and access rights that will allow you to retrieve images through the iEMV patient portal.

Importing Non-DICOM Files

It is possible to import Non-DICOM files into iEMV and store those files on the Intuition Server. From the Study list, right-click and Select Import from the menu. A sub-menu is opened:



Select one of the three choices for non-DICOM files. A dialog is opened where you can enter information that will be saved to identify the new object. Some information is added automatically and you may edit the information to best define the object.

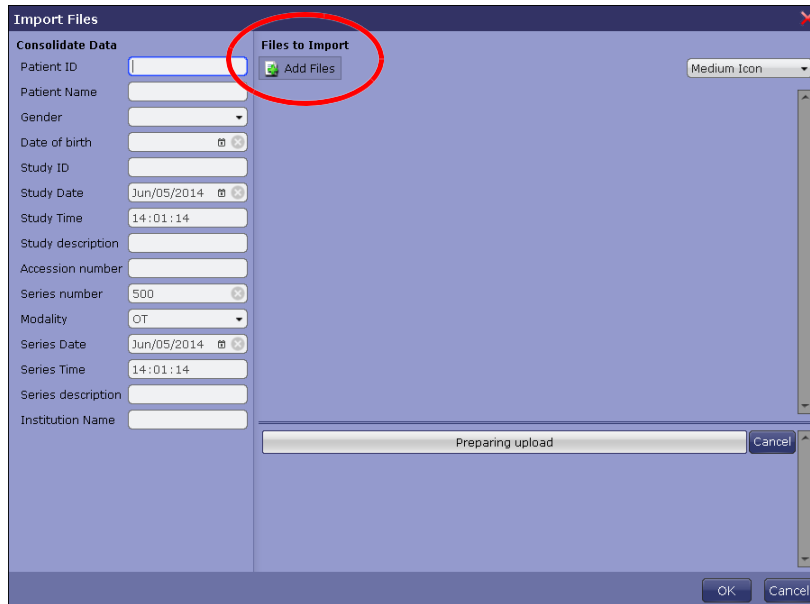


Figure 2-8: Create New Patient, Study or Series Dialog

Use the **Add files** icon (circled in [Figure 2-8](#)) to import additional files. These files will be added in the same way (as a new patient, new study, or to add to the selected study).

- Create new patient - Patient information is left blank so that you can enter a new Patient ID, Name, Gender and Date of birth (see figure below). Study and series information also needs to be added.

Import Files

Consolidate Data

Patient ID

Patient Name

Gender

Date of birth

Study ID

Study Date Jun/05/2014

Study Time 13:32:21

Study description

Accession number

Series number 805

Modality OT

Series Date Jun/05/2014

Series Time 13:32:21

Series description

Institution Name

- Create new study - The patient information is already added to the DICOM header. The values were taken from the study that was selected when you opened the right-click menu. The following dialog allows you to enter study and series information.

Consolidate Data

Patient ID 017

Patient Name Abdominal AD

Gender M

Date of birth Apr/01/1938

Study Date Mar/19/2014

Study Time 1:58:18 PM

Study ID

Study description

Accession number

Series number 500

Modality OT

Series Date Mar/19/2014

Series Time 1:58:18 PM

Series description

Institution name

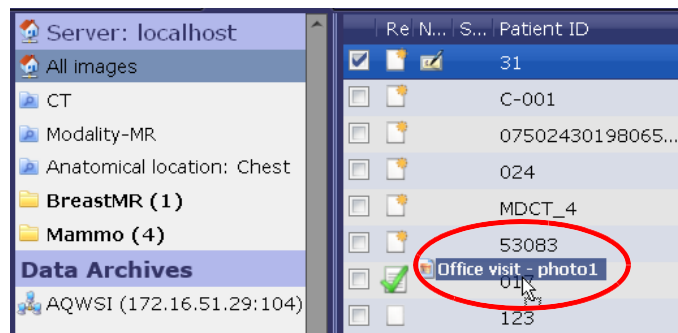
- Add to study - Patient and study information have been taken from the selected study and automatically added to the DICOM header. You can enter series information in this dialog (see figure below).

Series description

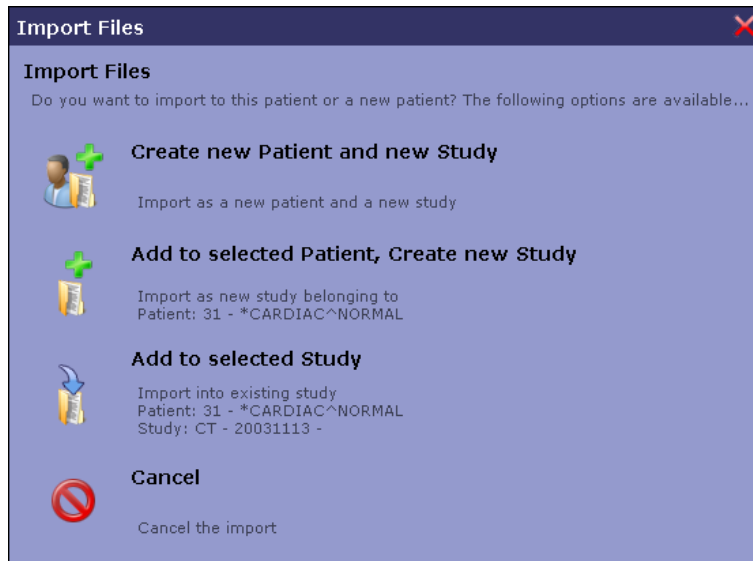
Institution name

Drag and Drop

Another way to import files is to drag and drop the file from the local disk to the Patient List.



A dialog is opened to ask whether you want to create a new patient, new study or new series:



Depending on which item is selected in this dialog, the import/upload dialog is opened, as shown in [Figure 2-8 on page 2-14](#).

Study Management Icons

This group of icons consists of basic management functions and are displayed by default. Below is a description of each function.



- Delete

To delete data from the Intuition Server, select one or more studies or series and then click the **Delete** icon. You can also right-click on the study or series, and select **Delete** from the context menu.

Warning: Data deletion, once confirmed, cannot be undone. A confirmation dialog is provided to exit without deletion.

Note: In order to delete a study or series, you must have the right to delete data. If you receive an error message saying **Delete error: Permission denied**, contact your system administrator to ensure your account is configured for data deletion.

- Refresh

Reloads the Study List. This will reflect any changes made to the list, such as imports or deletions, since the previous time the list was loaded.

- Search

Opens a dialog where search filter rules can be entered.

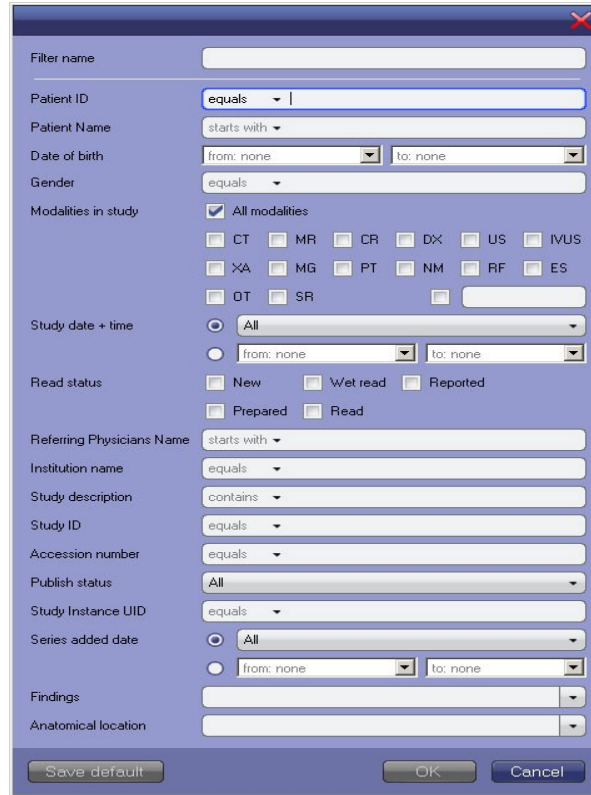
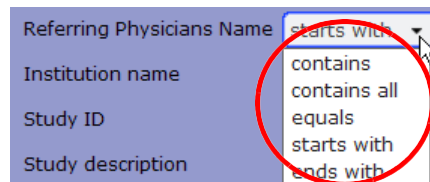


Figure 2-9: Search Filter Dialog

The Search filter contains a list of attributes commonly used to search for Patients and Studies. When a search is being performed using this filter, studies in the database are checked against the rules in the filter. If all specified fields in the filter match the corresponding tags in a study, that study is a match, and will be shown in the Patient List.

Configure the search filter as follows:

1. For each DICOM tag that must be matched, select a comparator (for example: equals, not equal, starts with, contains). Click the down-arrow in the input box of the tag and select the comparator (see figure below).



2. Enter the DICOM value or values required for the match. Depending on the field, data may be entered by typing, checking a checkbox or selecting an item from a menu.

Note: To find studies that match any or all of the words in a single tag, type each word on the same line, separated by a space. To find studies that match an exact phrase or sequence

of words, enclose the entire group of words in single quotes. Searches are not case-sensitive.

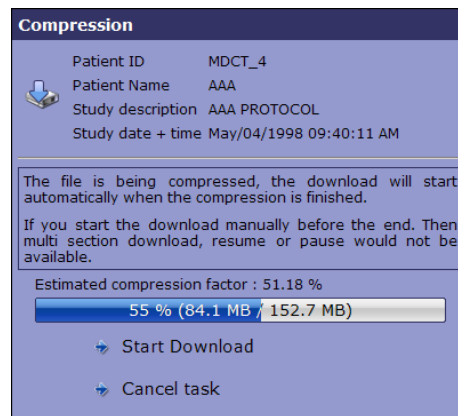
3. Click **OK** when finished configuration.

- Push

This option allows you to push the selected studies to the selected remote servers.

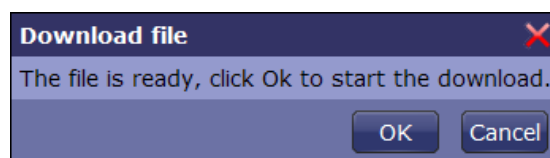


- Download



This option allows you to download the highlighted studies to your local drive. When the **Download** icon is clicked, the study data is first compressed into a Zip file. The **Compression** dialog is displayed so that you can see the progress of the compression, start the download immediately, or cancel the download. If you click **Start Download**, the data will be compressed and downloaded at the same time.

If you allow the compression to complete before downloading, a dialog is posted at the end (see the following figure).



Click **OK** to begin the download. Windows posts a “File Download” dialog so that you can save the compressed file. Click **Save**.

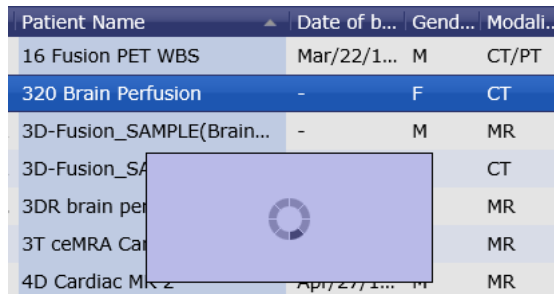
The Windows “Save As” navigation dialog then allows you to select a folder where the compressed data will be saved.

- Anonymize

This option allows you to anonymize the selected study by giving it a new patient name and ID. It is then downloaded to your PC.

- Load

Loads a study into the Viewer. When the load begins, Patient List functions are temporarily locked to prevent multiple clicks on the **Load** icon or on the study. A spinning wheel image is displayed on the screen to show that the load is in progress.



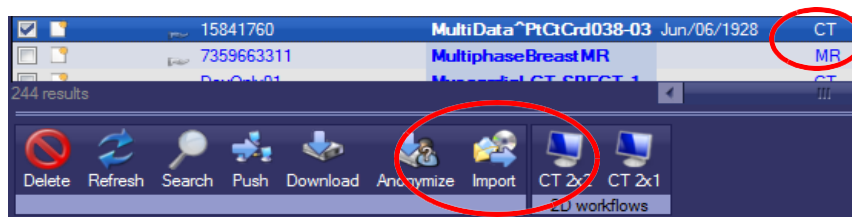
- Retrieve

The Retrieve icon is accessible only when the Patient List contains data from a remote DICOM datasources. To retrieve desired data, select one or more items from the Study List or Series list and click **Retrieve**. A dialog is posted to show you the progress of the retrieval. When it is complete, the dialog posts the status. If the retrieval fails, the status is reported as **Failed**.

2D Workflows

The 2D workflows correspond to Display Protocols that have been configured in iReview. When a selected study matches the rules in any Display Protocol, the name of the protocol appears in the 2D Workflows group. You can choose any one of the workflows displayed. Click the desired workflow and the study is loaded into the corresponding Display Protocol.

In the following figure, two Display Protocols have been configured to display CT studies. A CT modality is the only criteria for the protocols. The selected study is also CT, so both workflows are shown:

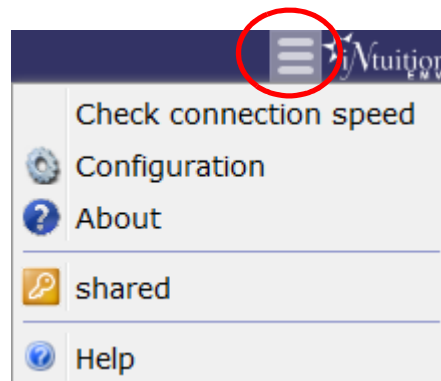


If no 2D workflows are shown when you select a study, there are two possible reasons for this. One is that the study does not match the rules of any Display Protocol currently configured. The other is that the

study matches the rules of *only one* Display Protocol. In that case, there is no need to display them, because there is only one choice of workflow. Double-click the study to load it into that Display Protocol.

Configuration Menu

Hover the mouse over the configuration icon in the top-right corner of the iEMV screen to display the Configuration Menu:



Check connection speed

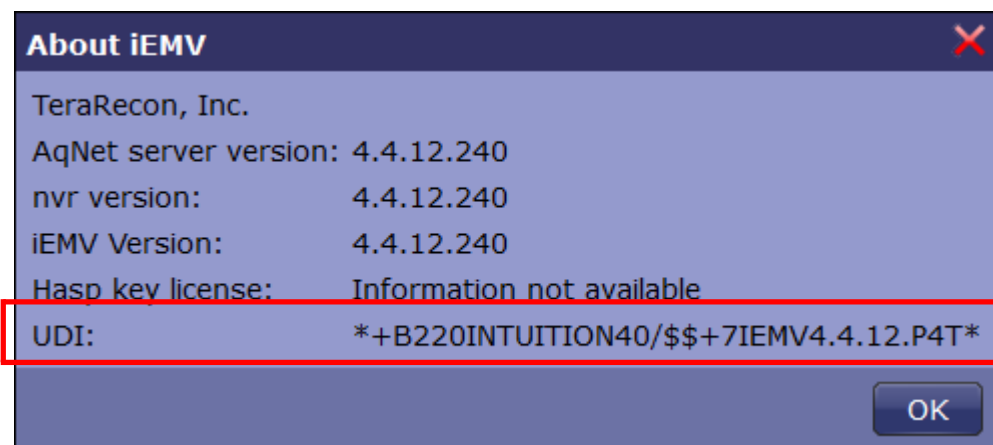
Hover the mouse over this item to view the recommended latency and bandwidth.

Configuration

The default settings for each of these options is set by your system administrator. Those settings are discussed in the sections where the corresponding features are described.

About

Select to display the Intuition Server and iEMV versions, HASP license, and the Unique Device Identifier (UDI). See the following figure:



Logout Button

This item shows the user name of the account you are currently logged into. Select the logout item to log out of this account. The login screen will be displayed so that you can log back in, or log into another account.

Help

Select this item to open the iEMV user manual.

Viewing 3D Data with Intuition Client

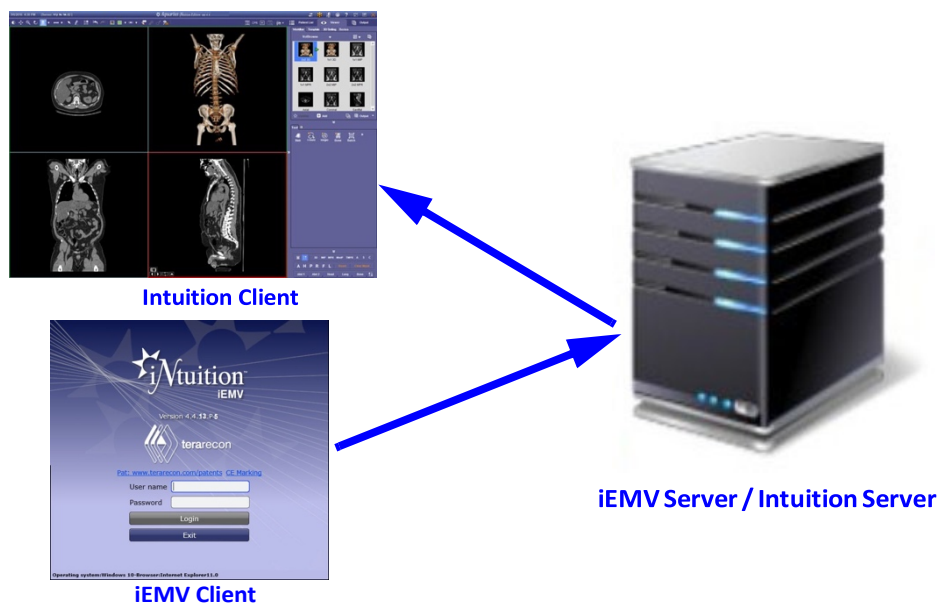
If you require a 3D viewer for a study, iEMV can be configured to launch the Intuition Client, which provides advanced 3D visualization. There are three options for launching Intuition Client from iEMV:

- [Connecting Intuition Client to the Same Intuition Server](#)
- ["Connecting Intuition Client to a Different Intuition Server" on page 2-23](#)
- ["Launching Intuition Client from a Remote Client" on page 2-25](#)

In each of these scenarios, Intuition Client is launched with the study that is currently selected in Patient List or loaded into the Viewer, on iEMV. Once Intuition Client has been opened, the study is automatically loaded.

Connecting Intuition Client to the Same Intuition Server

This configuration allows you to launch Intuition Client from iEMV, connecting to the same Intuition server you are connected to through iEMV.



First, make sure you have a valid configuration in order to launch Intuition Client from iEMV. This requires some new settings in the iEMV configuration file on the server, and must be modified by the system administrator at your site.

1. Select the desired study and series in the Patient List.
2. Click on the **Launch Intuition Client** icon in the Study Management bar.

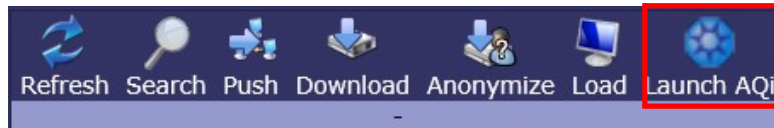


Figure 2-10 Launch Intuition Client Icon

A pop-up option is displayed at the bottom of the iEMV screen:



This allows the data, along with a command file, to be either downloaded to your client computer, or opened directly from the Intuition Server.

3. Do one of the following:
 - Click **Open** to launch Intuition Client.
 - Click **Save** to save the data and command file to your local storage. Then double-click on the saved file to launch Intuition Client.

Intuition Client is launched and is automatically connected to your Intuition Server. The selected study and series are loaded in the Intuition Client viewer.

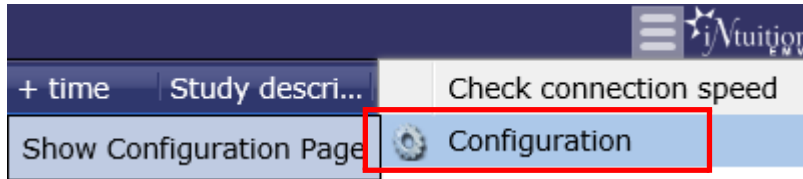
Connecting Intuition Client to a Different Intuition Server

Launch Intuition Client from iEMV, where Intuition Client is connected to a different Intuition Server from the one used by iEMV. You must have the Intuition Client client installed on your computer. In addition, the dataset to be loaded by Intuition Client (via command line) must be available on both servers.

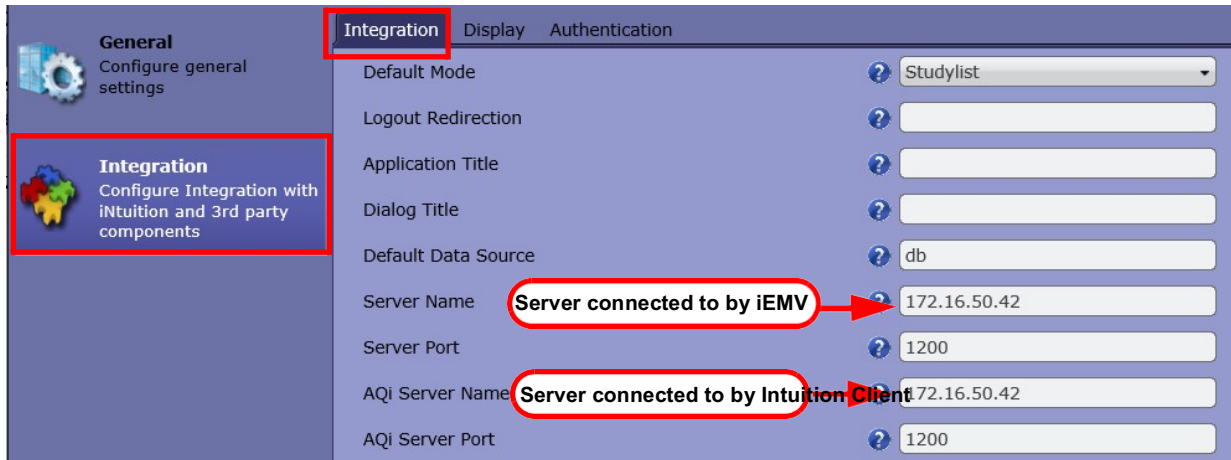
Configuration

The following settings must be configured in iEMV first:

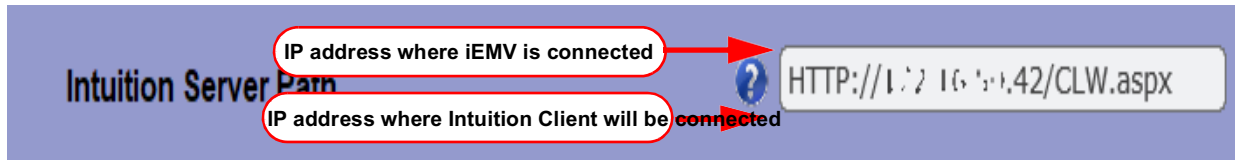
1. Launch iEMV and connect to the iEMV server.
2. Click the configuration icon in the top-right corner of the iEMV screen.



3. Click the **Integration** tab in the *left* panel of the configuration window .
4. Select the **Integration** tab at the *top* of the window, and enter the server info.



5. Click the **General** tab on the left, and then the **Viewer** tab at the top.
6. Enter the Intuition Web Server path names, one for the iEMV connection and the other for Intuition Client.



7. Click **OK** to exit the configuration window.

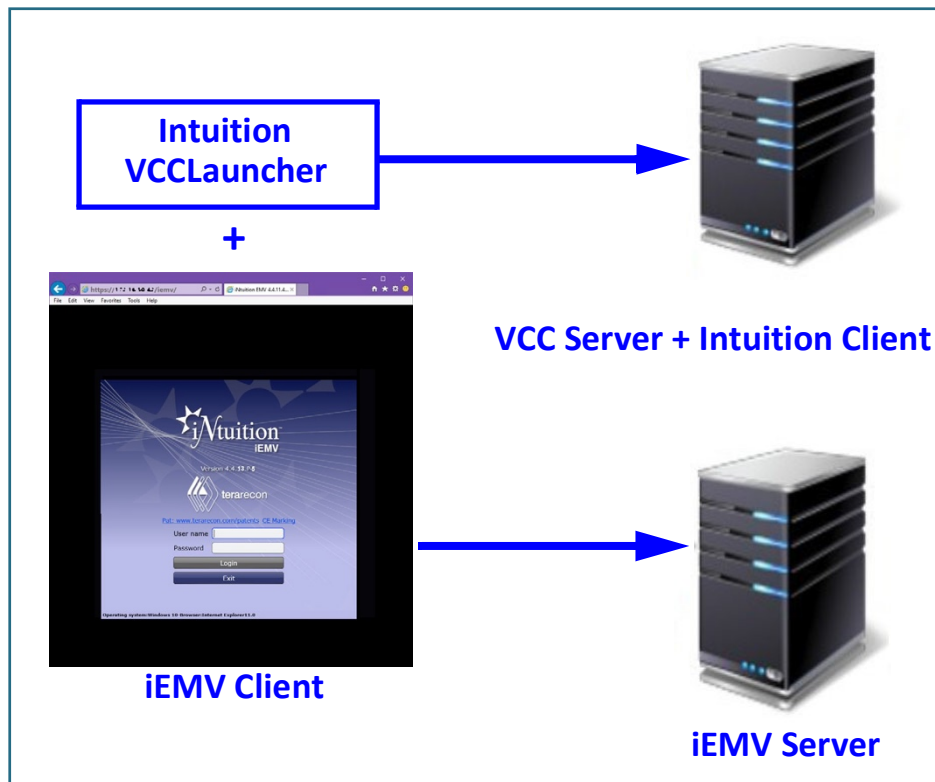
Launching Intuition Client

1. Connect to the iEMV server and then login to iEMV.
2. Select the desired study from the Patient List.
3. Click the **Launch Intuition Client** icon (see [Figure 2-10 on page 2-23](#)).

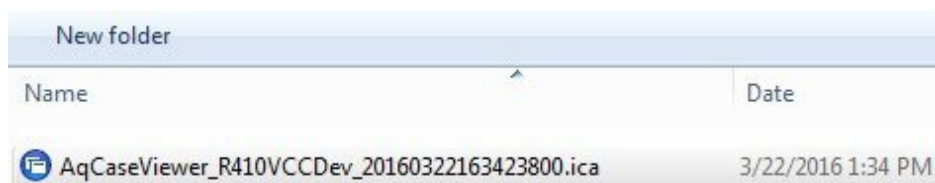
Intuition Client is launched and connected to the configured Intuition Client server. The selected study and series are loaded in the Intuition Client viewer.

Launching Intuition Client from a Remote Client

You can also launch Intuition Client from iEMV, where Intuition Client is installed on a VCC server. This option makes it possible to view a study in Intuition Client without having it installed on your local computer. A VCC server is required.



1. Install Intuition Client VCCLauncher_Install on the iEMV Client.
2. Set up the integration configuration on iEMV side.
3. Select the study from Worklist and click the **Launch Intuition Client** icon.
4. Click on either **Open** or **Save**.
 - **Open** launches the Intuition Client VCCLauncher, which in turn launches Intuition Client from the configured server.
 - **Save** downloads the file with command-line. The file extension is ".ica"

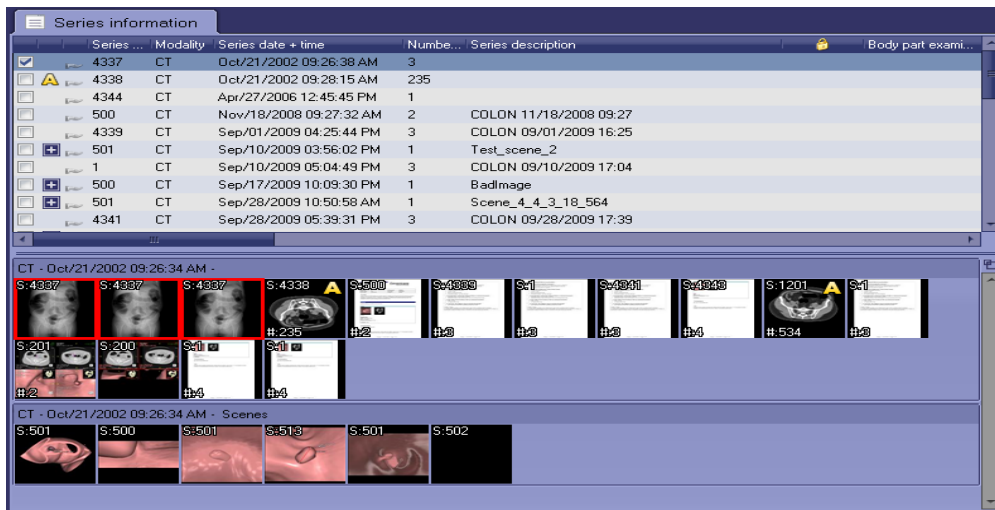


- Double-click the download file (shown in the previous figure) to launch Intuition Client via command-line.

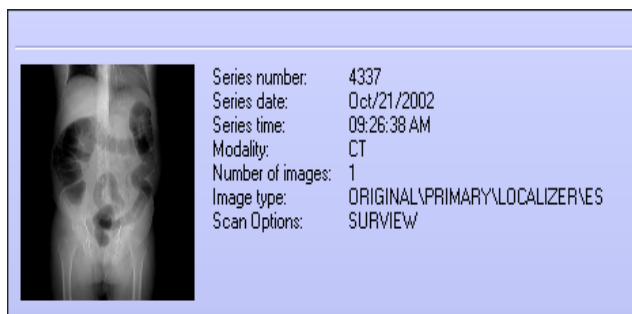
Intuition Client is launched, the data is loaded from the VCC server and not the iEMV server.

The Series List and Thumbnail Preview

The Series List displays all the series information for (one or more) selected study. The thumbnail preview displays all the series in thumbnails. Studies from different dates are displayed in separate rows and scenes are also displayed separately. When a series is selected, associated thumbnails are highlighted. If a series has multiple sub-series, all the sub-series are displayed as separate thumbnails.

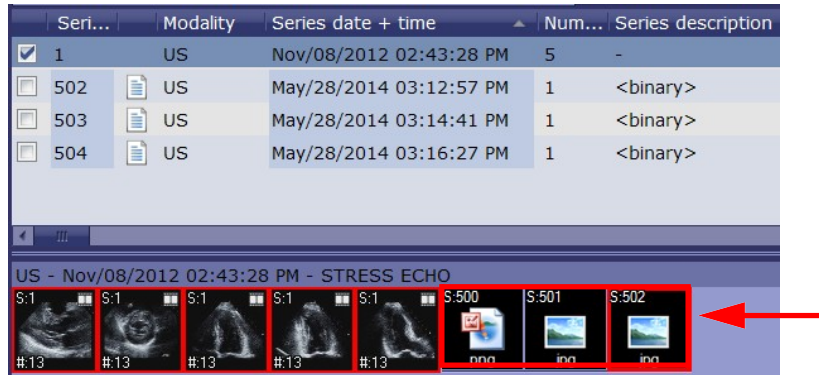


If all the sub-series have the same image number, only one thumbnail image is displayed. The label shows the number of images in series, which is calculated from the number of sub-series times the number of images for each sub-series in the same folder. When you hover the mouse over the thumbnail, a small window containing images and series information is opened.

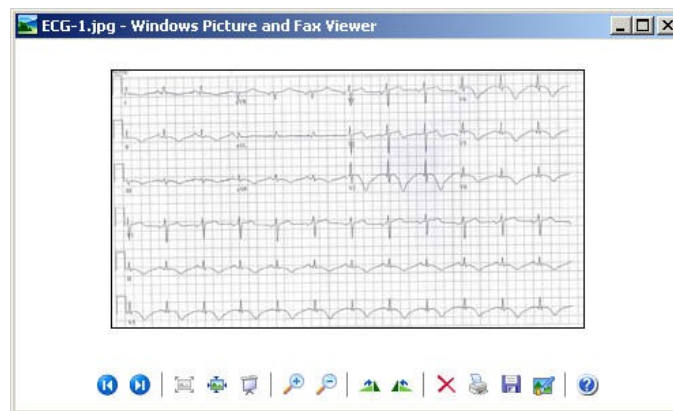


Non-DICOM Files

iEMV supports the display of non-DICOM files. These files are shown as series thumbnails in the Patient List (outlined in the following image):



Double-click on one of the thumbnails to open the file. The file will open in the application that has been configured in Windows to open with that file’s extension.



Folders and Filters

The Folders and Filters panel is located on the left side of the iEMV screen (see [Figure 2-1 on page 2-1](#)). A filter, indicated by a search icon on the screen (see [Figure 2-11](#)), is a set of rules that compares configured attributes (usually DICOM tags) with the corresponding attributes in the study. If the study matches the rule, then the study is displayed in the Study List.

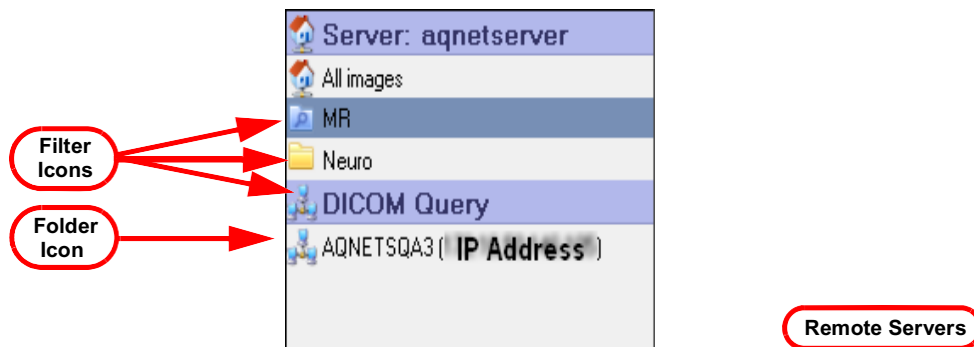
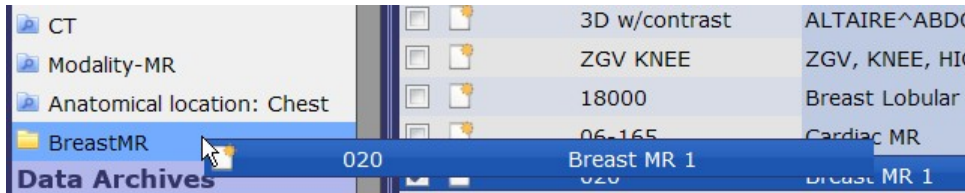


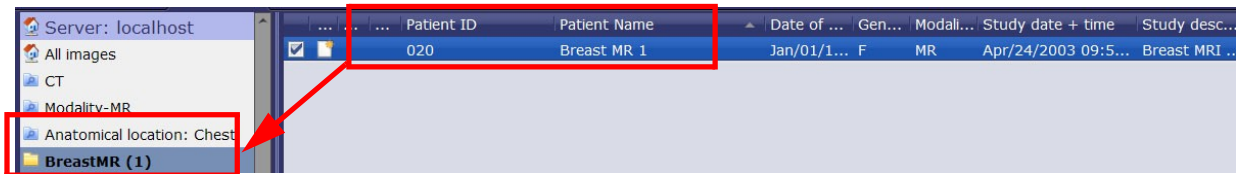
Figure 2-11: Folders and Filters Panel

A folder, indicated by a folder icon, contains studies from the Study List that have been manually added to it. When you click on that folder, only the studies in the folder are displayed in the StudyList.

Filters and folders must be configured in iReview. You cannot create a filter or a folder in iEMV. However, you can add studies to a folder that already exists. To do so, highlight the study or studies in the study list. Then drag and drop the study or studies into the folder.



In the example above, the “Breast MR 1” study is being added to the **BreastMR** folder. Below, the image shows that when the **BreastMR** folder is selected, the study is listed in the StudyList.



Note: If you are unable to access the contents of a filter, you might not have access rights to that filter. See your system administrator if you need access.

Chapter 3 The Viewer

Topics in this chapter:

- Elements of iEMV 3-1
- Using the Viewer 3-2
- Performing Measurements 3-19
- Collaboration 3-38
- Viewing Mammographic Data 3-40
- Parametric Map 3-41

Elements of iEMV

The labeled areas make up the main sections of the viewer and its interface. Each section is described in the table that follows.

Warning: Not intended for diagnostic use when used on a mobile device.

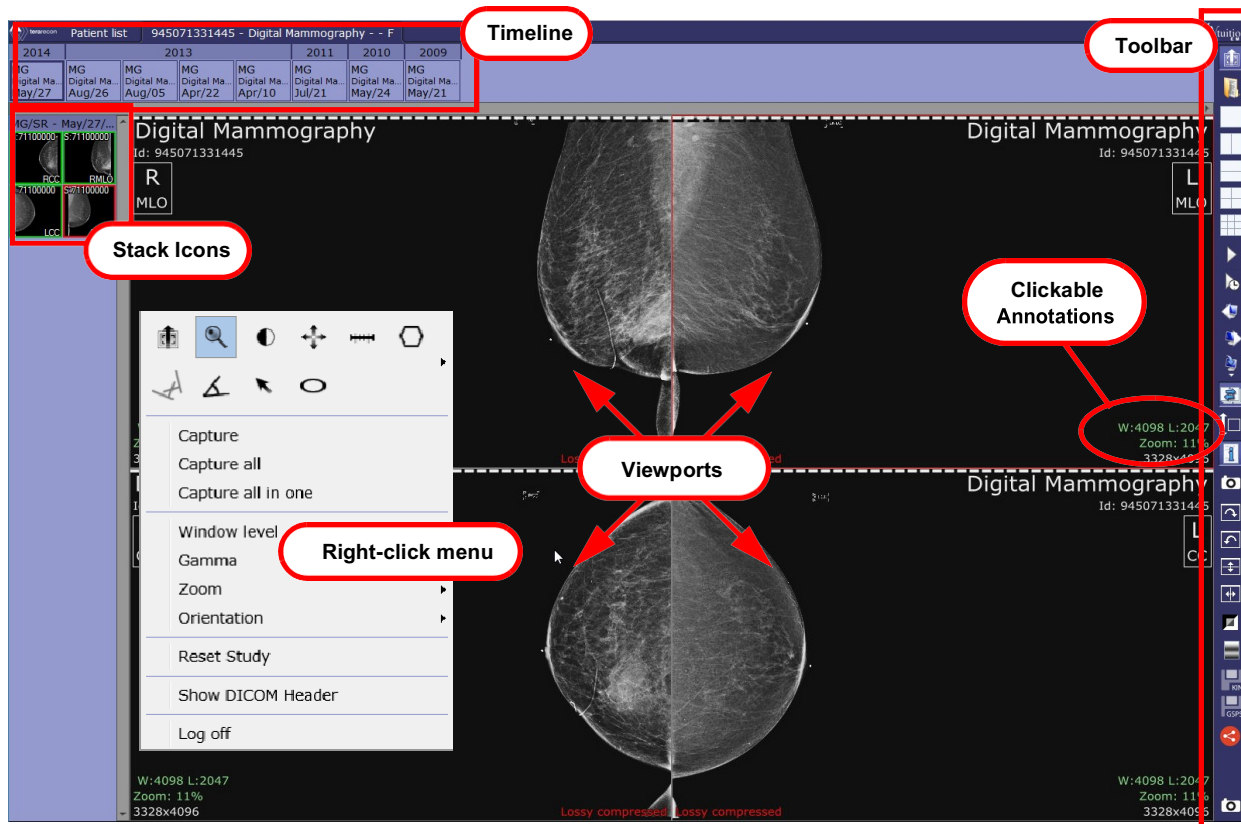


Figure 3-1: The iEMV Viewer

Note: The layout pictured above is the default layout for iEMV. However, other layouts can be configured. If you would like to change the layout, contact your system administrator.

Component	Description
Viewports	A viewport is a section of the main viewer where an image can be displayed. The number of viewports on the screen depends on the layout. In Figure 3-1 , the layout is 2x2, so there are four viewports. In the case of 1x1 layout, the entire viewer is a single viewport.
Toolbar	The Toolbar icons activate many of the functions that are important for layout, image manipulation and clinical review. These functions and many more are described in the following sections.
Timeline	Each icon represents one in a group of studies that are from the same patient. The timeline includes the currently loaded study and all prior studies from the patient.
Stack Icons	Each icon represents a single stack in the study. You can open a stack into a viewport by dragging and dropping it into a viewport.
Clickable Annotations	These annotations are displayed in green text to indicate that when they are clicked, a function or menu is activated. Some of the menus might contain functions that are also available in the Toolbar. This gives you the ability to choose which style of working is most convenient for you.
Right-click menu	When you place the mouse on a data image and click the right mouse button, a menu of functions is displayed. As with the clickable annotations, there is some duplication of functions, allowing you to choose the most convenient way to work. (Please note that not all functions are duplicated and some might be accessible in one way only.)

Using the Viewer

Topics in this section:

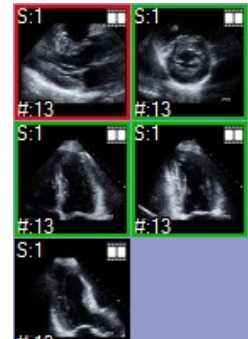
Loading Studies	3-3
Viewing Stacks	3-4
Mouse Options	3-6
Toolbar Icons	3-7
Clickable Annotations	3-16
Clickable Annotations	3-16

Loading Studies

To load study data, you can either double-click on the desired study in the Patient List, or select the desired study or series, and click the **Load** icon located in the middle of the iEMV Patient List screen.

Thumbnails

Along the left side of the iEMV screen, the series belonging to the study are displayed as thumbnails, which have color highlighting around them are currently loaded into viewports. Red highlighting indicates that the series is in the active viewport.



Remote Studies in the Timeline

Remote studies are shown in the timeline, if the study loaded has priors stored on any remote servers. By default, thumbnails in the timeline representing remote studies are shown in a blue font.

Color Coding for Federated Query

In the following example, some of the timeline thumbnails use a red font for the text, on a yellow background, while others use blue text on a green background. Some of the thumbnails have no special coloring. These match the coloring scheme for the federated query and can be seen in the Patient List.

2015	2014			2013						
CT No Descri... Apr/01	CR No Descri... Nov/02	CT No Descri... Oct/03	MR No Descri... Jun/05	CT No Descri... Jan/06	MR No Descri... Dec/07	CR No Descri... Nov/07	CR No Descri... Aug/09	CR No Descri... May/11	CT No Descri... Apr/11	MR No Descri... Me

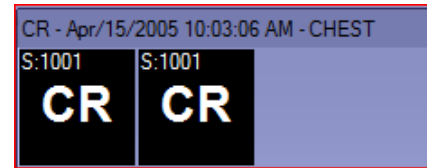
No Descriptions	
Patient Name:	GRAND^CANYON^^^
Patient ID:	ARIZONA
Accession number:	-
Study ID:	-
Study Date:	Dec/07/2013
Study Time:	04:10:06 PM
Referring Physicians Name:	-
Institution name:	-
Modalities in study:	MR
DataSource:	EVERCORE_SCP

To identify which datasource a particular study resides on, hover the mouse over the icon for that study to display the tooltip. The datasource is displayed at the very bottom of the tooltip, as shown in the previous image.

See Figure 2-6, Chapter 2, to compare the information in this tooltip with the DataSource column in the Patient List.

Remote Series Thumbnails

Remote series will not have thumbnails available. A text-based generic thumbnail, using only the modality name as a label, is shown to indicate that there is series data available.



Viewing Stacks

You can display a series in the viewer screen by dragging the thumbnail for that series onto any of the viewports in the Viewer screen. The new series replaces the old one in the Viewer.

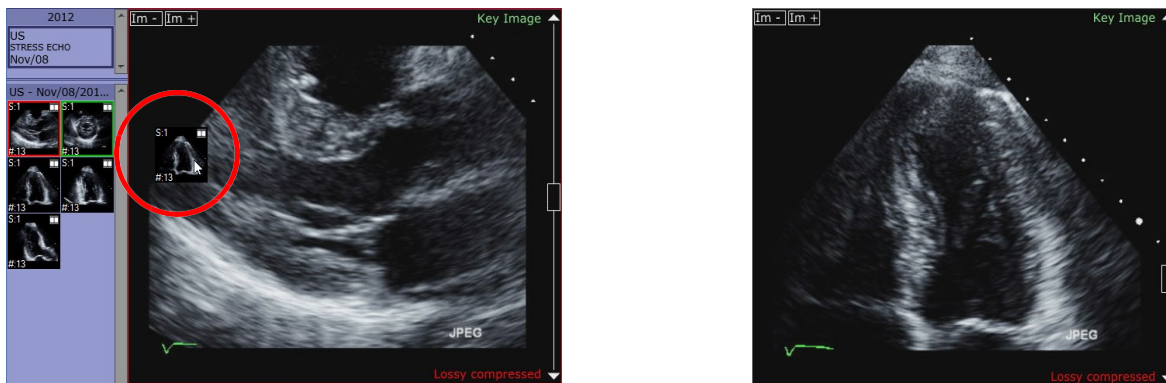
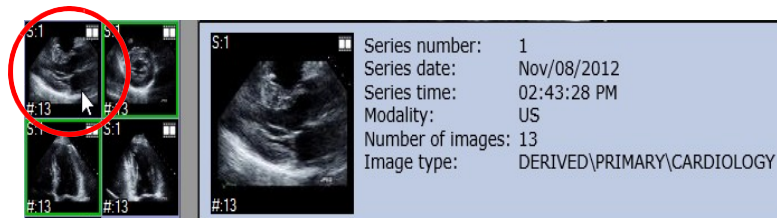


Figure 3-2 Left - Dragging Thumbnail to Viewer; Right - Stack Displayed in Viewer

When you hover the mouse over a thumbnail, a panel containing detailed information about the series is displayed.



If there are more series than can fit in the thumbnail area at the same time, use the slider bar to scroll to a series not currently visible.

Image Compression

Images may be compressed for display. The system can be configured for various compression modes. When Lossy compression is applied, this is indicated in the lower-right corner of the viewport.

Lossy compressed

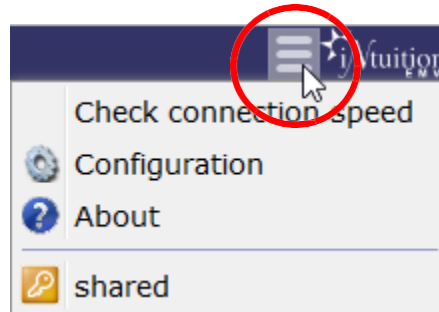
Hybrid Compression Mode

When using Non-Compressed setting, a hybrid mode allows you to view uncompressed images by default when there is no activity in the Viewer screen. When the images are manipulated they will be displayed

with lossy compression to provide better performance. As such, “Lossy compressed” is shown in the lower-right corner of each viewport. When activity in the Viewer stops, the images are once again displayed uncompressed.

To enable hybrid mode, do the following:

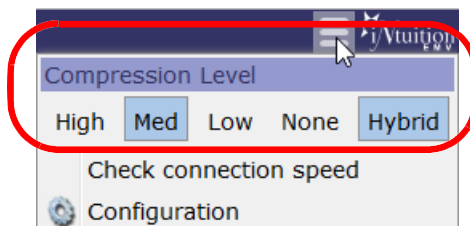
1. Hover the mouse over the configuration icon. Select **Configuration** from the drop-down menu:



2. Select **Viewer** from the menu row at the top of the configuration screen.



3. Check the box for **Enable hybrid compression**.
4. Click **OK** to close the Configuration screens.
5. When Images are displayed, you can confirm the current compression level.



Hybrid will also be selected.

Full-Screen Mode

To display iEMV using full screen browser mode, press F11 your keyboard. You can do this in either the Patient List or the Viewer. Pressing F11 again will return the browser to its original size.

Mouse Options



Hover the mouse over the mouse mode icon.



Note: The mouse icon shows the slice, zoom, W/L, pan, or no mouse icon, depending on which mode is currently selected.

This allows you to select the function of the *left* mouse button.

- No Mode - In this mode, mouse clicks do not activate any iEMV tool.
- Slice
 - Single Phase (3D)

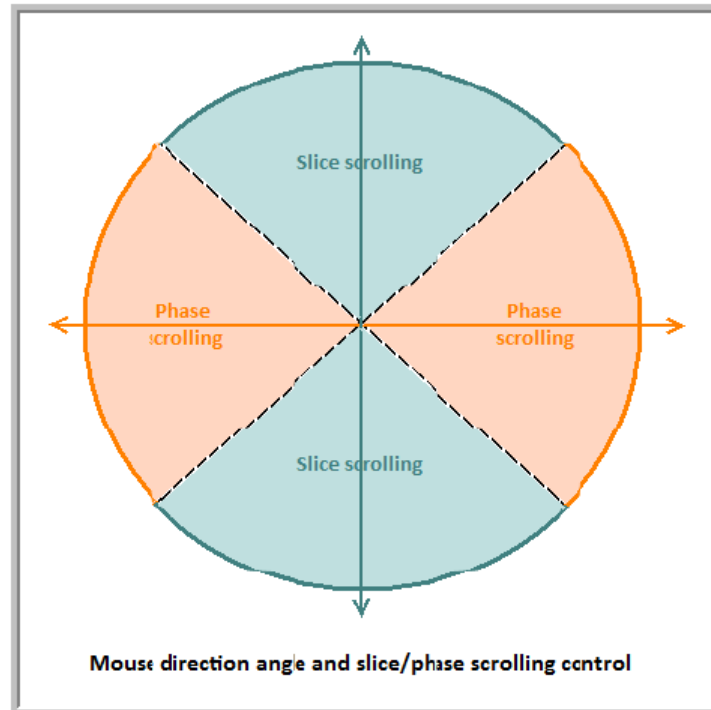
On a multi-image series, hold down the mouse button, and move the mouse up to scroll through the slices toward the start point of the scan. Move down to scroll toward the end of the scan.

- Multiphase (4D)

When multi-phase, multi-slice images are loaded into a viewport, you can either scroll through slices, or scroll through the phases within a single slice.

- Drag the mouse horizontally to scroll through the phases within a slice. Left-to-right scrolls in a forward direction, and right-to-left scrolls backward. When you reach the end of a set of phases, the display automatically advances to the next slice (left-to-right), or the previous slice (right-to-left).
- Drag the mouse vertically to scroll through slices. This works the same way that scrolling works with single-phase series. It does not advance to the next phase when the end of the slices is reached.

You do not need to move the mouse in a precisely horizontal or vertical direction. The viewport is divided into four sections by two (invisible) diagonal lines that cross in the middle of the screen. If you scroll more or less horizontally within the range defined by the diagonals, iEMV responds as if you were moving exactly along a horizontal line. The same is true for vertical scrolling. See the following diagram.

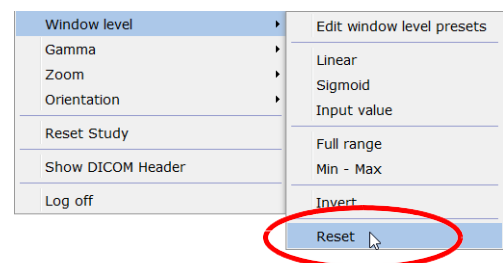


- Zoom - Move the mouse upward on the screen to make the image larger, downward to make it smaller.
- Window/Level - Make the image appear brighter/darker, and increase/decrease contrast.

Note: Non-DICOM images are displayed using the full color range. Changing the W/L changes the contrast or brightness of the image.

To reset the window/level back to the original values, right-click on the image, select **Window level** from the menu, and then select **Reset** from the sub-menu (see image at right).

- Pan - Move image around in the window.
- The other mouse buttons and button combinations retain their usual functions.



Toolbar Icons

In this section:

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[Capture](#) 3-11

Cine 3-9

Cine Dialog 3-9

Color 3-11

Save GSPS 3-14

Invert 3-11

Save KIN (Key Image Notes) 3-12

There are five layouts to choose from: 1x1, 2x1, 1x2, 2x2, and 3x3. 3-9

Orientation 3-11

Parametric Map 3-11

Protocol 3-9

Scroll 3-10

Select Protocol Step 3-10

SR 3-8

Start Collaboration 3-16

Sync 3-10



SR

Click to open the structured report viewer.

Note: This icon is visible only when data containing a structured report is loaded.

Auto-Open SR Viewer

There are two conditions in which the SR viewer is automatically opened when a study is loaded:

- The study contains one or more SR series, and the iReview setting, **Show SR Viewer automatically after open study** is enabled.
- The study contains *only* SR series. The viewer opens automatically whether or not **Show SR Viewer automatically after open study** is enabled.

Layout

There are five layouts to choose from: 1x1, 2x1, 1x2, 2x2, and 3x3.



Cine



There are two **Cine** functions: **Cine 2D** (right arrow image) plays through the images of a single series. **Cine 4D** (right arrow with clock image) plays through the images of multiphase series, while remaining in the same image position.

Cine Dialog



Select Cine Dialog to control the direction, speed, and type of cine.

In the example shown, the 2D cine is cycling in a forward direction. The speed has been set to 26 frames/second (fps). Actual speed is dependent on the network speed. The actual speed shown in the dialog is 23.3 fps.

Protocol

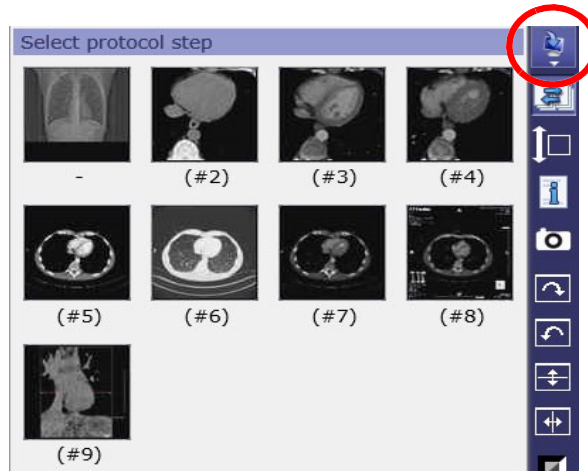


This tool allows you to step from one display protocol step to the next (or the previous) step. Click the right-arrow to advance to the next step in the protocol (or the left-arrow to go back to the previous step).

Note: Display Protocols must be configured in iReview.

Select Protocol Step

You can use the **Select protocol step** panel to select a protocol step out of order. Hover the mouse over the tool icon and then click the desired protocol (see the following image).



Sync

The sync icon enables the synchronization of image content of a series for navigation, and when playing either a 2D or 4D cine in more than one viewport. This change remains in effect as long as the data is loaded. Click the icon to toggle the synchronization on or off.

When synchronization is enabled, the icon has a light color and appears sunken. When it is disabled, the color is darker and the icon appears flat.

Scroll

The scroll option has two settings, single and multi.

- Single scroll - Scroll through one series only.
- Multi scroll - Scroll through all loaded series.


Annotations

Toggle off/on the annotations (Text Overlay).

Capture

Capture the selected image in the view window to the Output Panel.

Orientation

 There are four orientation functions:

- CW - Rotate 90 degrees Clockwise
- CCW - Rotate 90 degrees Counter-Clockwise
- Flip V - Vertical Flip
- Flip H - Horizontal Flip

Invert

Invert the color scale for the image. This applies to both grayscale and color images.

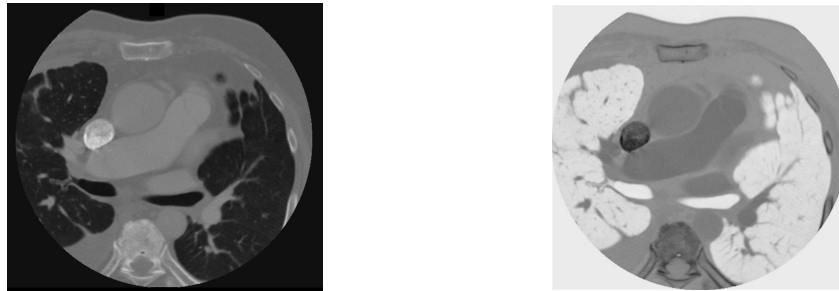


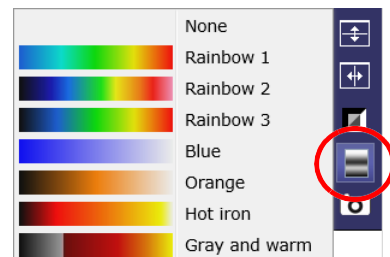
Figure 3-3 Left - Original Grayscale; Right - Color Inverted

Color

Apply the selected pseudo-color template to a grayscale image.

It is possible to apply a pseudo-color overlay onto a color image, but be aware that the image will have a different appearance, and any information conveyed by the original color will be obscured. This applies to both DICOM and non-DICOM images.

You can remove the color overlay by selecting **None** from the pulldown menu, shown at right.



Parametric Map

Parametric Map is a color-coded visualization of the change in intensity over time. For details, see ["Parametric Map" on page 3-41](#).



Save KIN (Key Image Notes)

Key Image Note (KIN) allows you to flag certain images as significant for further examination, referral, or other purposes.

Marking an Image as KIN

In order to save KIN, you must first mark it as KIN. To mark the image as KIN, right-click on the image and select **Mark as KIN**. An annotation then appears in the upper-right corner to indicate it is now KIN:



Note: Depending on how iReview is configured, performing a measurement or adding a text annotation on the image can automatically mark it as KIN.

Saving Image as KIN

Note: If you have configured the Viewer in iReview to save measurements and key images when a tab is closed, they are saved automatically.

Click the **Save KIN** icon. The **Save Key Images** dialog is opened:

1. Select the relevant document title from the drop-down menu.

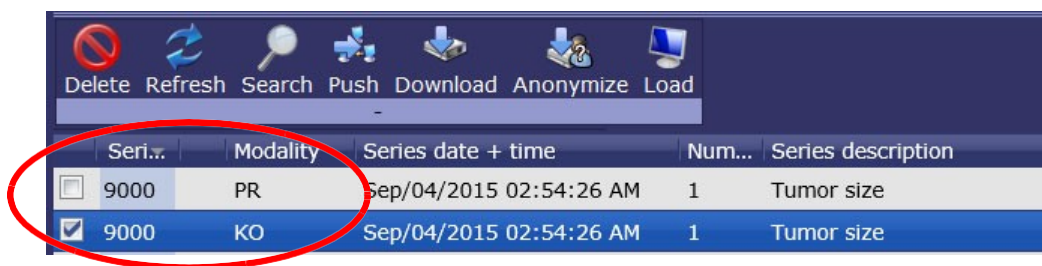
Note: All Key Images having the same document title are saved as a single series. The series is identified by a single icon in the series thumbnail list.

2. Enter a description for the key images (optional). This will appear in the annotations when the key image series is loaded into the Viewer.
3. Enter a series description (optional). This will appear in the series description column of the Series List.
4. Check the **Append to existing series** box if you want the key image series to be appended to an existing series. If this is not checked, the key image series is saved as a separate series.

Click **OK** when done. The image is saved as a series.

Applying KIN

KIN series appear in the series list starting at series number 9000, with KO as the modality:

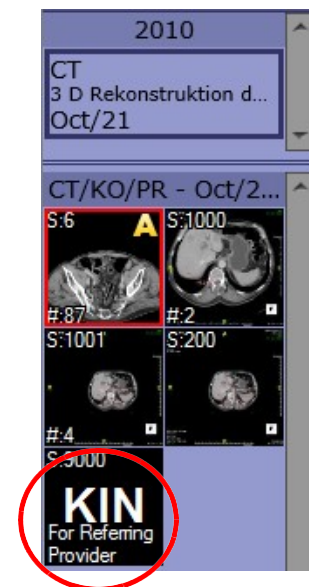
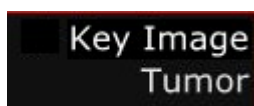


Seri...	Modality	Series date + time	Num...	Series description
<input type="checkbox"/> 9000	PR	Sep/04/2015 02:54:26 AM	1	Tumor size
<input checked="" type="checkbox"/> 9000	KO	Sep/04/2015 02:54:26 AM	1	Tumor size

Figure 3-4 KIN Series

When you load the study, the KIN series is identified in the thumbnail list, as shown at right.

When this series is loaded, the description entered in the standard DICOM KIN series, or when the image was saved in iReview, is now shown in the annotation in the upper-right section of the image (see image below). The image is also identified in the annotation as a Key Image.



Note: KIN thumbnails are normally placed at the end of the row, as they are arranged in order of series number, and KIN series begin at series number 9000. It is possible to configure the placement of KIN thumbnails so that they appear at the beginning of the study; however, this must be done in iReview.



Save GSPS

The Grayscale Softcopy Presentation State (GSPS) captures image manipulations such as W/L, zoom, flip, rotate, rulers, or annotation text. After you have created a presentation image from the series, you can save the set of changes you have applied to the image so that it can be applied again later to show the presentation state of the series.

The Save GSPS function creates a new series for each original series that is currently open in the viewer.

Operations That Can Be Saved With GSPS

The following image operations can be saved using GSPS:

- Zoom, Orientation, Window/Level
- Magnification, Display Shutters, Size (Fit, True or 100%)
- Horizontal Flip
- Overlays
- Measurements:
 - Distance
 - Ellipse
 - Oblique Ellipse
 - Circle
 - Polygon
 - Arrow or Text Annotation

To save GSPS, click the Save GSPS icon. You can also right-click on the image and select **GSPS** and then **Save** from the menu. Both of these operations open the **Save GSPS** dialog:

- Presentation Description - Text entered in this box identifies the specific set of operations that have been performed on this image prior to opening this dialog. The same text is shown in the right-click menu under **GSPS**.
- Series Description - This is displayed in the Series Description column in the Series List.

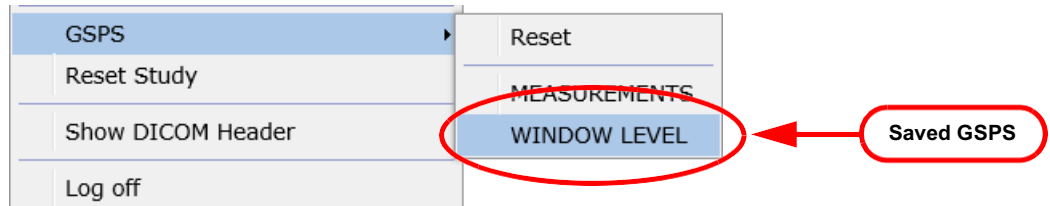
Click **OK** when done. The GSPS will be sent (pushed) to the Series List. Once a GSPS has been saved on a series, it can be applied to that same series later.

Note: It might take a few minutes for the GSPS series to be complete on your system.

Applying GSPS

GSPS objects appear in the series list starting at series number 9000, with PR as the modality:

Right-click on the image and select GSPS from the menu. This opens a sub-menu where you can choose which GSPS to apply.



Note: If no GSPS is listed in the sub-menu, that means that nothing was saved on that series. It is possible that the GSPS was saved on a different series in the study.

In the following example, the GSPS that was applied included both a zoom in and a change to the window/level.

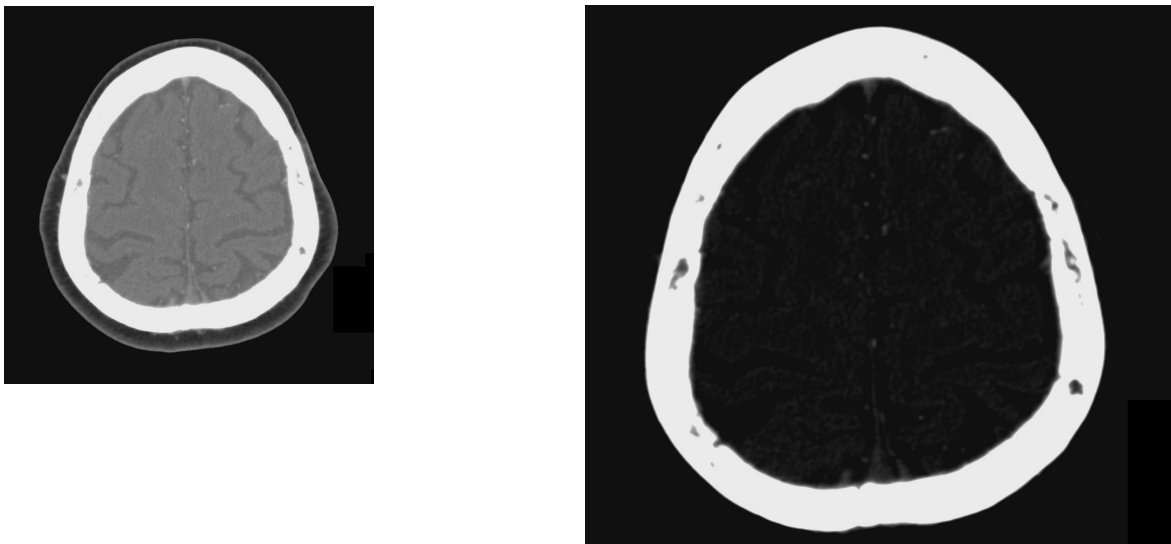


Figure 3-5 Left: Before “WINDOW LEVEL” GSPS applied Right: After GSPS Applied

Applying GSPS On Load

If GSPS is configured to be applied on load, an annotation is displayed in the lower-right corner to notify you (see image at right).



Start Collaboration

The Collaboration feature allows you send data to another user so that you can collaborate on the examination.

For instructions on using the Collaboration feature, see ["Collaboration" on page 3-38](#).

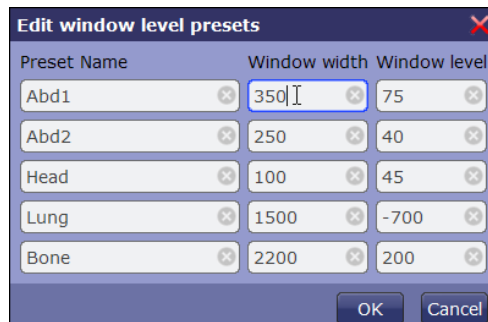
Clickable Annotations

The annotations on the image are configurable based on the **annotation** setup in viewer configuration. Configuration must be done in iReview. The green annotations are selectable.

- **Zoom Factor** - Select the Zoom option:
 - Original Size - Display image at 100% the size of the DICOM image.
 - Fit to Screen - Display image at a size that fits the screen.



- **W/L** - Select different options to apply to the Window Width and Window Level.
 - Edit window level presets - Add, change or remove any of five preset W/L values.



- Linear - The standard linear curve.
- Sigmoid - Sigmoid uses an S-shaped curve for the Window/Level. The contrast then appears more like an X-Ray film.
- Input Value - Arbitrary LUT stored in the DICOM files (often used with CR, DX, MG and PET images).

The curve is calculated and optimized on the scanner to provide the same perceived image on the console, monitor and in print. You can select **Input Value** only if the LUT is stored in the DICOM header.

- Full Range - Displays the full acquisition range of HU.
- Min-Max - Selects a Window/Level range that displays the image so that the full range of values in the data can be seen.
- W/L Preset Values - Select from up to five predefined W/L values, depending on the type of tissue being examined.
- Invert - Invert the HU values in the image.
- Reset - Restore the W/L to the original values from the DICOM header.

Keyboard Shortcuts for W/L Presets

W/L presets are accessed by typing the numbers 1 through 5 on either the keyboard or using the numpad.

Note: If you use the numpad, make sure that the Num Lock is enabled.

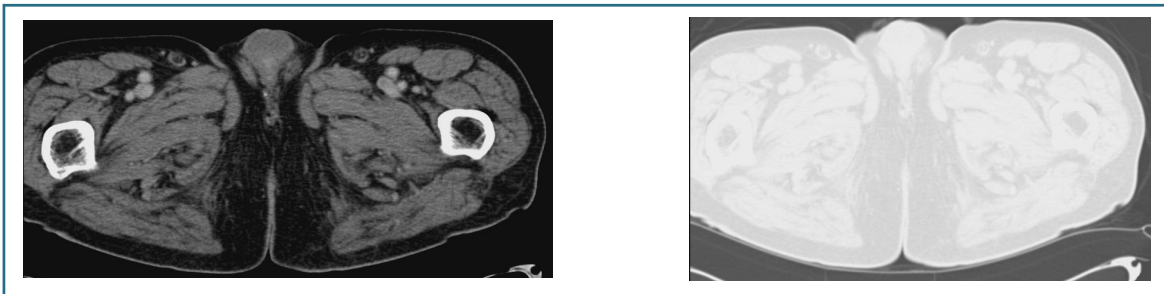
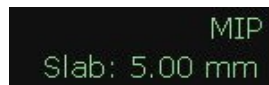


Figure 3-6 Example W/L Presets - Left: Preset 1 Right: Preset 4

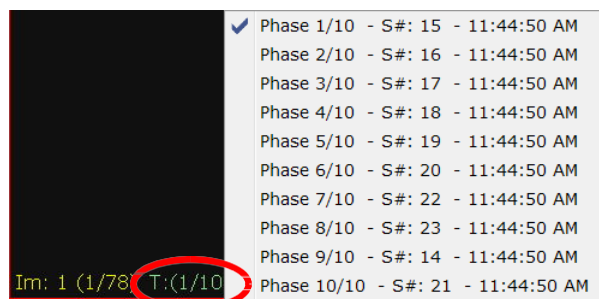
- **2D Image Format** - Display the image in one of three formats: the original format, MIP and ThickMPR.
 - Slab - When either MIP or ThickMPR is selected, the **Slab** annotation is displayed underneath. The default thickness is 5mm, but you can click on the annotation to change it. Select the desired slab thickness from the pulldown menu.



- **Phases (multiphase only)** - Select a different phase of a 4D image to display.

The Phase annotation appears in the form **T (a/ b)**, where (a) is the currently displayed phase, out of the total number of phases (b).

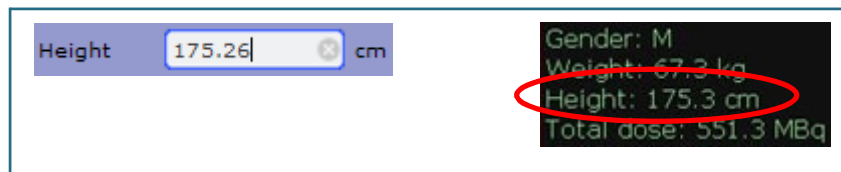
Select a different phase from the pulldown menu.



- SUV Parameters (PET only)** - When a PET series for which SUV parameters are available is loaded, the parameters are displayed as editable annotations. To change them, click on any of the parameters and select **Edit** from the popup menu (left image below). The **Edit** dialog is displayed (right).

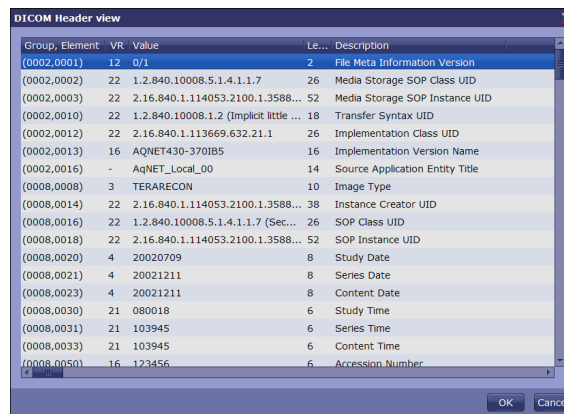


Update the desired parameter and click **OK**. The change is reflected in the annotation:



Right-Click Menu on Study Images

The contents of the right-click menu on images are different, depending on the modality of the study.



Function	Description
Capture	Capture the selected image.
Capture all	Capture all images currently displayed in the viewer, and place each image in a separate cell of the Output Panel.
Capture all in one	Capture all images currently displayed in the viewer, and place them all in a single cell of the Output Panel.
Window Level	Adjusts the brightness and contrast of the image.

Function	Description
Gamma	Adjusts the gamma-curve of the image.
Zoom	iEMV has two zoom options: <u>Original Size</u> - The image is displayed at 100% of the size of the DICOM data. <u>Fit to Screen</u> - The image is displayed to fit the screen
Orientation	This option is the same as the top bar tool icon. See " Orientation " on page 3-11 .
Overlays	Show/hide overlays on the image (see Show/Hide DICOM Overlays " Show/Hide DICOM Overlays " on page 3-19 for further description).
Show DICOM Header	Display a dialog showing all elements in the DICOM header of the current series. (See Figure 3-7 .)
Log off	Log out of iEMV.

Show/Hide DICOM Overlays

If the series contains DICOM Overlay files, the Overlays menu appears as a selection. Right-click on the image and select Overlays, then select Show overlays.

The following image shows an overlay used for dual energy scans. It is a circular outline that shows the FOV of the energy source that is not shown in the image.

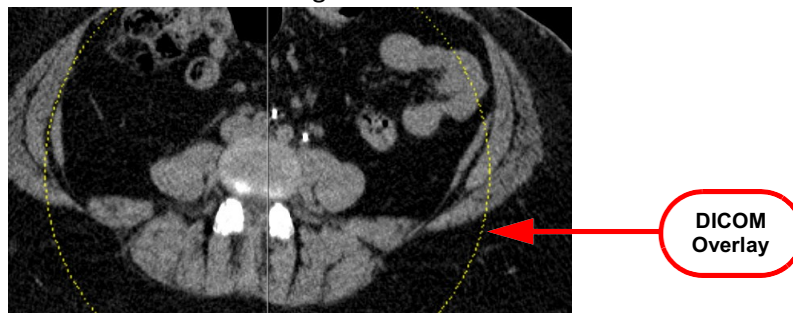


Figure 3-7 Showing DICOM Overlay

Performing Measurements

Topics in this section:

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Measurement Accuracy

Following error estimation was derived from the testing conducted under controlled conditions against a digital phantom. Please note that the error estimation does not account for image modality error.

Error from length measurements such as distance, line, circumference, and so forth, is within 3%. Error from the intensity measurements is less than one. Error from angle measurements is less than 1 degree. Error from area measurements is within 2%.

The following is a description of each type of measurement used in the Viewer.

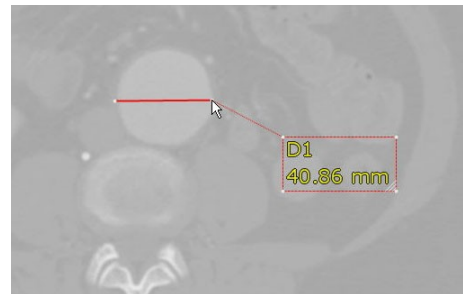
Note: Please be aware that measurement tools are supported for use with both DICOM and non-DICOM image files, as well as for modalities that do not include pixel spacing information in the DICOM header. When pixel spacing is not available, the measurement cannot calculate a physical distance. In that case, the results are displayed in pixel units, based on the resolution of the modality.

Distance

This feature calculates the distance of a line drawn on the image.

To draw a line, do the following:

1. Click on one edge of the area to be measured.
2. Drag the mouse across the area.
3. Release the mouse to finish drawing.

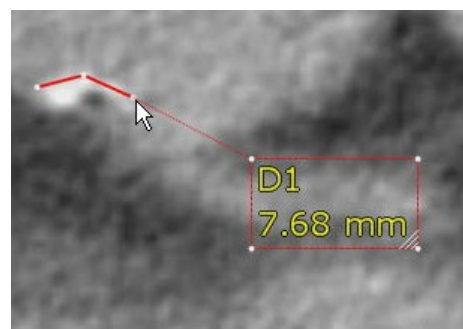


Line Segment

This measurement allows you to draw a series of connected line segments by clicking on the image, moving the mouse to another point on the image, and clicking again at a new point, repeating those actions as many times as required. The measurement given is the sum of the lengths of all connected segments in this measurement.

To place a **Line Segment** measuring tool onto an image, do the following:

1. Click on one edge of the area to be measured.
2. Move the mouse to the endpoint of that segment.
3. Click on that point to complete the line segment.



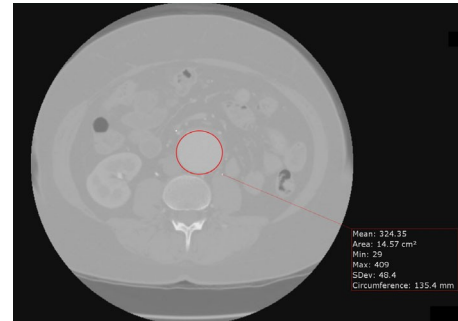
4. Repeat steps 1-3 to draw a new line segment, as many times as needed.
5. Double-click to finish drawing.

Ellipse

This feature calculates the average value within an area, defined by the ellipse drawn on the image (see the figure at right).

To draw an ellipse, do the following:

1. Click on one edge of the area to be measured.
2. Drag the mouse across the area to be measured.
3. Release the mouse to finish drawing.



Oblique Ellipse

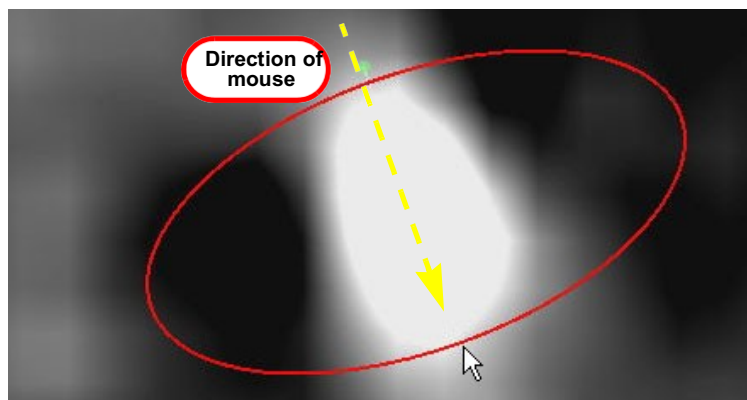


Note: Dashed-line arrows in the images used for this section are not part of the iEMV image. They have been added to show the direction of mouse movement on the screen.

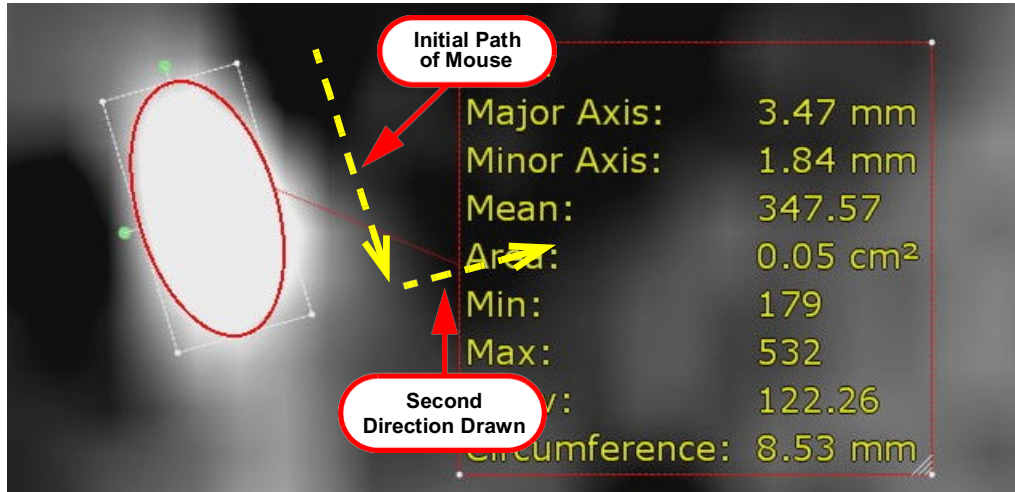
This feature calculates the area of the ROI, the maximum and minimum intensity values within the ROI, the mean intensity, the standard deviation, the lengths of the major and minor axes that define the ellipse, and the circumference of the ROI.

To draw an oblique ellipse, do the following:

1. Click on the edge of the area you are going to measure.
2. Release the mouse.
3. Move the mouse across the area to the opposite edge. An ellipse is drawn as you move the mouse.



4. Click the mouse when finished drawing the ellipse.
5. Move the mouse in a direction different from the line just drawn. The ellipse will expand in the perpendicular direction.



6. Click when done drawing the ellipse.

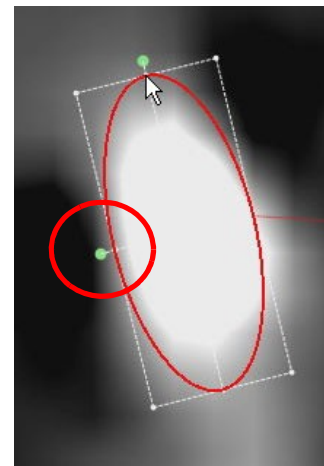
You can modify the ellipse after completing the initial drawing to get a more accurate measurement.

Resizing the Ellipse

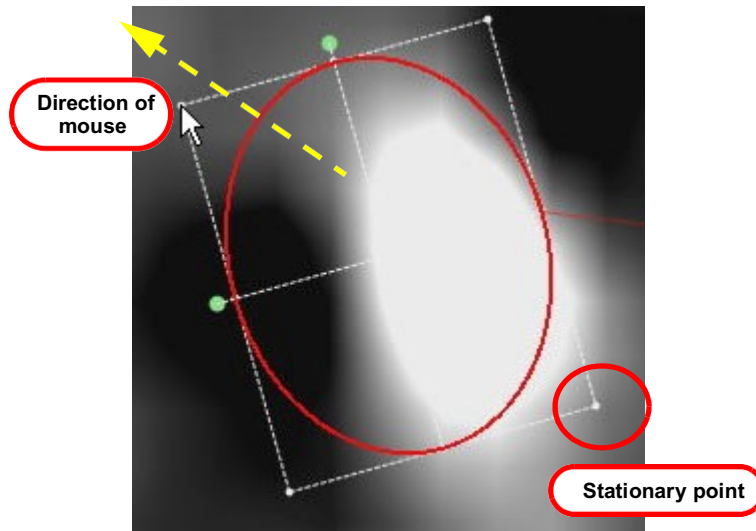
There are eight control points on the rectangular box that bounds the ellipse. When you hover the mouse over any of these control points, the cursor becomes a plus ('+') sign. These points allow you to resize and reshape the ellipse.

Four of the control points are on the midpoint of each side of the box that bounds the ellipse. Click on any of these control points to widen or narrow the ellipse (see image at right). The control point on the opposite side moves the same distance in the opposite direction, while the center point remains stationary.

The other four control points are located at each of the corners of the bounding box. These also allow you to resize the ellipse, but the control point that is diagonally opposite remains stationary, while all other points, including the center, move along with the corner being dragged.



Note: Do not click directly on the green dot to resize the ellipse. Click on the edge of the circle itself to resize the ellipse. The green dots are used for rotating the ellipse. Please see [Rotating the Ellipse](#) below.



Rotating the Ellipse

The green dots at the midpoint control points allow you to rotate the ellipse about the center. Click on any of these and move the mouse in a clockwise or counterclockwise direction.

Circle

1. Click the center of the ROI and move the mouse in any direction.
2. Click again when the region of interest is encircled.

To edit the circle, click anywhere along the circumference of the circle, and hold down the mouse. A diameter line is displayed on the circle, beginning at the click point. You can then move the mouse in any direction to modify the size. The opposite point of the diameter remains stable.

Polygon

Polygon allows you to draw an outline around a region of interest by clicking on the image, moving the mouse to another point on the image, and clicking again at a new point, repeating those actions as many times as required.

To measure the region of interest, do the following:

1. Click on one edge of the area to be measured.
2. Move the mouse to the endpoint of the segment.
3. Click on that point to complete the line segment.
4. Repeat steps 1-3 to draw a new segment of the polygon, as many times as needed.
5. Double-click to finish drawing. The software connects the final point to the initial point to form a closed area.

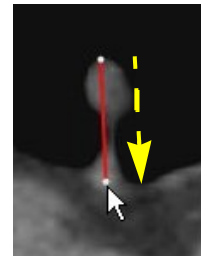
To edit the polygon, click a dot (endpoint) of any of the line segments, and drag the dot to the desired location.

Note: Clicking and dragging on the polygon, but not on an endpoint, will move the entire polygon.

TT-TG Distance Measurement

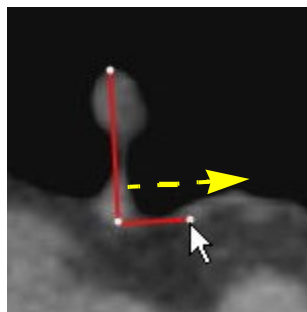
Note: The yellow dashed-line arrows in the images used for this section are not part of the iEMV image. They have been added to show the direction of mouse movement on the screen.

6. Click one end of the distance to be measured, and move the mouse to the other end of the distance being measured.
7. Click the endpoint of the line. This line is called the baseline (see image at right).

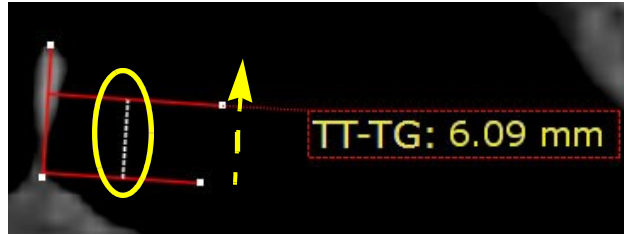


Note: The initial measurement can be approximate, because the measurement can be edited later.

8. Move the mouse away from the baseline. A line perpendicular to the baseline is displayed automatically. See the following image.



9. Position the perpendicular line at one end of the distance to be measured. Click once when done.
10. Move the mouse again. A third line, parallel to the second, is displayed. In addition, a dotted line is displayed (circled in green in the following image), connecting the two parallel lines.



11. You can move the second parallel line anywhere along the baseline. As it is moved, dotted line increases or decreases in length, and the numerical measurement result changes to reflect the distance between the two parallel lines.
12. Position the third line at the other end of the distance. Click once when done. The measurement result is displayed on the screen:

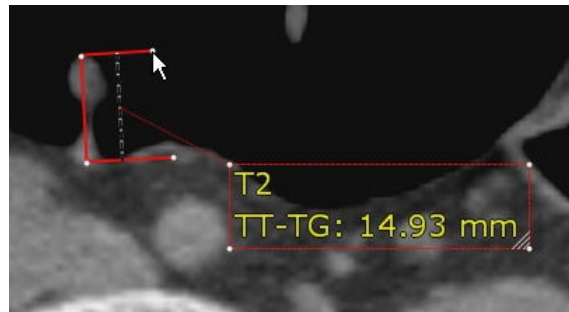
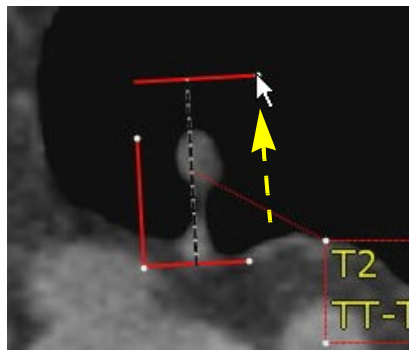
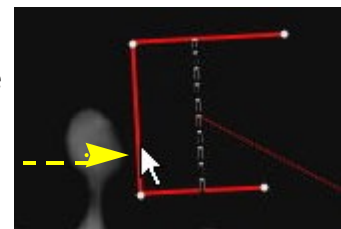


Figure 3-8: Completed TT-TG Measurement

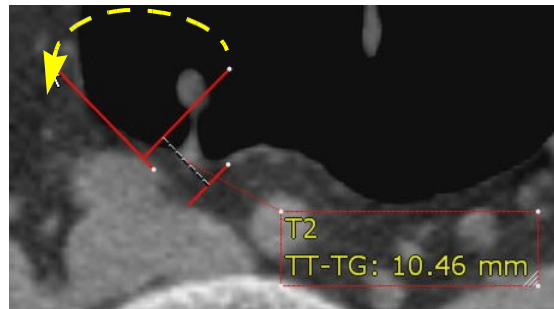
Editing the TT-TG Distance Measurement

Moving the TT-TG Measurement: To move the measurement, click on the baseline or on either of the two perpendicular lines. You can then move the measurement to any other place on the screen. Release the mouse when done.

Changing the TT-TG Measurement Distance: To change the measurement distance, click on the endpoint of one of the parallel lines. You can move the parallel line so that it increases or decreases the distance. The dotted line increases and decreases with the movement of the parallel line, and the numerical value also changes accordingly.



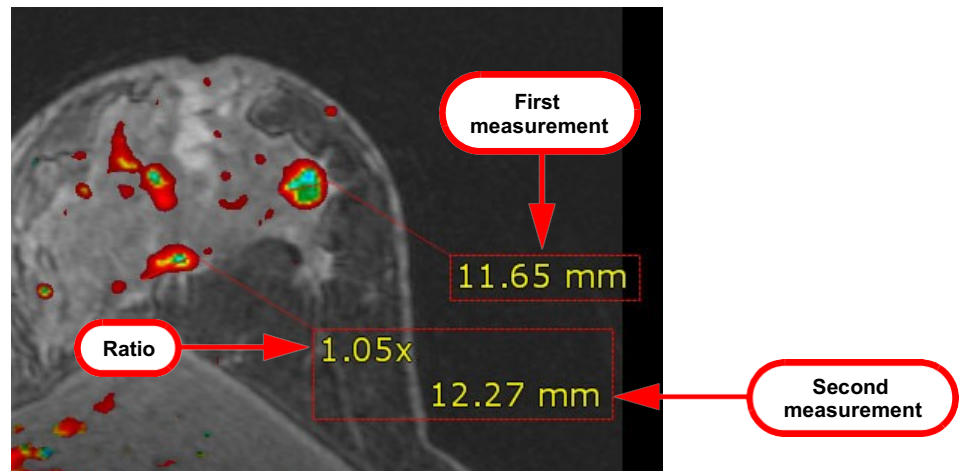
Rotating the TT-TG Measurement: To rotate the measurement, click on one of the endpoints of the baseline. Drag the mouse in the direction of rotation. The dotted line is rotated. The distance changes as it is rotated.



Note: You might need to readjust the start or end of the measurement, or move the entire measurement, after rotation. The baseline need not be the same length as the measurement result.

Ratio

This measurement calculates a ratio between two or more distance measurements and the first, or baseline measurement.



1. Obtain a distance measurement. This measurement will serve as a baseline.
2. Obtain a second distance measurement. The result will display the ratio of the new measurement to the first.
3. You can continue to perform distance measurements on the image. Each new measurement result will display the ratio between the new measurement and the original.

4. Double-click to finish.

Pelvis Swing

Pelvis swing measures the difference between the height of one hip and the other.

1. Open a pelvic study and select **Pelvis Swing**.
2. Click the highest point on the femoral head of one hip. A horizontal line is displayed on the image that passes through that high point.
3. Click the highest point on the femoral head of the other hip. A similar horizontal line is displayed on that point.

The vertical distance between these two parallel lines, shown on the image, shows the amount of pelvis swing. See [Figure 3-9 on page 3-28](#).

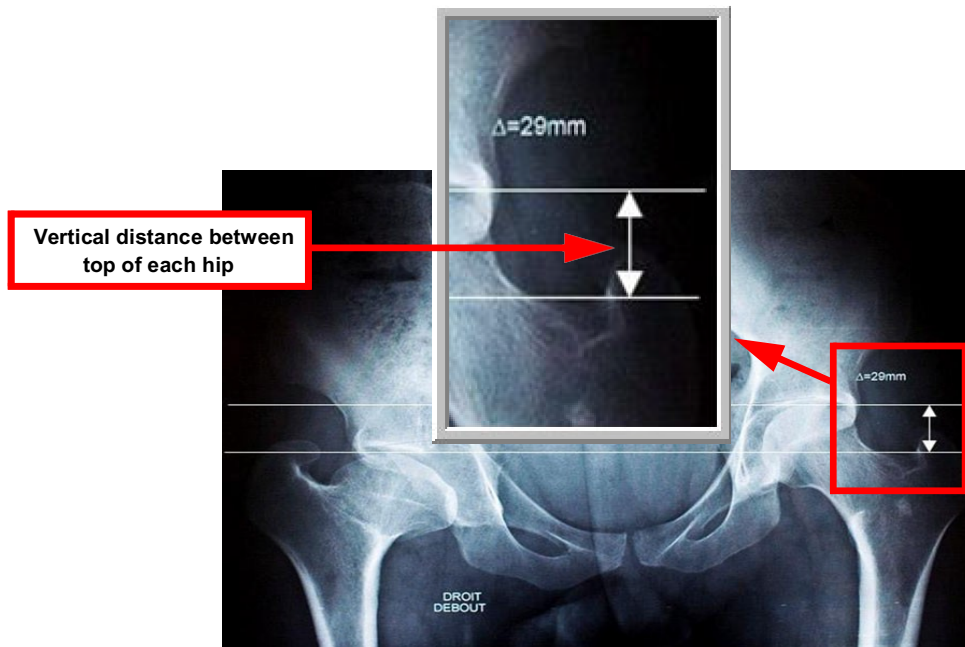
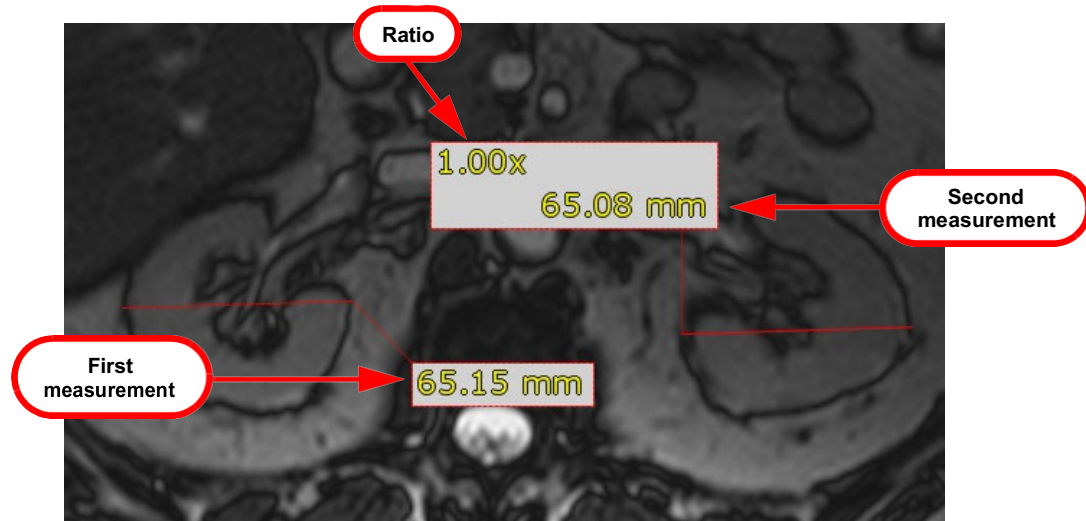


Figure 3-9: Pelvis Swing Measurement

Parallel Ratio

This is used to measure a ration at a set vertical position, all measurement distances drawn on the image are aligned to be parallel.



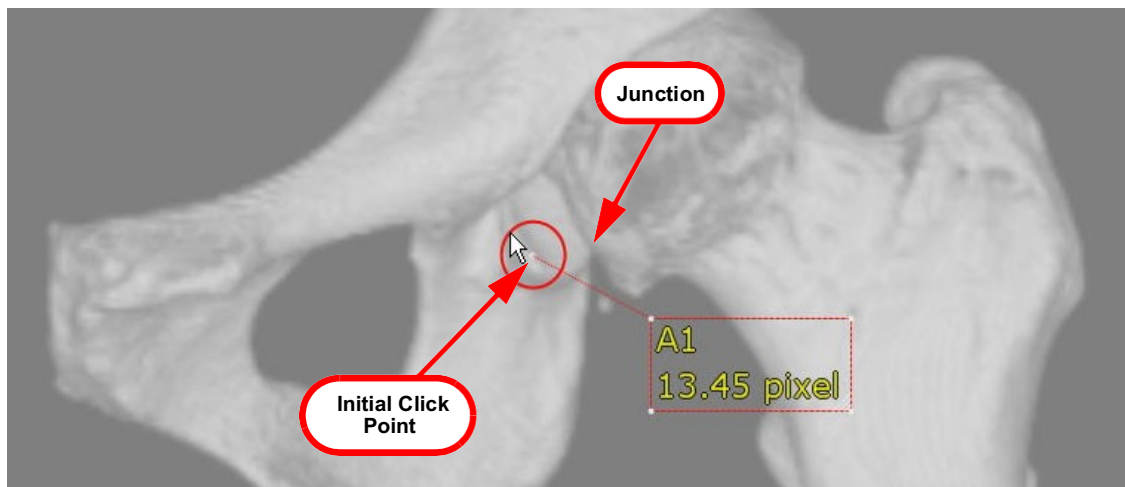
Center Angle



The center angle measurement tool calculates the degree of the angle between two lines, using the center of a circle as the vertex of the angle.

To measure an angle using the Center Angle tool, do the following:

1. Click on the image *near*, but not directly on, the junction of the two sides of the angle to be measured.



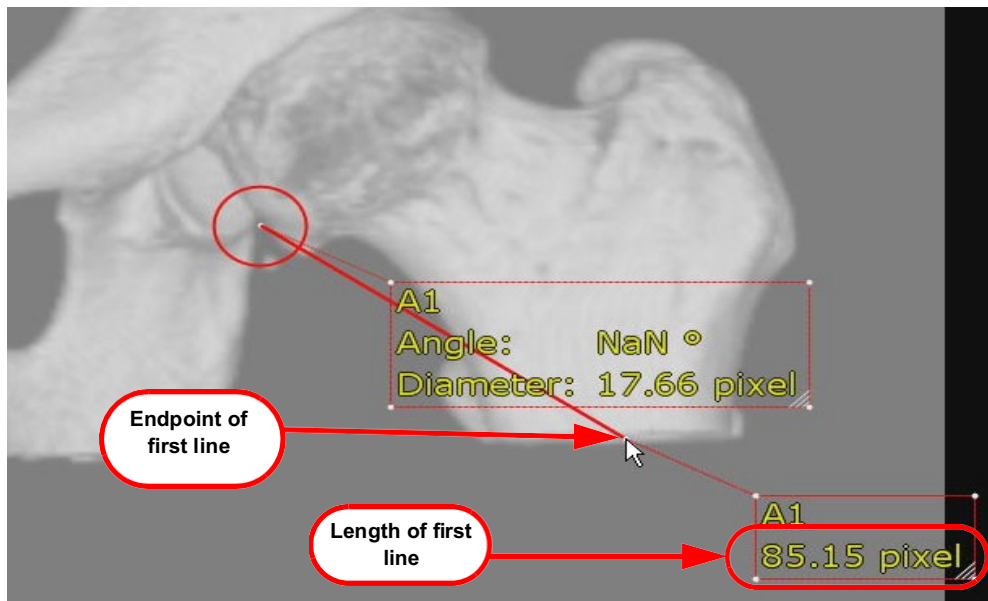
2. Move the cursor toward the junction. The circle will grow larger as you move away from the initial click point. At the same time, the center point will follow behind the cursor as you move it.
3. When the center of the circle is directly on the junction in the image, click once to stop drawing the circle.

The following image shows the center of the circle on the junction of the angle, just before it is clicked:



- 4. Draw a line to the endpoint of one side of the angle. Click on the endpoint.

In the following image, the cursor is over the endpoint of the first line of the angle:



- 5. Draw a line to the endpoint of the other side of the angle, and click on the endpoint.
The measurement result is displayed:

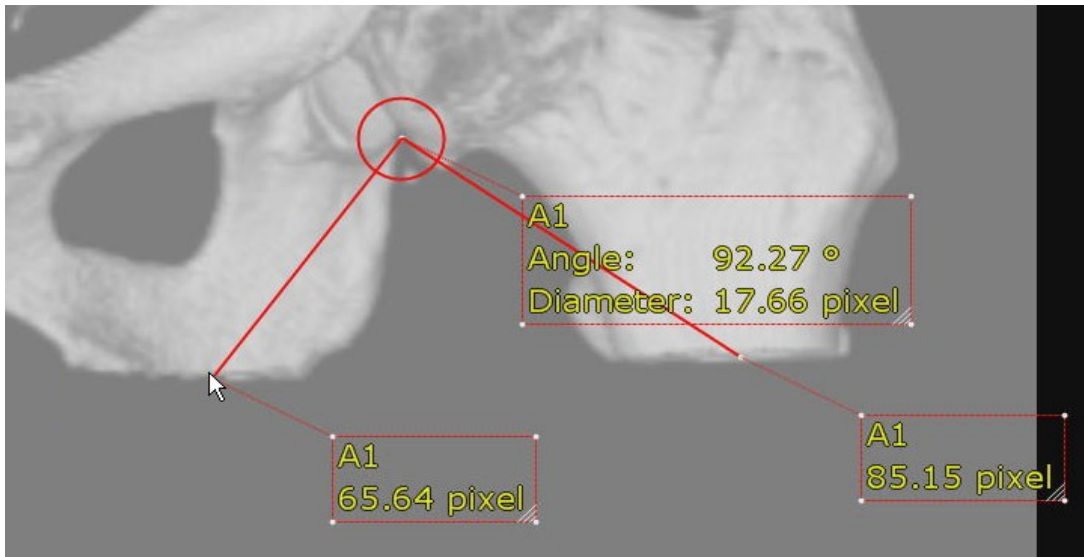


Figure 3-10: Final Measurement Result

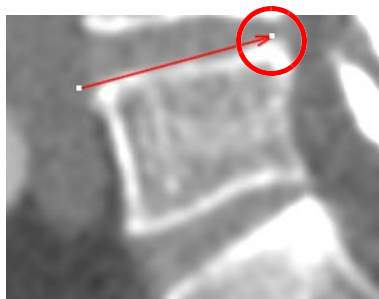
Cobb Angle

A Cobb angle provides the angle between two unconnected lines. The following example shows how to measure the angle of curvature between two vertebrae.

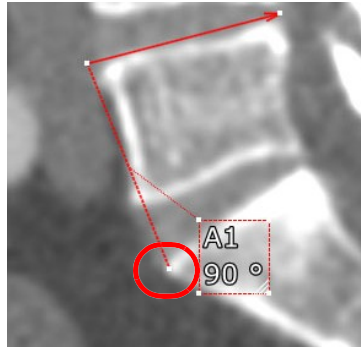
Note: If your version of iEMV does not have the Cobb Angle tool option, you can still measure a Cobb angle by using the Angle tool.

Click the image on the following four points:

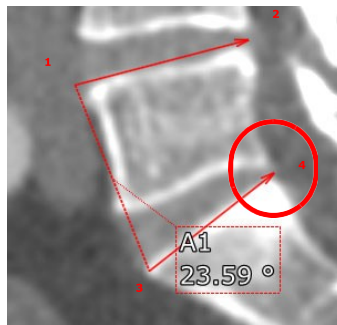
1. The start point of the first edge
2. The end point of the first edge:



3. The start point of the second edge:



4. The end point of the second edge:



Alternate Method

You can also measure a Cobb angle by clicking and dragging the mouse from the start point of the first edge to the end point. Release the mouse after drawing the edge of the first vertebra. Then click on the start point of the second vertebra and drag the mouse to the end point.

Angle

The angle measurement tool displays the degree of the angle between two lines drawn on an image.

To measure an angle, do the following:

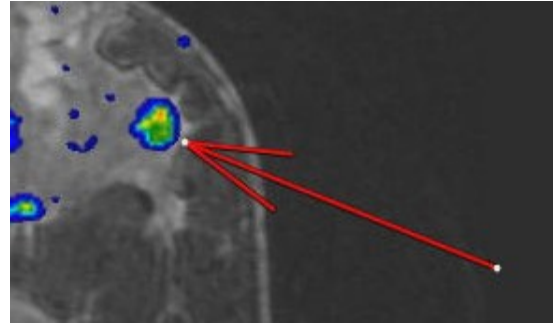
1. Click on the endpoint of the first line.
2. Move the mouse to the vertex point of the angle and click that point to complete the first line.
3. Move the mouse to the endpoint of the second line and click to complete the second line.



Arrows and Text

To add an arrow to an image:

1. Select **Arrow** from the menu.
2. Click on the spot that you want the arrow to point to. The arrow is always drawn from the pointing end.
3. Drag the mouse away from the initial spot.
4. Release the mouse when the arrow has the desired length.



To add text:

1. Select **Text** from the menu.
2. Click on the spot where you want to place the text. The following dialog is opened:

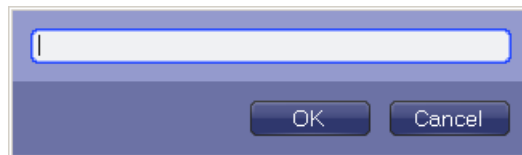
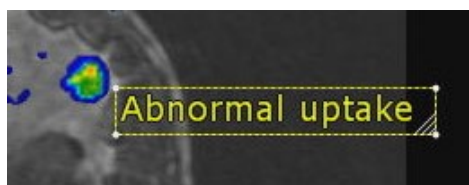


Figure 3-11: Add Text Dialog

3. Type in the desired text and click **OK**.

The text is shown inside a box whose upper-left corner touches the spot you clicked on (see the following image).

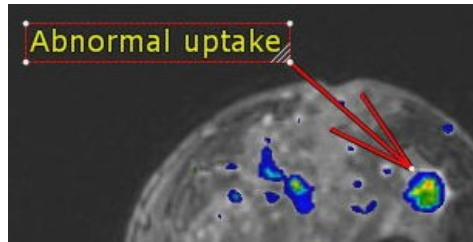


To add an arrow and text in one step:

1. Select **Arrow + Text** from the menu.
2. Click on the spot that you want the arrow to point to. The arrow is drawn from the pointing end.
3. Drag the mouse away from the initial spot.
4. Release the mouse when the arrow has the desired length. The **Add Text Dialog** (see [Figure 3-11](#)) is opened.

5. Type in the desired text and click **OK**.

The text is shown inside a box whose closest corner touches the endpoint of the arrow.



Pen

This is a freehand drawing tool that allows you to draw any shape on an image.

Note: This feature allows you to freehand draw on the image. It does not calculate any measurement, and is used for collaboration. See ["Collaboration" on page 3-38](#) for more details.

1. Click on the image near the area to be identified, and hold the left mouse button down.
2. Draw any shape on the image; for example, draw a circle around the area to be identified.
3. Release the mouse button when you are finished.

Pen drawing is automatically run in continuous mode, meaning that even after you are done drawing, the mouse is still in pen mode, and will begin drawing if you click the mouse button again.

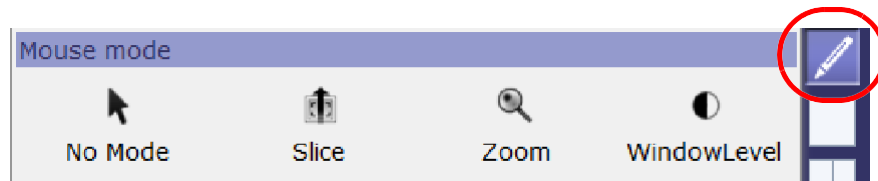


Figure 3-12: Pen Tool Selected

The following figure shows images with hand-drawn shape added using the Pen tool:

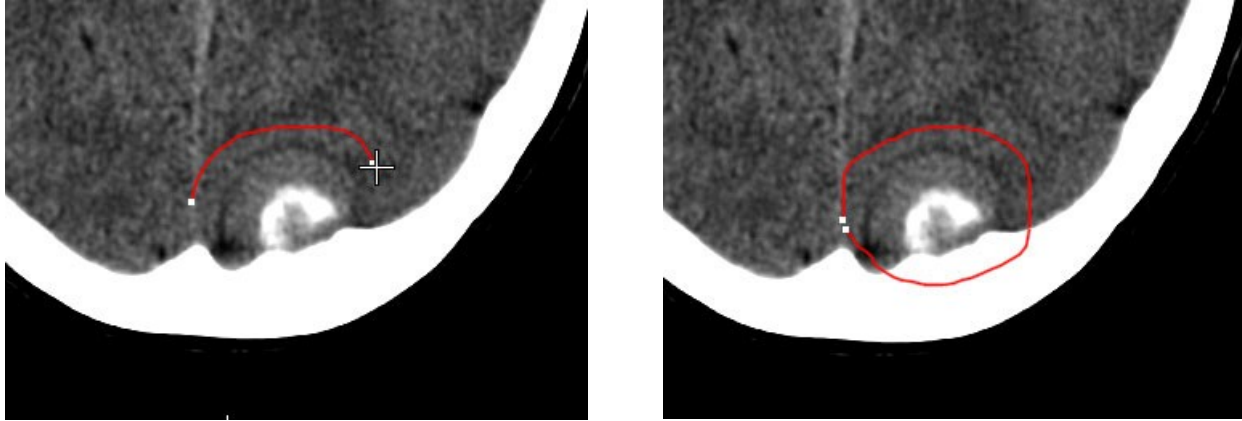


Figure 3-13: Freehand Drawing in Pen Mode (clockwise direction)
Left: In Progress; Right: Completed

Intensity

The Intensity measurement shows the brightness of the pixels inside the ROI. CR, CT, MR, US, and XA modalities are all supported.

Mirror Measurements

These measurements allow you to draw an ROI on an image, while a mirror image of the ROI is automatically drawn on the reflection area. To designate where the reflection will be drawn, you first must draw a line on the image that will serve as the “mirror,” around which the two ROIs will reflect each other. This line can be drawn anywhere on an image.

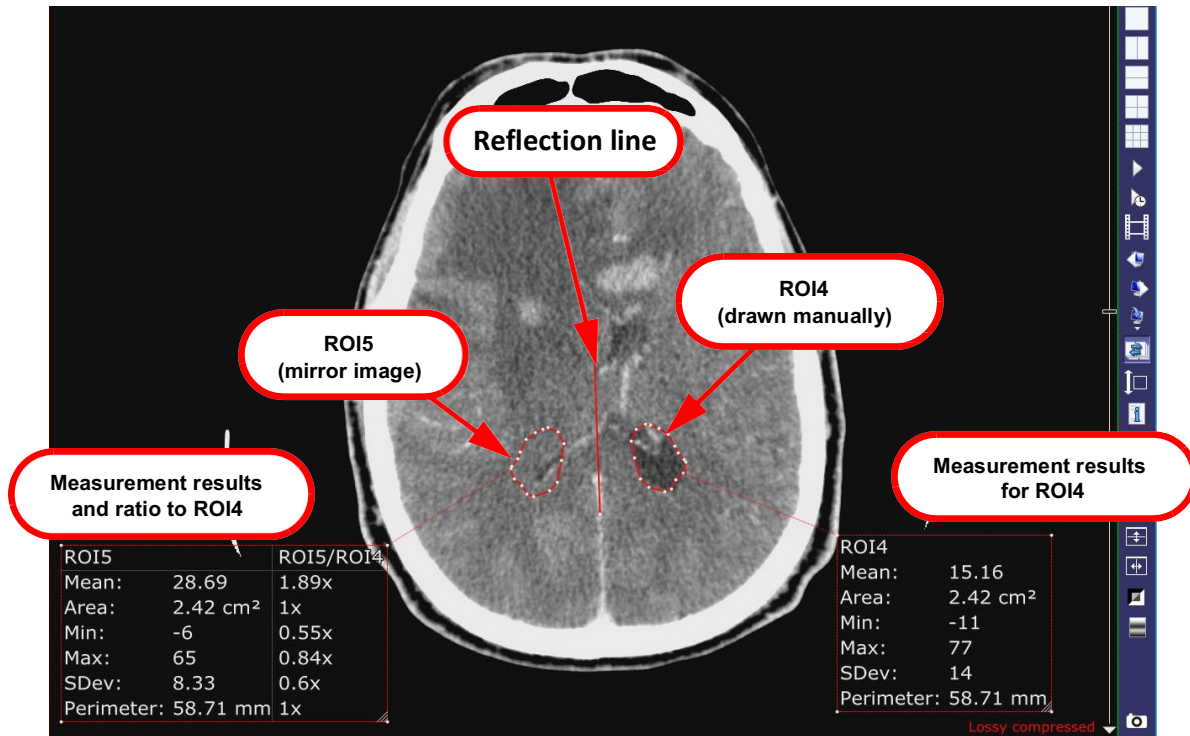
There are three mirror measurement tools: **Mirror Circle**, **Mirror Polygon** and **Mirror Ellipse**. These ROIs are drawn in the same way as the Circle, Polygon and Ellipse measurements.

1. Draw a line on the image to establish the center of the reflection.
2. Using one of the three mirror measurement tools, begin drawing an ROI on one side of the line. As you draw, you will see a reflection of the ROI being drawn on the other side of the line.

When the measurement is complete, two boxes containing results are displayed, one for each ROI.

Note: In the example image below, the manually drawn ROI is labeled as “ROI4” and the reflection is “ROI5.”

The dimensions, area and perimeter are identical for each, but the intensity measurements vary, depending on differences in the tissue enclosed in each ROI. Results for ROI5 also show the ratio of each value to the same value in ROI4.



Time-Intensity Measurement

Note: The Time-Intensity Measurement feature is optional and requires a separate license.

There are four kinds of time-intensity measurements: point, ellipse, circle, and polygon. These objects are drawn in the same way as described above.

The following two images show the time-intensity point (left) and time-intensity ellipse (right).

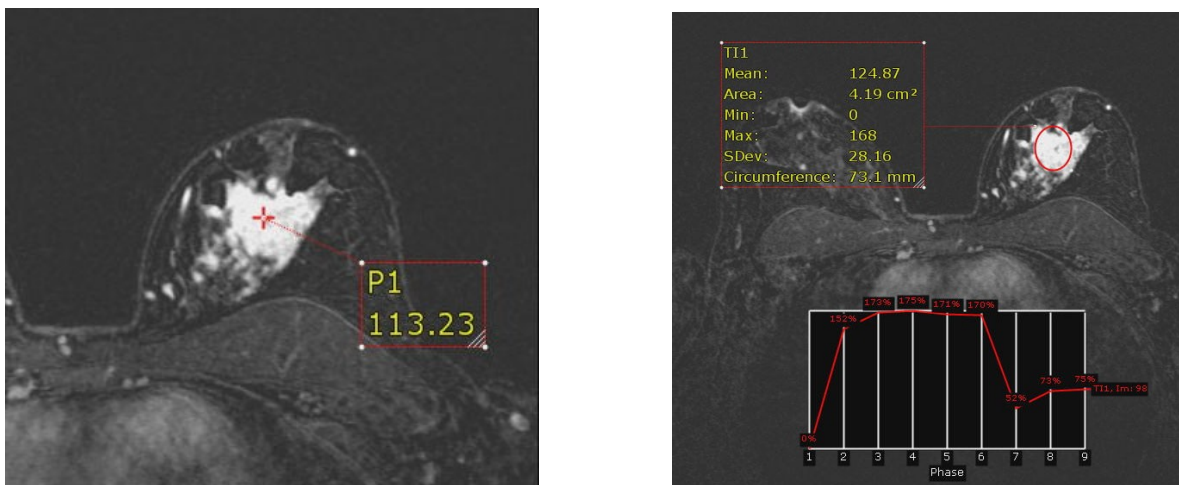


Figure 3-14: Time-Intensity Measurement Results and Graphs

If the number of phases plotted in the graph is below 20, the graph is displayed as in [Figure 3-14](#). For time-intensity measurements having 20 or more phases, only the current phase and value is displayed.

Calibration

Calibration is required when the study data does not contain pixel spacing. To calibrate the data, draw a line along a known distance. Measurements are then based on the calibrated scale, giving more accurate results.

Note: If the study data does not contain pixel spacing, you must perform calibration prior to using measurements.

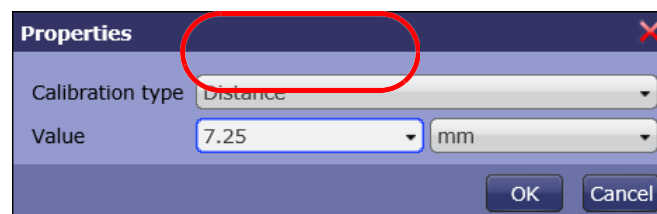
1. Right-click on the image to be calibrated.
2. Click on the calibration icon.



3. Drag the mouse to draw a line.



4. When you release the mouse, the **Properties** dialog opens. Enter the known value of the length.




Note: Make sure the units are correct for the value.

5. Click **OK**. The next time you measure a distance, the measurement is calibrated, based on the value entered here.

Collaboration

There are two ways to begin a collaboration session:

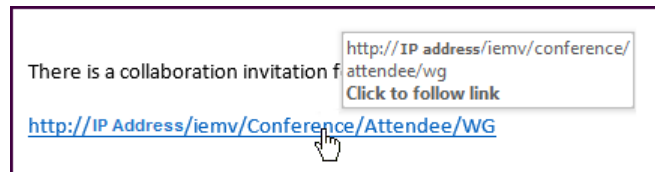
- Right-click on the image and select **Host Collaboration**.
- Click the **Host Collaboration** icon. 

An email is automatically generated, which contains a link to the study on the same server you are connected to. You will need to address the email, and optionally, you can add any information needed in the body of the email.

Note: Do not delete the link. The recipient needs it in order to connect to the session.

Attendee Participation

When an attendee receives the email, they can connect to the server by clicking the link. iEMV is launched in the attendee's default browser.



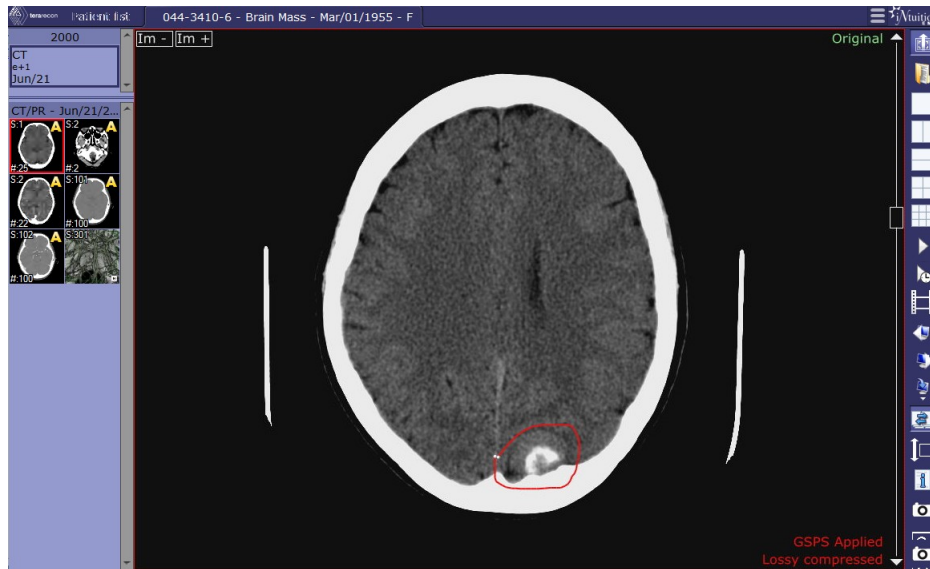


Figure 3-15: iEMV Host

Controlling the Session

When iEMV is started on your device in collaboration mode, it is hosting the collaboration. This means that initially, you are in control of what attendees will see in their browsers. iEMV tools are shown along the right edge of the browser. When you make a change, the attendees will see the change on their screens.

An attendee can assume control of the session by clicking the collaboration icon. The toolbar items are enabled in that attendee's monitor, and the Pen tool is automatically selected.

Note: The host of a collaboration session is not the same as the controller. Control of collaboration sessions can go back and forth many times among all the attendees and the host. The person who initiates the session is always the host. The host has access to the Patient List, and has the ability to load different studies.

If an attendee assumes control, you are no longer the current controller. The toolbar disappears from the screen. You can regain control of the session by clicking the collaboration icon.

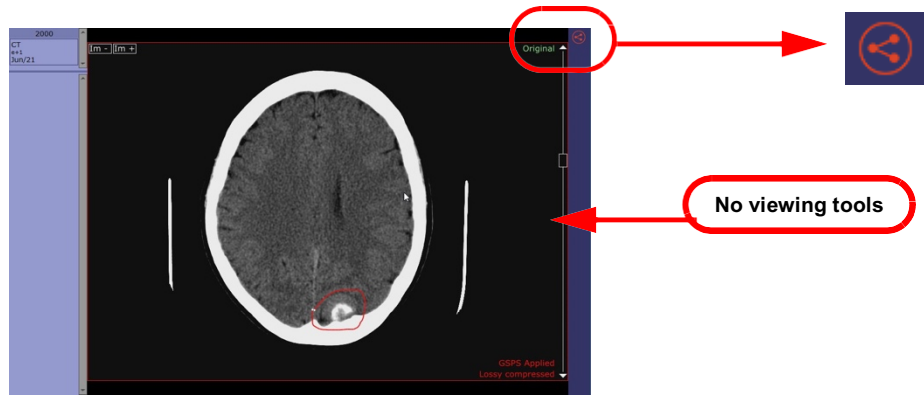


Figure 3-16: Not Controlling the Collaboration

Loading another Study

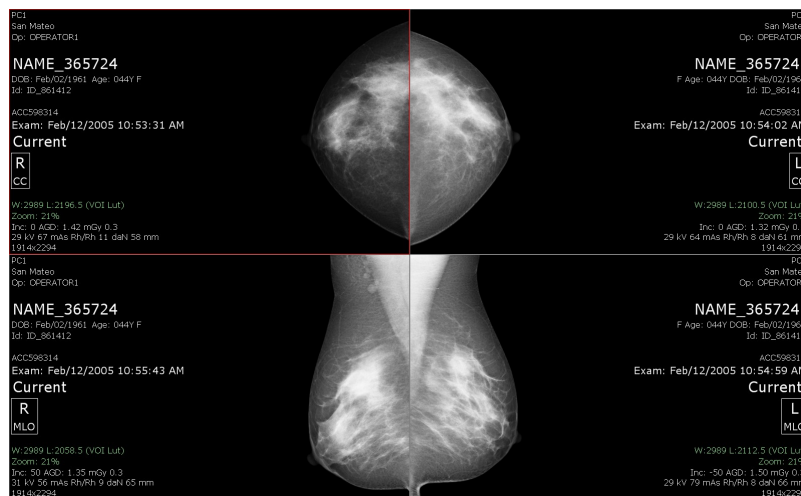
As the host, you can load another study even when you are not in control of the session. Click the **Patient List** icon to show the Patient List, and then load a new study in the same way you do normally.

When a new study is loaded, the same study is also loaded in each attendee’s iEMV client. In addition, the timeline thumbnail are refreshed to show the timeline of the newly loaded study.

Viewing Mammographic Data

iEMV supports all DICOM format images, including Mammographic data.

Warning: Interpretation of mammographic images is supported only when the software is used without compression and with an FDA-approved display device.



Parametric Map

Note: The Parametric Map feature is available only if you have purchased Advanced Processing (APS). Parametric Map is optional and requires a separate license. Also note, this icon is not shown unless a study containing Parametric Map data is loaded.

Parametric Map is a color-coded visualization of the change in intensity over time. To analyze the time-density curve, two thresholds are used in the Parametric Map module. One is the uptake value, which describes how fast the intensity changes between the pre-contrast and peak phases (also known as the initial, or wash-in phase). Each pixel in the image has an uptake threshold that indicates by what percentage that pixel's intensity increased between the two phases. In comparing the pixel intensities of the pre and the peak phases, it is usually the case (depending on the scanning protocol, scanner, and contrast media used), that areas with wash-in below 40-60% can be ignored. This threshold is set using the Uptake bar.

The second map shows the speed of the contrast washing out, also called the delayed phase. Each pixel is compared between the peak and post phases, to derive the difference in intensity for that pixel. There are three possible results:

- Type I: The pixel intensity has increased gradually.
- Type II: The pixel intensity has not changed.
- Type III: The pixel intensity has decreased gradually.

Each of these three types is represented by a different color. By default, Type I is represented by blue, Type III by red, and Type II by the rainbow in the middle. There is no official standard that defines the percentage borders between each of the 3 types. By default, the border between Type I and Type II is set to 20% in iEMV. This means that an increase in contrast of 20% or more is shown with the blue overlay, a decrease of 20% or more is shown with red, and values in between use the rainbow overlay. These borders can be changed, as can the colors themselves.

To see the parametric map, click the **Parametric Map** icon. The uptake bar (on the left) and color bar (at right) are displayed on the image. These determine the colors used to show the changes in intensity during the delayed phase:

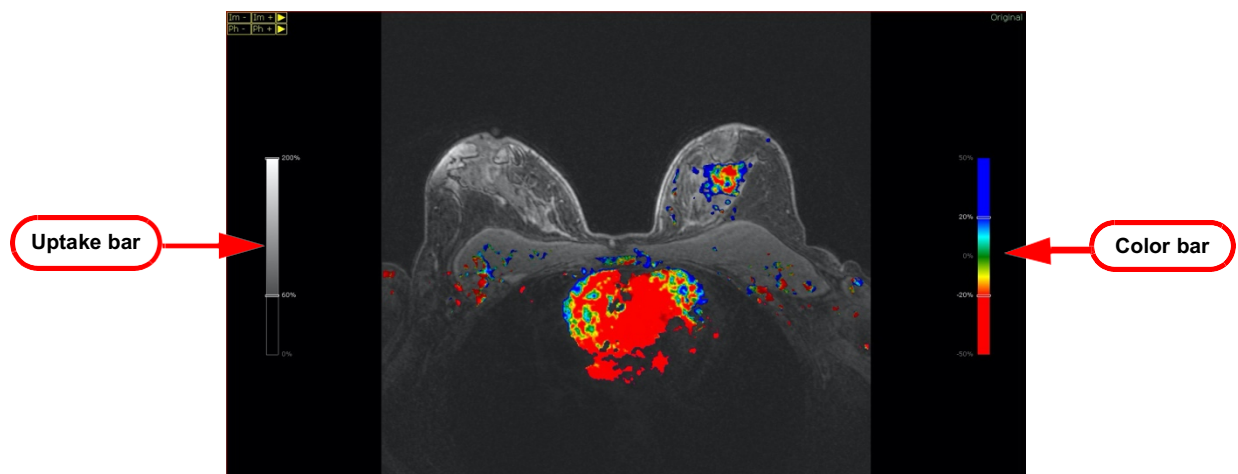


Figure 3-17: Parametric Map

The Color Bar

The color bar shown in [Figure 3-17](#) controls the color map of the delayed phase. There are three color areas, one for each type of change. Between each pair of adjacent colors is a slider that allows you to change the percentage border for both colors.

To change the percentage border between two colors, click and drag the slider up or down (see). For example, to lower the threshold between the Type I and Type II colors, drag the upper slider downward. As this threshold is lowered, the amount of the Type I color will be increased on the image.

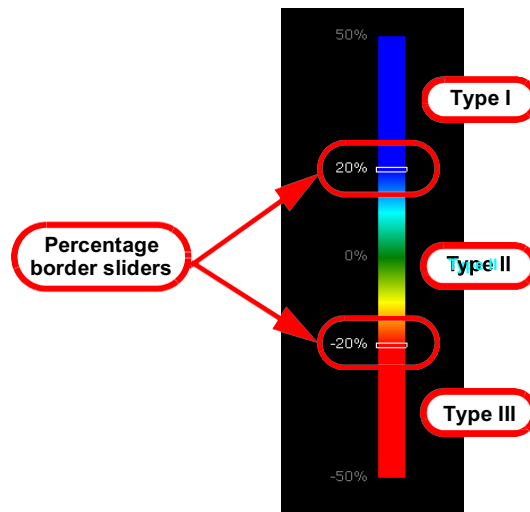


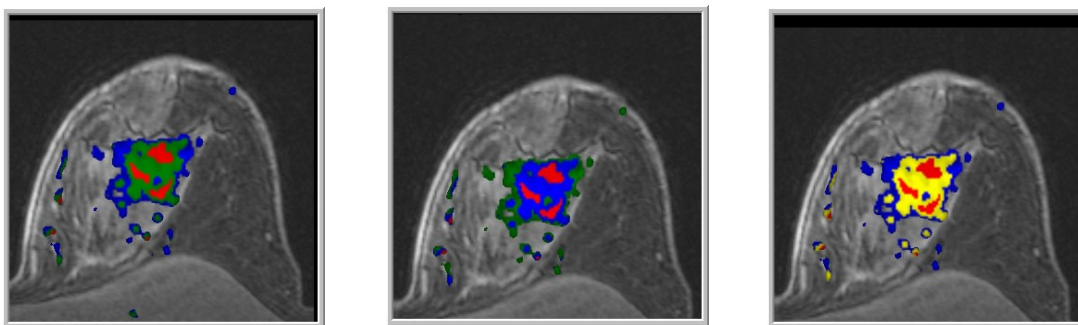
Figure 3-18: Color Bar

To change the colors used for the delayed phase, do the following:

1. Click the color bar. A menu is opened, as shown in the figure at right.
2. The alternate color maps are shown under the Rainbow color map. Click a different color map to select it.



The following images show (from left to right) how the Red/Green/Blue, Red/Blue/Green and Red/Yellow/Blue color maps highlight different uptake rates:

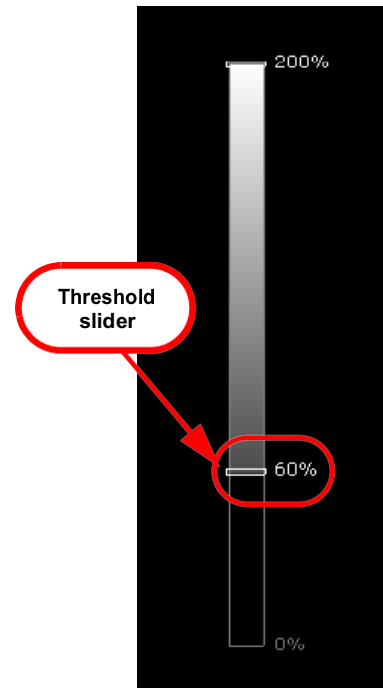


The Uptake Bar

The Uptake bar allows you to control how much color overlay to show on the image.

Drag the threshold slider up and down to increase or decrease the percentage threshold at which color is shown on the image. Any pixel whose percentage change is below the threshold will not show any color.

A lower threshold allows more color to be displayed. This makes it less likely that diseased tissue will be missed, but there will also be more noise on the image. The Uptake bar allows you to try different percentages until the amount of color suits your needs.



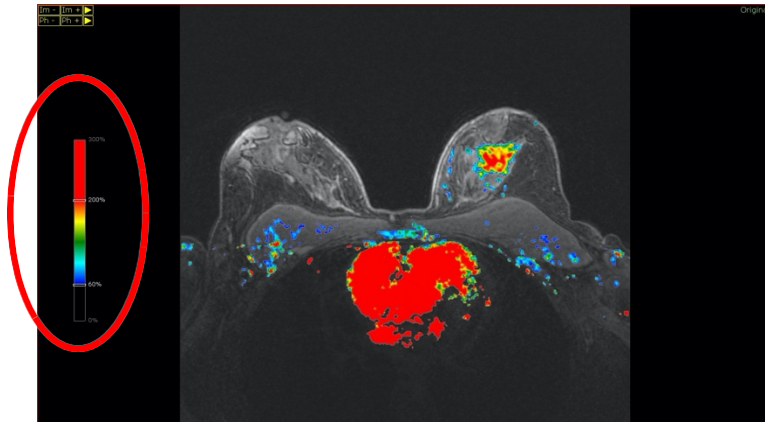
The Initial Phase

Bar



To access the initial phase bar, click the color bar to display the menu. Then click **Initial Rainbow**, at the top of the menu (see image at right).

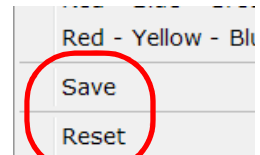
The Initial Phase bar is then displayed on the left side of the viewer. The color map for the initial phase is displayed on the image, as shown below:



You can use the sliders to change the borders between the colors, as described in ["The Color Bar" on page 3-42](#). However, no other colors are available for the initial phase. Note that the percentage ranges on this bar are different from those on the delayed phase color bar.

Save and Reset

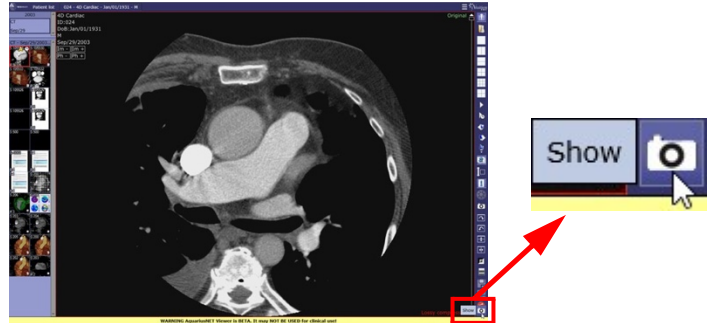
Select **Save** to make the current color map the default map for future studies. If you change the colors or the borders between colors in the color map and then save it, the saved color scheme is used by default the next time a study containing Parametric Map APS data is loaded.



Select **Reset** to restore the original default color map (Delayed Rainbow).

Chapter 4 Output

When images are captured, they are stored temporarily in the Output Panel. To view the Output Panel, click the camera icon in the bottom-right corner of the Intuition™ EMV (iEMV) Viewer:



Note: Do not confuse this icon with the camera icon further up on the right side of the screen. When you hover over that one, the tool tip says **Capture**. This one says **Show**.

The Output Panel is opened. ([Figure 4-1](#))

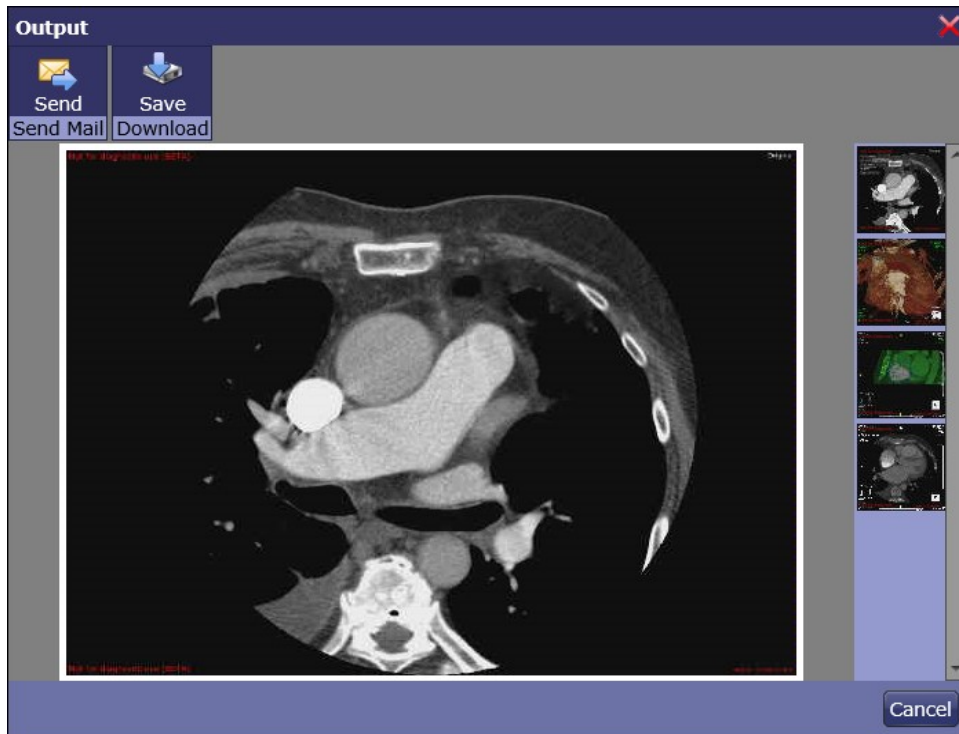
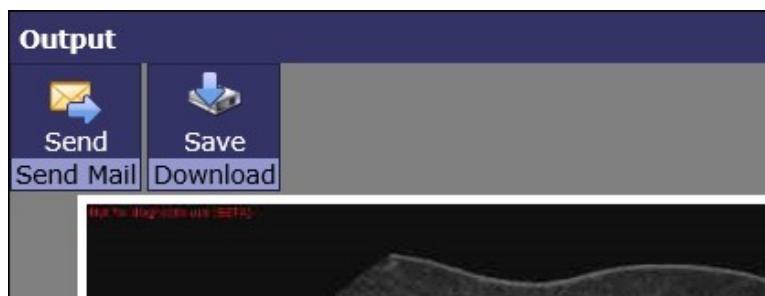


Figure 4-1: The Output Panel

Download and Save

Save a series or image on your local hard disk.

To save an image, click the image and then click **Save**. A Windows navigation dialog is opened so you can specify where to save the file. A zipped folder is created in that location and is given a filename consisting of the date and time. The file itself is saved in JPEG format and is numbered sequentially.



Closing the Output Panel

To close the Output Panel window, click the 'X' box in the upper-right corner, or click the **Cancel** icon.

Note: Images are automatically deleted from the Output Panel when a different study is loaded.

Chapter 5 The Contrast Tool

Topics in this chapter:

- Opening the Contrast Tool..... 5-1
- Adding, Editing and Deleting Profiles.....5-3
- Testing the Current Environment Using a Profile5-5

The Contrast Tool allows you to create and save display profiles to best display the application in various lighting conditions.

Opening the Contrast Tool

To access the tool, you need to log in to the Intuition Server.

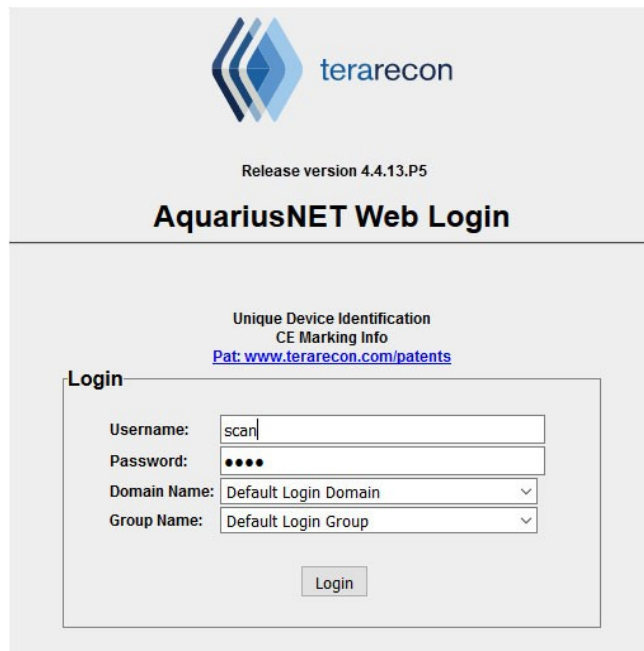
1. Enter the following URL in your web browser:

`https://<hostname>/Login.aspx`

Where *hostname* is the name or IP address of the Intuition Server you are connected to through iEMV.

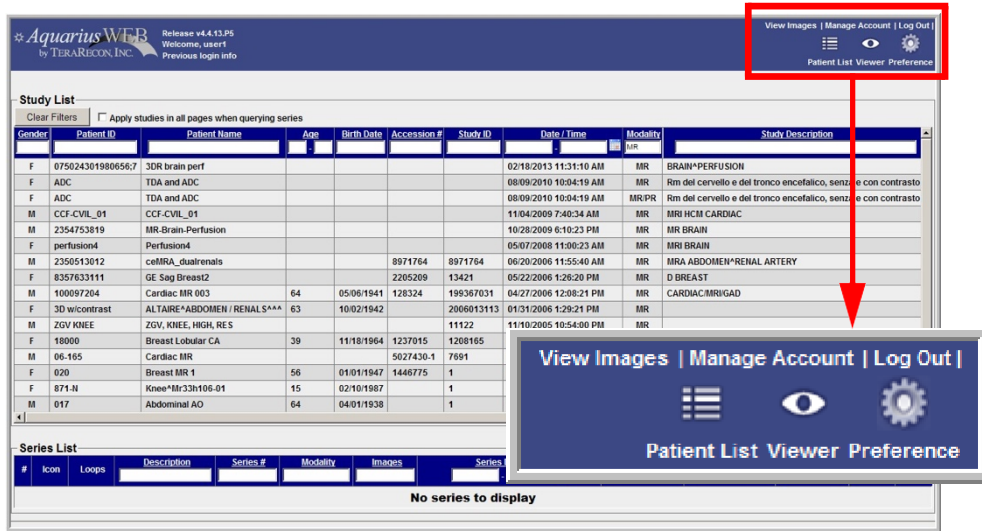
When you are connected to the server, you might see an error message saying that there is a problem with the web site's security certificate. For more information about this message, see "[Internet Security](#)" on page 1-1.

The following login page is displayed:



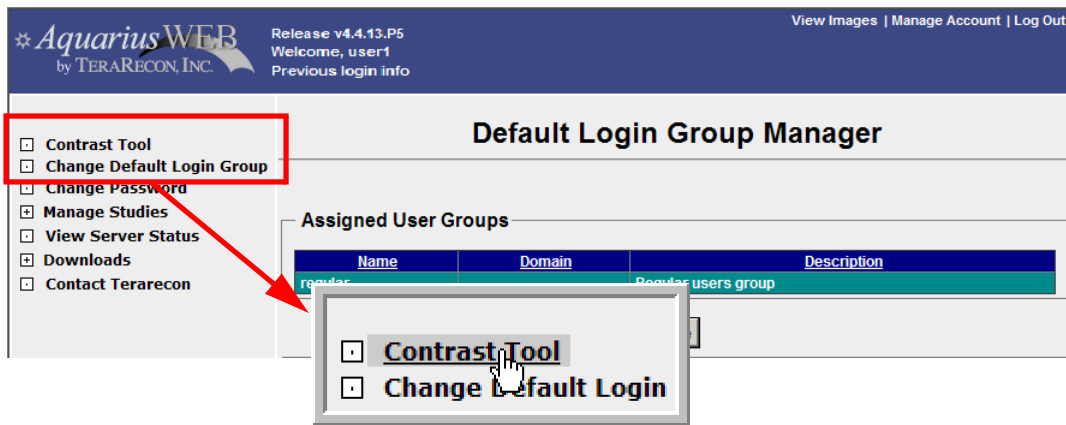
2. Enter your username and password.

The Intuition Server Welcome Page is displayed:



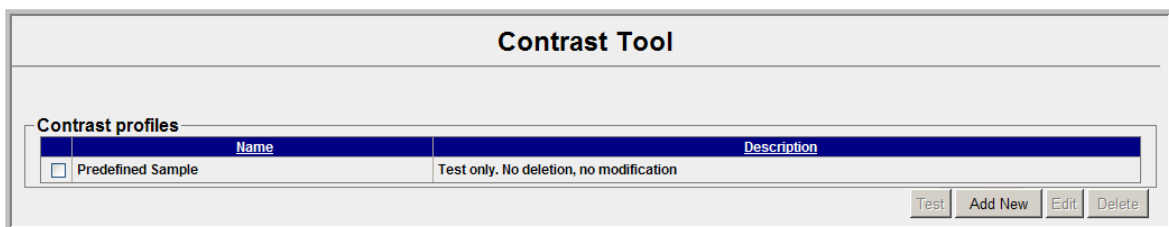
3. In the upper-right corner of the Welcome Page, click the **Manage Account** link.

The account management page is opened:



4. Click the **Contrast Tool** link in the navigation panel on the left.

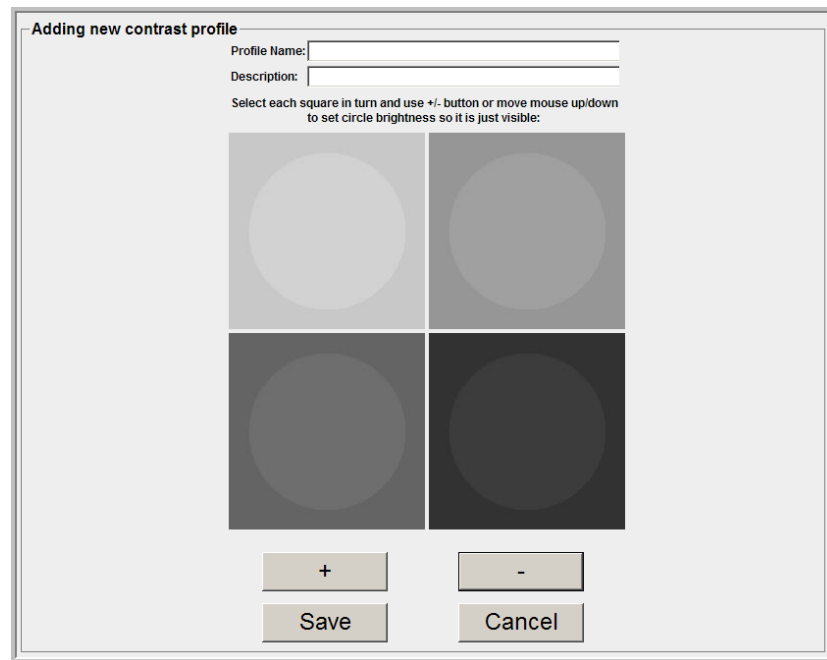
The Contrast Tool is opened:



Adding, Editing and Deleting Profiles

Adding a New Profile

To add a new contrast profile, click the **Add New** icon. The following information is displayed in the main screen:

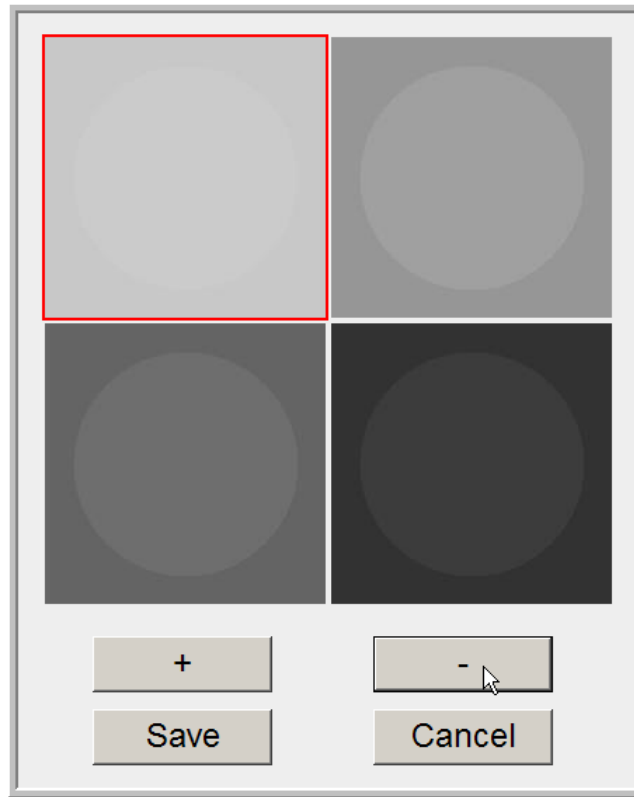


Constructing the Profile

Click on each square to select it, one square at a time. Current selection is indicated by a red border around the selected square. In the following image, the upper-left square is selected.

For each square, use the plus (+) and minus (-) icons to increase or decrease the brightness of the circle so that it is just visible against the square. Alternatively, you can click on the circle and drag the mouse up or down the circle to make it darker or lighter, respectively.

Note: The circle cannot be made any darker than the underlying square. The circle is always brighter than, or as bright as, the square.



Saving the Profile

To save the profile, enter a profile name and description, and then click Save. The profile is saved on the server under your account and is accessible whenever you log in.

Profile Name:	<input type="text" value="SampleProfile"/>
Description:	<input type="text"/>

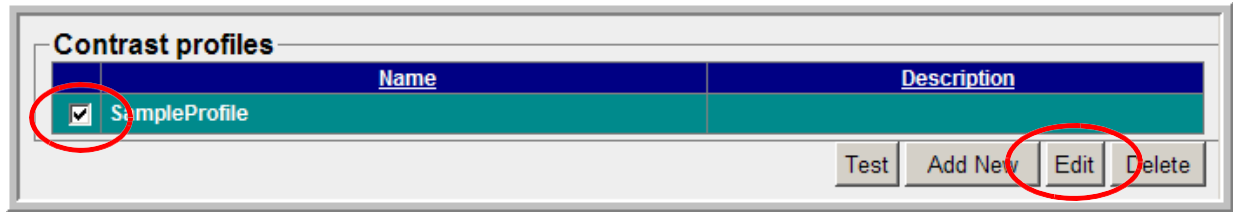
Adding Additional Profiles

After saving a profile, the Contrast Tool web page is still in Add New mode. You can continue to add new profiles by clicking the **Add New** icon. Each time an additional profile is added, the most recently added profile is used as a template for the new profile. This means that the four circles are set to the same brightness levels they had when you saved the previous profile.

To exit Add New mode, click the **Cancel** icon. You will then be able to select other profiles in the list.

Editing a Profile

To edit a profile, click the desired profile in the **Contrast profiles** list, and then click the Edit icon.



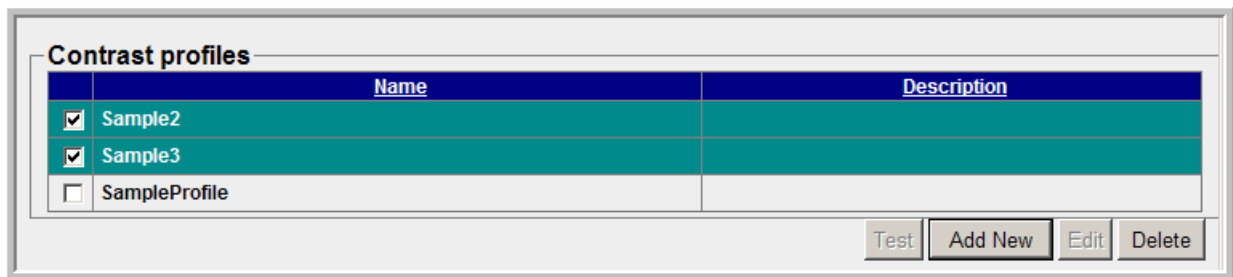
The profile is opened. You are then able to:

- Change the brightness of any of the circles. This is done exactly as described in "[Constructing the Profile](#)" on page 5-3.
- Change the text in the **Description** box.

Note: You cannot change the profile name.

Deleting a Profile

1. Select the profile or profiles to be deleted, and then click the **Delete** icon. A confirmation dialog is displayed.
2. Click **OK** to delete, cancel to cancel the deletion.

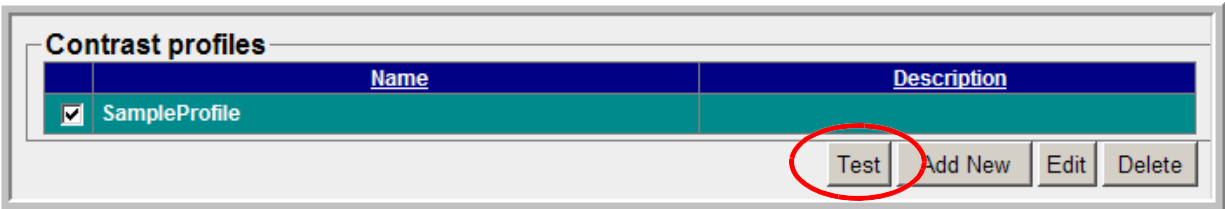


Note: The Edit icon is disabled when more than one contrast profile is selected. You can edit only one profile at a time, but you can delete any number of profiles at one time.

Testing the Current Environment Using a Profile

The purpose of testing is to determine how good the lighting is in your current environment, when compared to a profile previously created in an environment that is optimal for viewing images.

To begin testing, select the desired profile by checking the box to the left, and then click the **Test** icon.

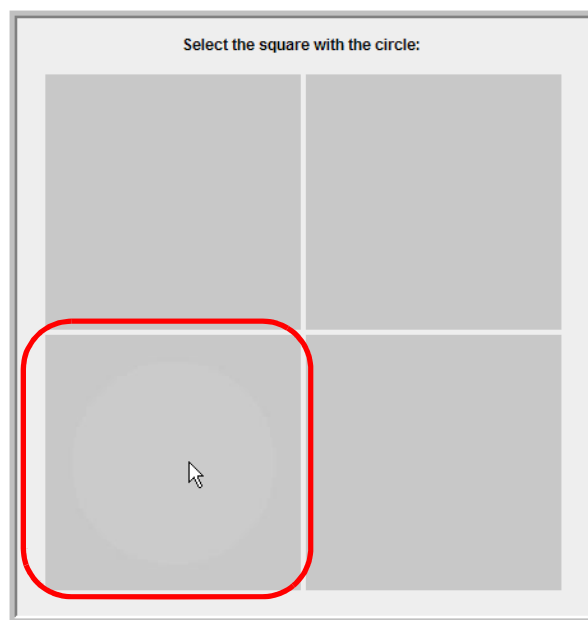


During the test, four sets of squares are displayed, one at a time. For each set, click on the square that contains a visible circle.

Note: *This test is timed.* For an accurate evaluation, you must click the visible circle within 5 seconds after the squares are displayed. The circle might be barely visible, so it is also important to look carefully.

The lightest spot is tested first. The circle is placed in one of the four squares at random.

In the following image, the lower-left square contains the circle, which, although difficult to see, is visible.



If you cannot see a circle at all, this indicates to the software that the lighting in your current environment is less than optimal, when compared with this profile.

After you have made a selection, or after 5 seconds have passed, the contrast tool displays the next-darkest set of squares. The circle is shown in one of the other squares, randomly selected, at the gray level stored in the saved profile.

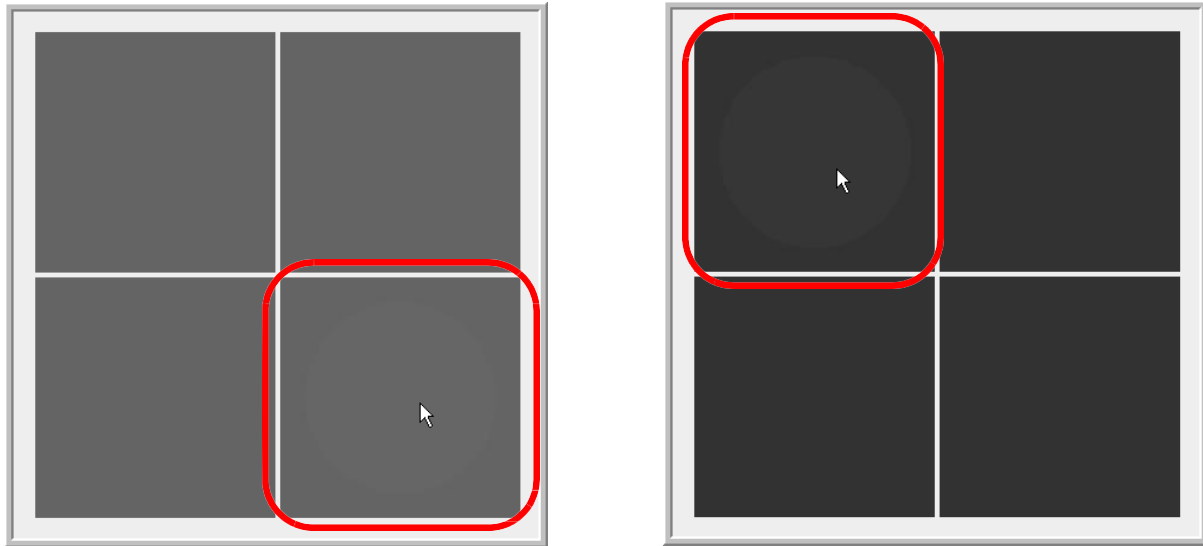


Figure 5-1: Test Mode - Third and Fourth Selections

Test Results

When you have finished selecting the circle in each set of squares, the test results are reported in a dialog (see the following image). The score is the percentage of times (out of 4) that you correctly identified the square containing the circle.



Click **OK** to close the results dialog.

Appendix A Keyboard Shortcuts

Group	Command	Keyboard Shortcut
Capture	Capture	C
	Capture all visible	Ctrl+Shift+C
	Capture all in one	Ctrl+Alt+C
Display Protocol	Go to Next Step	(Number pad) .
	Go to Previous Step	(Number pad) 0
Image	Set to preset Window Level 1	1
	Set to preset Window Level 2	2
	Set to preset Window Level 3	3
	Set to preset Window Level 4	4
	Set to preset Window Level 5	5
	Toggle Invert	Ctrl+i
	Reset W/L, zoom and pan	SHIFT+r
	Reset Orientation (flip, rotate)	SHIFT+o
	Reset Window/Level	SHIFT+w 6
	Reset Zoom	SHIFT+z
Measurement	Distance	D
	Angle	Shift+,
	Ellipse	E
QuadrantView	Next	W
Scroll Mode	Toggle	Q
Sync	Toggle	Space
Viewer	Go to First Image	Home key
	Go to Last Image	End key
	Show Previous Phase	PageUp
	Show Next Phase	PageDown
	Show Previous Image or Stack	Up
	Show Next Image or Stack	Down
	Show Previous Stack	Left
Show Next Stack	Right	
Cine 4D	Toggle	Shift+F3

Group	Command	Keyboard Shortcut
Cine 2D	Toggle	F3

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