ResolutionMD® 6.1

User Guide for HTML5

RMDH61-UG40USENUS

2017/05/15

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Welcome to the ResolutionMD® Software User Guide

The ResolutionMD® software is a medical image viewer in your browser. The software features an easy-to-use search interface, collaboration, and advanced visualization.

Visualization features include 2D viewing, Maximum Intensity Projection (MIP) including slabbing up to 50 mm, Multi Planar Reformatting (MPR) for axial, sagittal and coronal views, and 3D volume rendering. Each view mode enables you to view and interact with images, data, and reports (i.e. split view, linked scrolling, cine, pan and zoom, annotations and measurements.)

This guide describes how to use the functionality of the software in detail.

NOTE: This user guide is distributed with the ResolutionMD software in electronic form. You may request a paper copy by contacting technical support

About this Release

Product: ResolutionMD®

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Confidential and Proprietary

About this Guide

In this guide, any interactions that refer to clicks or double-clicks are interchangeable with taps and double-taps on touchscreen devices. While most interactions will be the same in both desktop and mobile browsers, any differences in operation on touchscreen devices will be highlighted in this guide.

NOTE: Certain features are currently only accessible on devices with a mouse and keyboard.

Indications for Use and Regulatory Status

Product: ResolutionMD®

Version: 6.1

UDI: +B037RESMDC0/$$7VERSION612

Model #: RESMD-C

Year of Software Release: 2017

Indications for Use - USA

ResolutionMD® software is an enterprise medical image viewer used with off-the-shelf servers, web browsers, and specific mobile devices for the 2D display, Multi-planar reformatting and 3D visualization of medical image data and reports. It provides collaboration and integrated secure audio-video communication, and displays DICOM and non-DICOM medical images and reports.

ResolutionMD is intended for use as a diagnostic, review, and analysis tool by trained healthcare professionals to drive clinical management. When interpreted by a trained physician, reviewed images may be used to aid in diagnosis. When used on a mobile device, ResolutionMD is not intended to replace full radiology workstations.

ResolutionMD is not to be used for primary mammography diagnoses.

Regulatory Status

United States - 510(k) Clearance

Rx Only

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

Manufacturer

Manufacturer

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Supported Mobile Devices, Browsers, and Operating Systems

The ResolutionMD HTML5 client is accessed through a browser on your desktop or mobile device. ResolutionMD is intended for diagnostic use from specific mobile devices and browsers.

The following mobile devices running iOS 9 or 10 are validated for use with the ResolutionMD® software.

- iPhone 4S*, iPhone 5, iPhone 5S, iPhone 6, iPhone 6 Plus, iPhone 6S, iPhone 7, iPhone 7 Plus
- iPad 2*, iPad 3*, iPad 4, iPad Air, iPad Air 2, iPad Mini*, iPad Mini 2, iPad Mini 3, iPad Pro (9.7"), iPad Pro (12.9")

*iOS 9 only, as iOS 10 is not supported on these older devices

Please consult our web site at www.calgaryscientific.com/validated-devices for updates to the list of supported devices.

The following browsers are supported for use with the ResolutionMD® software:

- For Windows OS: Internet Explorer Version 11, Google Chrome (Current), FireFox (Current)
- For Mac OS: Safari (Current), Chrome (Current), FireFox (Current)
- For iOS: Mobile Safari (Current)

NOTE: "Current" indicates that the automatic update default setting is supported. The minimum browser versions required are Chrome v42, FireFox v35, Safari v6, and Mobile Safari v9.

If you are using a mobile device or browser that is not on the above list, you should not use ResolutionMD for diagnosis.

Before You Begin

The topics in this section provide important information about the software's intended use, capabilities and limitations, as well as instructions to help you set up your device and your reading environment for optimal results.

Because the ResolutionMD® software is a medical device, it is imperative that you fully understand this information before you begin using the product.

Warnings

The ResolutionMD® software should only be used by qualified professionals to review the pathology relevant to the diagnosis. It must be used only in the context of the approved Indications for Use.

The software is not intended to replace the skill and judgment of a qualified medical practitioner and should only be used by people who have been appropriately trained in the software's functions, capabilities and limitations.

When used on a mobile device, ResolutionMD is not intended to replace full workstations and should be used only when there is no access to a workstation.

ResolutionMD is intended to be used with specific validated mobile devices as listed in the Supported Mobile Devices, Browsers, and Operating Systems section of this User Guide.

ResolutionMD is not to be used for primary mammography diagnoses.

Precautions

To ensure the best use of the ResolutionMD® software and its features, you should always take the following precautions into consideration.

Software features

You should ensure that the software features available on the device are appropriate prior to actual use.

Lighting

The ResolutionMD software should not be used in outdoor lighting or other high ambient light conditions. You should familiarize yourself with the viewing characteristics of the device under various lighting conditions prior to actual use.

For more information on optimal viewing conditions and how to assess ambient light, see Your Reading Environment.

Screen size and resolution

You should ensure that the screen size and resolution of the device are appropriate prior to actual use.

Brightness settings

You should be aware that other applications can change the screen brightness setting and ensure the recommended settings are in place prior to each use.

Battery life

You should be aware of expected battery life of the mobile device under wireless usage conditions relative to the anticipated duration of usage of the ResolutionMD® application and ensure that the mobile device is adequately charged.

You should review information in this user guide prior to using the ResolutionMD software in order to understand the features, capabilities and limitations of the solution. If you have any questions on how to connect to the solution or requirements for additional training, you should contact your user administrator.

Data Limitations

You should be aware of the limitations in the accuracy and correctness of the output data displayed on the screen, printed, or exported from the ResolutionMD® software. The quality of the data is dependent on the correctness of the input data, your interaction with the data, the quality, characteristics, and settings of the display device or printer, the amount of ambient light in the vicinity and the necessity to interpolate the data for display purposes. For example, measurement values in the ResolutionMD software are dependent on the calibration information provided by the modality in the DICOM header.

Medical images are susceptible to magnification errors caused by differing patient sizes and projection distances. If not corrected by the modality, these errors can affect the accuracy of the calibration information contained in the image's DICOM header. Measurement values in the ResolutionMD® software are dependent on the calibration information provided by the modality in the DICOM header. Accuracy also depends on the pixel spacing and slice interval values that are provided in the DICOM header for the data set. Because of this, the ResolutionMD software's measurements should be used for reference only until the accuracy of the DICOM header information can be verified or the image information has been calibrated through the use of a measurement instrument in the image.

When working with the work list / study list, you should be aware that while you are viewing any images and reports from your browser, any real-time updates on image information or availability will not automatically be seen in your current viewing session. These updates can only be viewed if you perform a new search and re-access the updated study.

User Profile

There are two profiles for intended users of the ResolutionMD® software:

1. Referring physicians who refer their patients to the institution or organization controlling the ResolutionMD software for imaging studies. Referring physicians wish to review images in addition to reviewing the radiologists' final report of findings to enable them to confirm their treatment plans and communicate with the patient.
2. Diagnostic imaging specialists and radiologists at the institution or organization controlling the ResolutionMD software. The solution can be used for diagnostic reading of images. Radiologists use ResolutionMD software tools.

Patient Privacy

The ResolutionMD® software accesses images together with patient information. It is important to protect this data from access by unauthorized persons.

It is recommended that when connecting to the ResolutionMD software via a remote connection you should ensure that secure transmissions are enabled in order to protect private patient information. This can be facilitated via a VPN connection to a corporate network or SSL directly into the ResolutionMD server.

Risk of Potential Errors

While the ResolutionMD® software has been tested extensively, it is impossible to completely test any piece of software, and errors may remain in the software. It is possible that an error could manifest as an incorrect measurement or image. You must be aware of the potential for errors.

Certain views make use of interpolated data. This is data that is created by the ResolutionMD software based on the original data set. Interpolated data may give the appearance of healthy tissue in situations where pathology that is near or smaller than the scanning resolution may be present.

Your Reading Environment

It is essential that you use the ResolutionMD® software under appropriate lighting conditions.

The ResolutionMD software should not be used in outdoor lighting or high ambient light conditions. Position yourself and the device so that there are no visible reflections of objects or light sources on the screen.

You should familiarize yourself with the viewing characteristics of the device under various lighting conditions prior to actual use. To ensure optimal viewing conditions, you must set the display brightness to the maximum value and disable any automatic brightness features on the viewing device. Be aware that other applications can change the screen brightness setting and you must ensure the recommended settings are in place prior to each use.

You should also perform a light test as described below to ensure that ambient light conditions are appropriate for use.

Assessing Ambient Light

Validated devices have been tested for diagnostic use at light levels up to 300 lux which is the maximum recommended light level.

Perform ambient light user assessment to ensure appropriate lighting conditions prior to use.

To perform ambient light user assessment

1. Set your device's display to maximum brightness and disable Auto-Brightness.
2. Select **Light Test** from the settings ⚙ menu.

3. Click **Perform Light Test**.

There are two patterns for assessing ambient light: TG18-CT and TG18-MP.

TG18-CT

This pattern is intended to support visual inspection of the luminance response of a display device. It should be evaluated for visibility of the central half-moon targets and the four low-contrast objects at the corners of each of the 16 different luminance regions.

TG18-MP

This pattern is intended to support visual inspection of the bit-depth resolution of a display device. It should be evaluated to ascertain the horizontal contouring bands, their relative locations, and grayscale reversals.

To assess the suitability of environmental lighting, you should review these patterns and determine whether your ability to discern the above information is comparable to ideal lighting conditions. If you are not able to perform this task, find a more appropriate environment before proceeding.

These patterns were developed by the American Association of Physicists in Medicine (AAPM) Task Group 18[1], whose purpose is to generate a document that provides guidelines to practicing medical physicists and engineers for in-field performance evaluation of electronic display devices intended for medical use.

Screen Adjustments

Always ensure that your screen and environment is optimal for using the ResolutionMD® software.

Your Device's Screen

Your device's screen should be clean and free of dirt, smudges and fingerprints prior to viewing medical images.

View the screen straight on (perpendicularly) because image accuracy degrades with viewing angle.

To avoid specular reflections, take special care to move to a location without bright light sources such as windows, light boxes, bright walls, and overhead lighting. Examine the display in your device's Sleep or Off mode for visible reflections and reorient yourself or the display until they are not present.

Ensure that your device's screen is set to maximum brightness and auto-brightness features are disabled.

Training & User Familiarization

It is strongly recommended that user training be conducted by each institution implementing the device. This training should include:

1. Institutional on-call process for reviews to be performed using the mobile technology.
2. Log-in protocols and security for mobile access to the ResolutionMD® server.
3. Operation of the software and practice on various uses cases including use of the mobile device under various lighting conditions.
4. Review of labeling including Indications for Use, directions for use, warnings and precautions.
5. Criteria for activation of fall-back procedures should mobile access to imaging data not be available or fail during attempts to access it.

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[1]Reference: AAPM ON-LINE REPORT NO. 03: ASSESSMENT OF DISPLAY PERFORMANCE FOR MEDICAL IMAGING SYSTEMS, American Association of Physicists in Medicine, 2005.

6. How to access user and product support through their institution.
7. Review of criteria and procedures for reporting adverse events to technical support.

Expected Performance

Due to performance characteristics of remote and shared wireless data connections, you may experience variable response times to searches and image interaction requests.

The ResolutionMD® software does not require full DICOM images to be downloaded to your mobile/desktop viewing device as studies/datasets are transferred between the PACS/VNA and the ResolutionMD® server within the hospital network. The delivery of rendered images from the server to devices over wireless networks will vary somewhat over different network types depending on bandwidth availability (i.e. raw speed of the network, either Wi-Fi or 3G cellular, and network latency, i.e. inherent delays on the network). In any case, we have observed that once communication is established to the server, typical data sets are fully loaded on the server and available for initial viewing on the mobile device in 8 to 15 seconds.

The following table characterizes the loading time in seconds for a "small" (38-slice, ~19MB) and "medium" (426-slice, ~213MB) CT data sets under 3 network conditions: Wi-Fi, "Good" 3G and "Poor" 3G. 2 to 3 bars signal strength is considered "Poor" 3G connection. The loading times are calculated by averaging the time taken by 3 consecutive loads of the data set.

Data Set	Wi-Fi	"Good" 3G	"Poor" 3G
Small (38 slices)	8.3	9.7	13.5
Medium (426 slices)	11.3	13.2	15.0

A progress bar is displayed across the screen as the data set is loading. If the connection is lost during transmission, an error message is displayed.

Accessing the ResolutionMD® Software

The ResolutionMD® software is accessible on devices via an Internet connection from a browser (Chrome, Safari, Internet Explorer or Firefox).

Deployment Model

The ResolutionMD® software enables you to conveniently view medical images via a web browser.

Images are acquired from a connected PACS or medical image archive and loaded into memory on a centralized ResolutionMD server. You interact with the server-based application via a browser to view the images.

Depending on the deployment model used, the ResolutionMD software provides:

- standalone work list / study list search and image viewing functionality
- image viewing when launched from a third-party application providing the work list / study list functionality

Logging In

Before you log in, check that you have the URL address of the application as well as your login credentials. If you do not have this information, contact your system administrator.

To open a viewing session

1. Browse to the URL provided by your system administrator.
2. Enter your provided credentials in the appropriate fields.

NOTE: Your viewing session will automatically close if you do not interact with ResolutionMD® for a period of time (the default is 10 minutes).

After you log in, the search panel will be displayed.

Logging Out

If you do not explicitly log out using the procedure below, your viewing session will automatically close if you do not interact with the ResolutionMD® software for a period of time (the default is 10 minutes).

To close a viewing session

- Select **Log Out** from the settings ⚙ menu.

The ResolutionMD® Software Interface

The ResolutionMD® software is designed for professionals — such as radiologists and technologists — to view and interact with medical images and reports using a web browser.

The ResolutionMD software interface is composed of three main features.

User Interface Feature	Description
The Search Panel	The search panel is the first panel you see after logging in. You use this panel to search for studies of interest and to add them to the study list.
The Study List	The study list contains the studies you have added from the search panel. You can select images and series from this list to view in the image viewer.
The Image Viewer	The image viewer displays images and series from the studies and provides access to tools for interacting with the data in 2D, MIP/MPR and 3D view modes.

Using the Search Panel

Using the search panel, you can find, browse and add selected studies to the study list.
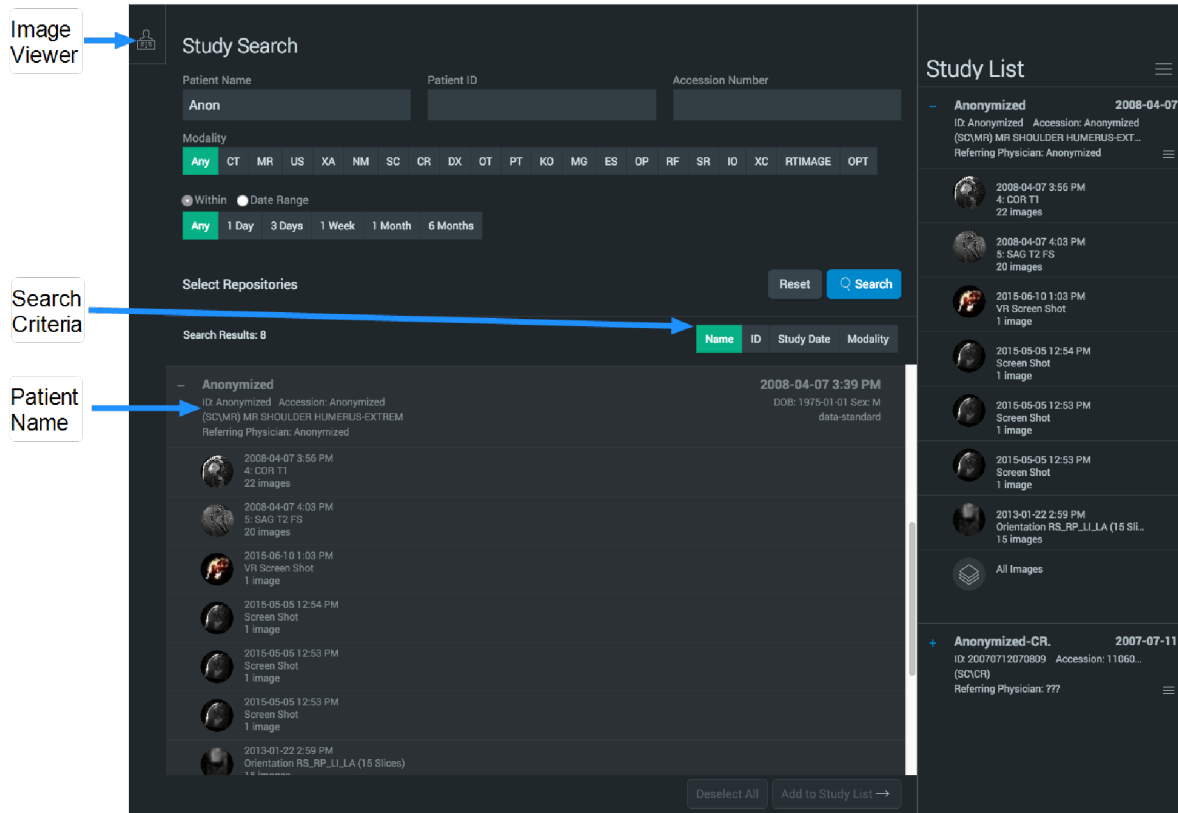
Performing Searches

Using the search panel, you can quickly find studies by patient name and other criteria such as patient ID, accession number, modality, and date range.

To search by patient name

1. Enter the patient name in the **Patient Name** box. You can enter the first and last name, or just the last name. You can also enter a partial last name.
2. Press the **Enter** key, or click **Search**.

To search by patient ID or other criteria

1. Enter search terms into the appropriate text boxes. If you provide only a partial patient ID (or other criteria), use asterisks before and/or after the partial number to indicate there are missing digits.
2. Press the **Enter** key, or click **Search**.

> **NOTE:** Search criteria may be: patient name, patient ID, accession number, date of birth, referring physician, or study description.

To narrow your search

After entering search terms in the text boxes but before clicking **Search**, select your desired search criteria:

- **Within Last** enables you to narrow your search using preset date ranges.
- **Date Range** enables you to narrow your search by specifying a date range by picking a start and end date.
- **Modality** enables you to restrict your search to a specific type of study, such as computed tomography (CT) or magnetic resonance (MR).

To reset your search

- Click **Reset**.

You can also limit your search to one or more archives. See Selecting Repositories.

Selecting Repositories

If you have access to multiple repositories, you can choose which repositories to search.

To select repositories

1. Click **Select Repositories**.
2. Fill the check boxes for the data repositories you wish to search.

Browsing Search Results

Search results are displayed as a list of studies. The number of results returned is displayed above the search results.

NOTE: Studies that have already been added to the study list are greyed-out in the results.

To sort search results

- Click the search criteria you wish to sort by.

NOTE: Clicking the same search criteria again reverses the sorting order of the search results.

You can expand the studies to preview their contents.

To expand a study

- Click the **+**.

You can also collapse expanded studies to hide their contents.

To collapse a study

- Click the **-** to the left of an expanded study.

Adding studies to the study list

You can select studies of interest to add to the study list for viewing.

To select studies

- Click the studies you wish to select. They will appear highlighted when they are selected.

To deselect studies, do one of the following:

- Click selected studies. Their highlight will disappear when they are deselected.
- Click **Deselect All**. This will deselect all the studies in the search results.

To add selected studies to the study list

- Click **Add to Study List**.

NOTE: You can also double-click a study to view it immediately in the image viewer. This will add the study to the study list and closes any open studies.

Using the Study List

The study list contains all the studies of interest added from the search panel. From here you can view their contents in the image viewer.
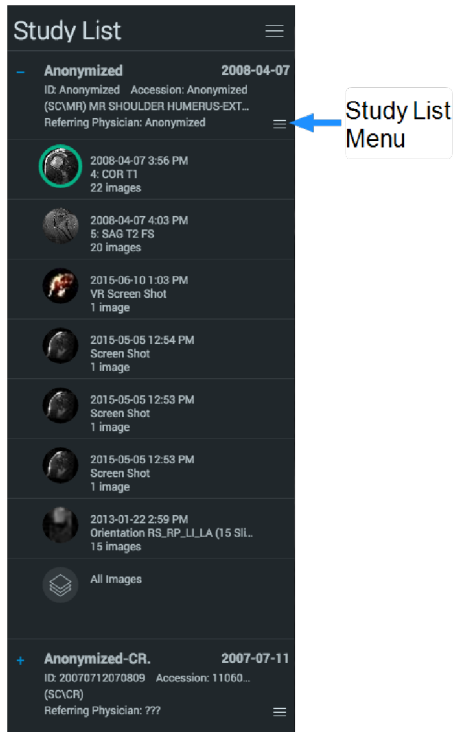
As in the search panel, you can expose the contents of studies by expanding them in the study list.

To expand a study

- Click the **+**.

To view an image or series, do one of the following:

- Double-click an image in the study list.
- Click and drag an image into the image viewer.

Images currently being viewed in the image viewer will be highlighted in the study list.

To view more than one image at a time in the image viewer, see **Viewing Multiple Images With 2D Layouts**.

NOTE: A ring appears around the thumbnails of the series that have been displayed in the viewer.

Viewing Unsupported Data

The ResolutionMD software will notify you if you attempt to load unsupported data. You will be able to view the data, but there will be a persistent warning in red that you are viewing unsupported data.

To view all images in a study

- Double-click the All Images entry in the study list. This will load all of the images in the study as though they were a single stack.

To view a report

- Double-click a report in the study list.

To print a report

- Click the **Print Report** tool.

To close studies, do one of the following:

- Select **Close Study** from the study list menu.
- Click the **Close All Studies** tool.

To display related studies

- Select **Related Studies** from the study list menu. (See **Displaying Related Studies**.)

To open the Share Study panel

- Select **Share Study** from the study list menu. (See **Using Study Share**.)

To shrink the study list

- Click the **Shrink Study List** ⬒ tool.

To expand the study list

- Click the **Expand Study List** ⬓ tool.

To access search or search results

- Click the **Data Panel** tool.

NOTE: Any study that contains DICOM images also contains a special

All Images series which loads the images from all the series in the study. Cine functionality is unavailable when viewing the All Images series, but you can otherwise view it like any other series.

All Images is best suited for viewing studies that contain multiple single-image series, such as CR/DR studies, to avoid having to load single images into the view individiually.

Displaying Related Studies

When you retrieve related studies, any studies with the same Patient ID as the study you are viewing will appear in the study list. This is useful when choosing series to display in split view layouts.

To display related studies

- Select **Related Studies** from the study list menu.

NOTE: Related studies may be automatically displayed if so configured in the server.

Using Study Share

The study share feature facilitates sharing studies with other clinicians. The Share Study action enables you to share study information through third-party services, like BEAM or DatCard. You can access this feature by clicking on the **Share Study** button in the study list menu for the desired study in the study list.

NOTE: The Share Study action will only be available if sharing study actions have been configured.

To open the Share Study panel

- Select **Share Study** from the study list menu.

NOTE: You may need to disable your browser's popup blocker for the Share Study panel to appear.

To share a study

- Open the Share Study panel and select the desired sharing action. A new browser tab will be opened where you can specify the required information to share from the selected study.

NOTE: Only one study can be shared at a time.

Using the Image Viewer

The image viewer displays images and data from the study list in 2D, MIP/MPR and 3D view modes. It also contains tools for interacting with the data. This module describes how to use the image viewer to navigate and interact with images and data in the various view modes.
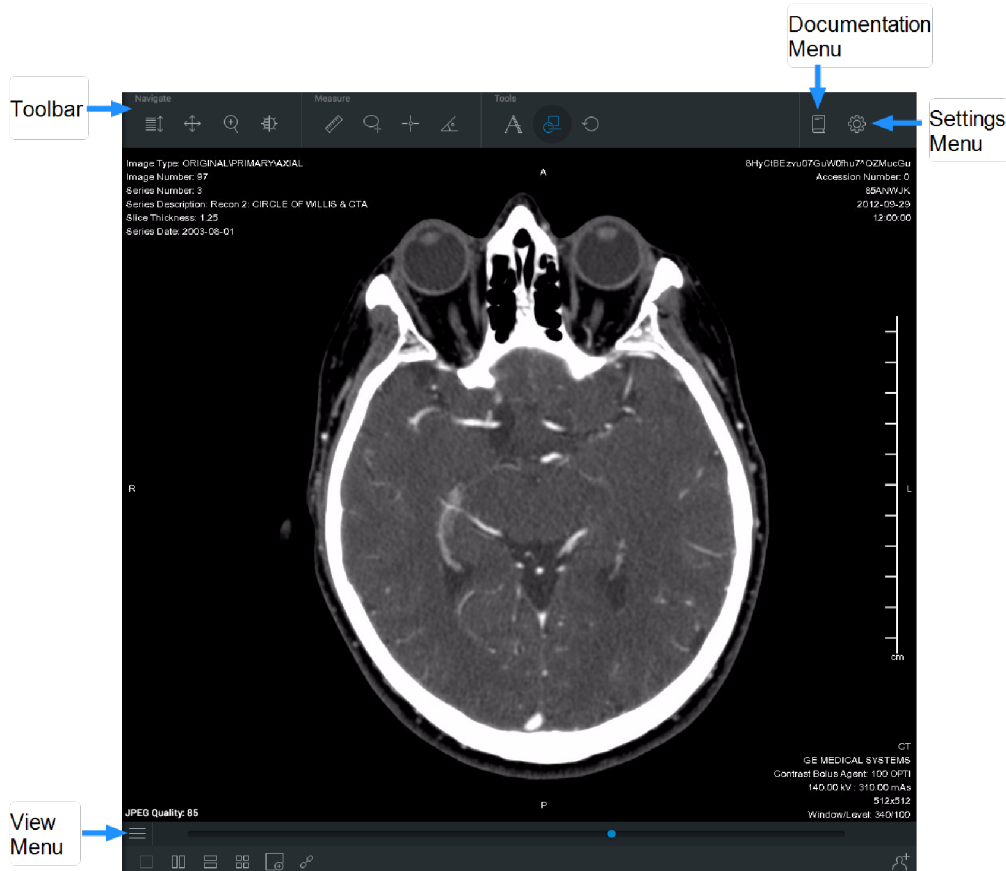
To access the image viewer

- Click the **Image Viewer** tool.

To access search, search results or the study list

- Click the **Data Panel** tool.

Using the Toolbar

The toolbar provides access to commonly used tools in the image viewer. On devices with smaller screens like smartphones, you will find additional tools, such as measurements, available from the settings ⚙ menu. (See The Settings Menu.)

To select a tool

- Click the tool. The tool will be highlighted when it is selected.

The Documentation Menu

The documentation ⬚ menu provides access to

- This user guide
- The hotkey reference
- About the software

The Settings Menu

You can configure the view via the settings ⚙ menu. On smaller screens, you can use this menu to configure the toolbar and to access documentation.

With full screen, it is possible to expand ResolutionMD® to cover the entire screen.

To enable full screen

- Select **Toggle Full Screen** from the settings ⚙ menu

To disable full screen, do one of the following:

- Select **Toggle Full Screen** from the settings ⚙ menu.
- Press the **Esc** key.

Navigating Images

You can navigate images in the image viewer with the navigation tools.

	Scroll (2D and MIP/MPR view modes) When selected, click and drag up and down to scroll through the images in the series.
	Rotate (3D view mode) When selected, click and drag in any direction to rotate the volume.
	Pan When selected, click and drag in any direction to pan the image.
	Zoom When selected, click an drag up and down to zoom in and out of the image.
	Window/Level When selected, click and drag left and right to adjust window width, and up and down to adjust window level.
	Mirror Vertical / Mirror Horizontal Select Mirror Vertical or Mirror Horizontal from the view menu.

Rotate

Select Rotate CW (clockwise) or Rotate CCW (counter-clockwise) from the view menu.

Invert Intensities

Select Invert from the view menu (keyboard shortcut **I** on desktop devices)

2D Lens

Select Lens from the view menu (keyboard shortcut **O** on desktop devices)

Capture

Select Capture from the view menu

There are also device-specific methods to navigate in the image viewer regardless of the selected navigation tool.

Navigating on Desktop Devices

You can navigate images in the image viewer using the following methods on desktop devices with mouse and keyboard. These interactions work independently of the selected tool.

To scroll through single images

- Scroll up and down with the mouse wheel.
- Press the **Right** arrow key to advance to the next slice and press the **Left** arrow key to go back to the previous slice.

To zoom in, do one of the following:

- Press the **+** key.
- Hold **CTRL-SHIFT** while clicking and dragging the mouse cursor up.

To zoom out, do one of the following:

- Press the **-** key.
- Hold **CTRL-SHIFT** while clicking and dragging the mouse cursor down.

To pan the image

1. Position the mouse pointer over the image.
2. While holding **SHIFT**, click and drag the image. This will "grab" the image so that you can move it around the main view.

To adjust window width, do one of the following:

- Right-click and drag left or right.
- Hold **CTRL-ALT**, click-drag left or right.

To adjust window level, do one of the following:

- Right-click and drag up or down.
- Hold **CTRL-ALT**, click-drag up or down.

Navigating on Touchscreen Devices

You can navigate images in the image viewer using the following methods on touchscreen devices.

Functionality	Touchscreen Interaction
Scroll with no tool selected (2D)	Drag up/down
Scroll single images (2D)	Tap near the top or bottom of the view
Rotate (3D)	Drag

Functionality	Touchscreen Interaction
Window/Level	Double-tap, then drag
Pan	Drag with two fingers
Zoom	Pinch or spread fingers

Using the Precision Loupe (touchscreen only)

The precision loupe enables touchscreen device users to interact with the view with pixel-level precision. When measurement or annotation tools are selected, the precision loupe appears as a magnification of the region directly under the user's finger, with a single pixel centered in the cross-hairs.
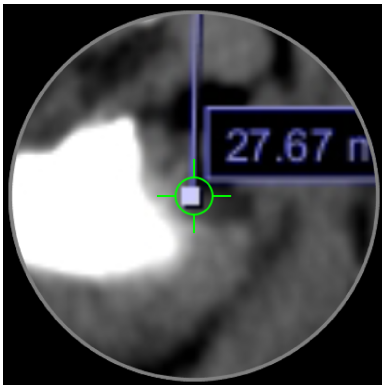
You can "click" on the view using the precision loupe to accurately place and select points for adding and manipulating measurements and annotations.

To "click" using the precision loupe

1. Position the loupe with the cross-hairs centered on the desired pixel.
2. Hold the loupe still for a moment. The cross-hairs will shrink and "click" on the pixel.

To delete an annotation or measurement using the precision loupe

1. Position the loupe with the cross-hairs centered on the annotation or measurement point you wish to delete.
2. Hold the loupe still for a moment. The cross-hairs will shrink and select the point.
3. Click the **Delete** 🗑 tool.

Working with Measurements

You can make various measurements in the image viewer with the provided measurement tools.

	Linear Measures the distance between two points in the view
	ROI Measures the area, mean signal intensity, and standard deviation within an ellipsoid region of interest (ROI)
	Point Measures the signal intensity of a selected pixel in the view
	Angle Measures the angle between definable segments
	Cobb Measures the Cobb angle between definable segments

NOTE: In the 3D view mode, only linear measurement is available.

To make linear measurements

1. Select the **Linear** tool.
2. Click the first point on the image and drag to the second endpoint and release the mouse button.

To make ROI measurements

1. Select the **ROI** tool.
2. Click and drag to draw the ROI.
3. Click and drag the handles at the corners of the ROI to adjust the size and shape of the region.

To make point measurements

1. Select the **Point** tool.
2. Click on the point you wish to measure.

To make angle measurements

1. Select the **Angle** tool.
2. Click where you wish to measure.
3. Drag the handles to adjust the angle as required.

To make Cobb angle measurements

1. Select **Cobb** from the measurement panel.
2. Click and drag to define the first line.
3. Click and drag to define the second line.
4. Drag the endpoints to adjust the angle as required.

NOTE: Medical images are susceptible to magnification errors caused by differing patient sizes and projection distances. If not corrected by the modality, these errors can affect the accuracy of the calibration information contained in the image's DICOM header. Measurement values in the ResolutionMD® software are dependent on the calibration information provided by the modality in the DICOM header. Accuracy also depends on the pixel spacing and slice interval values that are provided in the DICOM header for the data set. Because of this, measurements should be used for reference only until the accuracy of the DICOM header information can be verified or the

image information has been calibrated through the use of a measurement instrument in the image.

Measurements rely on certain DICOM metadata to be in place, including Rescale Slope, Rescale Intercept, and Pixel Spacing. In the event that this metadata is not contained in the DICOM images being viewed, any measurements placed will be reported as "n/a".

You can select and make changes to existing measurements. For more information, see **Manipulating Measurements**.

Working with Annotations

You can use the annotation tool to write and edit annotations in the image viewer.

To add an annotation

1. Select the **Annotation** tool from the toolbar.
2. Click on the image where you wish to annotate.

To edit an annotation

1. With the annotation tool selected, click in the text box of the annotation.
2. Edit text as desired.
3. Press **Enter**.

You can select and make changes to existing annotations. For more information, see **Manipulating Measurements**.

Manipulating Measurements

While any measurement tool is selected, you can select and make changes to existing measurements.

To select a text box

- Click on the text box.

To select measurements

- Click anywhere on the measurement or markup. (Ensure that the mouse cursor becomes a hand before clicking.)

To select endpoints on measurements

- Click on an endpoint.

To move text boxes

1. Select the text box.
2. Drag to your desired location.

To move endpoints

1. Select an endpoint.
2. Drag to your desired location.

To move measurements

1. Select the measurement.
2. Drag to your desired location.

To delete measurements or markups (mouse and keyboard only)

1. Select the measurement. (You may select the text box.)
2. Press the **Delete** key or click the **Delete** 🗑 tool.

Resetting the View

You can reset the image to the default view at any time.

To reset a single view, do one of the following:

- Select **Reset** ↻ from the view menu.
- Press the **Home** key.

To reset all views

- Click **Reset** ↻ in the toolbar.

Configuring Metadata Display

You can configure the desired level of metadata displayed in the image viewer.

To configure the metadata display

1. Select **Display Settings** from the settings ⚙ menu.
2. Select the desired level of metadata display:

⚙	Auto Metadata Display
	Full Metadata Display
	Limited Metadata Display
	No Metadata Display

NOTE: The default display setting will automatically set the metadata display level based on the size of the image view.

About View Modes

There are three different modes to view data: 2D, 3D, and MIP/MPR. The 2D view mode displays data in a two-dimensional format, the 3D view mode displays data in a three-dimensional format, and MIP/MPR view mode enables you to display data simultaneously in different orientations.

Images are initially displayed in the 2D view mode, but you can switch view modes at any time in the image viewer.

To switch view modes, do the following:

- Select a view mode from the view menu.

Viewing Data in 2D View Mode

In this view mode, you can view a study and its contents in a two-dimensional format. The orientation of the image is labeled at the sides of the viewer: Superior, Inferior, Anterior, Posterior, Left, Right.

Scrolling With the Image Slider Bar

You can scroll using the image slider bar located below the image regardless of the selected tool.

To scroll through images using the image slider bar

- Click the slider and drag left or right.

You can also "jump" to an image by clicking directly on the image slider bar.

### Viewing Measurements and Annotations Saved as GSPS

Some data sets contain measurements and annotations saved from another viewing system as GSPS (Greyscale Softcopy Presentation State) information. GSPS is displayed by default.

To toggle GSPS display

- Click the **GSPS Data** tool .

Magnifying Part of an Image

You can magnify a region of an image with the **2D Lens** tool.
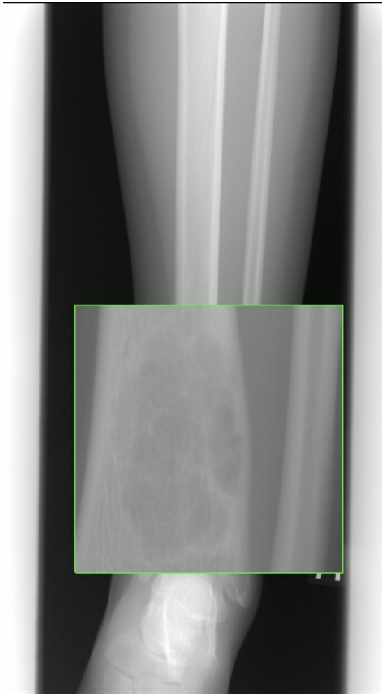
To toggle the 2D Lens tool

- Select **Lens** 🔍 from the view menu.
- Press the **O** key.

To move the lens over the image

- Click on the magnified region and drag to reposition the magnifying glass.

Viewing Multiple Images With 2D Layouts

With 2D layouts, you can view several images simultaneously in multiple 2D views:

1x1 Single Layout

	1x2 Side-by-side Layout
	2x1 Top-Bottom Layout
	2x2 Grid Layout

To select a 2D layout

- Click one of the 2D layout tools.

To display selected images in 2D layouts, do one of the following:

- Drag the desired series from the study list into each of the panes in the layout. (Desktop only)
- Double-click the desired series.
- Tap the desired series in the study list and tap the pane you wish to view the image in. (Touchscreen only)

Yellow reference lines appear when viewing and interacting with orthogonal images in other views.

**NOTE**: Reference lines are to be used for clinical reference only.

When scrolling is linked, images in different views that share a common frame of reference will scroll together.

To link scrolling

- Click the **Link Scrolling** tool   .

To manually link scrolling by slice

Sometimes the data set does not contain slice position information and you must manually align the views visually by scrolling to the desired parts of the anatomy before linking the views.

1. Scroll each of the views to the respectively desired slices.
2. Click the **Link Scrolling by Slice Number** tool.

To quickly toggle between a 2D layout and a 1x1 single layout

- Double-click the 2D layout pane you wish to see in 1x1 single layout. Double-click the view again to toggle back to the previous 2D layout.

Working With Presets

You can select preset window and level using the presets panel.

To display the presets panel

- Select **Presets** from the view menu located beneath the view.

To select a preset from the presets panel

1. Select **Window/Level Presets** from the view menu.
2. Select a preset.

Applying CT Presets (desktop only)

You can quickly apply CT presets to the image using the following shortcut keys on the number row.

Shortcut Key	Preset	Window Width	Window Level
1	Body Soft Tissue	350	50

Shortcut Key	Preset	Window Width	Window Level
2	Body Lung	1600	(-)500
3	Body Bone	1500	300
4	Body Liver	200	60
5	Head Post Fossa	200	40
6	Head Mid Brain	80	40
7	Head Blood	700	80
8	Head Bone	4000	600
9	Head IAC	3200	250
0	CTA MIP	700	250

Playing Through Images With Cine

Cine mode automatically scrolls through images at the current window/level and zoom settings. Motion studies, such as cardiac ultrasound or X-ray angiography, will automatically open in cine mode at the frame rate specified in the DICOM header.

NOTE: Image viewer interactions such as pan, zoom, window/level etc. are disabled while cine mode is activated.

To activate cine mode

- Select **Cine** ▦ from the view menu. The image slider bar will fill with color indicating data buffering progress.

To start scrolling

- Click the **Play** button ▷ . (You may start scrolling even while the data set is being buffered.)

To stop scrolling

- Click the **Pause** button ⎮⎮ .

To adjust maximum framerate

- Click the **fps** button and adjust the slider to the desired framerate.

To reverse scrolling direction

- Click the **fps** button and click to fill the **Playback Reversed** check box.

To deactivate cine mode

- Click the **X** button.

Viewing Data in 3D View Mode

In this view mode, you can view a study and its contents in a three-dimensional format.

All of the methods of navigating the data described in Navigating Images apply in 3D view mode.

In addition to those interactions, you can snap the volume to any of the six standard orientations by clicking the spheres on the orientation axis. The following shortcuts are also available on devices with a keyboard.

Keyboard shortcuts

You can use keyboard shortcuts to quickly snap the volume to any of the six standard orientations.

| Orientation	Keyboard Shortcut
Left Lateral	L
Right Lateral	R
Posterior	P
Anterior	A
Superior	S

Orientation	Keyboard Shortcut
Inferior	I

Magnifying Part of a Volume with the Lens Tool (desktop only)

You can use the lens tool to magnify a selected portion of the volume in the 3D view mode while keeping the entire volume in the main view. A magnified view is displayed in the upper-right corner.

The lens tool is made up of a lens and a magnified view. The magnified view shows a close-up of the area covered by the lens.
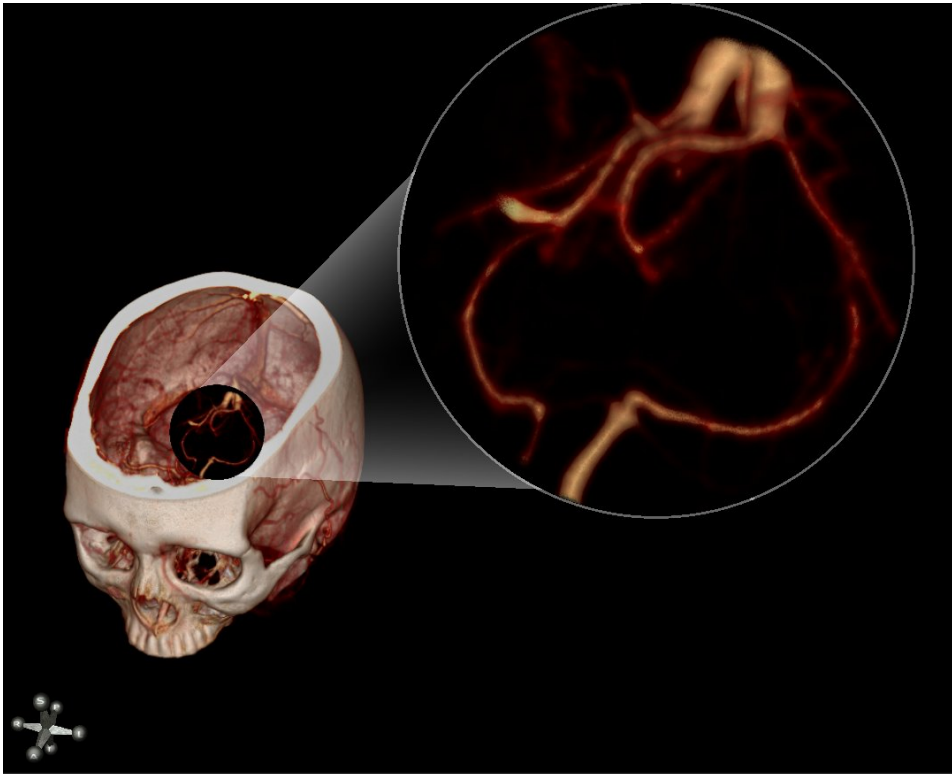
To enable the lens tool

- Press the **O** key.

NOTE: The lens tool is only available in the 3D view mode.

To move the lens over the volume

1. Position the pointer over the lens to select the lens.
2. Click and drag to reposition the lens.

To move the lens through the volume

1. Position the pointer over the lens.
2. Scroll the mouse wheel up to push the lens deeper into the volume or down to move the lens in the opposite direction.

To adjust the magnification of the lens view

1. Position the mouse pointer over the magnified view. This selects the magnified view.
2. Do one of the following:
   - Scroll the mouse wheel up to increase magnification.
   - Scroll the mouse wheel down to decrease magnification.

Removing Obscuring Anatomy

This topic describes how to remove obscuring material from the volume.

Using Clipping Planes

You can slide clipping planes into the volume to cut away obscuring features. Clipping planes appear as a box drawn around the outside of the volume with spherical "handles" located on the corners and

sides.
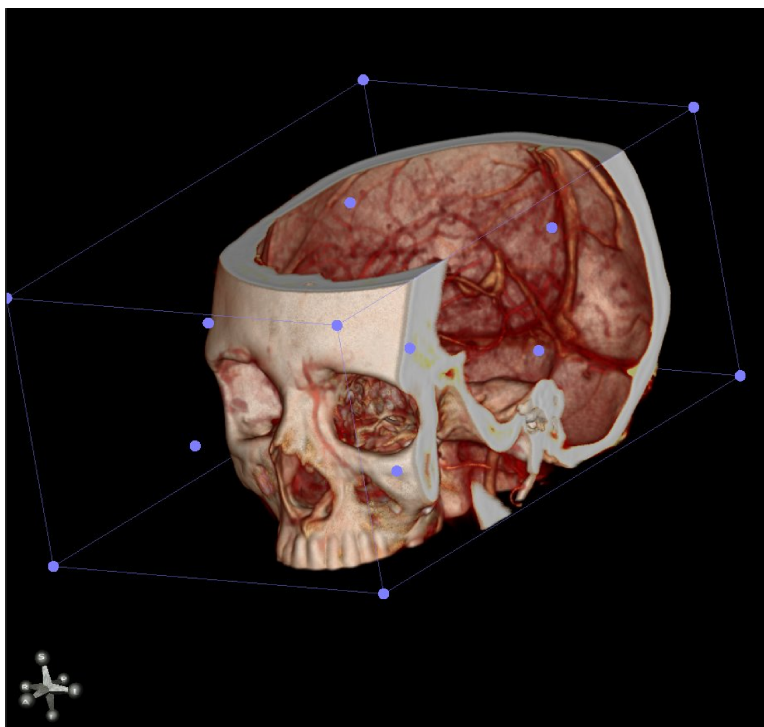
To toggle the clipping planes, do one of the following

- Select **Clipping Planes** from the view menu.
- Press the **C** key.

To rotate the clipping planes, do one of the following:

- Click on an edge of the clipping planes and drag.
- Click on a corner of the clipping planes and drag.

To resize the clipping box

- Click a "handle" located in the side of the clipping planes and drag.

To rotate the volume when clipping planes are enabled

- Click outside the clipping planes and drag.

To reset the volume's clipping planes and orientation, do one of the following

- Click the **Reset** ↻ tool.
- Press the **HOME** key.

To reset the volume's clipping planes (desktop only)

- Press the **G** key.

Using the Scalpel Tool

You can use the scalpel tool to cut away obscuring anatomy with a much greater degree of precision than using clipping planes.

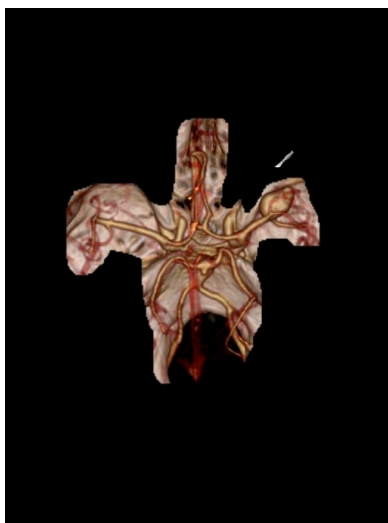### To toggle the scalpel tool

- Press the **X** key.

To cut away obscuring features

1. Left-click and drag the scalpel around the region of interest to create an outline.
2. When satisfied with the shape of the outline, release the mouse button. Position the mouse cursor over the region you wish to highlight and remove.
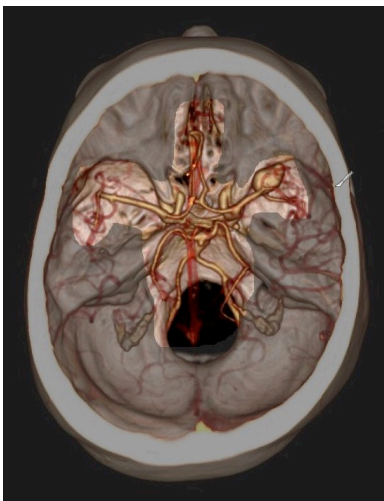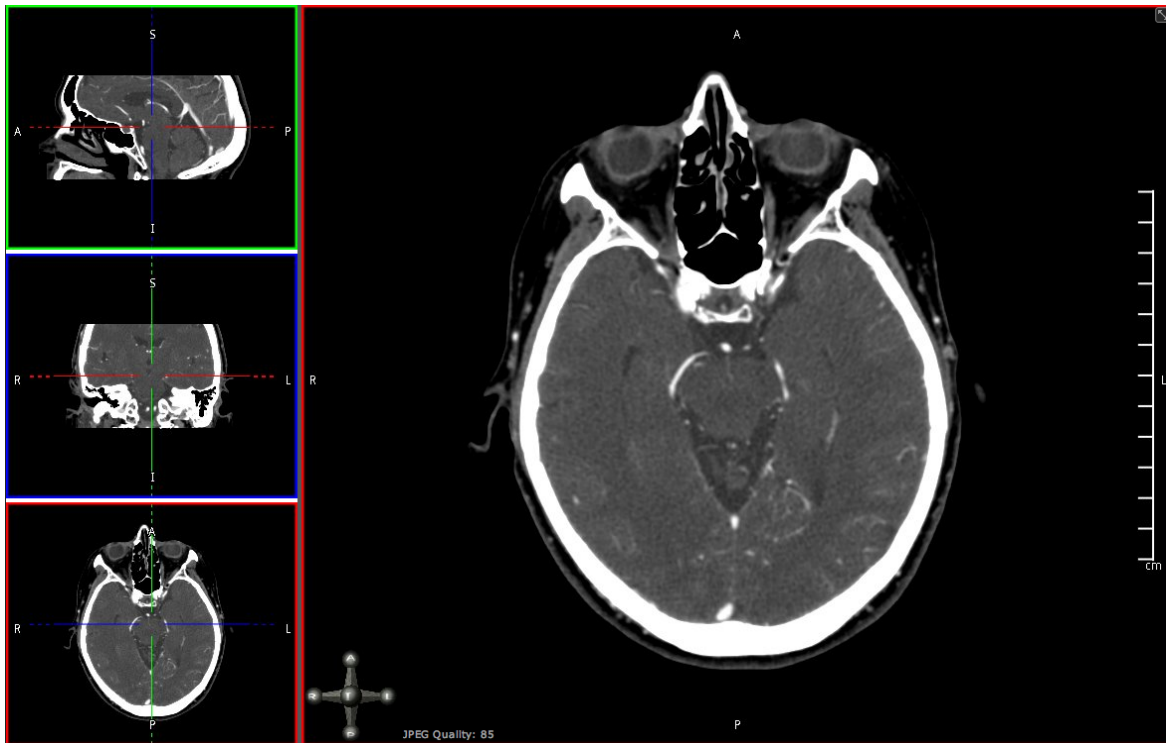
3. Press **Delete** to remove the region.

- While the scalpel tool is enabled, press **Z**.

Viewing Images in MIP/MPR View Mode

In this view mode, you can view a series in any arbitrary orientation or thickness.

Each of the colored positional lines in the orthogonal strip views represents the plane of one of the other views. For example, the red positional lines in the top and middle strip views represent the position of the bottom strip view with the corresponding red border. In this image, the plane represented by the bottom strip view is assigned as the main view.

To assign an orthogonal view as the main view

- Double-click the desired strip view.

All of the methods of navigating the data described in Navigating Images apply in MIP/MPR view mode.

In addition to those interactions, you can snap the volume to any of the six standard orientations by clicking the spheres on the orientation axis.

NOTE: For colorblind users, the three orthogonal strip views are framed in green (top), blue (mid), and red (bottom).

Manipulating Planes

The following procedures describe how to manipulate the planes in the strip views.

To move a plane orthogonally

- Click a solid part of a positional line and drag.

To rotate a plane

- Click a dashed part of a positional line and drag.

### To freely move a set of positional lines

- Click in the center of the "cross hair" formed by the positional lines and drag.

  You can also instantly center the positional lines on a region of interest by directly triangulating a point.

To directly triangulate a point

- Hold **CTRL** and click on a desired point in any of the strip views. (Hold **CMD** and click on Mac)

The following double oblique view was created using these methods.
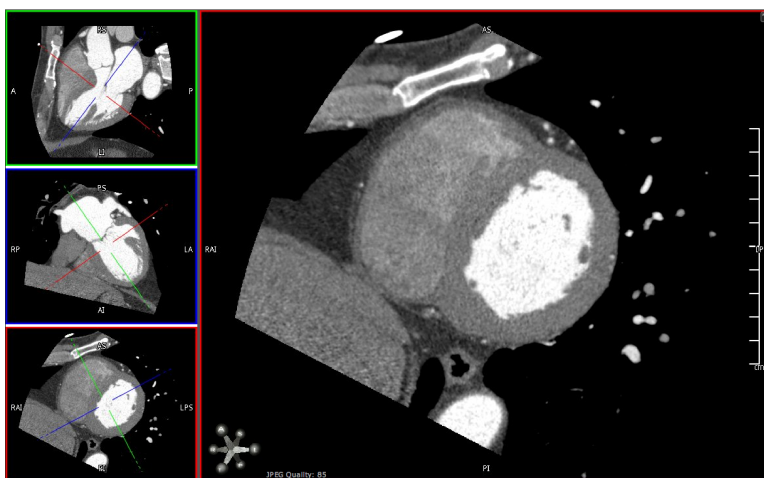
Applying CT Presets (desktop only)

You can quickly apply CT presets to the image using the following shortcut keys on the number row.

Shortcut Key	Preset	Window Width	Window Level
1	Body Soft Tissue	350	50
2	Body Lung	1600	(-)500
3	Body Bone	1500	300
4	Body Liver	200	60
5	Head Post Fossa	200	40
6	Head Mid Brain	80	40
7	Head Blood	700	80
8	Head Bone	4000	600
9	Head IAC	3200	250
0	CTA MIP	700	250

Using Curved MPR

You can assign the curved MPR view to the main view by double-clicking the curved MPR view, as seen in the following example.
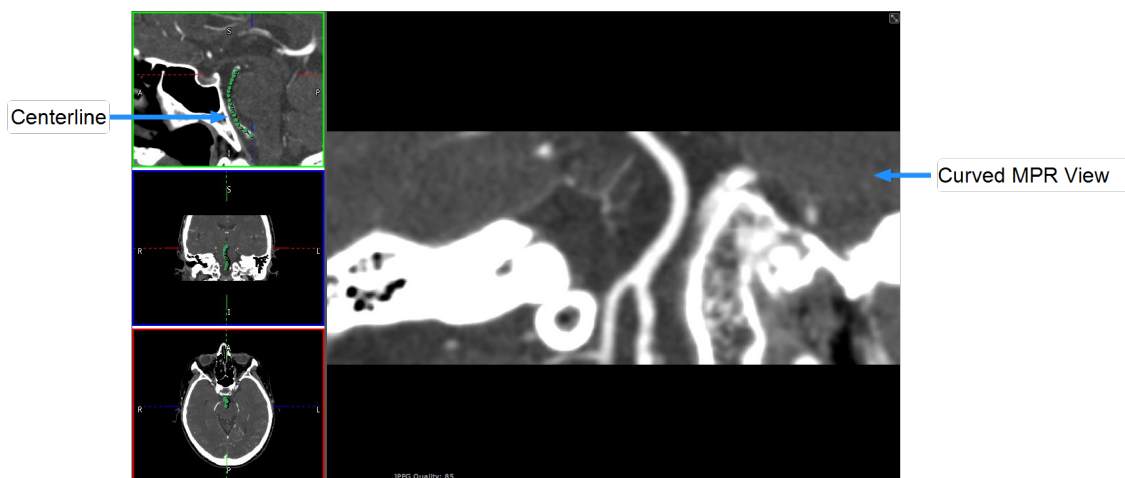
The following procedures describe how to use the curved MPR view.

To enable curved MPR

- Select **CMPR** from the view menu.

By default, the bottom left pane becomes the curved MPR.

To define a centerline, do one of the following:

- Hold down the left mouse button and draw the centerline in any of the views. (desktop only)
- Draw the centerline by dragging your finger on any of the views. (touchscreen only)
- Define a centerline by clicking points in any of the views.

NOTE: You can zoom and scroll through slices while defining a centerline.

To adjust the centerline

- Click and drag any of the handles along the centerline.

To rotate the curved MPR view

- Click and drag anywhere in the curved MPR view.

To reset curved MPR (desktop only)

- Press the **D** key.

To undo changes to the centerline (desktop only)

- Press the **Z** key.

NOTE: Pressing the **Z** key repeatedly will undo successive changes.

Working with Thick Slabs

Thick slabbing is useful for viewing a thicker portion of the data in a single image.

To enable thick slab

- Select **Thick Slab** from the view menu. The thickness of the slab will be displayed in the view.

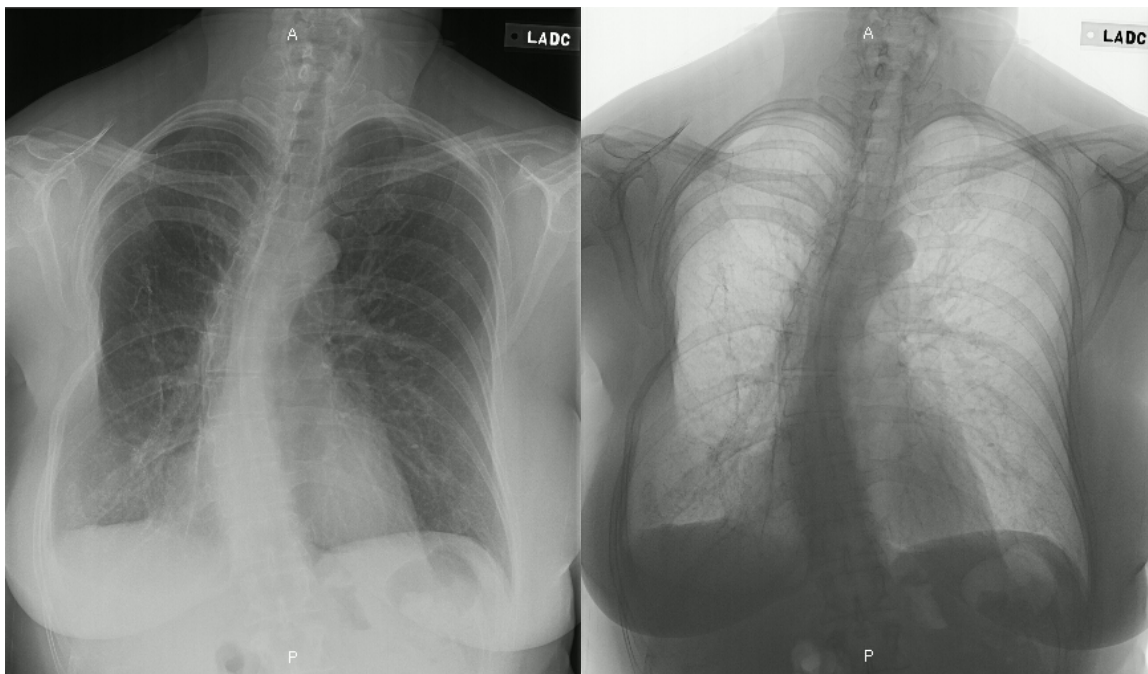### To adjust the thickness of the slab

- Click the **+** or **-** buttons.

NOTE: Enabling slabbing automatically creates a thick slab with a thickness of ten times the acquisition slice thickness.

Inverting Intensities

You can invert images in any of the view modes.

To invert intensities, do one of the following:

- Select **Invert Intensities** from the view menu.
- Press the **I** key.

Using Multi-Monitors

The ResolutionMD® software supports the configuration and use of multi-monitors with a workstation by opening a new window which can be viewed on a separate monitor. This allows users to fully utilize the workspace of a multi-monitor workstation for viewing medical images and reports.

NOTE:

- Collaboration while using multi-monitor can be initiated from either monitor and will share the contents of that monitor with session participants.
- You can only view one 3D view or one MIP/MPR at a time.

To open a second window

1. Select the **New Window** tool [icon] .
2. Drag and resize the second window as desired.

Alternatively,

1. While in the image viewer, select **Display Settings** from the settings [icon] menu.
2. Select the **New Window** tool [icon].
3. Drag and resize the second window as desired.

NOTE: ResolutionMD supports a maximum of two windows.

To save the multi-monitor configuration

1. While in the image viewer, select **Display Settings** from the settings [icon] menu.
2. Select the **Save Displays** [icon] tool.

NOTE: Firefox and Internet Explorer 11 will launch, position and resize the second window. Chrome and Safari will launch the second window, but you will need to position this window as desired.

Adjusting Image Quality

Depending on the quality of your network connection, you can adjust the image quality to fine tune performance. Your adjustments are saved on your device and will be used in the future.

The interactive quality slider adjusts the image quality during interaction with the volume and reduces the amount of network bandwidth used. The final quality slider adjusts the quality of the image after interaction.

To adjust image quality

1. Select **Display Settings** from the settings ⚙ menu.
2. Adjust the quality sliders.

> **NOTE**: User-selected quality settings may result in information loss from the original imagery. Diagnostic interpretation should not be formed from the interactive images but only from the static, final-quality resulting image.

About Collaboration

Collaboration functionality enables you to share the current viewing session with other users on the web or on mobile devices. The collaboration panel contains the interface for inviting participants and administering their permissions for the session.

To open the collaboration panel

- Click the **Collaboration** tool in the image viewer.

> **IMPORTANT**: In a collaboration session, only the host's view is of diagnostic quality.

Hosting Sessions

The host invites participants and controls their privileges from the collaboration panel. All the collaborators view the images in the host's selected view mode.

To invite a user to a session via email

1. Click **Email** in the collaboration panel. This will create a message in your default email client.
2. Enter the recipient's email address in the **To:** field of the message.
3. Send the message.

You can also send an invitation by providing participants with a link via other means of your choosing.

To copy the link to the session

- Click **Copy Link** in the collaboration panel.

A list of participants will be visible in the collaboration panel. Participants will be able to see all your interactions in the image viewer as long as the session is active.

The host can grant or revoke permission for participants to interact with the session.

To toggle a participant's ability to interact with the session

- Click the **Interact** tool   beside the participant's name in the collaboration panel.

Collaborators can point out regions in the image viewer with their own uniquely-colored pointer. This ability can be enabled by the host.

To toggle the pointer

- Click the **Pointer** tool   beside the collaborator's name in the collaboration panel.

To remove a participant from the session

- Click the **X** beside the participant's name in the collaboration panel.

Confidential patient information is hidden in collaboration sessions by default. You can choose to toggle display on or off.

To toggle confidential patient information

- Fill or clear the **Show confidential patient information** check box in the collaboration panel.

> **NOTE:** This option only appears if the server is configured to display confidential patient information.

To end a collaboration session

- Click **End Session** in the collaboration panel.

Joining Sessions

> **IMPORTANT**: In a collaboration session, only the host's view is of diagnostic quality.

To join a collaboration session

1. Click the link in the invitation email or otherwise provided by the session's host.
2. Enter your name and email address to identify yourself to the host.

If the host has already loaded images, participants will see the image view and the host's mouse cursor. Participants can interact with the view if the host grants them the ability.

> **NOTE**: The aspect ratio seen by participants is determined by the host's own display.

Collaborating with Audio/Video Sessions

It is possible for collaborators to communicate in a real-time audio/video (A/V) session.

To initiate an A/V session

- Click the **A/V Share** tool to begin sharing video from your camera with other collaborators.

To stop sharing video from your device

- While sharing video, click the **A/V Share** tool.

> **NOTE**: You may need to grant your web browser access to your device's camera.

To resize an A/V window

- Click and drag the bottom-right corner of the window.

You can adjust the opacity of obtrusive or distracting A/V windows.

To adjust the opacity of an A/V window

- Click and drag the slider located at the bottom of the A/V window.

Getting Around With Keyboard Shortcuts (desktop only)

You can quickly get around the interface with the following keyboard shortcuts:

General Navigation

Keyboard Shortcut	Function
SHIFT-W	Move focus to study list
SHIFT-V	Open image viewer
SHIFT-R	Open search results
SHIFT-S	Open and move focus to search panel
SHIFT-X	Toggles study list panel if the screen is large enough to show both the viewer and study list

Image Viewer

Keyboard Shortcut	Function
HOME	Reset view
-	Zoom out
+	Zoom in
SHIFT-Click and Drag	Pan/Translate

Keyboard Shortcut	Function
DELETE	Remove selected markup or node. Removes selected area in 3D scalpel
Right-click and Drag	Window/Level
V	Reset Window/Level
CTRL-SHIFT-Click and Drag	Zoom

2D

Keyboard Shortcut	Function
Click+Drag	Scroll
CTRL-SHIFT-Click and Drag	Zoom
Right-click and Drag	Window/Level
ALT-Mouse Wheel	Zoom
D	Reset Pan and Zoom
S	Return to default slice
1-0	Window/Level presets
I	Invert intensities
T	Invert intensities

Keyboard Shortcut	Function
O	Toggle magnifying glass
LEFT ARROW	Scroll up
RIGHT ARROW	Scroll down
UP ARROW	Navigate one image stack up in a multi-stack series
DOWN ARROW	Navigate one image stack up in a multi-stack series

MIP/MPR

Keyboard Shortcut	Function
Click+Drag	Scroll
ALT-Mouse Wheel	Zoom
ALT-click and Drag	Auto Scroll
CTRL-click	Triangulate
E	Toggle extents
S	Toggle slabbing
C	Reset pan and zoom in current view
D	Reset pan and zoom in all views

Keyboard Shortcut	Function
I	Invert intensities
T	Invert intensities
LEFT ARROW	Scroll up
RIGHT ARROW	Scroll down
UP ARROW	Navigate one image stack up in a multi-stack series
DOWN ARROW	Navigate one image stack up in a multi-stack series

3D

Keyboard Shortcut	Function
Click+Drag	Rotate
ALT-Mouse Wheel	Rotate about horizontal axis
L	Left Lateral view
R	Right Lateral view
P	Posterior view
A	Anterior view
S	Superior view

Keyboard Shortcut	Function
I	Inferior view
G	Reset clipping panes
O	Toggle lens tool
C	Toggle clipping planes
X	Enable scalpel
Z	Undo scalpel
LEFT ARROW	Rotate left about the vertical axis
RIGHT ARROW	Rotate right about the vertical axis
UP ARROW	Rotate up about the horizontal axis
DOWN ARROW	Rotate down about the horizontal axis

Accessing Documentation

This user guide and other information are accessible from the ResolutionMD® software.

To access documentation

1. Click the **Documentation** tool ⬚ .
2. Click the document you wish to view.

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