

RadiAnt DICOM Viewer

User manual

Version 2020.1
4/8/2020



<https://www.radiantviewer.com>

Copyright © 2009-2020 Medixant.
All rights reserved.

Table of contents

1 Welcome to RadiAnt DICOM Viewer	8
1.1 Features.....	9
1.2 System requirements.....	13
1.3 Installation	14
.....Troubleshooting	18
Installation is blocked by Windows 10.....	18
1.4 Security considerations.....	20
1.5 Activation.....	21
.....Trial license activation	23
.....Paid license activation	28
.....Deactivation	37
2 Basic Topics	43
2.1 Opening a DICOM study from a CD/DVD	43
2.2 Opening a DICOM study from a folder.....	44
2.3 Opening a DICOM study from a ZIP archive.....	47
2.4 Opening specific DICOM file(s).....	50
2.5 Opening a study from a PACS server.....	53
.....Displaying pushed studies	58
2.6 Using basic tools.....	59
.....Browsing series and images	61
.....Changing brightness / contrast	63
.....Changing zoom level / position	67
2.7 Taking measurements.....	69
.....Length	69
.....Ellipse	75
.....Closed polygon	79
.....Open polygon	82
.....Angle	85
.....Cobb angle	86

.....Deviation	87
.....Arrow	89
.....Pencil tool	94
2.8 Flips / Rotations	95
2.9 Cine mode	97
2.10 Annotations	98
2.11 Copying to the clipboard	101
2.12 Full-screen mode	103
 3 Advanced Topics	 106
3.1 Local archive	106
.....Importing DICOM CD/DVD	107
.....Importing DICOM folder	108
.....Importing DICOM ZIP archive	110
.....Importing DICOM file(s)	112
.....Importing studies from PACS servers	114
.....Importing studies from viewer	117
.....Opening studies	118
.....Searching studies	119
.....Exporting images	119
.....Deleting images	121
.....Keywords	123
.....Multiple databases	125
.....Database window configuration	128
.....Backing up databases	131
.....Database maintenance	132
3.2 Exporting images	133
3.3 Multiple series viewing	137
.....Multiple windows	142
.....Synchronization	144
Auto synchronization	145
Manual synchronization	146
.....Cross-reference lines	147
.....3D Cursor	149

.....Adding more studies	150
.....Splitting series	151
3.4 ROI operations.....	153
3.5 Image filters.....	156
3.6 2D Multiplanar reconstruction (MPR).....	158
3.7 3D Multiplanar reconstruction (MPR).....	160
.....Changing the viewing plane	162
.....Browsing volume	165
.....Changing zoom level and position	166
.....Changing brightness / contrast	168
.....Changing thickness (MIP/MinIP/Avg)	170
.....Taking measurements	172
Length.....	172
Ellipse.....	173
Closed polygon.....	173
Open polygon.....	174
Angle.....	174
Arrow	175
.....Exporting images	176
.....Window configuration	178
.....Settings	181
3.8 3D Volume Rendering (VR).....	183
.....Rotations	185
.....Changing zoom level and position	187
.....Changing color and opacity	188
.....3D presets	191
.....Removing unwanted structures	196
.....3D snapshots	200
.....Taking measurements	202
Length.....	202
Arrow	204
.....Exporting images	205
.....Exporting movies	207
Quick movie.....	208
Advanced movie.....	210
.....Exporting 3D models	214
.....Annotations	217

..... Settings	218
3.9 Image fusion (PET-CT).....	220
3.10 Time-intensity curves (TIC).....	224
3.11 PACS connectivity	229
..... PACS search presets	230
..... PACS configuration	232
..... PACS troubleshooting	240
..... PACS integration	244
3.12 Special types of DICOM files.....	246
..... Structured report (SR)	246
..... MPEG2/4 video	247
..... Encapsulated PDF	249
..... DICOMDIR	249
3.13 DICOM tags	250
3.14 Changing language.....	253
3.15 Keyboard customization.....	255
3.16 Program and license information.....	258
4 Appendix	260
4.1 Keyboard shortcuts.....	260
4.2 Mouse functions	268
4.3 Multi-touch operations	270
4.4 Configuration files.....	271
..... Options.xml	271
..... Overlay.xml	274
4.5 Command-line arguments	277
4.6 URL protocol	279
4.7 Setup arguments	280
4.8 GPU acceleration.....	281
4.9 Citations	284
4.10 CD/DVD/USB Autorun Package.....	285
..... Software limitations	285
..... Package contents	285

.....Recording DICOM CD/DVD	287
.....Encrypted DICOM CD/DVD/USB	297

1 Welcome to RadiAnt DICOM Viewer

RadiAnt DICOM Viewer is an application for processing and displaying medical images in DICOM format (Digital Imaging and Communications in Medicine).

The viewer allows users to open studies from CD/DVD/BluRay disks, flash memory, local and network folders, and PACS locations.

Studies obtained from different imaging modalities can be displayed in RadiAnt DICOM Viewer:

- Digital Radiography (CR, DX)
- Mammography, Digital Breast Tomosynthesis (MG)
- Computed Tomography (CT)
- Magnetic Resonance (MR)
- Positron Emission Tomography PET-CT (PT)
- Ultrasonography (US, IVUS)
- Digital Angiography (XA)
- Gamma camera, Nuclear medicine (NM)
- Secondary Pictures and Scanned Images (SC)
- Endoscopy (ES)
- Microscopy (SM, GM)
- Structured Reports (SR)
- Encapsulated PDF Documents (OT)

The viewer can handle many types of DICOM images:

- Monochromatic (e.g. CR, CT, MR) and color (e.g. US, 3D reconstruction)
- Static images (e.g. CR, MG, CT) and dynamic sequences (e.g. XA, US)
- Uncompressed and compressed (RLE, JPEG Lossy, JPEG Lossless, JPEG 2000, JPEG-LS)
- MPEG2/MPEG4 compressed video files

RadiAnt DICOM Viewer is not a medical product. It has no FDA/CE or any other certifications and is not intended for diagnostic purposes.

1.1 Features

Basic Functionality

- Desktop application for installation on PCs, laptops, and tablets running Windows systems
- Windows XP/Vista/7/8/8.1/10 supported
- Native ARM 64-bit version for the new generation of Windows 10 on ARM devices (e.g., Surface Pro X)
- No additional dependencies (.NET, Java, etc.)
- Lightweight, compact application¹
- Excellent performance with 32- and 64-bit versions that are both optimized for multi-core processors
- Asynchronous reading (you can browse images as they are being opened)
- Advanced memory management system that facilitates the concurrent opening of studies that contain thousands of images

Supported DICOM Formats

- Files from different imaging modalities: CR, DX, MG, CT, MR, PT, US, XA, NM, SC, SR
- Monochromatic images (e.g., CR, CT, MR)
- Color images (e.g., US, 3D reconstructions)
- Static images (e.g., CR, MG, CT)
- Dynamic sequences (e.g., XA, US)
- Uncompressed images (little endian/big endian, implicit/explicit VR)
- Compressed images (RLE, JPEG Lossy, JPEG Lossless, JPEG 2000, JPEG-LS)
- Structured reports
- Encapsulated PDF documents
- MPEG4/MPEG2 DICOM videos

Access DICOM Studies

- Open DICOM studies from CD/DVD/Blu-ray discs
- Open DICOM studies from local and network folders
- Open DICOM studies from USB drives
- Open ZIP archives (unencrypted/encrypted) with DICOM files
- Search and download DICOM studies from PACS locations (servers, workstations, modalities)
- Accept and display studies pushed from other PACS locations

Local Archive

- Store DICOM studies in a local database
- Import DICOM studies from CD/DVD/Blu-ray discs
- Import DICOM studies from local and network folders
- Import DICOM studies from USB drives
- Import ZIP archives (unencrypted/encrypted) with DICOM files
- Import DICOM studies from PACS locations
- Organize study collection using keywords
- Multiple databases supported

Export Images

- Export DICOM files to JPEG/BMP images
- Export DICOM files to MP4/WMV movies
- Export DICOM files in original format²
- Copy displayed image to Windows Clipboard

Basic Tools

- Perform fluid zooming
- Perform fluid panning
- Adjust brightness and contrast (window level/window width)
- Negative mode
- Apply window presets for computed tomography (lung, bone, etc.)
- Rotate (90 CW, 90 CCW, 180)
- Flip (horizontal, vertical)
- Apply image filters (sharpen, smooth, edge, emboss)
- Display dynamic series/sequences (CINE) with option to adjust frames per second
- Display DICOM overlays (annotations or graphic overlays included in the file)
- Display DICOM file structure with searchable DICOM tags, their descriptions and values

Measurements/ROI

- Measurement of segment length
- Manual calibration of length measurements
- Support for calibrated regions in ultrasound images
- Measurement of mean, minimum and maximum parameter values (e.g. density in Hounsfield Units in computed tomography, SUVbw in PET) within circle/ellipse and its area
- Measurement of area and perimeter of a closed polygon
- Measurement of open polygon length

- Measurement of angle value
- Measurement of Cobb angle value
- Measurement of deviation distance
- Arrow tool for annotations
- Pencil tool for freehand drawing

Compare Series

- Compare multiple series in the same or different windows
- Automatic synchronization between series with images acquired in the same plane (e.g., computed tomography series before and after contrast media administration)³
- Manual synchronization between series from different studies that have a similar patient orientation
- Cross-reference lines in series with different image planes (e.g., magnetic resonance study)³
- 3D cursor tool
- Split multi-sequence series into separate panels

Advanced Tools

- 2D MPR (orthogonal multiplanar reconstructions)
- Fusion of series with different modalities (e.g., PET-CT) or with different protocols (e.g., MR T1/T2 – DWI)
- Time-intensity curves (TIC, e.g., for breast MRI)
- 3D MPR (oblique multiplanar reconstruction) with MIP (maximum intensity projection), MinIP (minimum intensity projection) and Avg (average) modes
- 3D VR (volume rendering)
- 3D snapshots for saving and restoring 3D VR views
- Creation of quick movies (simple rotations) and advanced 3D snapshot-based videos with volume-rendered objects
- Export 3D models to STL files
- GPU acceleration for 3D VR and 3D MPR/MIP⁴

Interface

- A simple and intuitive interface with full-screen mode
- Multi-touch support for Windows 8/8.1/10 touch-enabled devices
- Multilingual interface—more than 30 translations available⁵
- Customizable keyboard shortcuts
- Integration with third-party systems via command-line arguments and the radiant:// URL protocol

¹ The installer size of RadiAnt DICOM Viewer is 7MB; the disk space occupied after installation is 9MB.

² It is not possible to export secondary images obtained using Multiplanar Reconstructions (MPR), 3D Volume Rendering, Fusion, or Time-intensity Curve (TIC) tools to DICOM files.

³ The series have to belong to the same study.

⁴ Only available with the 64-bit version of RadiAnt DICOM Viewer. Supported NVIDIA graphics card required.

⁵ RadiAnt DICOM Viewer and RadiAnt DICOM Viewer CD/DVD are distributed with English and Polish language support. Other translations (Arabic, Brazilian Portuguese, Bulgarian, Chinese, Chinese [Taiwan], Croatian, Czech, Danish, Dutch/Flemish, French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Mongolian, Norwegian, Persian, Portuguese, Romanian, Russian, Serbian, Slovak, Spanish, Swedish, Turkish, Ukrainian) have been created by the community and are available for download from <https://www.radiantviewer.com/translations/>. Not all translations have been updated for the newest version of the viewer.

1.2 System requirements

Minimum system requirements:

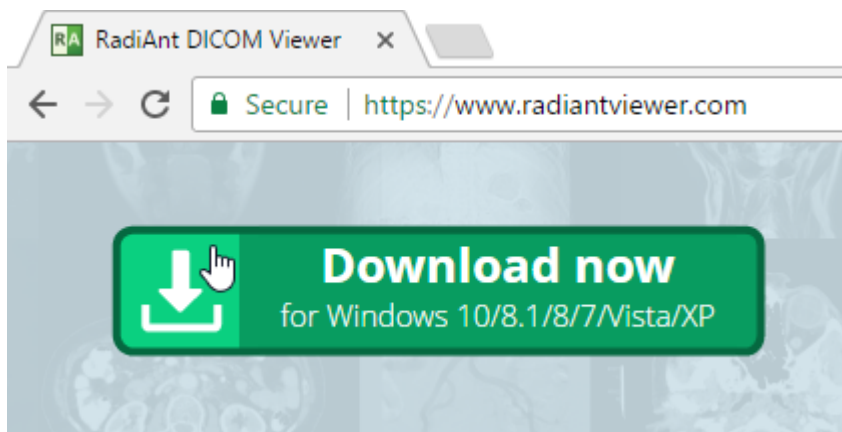
- Microsoft Windows system (XP SP3, Vista, Windows 7, Windows 8, Windows 8.1 and Windows 10 are supported)
- Intel or AMD 1GHz or faster processor
- 512MB of RAM
- 9MB of available hard-disk space for installation; additional free space required for image caching
- 1024 x 768 screen resolution

Recommended system requirements:

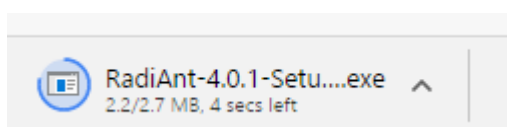
- Microsoft Windows 10 system
- Intel or AMD 3GHz or faster processor with four or more cores
- 4GB of RAM (8GB for 3D viewing) or more
- Fast SSD system drive
- 1920 x 1080 (or higher) screen resolution
- NVIDIA graphics card (10 series or newer) for [GPU-accelerated](#) 3D VR and MPR

1.3 Installation

Download RadiAnt DICOM Viewer from <https://www.radiantviewer.com>

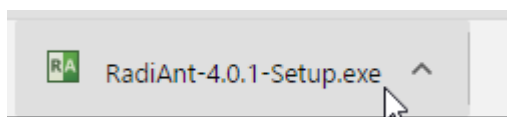


Save the file to your computer - depending on your connection speed, the software may require between one second and one minute to download in full.

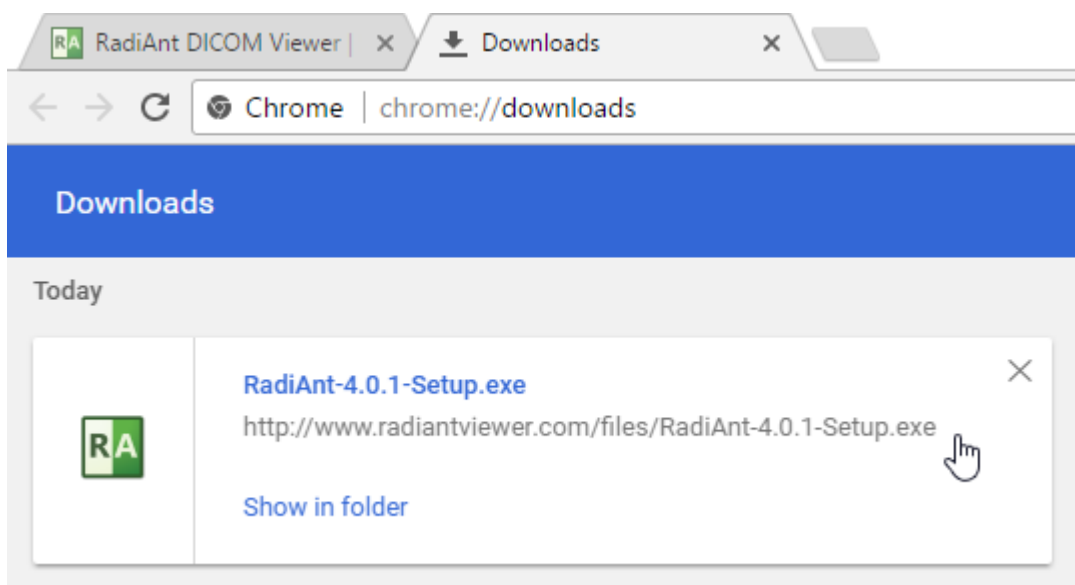


Click the downloaded file to run the installer.

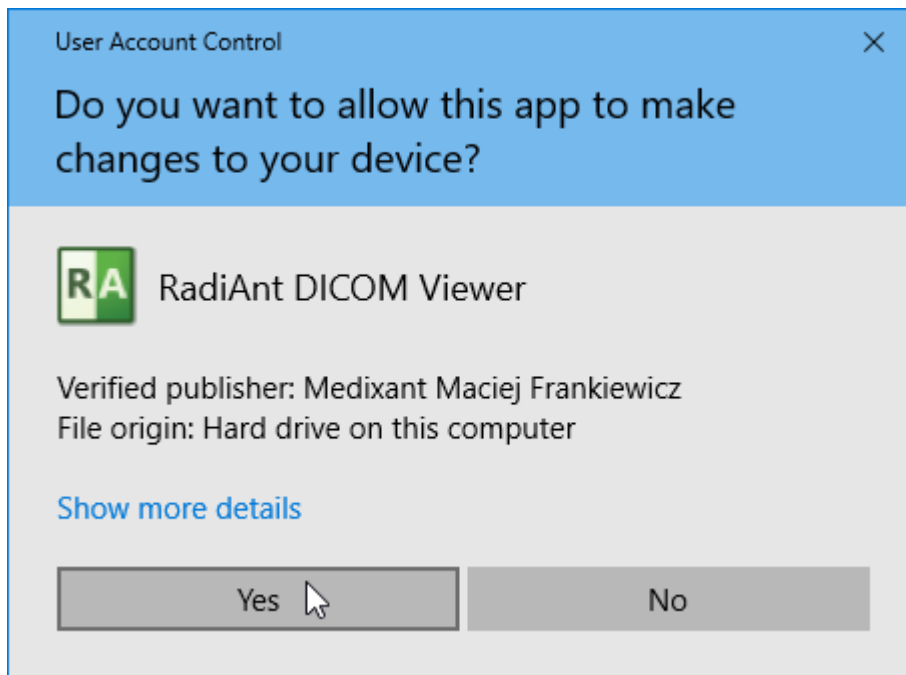
In the bottom download bar:



or in Downloads:



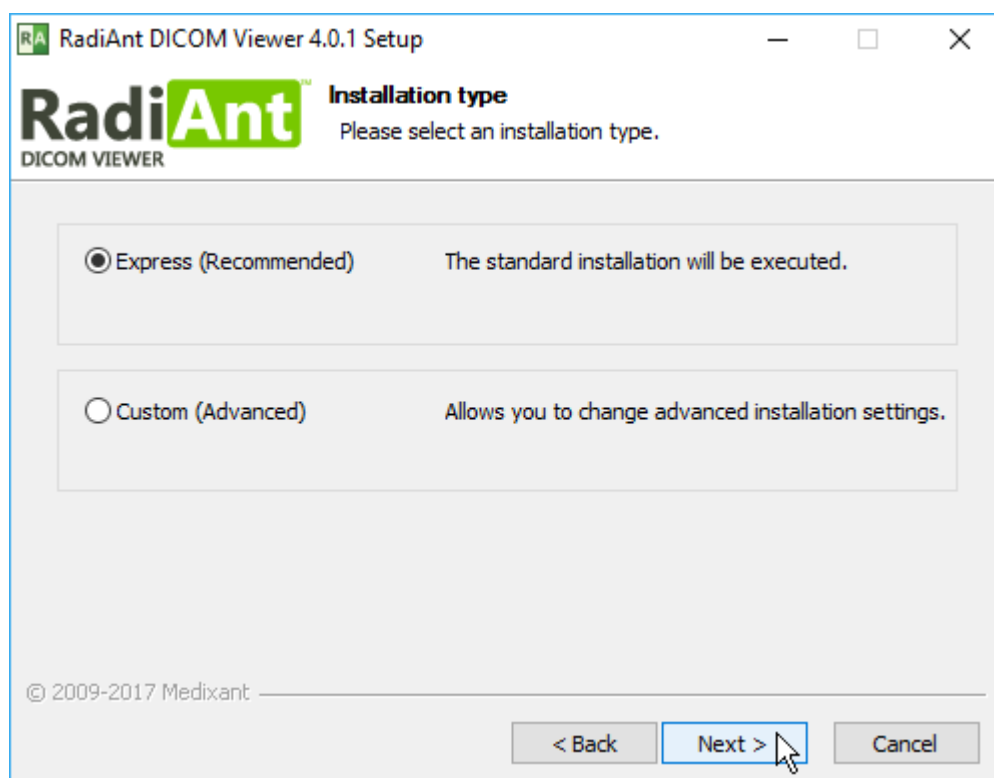
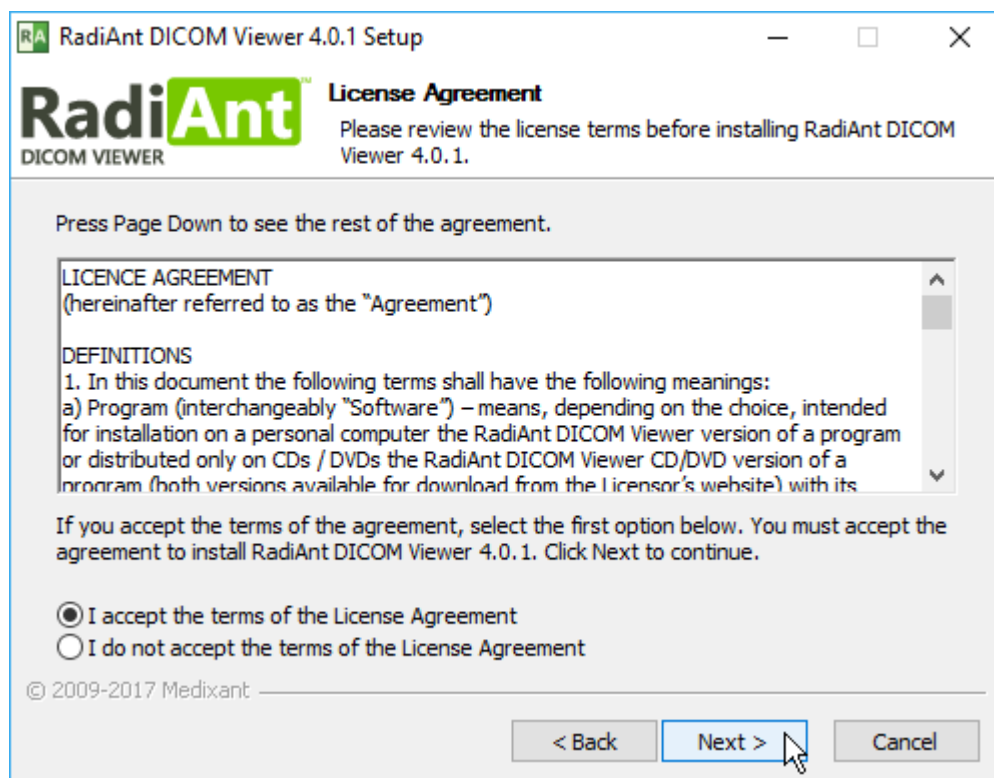
Windows 7, Windows 8/8.1 and Windows 10 users may be prompted with a “User Account Control” alert; if so, select **Yes** or **Continue** to proceed with the installation.

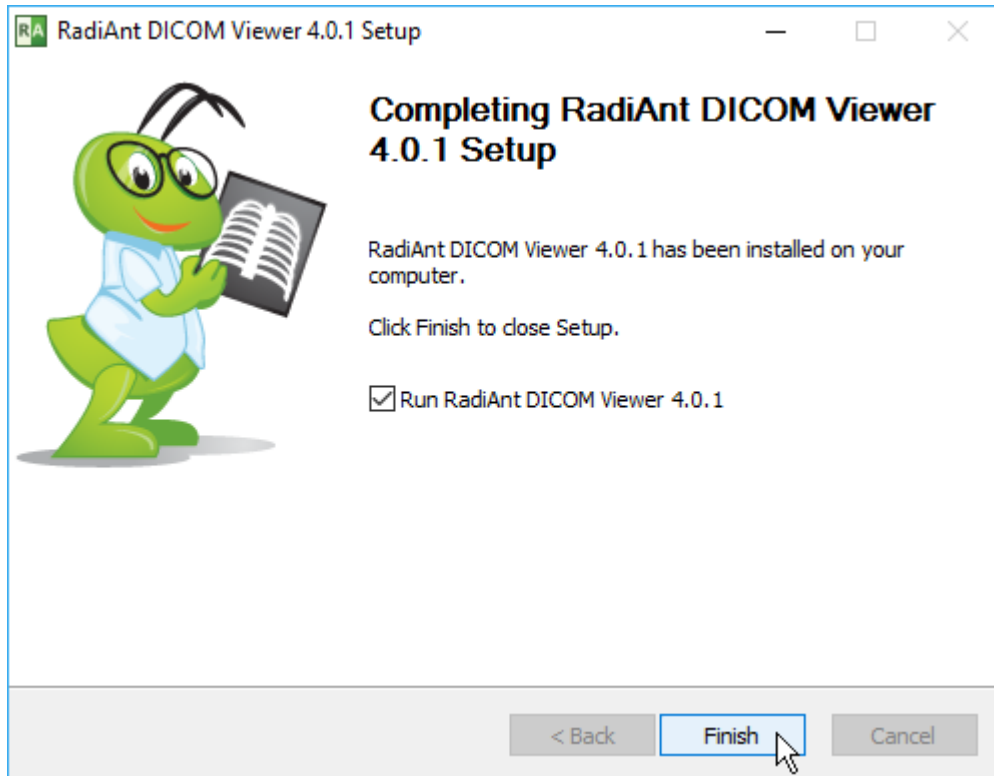


If you answer **No**, RadiAnt DICOM Viewer will be installed only for the current user.

Follow the steps outlined by the setup wizard to complete the installation.

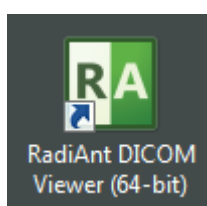
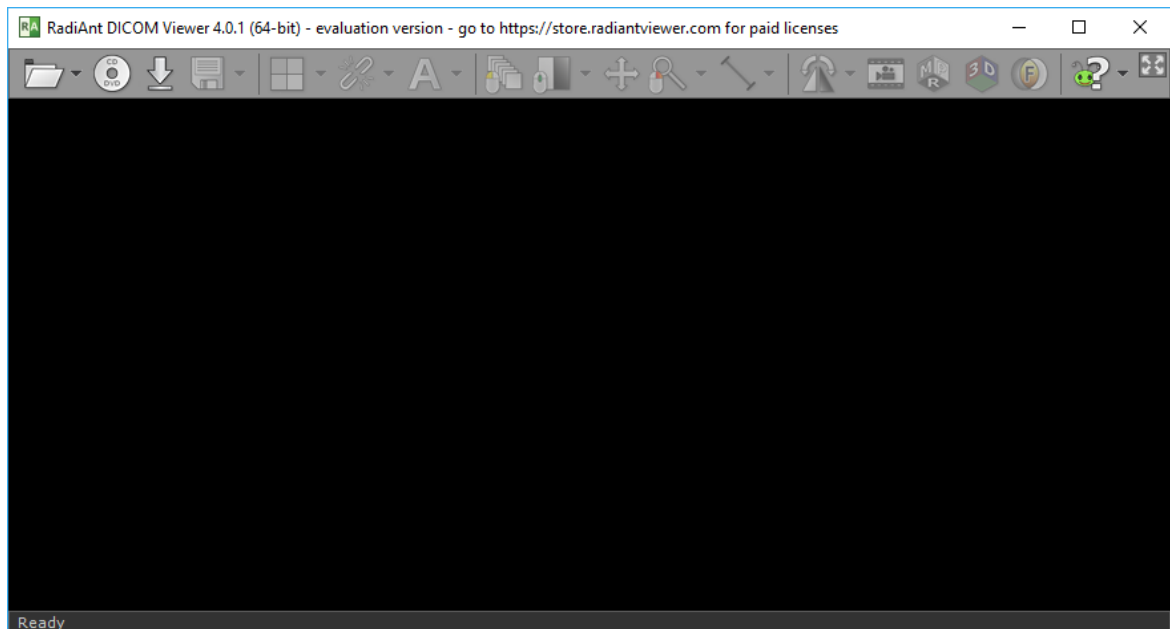






Once the setup has completed, your software is installed.

If this is your first time installation, you will need to [activate the software](https://store.radiantviewer.com). Otherwise, RadiAnt DICOM Viewer will start automatically.



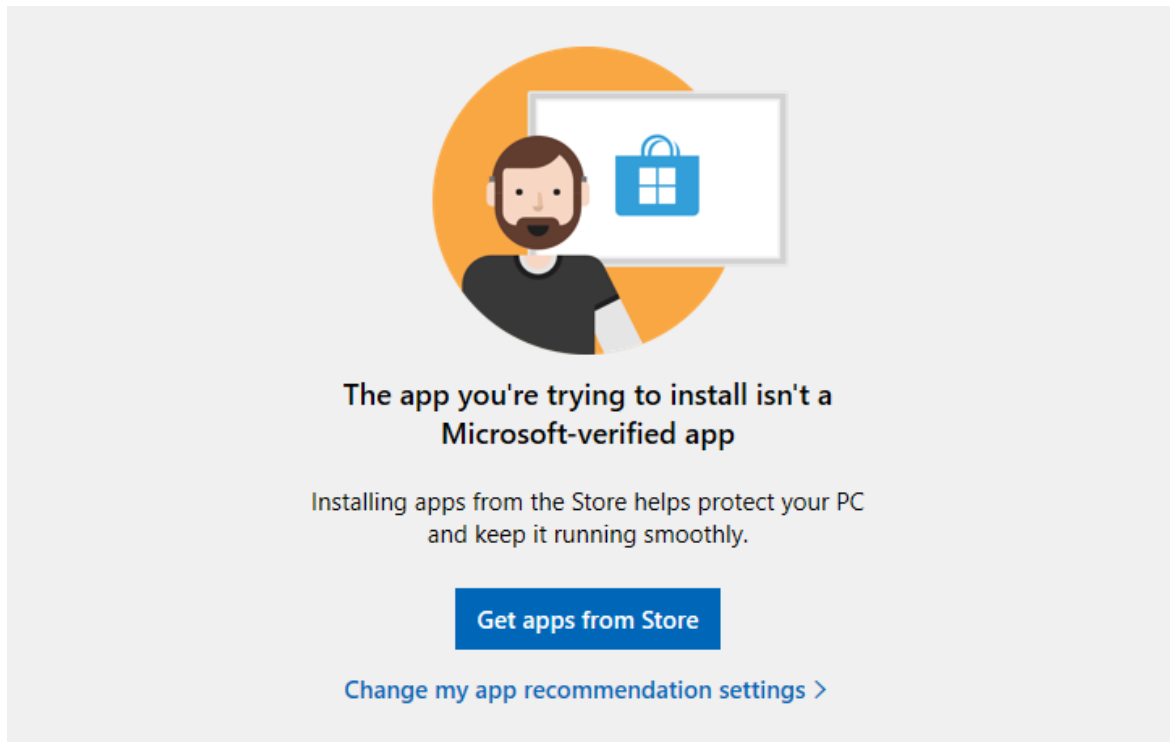
The next time you want to use RadiAnt DICOM Viewer, simply double-click its desktop icon to begin using the software immediately!

1.3.1 Troubleshooting

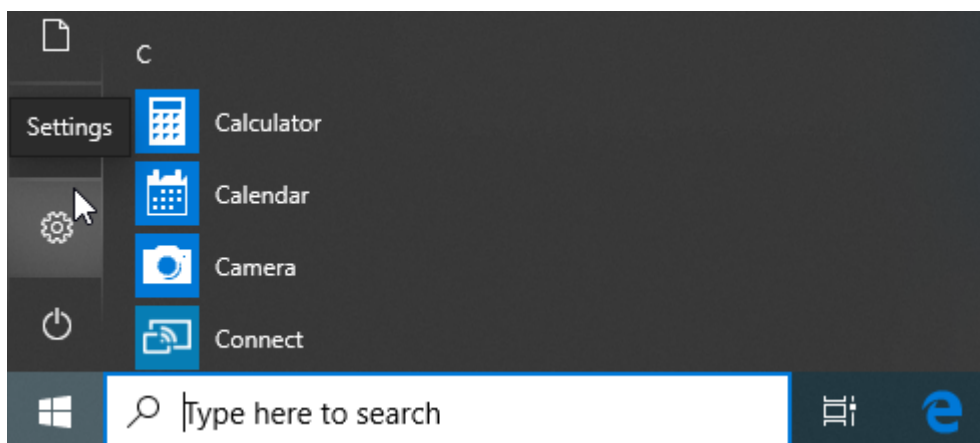
1.3.1.1 Installation is blocked by Windows 10

Windows 10 users need to ensure that the option to allow Windows 10 to install apps downloaded outside the Windows Store is enabled.

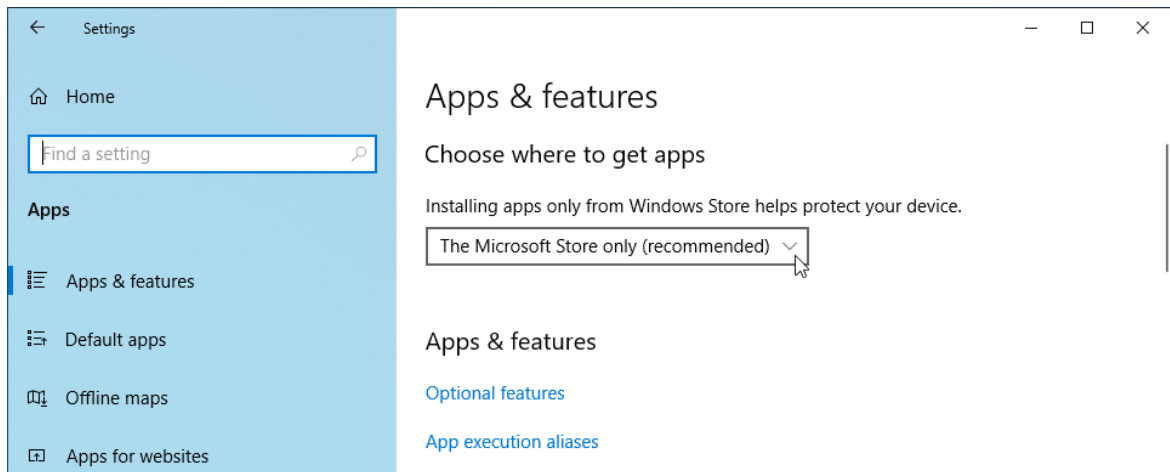
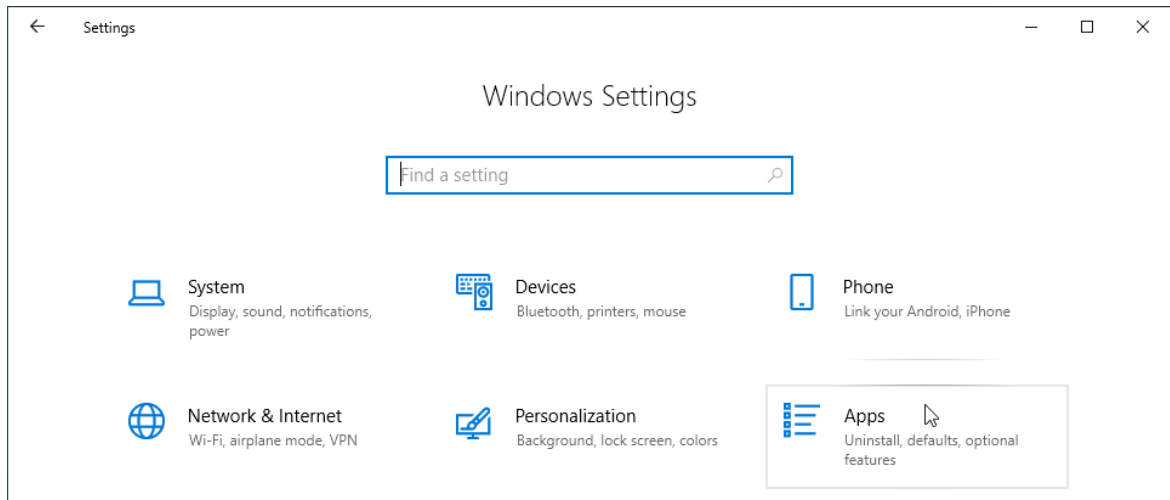
If non-store apps are blocked by Windows 10, when you try to run the installer, the warning message displayed below (or similar) will appear:



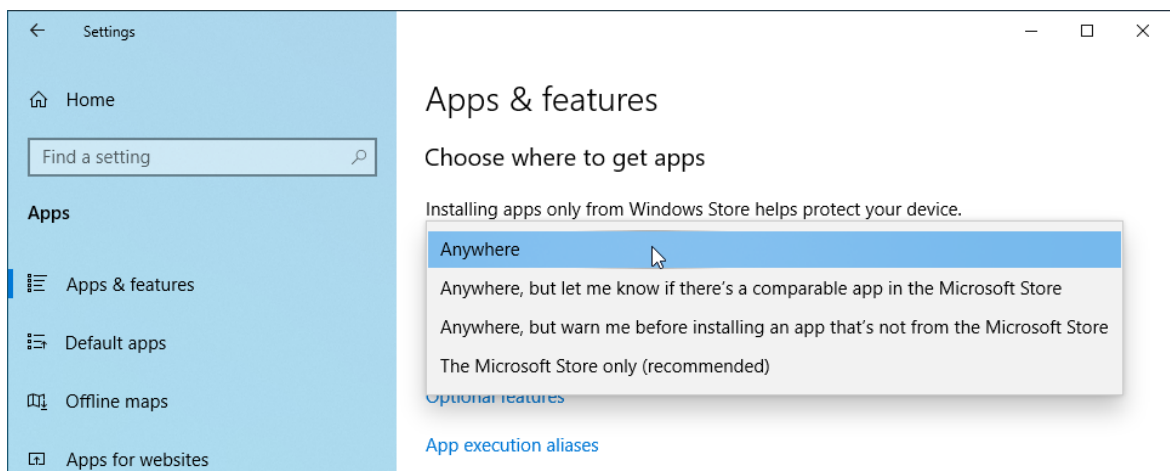
To remedy this issue, click on the Start menu button and open the Settings app.



Navigate to Apps > Apps & features.



In the **Choose where to get apps** section, select the **Anywhere** option from the drop-down menu to stop Windows 10 from preventing programs from outside the Windows Store from being installed.



1.4 Security considerations

Unless they are anonymized or non-medical, DICOM files usually include very sensitive information about the patient (name, age, ID number, birth date, weight, etc.) and contain the medical image, which itself is of an extremely sensitive nature. Special care must be taken to ensure that this information stays private and is not susceptible to unauthorized access. Before taking any further actions, make sure that you are authorized to view and store specific DICOM files on your machine.

When you store DICOM files on your computer:

- Apply physical security measures (locks, security alarms, monitoring, etc.) to prevent unauthorized persons from accessing your computer that stores DICOM files.
- Use full disk encryption (e.g., Microsoft BitLocker) with a strong password to render data unreadable even if an unauthorized person were to gain access to your computer.
- Use firewall and antivirus software to prevent intrusion and to detect infected files that might compromise the security of your computer, and thereby enable unauthorized file access.
- Protect access to your Windows account with a strong password. Use a minimum length of 8 or more characters. Include different types of characters: numbers, symbols, capital letters, and lower-case letters.
- Log off or power off when leaving your computer unattended.
- Delete the DICOM files from your computer when they are no longer necessary.

When you search and download studies from PACS locations, keep in mind:

- The PACS client module that you use to search for and download studies (DICOM files) communicates over unencrypted TCP connections. Make sure the network connection is secure and there is no possibility for an unauthorized user to eavesdrop on the data.
- On less secure networks, or when two networks are connected through WAN, the data transfer must be made private. Set up VPN tunnel (e.g., IPsec IKEv2, OpenVPN) to encrypt the connection between the PC where RadiAnt DICOM Viewer is installed and the other PACS location.
- The same security rules apply to any computer on which RadiAnt DICOM Viewer is installed and the PACS connection is configured. This way, unauthorized persons can be prevented from searching and downloading studies from configured PACS locations.

1.5 Activation

Activation (trial license)

What is activation (trial license)?

Activation in trial mode allows you to use a fully functional version of RadiAnt DICOM Viewer during the evaluation period.

How often do I need to activate RadiAnt DICOM Viewer (trial license)?

The evaluation version expires after a predetermined period of time (displayed after activation). After expiration, the installation needs to be reactivated for further evaluation. Old versions may not qualify for the evaluation. In that case, you can purchase a license if you want to continue to use the old version or download the most recent version from RadiAnt's website and activate it in trial mode.

Activation (paid license)

What is activation (paid license)?

Product activation is the process of verifying the validity of a product's license. Once the product is activated, the user can access the software. The product activation process protects both your rights as a consumer and the rights of Medixant as a software developer. It verifies that you have installed genuine RadiAnt DICOM Viewer software and that the product has not been activated on more computers than those permitted by the EULA.

How often do I need to activate RadiAnt DICOM Viewer (paid license)?

For paid licenses, the activation is permanent. You will only need to reactivate when you transfer your RadiAnt DICOM Viewer license to another computer or when you renew your Update & Support subscription.

How can I transfer the license to another computer?

First, you need to [deactivate the license](#) on your "old" computer. After successful deactivation, the license can be activated on a new machine. Please note, a license can be transferred only once in a 90-day period.

I have purchased N licenses. Can I install RadiAnt DICOM Viewer on more than N computers?

No, you need a separate license for each computer (or terminal) on which RadiAnt DICOM Viewer is installed (or used).

Deactivation

What is deactivation?

Deactivation lets you transfer your RadiAnt DICOM Viewer paid license to another computer.

How often can I deactivate a license?

A single license can be deactivated only once in 90 days.

A license key valid for N licenses can be deactivated N times during a 90-day period.

Can the same computer be deactivated and reactivated many times?

Deactivation is intended for situations in which you no longer plan to use RadiAnt DICOM Viewer on your "old" computer.

It is not designed for transferring the paid license back and forth between two computers that are in active use. As such, the software can only be deactivated on the same computer twice.

When this limit is reached, you will not be able to deactivate the license.

Is it possible to deactivate a license if the computer cannot be accessed anymore? (stolen, broken, etc.)

Please log in to ["My Licenses" account](#) with the email address provided when purchasing the license. You will be able to deactivate your old computer there.

1.5.1 Trial license activation

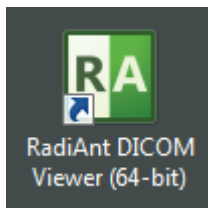
Automatic activation

The steps below illustrate the process by which you can activate RadiAnt DICOM Viewer in the evaluation mode on computers that are connected to the Internet.

If your computer has no Internet connection, you can [activate the software manually](#).

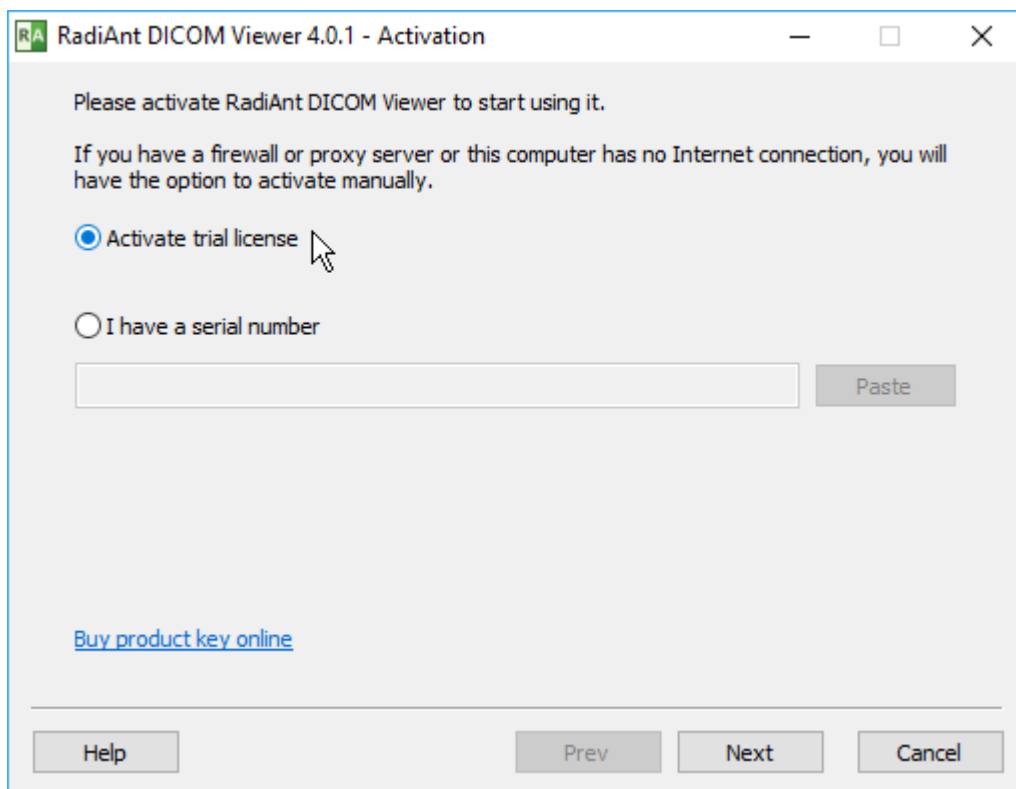
To activate your software:

1. Launch RadiAnt DICOM Viewer by clicking on the product icon on your desktop.

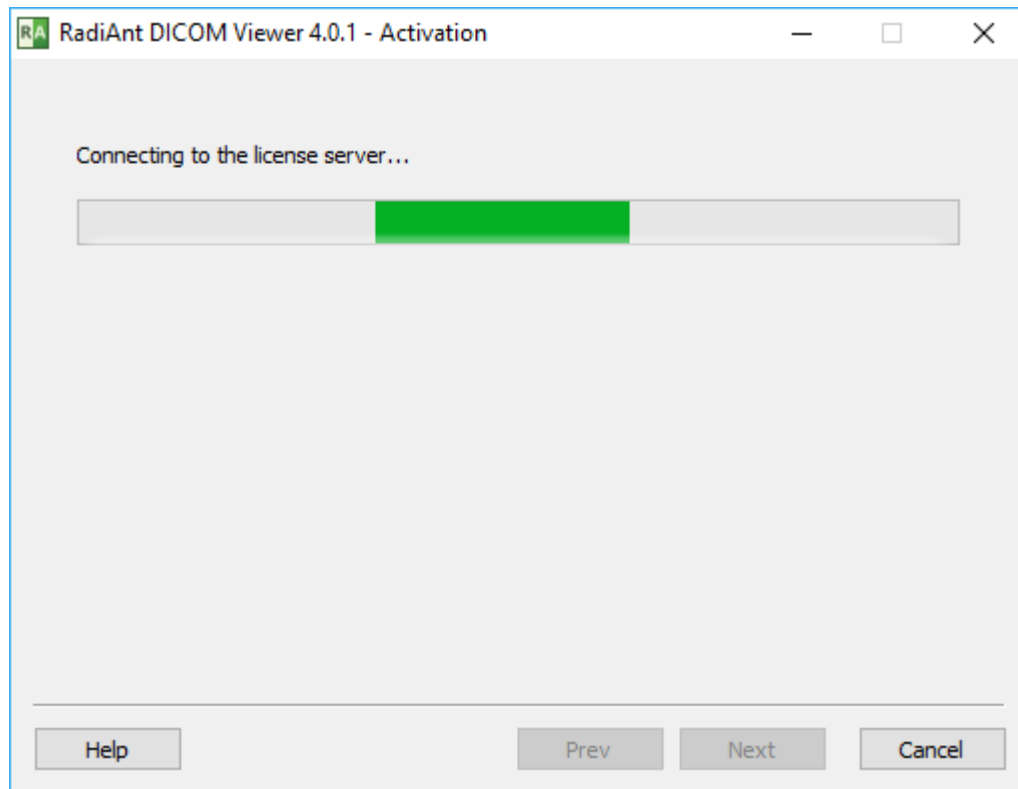


2. On the Activation screen, choose the following option:

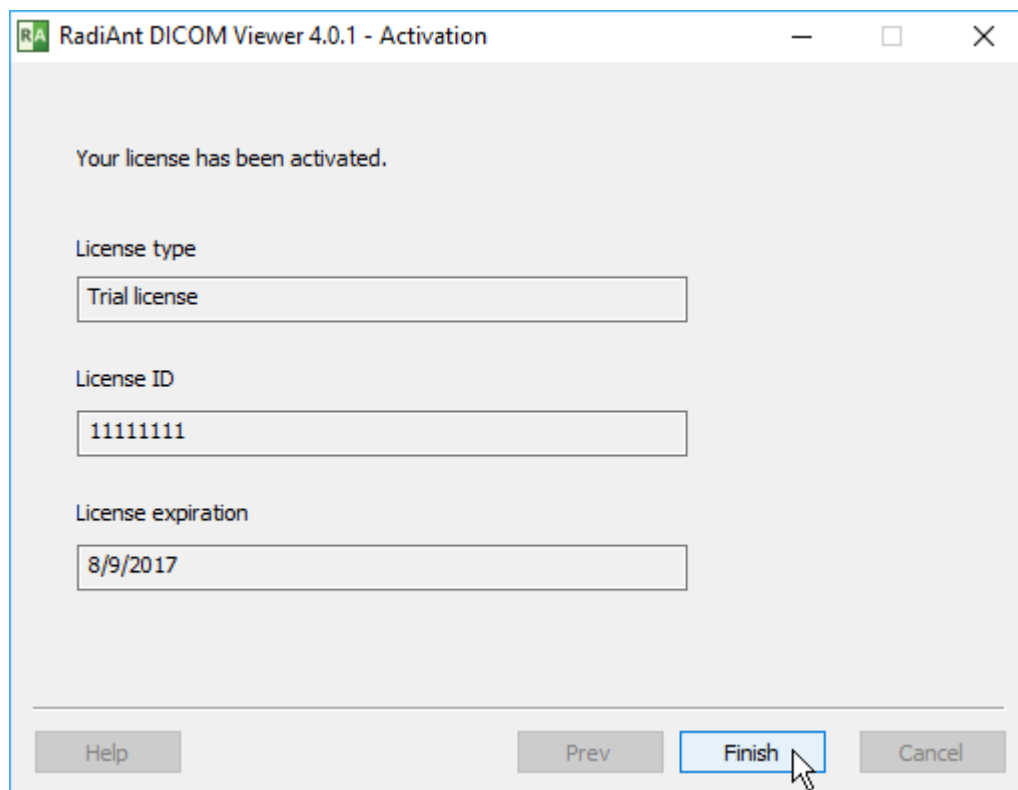
- **Activate trial license**.



3. Click the **Next** button. RadiAnt DICOM Viewer will attempt to connect to the license server.



4. When you see the Activation info screen, activation is complete.



5. Click the **Finish** button to start using the software.

Manual activation

The process by which you can activate RadiAnt DICOM Viewer in the evaluation mode on computers that are not connected to the Internet is described below.

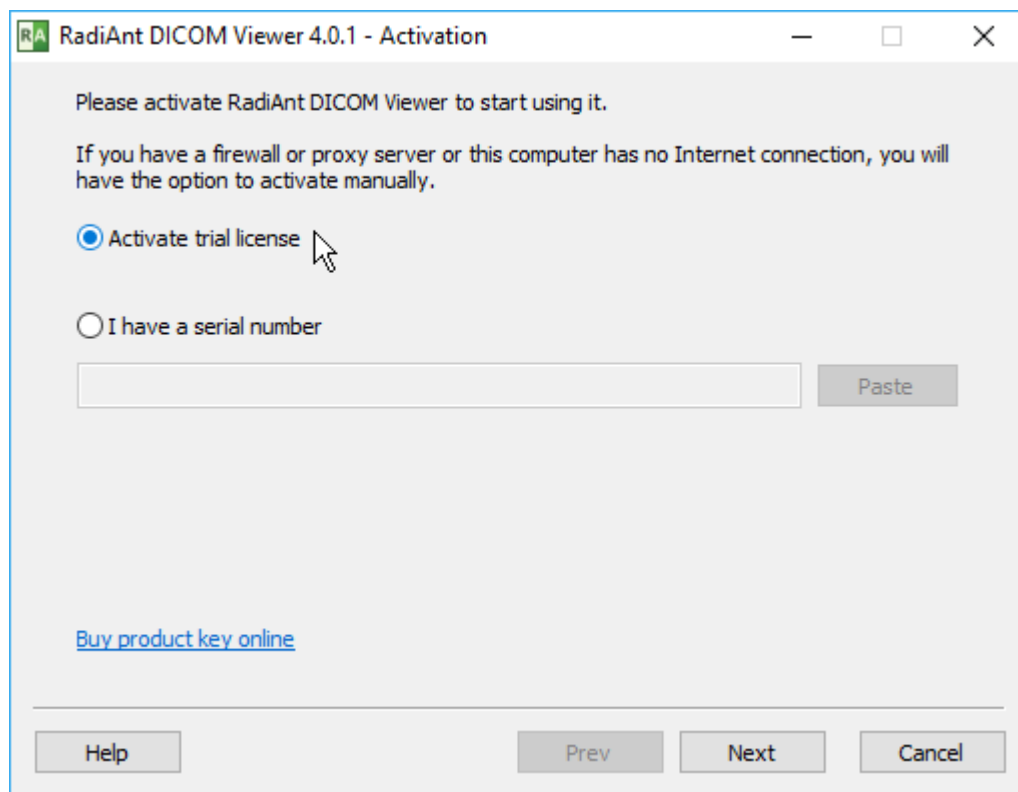
To activate your software:

1. Launch RadiAnt DICOM Viewer by clicking on the product icon on your desktop.

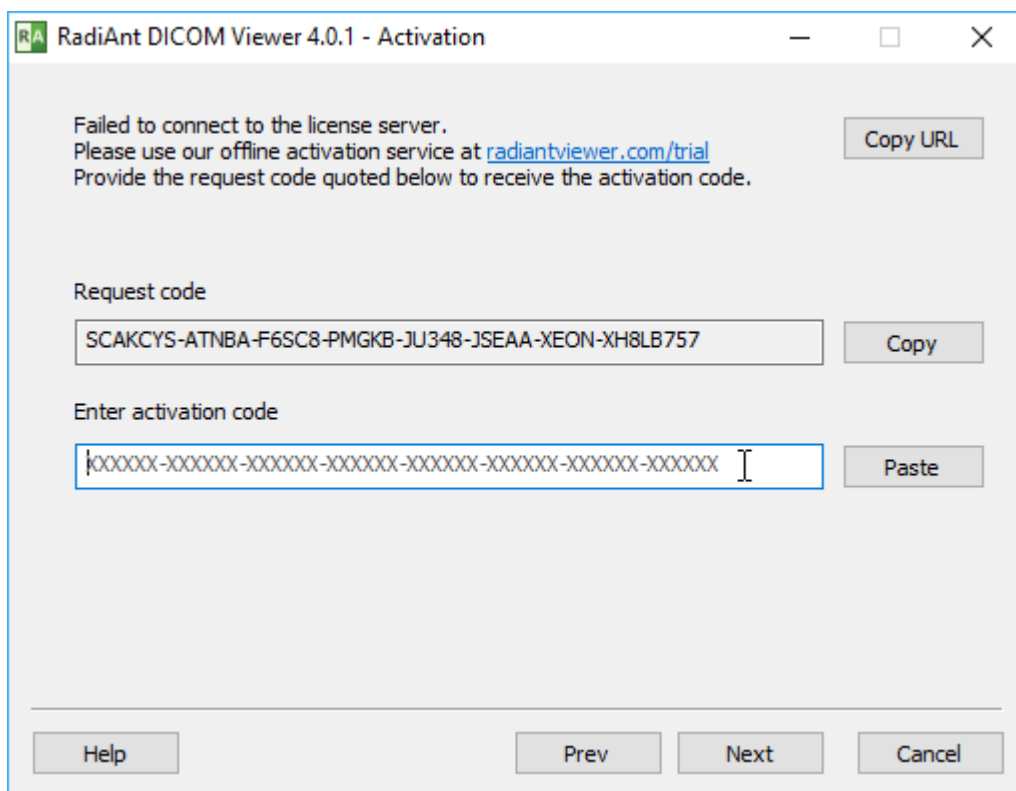


2. On the Activation screen, choose the following option:

- **Activate trial license**.



3. Click the **Next** button. After a failed attempt to connect to the license server, the offline activation screen will be displayed.



RadiAnt DICOM Viewer 4.0.1 - Activation

Failed to connect to the license server.
Please use our offline activation service at radiantviewer.com/trial
Provide the request code quoted below to receive the activation code.

Request code

SCAKCYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-XH8LB757

Copy

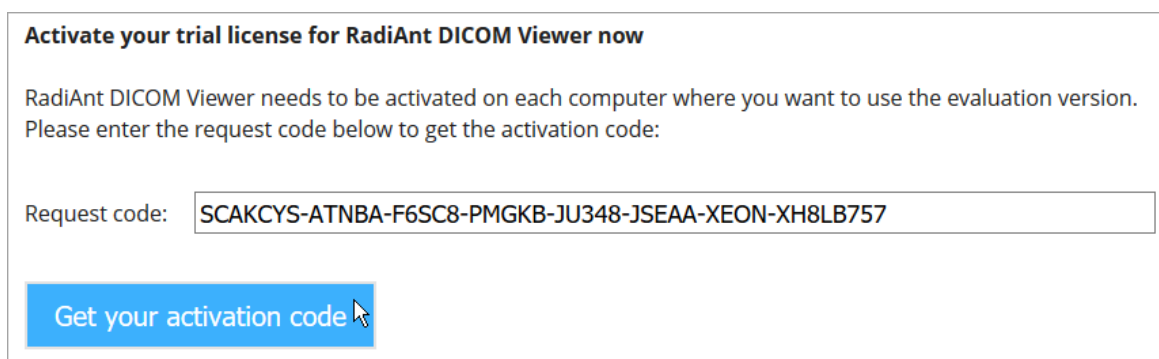
Enter activation code

XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX

Paste

Help Prev Next Cancel

- Go to <https://radiantviewer.com/trial> and complete the form with the request code. Click the **Get your activation code** button.



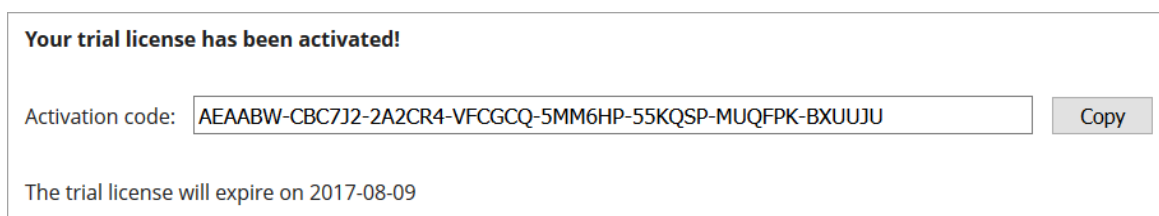
Activate your trial license for RadiAnt DICOM Viewer now

RadiAnt DICOM Viewer needs to be activated on each computer where you want to use the evaluation version.
Please enter the request code below to get the activation code:

Request code:

Get your activation code

- The trial activation code will be displayed.

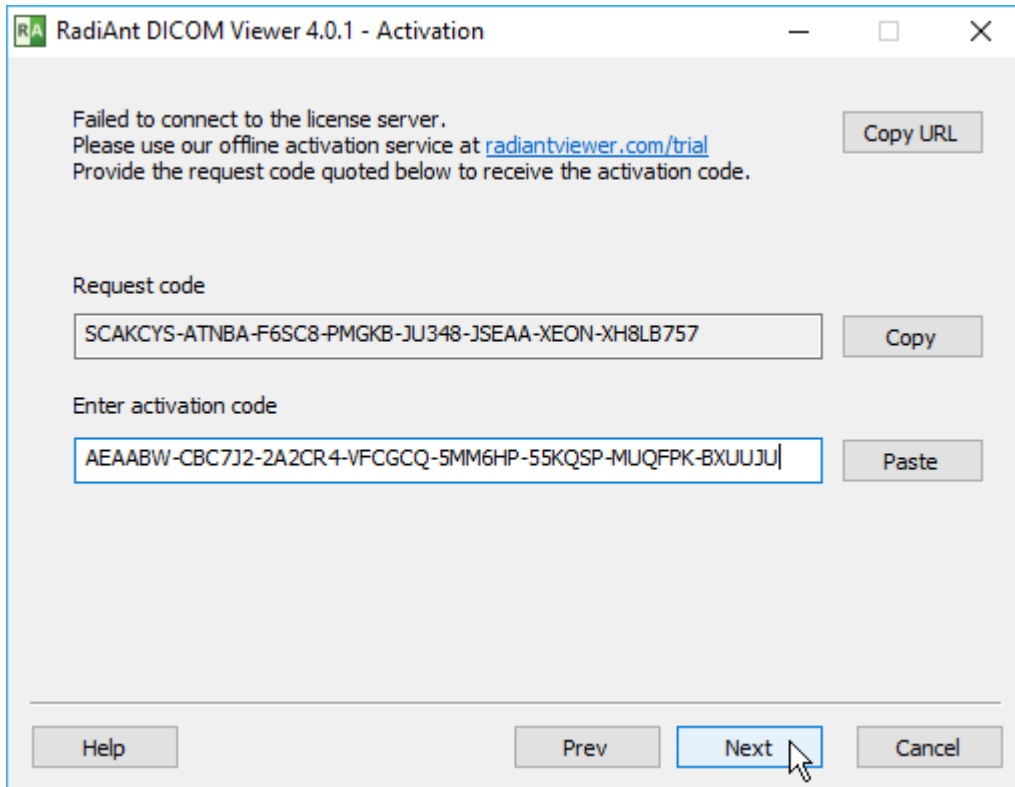


Your trial license has been activated!

Activation code: **Copy**

The trial license will expire on 2017-08-09

- Enter this code in the appropriate field on the RadiAnt DICOM Viewer offline activation screen and press the **Next** button.



RadiAnt DICOM Viewer 4.0.1 - Activation

Failed to connect to the license server.
Please use our offline activation service at radiantviewer.com/trial
Provide the request code quoted below to receive the activation code.

Request code

SCAKCYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-XH8LB757

Enter activation code

AEAABW-CBC7J2-2A2CR4-VFCGCQ-5MM6HP-55KQSP-MUQFPK-BXUUJU

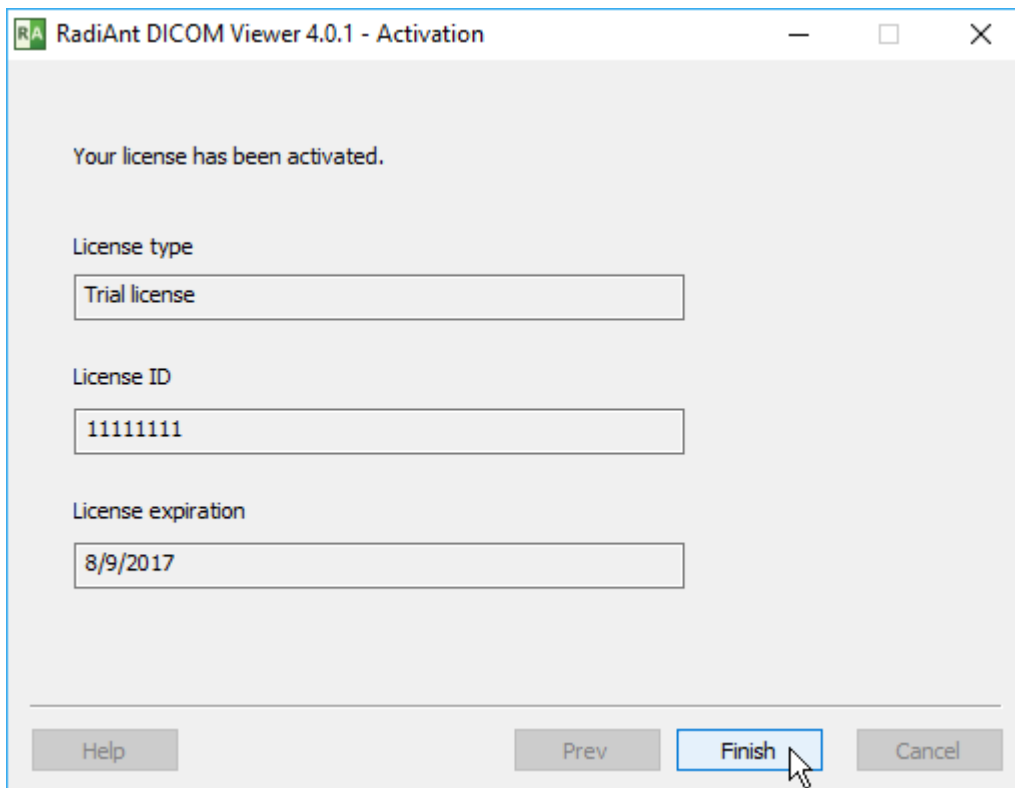
Copy URL

Copy

Paste

Help Prev Next Cancel

7. When you see the Activation info screen, activation is complete.



RadiAnt DICOM Viewer 4.0.1 - Activation

Your license has been activated.

License type

Trial license

License ID

11111111

License expiration

8/9/2017

Help Prev Finish Cancel

8. Click the **Finish** button to start using the software.

1.5.2 Paid license activation

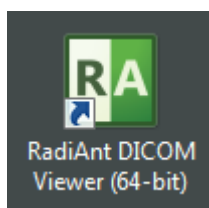
Automatic activation

The steps below illustrate the process by which you can activate RadiAnt DICOM Viewer on computers that are connected to the Internet.

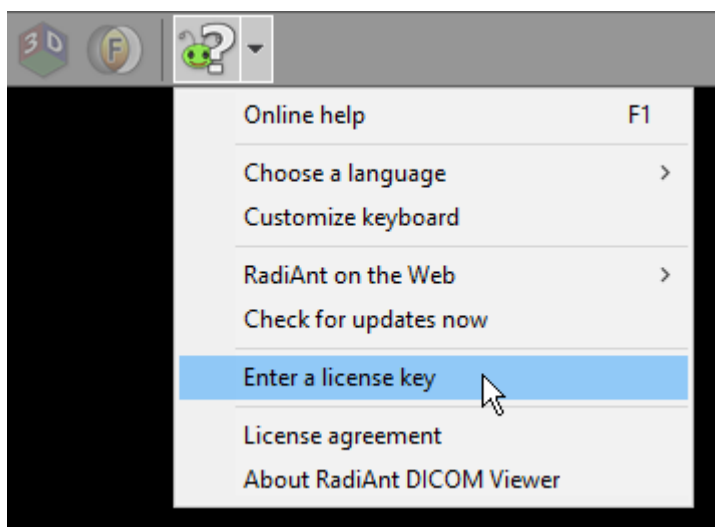
If your computer has no Internet connection, you can [activate the software manually](#).

To activate your software:

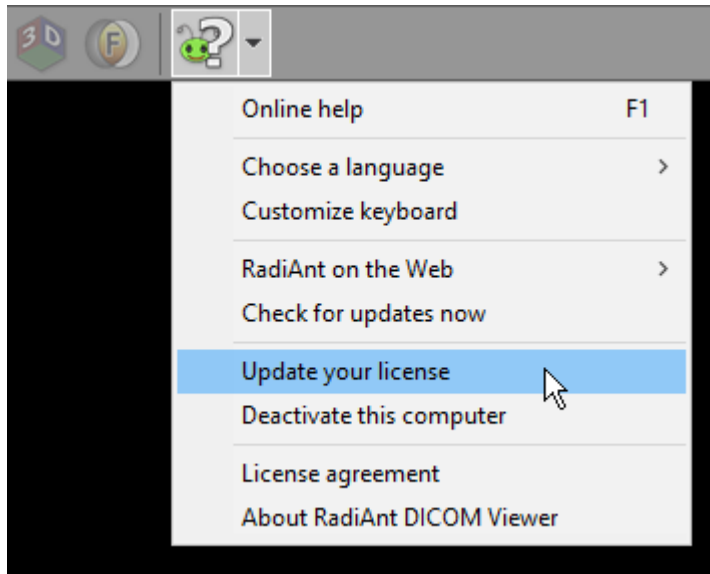
1. Launch RadiAnt DICOM Viewer by clicking on the product icon on your desktop.



If you have previously activated the software in trial mode, click the arrow next to the **Help** button on the toolbar and select [Enter a license key](#).

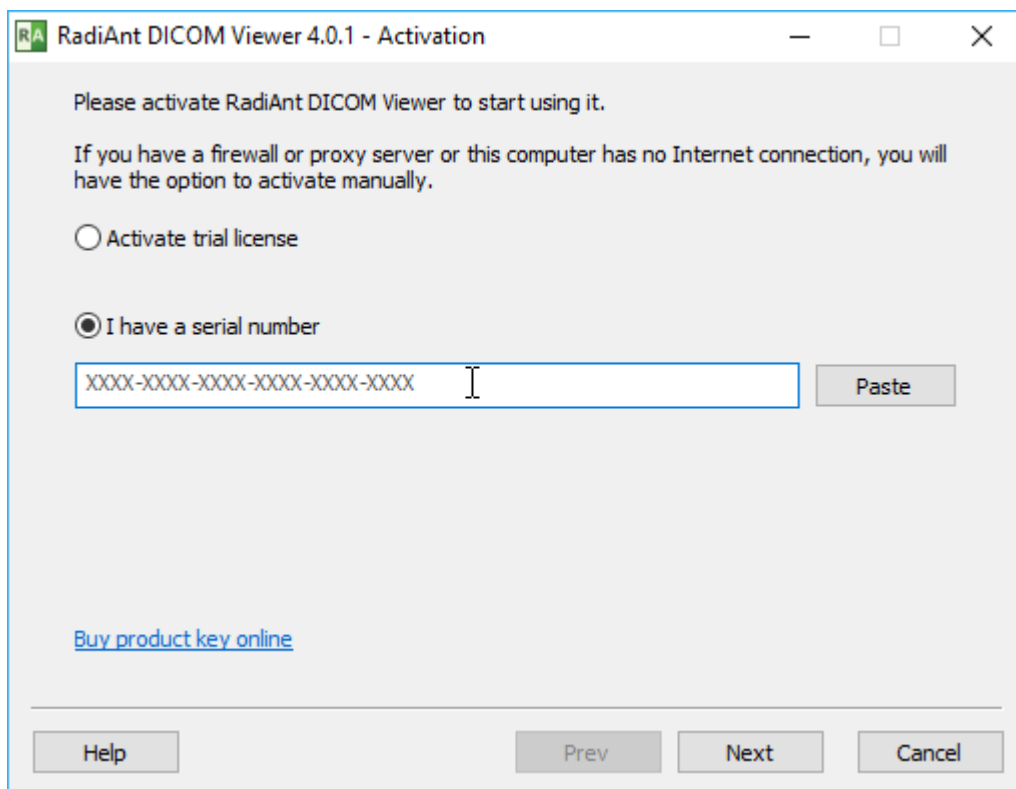


Alternatively, you can click [Update your license](#) if your RadiAnt DICOM Viewer installation was activated with the paid license and you have now purchased Update & Support renewal.

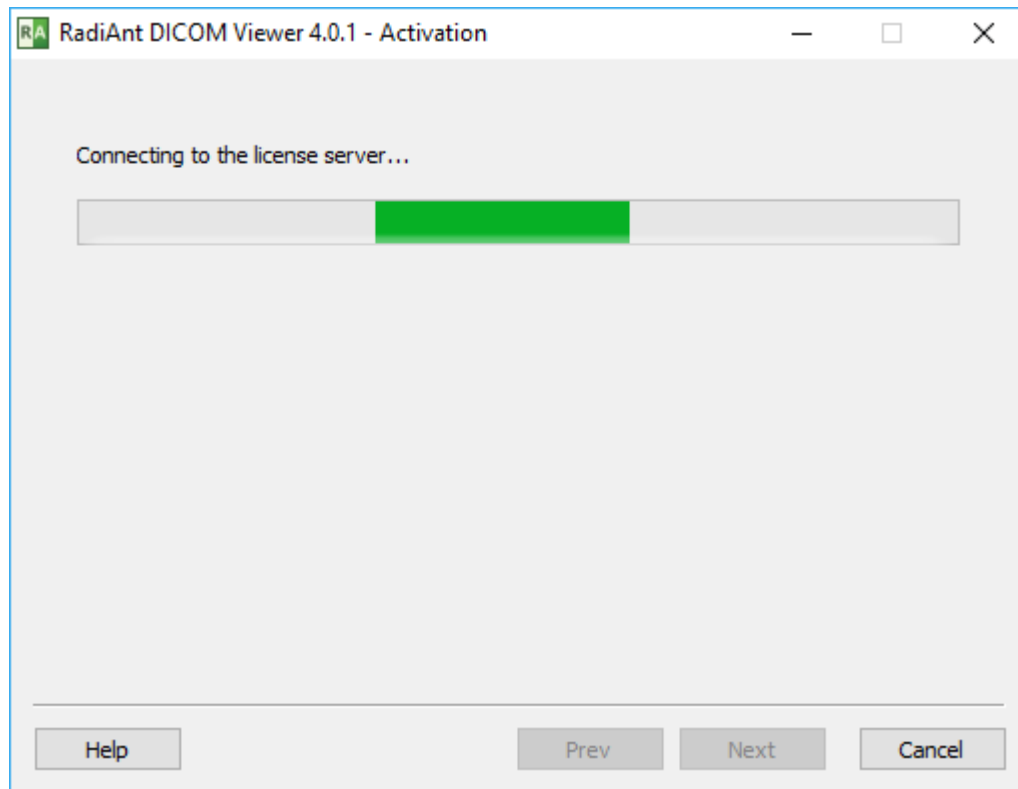


2. On the Activation screen, choose the following option:

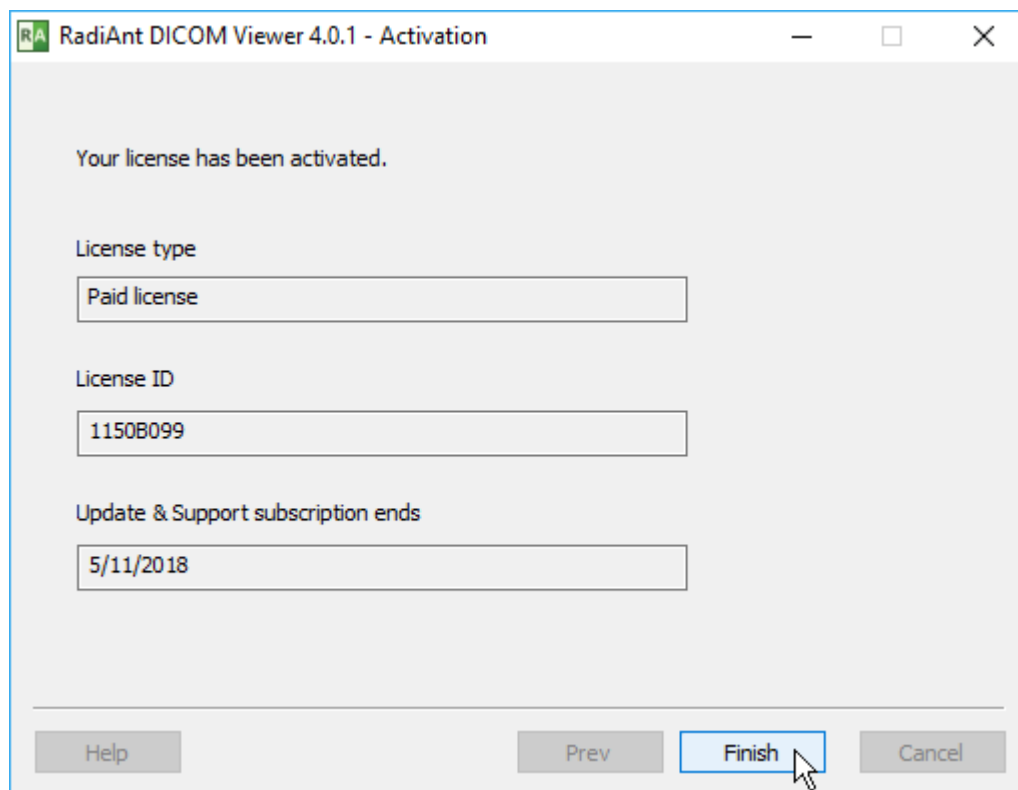
- **I have a serial number** .



3. Enter your serial number and click the **Next** button. RadiAnt DICOM Viewer will attempt to connect to the license server.



4. When you see the Activation info screen, activation is complete.



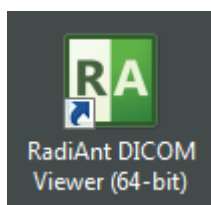
5. Click the **Finish** button to start using the software.

Manual activation

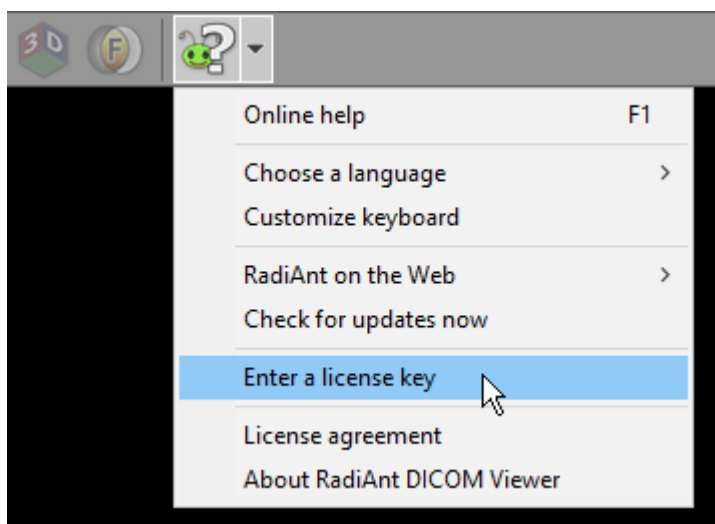
The steps below illustrate the process by which you can activate RadiAnt DICOM Viewer on computers that are not connected to the Internet.

To activate your software:

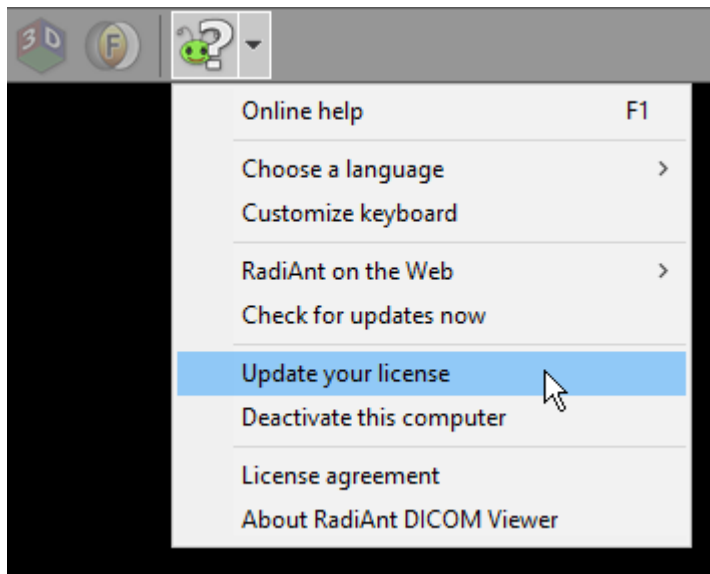
1. Launch RadiAnt DICOM Viewer by clicking on the product icon on your desktop.



If you have previously activated the software in trial mode, click the arrow next to the **Help** button on the toolbar and select [Enter a license key](#).

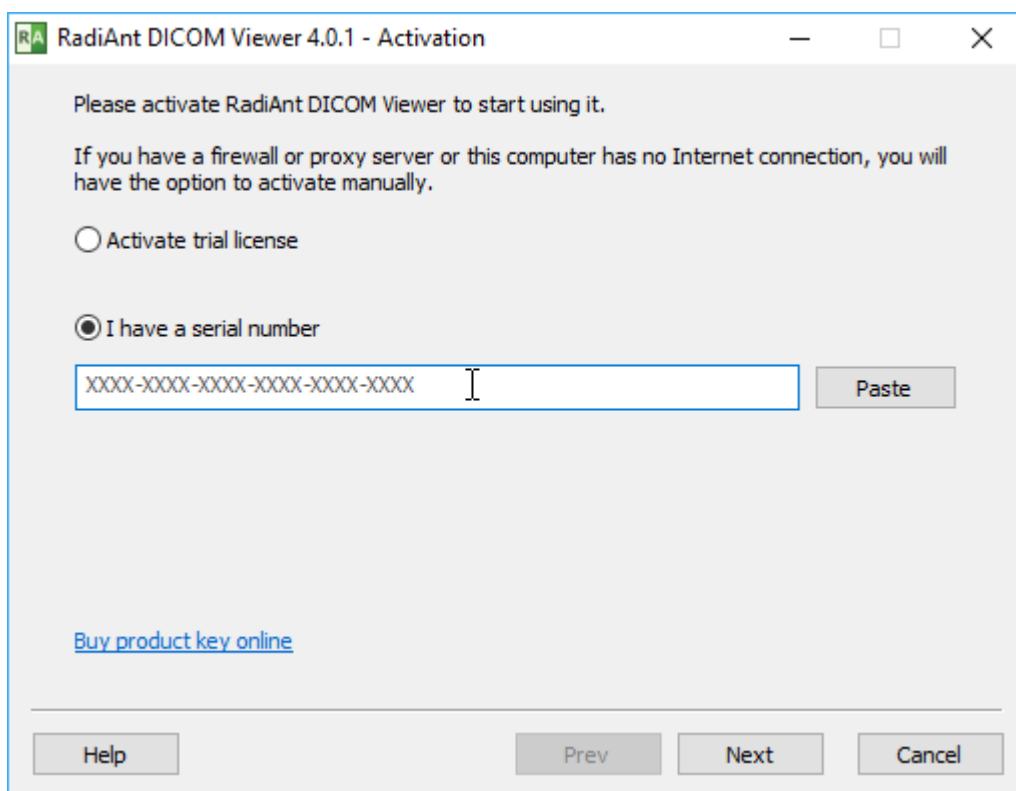


Alternatively, you can click [Update your license](#) if your RadiAnt DICOM Viewer installation was activated with the paid license and you have now purchased Update & Support renewal.

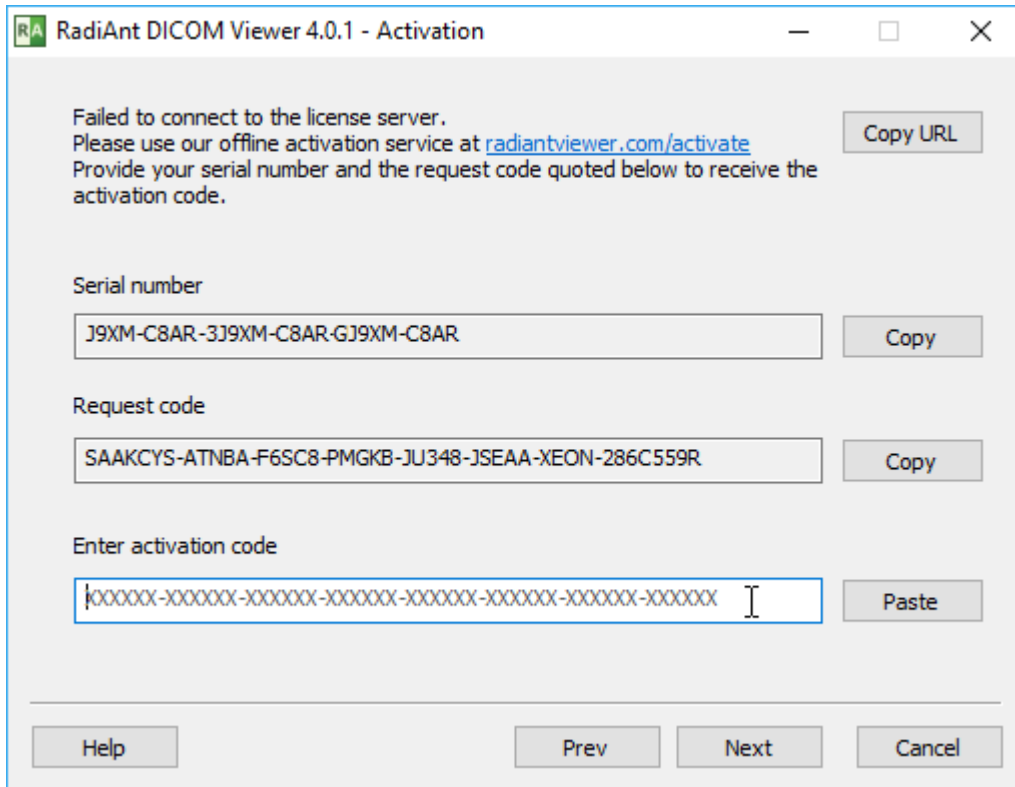


2. On the Activation screen, choose the following option:

- **I have a serial number** .



3. Enter your serial number and click the **Next** button. After a failed attempt to contact the license server, the offline activation screen will be displayed.



RadiAnt DICOM Viewer 4.0.1 - Activation

Failed to connect to the license server.
Please use our offline activation service at radiantviewer.com/activate
Provide your serial number and the request code quoted below to receive the activation code.

Copy URL

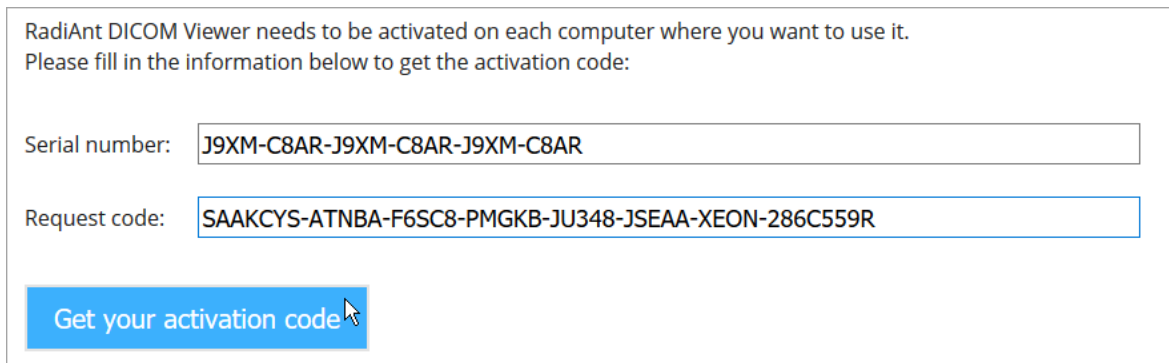
Serial number
J9XM-C8AR-3J9XM-C8AR-GJ9XM-C8AR Copy

Request code
SAACYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-286C559R Copy

Enter activation code
XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX Paste

Help Prev Next Cancel

4. Go to <https://radiantviewer.com/activate> and fill in the form with the serial number and request code. Click the **Get your activation code** button.



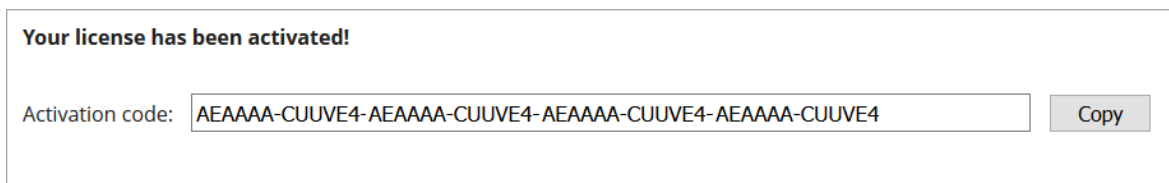
RadiAnt DICOM Viewer needs to be activated on each computer where you want to use it.
Please fill in the information below to get the activation code:

Serial number: J9XM-C8AR-J9XM-C8AR-J9XM-C8AR

Request code: SAACYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-286C559R

Get your activation code

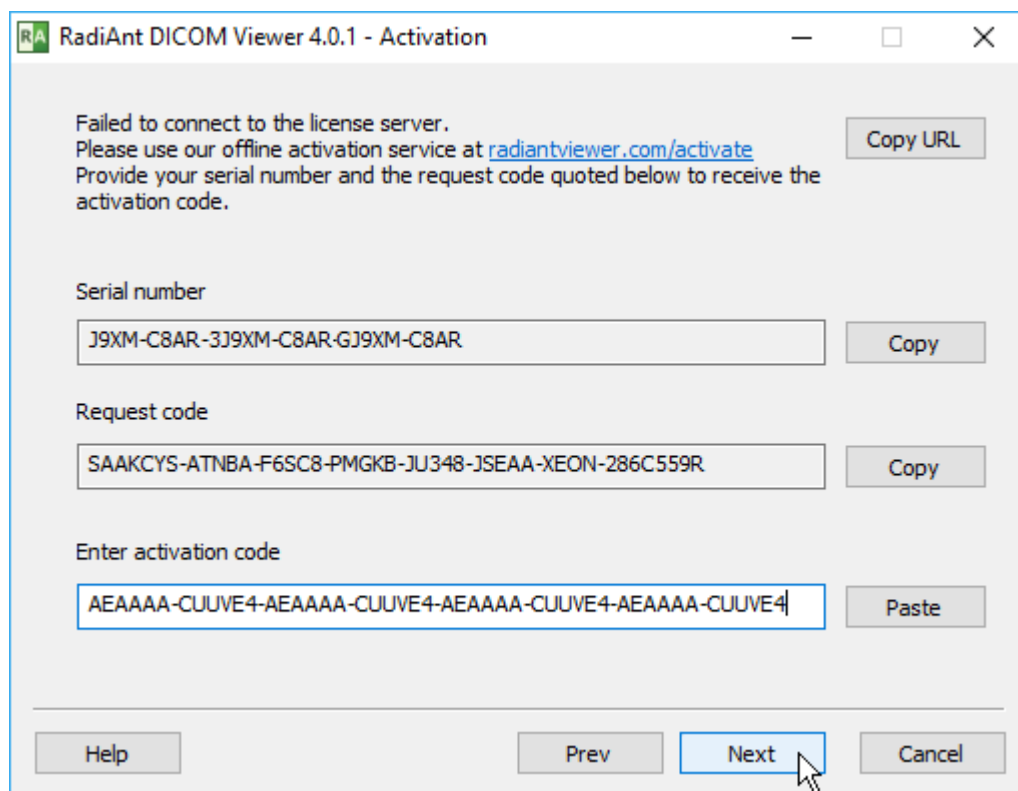
5. After the license is validated, the activation code will be displayed.



Your license has been activated!

Activation code: AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4 Copy

6. Enter this code in the appropriate field on the RadiAnt DICOM Viewer offline activation screen and press the **Next** button.



RadiAnt DICOM Viewer 4.0.1 - Activation

Failed to connect to the license server.
Please use our offline activation service at radiantviewer.com/activate
Provide your serial number and the request code quoted below to receive the activation code.

Serial number
J9XM-C8AR-3J9XM-C8AR-GJ9XM-C8AR

Request code
SAAKCYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-286C559R

Enter activation code
AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4

Copy URL

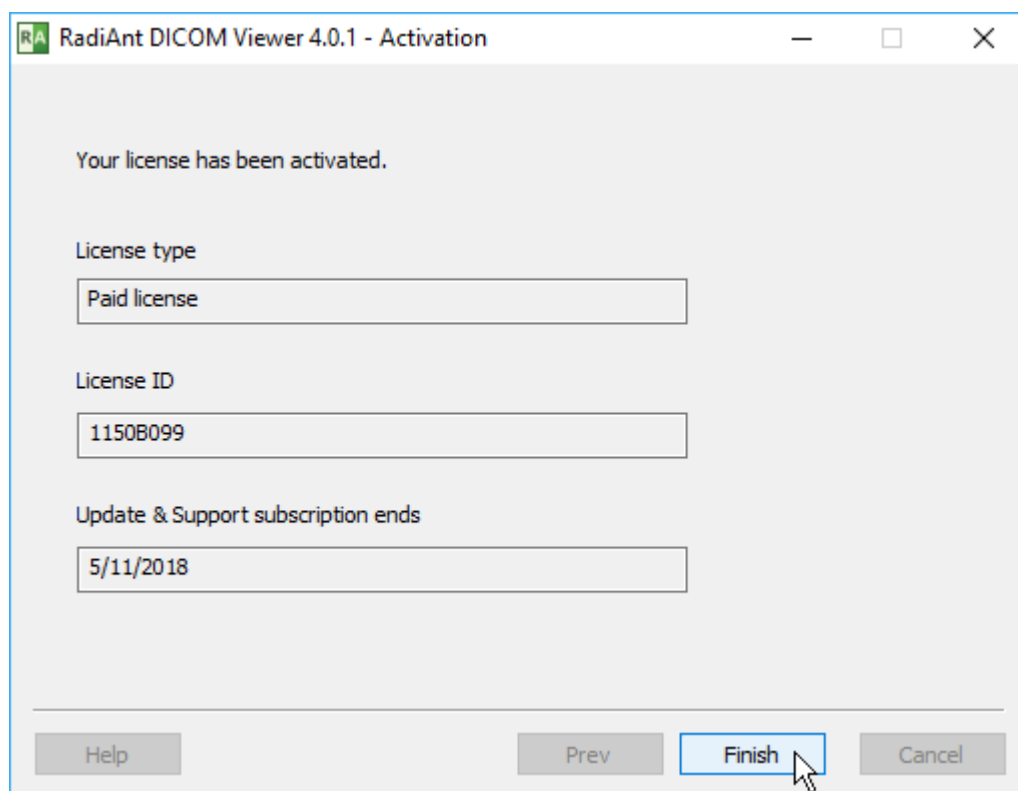
Copy

Copy

Paste

Help Prev Next Cancel

7. When you see the Activation info screen, activation is complete.



RadiAnt DICOM Viewer 4.0.1 - Activation

Your license has been activated.

License type
Paid license

License ID
1150B099

Update & Support subscription ends
5/11/2018

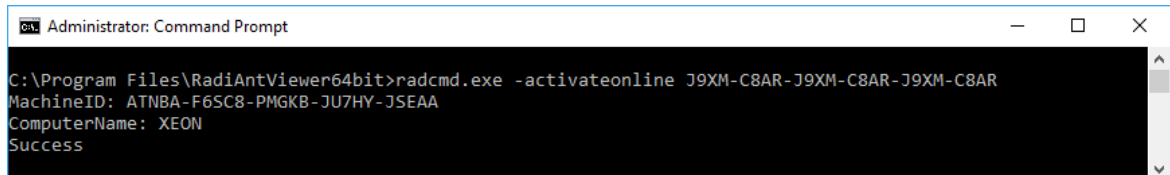
Help Prev Finish Cancel

8. Click the **Finish** button to start using the software.

Automatic command-line activation

RadiAnt DICOM Viewer can be activated automatically on local and remote computers using the command-line tool located in the installation folder (radcmd.exe):

1. Execute the following command: `radcmd.exe -activateonline SERIALNUMBER`
2. The output of the command above includes the machine ID, the computer name and the result. After successful activation, radcmd.exe returns the exit code 0.

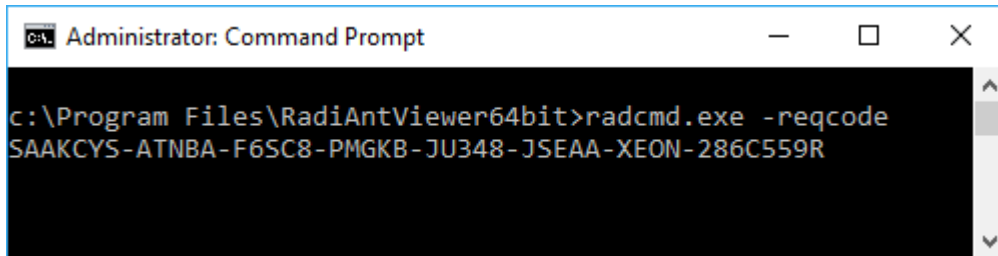


```
Administrator: Command Prompt
C:\Program Files\RadiAntViewer64bit>radcmd.exe -activateonline J9XM-C8AR-J9XM-C8AR-J9XM-C8AR
MachineID: ATNBA-F6SC8-PMGKB-JU7HY-JSEAA
ComputerName: XEON
Success
```

Manual command-line activation

RadiAnt DICOM Viewer can be activated manually on local and remote computers using the command-line tool located in the installation folder (radcmd.exe):

1. Get the request code from the computer you want to activate by executing the following command: `radcmd.exe -reqcode`
2. The output of the command above includes the request code in one line.



```
C:\Program Files\RadiAntViewer64bit>radcmd.exe -reqcode
SAAKCYS-ATNBA-F6SC8-PMGKB-JU348-JSEAA-XEON-286C559R
```

3. Use your serial number and the request code to activate your license at <https://radiantviewer.com/activate>

RadiAnt DICOM Viewer needs to be activated on each computer where you want to use it. Please fill in the information below to get the activation code:

Serial number:

Request code:

4. After the license is validated, the activation code will be displayed.

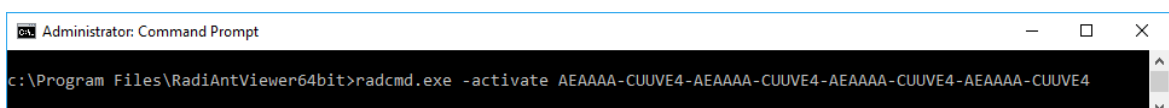
Your license has been activated!

Activation code:

5. Execute the command below to complete the activation process:

`radcmd.exe -activate ACTIVATION_CODE`

(replace ACTIVATION_CODE with the activation code obtained in the previous step)



```
C:\Program Files\RadiAntViewer64bit>radcmd.exe -activate AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4-AEAAAA-CUUE4
```

6. After successful activation, radcmd.exe returns the exit code 0.

1.5.3 Deactivation

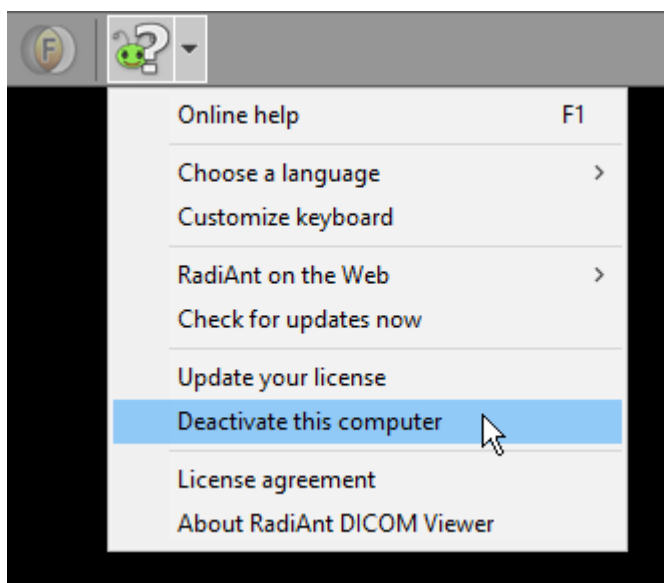
Automatic deactivation

The steps outlined below illustrate the process by which you can deactivate RadiAnt DICOM Viewer on computers that are connected to the Internet.

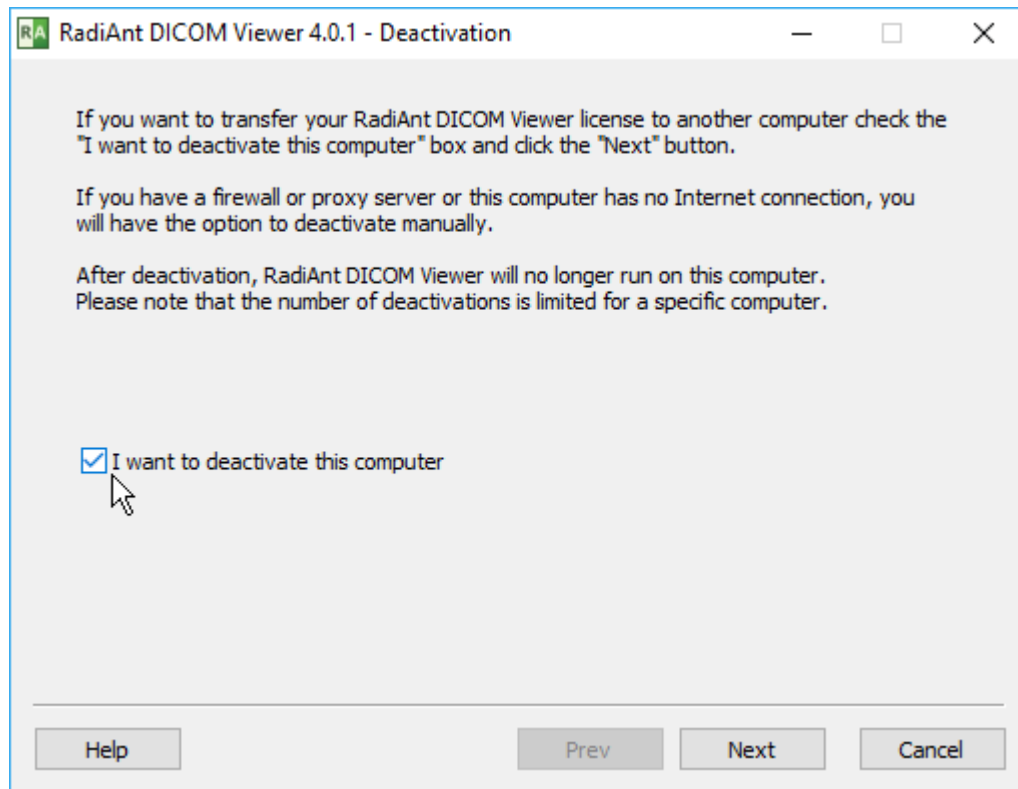
If your computer is not connected to the Internet, you can [deactivate the software manually](#).

To deactivate your software:

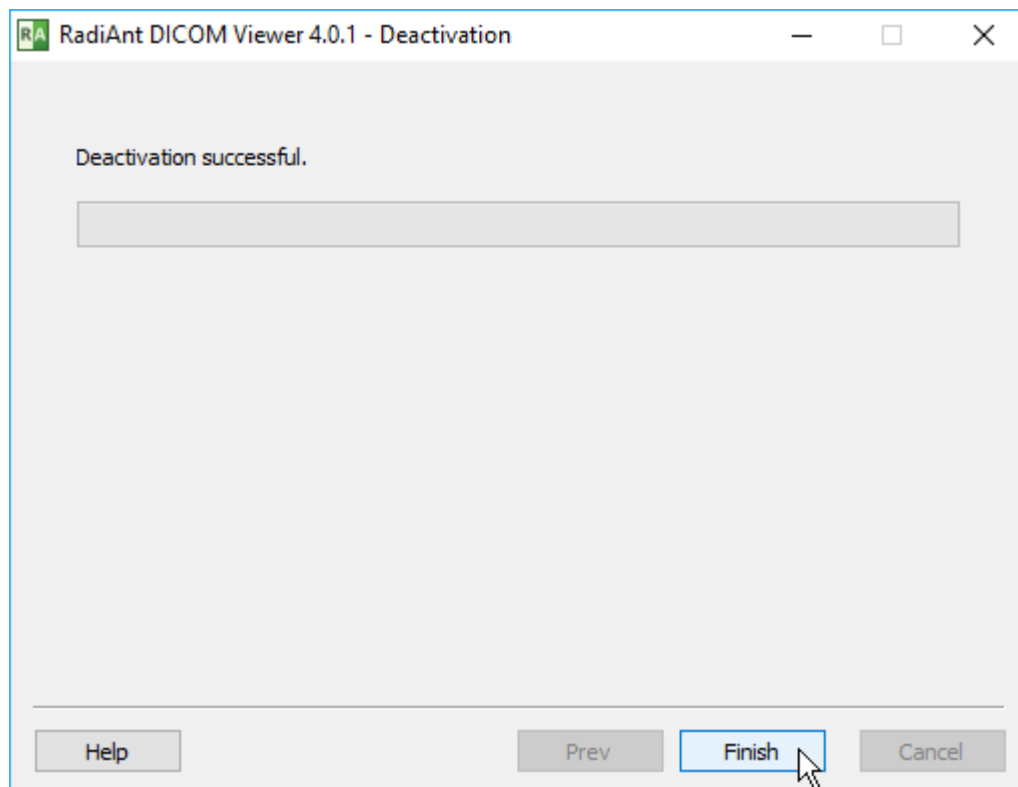
1. Select **Deactivate this computer** from the drop-down menu next to the help button.



2. On the deactivation screen, check the **I want to deactivate this computer** checkbox.



3. Click the **Next** button. RadiAnt DICOM Viewer will attempt to connect to the license server. When you see the confirmation message, deactivation is complete.



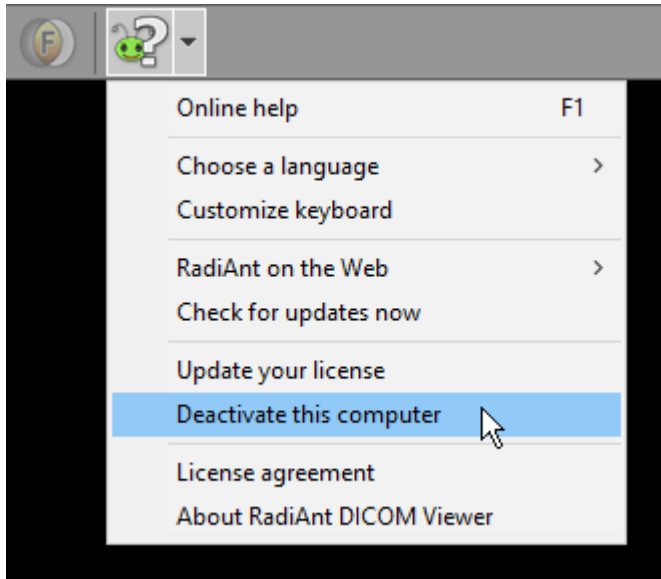
4. Click the **Finish** button to close the software.

Manual deactivation

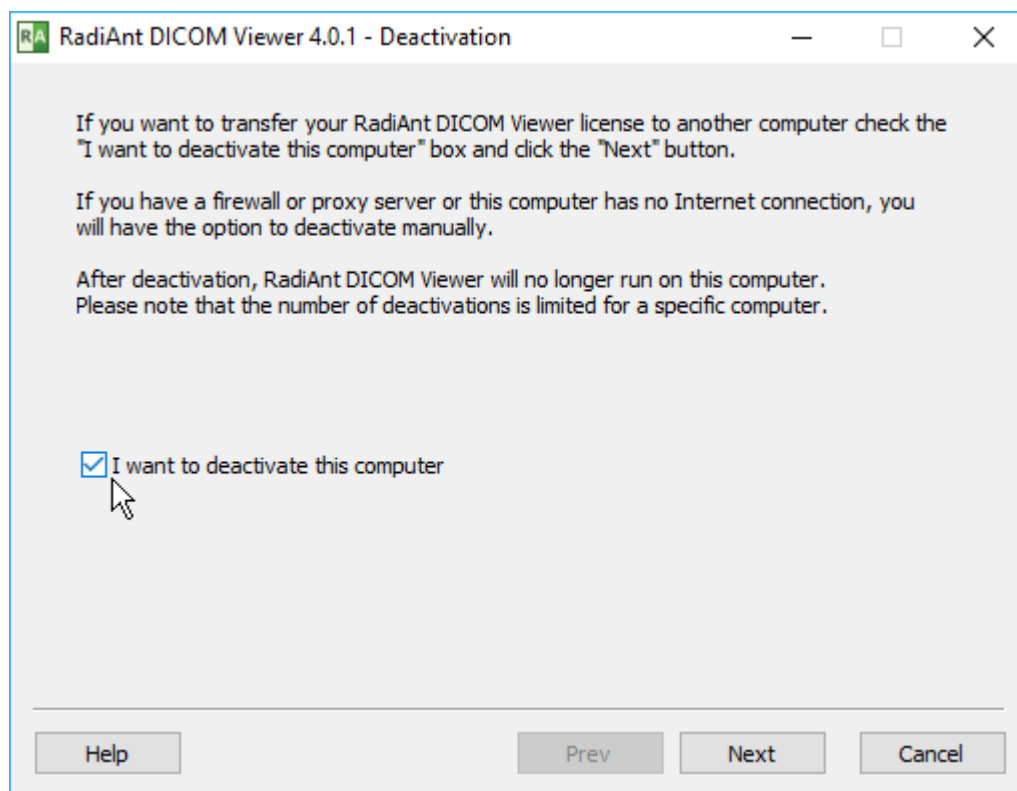
The steps below illustrate the process by which you can deactivate RadiAnt DICOM Viewer on computers that are not connected to the Internet.

To deactivate your software:

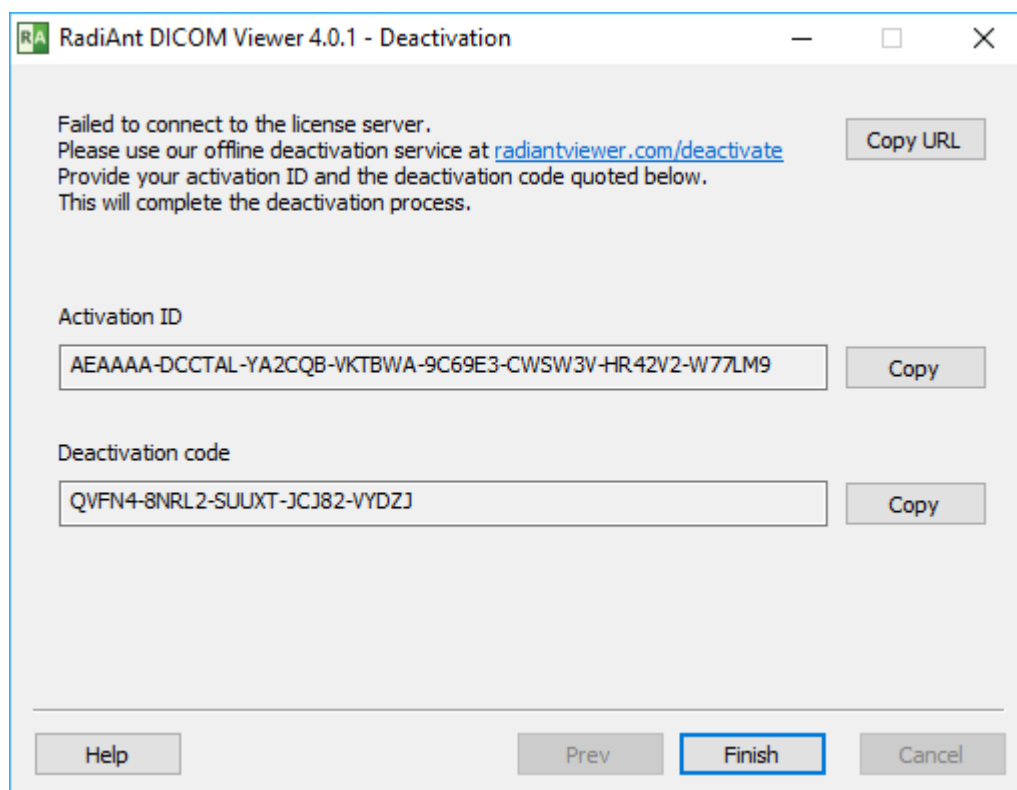
1. Select **Deactivate this computer** from the drop-down menu next to the help button.



2. On the deactivation screen, check the **I want to deactivate this computer** checkbox.



3. Click the **Next** button. After a failed attempt to contact the license server, the offline deactivation screen will be displayed.



4. Go to <https://radiantviewer.com/deactivate>, and complete the form with the activation ID and deactivation code. Click the **Complete the deactivation process** button.

Deactivate your RadiAnt DICOM Viewer installation now

RadiAnt DICOM Viewer needs to be deactivated before a license is moved to another computer. Please fill in the information below to complete the deactivation process:

Activation ID:

Deactivation code:

5. Your deactivation is now confirmed.

Your license has been deactivated!

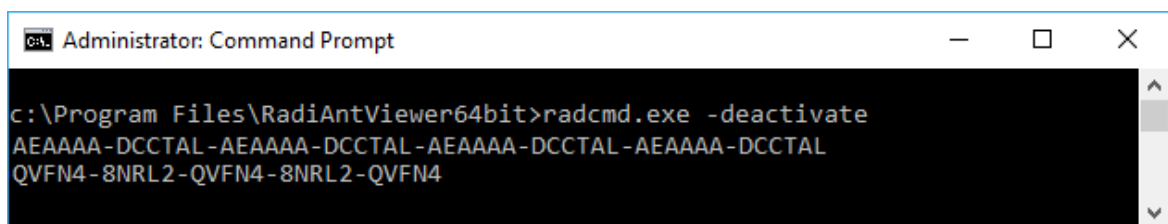
You can now activate this license on another computer.

6. Click the **Finish** button to close the software.

Manual command-line deactivation

RadiAnt DICOM Viewer can be deactivated on local and remote computers using the command-line tool located in the installation folder (radcmd.exe):

1. Execute the following command: `radcmd.exe -deactivate`
2. The output of the command above includes the activation ID and the deactivation code in two lines.



```
Administrator: Command Prompt
c:\Program Files\RadiAntViewer64bit>radcmd.exe -deactivate
AEAAAA-DCCTAL-AEAAAA-DCCTAL-AEAAAA-DCCTAL-AEAAAA-DCCTAL
QVFN4-8NRL2-QVFN4-8NRL2-QVFN4
```

3. Go to <https://radiantviewer.com/deactivate>, and complete the form with the activation ID and deactivation code obtained in the previous step. Click the **Complete the deactivation process** button.

Deactivate your RadiAnt DICOM Viewer installation now

RadiAnt DICOM Viewer needs to be deactivated before a license is moved to another computer. Please fill in the information below to complete the deactivation process:

Activation ID:

AEAAAA-DCCTAL-AEAAAA-DCCTAL-AEAAAA-DCCTAL-AEAAAA-DCCTAL

Deactivation code:

QVFN4-8NRL2-QVFN4-8NRL2-QVFN4

Complete the deactivation process 

4. Your deactivation is now confirmed.

Your license has been deactivated!

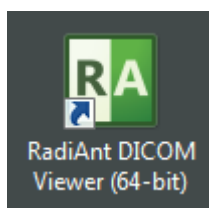
You can now activate this license on another computer.

2 Basic Topics

2.1 Opening a DICOM study from a CD/DVD

1. Insert a disk with a DICOM study into a CD/DVD drive. If the default viewer is automatically started from the CD, close it in order to obtain better reading speeds in RadiAnt DICOM Viewer.

2. Run RadiAnt DICOM Viewer by double-clicking its desktop icon.



3. Click the **CD/DVD** button on the toolbar in main window (this button is hidden when no CD/DVD drive is detected), or use shortcut **Ctrl + Alt + O**.



4. The process of disk scanning will start. You can browse images of the study as soon as they begin appearing in the series preview bar.

5. The status bar shows the number of remaining files, elapsed time and estimated time to finish.



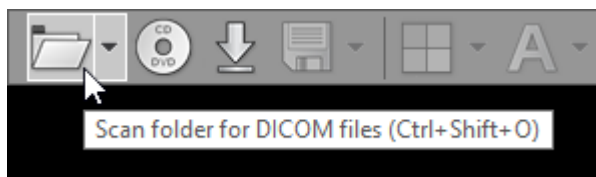
6. Remove the disk from the CD/DVD drive only when you finish viewing the study. (Ejection will render images unavailable for viewing.)

2.2 Opening a DICOM study from a folder

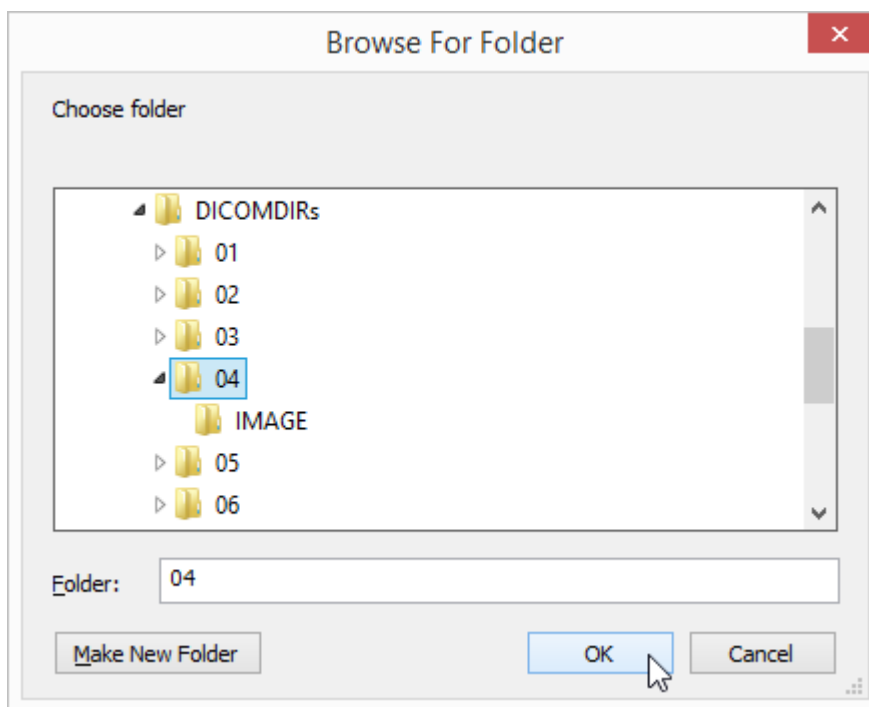
1. Run RadiAnt DICOM Viewer by double-clicking its desktop icon.



2. Click the **Folder** button on the toolbar in main window, or use the shortcut **Ctrl + Shift + O**.

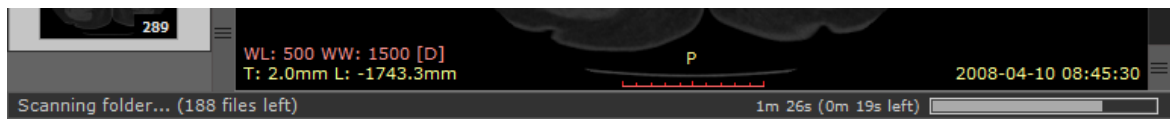


3. Find the folder you want to scan for DICOM files, select it, and then click **OK**.



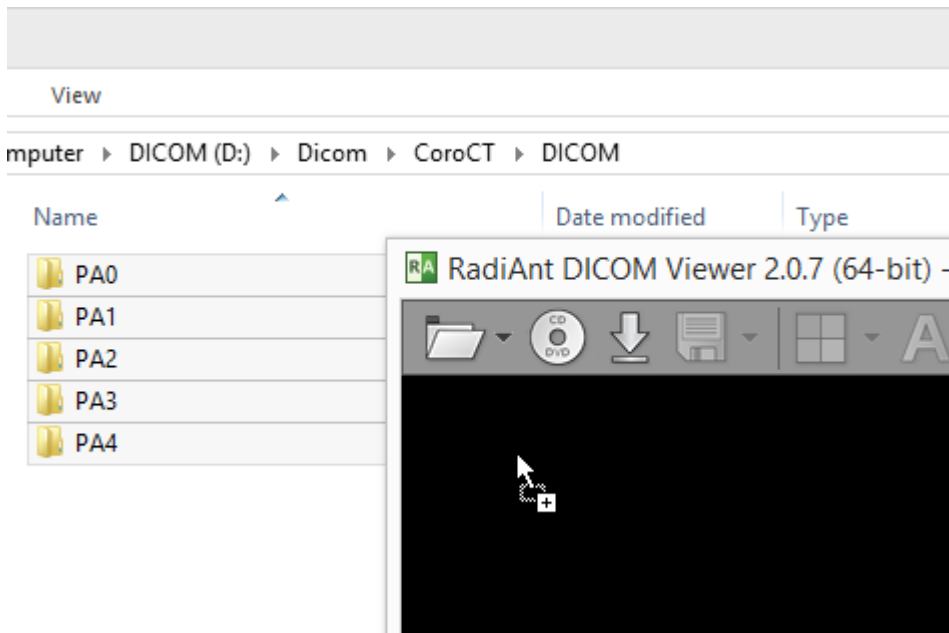
4. The process of scanning will start. You can browse images of the study as soon as they begin appearing in the series preview bar.

5. The status bar shows the number of remaining files, elapsed time, and estimated time to finish.

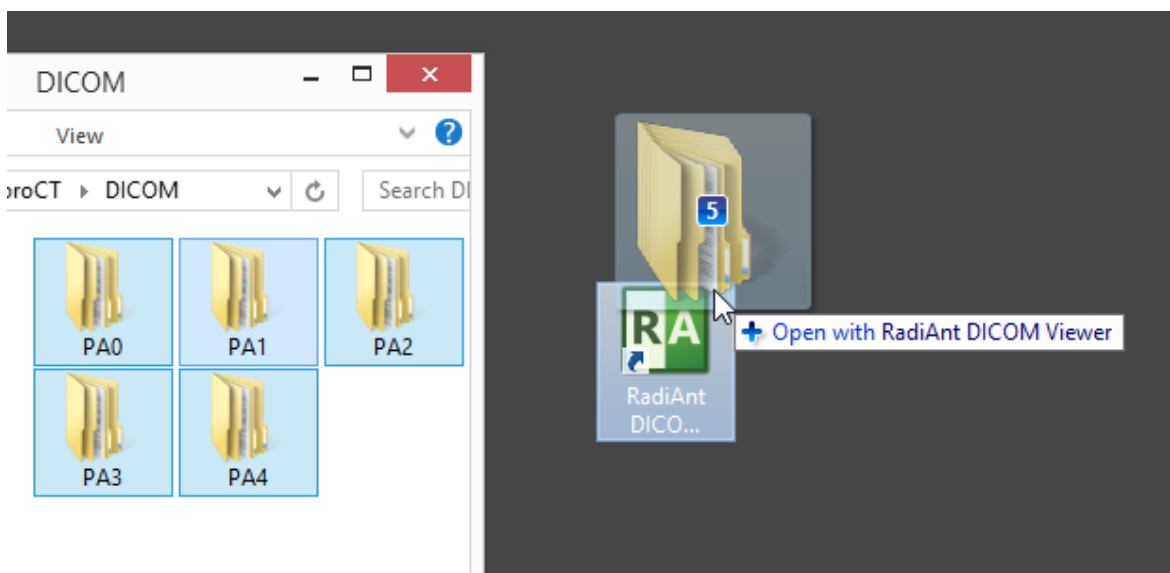


You may also use two other, faster methods:

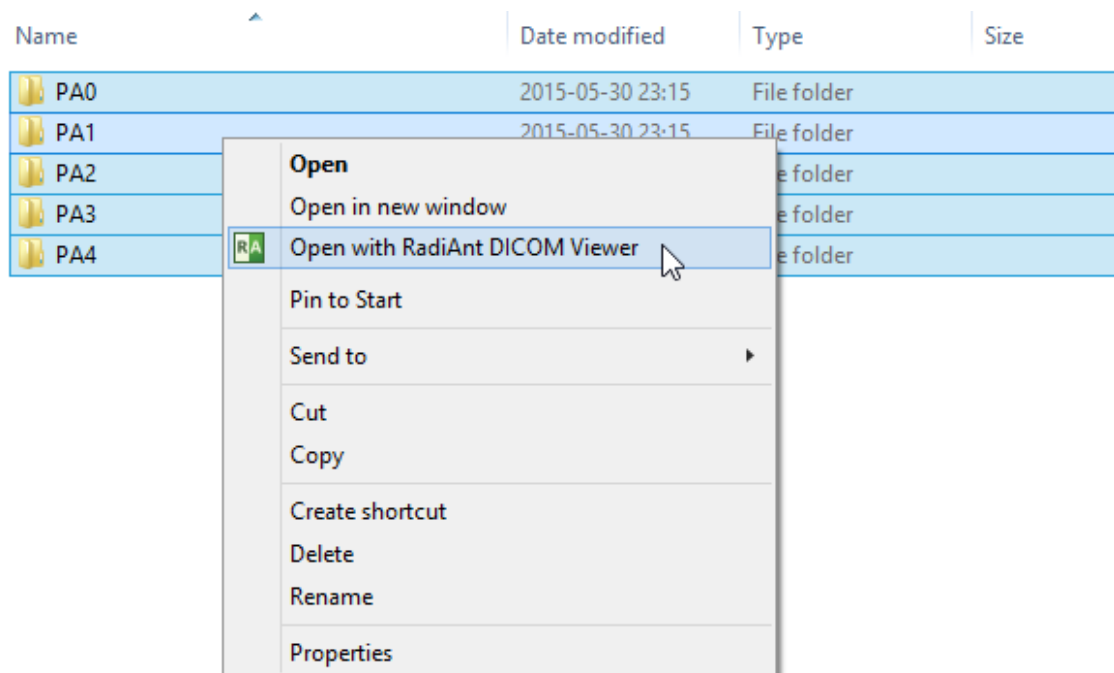
1. Drag & drop the selected folder(s) onto either RadiAnt DICOM Viewer main window:



Or, to its desktop icon:



2. Right-click the context menu on the selected folder(s) and choose [Open with RadiAnt DICOM Viewer](#).



2.3 Opening a DICOM study from a ZIP archive

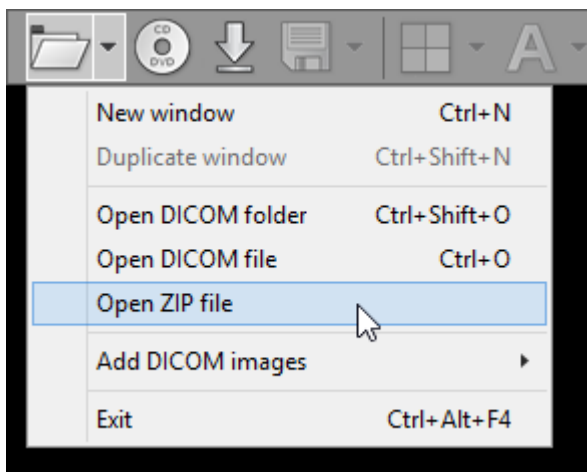
1. Run RadiAnt DICOM Viewer by double-clicking its desktop icon.



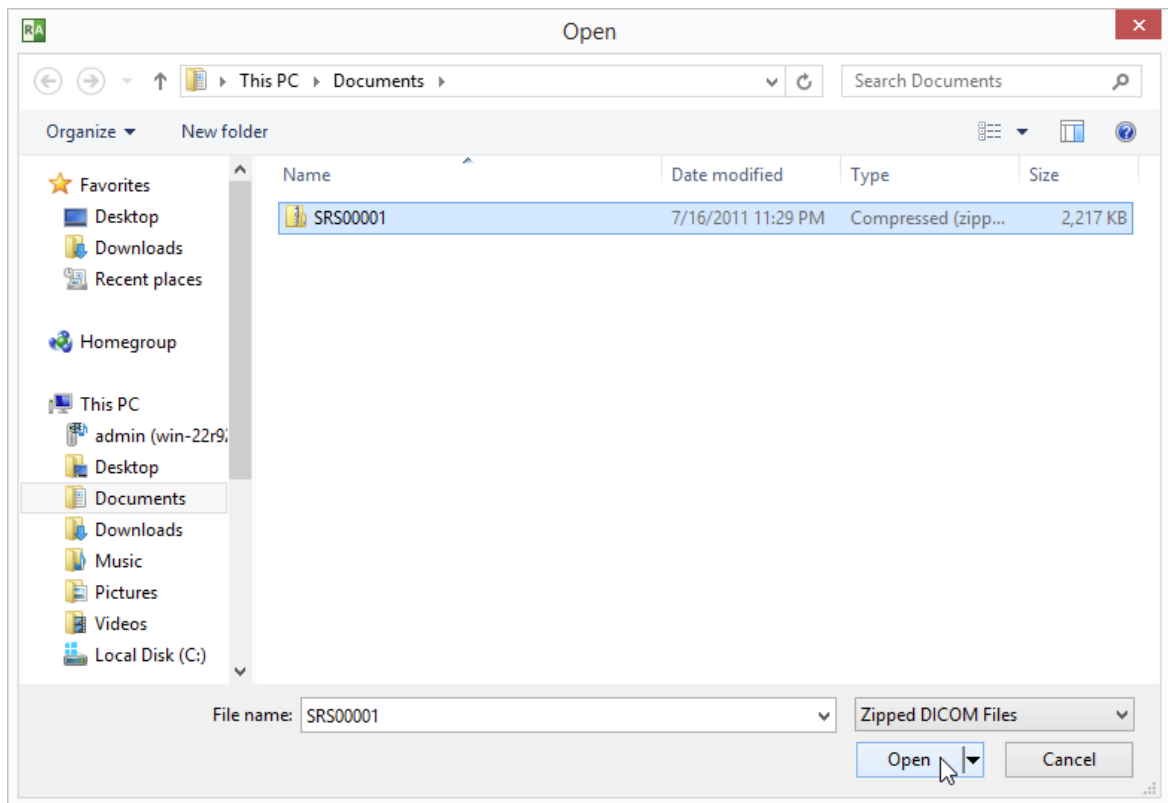
2. Click the arrow next to the folder icon on the toolbar in the main window.



3. Click [Open ZIP file](#).



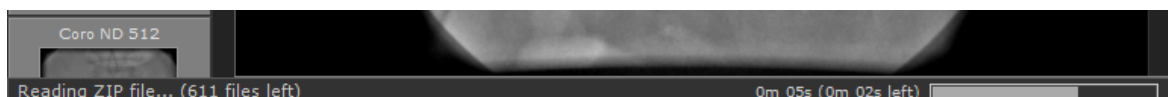
4. Find the zip archive, select it, and click **Open**.



5. If the archive is encrypted, a password prompt will be displayed.

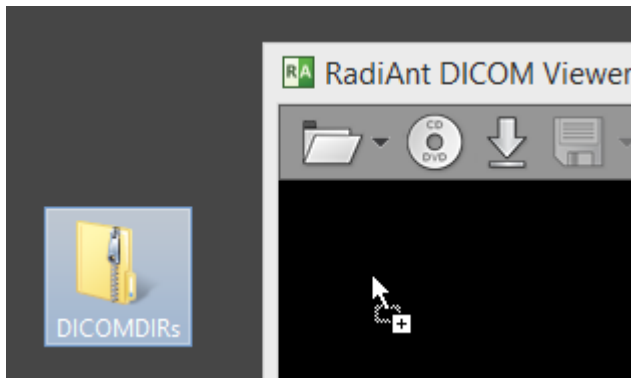


6. The process of unpacking and file scanning will start. You can browse images of the study as soon as they begin appearing in the series preview bar.
7. The status bar shows the number of remaining files, elapsed time and estimated time to finish.

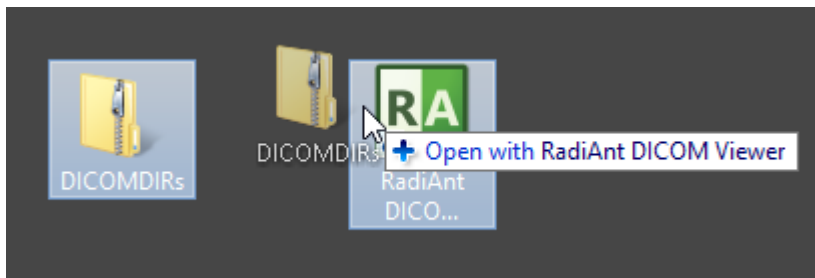


You can also use two other, faster methods:

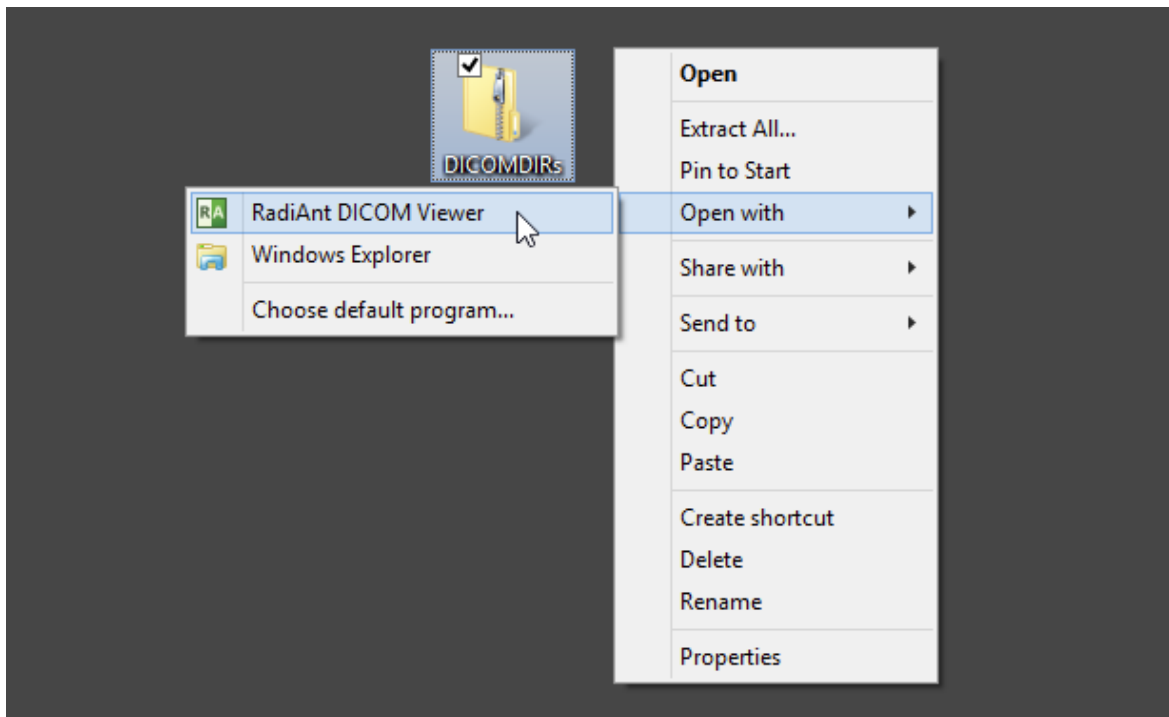
1. Drag & drop selected ZIP archive onto either RadiAnt DICOM Viewer main window:



Or, to its desktop icon:

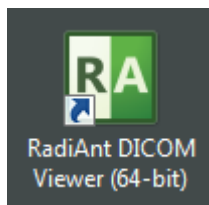


2. Use right-click context menu on the selected ZIP archive and click [Open with](#) / [RadiAnt DICOM Viewer](#).



2.4 Opening specific DICOM file(s)

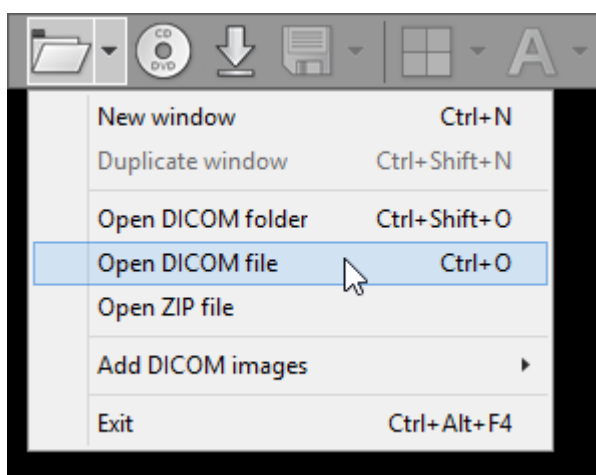
1. Run RadiAnt DICOM Viewer by double-clicking its desktop icon.



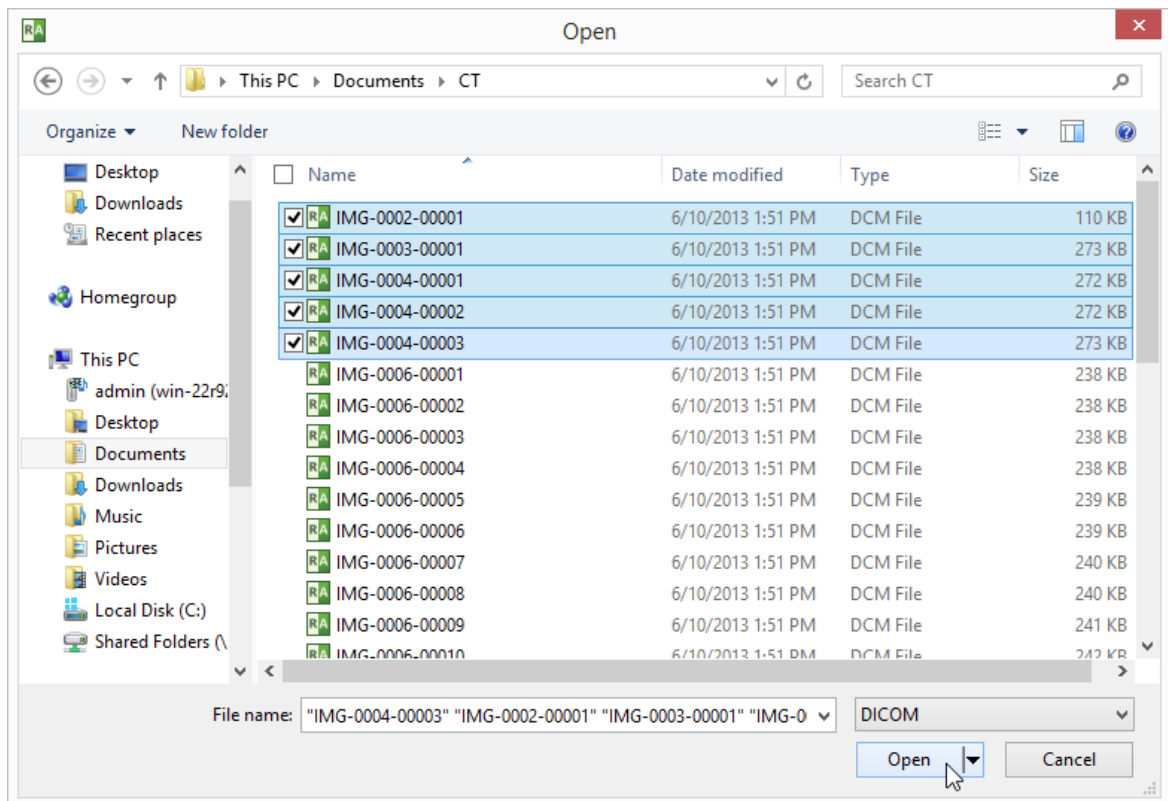
2. Click the arrow next to folder icon on the toolbar, or use the **Ctrl + O** keyboard shortcut.



3. Click **Open DICOM file**.

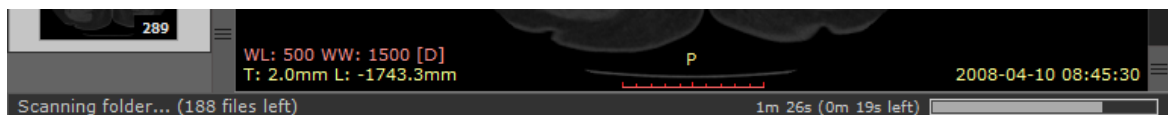


4. Find the DICOM file(s), make your selection, and click **Open** .



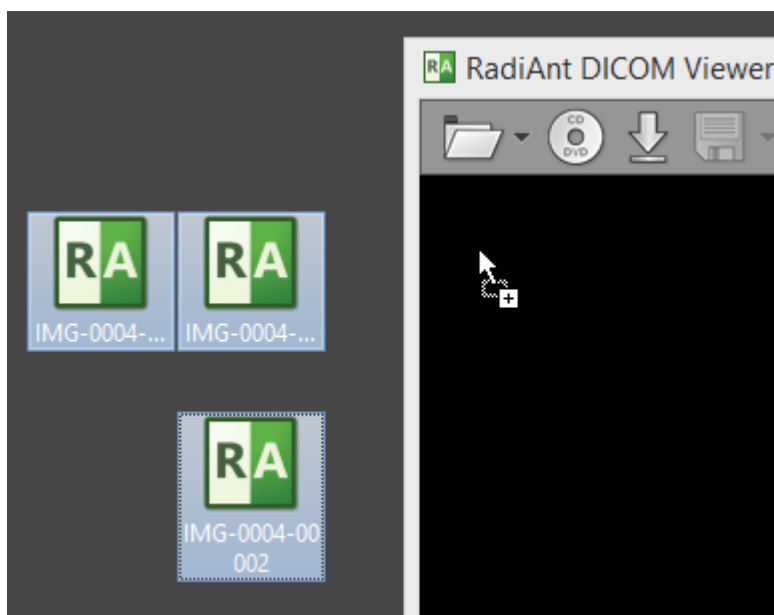
5. The process of loading will start. You may browse images of the study as soon as they begin appearing in the series preview bar.

6. The status bar shows the number of remaining files, elapsed time, and estimated time to finish.

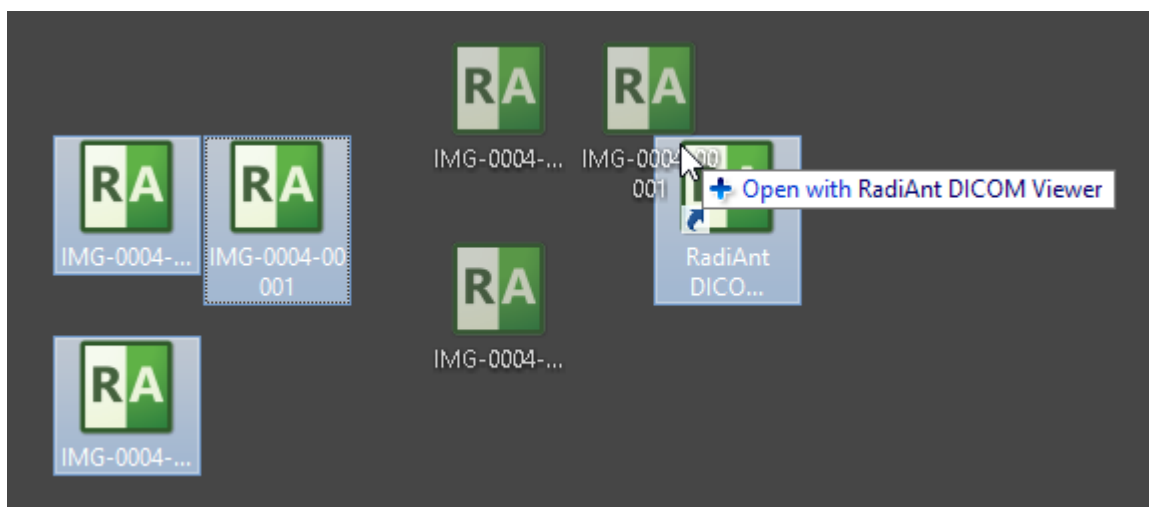


You can also use a faster method:

1. Drag & drop the selected DICOM file(s) onto either RadiAnt DICOM Viewer main window:



or to its desktop icon:

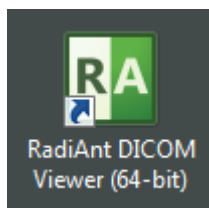


2.5 Opening a study from a PACS server

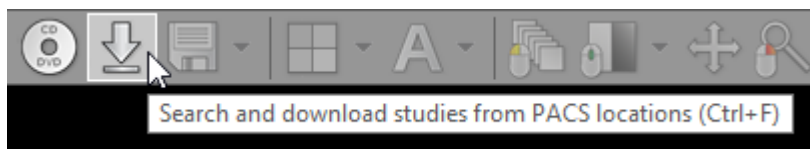
The RadiAnt DICOM Viewer PACS client feature lets you search and download studies from PACS hosts (Picture Archiving and Communication System).

Before you begin, you need to make sure that your PACS server and RadiAnt are properly configured. Please refer to the advanced section of this manual for [configuration instructions](#). Sometimes the configuration process may be [quite complicated](#) or even impossible without the technical support from the vendor of your PACS server.

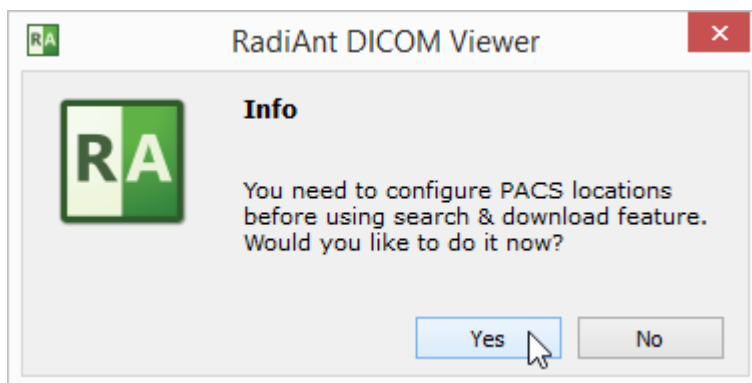
1. Run RadiAnt DICOM Viewer by double-clicking its desktop icon.



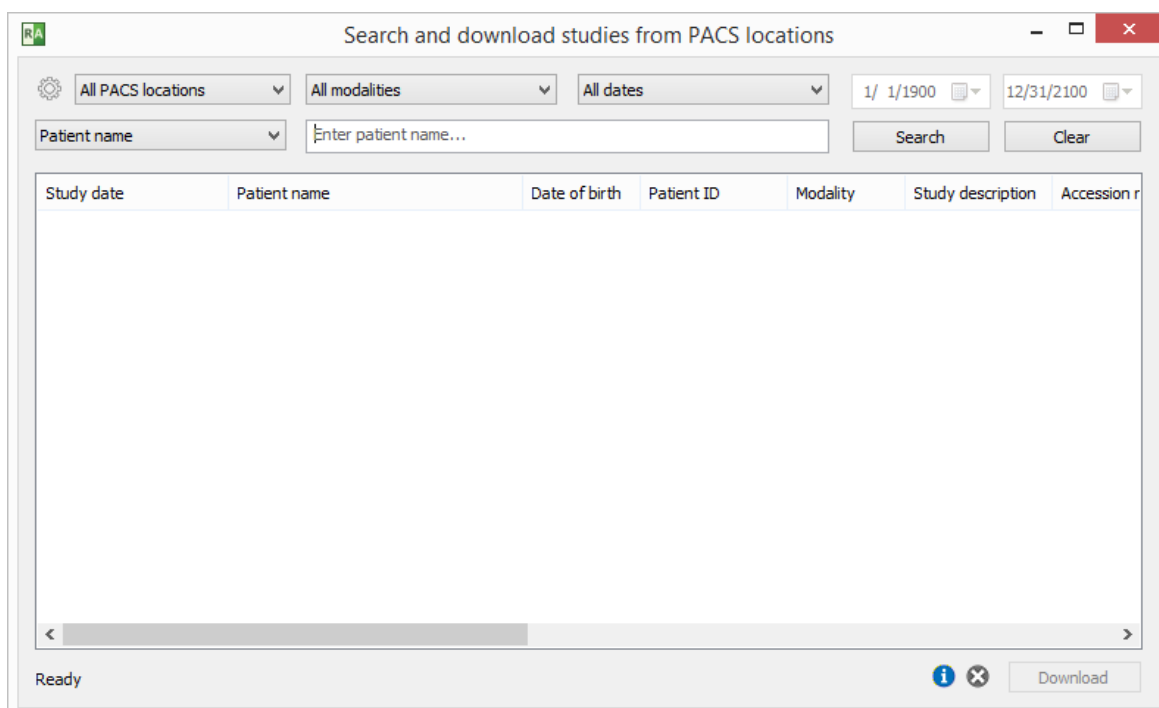
2. Click the **Download** button on the toolbar in the main window, or press **Ctrl + F**.



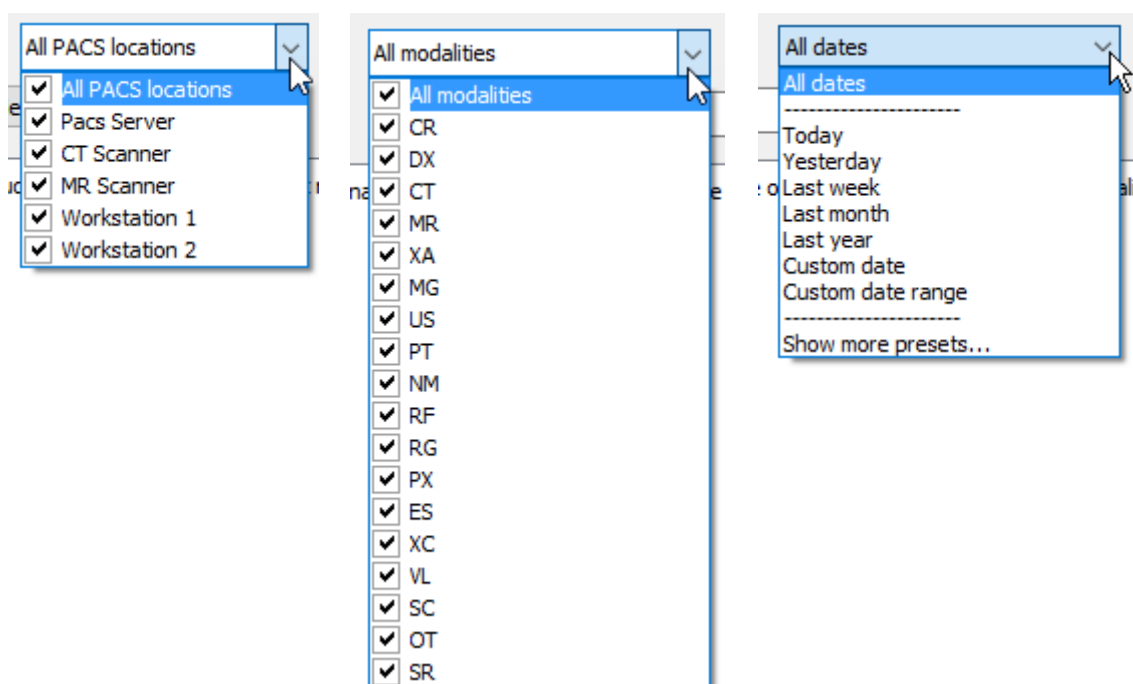
3. If the PACS host was not yet configured, you will see the message asking you to add a new PACS host. Please refer to the [advanced section of this manual](#).



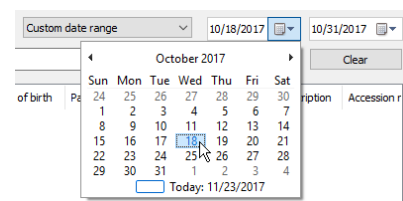
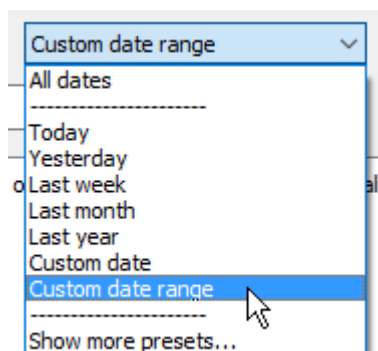
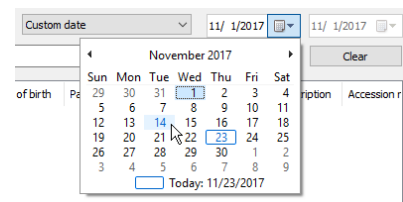
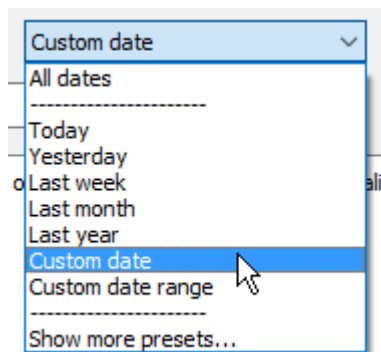
4. Once the configuration is finished, you will see the PACS search window.



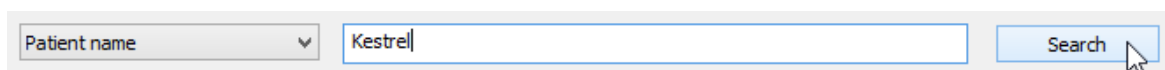
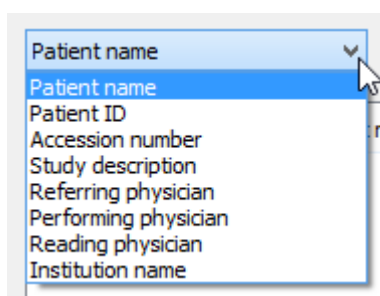
5. Select the PACS location(s), modality(ies) and date range.



Preset, specific date or specific begin and finish dates can be chosen - just select **Custom date** or **Custom date range**.

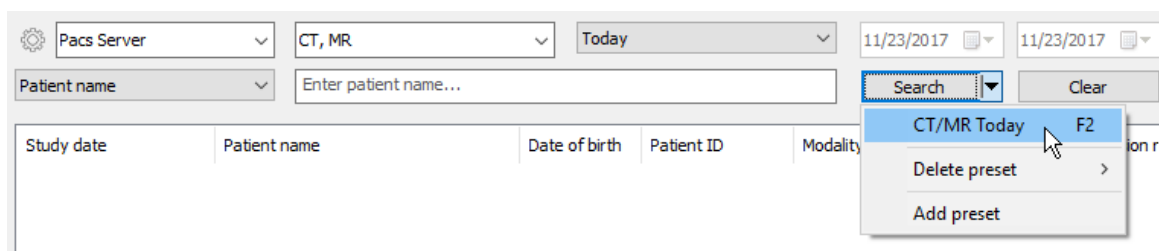


6. You can choose one of the following main search field types: Patient name, Patient ID, Accession number, Study description, Referring physician, Performing physician, Reading physician, Institution name. Enter the text into the field and press Enter or click the **Search** button.

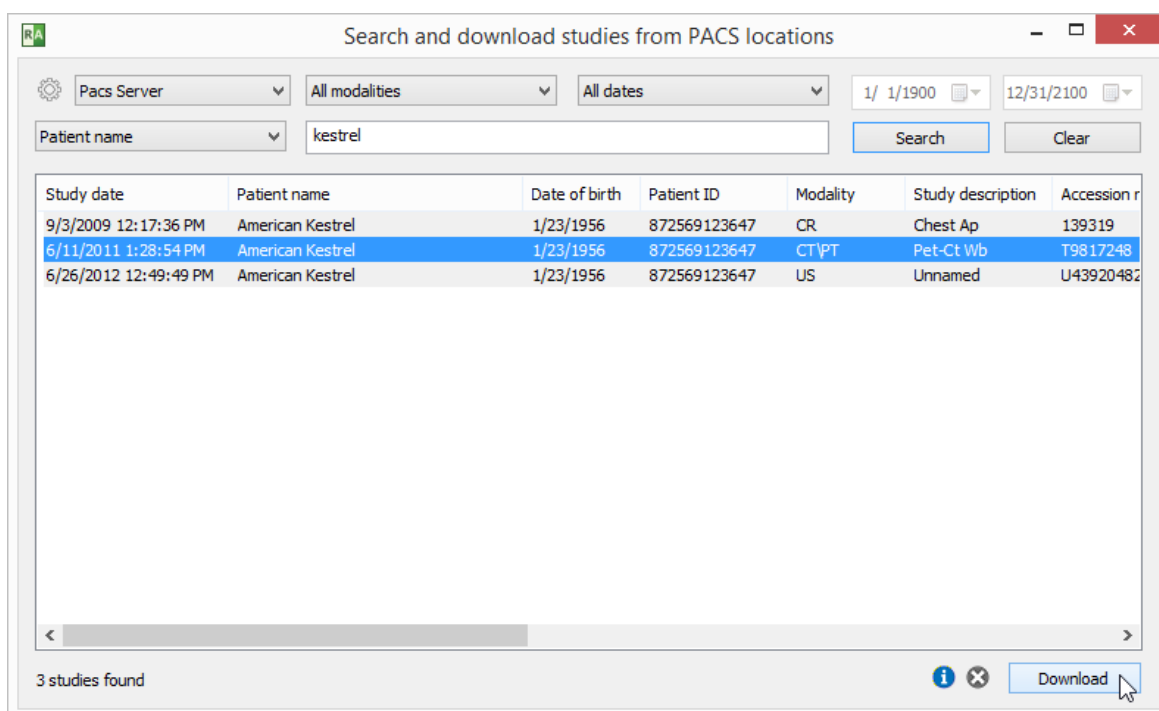


Custom main search fields can be added in the [options.xml file](#).

7. Search parameters that are used on a frequent basis can be saved as [search presets](#) so that they can be quickly accessed from the drop-down menu located next to the **Search** button or via keyboard shortcuts.



8. The results coming from the server will start appearing in the list. The number of studies found will be displayed in the lower left corner. Select the study you want to download from the list and click the **Download** button or press **Enter**. You can also just double-click the study to start the download process. You can browse images of the study as soon as they begin appearing in the series preview bar.



9. The status bar shows the number of received files, the transfer speed, elapsed time, and estimated time to finish.



By default, the study will be downloaded to the active viewer window (if another study was previously opened in this window, it will be closed). Other download modes are available from the pop-up menu displayed after clicking the right mouse button on the selected study/studies. Click **Add to active window** or press **Shift + Enter** to download the study to the active window without clearing previous study. Click **Download to new window** or press **Ctrl + Enter** to open a new window and start downloading the study to it. Click **Download to**

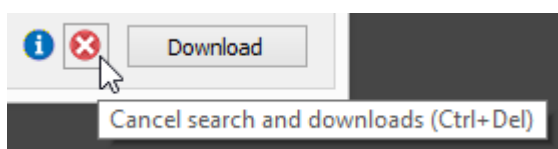
separate windows or use the shortcut **Ctrl + Shift + Enter** to download each of the selected studies to a new window.

Study date	Patient name	Date of birth	Patient ID	Modality	Study description	Accession r
9/3/2009 12:17:36 PM	American Kestrel	1/23/1956	872569123647	CR	Chest Ap	139319
6/11/2011 1:28:54 PM	American Kestrel	1/23/1956	872569123647	CT\PT	Pet-Ct Wb	T9817248
6/26/2012 12:49:49 PM	American Kestrel	1/23/1956	872569123647	US	Unnamed	U43920482
8/1/2012 10:00:21 AM	Keel Billed Toucan	1/23/1956	872569123647	MC	Mammo	A23490823
8/1/2012 7:32:33 AM	Painted Bunting				Spine L-S	
7/30/2012 11:30:26 AM	Rainbow Lorikeet				Thorax Breast	
6/22/2007 11:47:47 AM	Scarlet Macaw				Unnamed	

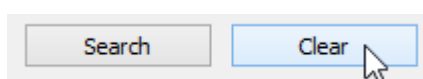
You can search all studies of the selected patient (that is, studies that have the same Patient ID field) by clicking **Find all studies of this patient** in the pop-up menu or pressing **Ctrl + P**.

Download	Enter
Add to active window	Shift+Enter
Download to new window	Ctrl+Enter
Download to separate windows	Ctrl+Shift+Enter
Find all studies of this patient	Ctrl+P

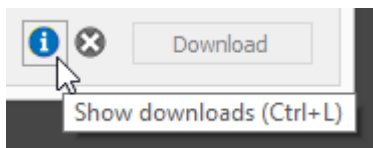
You can stop the download process at any time by clicking the stop icon or using the shortcut **Ctrl + Del**.



To reset the search fields, click the **Clear** button.



Press the Info icon or use the shortcut **Ctrl + I** to show the list of active and finished downloads along with detailed statistics and status messages.

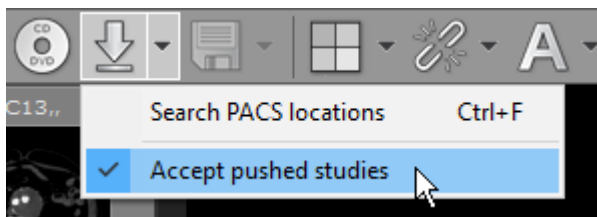


Patient (study date)	Progress	Download time	Bytes transferred	Current speed	Average speed	Downloaded files	Expected files	PACS location	Error message	Queued	Started	Finished
American Kestrel (6/11/2011 1:28:54 PM)	94%	06s	153.0 MB	19.9 MB/s	25.3 MB/s	568	600	Pacs Server		9/6/2015 12:13:09 PM	12:13:09...	
Keel Billed Toucan (8/1/2012 10:00:21 AM)	Finished	04s	217.5 MB	54.4 MB/s		4		Pacs Server		9/6/2015 12:13:09 PM	12:13:11...	12:13:15...
Painted Bunting (8/1/2012 7:32:33 AM)	Connecting						83	Pacs Server		9/6/2015 12:13:09 PM	12:13:15...	
Rainbow Lorikeet (7/30/2012 11:30:26 AM)	Waiting						1012	Pacs Server		9/6/2015 12:13:09 PM		
Scarlet Macaw (6/22/2007 11:47:47 AM)	Waiting					4		Pacs Server		9/6/2015 12:13:09 PM		
American Kestrel (6/26/2012 12:49:49 PM)	Finished	02s	50.7 MB	25.4 MB/s		1		Pacs Server		9/6/2015 12:13:09 PM	12:13:09...	12:13:11...
American Kestrel (9/3/2009 12:17:36 PM)	Finished	01s	9.4 MB	9.4 MB/s		1		Pacs Server		9/6/2015 12:13:09 PM	12:13:09...	12:13:09...

2.5.1 Displaying pushed studies

By default, unsolicited (not requested specifically via PACS search window) studies received from other PACS locations are stored in the default [local database](#).

If you want to be able to push studies from other PACS locations to RadiAnt and display them immediately in a viewer window, then you have to enable the [Accept pushed studies](#) option.

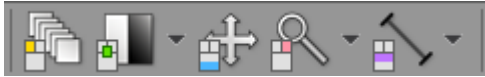


This option can be enabled in only one viewer window at a time, being reset after the program is closed and reopened.

You can permanently enable this option by editing [the options.xml file](#).

2.6 Using basic tools

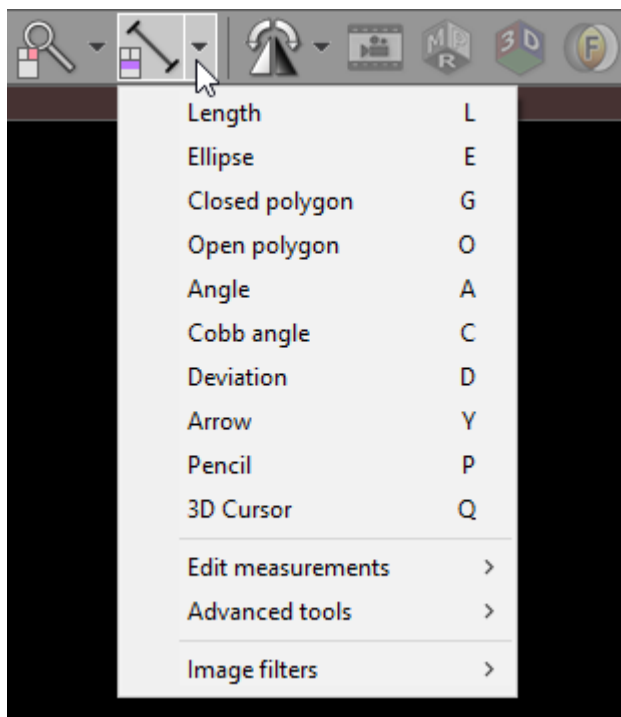
In the middle of the toolbar there are five buttons.



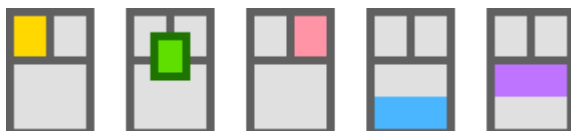
They represent basic tools which are available in RadiAnt DICOM Viewer:

- [Browse series](#)
- [Adjust image window](#)
- [Pan image](#)
- [Zoom image](#)
- ROI tools:
 - [Length](#)
 - [Ellipse](#)
 - [Closed polygon](#)
 - [Open polygon](#)
 - [Angle](#)
 - [Cobb angle](#)
 - [Deviation](#)
 - [Arrow](#)
 - [Pencil](#)
 - [3D Cursor](#)

The default ROI tool is length measurement. The ROI tool can be changed by clicking the arrow on the right side of the button and choosing specific tool from the drop-down menu.



Each tool can be assigned to one of three basic mouse buttons or two extended mouse buttons. Just click the tool button with the left, middle, right, back (4th) or forward (5th) mouse button. The current assignment is represented by a mouse icon with one (or more) buttons highlighted: **left**, **middle**, **right**, **back** or **forward**.



By default the following tool assignment is used:

Mouse button	Default tool
Left	Browse series
Middle	Brightness and contrast adjustment (windows level / width)
Right	Zoom in/out
Back (4th)	Pan
Forward (5th)	Length measurement

2.6.1 Browsing series and images

Browsing series

Click the thumbnail image in the series preview bar to load the desired series and browse its images.

You can easily switch between series by pressing the **Left Arrow** or **Right Arrow** keys.

Alternatively, while hovering over the image panel, horizontal mouse wheel can be used for changing series.

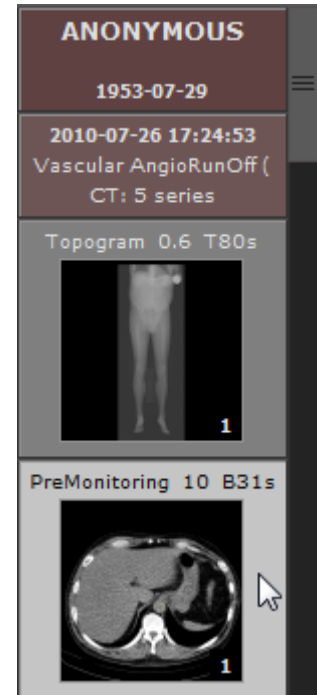
The series displayed in the active panel is highlighted in the preview bar.

The first series of a study is preceded by two colored boxes with patient and study data:

- Patient name
- Patient birth date
- Study date and time
- Study description
- Modality and number of series

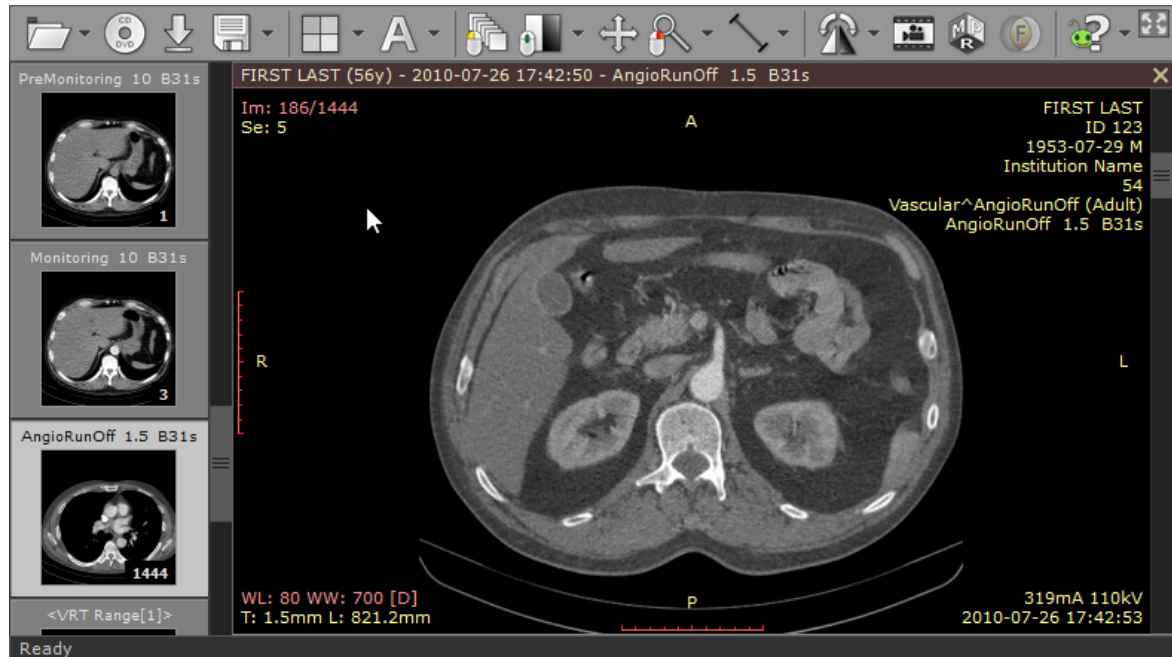
Each series thumbnail image has a series description as a caption, and in its bottom right corner, the total number of images in the series is displayed.

The list can be scrolled either using a scrollbar or by dragging it with one finger on multi-touch devices.



Browsing images

As soon as the images start appearing in the panel you may begin browsing them.



There are several different ways of paging through the images of the series:

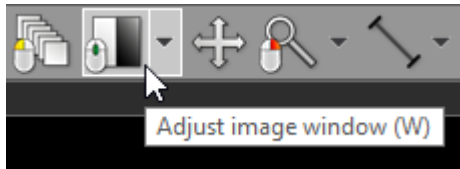
1. Click the **Browse series** button on the toolbar (or press the **B** key). Next, press the left mouse button over the image, and drag the mouse up or down to browse a series in both directions.



2. Turn the mouse wheel while the cursor hovers over the panel with the image.
3. Use the scrollbar on the right side of the panel.
4. Press the **Up Arrow** or **Down Arrow** on the keyboard to return to the previous image, or move on to the next.
5. Press **Page Up** or **Page Down** to move 10 images backward or forward.
6. On a multi-touch device, touch the image with one finger and drag it up or down. (The tool must be associated with the left mouse button - if it is not, touch the "Browse series" tool button.)

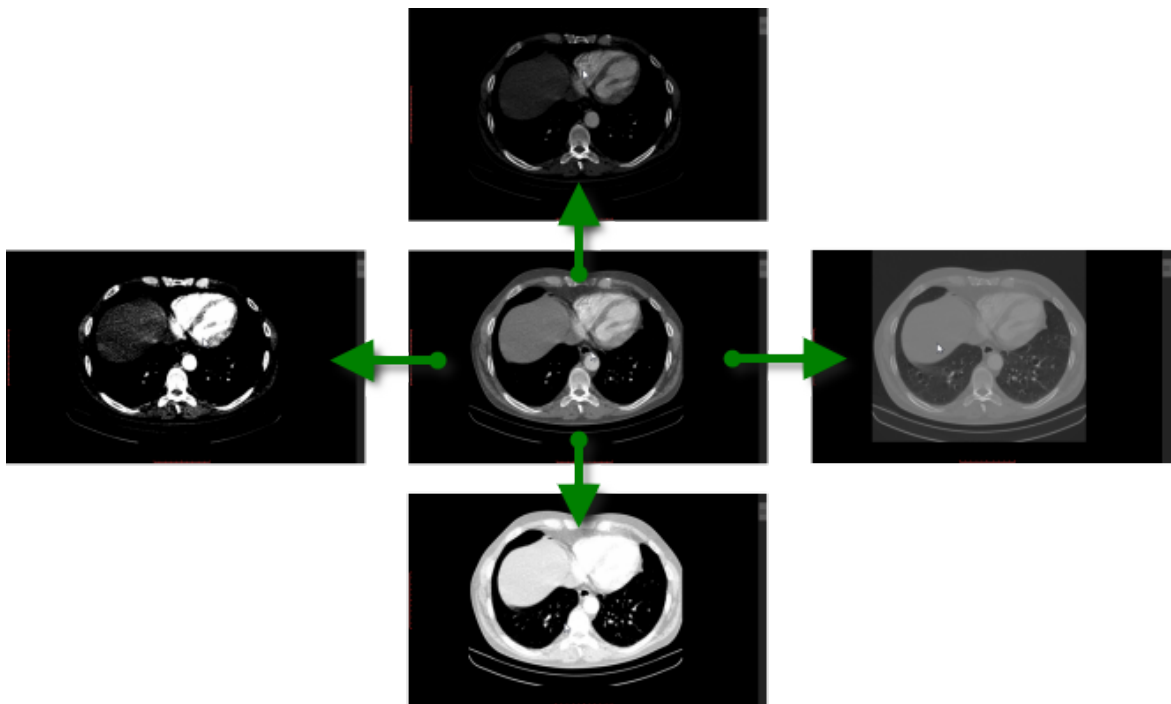
2.6.2 Changing brightness / contrast

Click the **Adjust image window** button on the toolbar (or press the **W** key).



Next, press the left mouse button over the image and drag the mouse to change brightness (window level - WL), or contrast (window width - WW):

- Up to decrease brightness (window level goes up)
- Down to increase brightness (window level goes down)
- Left to increase contrast (window width shrinks)
- Right to decrease contrast (window width expands)



By default, the windowing tool is associated with the middle mouse button.

Press the **Ctrl** key and drag the mouse with the left button down, and the windowing tool will be active regardless of current association.

On multi-touch devices, touch the image with three fingers and drag them in the directions described above to adjust window level and width.

Window presets

Different window presets can be quickly applied by pressing **0** through **9**.

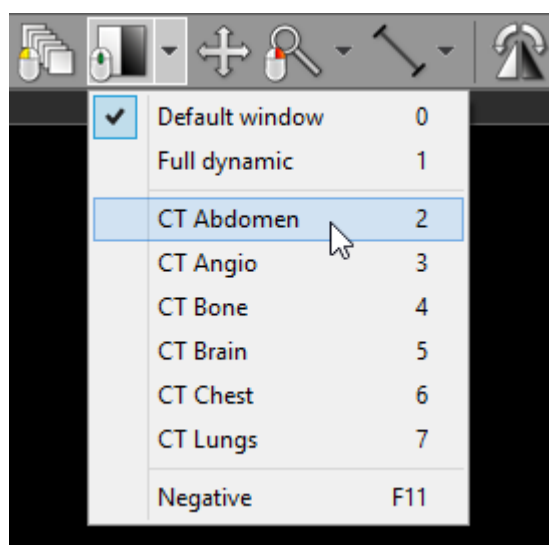
0 Default window for the current image.

1 Full dynamic window (pixel with lowest value is displayed as black, whereas pixel with the highest value is displayed as white).

2 - **9** set different WL/WW depending on image modality. In the table below presets for CT images are shown.

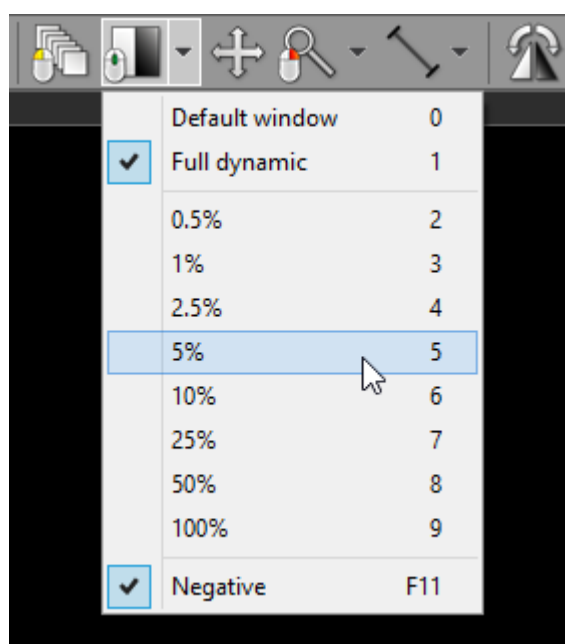
Key	Preset	WL	WW
2	CT Abdomen	60	400
3	CT Angio	300	600
4	CT Bone	300	1500
5	CT Brain	40	80
6	CT Chest	40	400
7	CT Lungs	-400	1500

These presets are also available from the [Adjust image window](#) drop down menu.



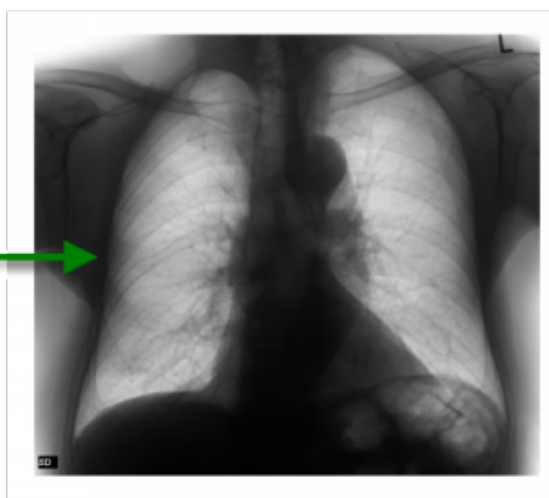
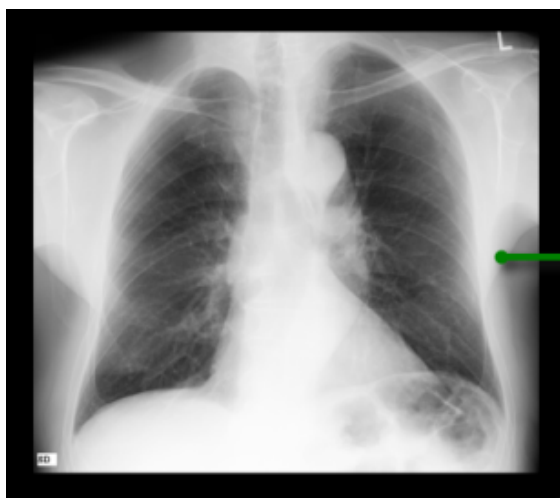
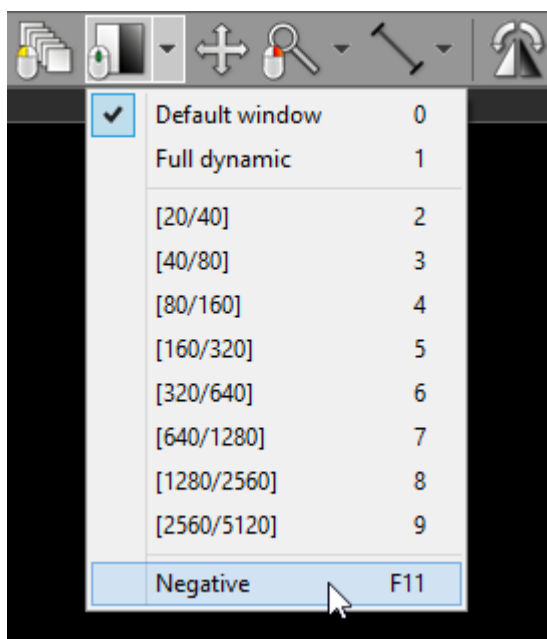
The preset values for PET (Positron Emission Tomography) series apply to the maximum value of the displayed range and are presented as the percent of the highest value in the entire image series.

Key	Displayed range maximum value (as % of the highest value in series)
2	0.5%
3	1%
4	2.5%
5	5%
6	10%
7	25%
8	50%
9	100%



Negative mode

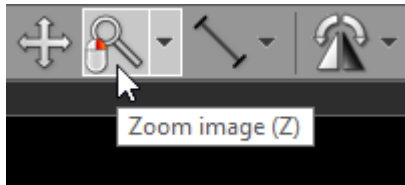
Press the **F11** key or click the **Negative** menu item to toggle negative mode for the image.



2.6.3 Changing zoom level / position

Image zooming

Click the **Zoom image** button on the toolbar (or press the **Z** key).



Next, press left mouse button over the image and drag the mouse Up to zoom in or Down to zoom out.

By default, the zooming tool is associated with the right mouse button.

Another way to zoom is to place the cursor over the image, press the **Ctrl** key, and turn the mouse wheel in both directions to zoom in or out.

Alternatively, the **Ctrl + Plus (+)** and **Ctrl + Minus (-)** keyboard shortcuts can be used to zoom.

On multi-touch devices, touch the image with two fingers and drag them apart to zoom in, or toward each other to zoom out.

Different zoom presets can be quickly applied by pressing **Ctrl + 0-4**

Key	Preset
Ctrl + 0	Fill viewport with image
Ctrl + 1	100% (1 image pixel = 1 screen pixel)
Ctrl + 2	200% (1 image pixel = 2 screen pixels)
Ctrl + 3	400% (1 image pixel = 4 screen pixels)
Ctrl + 4	800% (1 image pixel = 8 screen pixels)

These presets are also available from the **Zoom image** drop down menu.

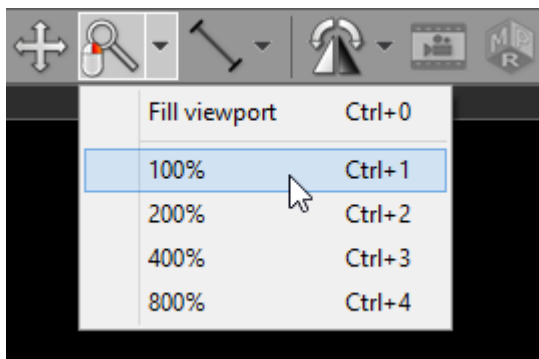
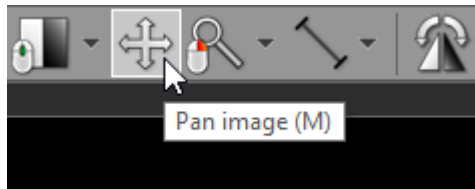


Image panning

When an image is zoomed in, panning can be used to reveal areas lying outside the viewing panel.

Click the **Pan image** button on the toolbar (or press the **M** key).



Next, press the left mouse button over the image and drag the mouse to move image around the screen.

By default, the image panning tool is associated with the back (4th) mouse button.

Press the **Shift** key and drag mouse with the left button down, and the panning tool will be active regardless of the current left mouse button association.

Alternatively, **Ctrl + Arrows (Up, Down, Left or Right)** can be used to pan.

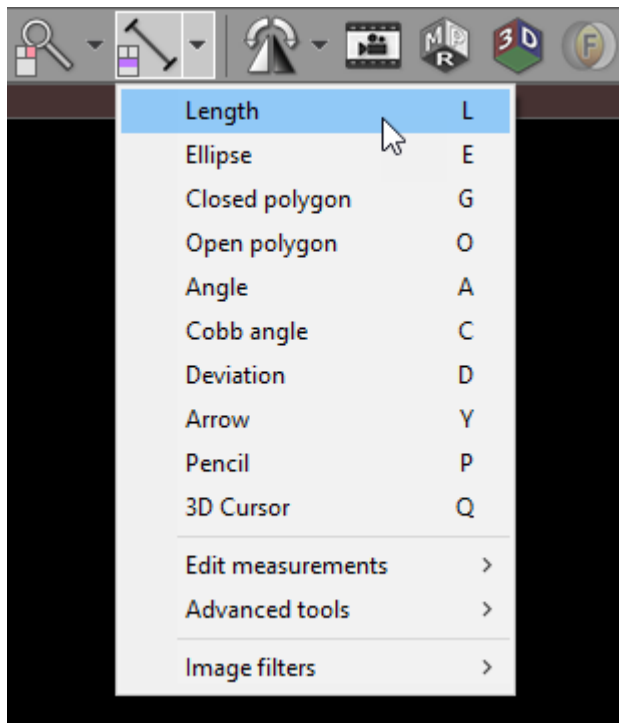
On multi-touch devices, touch the image with two fingers and drag them across the panel to move image. Keep the distance between the fingers unchanged to maintain the current zoom ratio.

Press **Ctrl + 0** to revert the zoom and pan settings and fill the viewport with the image.

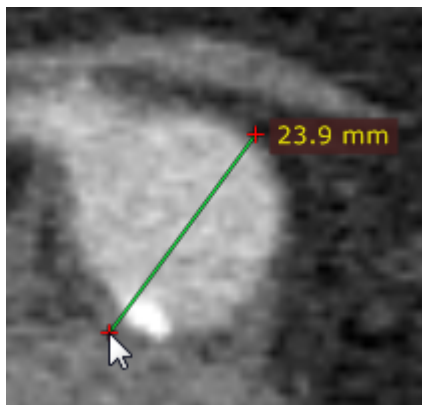
2.7 Taking measurements

2.7.1 Length

Select **Length** from the **Measurements** drop down menu (or press the **L** key).



Place the cursor over the starting point, then press left mouse button and drag the mouse to draw a segment with length measurement. Release the button to finish drawing.

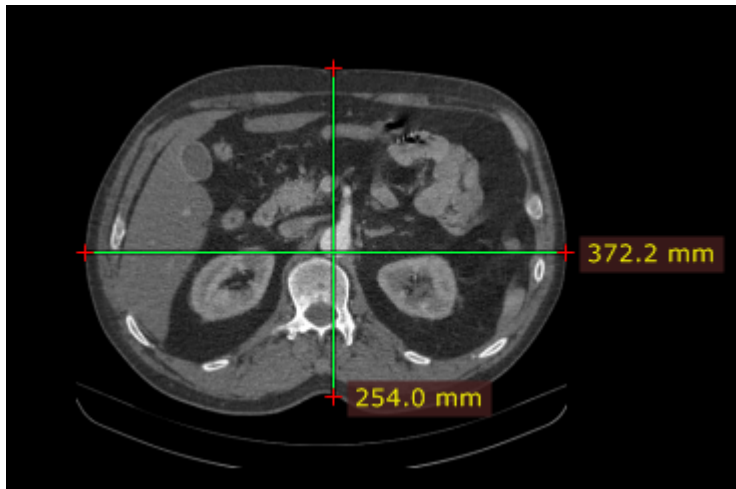


The distance value will be shown in either millimeters or pixels (when the calibration data is not included in the image file).

You can move the entire segment or one of its endings by dragging while pressing the left mouse button.

The label may be also dragged to a more convenient place if necessary.

Press **Shift** while drawing the segment to make it either vertical or horizontal.

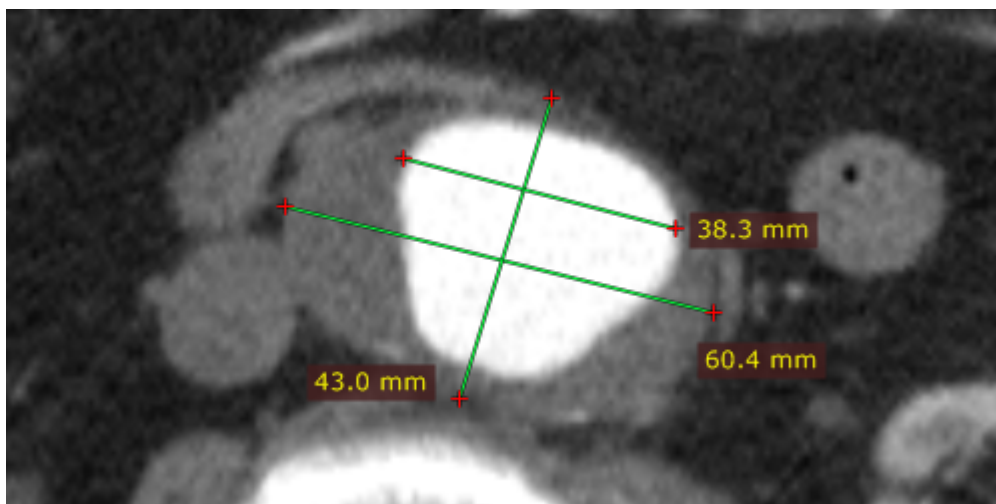


By default, the length measurement tool is associated with the forward (5th) mouse button.

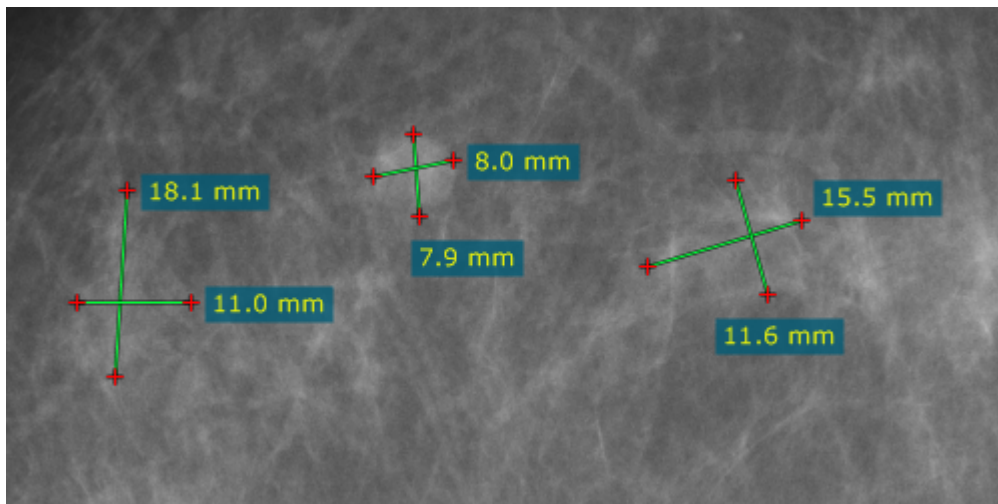
Press **Esc** while drawing the segment to delete it.

Calibration of measurements

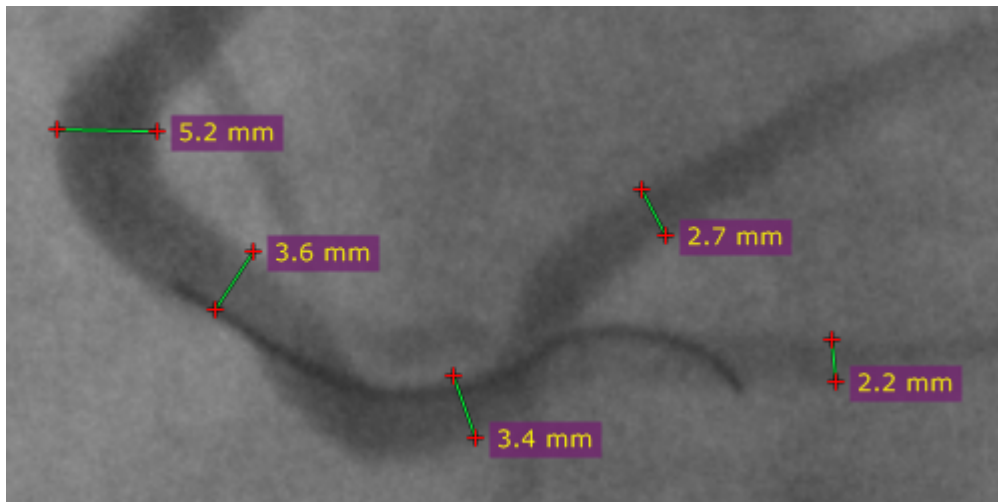
Depending on the source of the calibration data, the label with a measurement will be displayed in different colors:



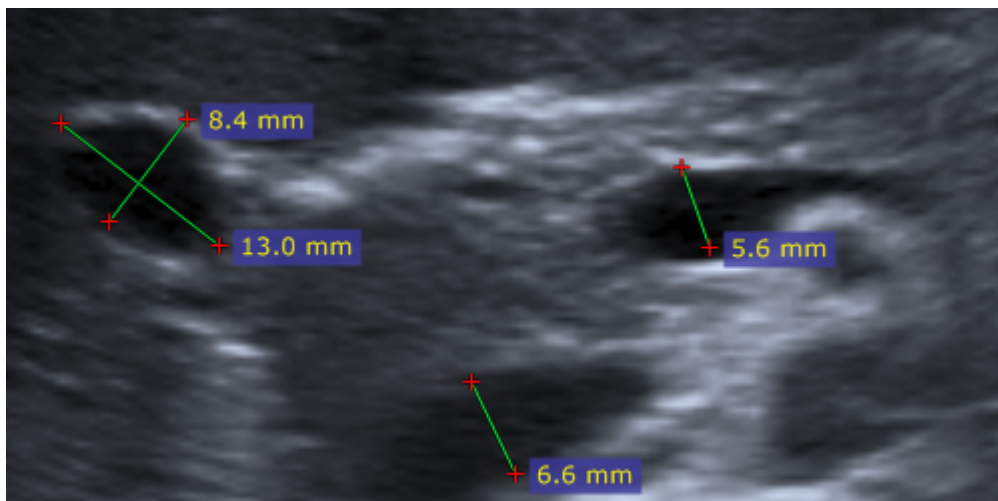
Measured distance is calibrated (the pixel spacing element is present).



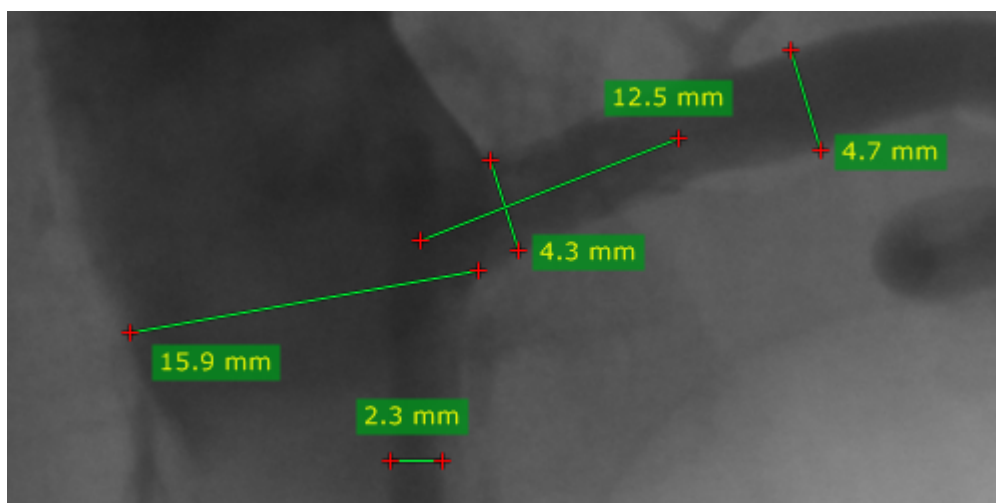
The distance is calculated using the estimated radiographic magnification factor.



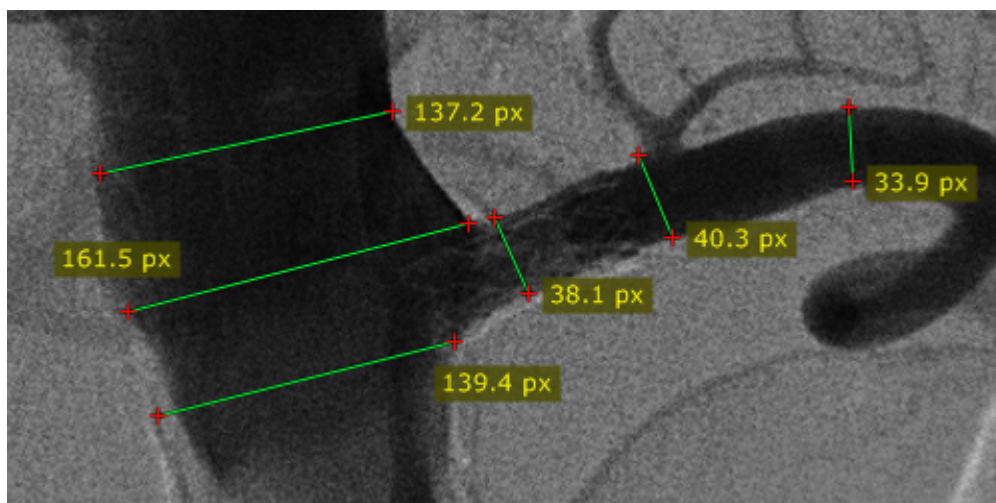
The distance is measured at the detector plane.



Ultrasound region calibration is used.



Manual calibration was performed by a user.

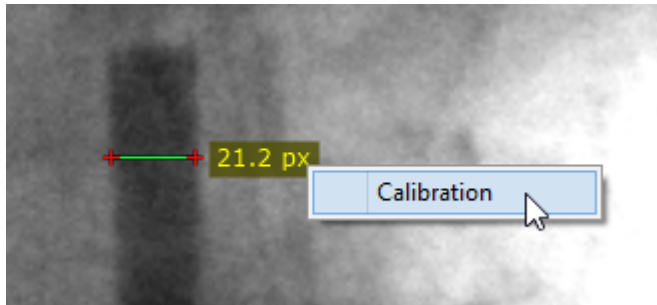


There is no calibration data available (measurement in pixels of the source DICOM image).

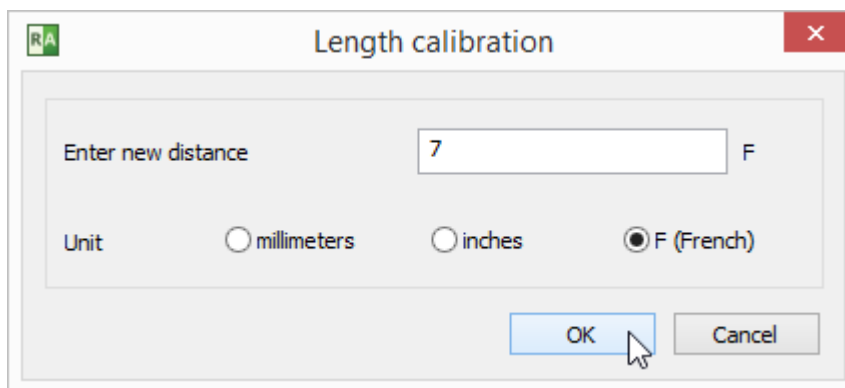
Manual calibration

The image can be manually calibrated (if no calibration data was present in the DICOM file) or recalibrated.

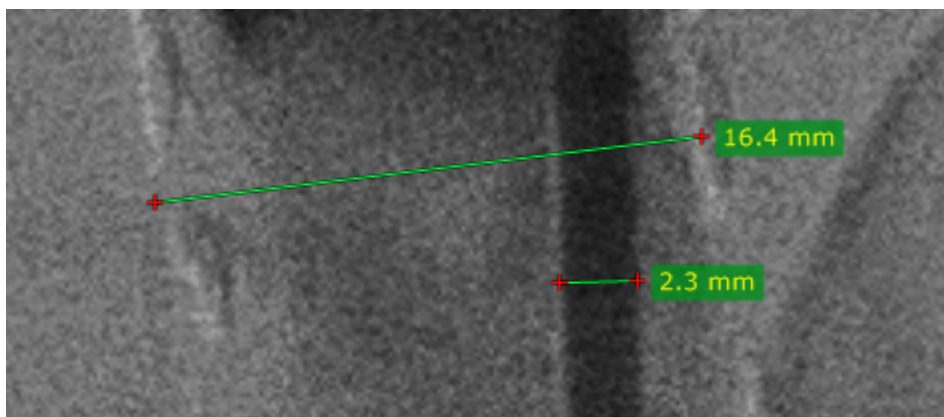
1) Measure the object with a known size, and then right-click the segment or its label to show a pop-up menu.



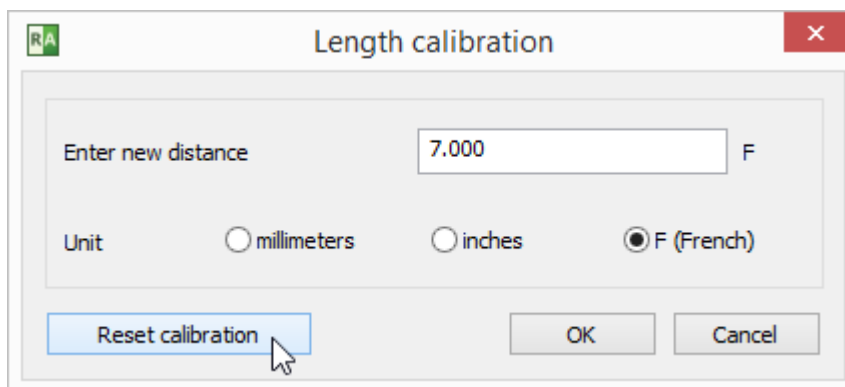
2) Click **Calibration** to open the dialog window. Enter the distance and select the units (millimeters, inches or French sizes), click **OK** to recalibrate the image.



3) Now the measurements will be taken with the manual calibration data and shown in millimeters.



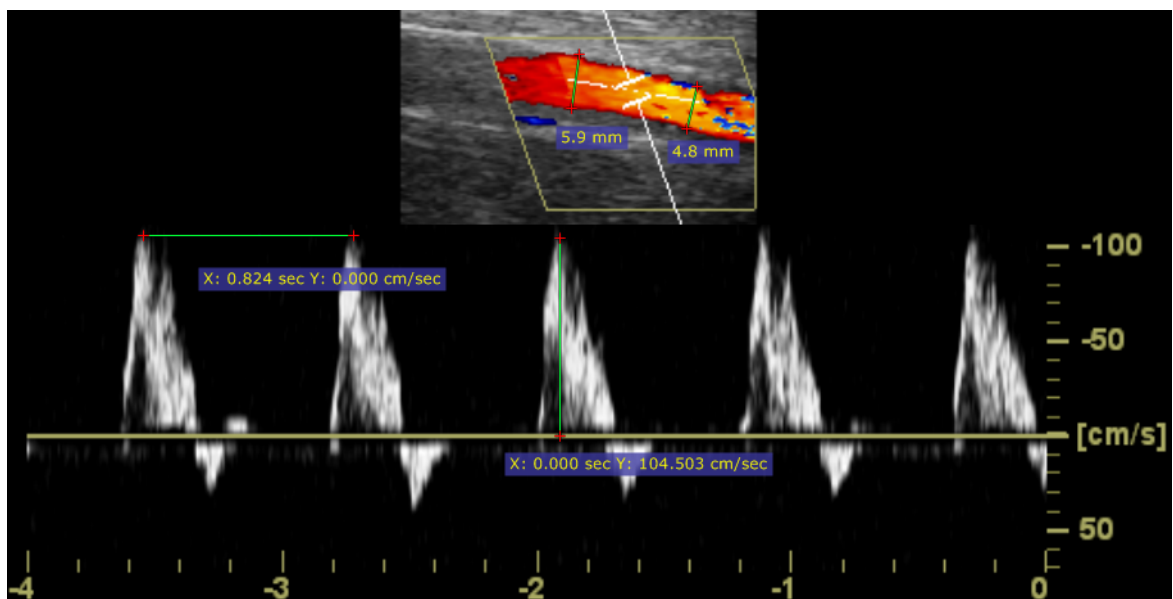
To revert the manual calibration show the "Calibration" window and click the **Reset calibration** button.



Measurements in US (ultrasound) images

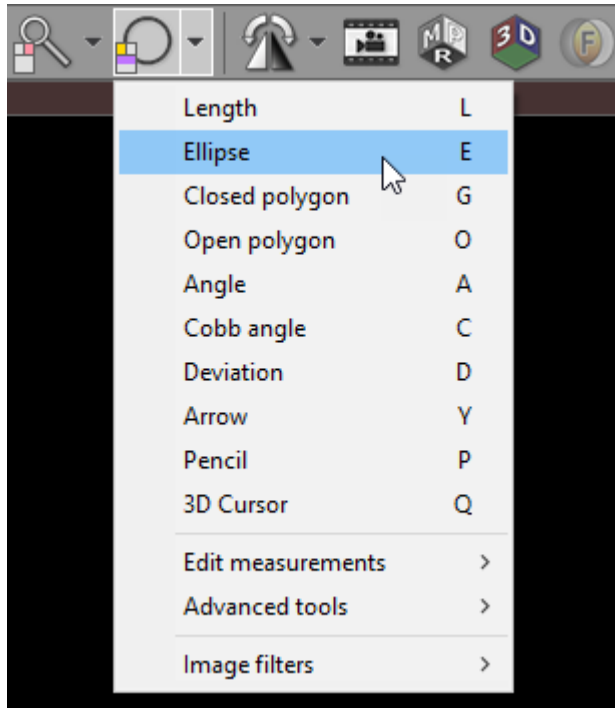
DICOM images coming from the ultrasound devices often include calibrated regions. Depending on the region type, different parameters can be measured.

Below is the sample screenshot showing the measurement of distance, velocity and time.

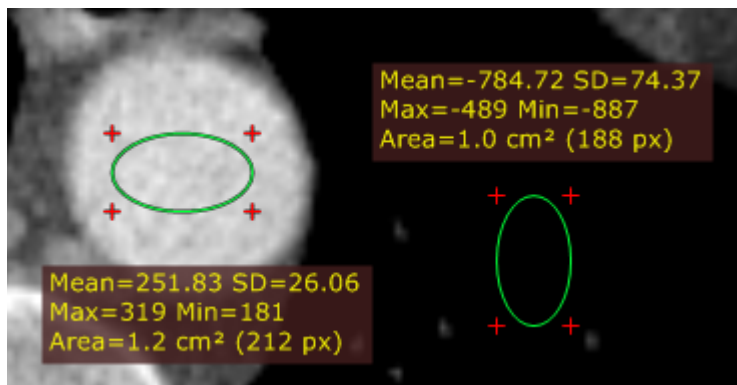


2.7.2 Ellipse

Select **Ellipse** from the **Measurements** drop down menu (or press the **E** key).



Press left mouse button and drag the mouse to draw an ellipse with pixel value measurement. Release the button to finish drawing.



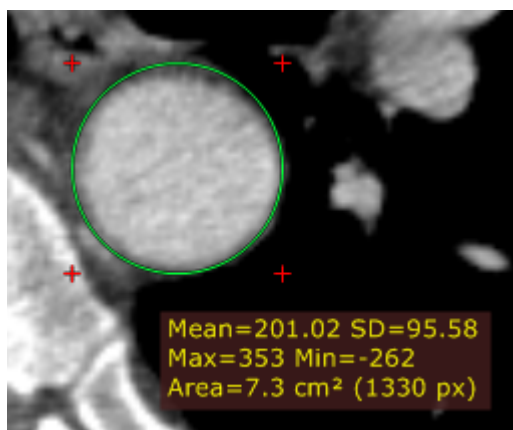
The values measured are:

Name	Description
Mean	Mean pixel value (Hounsfield Units for CT images)
SD	Standard deviation
Max	Maximum pixel value
Min	Minimum pixel value
Area (px)	Area in square centimeters and the number of pixels used for calculations

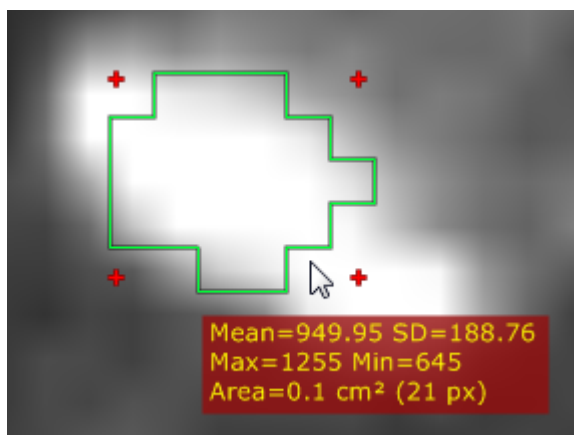
You can move the ellipse or change its size by dragging it or the surrounding cross-marks with the left mouse button pressed.

The label may also be dragged to a more convenient place if necessary.

Press **Shift** while drawing the ellipse to make it a perfect circle.



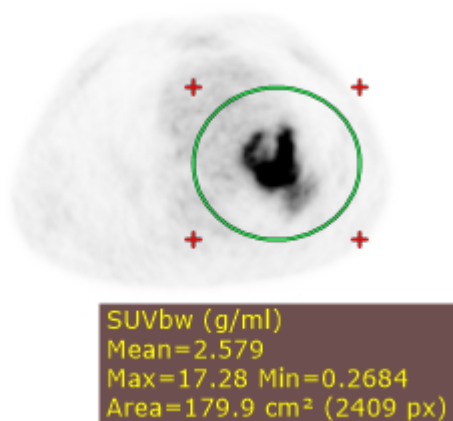
When drawing an ellipse in a magnified image, you can press the **Ctrl** key to show the boundary of actual pixels taken into account in calculations.



Press **Esc** while drawing the ellipse to delete it.

SUV measurement

For PET images the ellipse tool can be used to measure the maximum, minimum, and average values of the Standardized Uptake Value calculated using body weight (SUVbw) for a specified area.



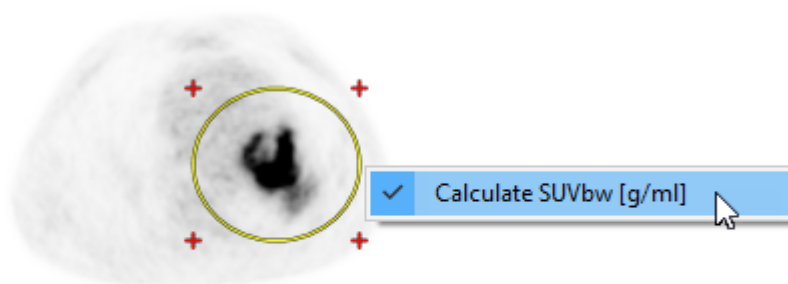
The SUV measurement is possible only when there is necessary data included in the DICOM files (patient weight, radio pharmaceutical dose and time, etc.), otherwise, the ellipse tool will show the uptake measured in Bq/ml (or in other units specified in the 0054,1001 DICOM tag).

The SUV calculation is based on the formula below:

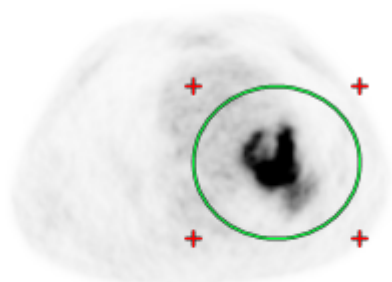
$$SUV_{bw} = \frac{A_c}{D * 2^{\left(\frac{-\Delta t}{T_{1/2}}\right)}} * W$$

A_c	Activity concentration (Bq/ml)
D	Injected dose (Bq)
W	Body weight (g)
Δt	Delay between the injection time and the scan start time (s)
$T_{1/2}$	Half-life of the radionuclide (s)

Hover the cursor above the ellipse and right click on the mouse. Select [Calculate SUVbw \[g/l\]](#) to switch between SUVbw and basic units.



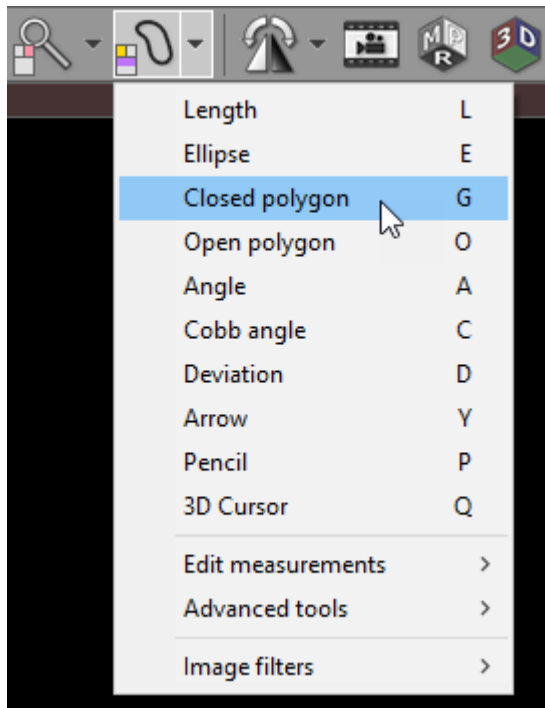
SUVbw (g/ml)
Mean=2.579
Max=17.28 Min=0.2684
Area=179.9 cm² (2409 px)



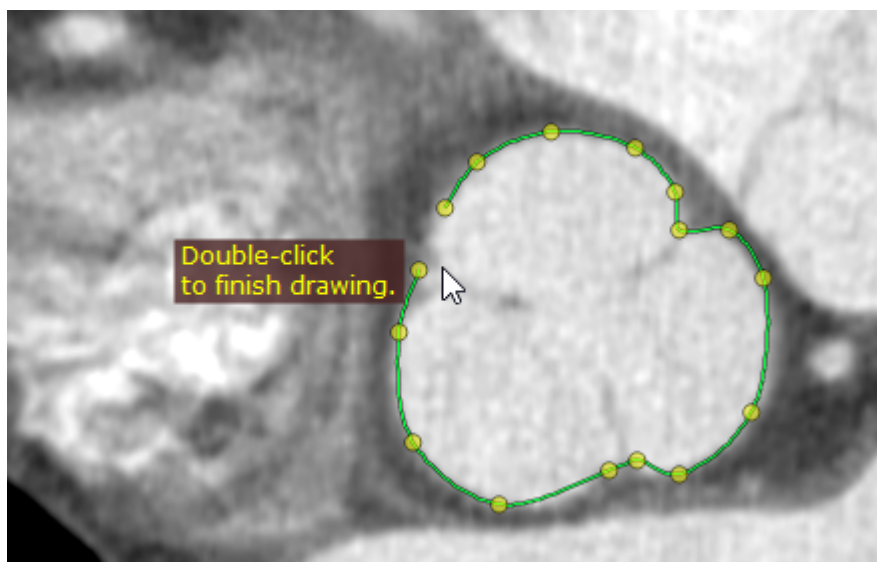
Mean=4468.33 SD=5437.96
Max=29934.78 Min=465.00
Area=179.9 cm² (2409 px)

2.7.3 Closed polygon

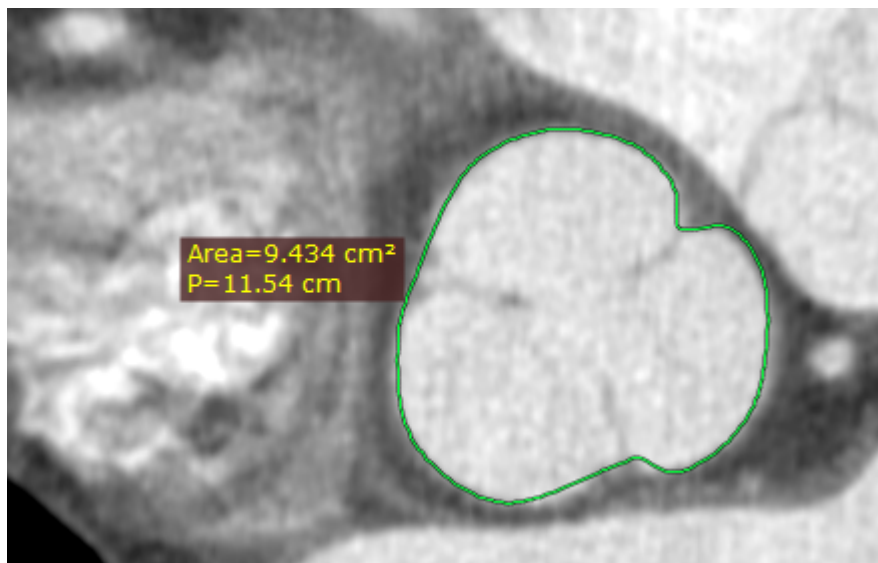
Select **Closed polygon** from the **Measurements** drop-down menu (or press the **G** key).



Left-click on the mouse to deposit the starting node. Repeat this process to deposit the remaining nodes around the structure you want to measure.



You can edit the final shape later if required. Double-click the left mouse button or click the starting node to complete the drawing.

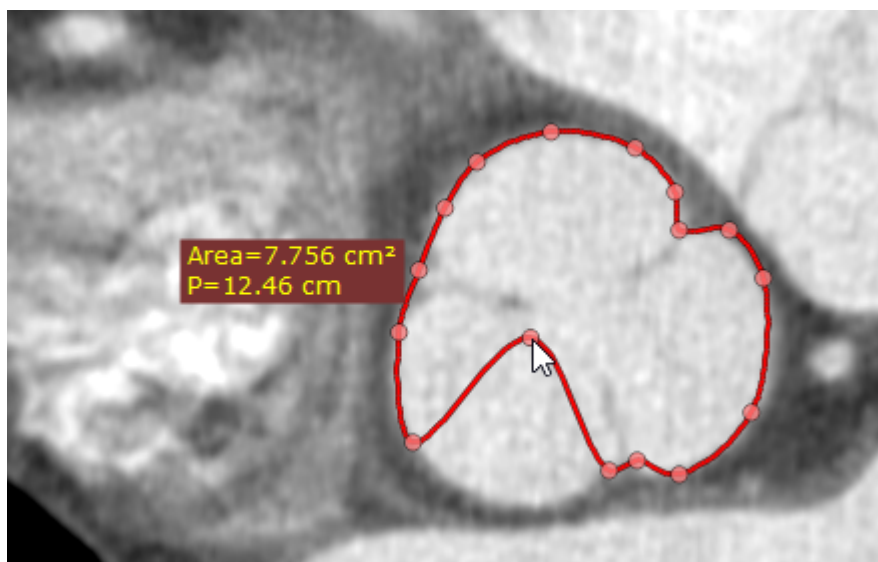


The area (cm²) and perimeter (cm) values are measured.

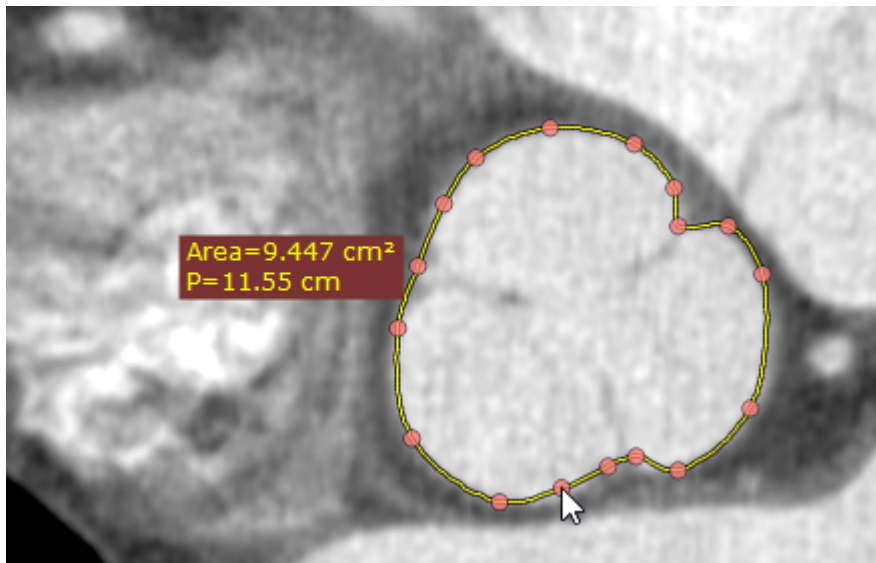
Press **Esc** while drawing the polygon to delete it.

Editing closed polygon

To move an existing node, position the cursor directly above it and click on the left mouse button. You can subsequently drag the node to a new position and release the button.

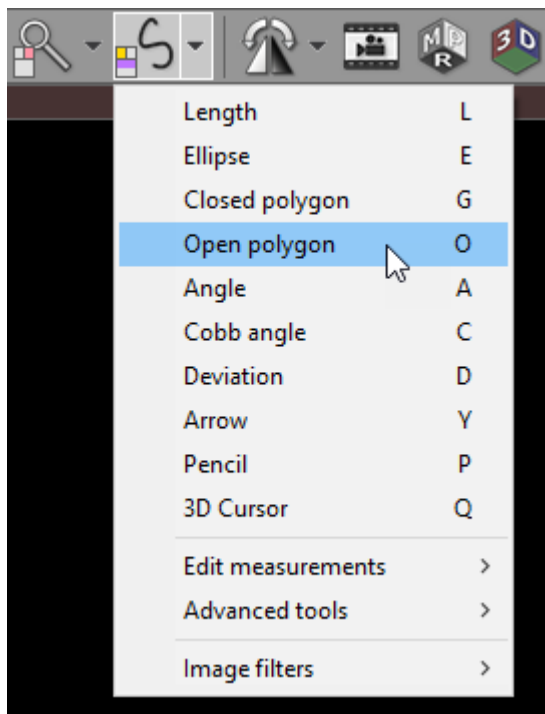


To add a new node, click on the selected polygon boundary where you want the new node to appear. You can drag the new node immediately after depositing it to adjust the shape of the boundary.

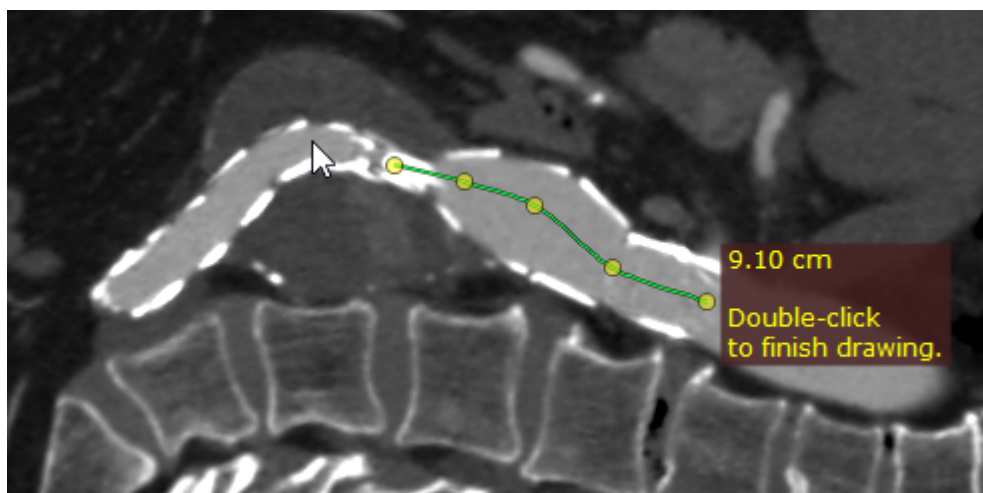


2.7.4 Open polygon

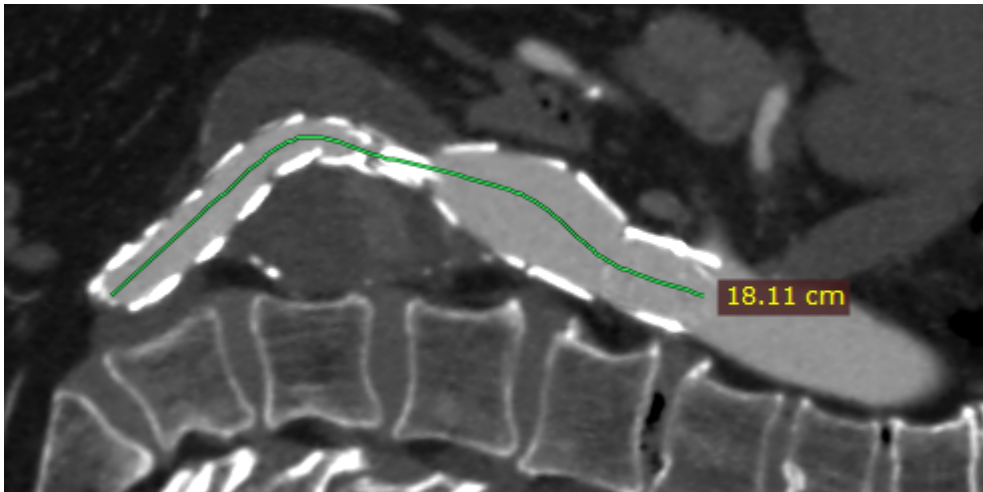
Select **Open polygon** from the **Measurements** drop down menu (or press the **O** key).



Click on the left mouse button to place the starting node. Repeat this process to deposit the remaining nodes along the structure you want to measure.



You can change the final shape at a later time if required. Double-click on the image to finish drawing.

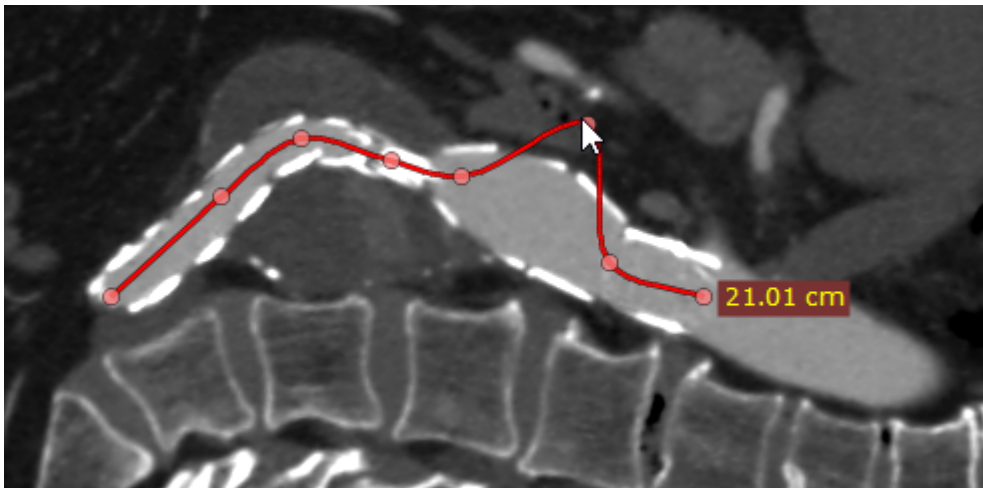


The distance of the drawn path is measured when you have finished mapping the image.

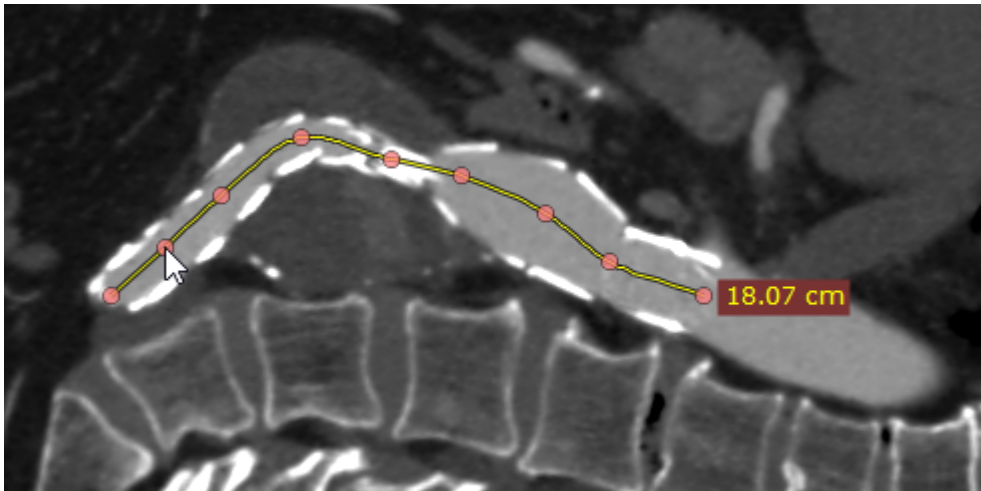
Press **Esc** while drawing the polygon to delete it.

Editing open polygon

To move an existing node, hover the cursor immediately above it and click on the left mouse button before dragging the node to the required position and releasing the button to place it.

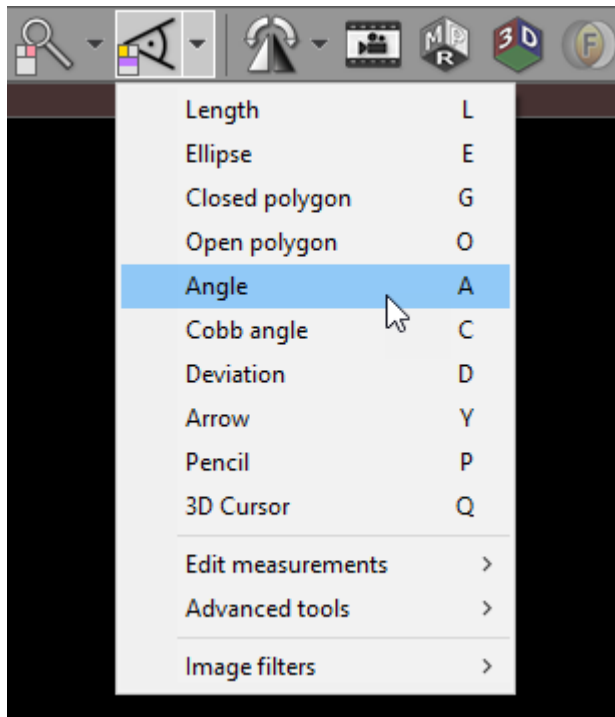


To add a new node, click on the point on the selected polygon line at which you want the new node to appear. To change the shape of the path, you can drag the new node immediately after placing it.

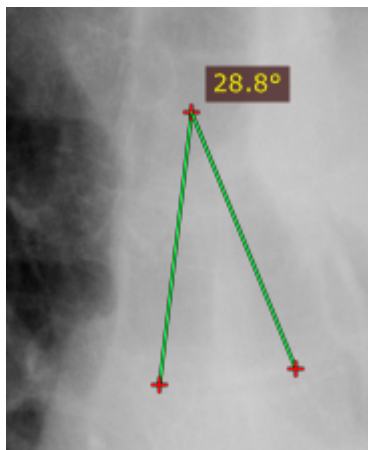


2.7.5 Angle

Select **Angle** from the **Measurements** drop down menu (or press the **A** key).



Press the left mouse button and drag the mouse to draw the first arm of the angle. Release the button and move the mouse to draw the second arm. Click the left button to finish drawing the angle.



The angle value is displayed in degrees.

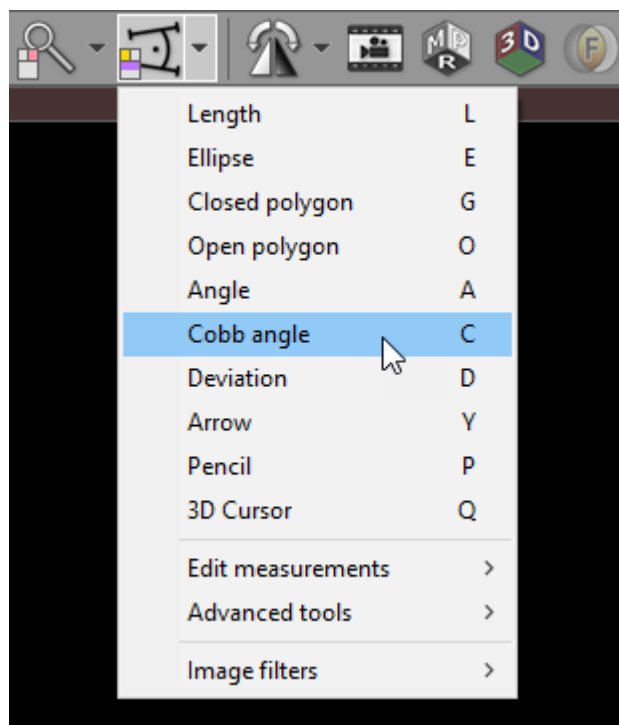
You can move the entire angle or one of its endings by dragging it or the cross-marks with the left mouse button pressed.

The label may also be dragged to a more convenient place if necessary.

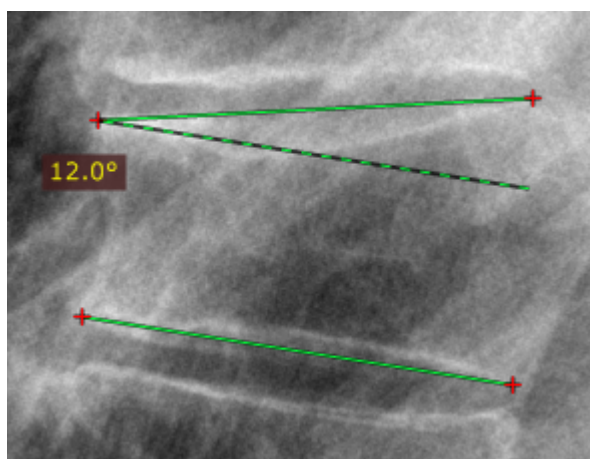
Press **Esc** while drawing the angle to delete it.

2.7.6 Cobb angle

Select **Cobb angle** from the **Measurements** drop down menu (or press the **C** key).



Press the left mouse button and drag the mouse to draw the first segment of the Cobb angle, and then release the button. To draw the second segment, again press the left mouse button and drag the mouse. Release the button to finish drawing the angle.



The Cobb angle value is displayed in degrees.

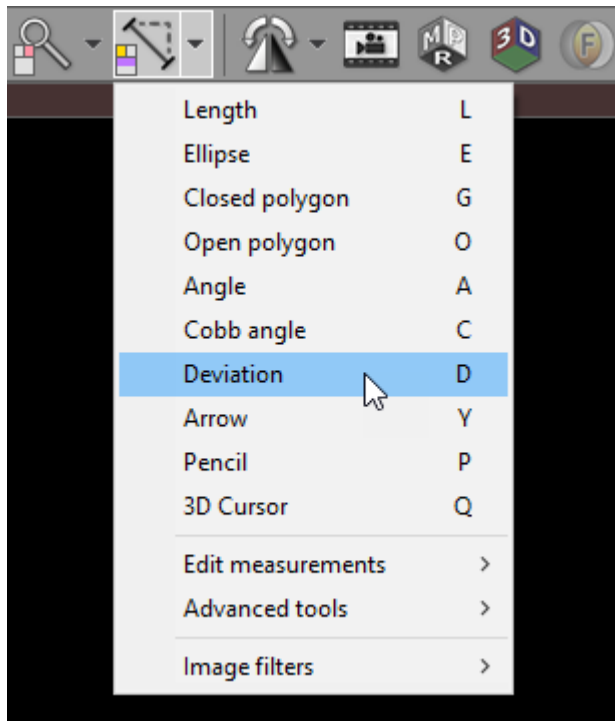
You can move the segments of the Cobb angle or one of their endings by dragging the segment or the cross-marks with the left mouse button pressed.

The label may also be dragged to a more convenient place if necessary.

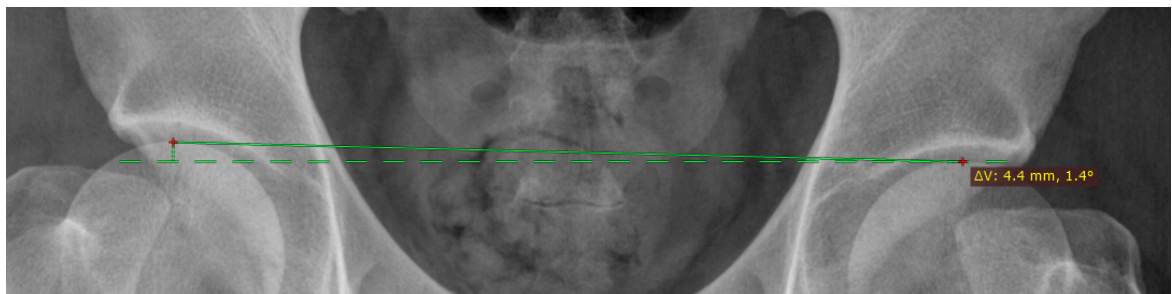
Press **Esc** while drawing the Cobb angle to delete it.

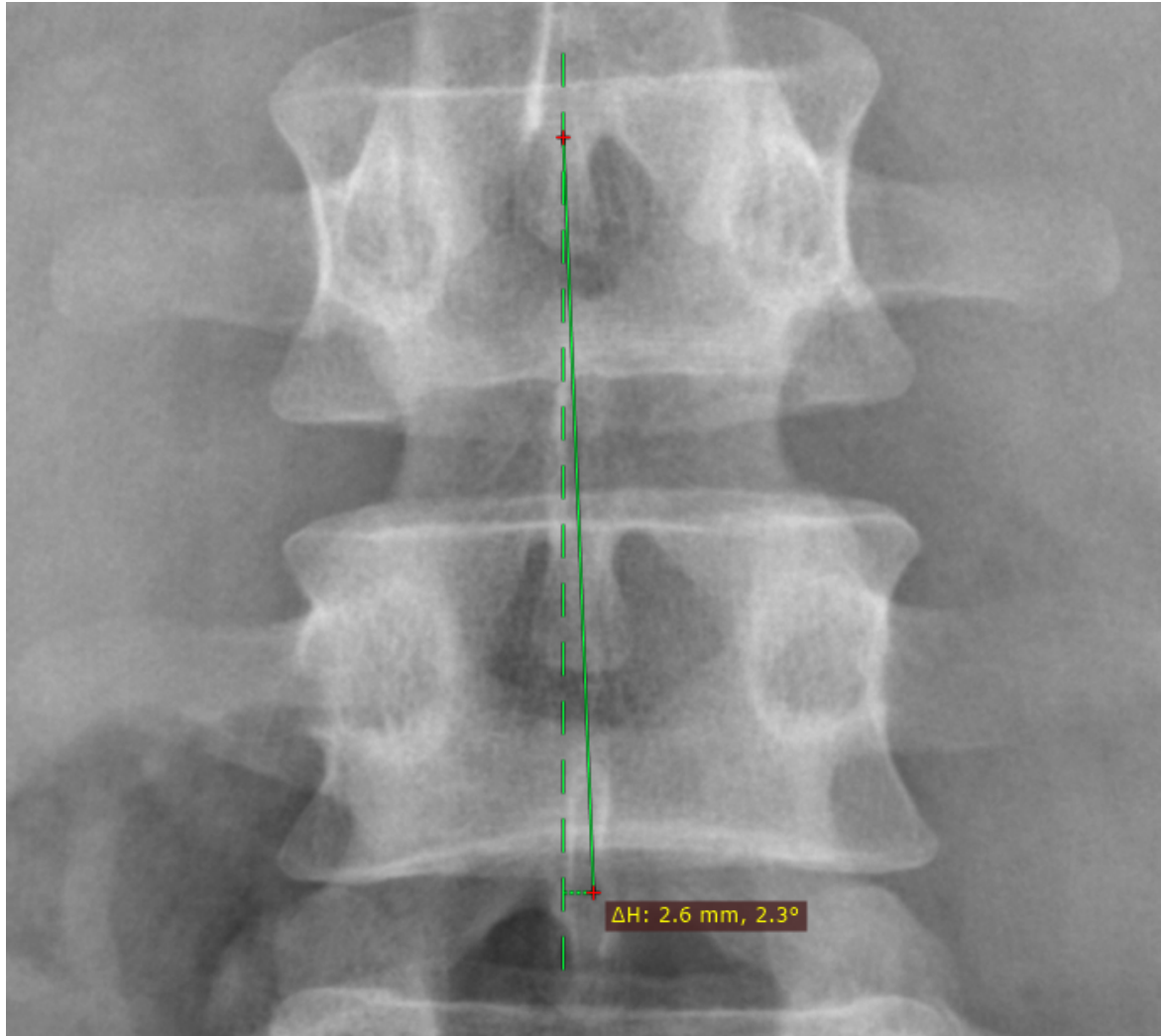
2.7.7 Deviation

Select **Deviation** from the **Measurements** drop down menu (or press the **D** key).



Place the cursor over the starting point, then press left mouse button and drag the mouse to draw a segment. Release the button to finish drawing.





The distance value in millimeters measured from one end of the segment to the straight line (either horizontal or vertical) intersecting the other end of the segment will be shown.
The second displayed value is the angle (in degrees) between the segment and the straight line intersecting one of its ends.

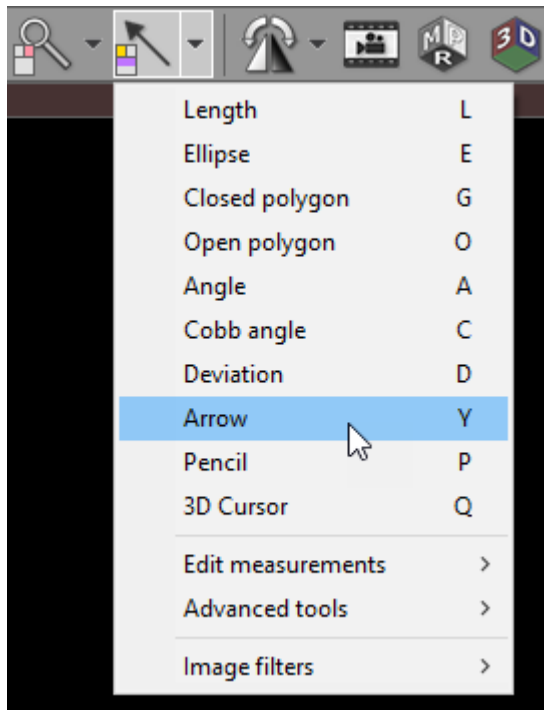
You can move the entire segment or one of its endings by dragging it or the cross-marks with the left mouse button pressed.

The label may also be dragged to a more convenient place if necessary.

Press **Esc** while drawing the deviation to delete it.

2.7.8 Arrow

Select **Arrow** from the **Measurements** drop down menu (or press the **Y** key).



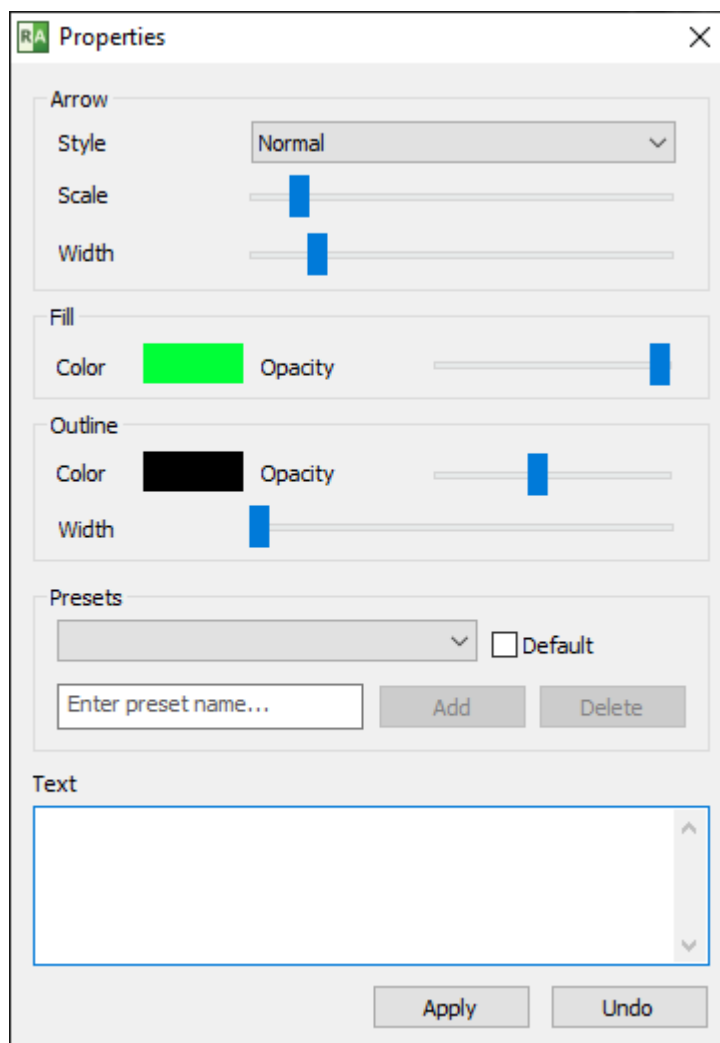
Place the cursor over the starting point, then click the left mouse button and drag the mouse to draw an arrow. Release the button to complete the drawing.

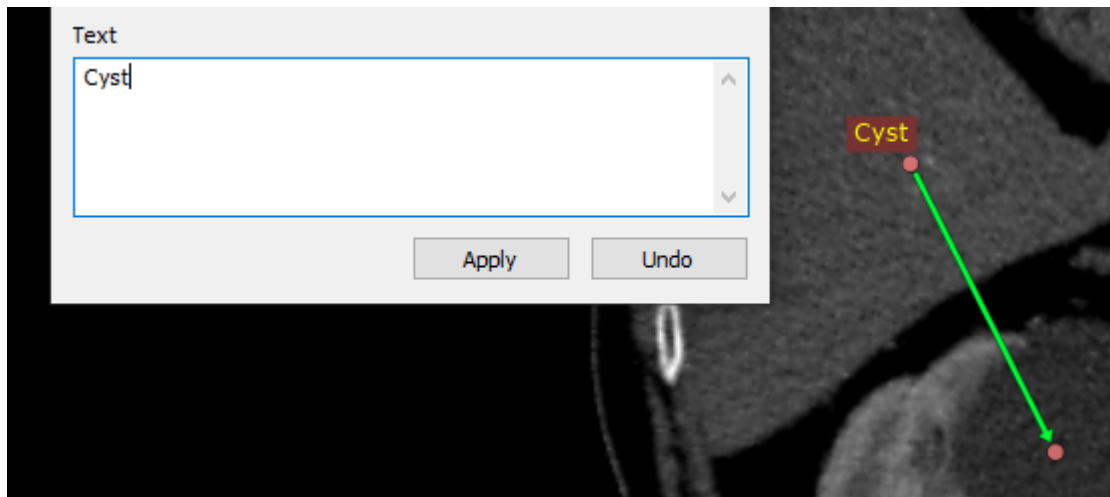


Press **Esc** while drawing the arrow to delete it.

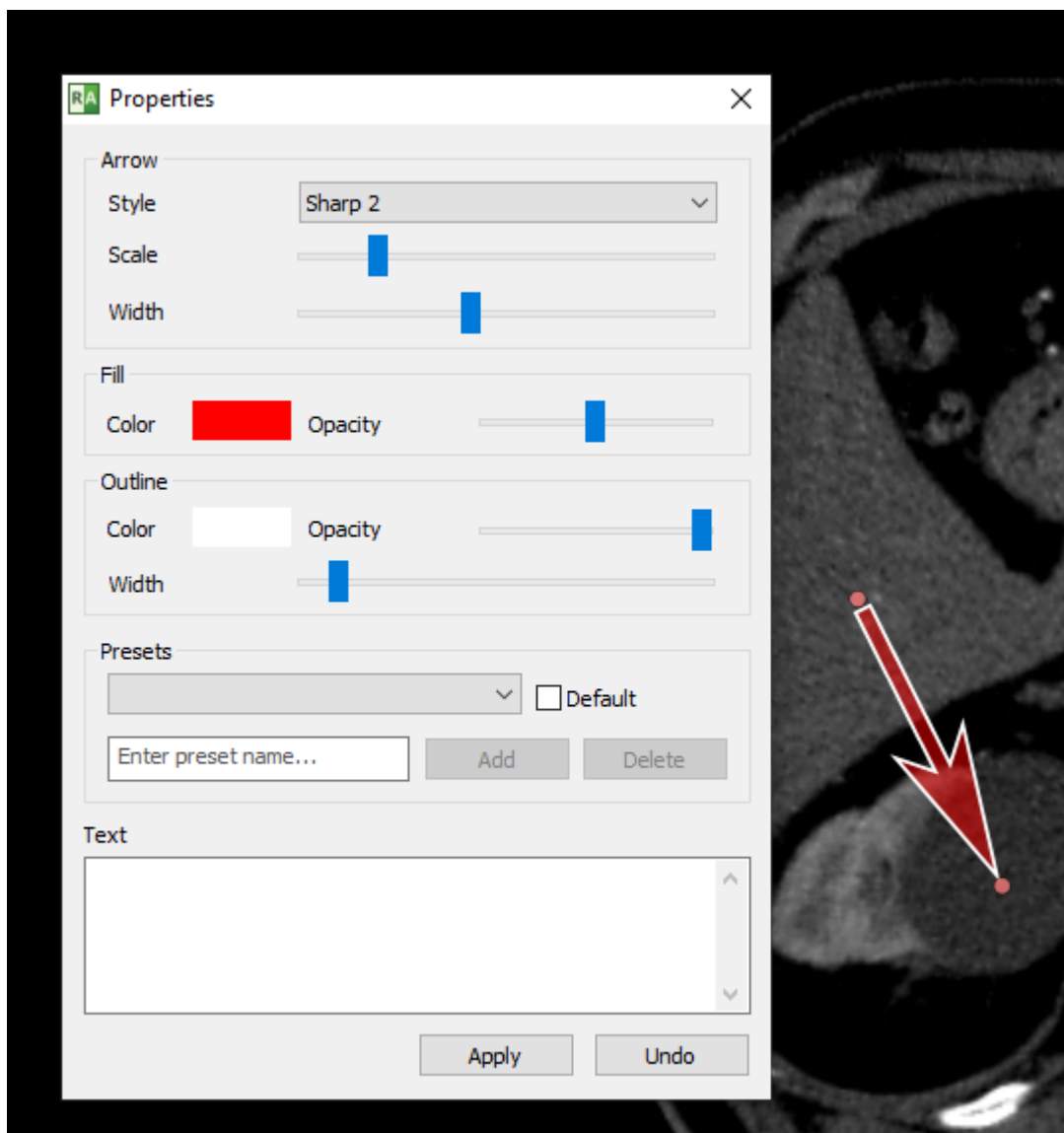
Customizing arrows

Double-click on the arrow or select **Properties** from the pop-up menu to edit the arrow or add a text label.



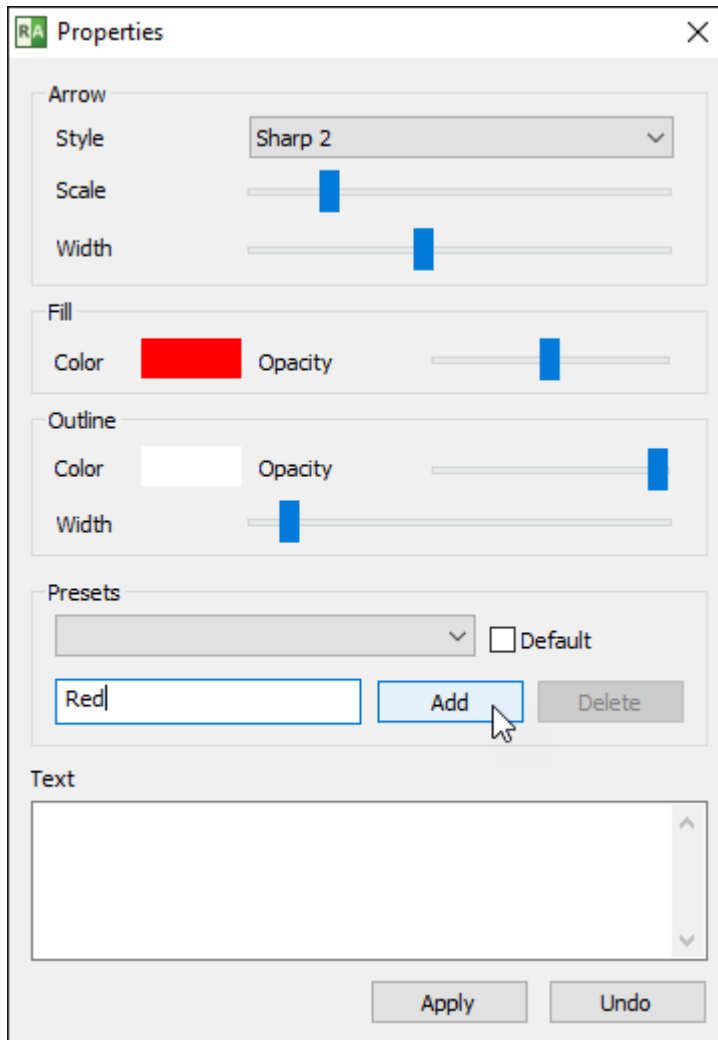


The style, sizes, colors, and opacity of the arrow can be changed to modify the arrow according to your preferences.

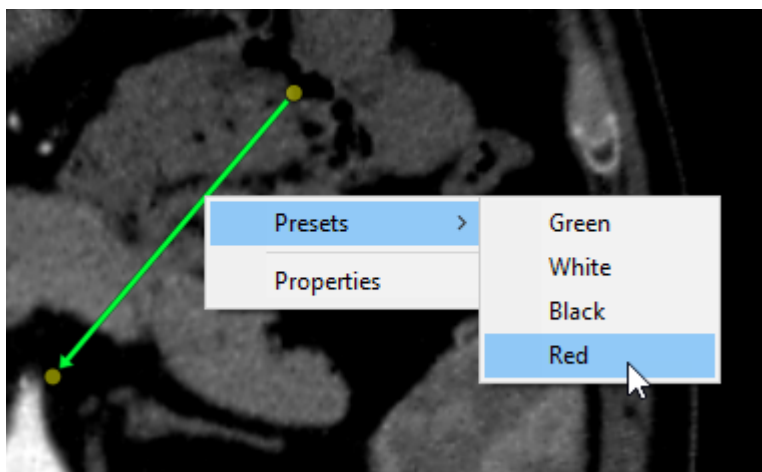


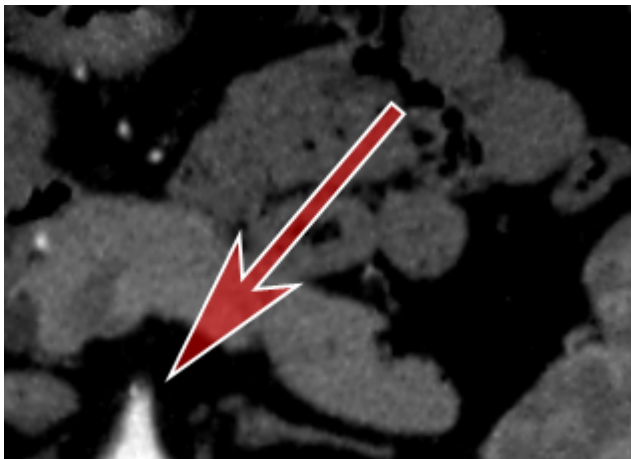
Presets

Custom presets can be saved so that they can be quickly applied at a later time. Simply enter the name of the preset and click on the **Add** button.

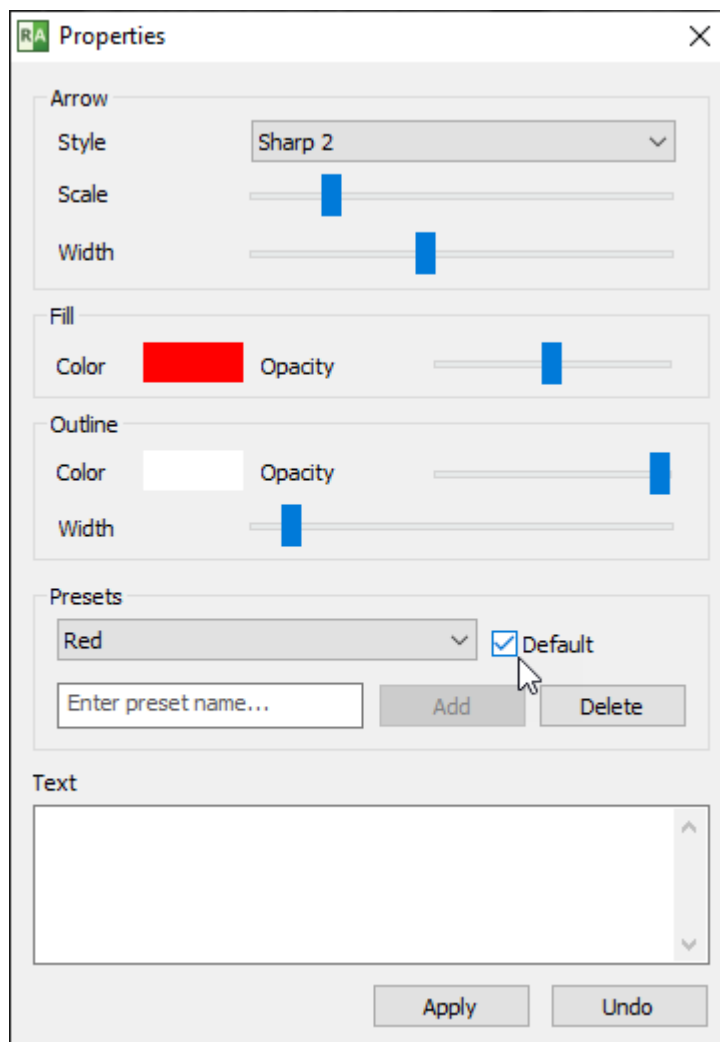


The added preset will be available in the pop-up menu.



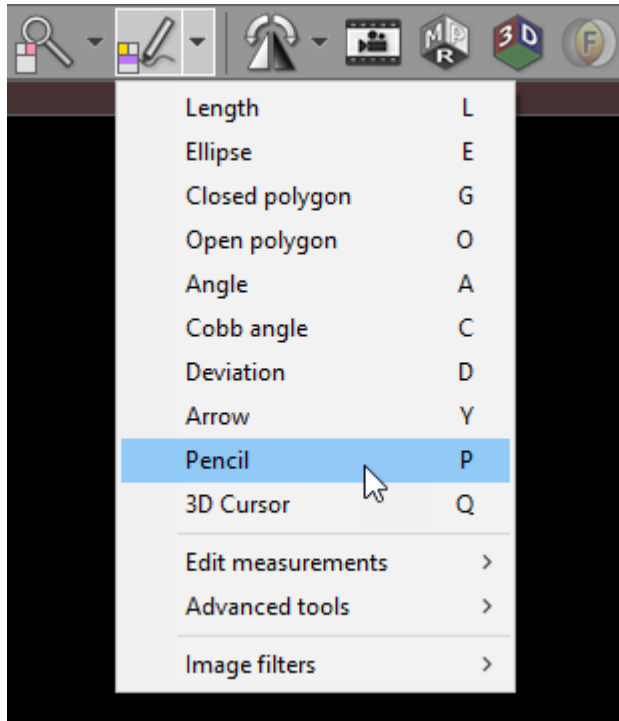


A preset can be applied to all created arrows by setting it as the default.

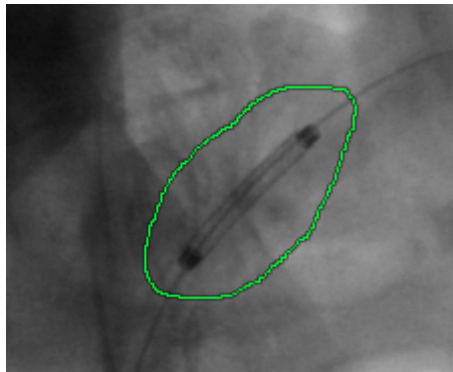


2.7.9 Pencil tool

Select **Pencil** from the **Measurements** drop down menu (or press the **P** key).

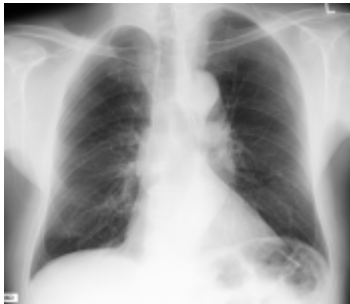


Press the left mouse button and drag the mouse to draw with a pencil. Release the button to finish drawing.



Press **Esc** while drawing a line with the pencil to delete it.

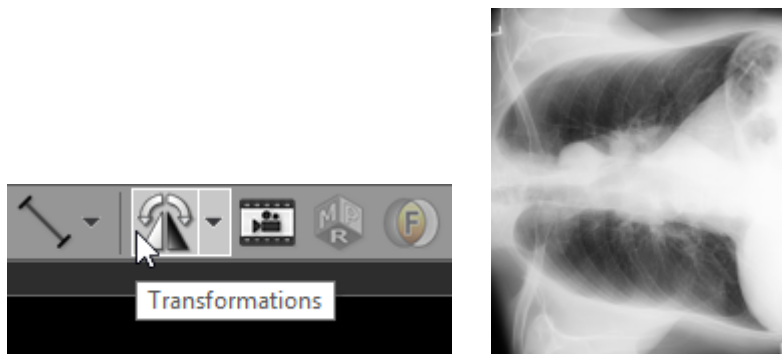
2.8 Flips / Rotations



Original image

Rotations

- Click on the left side of the **Transformations** button, or use the **Ctrl + [** shortcut to rotate the image 90 degrees counter-clockwise.



- Click on the right side of the **Transformations** button, or use the **Ctrl +]** shortcut to rotate the image 90 degrees clockwise.

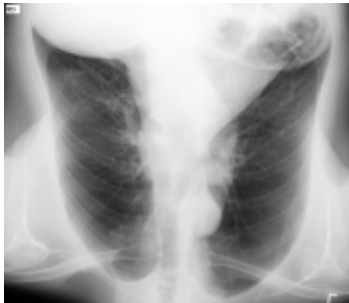


Flips

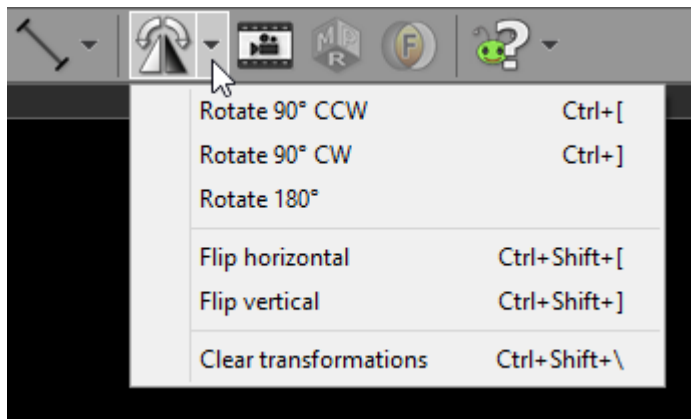
- To flip an image horizontally, select **Flip horizontal** from the **Transformations** drop down menu, or use **Ctrl + Shift + [**



- To flip an image vertically select **Flip vertical** from the **Transformations** drop down menu, or use **Ctrl + Shift +]**



You can also apply rotations and flips from a drop-down menu.



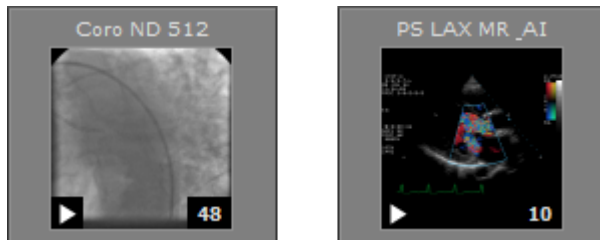
Multiple rotations and flips can be applied to the image to obtain desired orientation.

Select **Clear transformation** (or use **Ctrl + Shift + **) to restore the original orientation.

2.9 Cine mode

Dynamic sequences such as ultrasound (US, IVUS) or digital angiography (XA) are started automatically in cine (movie) mode upon loading.

Thumbnails representing such series have a little "play" icon in the lower left corner.



Cine mode can be also enabled manually for multi-image series such as computer tomography (CT) or magnetic resonance (MR).

Press the **Cine** toolbar button or use the **Space** key to start/stop cine mode.



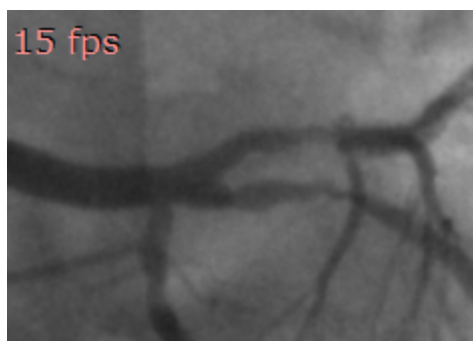
While cine mode is enabled and the cursor hovers over the image, the cine bar is overlaid at the bottom of the image.



Click its buttons to:

- go to the previous series
- go to the previous frame
- start/stop playing
- go to the next frame
- go to the next series
- change the frame rate (in frames per second)

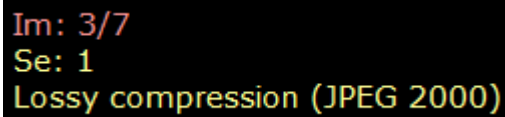
The actual frame rate is displayed in the top left corner of the image. Other annotations are hidden during cine run.



2.10 Annotations

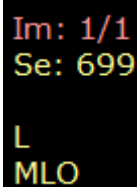
DICOM files contain a lot of information stored in tags associated with the image. The most important data is overlaid on top of the image displayed, grouped in the corners. Depending on image modality, some fields may be missing.

Top left



Im: 3/7
Se: 1
Lossy compression (JPEG 2000)

- Number of displayed image and total number of loaded images
- Series number
- Compression info (displayed only when lossy compression is used)

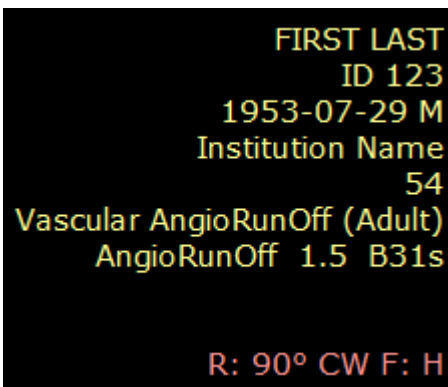


Im: 1/1
Se: 699
L
MLO

The following additional fields are presented only for MG modality (mammography):

- Image laterality
- View position

Top right



FIRST LAST
ID 123
1953-07-29 M
Institution Name
54
Vascular AngioRunOff (Adult)
AngioRunOff 1.5 B31s
R: 90° CW F: H

- Patient first and last name
- Patient ID
- Patient birth date and sex
- Institution name
- Study ID
- Study description
- Series description
- Image comments

- Study comments
- Rotation/flip (if applied)

Bottom left

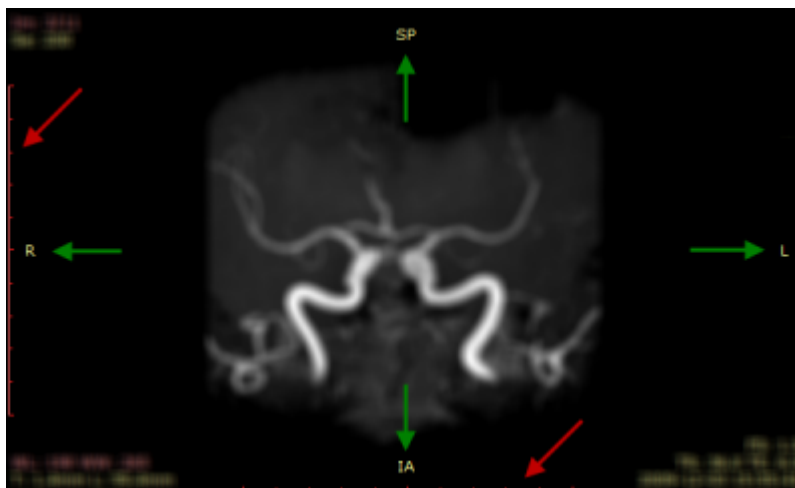
X: 278 Y: 282 Val: 242
 WL: 60 WW: 400 [CT Abdomen] N
 T: 1.5mm L: 850.2mm

- Mouse cursor position (coordinates of the pixel in displayed DICOM image) and value of the pixel
- Window level and window width (brightness and contrast), name of window preset, negative mode indicator
- Thickness and location of the slice (e.g. CT and MR modalities) or rotation and tilt of x-ray lamp (XA modality)

Bottom right

FS: 1.5
 TR: 5.2 TE: 2.4
 2012-07-30 11:50:34

- Field strength (FS, only for MR modality)
- Repetition time, Echo time (TR, TE, only for MR modality)
- Date and time of image acquisition



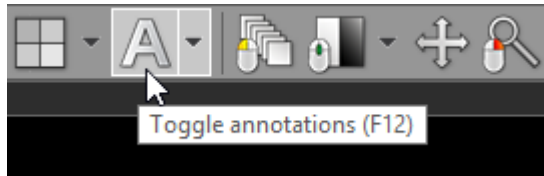
If the DICOM image contains scale information (pixel spacing), two 10cm rulers with 1cm marks are displayed along left and bottom edges of the panel (red arrows).

If the DICOM image contains information about patient orientation in space, there is a letter (or combination of letters) symbolizing the patient's sides displayed at the center of each panel's edge (green arrows).

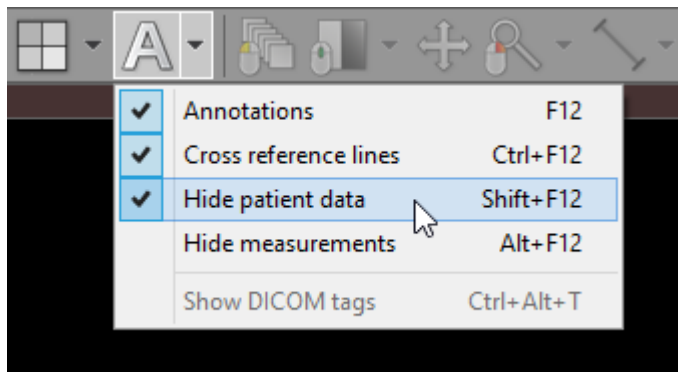
- A – anterior
- P – posterior

- L – left
- R – right
- S – superior
- I – inferior

Annotations can be turned off and on by clicking the **Annotations** button on the toolbar or pressing **F12** key.



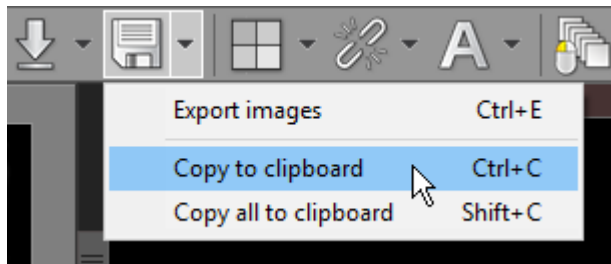
To hide all patient data (in series preview bar, panel title bar, overlaid annotations) click **Hide patient data** menu item or use the **Shift + F12** shortcut.



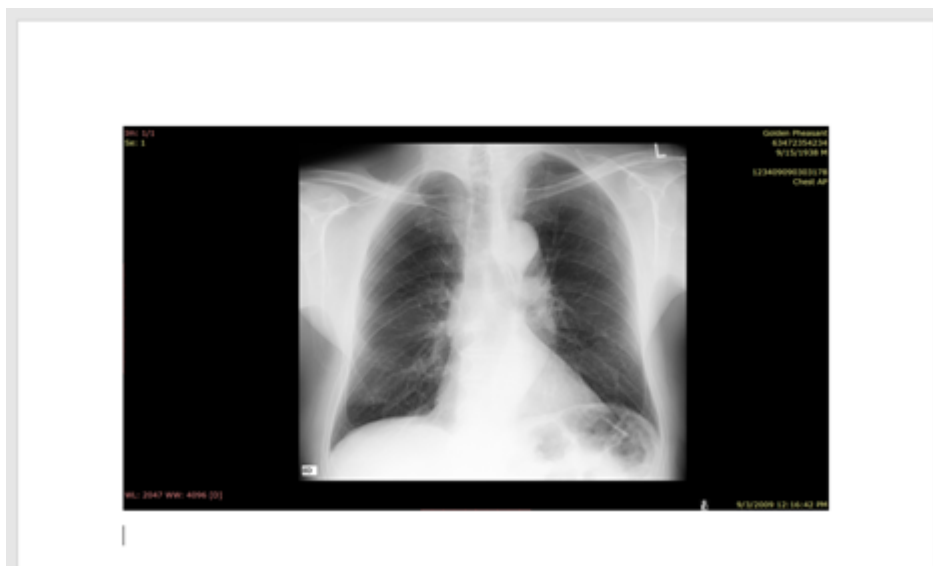
2.11 Copying to the clipboard

Image displayed in the active panel can be easily copied to the Windows clipboard and then pasted into other Windows application such as Microsoft Word, PowerPoint, etc.

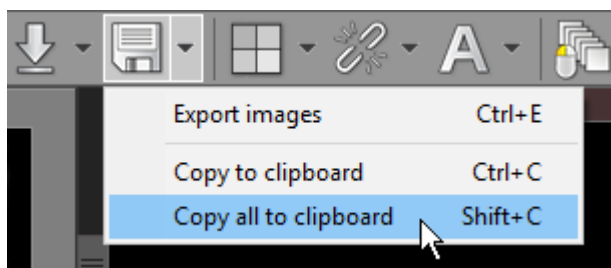
Click the **Copy to clipboard** in the **Export** drop-down menu or use the **Ctrl + C** shortcut.



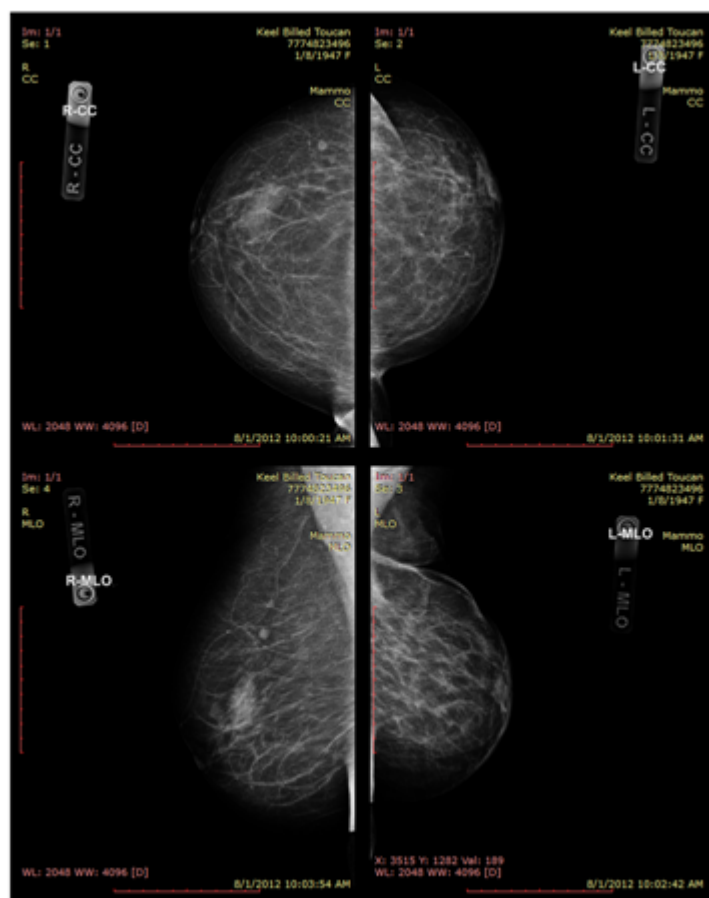
Switch to the application where you want to paste the image and press **Ctrl + V**



To copy all visible panels to the Windows clipboard, press **Shift + C** or click the **Copy all to clipboard** in the **Export** drop-down menu.

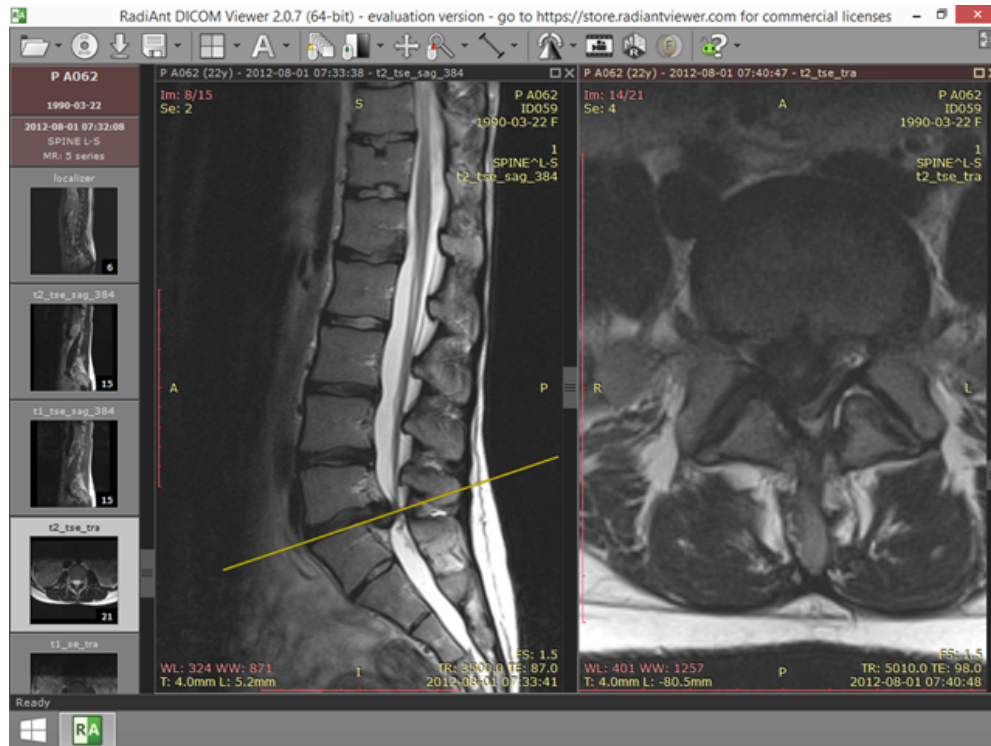


Switch to the application where you want to paste the image and press **Ctrl + V**

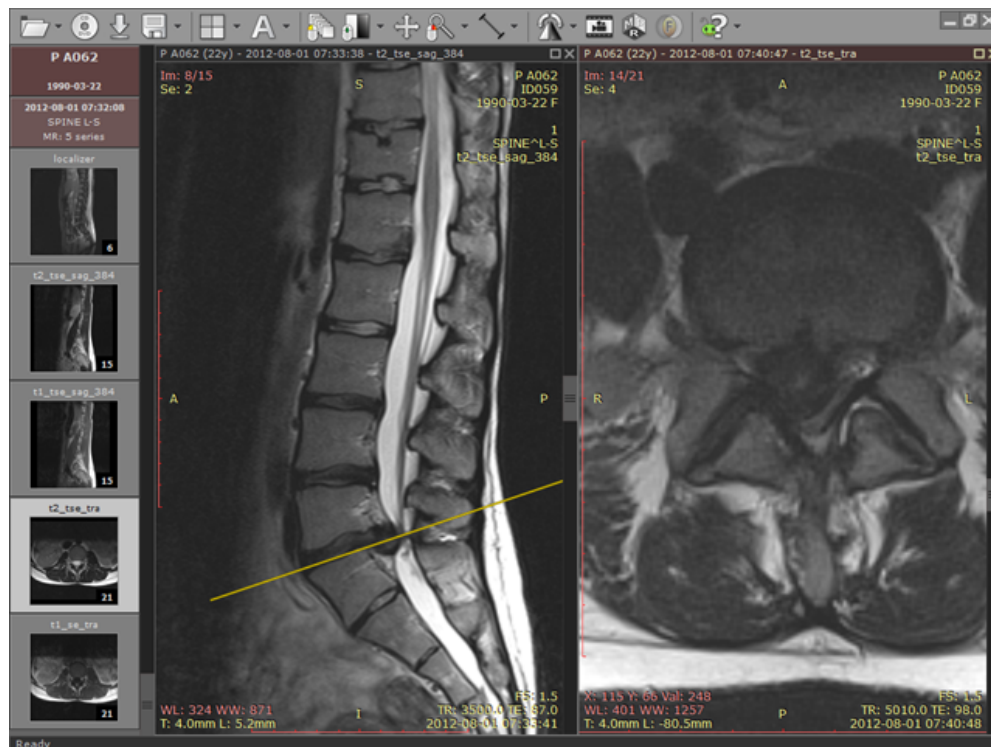


2.12 Full-screen mode

Full-screen mode allows you to hide the frame of the window and increase the viewing area.

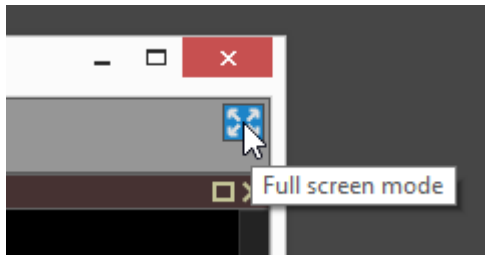


Normal mode

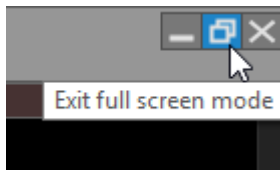


Full-screen mode

Click the **Full screen mode** button located on the right side of the toolbar or press **F**.



To restore the normal window, use the **Exit full screen mode** toolbar button or again press the **F** key.

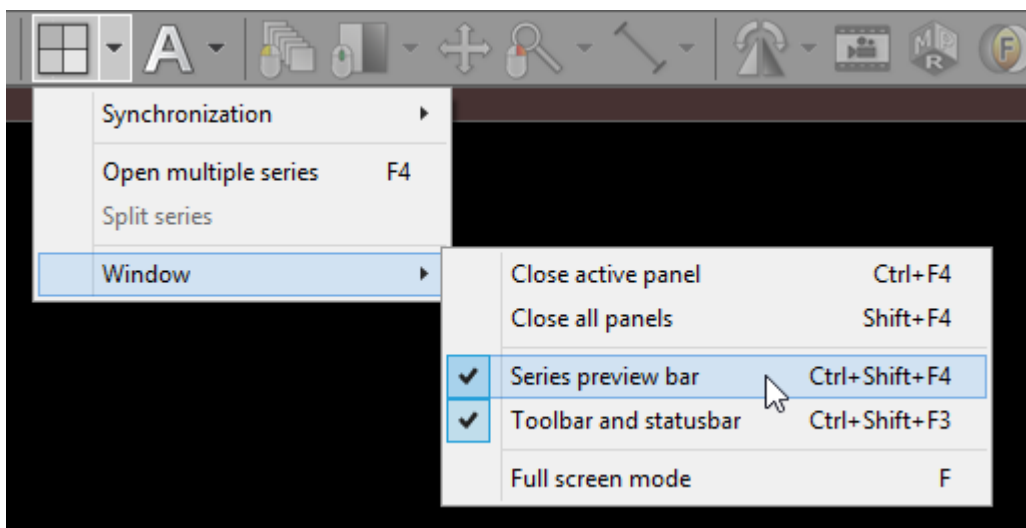


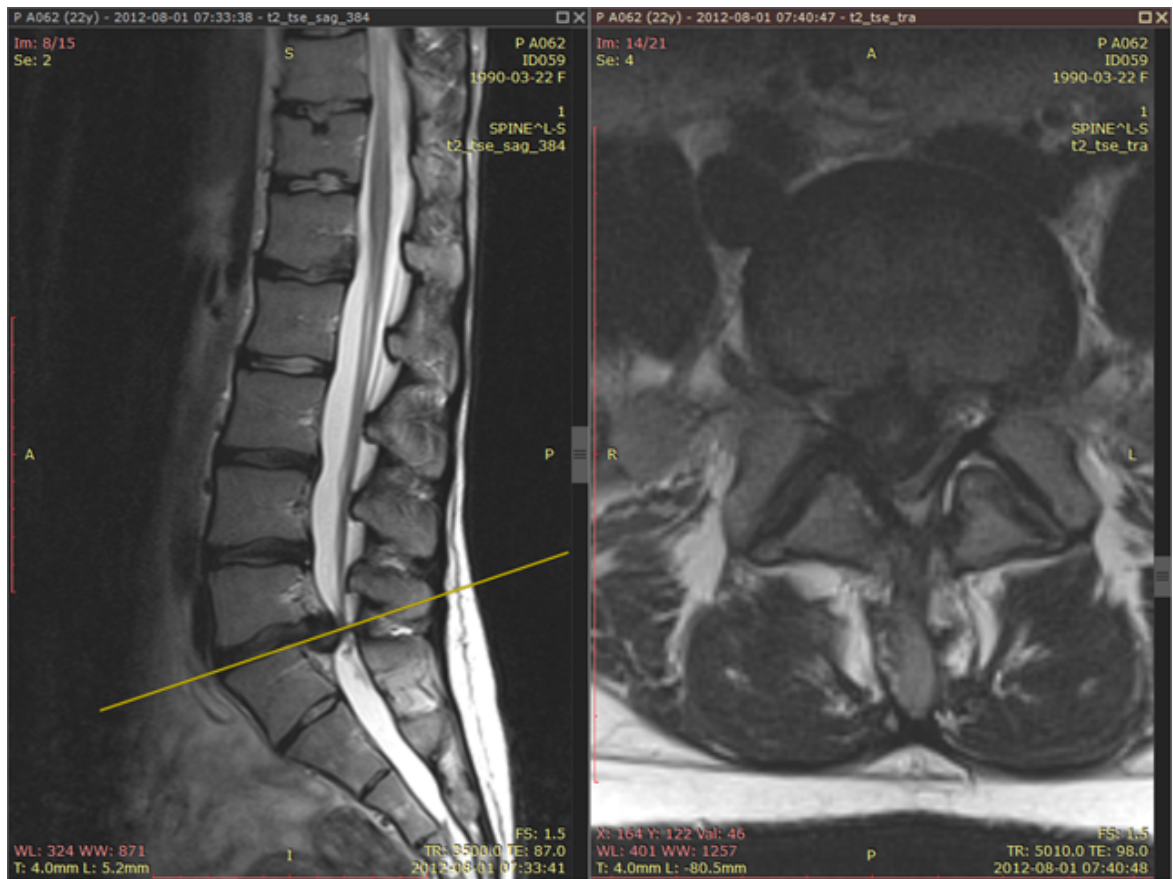
Switching between full screen and window modes can be also achieved by double-clicking the toolbar area.

To maximize the viewing area, both the series preview bar and the toolbar with the status bar can be temporarily hidden.

Click **Window** / **Series preview bar** menu item or use **Ctrl + Alt + F2** to toggle preview bar visibility.

Click **Window** / **Toolbar and status bar** menu item or use **Ctrl + Alt + F3** to toggle toolbar and status bar visibility.





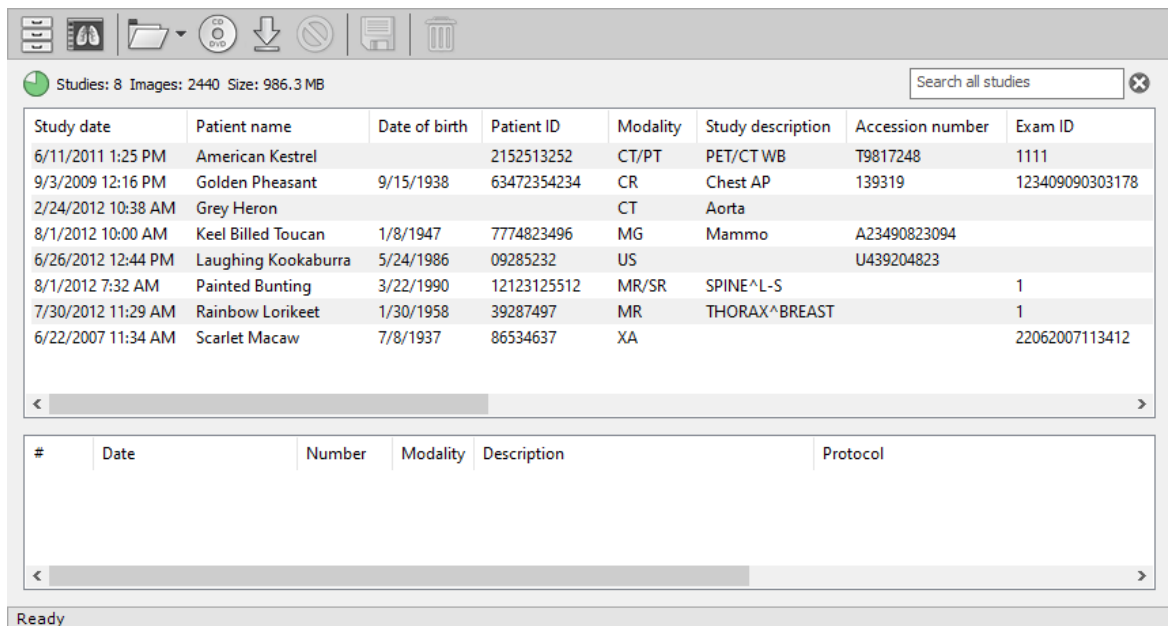
Full-screen mode with hidden toolbar, series bar and status bar

3 Advanced Topics

3.1 Local archive

The local archive feature allows you to import DICOM studies from [CD/DVD discs](#), [USB flash drives](#), [local and network folders](#) or [PACS servers](#), and store them on your local hard drive so that they can be easily accessed at a later date.

The local archive can be helpful in situations in which the original media is no longer available, or you would like to open the study without the need to repeatedly retrieve it from a PACS server. You can also access the database to organize and quickly find studies in your collection of DICOM files that are stored on the hard drive.



Study date	Patient name	Date of birth	Patient ID	Modality	Study description	Accession number	Exam ID
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB	T9817248	1111
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP	139319	123409090303178
2/24/2012 10:38 AM	Grey Heron			CT	Aorta		
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo	A23490823094	
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US		U439204823	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S		1
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST		1
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA			22062007113412

#	Date	Number	Modality	Description	Protocol

Make sure that you familiarize yourself with the [security considerations](#) before you import DICOM files (often containing sensitive information) to your computer.

Remember to [back up your database](#) regularly to ensure you are protected against hard drive failures and data corruption.

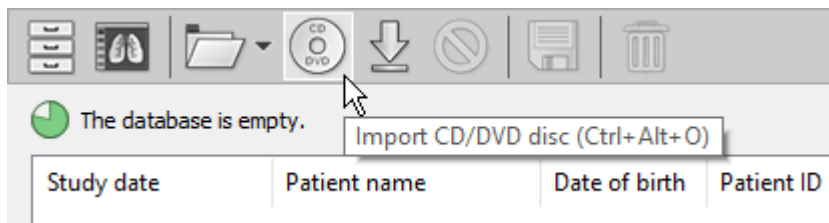
3.1.1 Importing DICOM CD/DVD

1. Insert a disc with a DICOM study into a CD/DVD drive. If the default viewer is automatically started from the CD, close it, as this will enable you to obtain better reading speeds in RadiAnt DICOM Viewer.

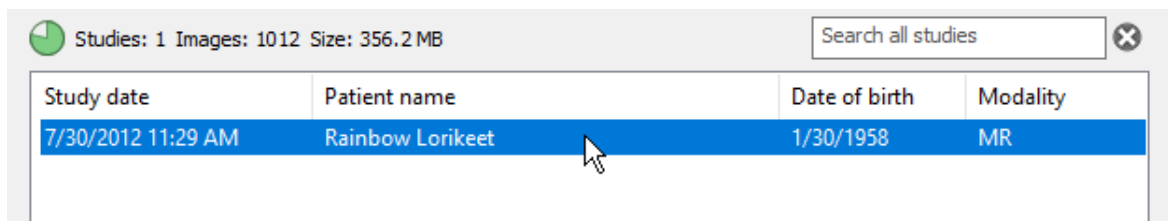
2. Click the **Local archive** button on the toolbar in the main window or use the **F8** shortcut.



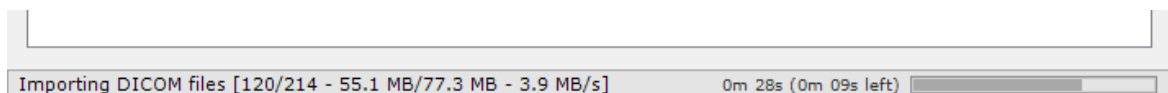
3. Click the **CD/DVD** button on the toolbar in the local archive window (this button is hidden when no CD/DVD drive is detected) or use the **Ctrl + Alt + O** shortcut.



4. The disc importing process will commence. You can open the study by double-clicking on the item as soon as it appears in the list.



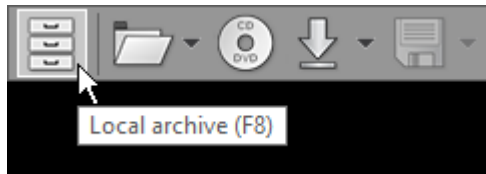
5. The status bar shows the number of imported files, total number of files, imported data size, total data size, importing speed, elapsed time, and estimated time to finish.



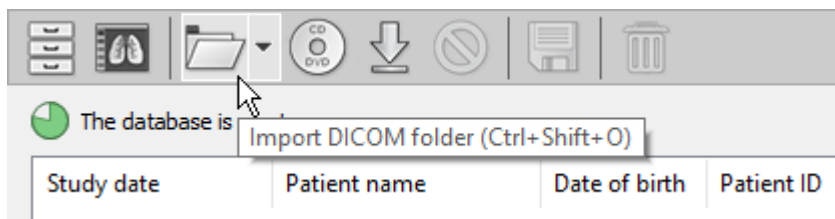
6. Remove the disc from the CD/DVD drive.

3.1.2 Importing DICOM folder

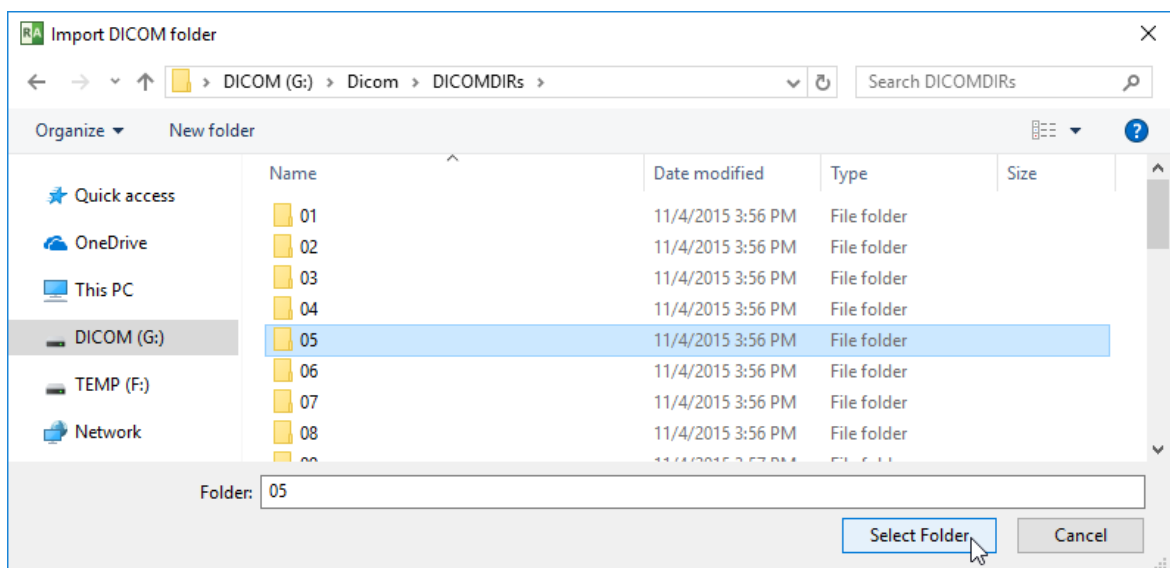
1. Click the **Local archive** button on the toolbar in the main window or use the **F8** shortcut.



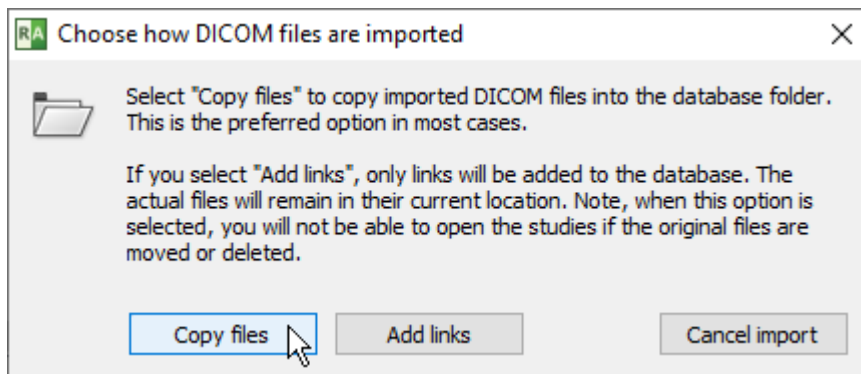
2. Click the **Folder** button on the toolbar in the local archive window or use the **Ctrl + Shift + O** shortcut.



3. Find the folder you want to import the DICOM files from, select it, and then click **Select Folder**.

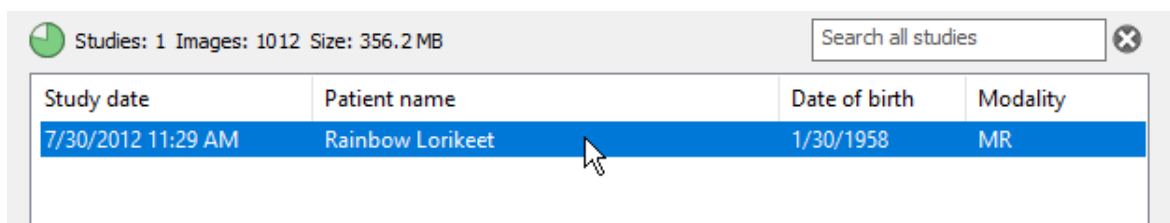


4. Choose how the DICOM files will be imported. You will typically use the **Copy files** option. This ensures the imported files are stored in the database folder.

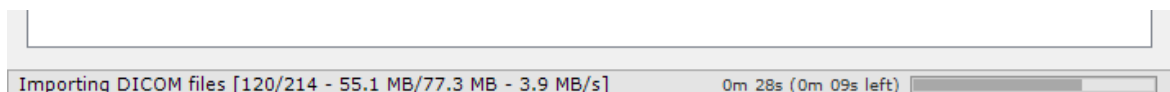


If you want to store the DICOM files in their original location and simply add links to the database, click **Add links**. Use this method if you store the DICOM files in a structured folder tree on your hard disk drive.

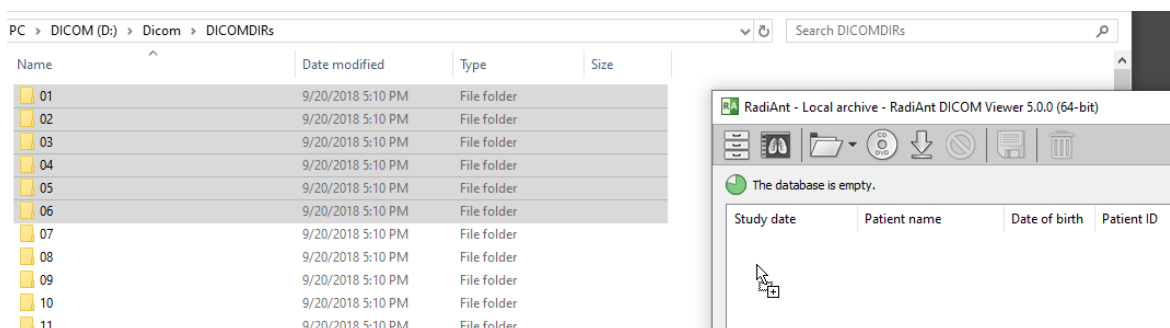
5. The folder importing process will commence. You can open the study by double-clicking on the item as soon as it appears in the list.



6. The status bar shows the number of imported files, total number of files, imported data size, total data size, importing speed, elapsed time, and estimated time to finish.

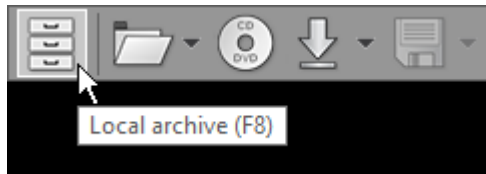


You can also import the folders by dragging and dropping them onto the local archive window.

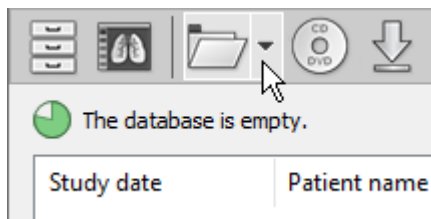


3.1.3 Importing DICOM ZIP archive

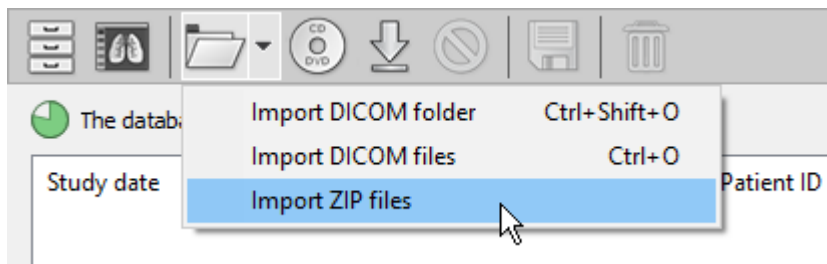
1. Click the **Local archive** button on the toolbar in the main window or use the **F8** shortcut.



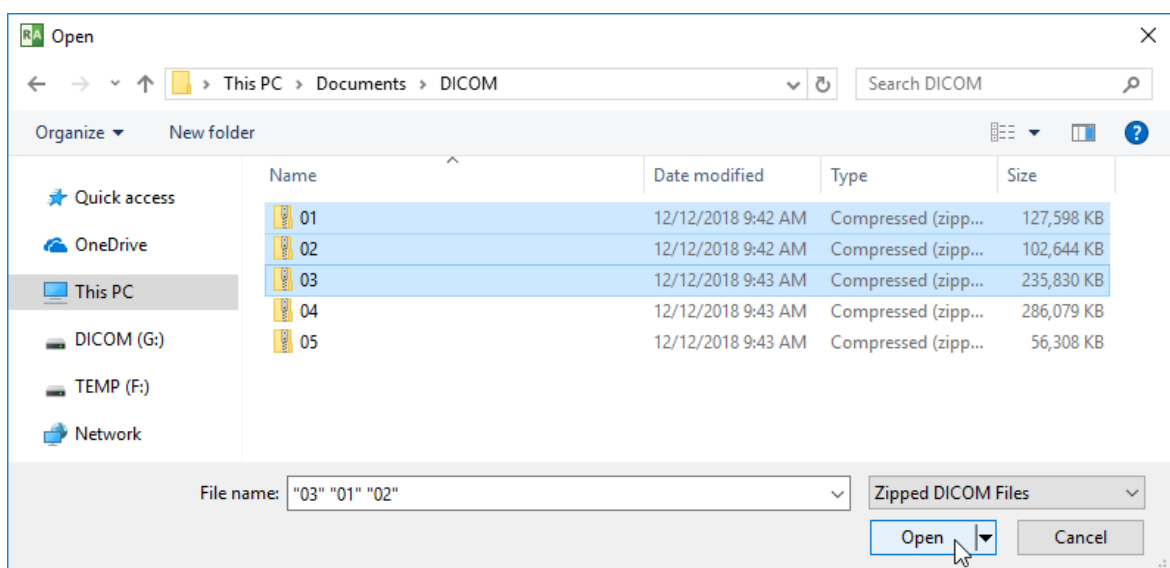
2. Click the arrow next to the folder icon on the toolbar in the local archive window.



3. Click **Import ZIP files**.



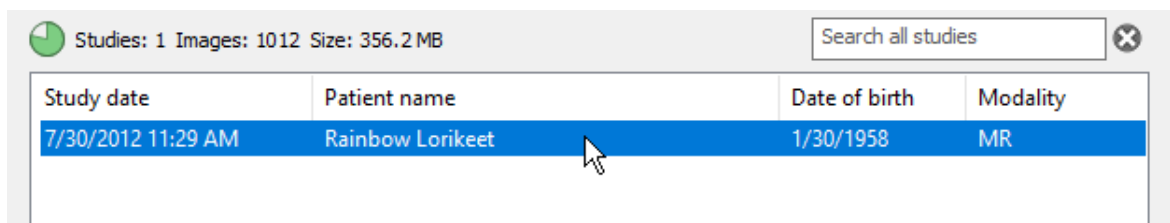
4. Find the zip archive(s), select the files you want to import, and click **Open**.



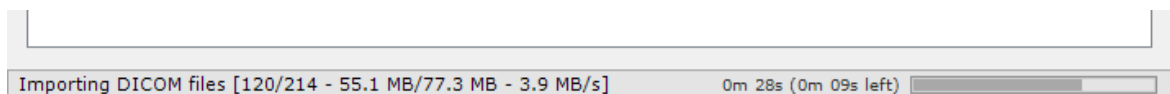
5. If the archive is encrypted, a password prompt will be displayed.



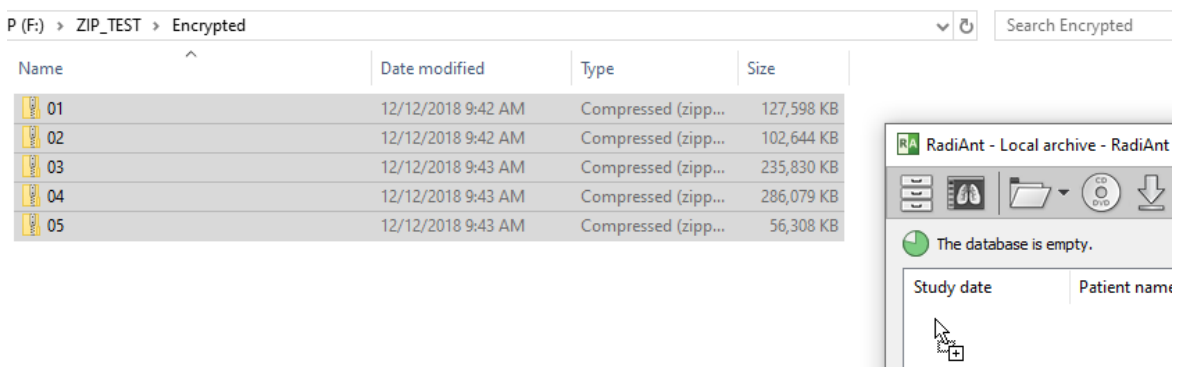
6. The file unpacking and importing process will commence. You can open the study by double-clicking on the item as soon as it appears on the list.



7. The status bar shows the number of imported files, total number of files, imported data size, total data size, importing speed, elapsed time, and estimated time to finish.

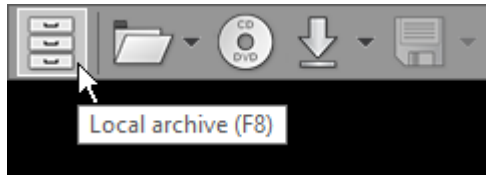


You can also import the ZIP files by dragging and dropping them onto the local archive window.

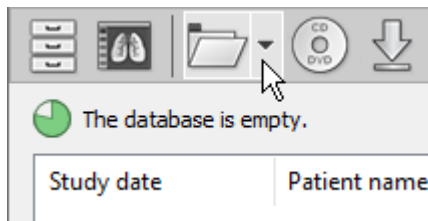


3.1.4 Importing DICOM file(s)

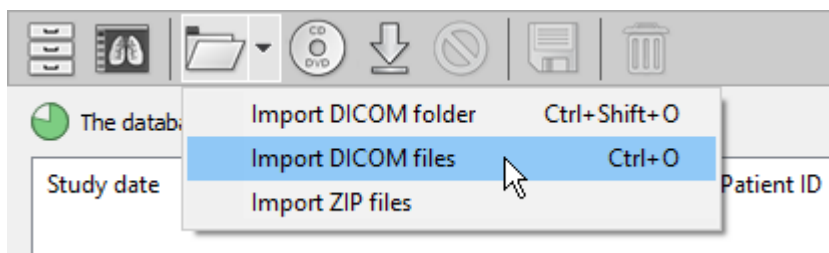
1. Click the **Local archive** button on the toolbar in main window or use the **F8** shortcut.



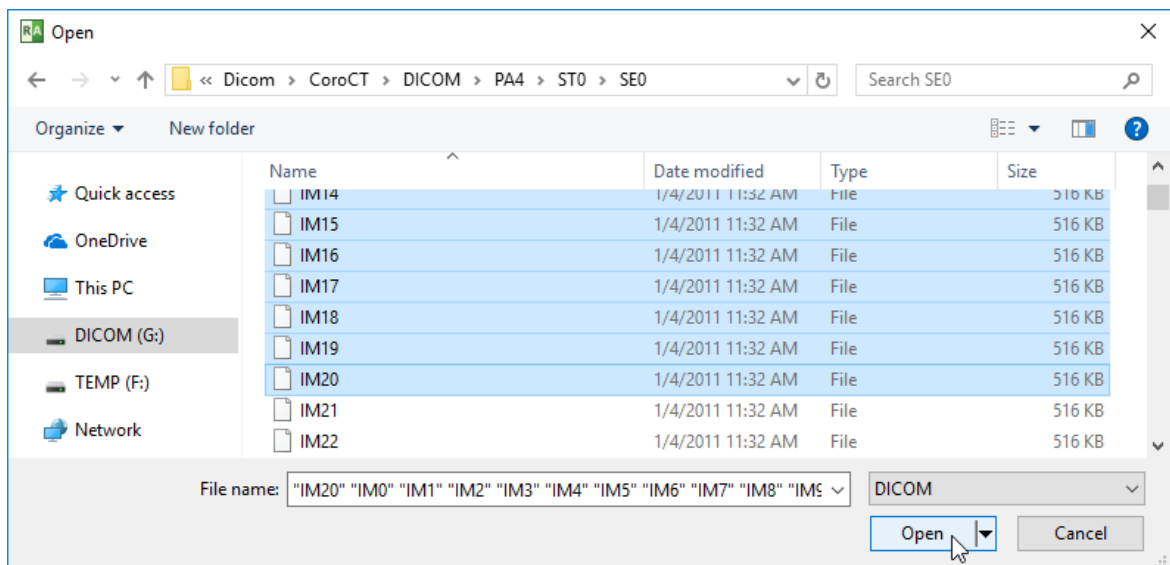
2. Click the arrow next to the folder icon on the toolbar in the local archive window.



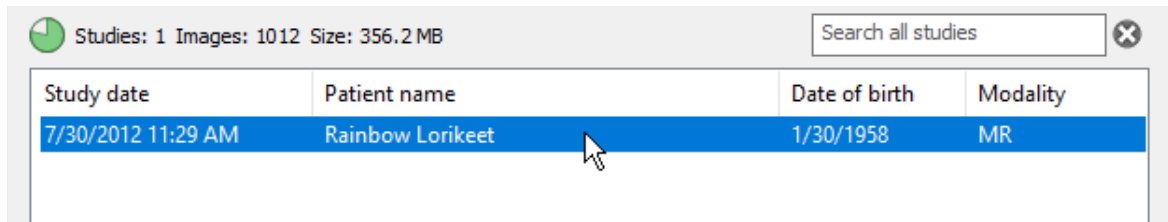
3. Click **Import DICOM files**, or use the **Ctrl + O** shortcut.



4. Find the DICOM file(s), select the files you want to import, and click **Open**.

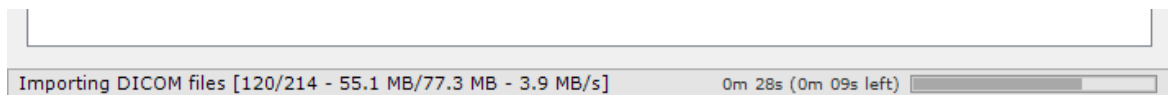


5. The file importing process will commence. You can open the study by double-clicking on the item as soon as it appears in the list.



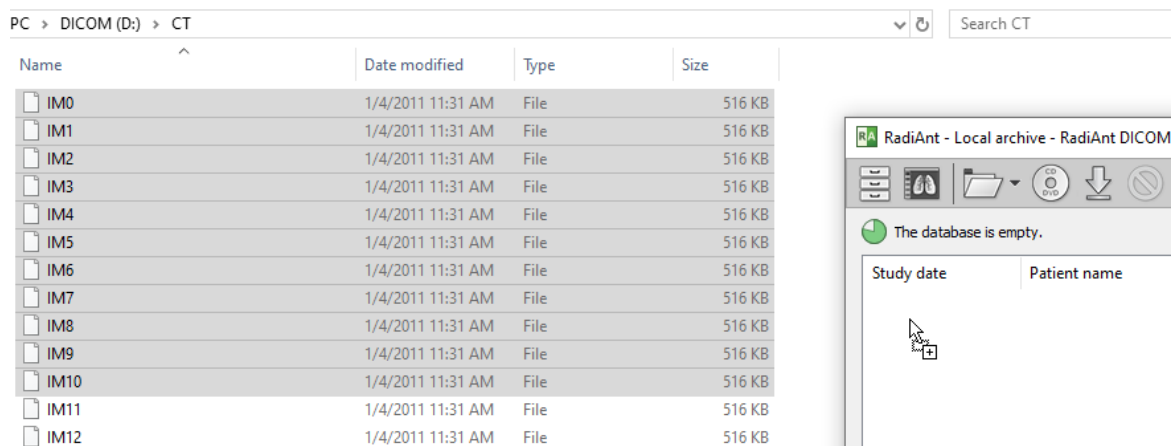
Study date	Patient name	Date of birth	Modality
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	MR

6. The status bar shows the number of imported files, total number of files, imported data size, total data size, importing speed, elapsed time, and estimated time to finish.



Importing DICOM files [120/214 - 55.1 MB/77.3 MB - 3.9 MB/s]	0m 28s (0m 09s left)
--	----------------------

You can also import the relevant DICOM file(s) by dragging and dropping them onto the local archive window.

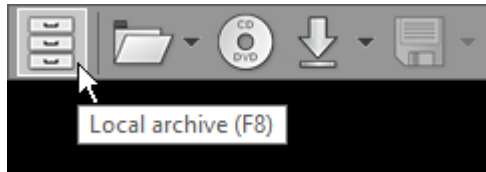


Name	Date modified	Type	Size
IM0	1/4/2011 11:31 AM	File	516 KB
IM1	1/4/2011 11:31 AM	File	516 KB
IM2	1/4/2011 11:31 AM	File	516 KB
IM3	1/4/2011 11:31 AM	File	516 KB
IM4	1/4/2011 11:31 AM	File	516 KB
IM5	1/4/2011 11:31 AM	File	516 KB
IM6	1/4/2011 11:31 AM	File	516 KB
IM7	1/4/2011 11:31 AM	File	516 KB
IM8	1/4/2011 11:31 AM	File	516 KB
IM9	1/4/2011 11:31 AM	File	516 KB
IM10	1/4/2011 11:31 AM	File	516 KB
IM11	1/4/2011 11:31 AM	File	516 KB
IM12	1/4/2011 11:31 AM	File	516 KB

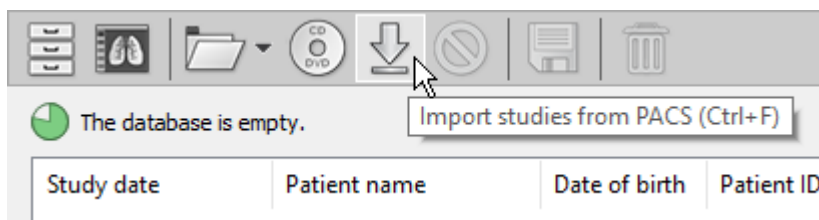
3.1.5 Importing studies from PACS servers

Before you commence, you should verify that the PACS server and RadiAnt are properly configured. Please refer to the advanced section of this manual for [configuration instructions](#). Sometimes, the configuration process may be [quite complicated](#) or even impossible without the technical support of the vendor of your PACS server.

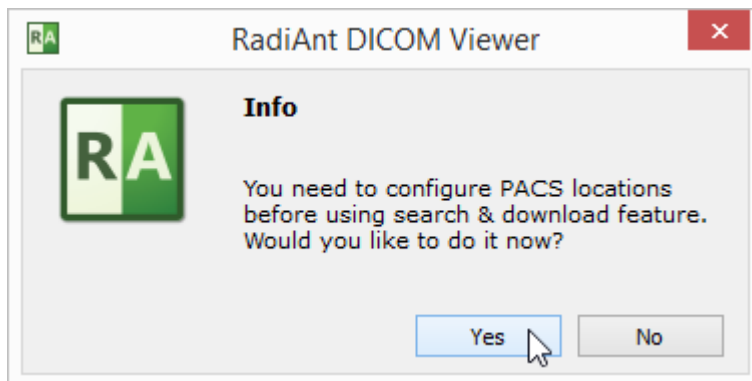
1. Click the **Local archive** button on the toolbar in the main window or use the **F8** shortcut.



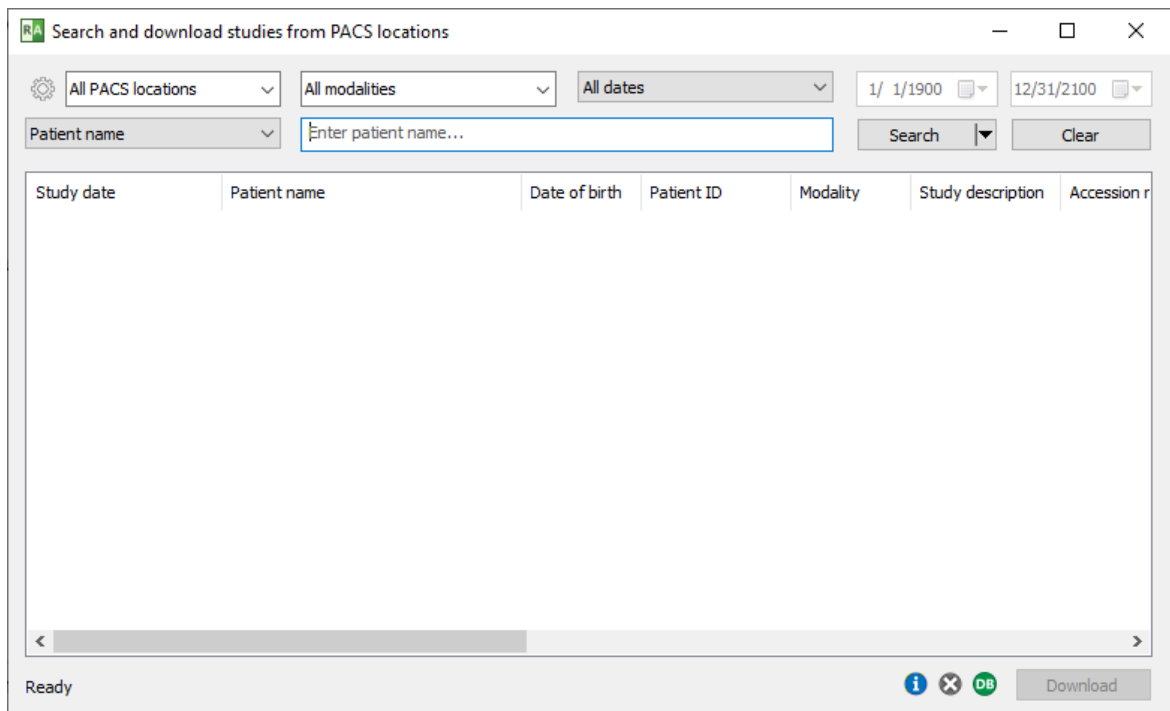
2. Click the **PACS import** button on the toolbar in the local archive window or use the **Ctrl + F** shortcut.



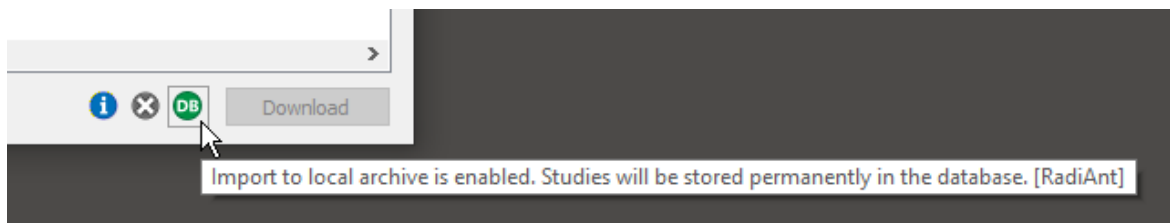
3. If the PACS host is not yet configured, a pop-up message will appear that asks you to add a new PACS host. Please refer to the [advanced section of this manual](#).



4. Once the configuration is complete, the PACS search window will appear.

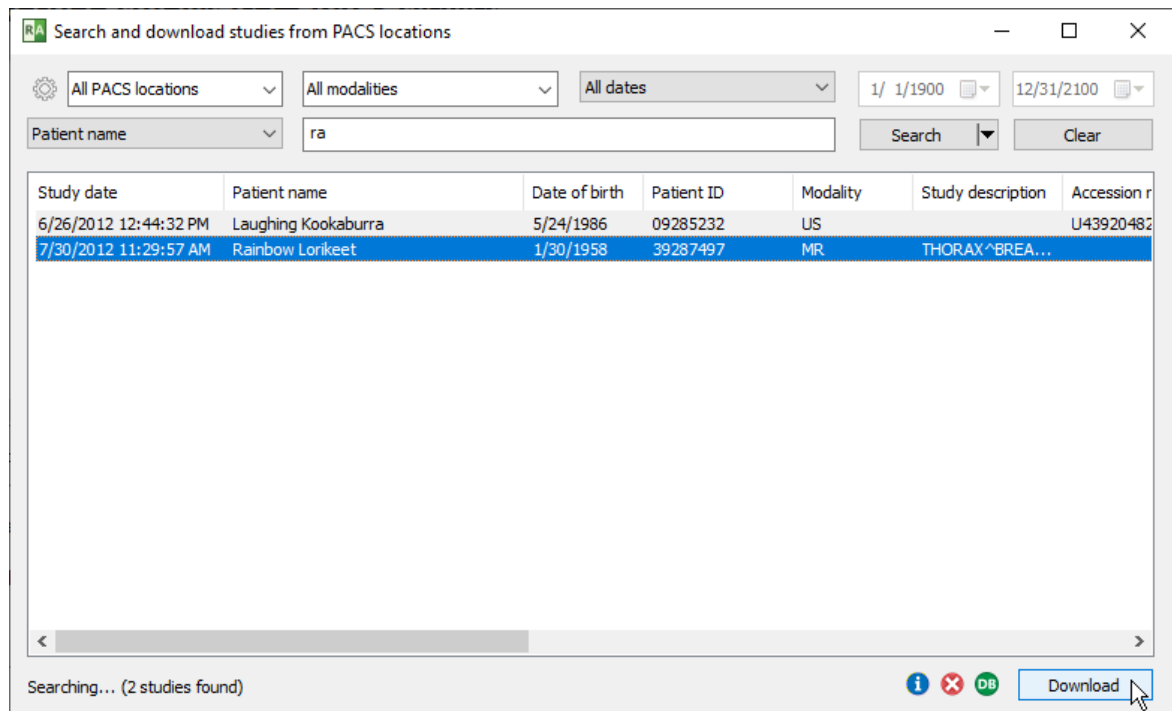


5. Ensure that the option to import to database is enabled (green DB icon in the bottom-left corner).

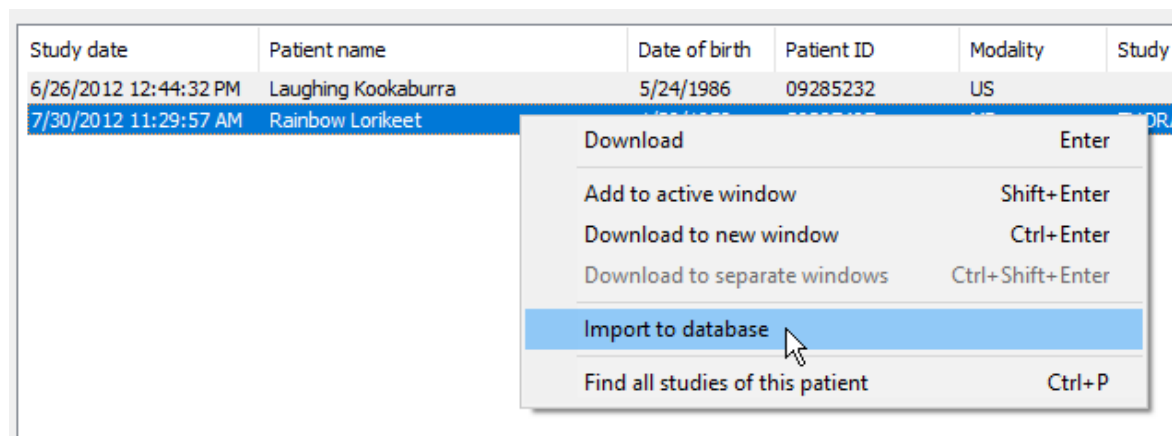


6. Enter the relevant [search parameters](#) and click the **Search** button.

7. The results of the search will start appearing in the list. The number of studies found will be displayed in the lower-left corner. Select the study you want to download from the list and click the **Download** button or press **Enter**. You can also simply double-click the study to start the download process. Images of the study will be added to the database and displayed in a viewer window at the same time.



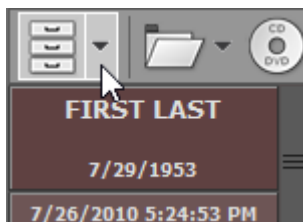
If you prefer to import studies to the database without immediately opening them in a viewer, right-click the selected study/studies. Select **Import to database**.



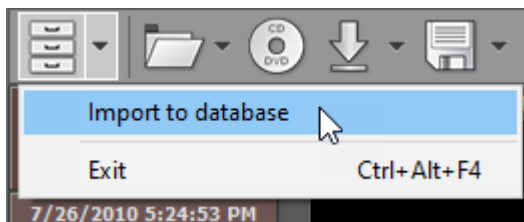
3.1.6 Importing studies from viewer

When you originally open the study directly in the 2D viewer (without importing it into the database first), you can quickly import the displayed images into the local archive.

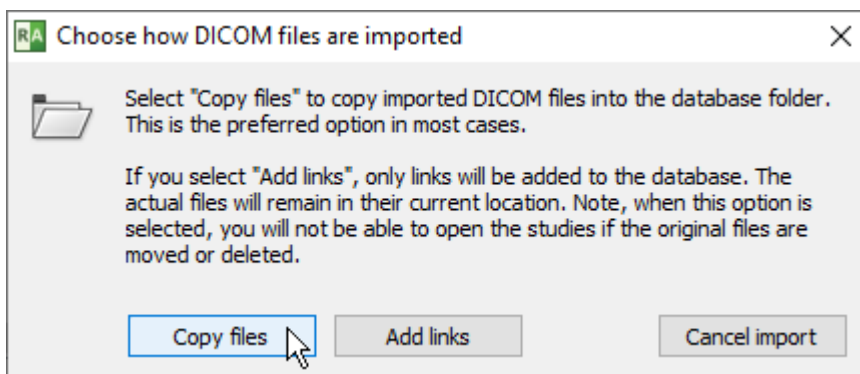
1. Click on the arrow that is displayed next to the **Local archive** button on the toolbar in the viewer window.



2. Click on the **Import to database** option.



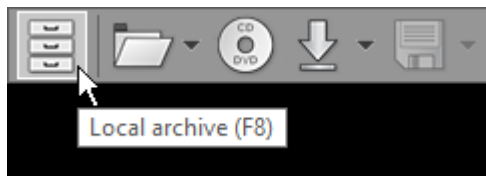
3. Choose how the DICOM files will be imported. You will typically use the **Copy files** option. This ensures the imported files are stored in the database folder.



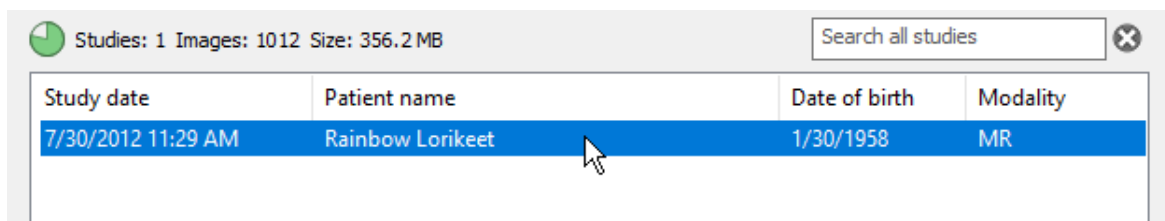
If you want to store the DICOM files in their original location and simply add links to the database, click on the **Add links** option. You should use this method if you store the DICOM files in a structured folder tree on your hard disk drive.

3.1.7 Opening studies

1. Click the **Local archive** button on the toolbar in the main window or use the **F8** shortcut.



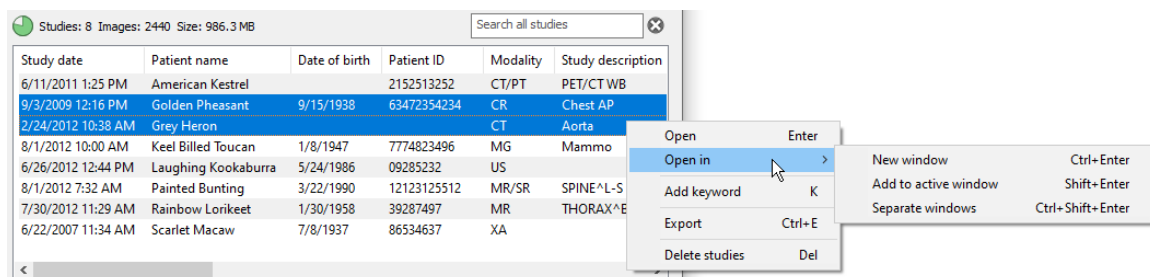
2. Double-click the study to open it in a viewer window.



You can also press **Enter** to open the selected study.

By default, the study is opened in the active viewer window (or a new one if no viewer window is opened) and the previously opened study is cleared.

Right-click on the selected study/studies to open the study per your preferences. The options are as follows:



Select **New window** or press **Ctrl + Enter** to open the study in a new window.


Select **Add to active window** or press **Shift + Enter** to add the study to the current window.

Select **Separate windows** or press **Ctrl + Shift + Enter** to open each study in a separate window.

3.1.8 Searching studies

Studies stored in the database can be quickly searched.

As soon as you start entering text in the search box above the list of studies, the results will appear in the results list.

Studies: 8 Images: 2440 Size: 986.3 MB					
2 studies found				Ra	
Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST

To clear the filter press **Esc** or click on .

3.1.9 Exporting images

1a. Select the studies that you want to export.

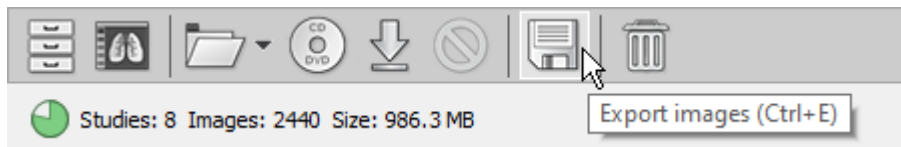
Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA	

or

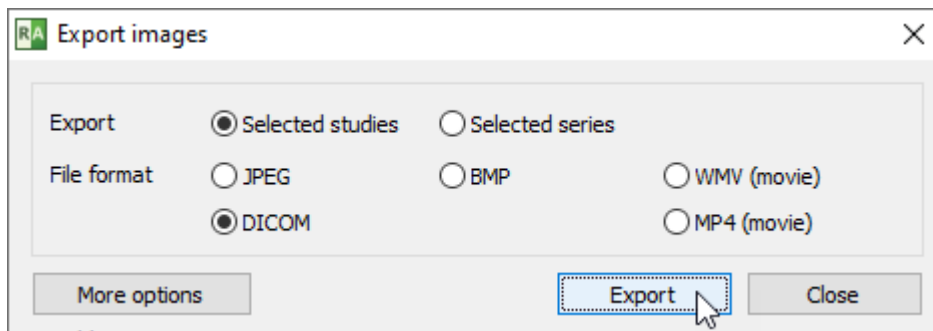
1b. Select the series of a chosen study that you want to export.

#	Date	Number	Modality	Description	Protocol	# Images
1	8/1/2012 7:32 AM	1	MR	localizer	localizer	6
2	8/1/2012 7:35 AM	2	MR	t2_tse_sag_384	t2_tse_sag_384	15
3	8/1/2012 7:36 AM	3	MR	t1_tse_sag_384	t1_tse_sag_384	15
4	8/1/2012 7:44 AM	4	MR	t2_tse_tra	t2_tse_tra	21
5	8/1/2012 7:46 AM	5	MR	t1_se_tra	t1_se_tra	21
6	8/1/2012 7:32 AM	99	SR	PhoenixZIPReport	Phoenix Document	

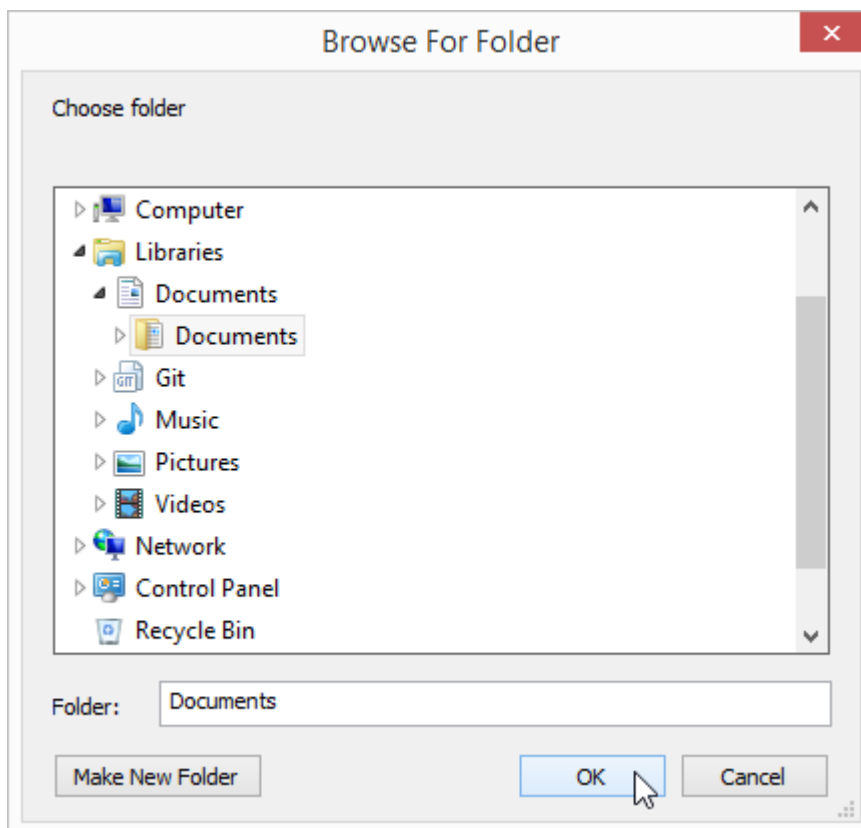
- Click the **Export** button on the toolbar or use **Ctrl + E** to access the export window.



The export window will open, and you can subsequently choose the destination format:



- Click **Export** to browse the system and select the destination folder.



- Click **OK**, and the export process will start.

Refer to the [Exporting images](#) section to learn more about the various options that are available in the export window.

3.1.10 Deleting images

1a. Select the studies you want to delete.

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA	

or

1b. Select the series of a chosen study that you want to delete.

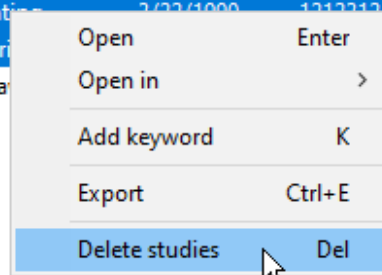
#	Date	Number	Modality	Description	Protocol	# Images
1	8/1/2012 7:32 AM	1	MR	localizer	localizer	6
2	8/1/2012 7:35 AM	2	MR	t2_tse_sag_384	t2_tse_sag_384	15
3	8/1/2012 7:36 AM	3	MR	t1_tse_sag_384	t1_tse_sag_384	15
4	8/1/2012 7:44 AM	4	MR	t2_tse_tra	t2_tse_tra	21
5	8/1/2012 7:46 AM	5	MR	t1_se_tra	t1_se_tra	21
6	8/1/2012 7:32 AM	99	SR	PhoenixZIPReport	Phoenix Document	

2. Click the **Delete** button on the toolbar or press **Del**.



You can also select the study, right-click, and choose **Delete studies** from the menu options.

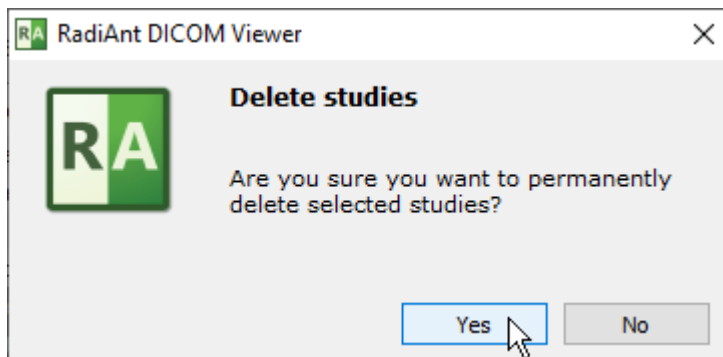
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA	



Or select the series, right-click, and choose **Delete series** from the menu options.

#	Date	Number	Modality	Description	Protocol	# Images
1	8/1/2012 7:32 AM	1	MR	localizer	localizer	6
2	8/1/2012 7:35 AM	2	MR	t2_tse_sag_384	t2_tse_sag_384	15
3	8/1/2012 7:36 AM	3	MR	t1_tse_sag_384	t1_tse_sag_384	15
4	8/1/2012 7:44 AM	4	MR	t2_tse_tra	t2_tse_tra	21
5	8/1/2012 7:46 AM	5	MR	t1_se_tra	t1_se_tra	21
6	8/1/2012 7:32 AM	99	MR	Phoenix Document	Phoenix Document	

3. Click **Yes** to confirm that you want to delete the selected studies or series.



3.1.11 Keywords

You can use keywords to organize your collection of studies and quickly search for studies with the assigned label.

Adding Keywords

To add a keyword to selected studies, right-click and select **Add keyword** or press **K**.

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta
8/1/2012 10:00 AM	Keel Billed Toucan			MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra			US	
8/1/2012 7:32 AM	Painted Bunting			MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet			MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw			XA	

Enter the keyword and click **OK**.

Add keyword

Enter new keyword or select from list

Aneurysm

OK Cancel

You can also select the keyword from the list if it was previously added to the database.

Add keyword

Enter new keyword or select from list

Aneurysm
Atherosclerosis
Dissection
Rupture

Searching Keywords

Assigned keywords are visible in the "Keywords" column of the study list.

	# Images	Size	Keywords
	600	161.9 MB	
	1	9.4 MB	
	635	117.9 MB	Aneurysm
	4	217.4 MB	

Enter a keyword in the search box to display studies with the assigned label.

Studies: 8 Images: 2440 Size: 986.3 MB			1 studies found		Aneurysm	
Study date	Patient name	Date of birth	Patient ID	Modality	Study description	
2/24/2012 10:38 AM	Grey Heron			CT	Aorta	

Deleting Keywords

To remove a keyword from selected studies, right-click, select **Remove keyword**, and then choose the keyword you want to delete.

You can also click Remove all, to clear all keywords for the selected studies.

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
2/24/2012 10:38 AM	Grey Heron			CT	Aorta

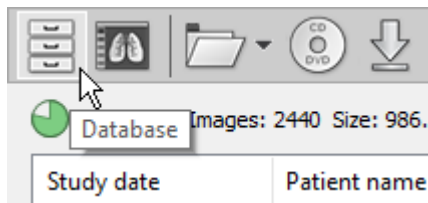
Open Enter
Open in >
Add keyword K
Remove keyword >
Export Ctrl+E
Delete studies Del

Aneurysm
Dissection
Rupture
Remove all

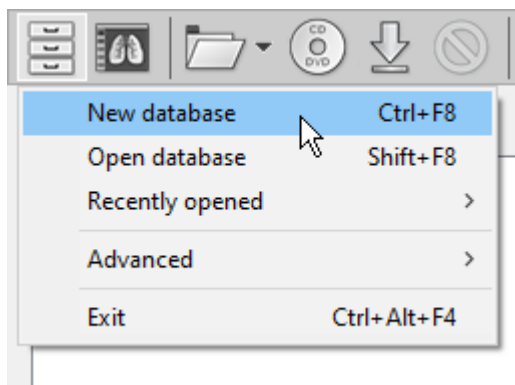
3.1.12 Multiple databases

Create a New Database

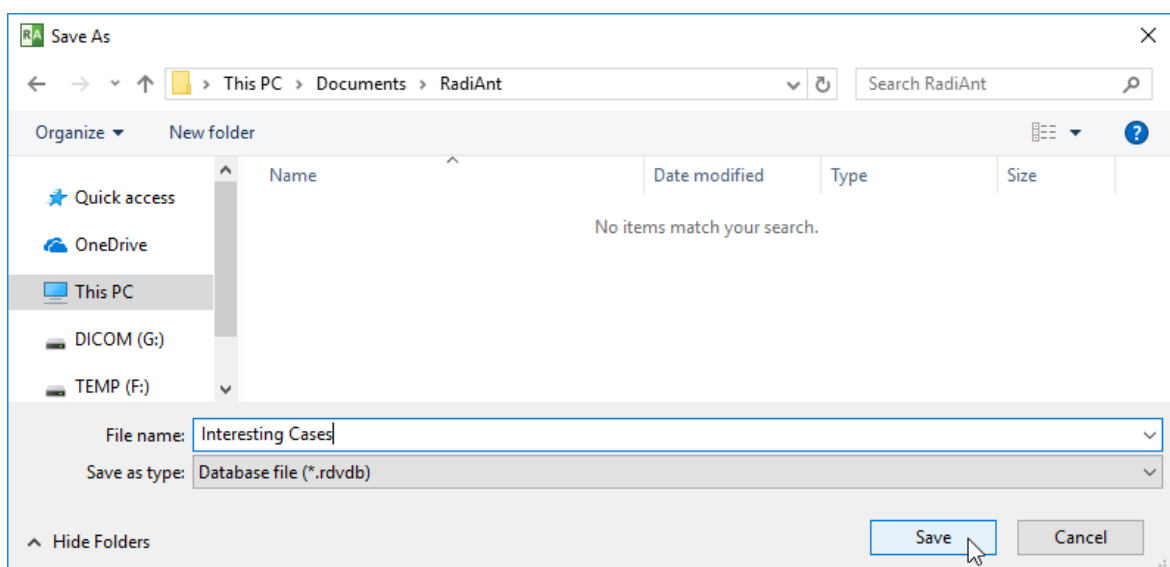
To create a new database, click the **Database** button in the local archive window.



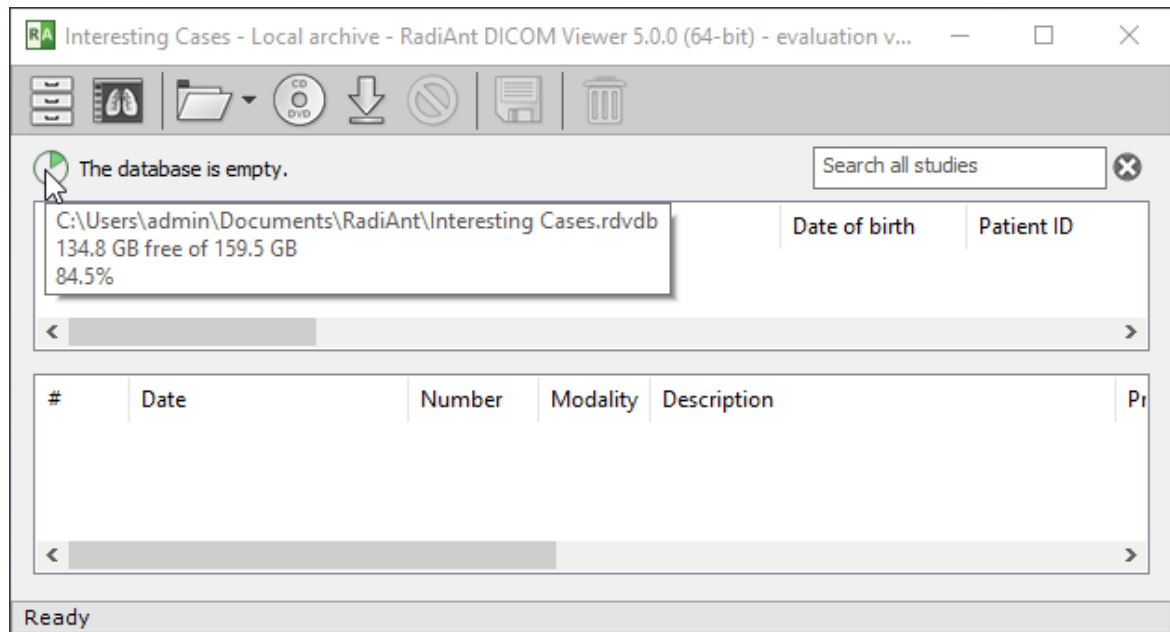
Then select **New database**. You can also use the **Ctrl + F8** shortcut.



Choose the location and name of the database. You are advised to create the database file in a new empty folder.

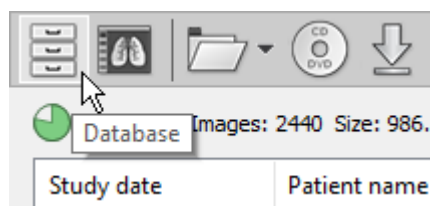


Click **Save**. The database will open in a new window. The name of the database is visible on the title bar. The location is presented in the tooltip box over the free space indicator icon.

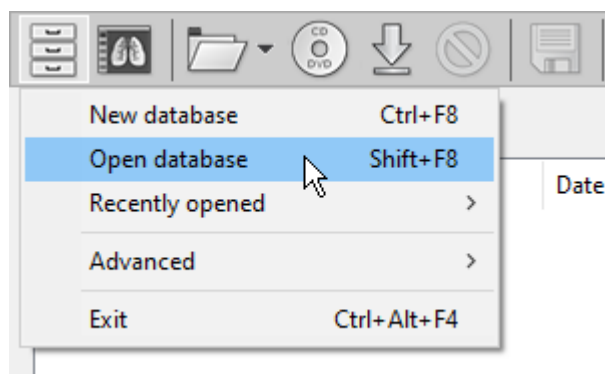


Open Database

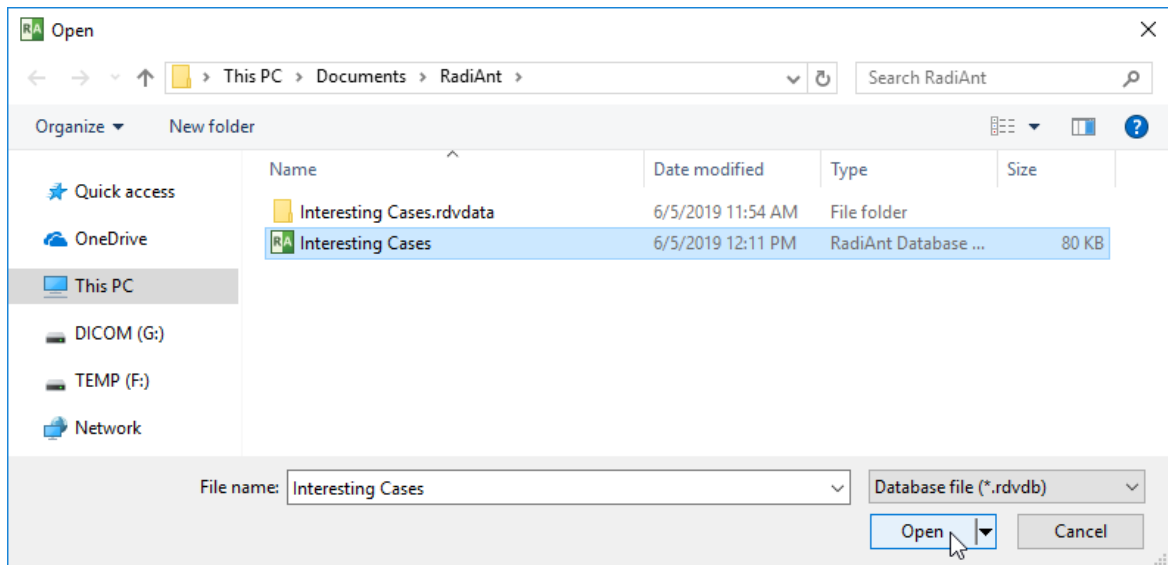
To open an existing database, click the **Database** button in the local archive window.



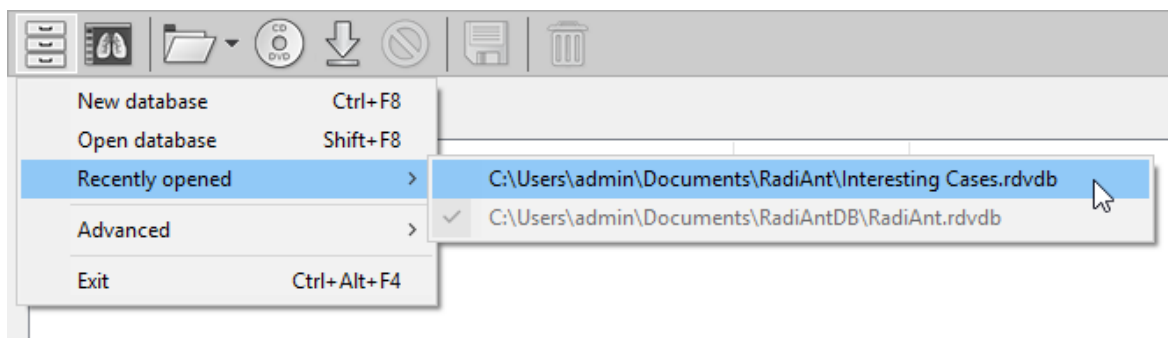
Then select **Open database**. You can also use the **Shift + F8** shortcut.



Browse for the database file and click **Open**. The database will open in a new window.



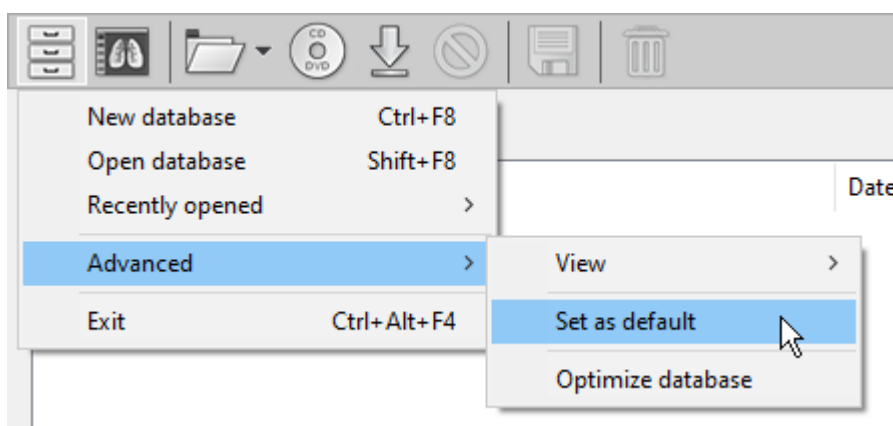
To quickly access recently opened databases, click the **Recently opened** menu item.



Default Database

The default database is created automatically in the Documents\RadiAntDB folder. This database is loaded automatically after RadiAnt is started. Studies received from PACS locations are automatically stored in the default database.

You can choose an alternative database as the default by clicking **Advanced -> Set as default** in the menu under the Database button on the local archive window toolbar.



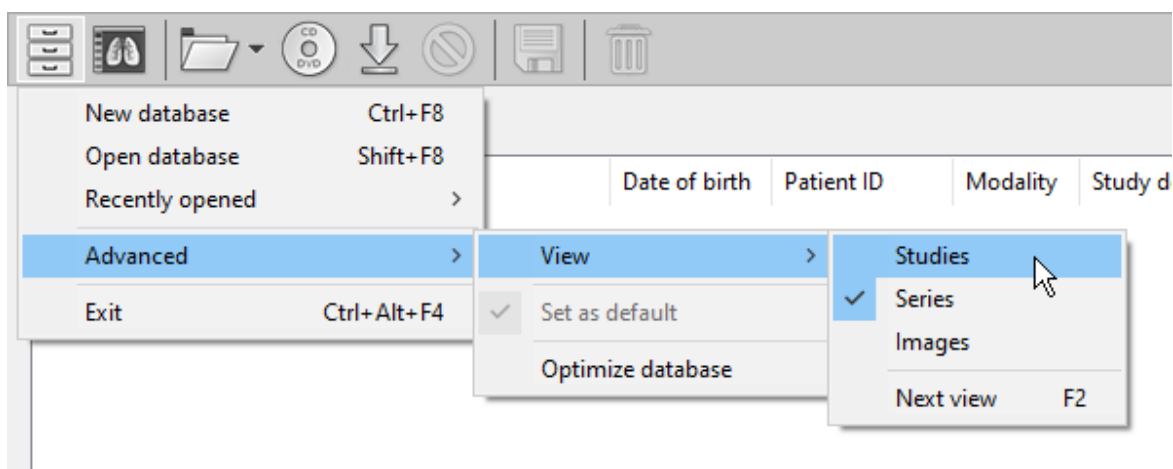
3.1.13 Database window configuration

Database Views

The default local archive view ("Series") shows the list of studies and below that the list of series in a selected study.

The "Studies" view shows only the list of studies and, the "Images" view shows the list of studies, list of series in a selected study, and list of images in a selected series.

You can change the default view by clicking **Advanced -> View** in the menu under the Database button in the local archive window and selecting **Studies**, **Series** or **Images**.



To quickly cycle views, use the **F2** shortcut.

Studies: 8 Images: 2440 Size: 986.3 MB

Search all studies

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA	

<

>

#	Date	Number	Modality	Description	Pt
1	6/11/2011 1:30 PM		PT	PET AC 2D	
2	6/11/2011 1:27 PM	2	CT	CT	

<

>

Series View (default)

Studies: 8 Images: 2440 Size: 986.3 MB

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta
8/1/2012 10:00 AM	Keel Billed Toucan	1/8/1947	7774823496	MG	Mammo
6/26/2012 12:44 PM	Laughing Kookaburra	5/24/1986	09285232	US	
8/1/2012 7:32 AM	Painted Bunting	3/22/1990	12123125512	MR/SR	SPINE^L-S
7/30/2012 11:29 AM	Rainbow Lorikeet	1/30/1958	39287497	MR	THORAX^BREAST
6/22/2007 11:34 AM	Scarlet Macaw	7/8/1937	86534637	XA	

Studies View

Studies: 8 Images: 2440 Size: 986.3 MB

Study date	Patient name	Date of birth	Patient ID	Modality	Study description
6/11/2011 1:25 PM	American Kestrel		2152513252	CT/PT	PET/CT WB
9/3/2009 12:16 PM	Golden Pheasant	9/15/1938	63472354234	CR	Chest AP
2/24/2012 10:38 AM	Grey Heron			CT	Aorta

#	Date	Number	Modality	Description	Pr
1	6/11/2011 1:30 PM		PT	PET AC 2D	
2	6/11/2011 1:27 PM	2	CT	CT	

#	Time	Instance number	Frame number	Location	Path
1	1:28:54 PM	1		143.00	D:\RadiAntC
2	1:28:54 PM	2		139.73	D:\RadiAntC
3	1:28:54 PM	3		136.46	D:\RadiAntC

Images View

Column Configuration

Columns in the list of studies can be set as per your preferences.

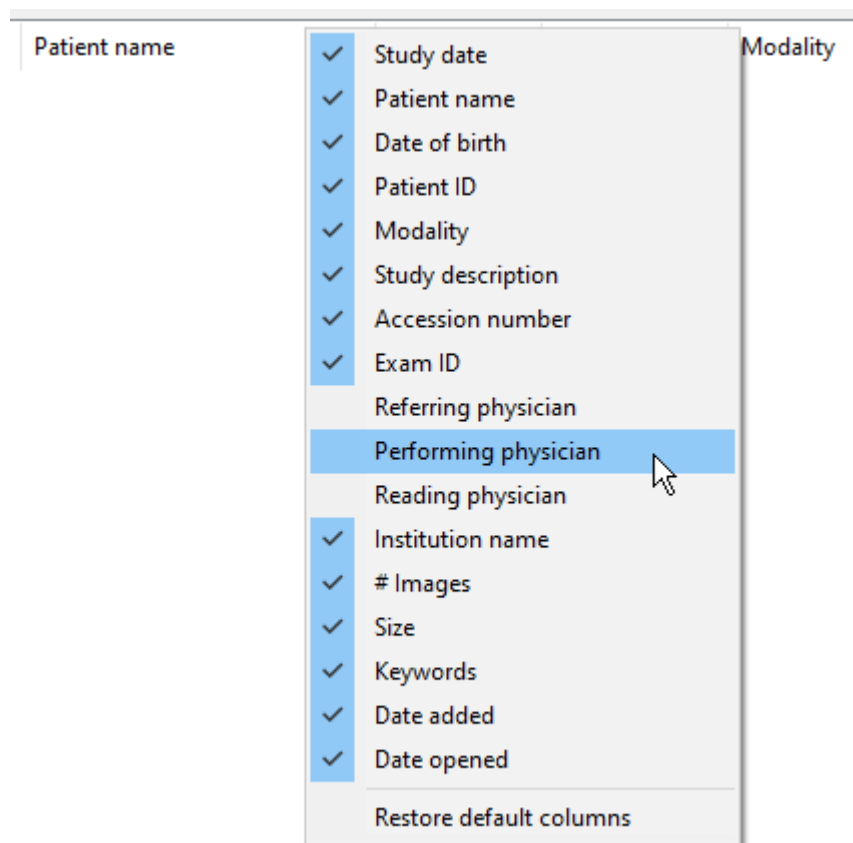
To change the order in which the columns appear, drag their headers to the desired location:

Study date | Patient name | Patient ID | Date of birth | Patient ID | Modality | Study description

To change the width of the columns, drag the dividers between the column headers:

Study date | Patient name | Date of birth | Patient ID | Modality | Study description

To hide or show specific columns, right-click on the column header and select the desired column to toggle its visibility.



To revert to the factory settings, click [Restore default columns](#).

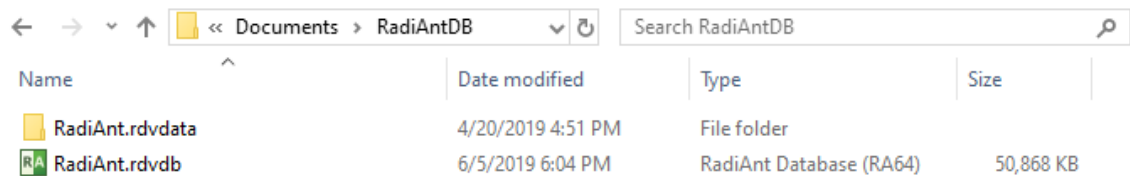
3.1.14 Backing up databases

Hard drive failure, files encrypted by ransomware, inadvertent file deletion—these are only a few scenarios that may render your data unavailable.

To mitigate the implications, you are advised to perform regular backups of your database. Ideally, those backups should be encrypted, since DICOM files often include sensitive information.

Which files and folders should I back up?

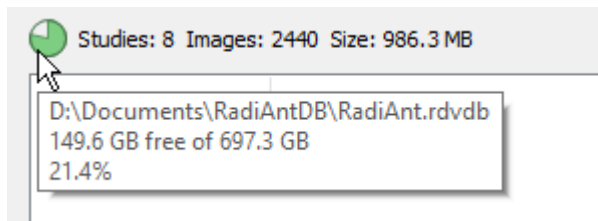
The database consists of a database file (with the ".rdvdb" extension) and a database folder (with the ".rdvdata" extension). These are located in the same folder:



A screenshot of a Windows File Explorer window showing the contents of the 'RadiAntDB' folder. The address bar shows the path 'Documents > RadiAntDB'. The search bar contains 'Search RadiAntDB'. The file list has two items: 'RadiAnt.rdvdata' (File folder, 4/20/2019 4:51 PM) and 'RadiAnt.rdvdb' (RadiAnt Database (RA64), 6/5/2019 6:04 PM, 50,868 KB).

Name	Date modified	Type	Size
RadiAnt.rdvdata	4/20/2019 4:51 PM	File folder	
RadiAnt.rdvdb	6/5/2019 6:04 PM	RadiAnt Database (RA64)	50,868 KB

You can view the location of the database file by hovering the mouse cursor over the hard disk free space indicator.



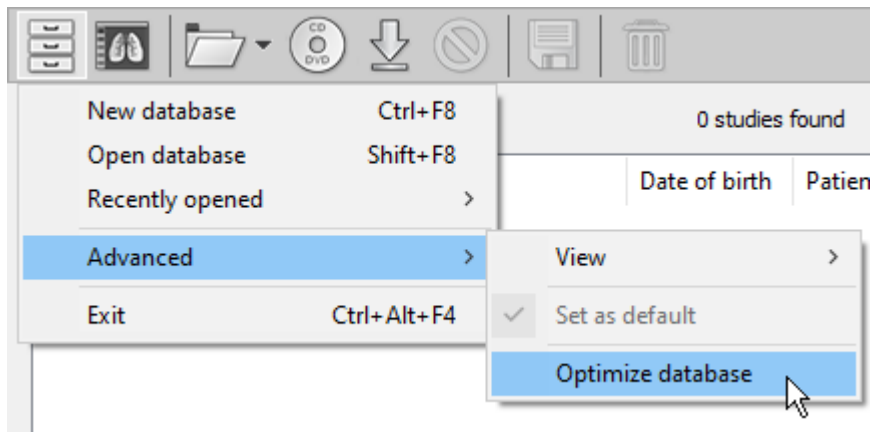
Both the database file and folder need to be included in the backup.

Note: If some studies were added to the database via the ["Add links" import mode](#), you also need to back up any folders that contain the DICOM studies that are located outside the RadiAnt database folder.

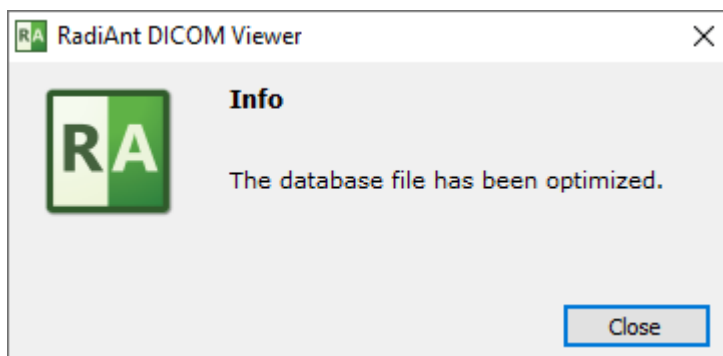
3.1.15 Database maintenance

When you regularly add studies to the database and later delete them, the size of the database grows in size, the indexes and tables become fragmented, and the performance decreases. To address these issues, you should regularly optimize the database files.

Click the Database button in the local archive window and select **Advanced -> Optimize database**.



Wait until the operation is complete. Click **Close**.



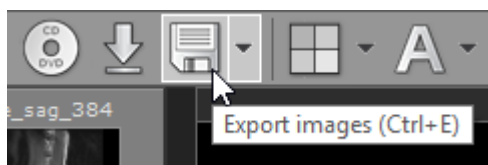
3.2 Exporting images

RadiAnt DICOM Viewer can export opened images or series to the following formats:

- JPEG
- BMP
- WMV (movie)
- MP4 (movie) - available on Windows 7 and newer systems
- DICOM

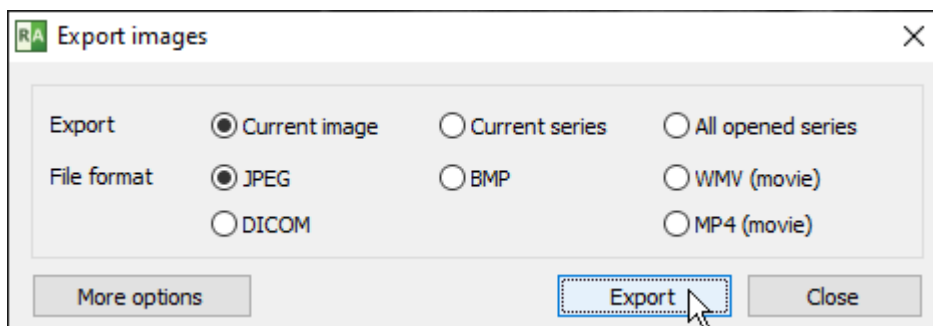
Basic export

Click **Export** tool button or use **Ctrl + E** to show the export window.

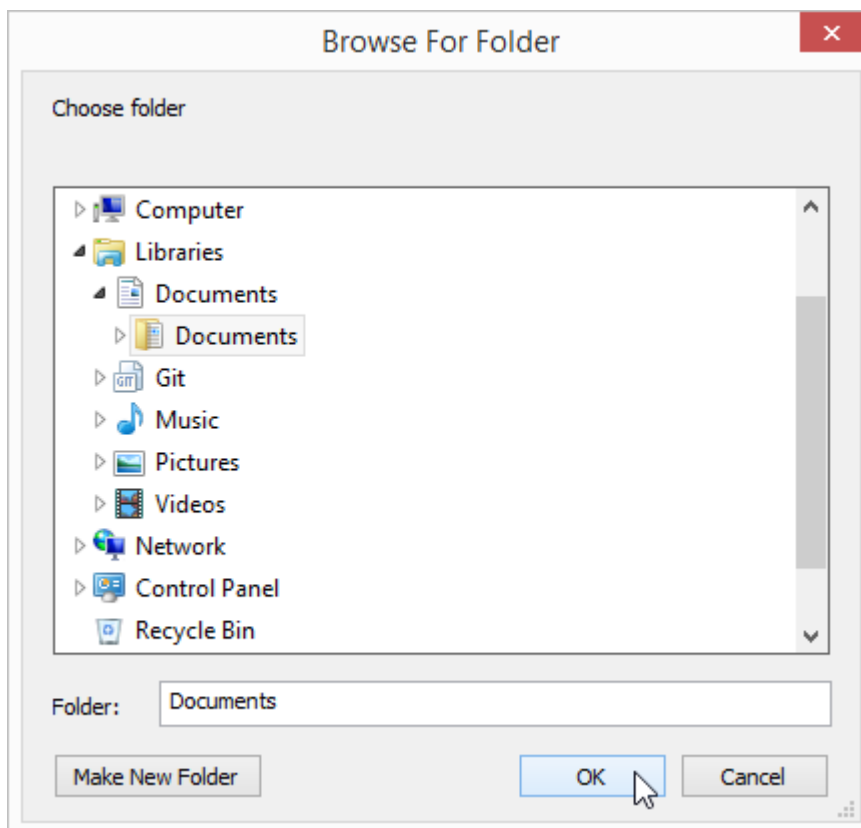


The export window will be opened so you can choose the destination format and source images:

- Current image (image displayed in active panel)
- Current series (all images displayed in active panel)
- All opened series (all series visible in the series preview bar)



Click **Export** to browse for the destination folder.

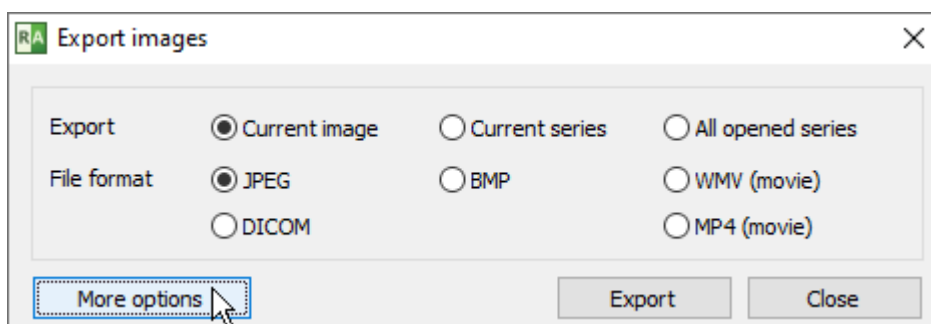


After clicking **OK**, the process will start.
The progress of the export will be shown on the status bar.



Advanced export

For advanced settings click **More options** before starting the export.



Additional controls will become visible (some may be inactive, depending on the destination file format).

Export location

Folder - click "Choose folder" to browse for the destination folder.

Filename prefix - a string that will precede each exported file's name.

Show in Explorer after export - exported images will be opened in File Explorer after the operation is completed.

File settings

Image size

- Default (1:1) - the size of the exported image will exactly match the source image in DICOM file.
- Current size - the size of the exported image will be exactly as seen in the panel.
- Fit to - the size of the exported image can be chosen from the list of dimensions or set to custom values.

Annotations

- Full - all annotations will be visible in exported images.

- Basic (anonymous) - patient name and ID will be hidden.
- Disabled - no annotations will be visible in exported images.

JPEG/Movie Quality - move the slider left to reduce the destination file size (worse quality), or right for larger destination files (better quality).

Frame rate (available only for WMV/MP4 export)

- Default - the destination movie frame rate will match the source DICOM image default frame rate.
- Custom - the frame rate can be set to custom value.

DICOM to DICOM export

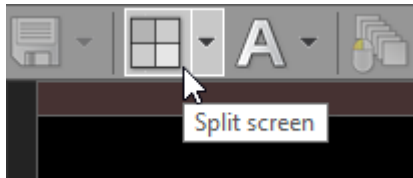
Source files are copied directly to the destination folder when DICOM is chosen as destination format.

Export to DICOM files is unavailable for secondary images obtained with the use of either MPR (Multiplanar Reconstruction), Fusion, or TIC (Time-intensity curve) tools.

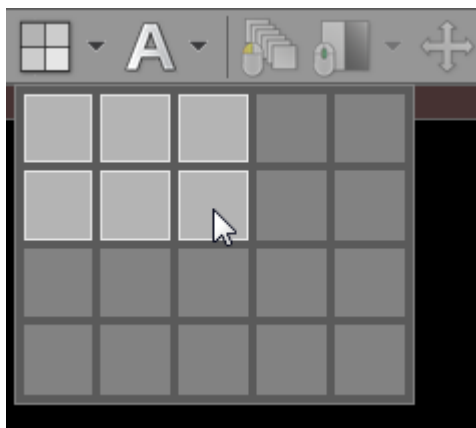
3.3 Multiple series viewing

Multiple series of either one or several studies can be concurrently opened in multiple panels for comparison purposes.

Click the **Split screen** button:

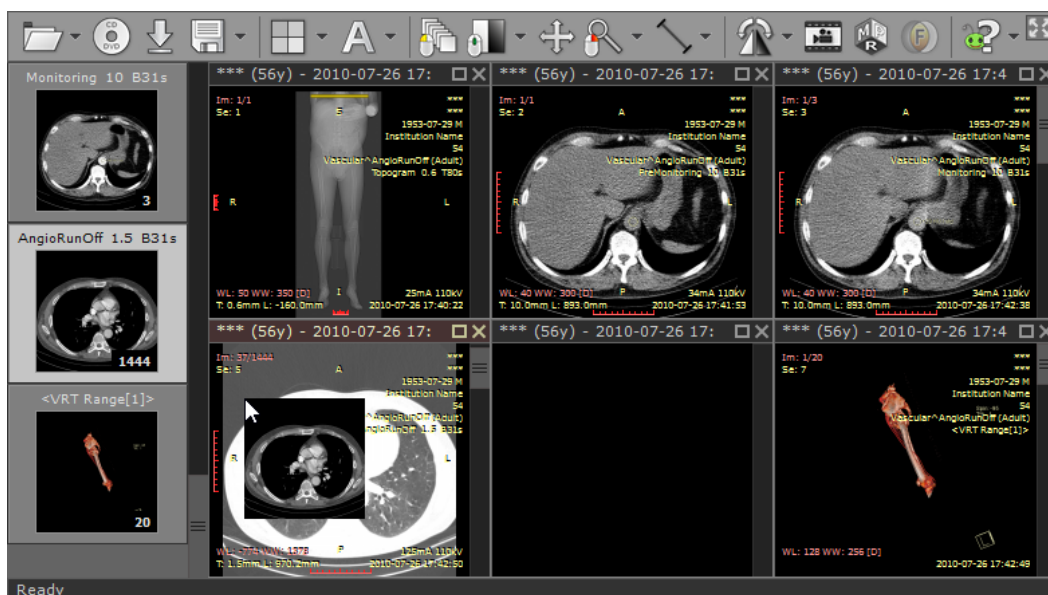


Move the cursor over the "cells" symbolizing the image panels:



Click again to select the splitting template (a maximum of five columns and four rows of panels can be selected).

Using the left mouse button, drag and drop thumbnails from the series preview bar into the panels to load the chosen series.



Another way of opening a series in new panel is to click its thumbnail while pressing the **Ctrl** key.

All panels will be automatically repositioned and new series will be loaded in the last panel.

Maximizing/restoring/closing panel

A panel can be quickly maximized by double-clicking the image it contains, or by pressing the **Maximize** button on the title bar of the panel or using **Ctrl + M**.



Press the **Restore** button, double-click the image it contains, or press **Ctrl + M** to restore the panel to its normal size and view all panels again.



Use the **Tab** key to switch between opened panels in maximized mode.

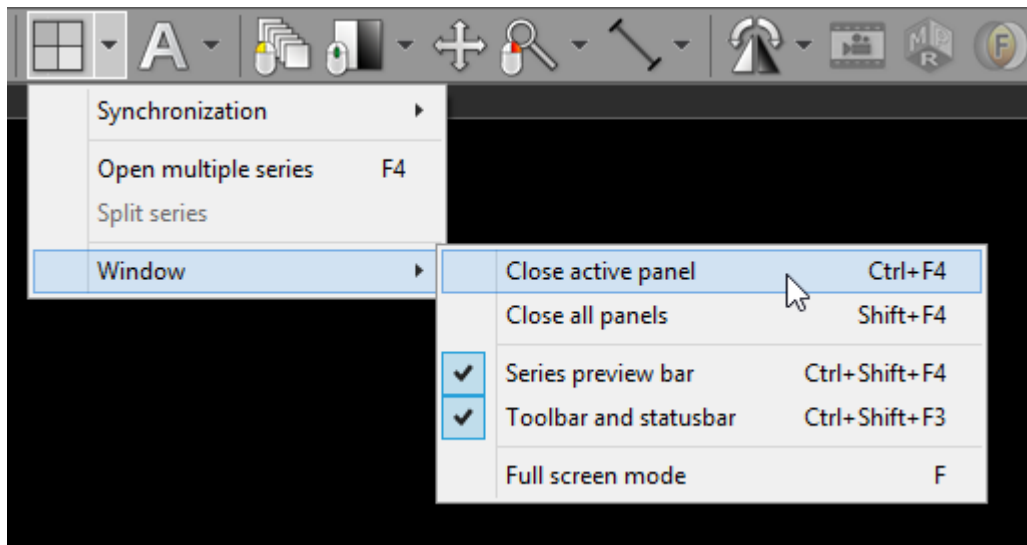
Click the **Close** button on the panel's title bar to close it or use **Ctrl + F4**.

If you hold the **Ctrl** key and click the **Close** button the panel will be cleared instead of being closed.



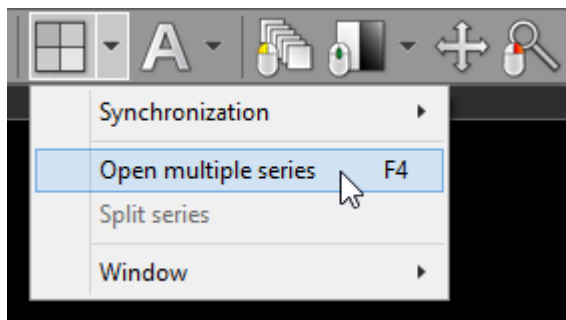
To close all visible panels, use **Shift + F4**.

The above actions are also available in the **Window** drop-down menu.

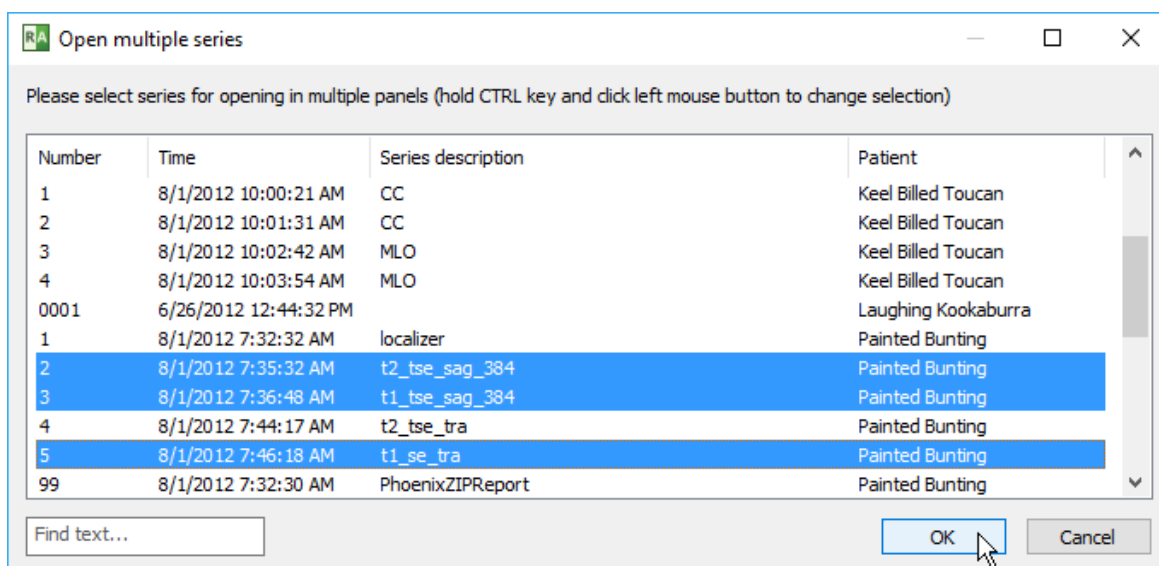


To quickly open multiple series

To speed up the process of opening more than one series at the same time, click the **Open multiple series** menu item or press the **F4** key.

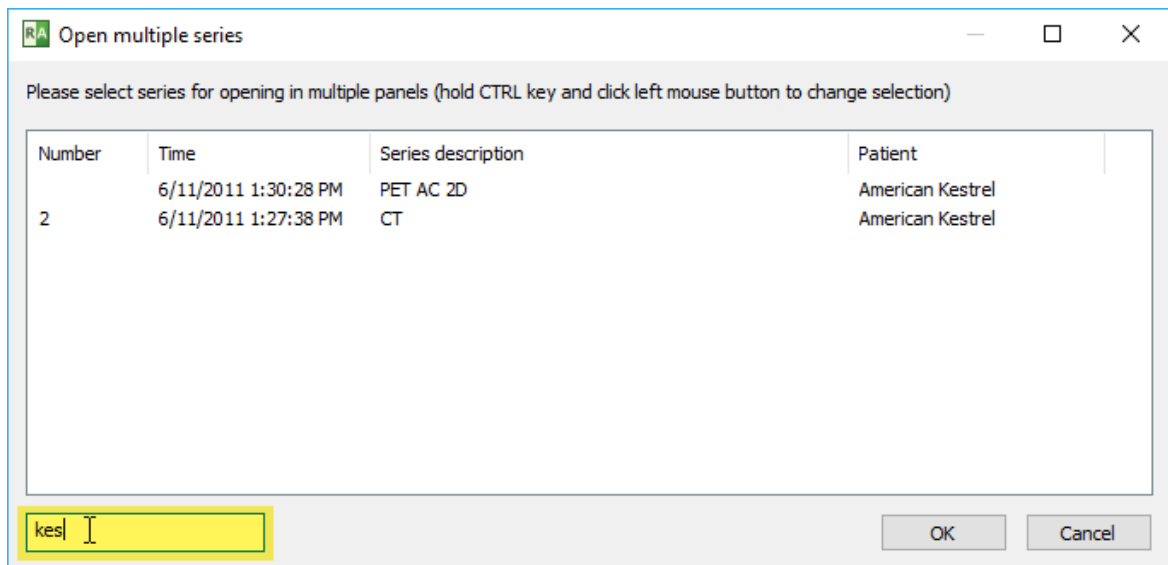


A window with the list of loaded series will appear.



Hold the **Ctrl** key and select series to opening by clicking them with left mouse button. Click **OK** to open the chosen series in multiple panels. All previously opened panels will close automatically.

To quickly filter the series list, start typing in the text field located in the lower-left corner of the window.

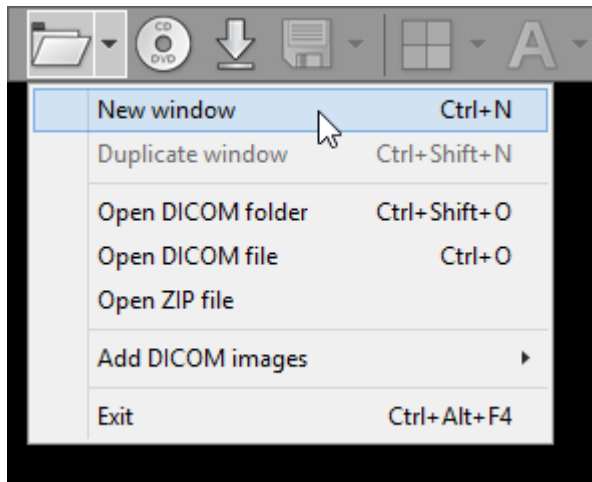


Press **Enter** to load the first of the displayed filtered series.

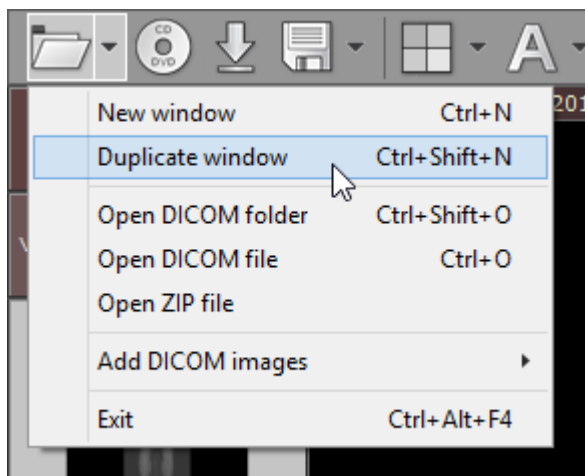
3.3.1 Multiple windows

You can open up to 16 viewer windows. These windows can be placed on the same or different monitors.

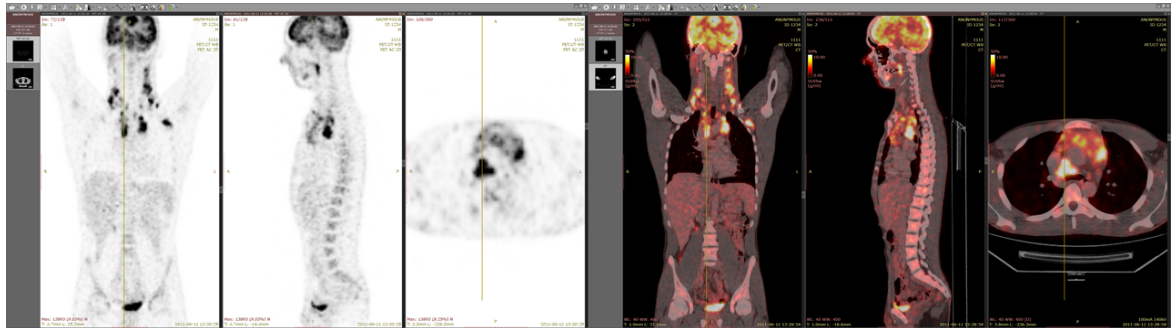
To show a new empty window, press **Ctrl + N** or click **New window** in the pop-up menu under the folder icon. Double clicking the RadiAnt icon on the Desktop is another way to open a new window.



Use the duplicate window feature to open a new window with the series displayed in the active window. Click **Duplicate window** or use the shortcut **Ctrl + Shift + N**.

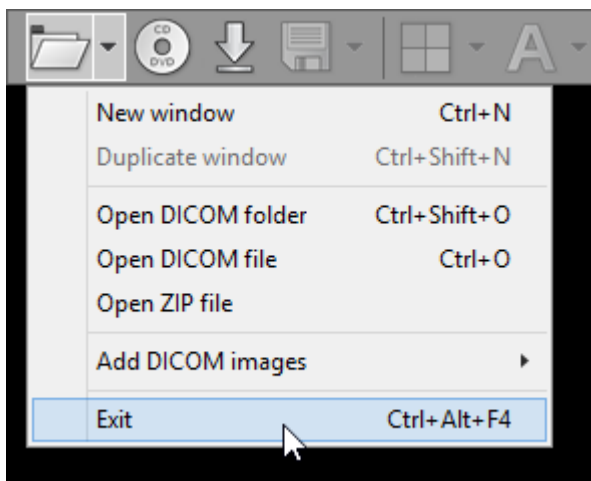


When the series from the same study are opened in two different windows, they are auto-synchronized; also, the cross-reference lines are displayed, if applicable. Finally, a fusion of images is possible too. This can be helpful when browsing series of the same study in a multi-monitor setting.




PET-CT fusion displayed on two monitors

Press **Alt + F4** to close the active window. To exit the application when multiple viewer windows are opened, press **Ctrl + Alt + F4** or click **Exit** in the pop-up menu under the folder toolbar icon. You can also press **Ctrl** while clicking the close button in one of the viewer windows.



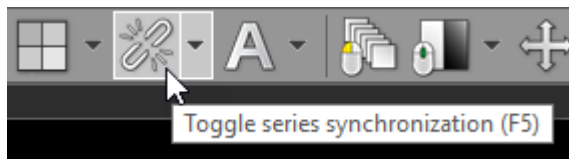
3.3.2 Synchronization

The synchronization feature lets you apply the same settings (slice position, zoom & pan, window) to the series of images opened in multiple panels.

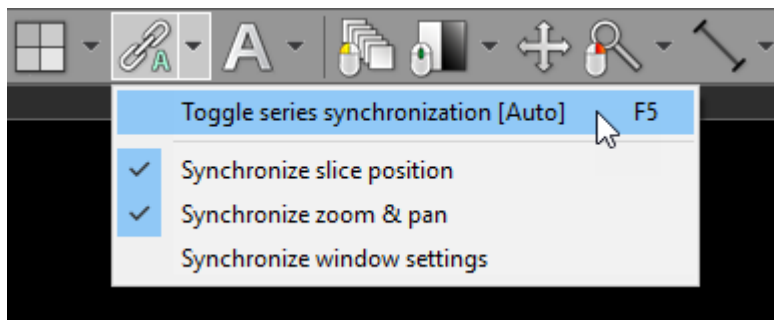
There are three synchronization modes available in RadiAnt DICOM Viewer: Auto ,

Manual  and Disabled .

You can switch between these modes by clicking the **Toggle series synchronization** button on the toolbar.



The synchronization mode can be also toggled by clicking the **Toggle series synchronization** drop-down menu item or by pressing the **F5** shortcut key.

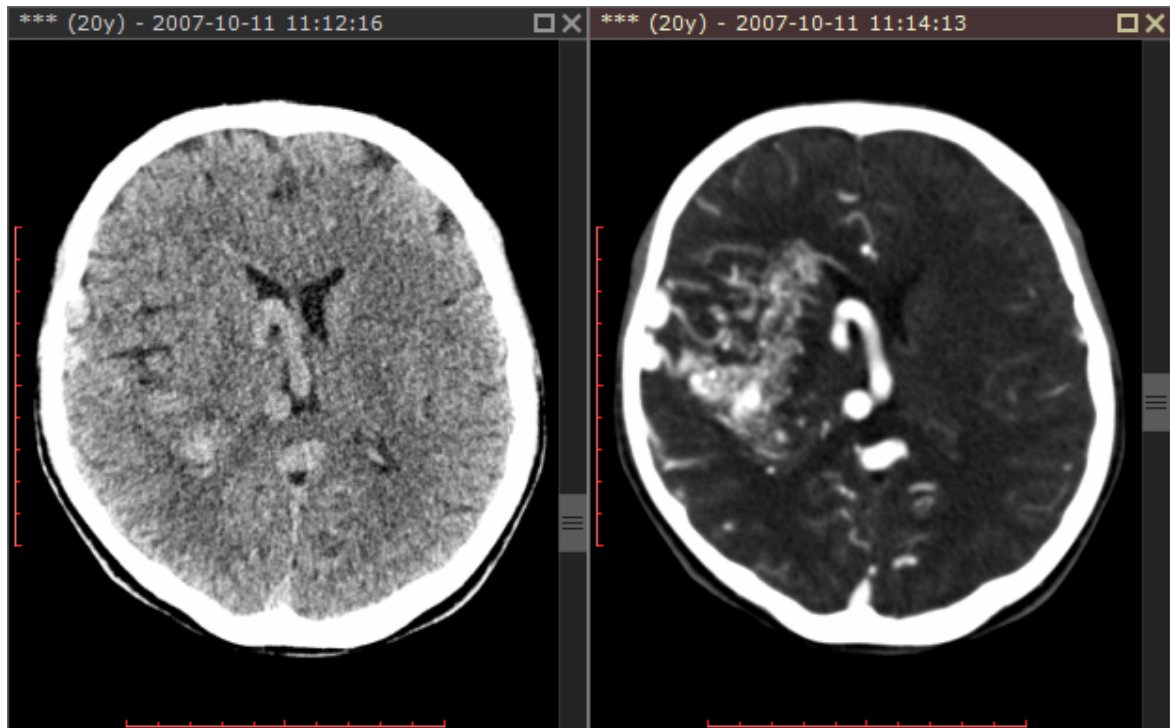



In the same menu you will also find items controlling the options of synchronization:

- **Synchronize slice position**
- **Synchronize zoom & pan**
- **Synchronize window settings** (disabled by default)

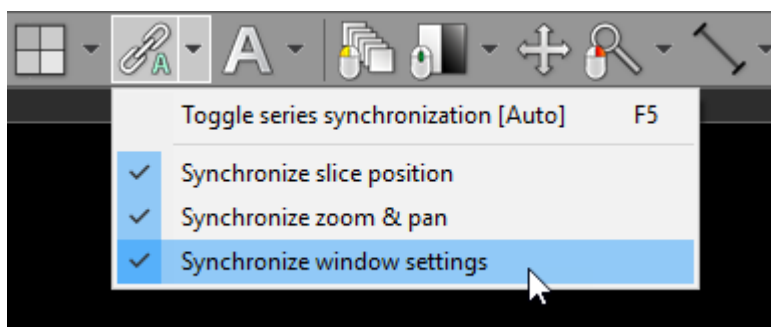
3.3.2.1 Auto synchronization

Series consisting of images that have been acquired in the same plane (or in similar planes, with the dihedral angle up to 5 degrees), within the same study (e.g. Computed Tomography series before and after administration of the contrast medium) are automatically synchronized by default (slice location, zoom level).



The toolbar button shows  when the automatic synchronization mode is enabled. You can disable the synchronization by pressing this button or by using the **F5** shortcut key.

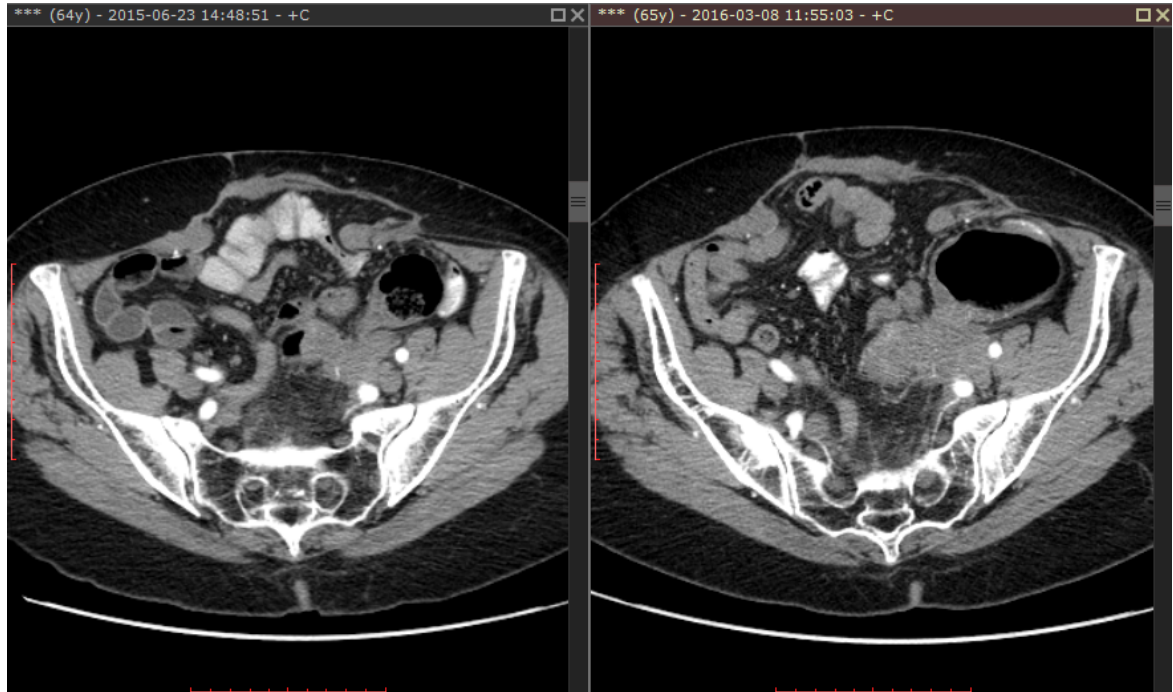
By default only slice position and zoom & pan settings are synchronized. To enable the synchronization of window settings click [Synchronize window settings](#).




Note that after the synchronization is enabled you have to change a setting to apply it to other series. E.g. you have to scroll series in one panel to synchronize the position of slices in other panels.

3.3.2.2 Manual synchronization

Series acquired in similar planes (with the dihedral angle up to 30 degrees) belonging to the same or different studies (of the same or different patients) can be synchronized manually.

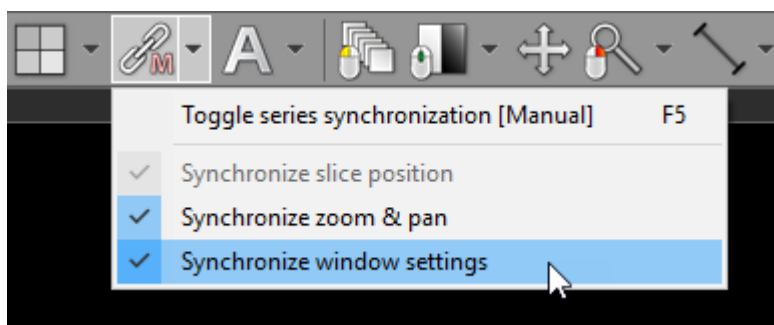


To enable manual synchronization, scroll series opened in different panels to the same level (e.g. the bifurcation of the aorta), pan images so that they are positioned similarly in viewports and click the **Toggle series synchronization** button or press **F5**.

The toolbar button shows  when the automatic synchronization mode is enabled.

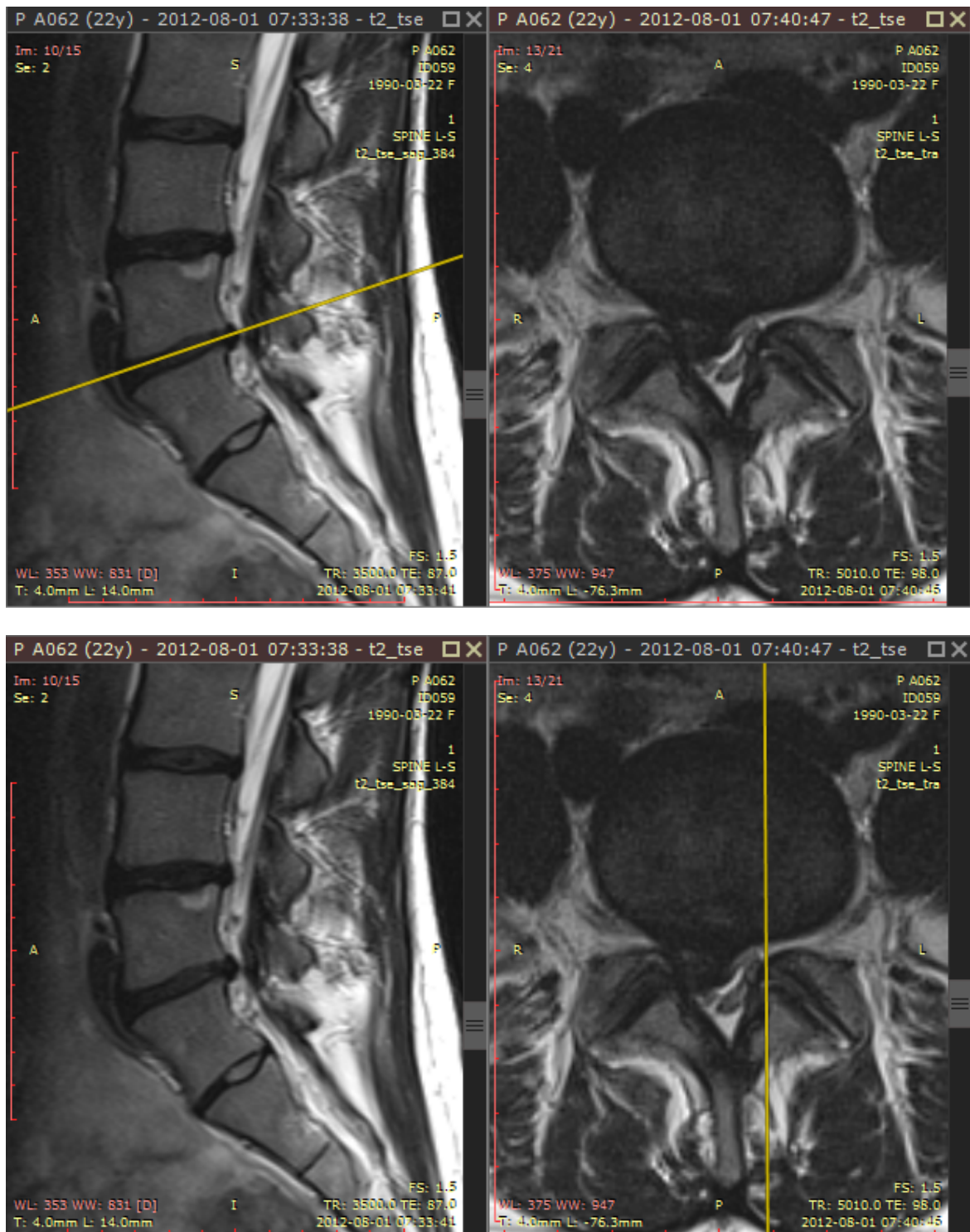
By default only slice position and zoom & pan settings are synchronized.

To enable the synchronization of window settings click [Synchronize window settings](#).



3.3.3 Cross-reference lines

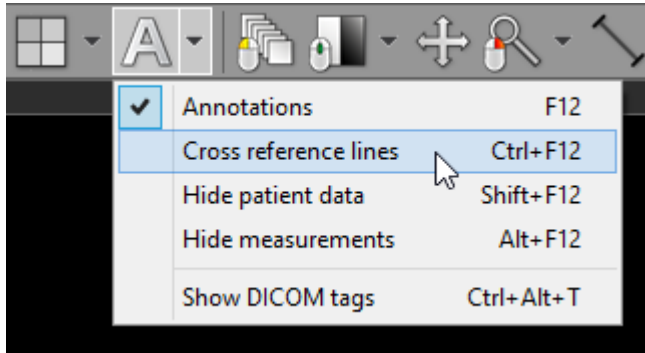
Cross-reference lines are displayed for better correlation of the anatomy when browsing series with different image planes (e.g. Magnetic Resonance study). They are visible as yellow lines that mark the intersection of the image planes.



Cross-reference lines are always displayed in inactive panels (those with gray title bars) as a reference for the image in the active panel (brown title bar).

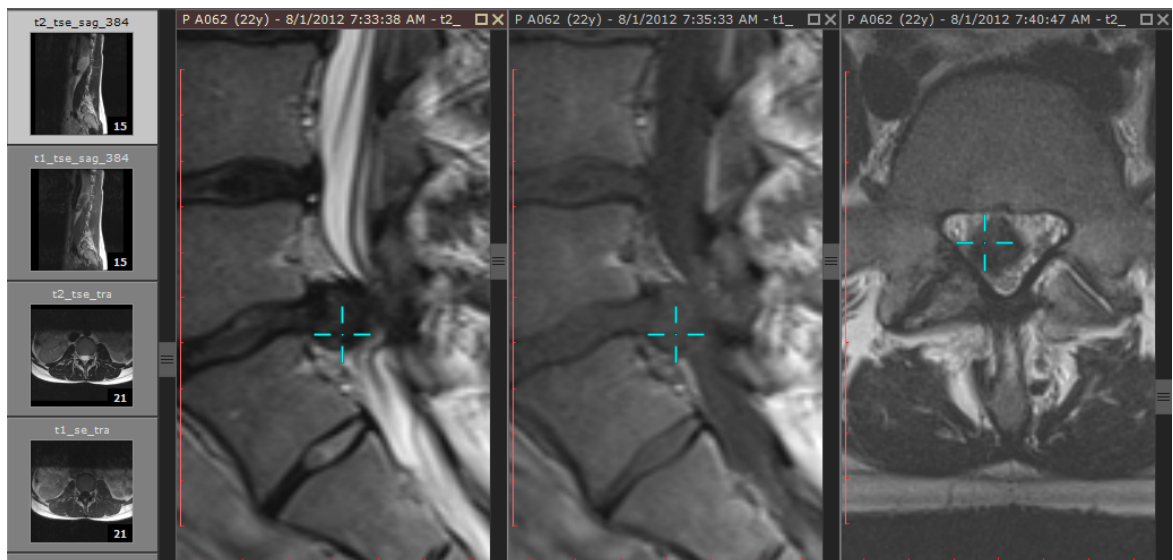
To change the reference source, activate the other panel by either clicking on its title bar or the image it contains.

Cross-reference lines can be switched off and on by clicking the [Cross reference lines](#) menu item or by using **Ctrl + F12**.



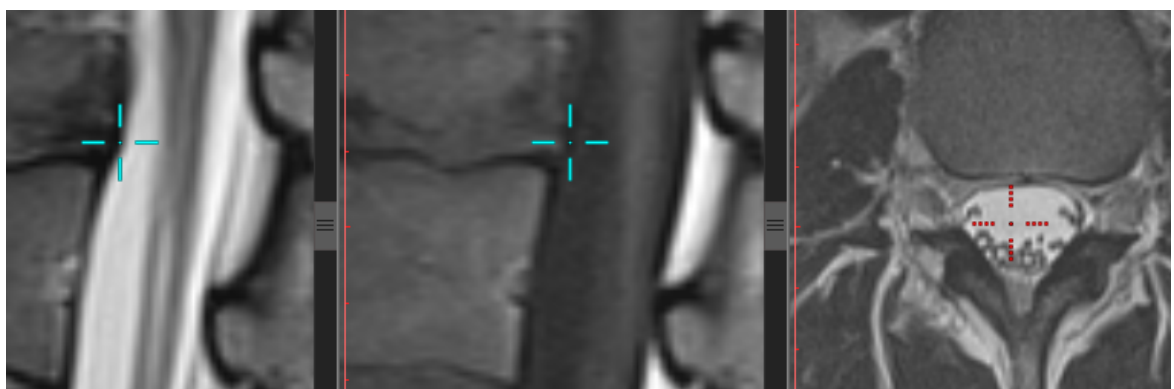
3.3.4 3D Cursor

The 3D Cursor tool can be displayed for better correlation of the anatomy when browsing series with different image planes (e.g. Magnetic Resonance study). It is visible as a blue cross-hair cursor that marks the same point in 3D space on all images.

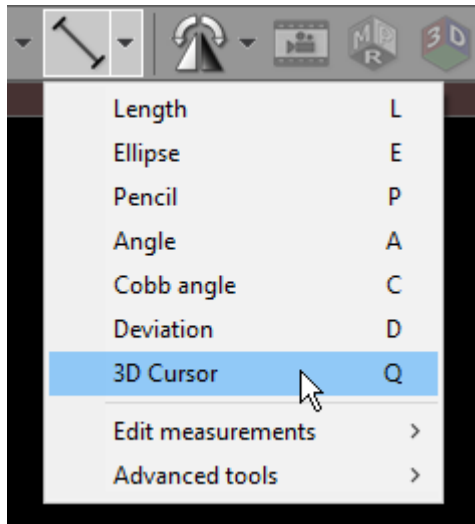


Hold **Ctrl + Shift** and press the left mouse button to show the 3D Cursor. Drag the mouse, with its left button pressed to change the position of the cursor in the active viewport. Images in other viewports will be scrolled automatically so that the displayed image plane is closest to the 3D cursor. The cursor disappears when the mouse button is released. [Reference lines](#) are temporarily hidden when the 3D Cursor is active. When [Cine mode](#) is enabled, the 3D Cursor cannot be activated.

If the cursor is located at some distance from the image plane (and no image with a closer plane can be found), it will be displayed in the red color.

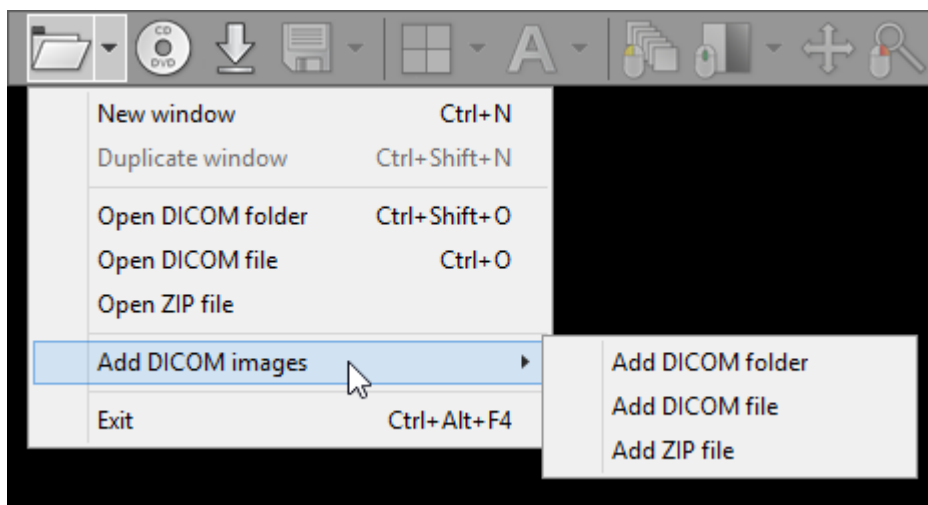


The 3D Cursor tool can be permanently assigned to the left mouse button by choosing it from the toolbar menu or by pressing the **Q** key.



3.3.5 Adding more studies

When a new study is opened, all images in panels and the series preview bar are cleared. To add new images from different location use the [Add DICOM images](#) drop-down menu.



New images can be added from a folder, selected files, or decompressed from a ZIP archive.

Notice that you cannot open directly two or more DICOM CD/DVD disks at the same time - when the first one is ejected, the images become unavailable for viewing. If you want to open more than one disk at the same time, first you need to copy their contents to a folder on your hard drive and then scan the folder for DICOM files.

3.3.6 Splitting series

Sometimes a single series of DICOM images obtained from a given modality contains multiple volumes. This is where the split series feature comes in handy.

It detects all the volumes contained in one series (e.g. arterial/venous post-contrast, PD/T2, DWI or cardiac CT multi-phase) and opens them in separate panels.

This makes simultaneous display and synchronization of images between such series possible.

Open a multi-sequence series and click the arrow next to the split screen icon on the toolbar in the main window, then click **Split series** or press **Ctrl + F5**.

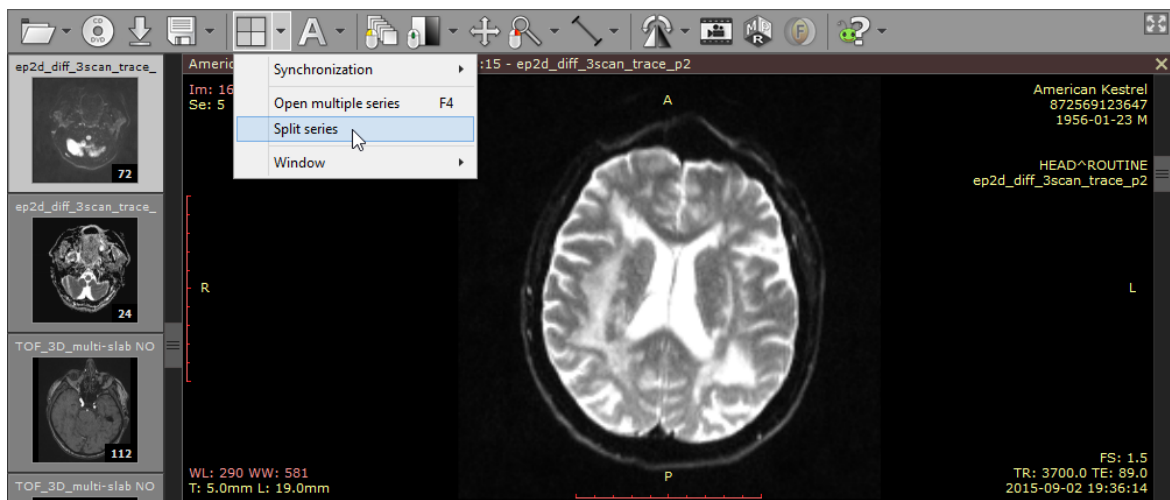
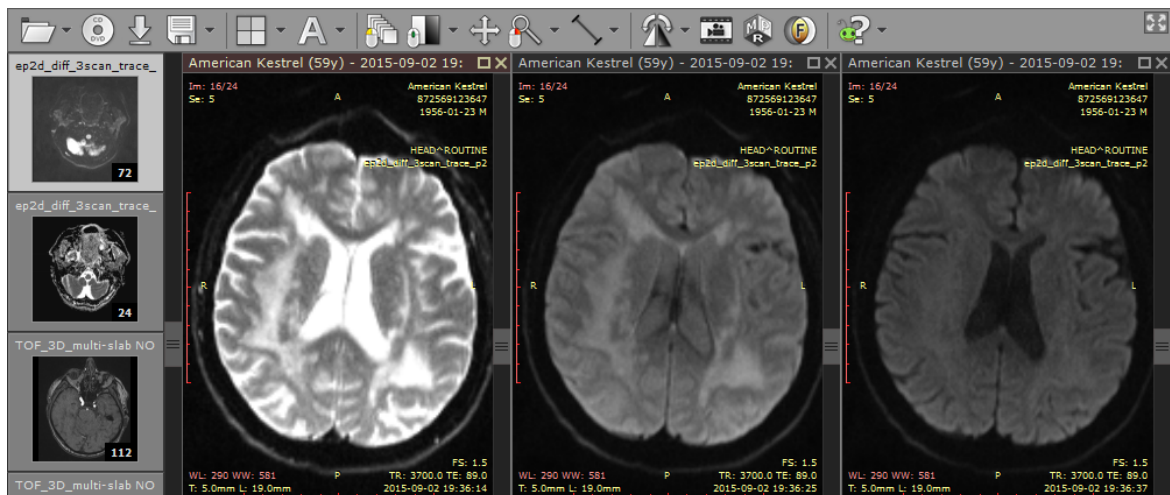


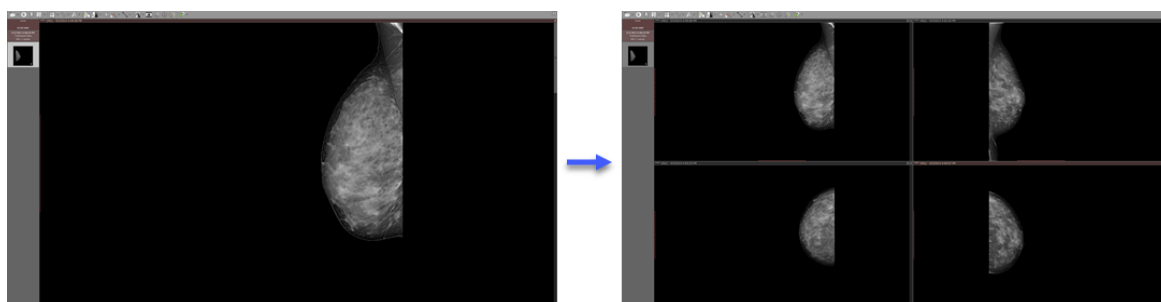
Image series containing three DWI sequences with different b-values.

Each of the volumes from the original series will be opened in a separate panel.



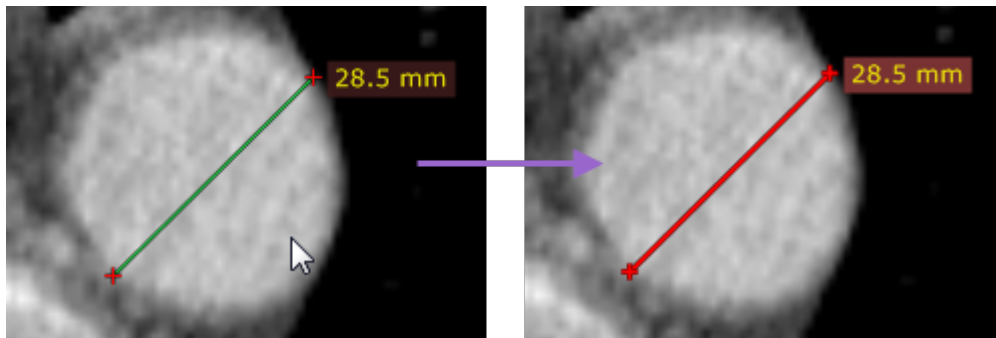
A single DWI sequence in each panel.

If the split series feature is used on a series containing non-volumetric images (CR, DX, MG, US, XA, etc.), each of the images of the series will be opened in a separate panel (up to 20 panels at the same time).

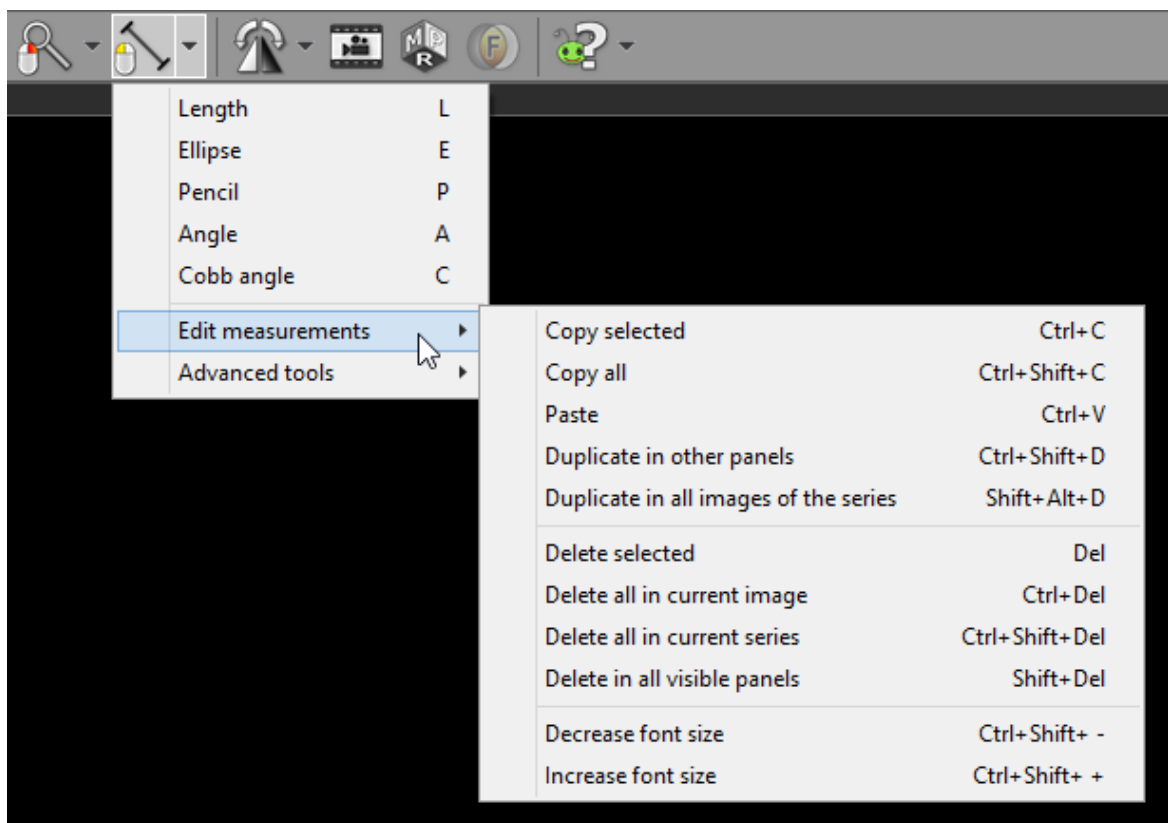


3.4 ROI operations

Select an object (segment, ellipse, angle, etc.) by clicking it with left mouse button. The object will turn red after it is selected.

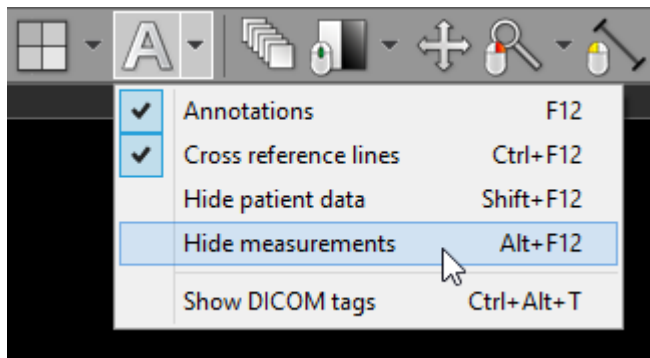


Use the [Edit measurements](#) drop down menu to copy, paste or duplicate objects.



Menu item	Keyboard shortcut	Description
Copy selected	Ctrl + C	Copies selected object in active panel.
Copy all	Ctrl + Shift + C	Copies all objects in displayed image from active panel.
Paste	Ctrl + V	Pastes copied object(s) into image displayed in active panel.
Duplicate in other panels	Ctrl + Shift + D	Duplicates selected object in active panel to other, inactive panels.
Duplicate in all images of the series	Shift + Alt + D	Duplicates selected object in active panel, to all other images of the same series.
Delete selected	Del	Deletes selected object in active panel.
Delete all in current image	Ctrl + Del	Deletes all objects in image displayed in active panel.
Delete all in current series	Ctrl + Shift + Del	Deletes all objects from the series displayed in active panel.
Delete in all visible panels	Shift + Del	Deletes all objects from all visible images.
Decrease font size	Ctrl + Shift + Minus (-)	Makes text in ROI labels smaller.
Increase font size	Ctrl + Shift + Plus (+)	Makes text in ROI labels larger.

To hide (and show) measurements (objects) in active panel click **Hide measurements** menu item or use **Alt + F12** .



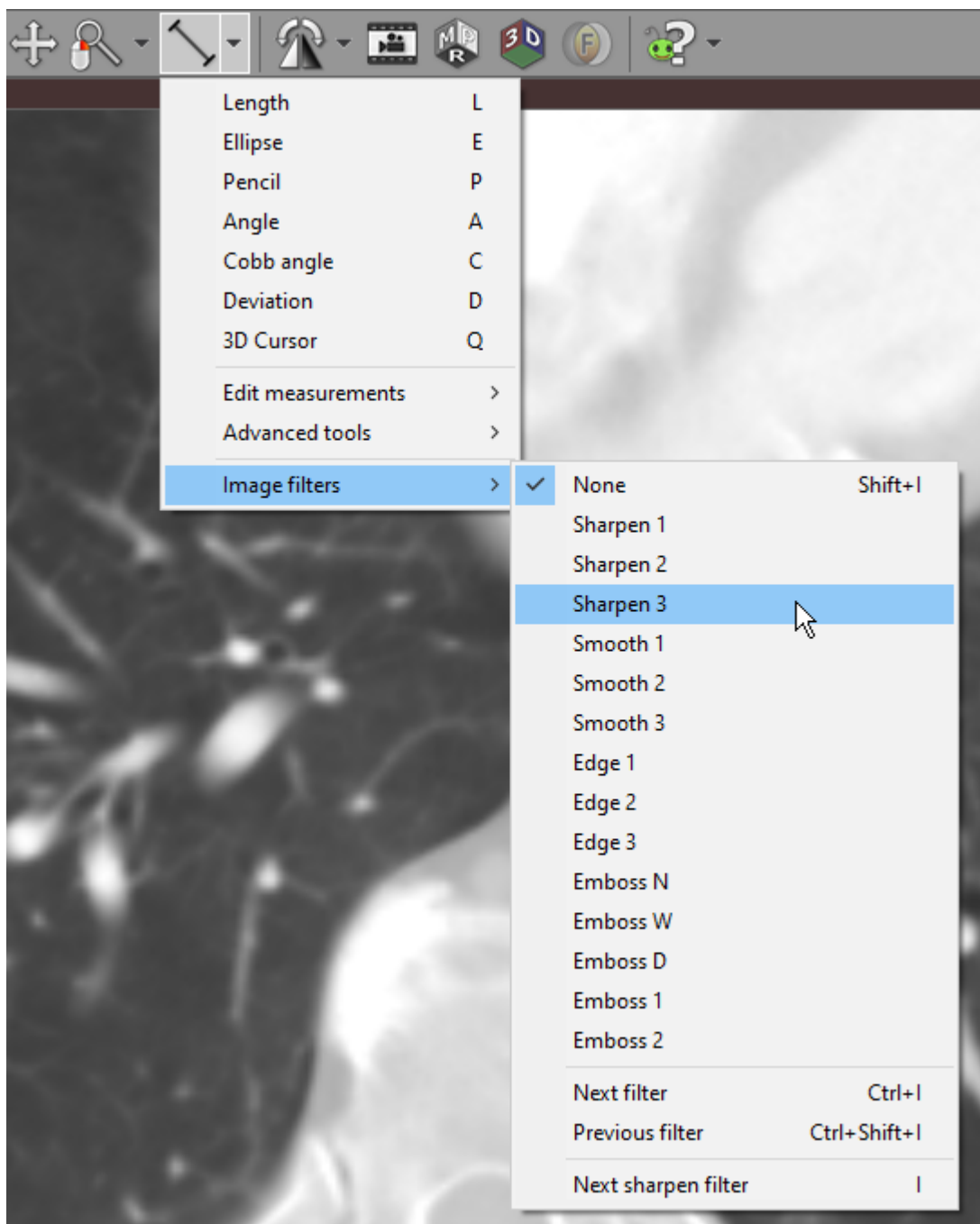
Once you start drawing an object in a panel with hidden measurements, all the objects will become visible again.

3.5 Image filters

The following image filters can be enabled for images displayed in the 2D viewer:

- Sharpen (1, 2, 3)
- Smooth (1, 2, 3)
- Edge (1, 2, 3)
- Emboss (N, W, D, 1, 2)

Select the **Image filters** drop-down menu and choose the desired filter.



The filter will be applied to the entire series of images.



To disable filters, select **None** or use the **Shift + I** shortcut.

To cycle through all available filters, select **Next filter** / **Previous filter** or press **Ctrl + I** / **Ctrl + Shift + I**.

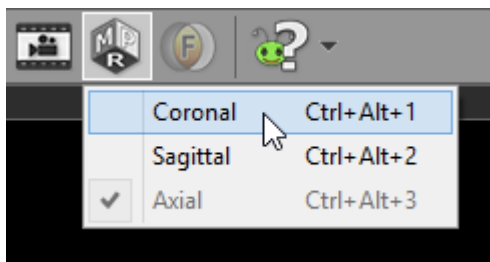
To cycle through sharpen filters only, select **Next sharpen filter** or press **I**.

3.6 2D Multiplanar reconstruction (MPR)

The MPR tool provided within the RadiAnt DICOM Viewer can be used to reconstruct images in orthogonal planes (coronal, sagittal, axial or oblique, depending on what the base image plane is). This can help to create a visualization of the anatomy which was not possible using base images alone.



Click the **MPR** button on the toolbar, and select the plane you would like the series to be reconstructed to (the current plane of source series is checked and grayed out).

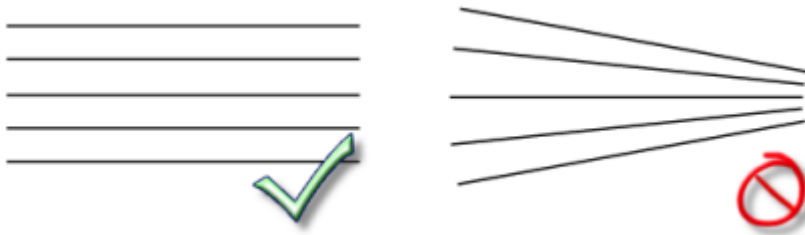


Alternatively, keyboard shortcuts below can be used to switch planes.

Keyboard shortcut	MPR plane
Ctrl + Alt + 1	Coronal
Ctrl + Alt + 2	Sagittal
Ctrl + Alt + 3	Axial

This process takes 1-2 seconds on a fast machine, but can be substantially slower on computers with less memory.

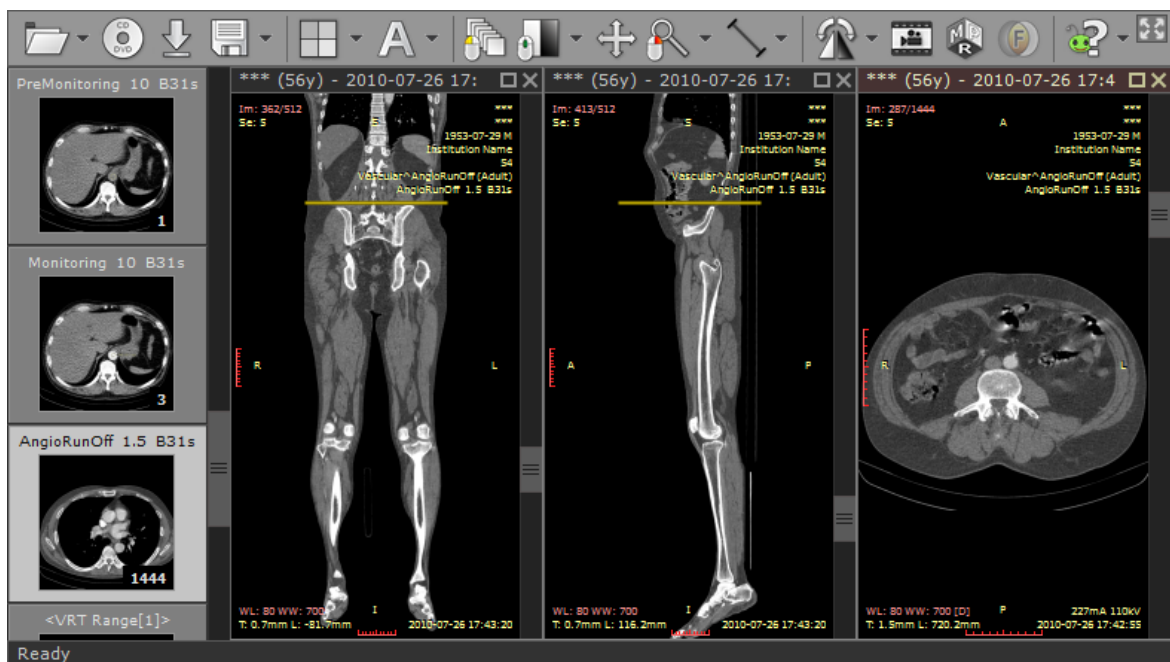
If the button is grayed out, the MPR tool cannot be applied to the series (e.g. in case of images with nonparallel planes).



One series can be reconstructed in three planes in order to easily localize an area of interest thanks to cross-reference lines.

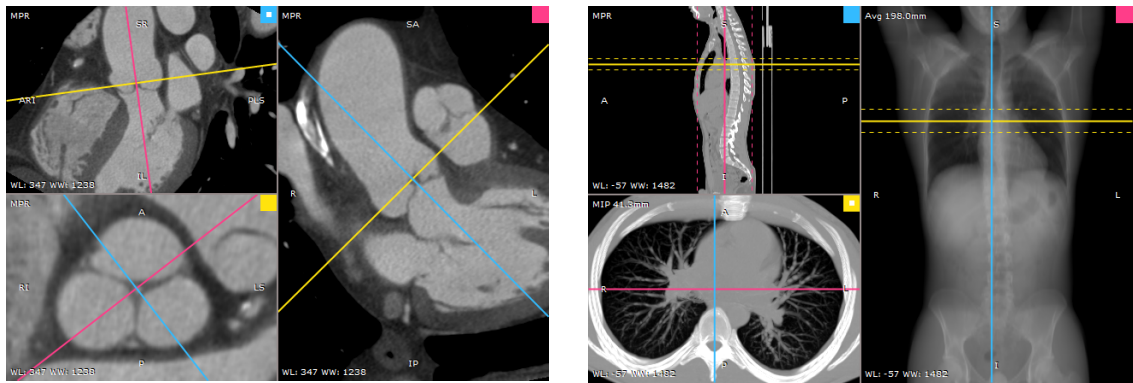
Use the screen splitting tool to open three panels, and drag the source series thumbnail into each of them.

Click first panel to activate it, and then select the new image plane using the MPR tool. Repeat this step for the second panel.



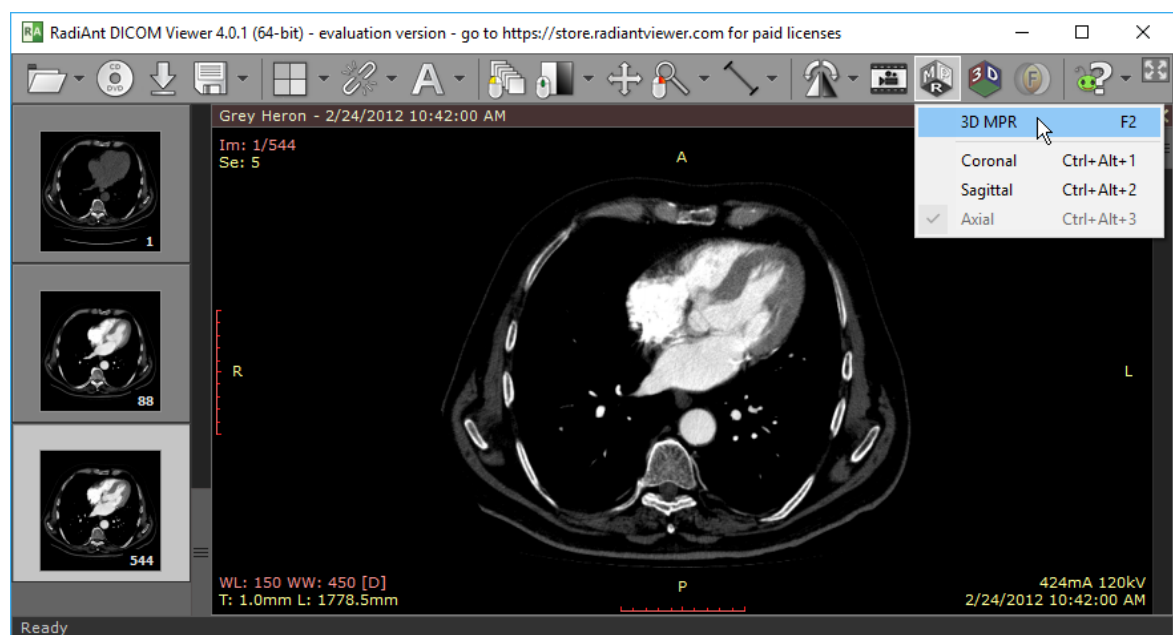
3.7 3D Multiplanar reconstruction (MPR)

The 3D MPR tool provided within the RadiAnt DICOM Viewer can be used to reconstruct images in arbitrary planes (oblique). This can help to create a visualization of the anatomy that would not be possible using base images alone.

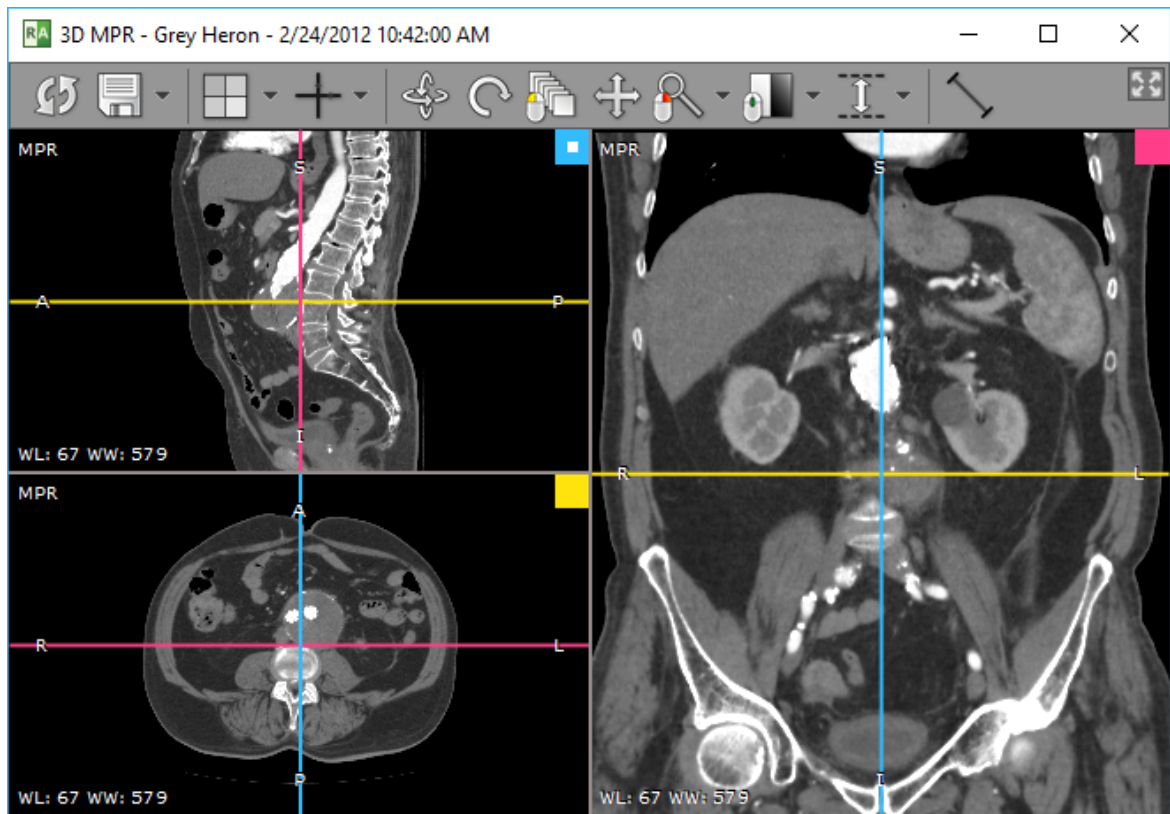


Opening the 3D MPR window

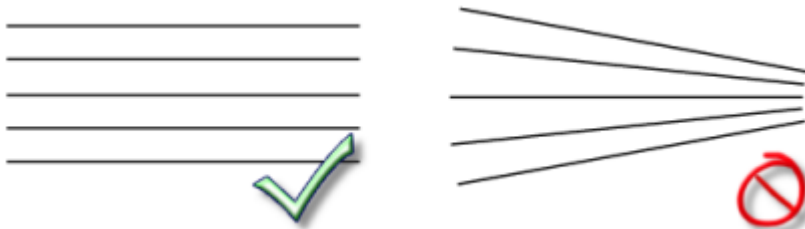
1. Open the volume series in the 2D viewer window and click the **MPR** button on the toolbar and then **3D MPR**. Alternatively, you can use the **F2** shortcut.



2. After the series is loaded into memory and preprocessed, the 3D MPR representation will be displayed in a new window. This process can take a few seconds on slower systems.



Some series cannot be used with the 3D MPR tool (e.g., images with nonparallel planes).



If the images are not spaced evenly within the volume, the missing slices will be interpolated, and some visual artifacts may appear in presentation and measurements.

Note, some larger series (e.g., >2000 CT images) require more than 1GB of free memory and the 64-bit RadiAnt DICOM Viewer version to load successfully.

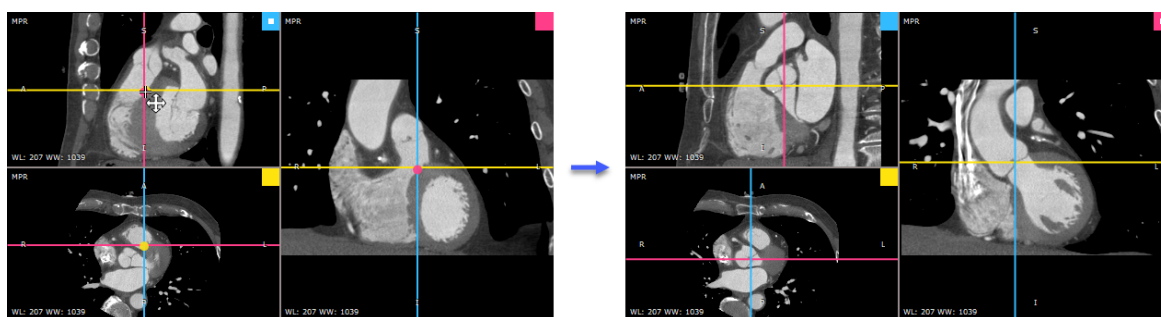
3.7.1 Changing the viewing plane

There are three viewports in the 3D MPR window; each shows the image reconstructed in a plane perpendicular to the other two viewports. In each viewport, there are two axes overlaid on the image. These axes represent intersections of planes from the other two viewports with the specific viewport's image plane. The color of the axis is consistent with the color code of the source viewport (small square in the top-right corner).

Initially, the viewports are set to the default planes (sagittal, axial, coronal). The orientation of those planes can be changed by rotating the axes, whereas the position of the plane is changed by dragging the intersection of the axes.

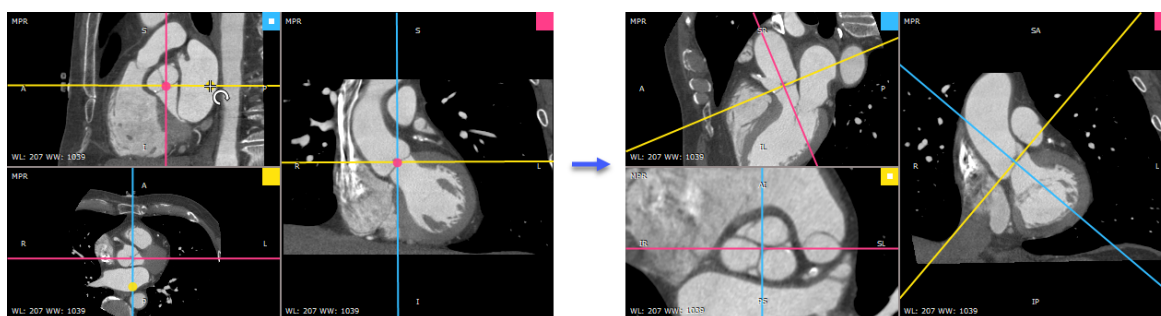
Moving axes

Place the mouse cursor over the intersection of the axes, press the left mouse button and drag the intersection to change the position of the planes in the two other viewports.



Rotating axes

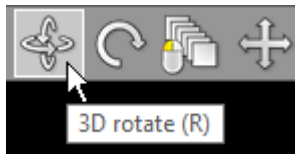
Place the mouse cursor over the axis arm, press the left mouse button and rotate the axes to change the orientation of the planes in the two other viewports.



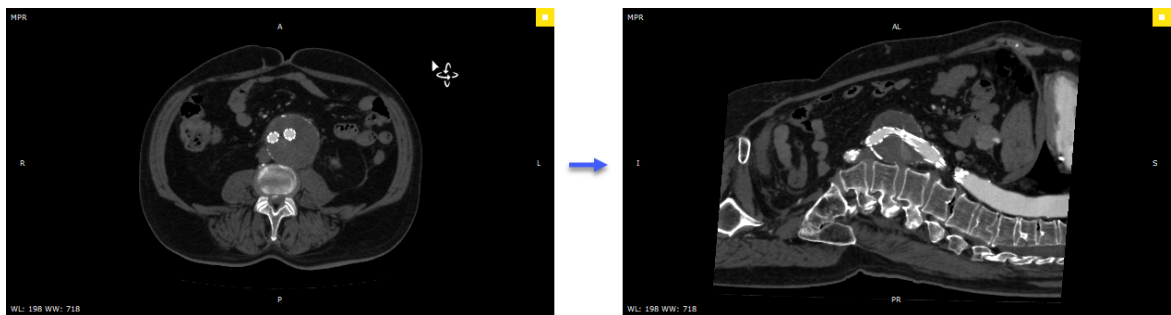
3D rotation

The image plane can also be changed directly in a specific viewport.

Click the **3D rotate** button on the toolbar (or press the **R** key).



Next, press the left mouse button over the image and drag the mouse to rotate the image plane around the X and Y axes (parallel to the viewing plane).

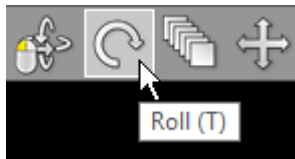


Press the **Alt** key and drag the mouse with the left button depressed. The 3D rotation tool will be active regardless of the current left mouse button association.

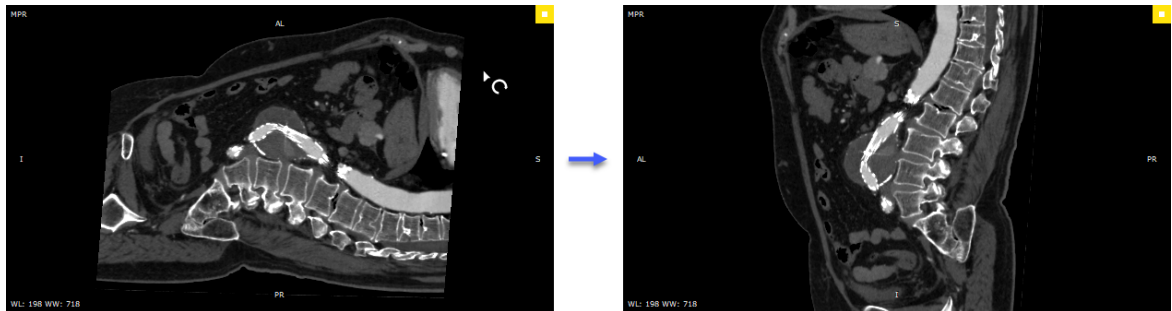
Alternatively, the 3D rotation can be performed using **Alt + Arrows (Up, Down, Left or Right)**.

Roll

Click the **Roll** button on the toolbar (or press the **T** key).



Next, press the left mouse button over the image and drag the mouse to rotate the image plane around the Z axis (perpendicular to the viewing plane).



Press the **Ctrl + Alt** key and drag the mouse with the left button depressed. The roll tool will be active regardless of the current left mouse button association.

Alternatively, press the **Left Arrow** or **Right Arrow** keys.

3.7.2 Browsing volume

There are several different methods by which you can page through the volume (moving the viewing plane to front or back without changing the orientation of the image plane):

1. Click the **Browse** button on the toolbar (or press the **B** key). Next, press the left mouse button over the image, and drag the mouse up or down to browse a volume in both directions.



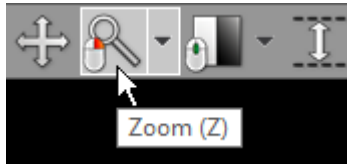
By default, the browse tool is associated with the left mouse button.

2. Press the **Up Arrow** or **Down Arrow** on the keyboard to move to back or front in small steps.
3. On a multi-touch device, touch the image with one finger and drag it up or down. (The tool must be associated with the left mouse button, if it is not, touch the **Browse** tool button.)
4. Press the left mouse button on the intersection of the axes in some other viewport and drag it up/down or left/right.

3.7.3 Changing zoom level and position

Image zooming

Click the **Zoom** button on the toolbar (or press the **Z** key).



Next, press the left mouse button over the image and drag the mouse up to zoom in or down to zoom out.

By default, the zooming tool is associated with the right mouse button.

Alternatively, the **Ctrl + Plus (+)** and **Ctrl + Minus (-)** keyboard shortcuts can be used to zoom.

On multi-touch devices, touch the image with two fingers and drag them apart to zoom in, or toward each other to zoom out.

Click **Fill viewport** or press **Ctrl + 0** to revert the zoom and pan settings and fill the viewport with the image.

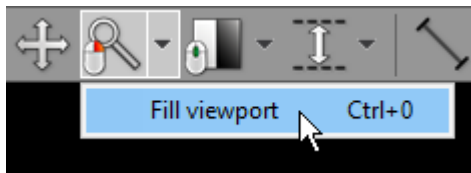


Image panning

When an image is zoomed in, panning can be used to reveal the areas lying outside the viewing panel.

Click the **Pan** button on the toolbar (or press the **M** key).



Next, press the left mouse button over the image and drag the mouse to move the image around the screen.

By default, the image panning tool is associated with the back (4th) mouse button.

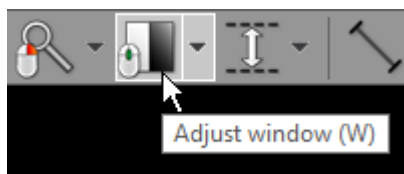
Press the **Shift** key, and drag mouse with the left button depressed and the panning tool will be active, regardless of the current left mouse button association.

Alternatively, you can use **Ctrl + Arrows (Up, Down, Left or Right)** to pan.

On multi-touch devices, touch the image with two fingers and drag them across the panel to move the image. Keep the distance between the fingers unchanged to maintain the current zoom ratio.

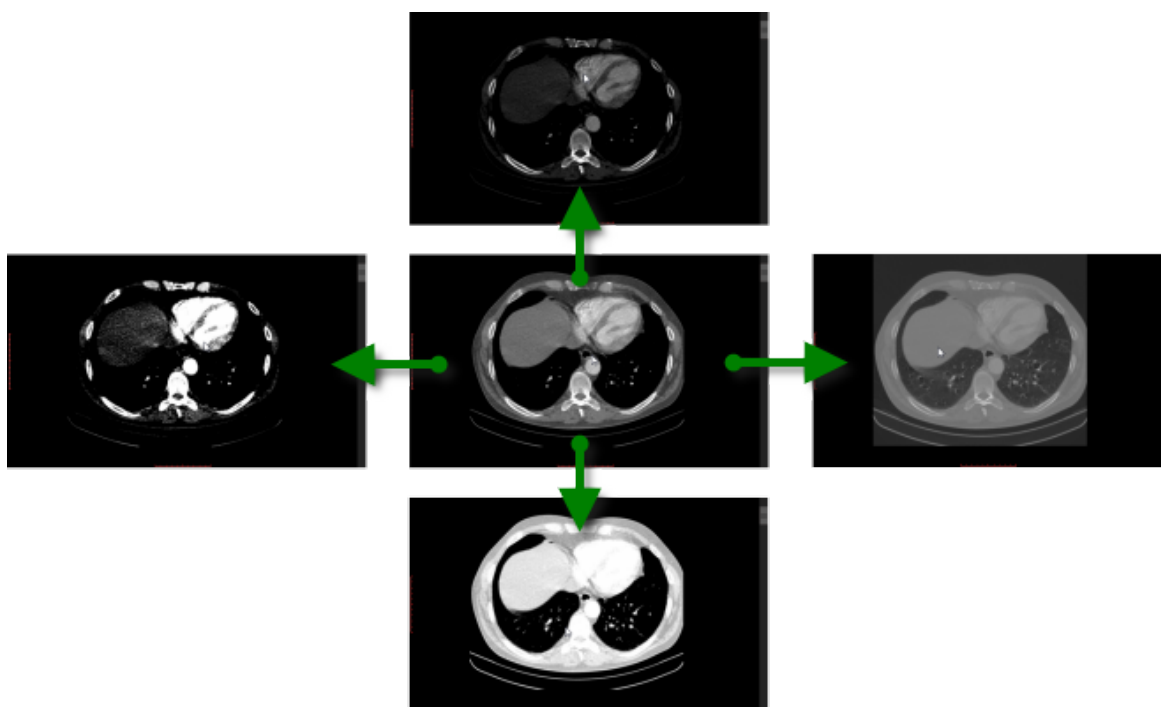
3.7.4 Changing brightness / contrast

Click the **Adjust image window** button on the toolbar (or press the **W** key).



Next, press the left mouse button over the image and drag the mouse to change brightness (window level - WL) or contrast (window width - WW):

- Up to decrease brightness (window level goes up)
- Down to increase brightness (window level goes down)
- Left to increase contrast (window width shrinks)
- Right to decrease contrast (window width expands)



By default, the windowing tool is associated with the middle mouse button.

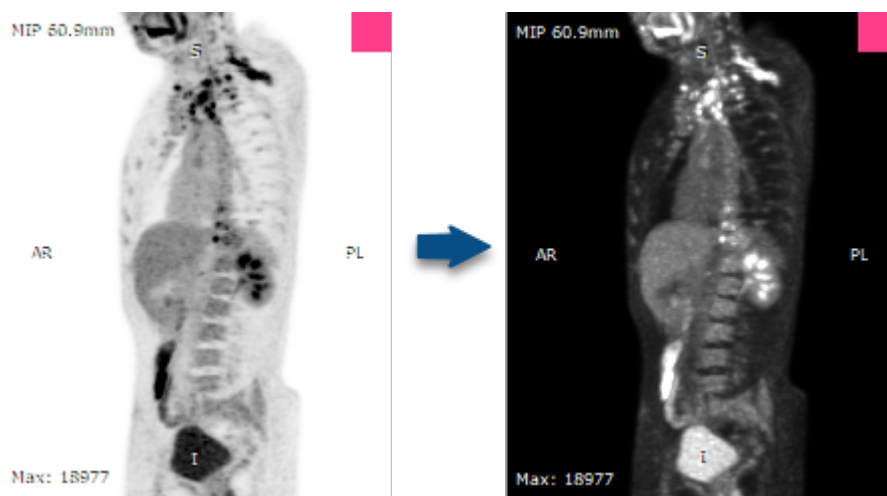
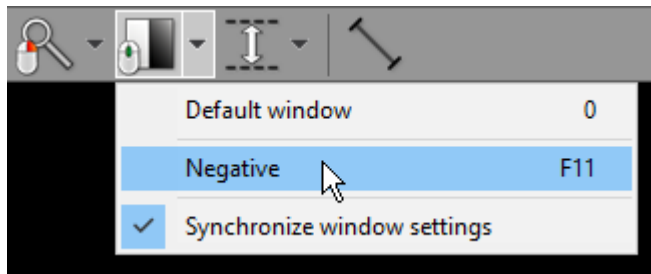
Press the **Ctrl** key and drag the mouse with the left button down and the windowing tool will be active, regardless of the current association.

On multi-touch devices, touch the image with three fingers and drag them in the directions described above to adjust the window level and width.

Press **0** to set the default window for the loaded series.

Negative mode

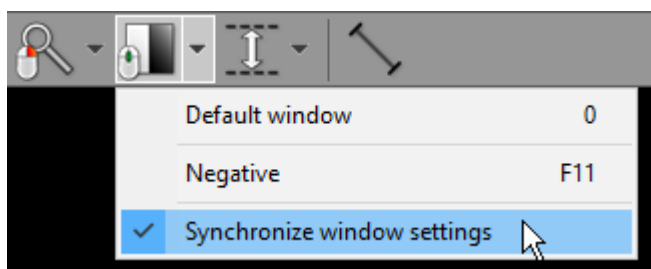
Press the **F11** key or click the **Negative** menu item to toggle the negative mode for the image.



Synchronization

Window settings are synchronized in all viewports by default.

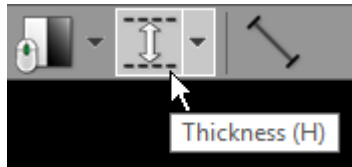
To toggle the synchronization, click the **Synchronize window settings** menu item.



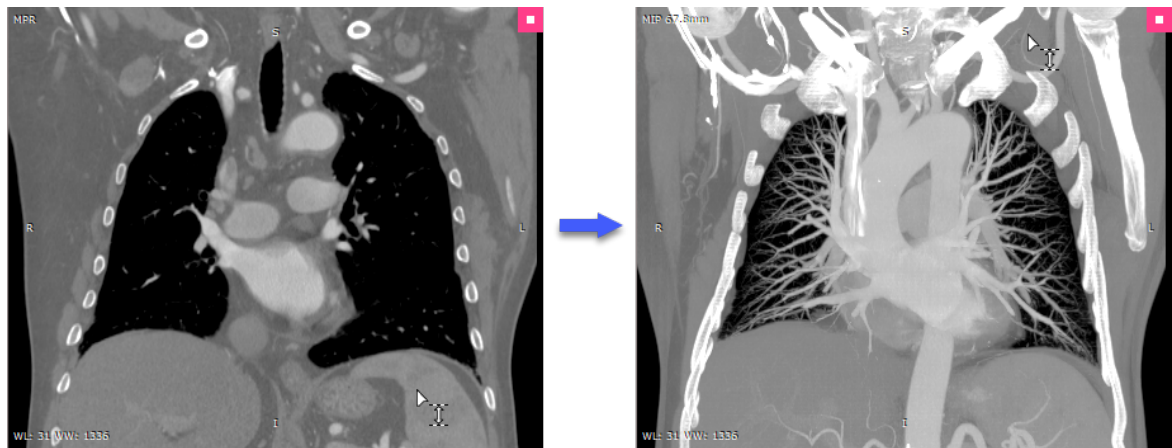
3.7.5 Changing thickness (MIP/MinIP/Avg)

Thickness

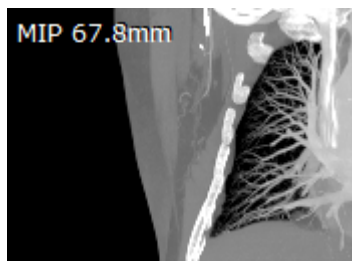
Click the **Thickness** button on the toolbar (or press the **H** key).



Next, press the left mouse button over the image and drag the mouse up to increase thickness or down to decrease thickness.



The value of the slab thickness in millimeters (and the rendering mode) is displayed in the top-left corner.



Press the **Ctrl + Shift** key and drag the mouse with the left button depressed, and the thickness tool will be active regardless of the current left mouse button association. Alternatively, the **Plus (+)** and **Minus (-)** keys can be used to change thickness.

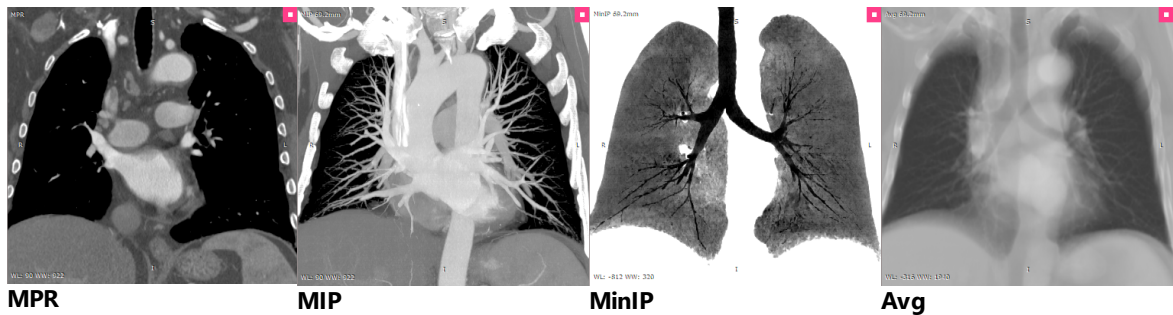
On multi-touch devices, touch the image with four fingers and drag them up or down to change thickness.

Rendering modes (MIP/MinIP/Avg)

Immediately after the 3D MPR windows is opened, the images are displayed with minimal possible thickness (in accordance with the size of the voxels in the volume).

When the thickness is increased, images are rendered in one of the following modes:

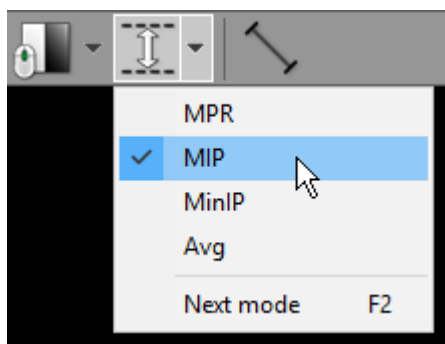
- MIP (Maximum Intensity Projection)
- MinIP (Minimum Intensity Projection)
- Avg (Average)



To quickly switch the applied rendering mode, press **F2**.

You can also click the rendering mode indicator in the top-left corner.

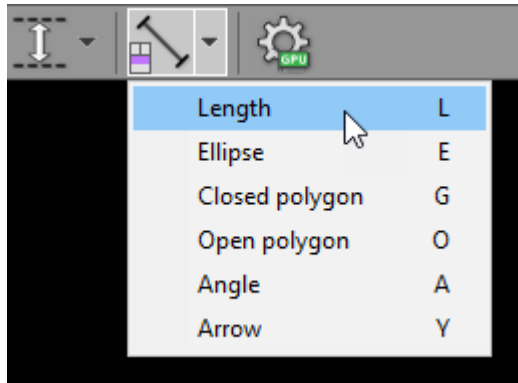
Alternatively, these modes are available from the **Thickness** drop-down menu.



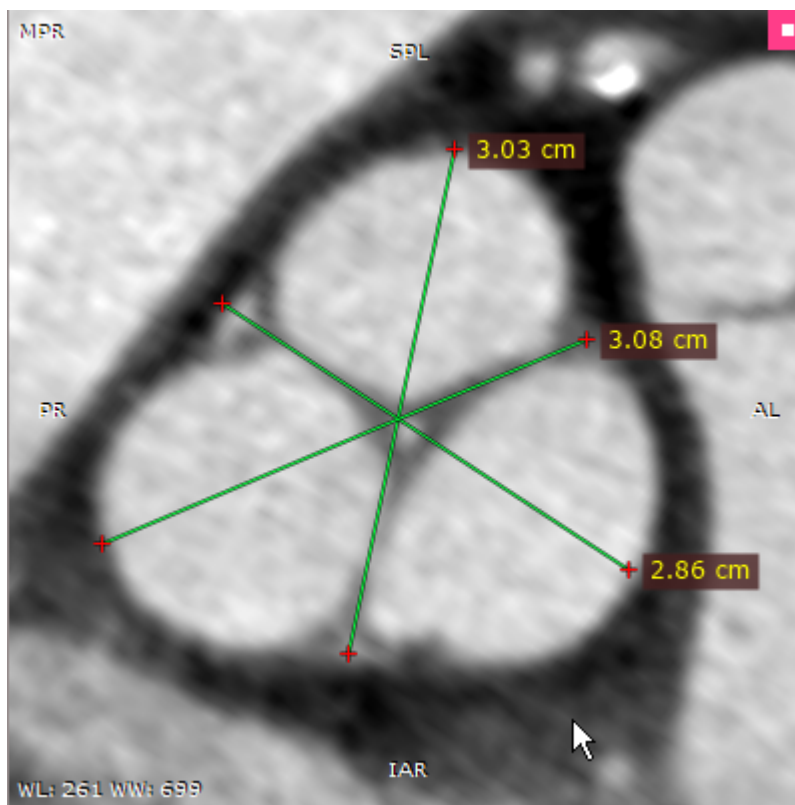
3.7.6 Taking measurements

3.7.6.1 Length

Select **Length** from the **Measurements** drop down menu (or press the **L** key).



Place the cursor over the starting point, then press left mouse button and drag the mouse to draw a segment with length measurement. Release the button to finish drawing.



The distance value will be shown in centimeters (or millimeters).

Note, for thick slabs (MIP, MinIP, Avg), the length is measured in the viewing plane, which means that the different depths of the structures are not taken into account.

You can move the entire segment or one of its endings by dragging while pressing the left mouse button.

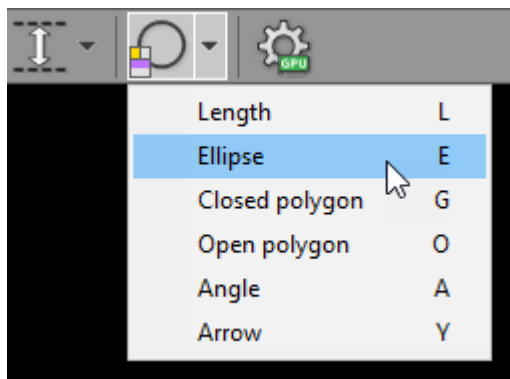
The label may also be dragged to a more convenient place if necessary.

By default, the length measurement tool is associated with the forward (5th) mouse button.

Press **Shift** while drawing the segment to make it either vertical or horizontal.

3.7.6.2 Ellipse

Select **Ellipse** from the **Measurements** drop down menu (or press the **E** key).

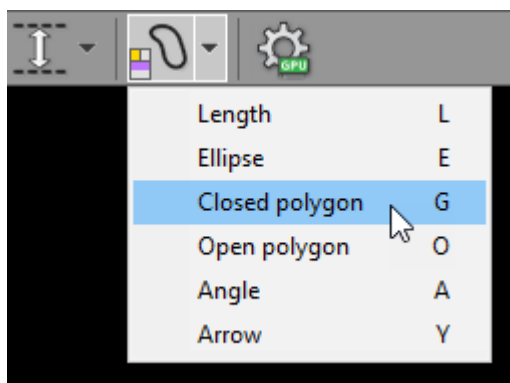


Press left mouse button and drag the mouse to draw an ellipse with pixel value measurement. Release the button to finish drawing.

You can read more about [the Ellipse tool in the 2D viewer section](#).

3.7.6.3 Closed polygon

Select **Closed polygon** from the **Measurements** drop down menu (or press the **G** key).



Click left mouse button to deposit the starting node. Repeat this process to deposit the remaining nodes around the structure you want to measure.

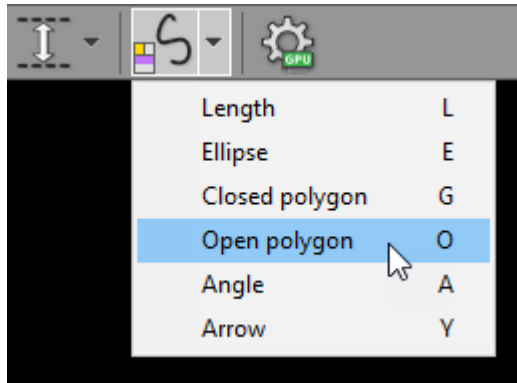
You will be able to edit the final shape afterward if need be. Double-click or click the starting node to finish drawing.

The values measured are area (cm²) and perimeter (cm).

You can read more about [the Closed polygon tool in the 2D viewer section](#).

3.7.6.4 Open polygon

Select **Open polygon** from the **Measurements** drop down menu (or press the **O** key).



Click left mouse button to deposit the starting node. Repeat this process to deposit the remaining nodes along the structure you want to measure.

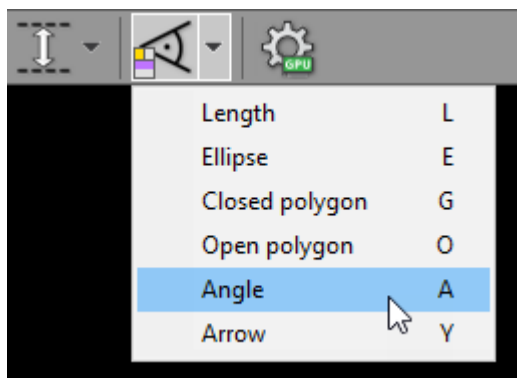
You will be able to edit the final shape afterward if need be. Double-click to finish drawing.

The value measured is distance of the drawn path.

You can read more about [the Open polygon tool in the 2D viewer section](#).

3.7.6.5 Angle

Select **Angle** from the **Measurements** drop down menu (or press the **A** key).

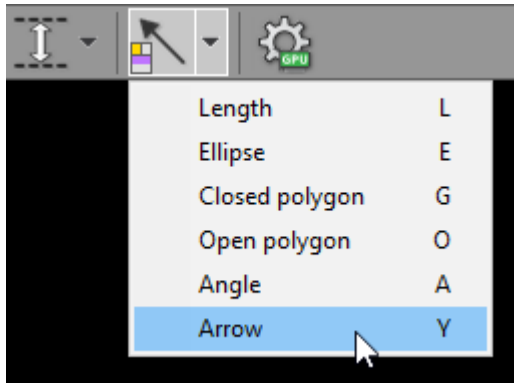


Press the left mouse button and drag the mouse to draw the first arm of the angle. Release the button and move the mouse to draw the second arm. Click the left button to finish drawing the angle.

You can read more about [the Angle tool in the 2D viewer section](#).

3.7.6.6 Arrow

Select **Arrow** from the **Measurements** drop down menu (or press the **Y** key).



Place the cursor over the starting point, then press left mouse button and drag the mouse to draw an arrow. Release the button to finish drawing.

You can read more about [the Arrow tool in the 2D viewer section](#).

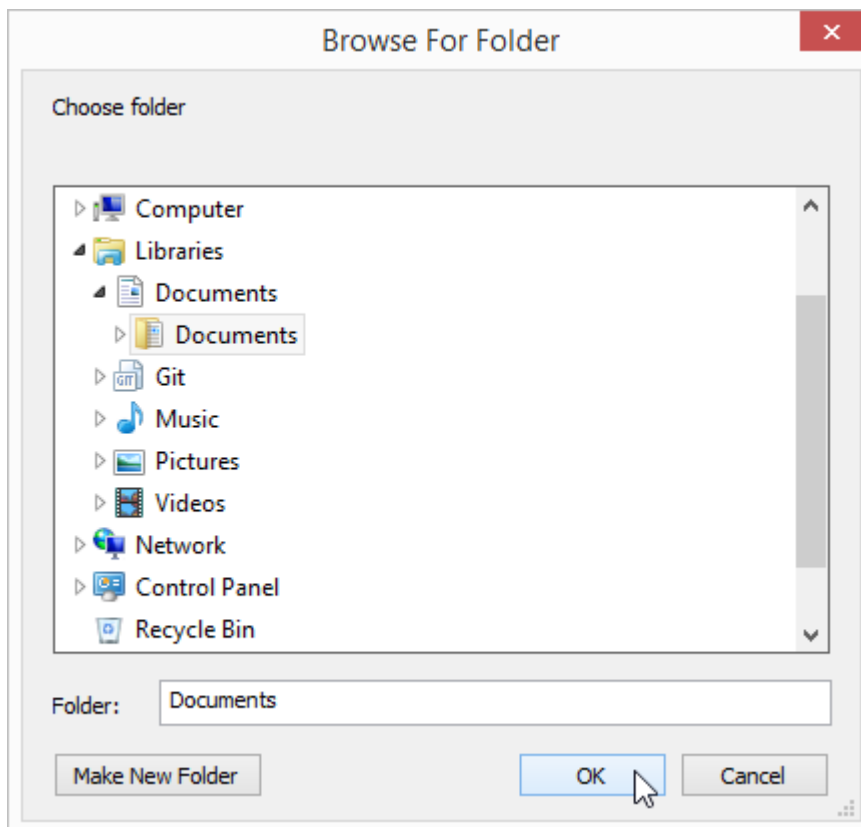
3.7.7 Exporting images

Saving JPEG images

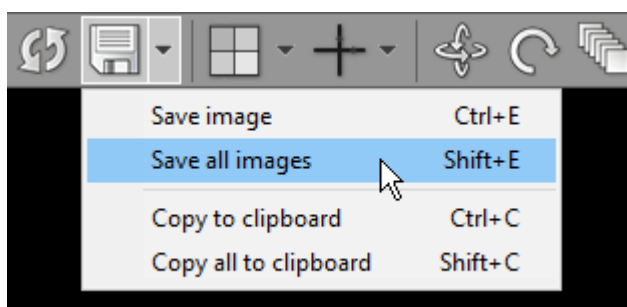
Click the **Export** button or use **Ctrl + E** to save the image in the active viewport as a JPEG file.



Browse for the destination folder and click **OK** to save the image.



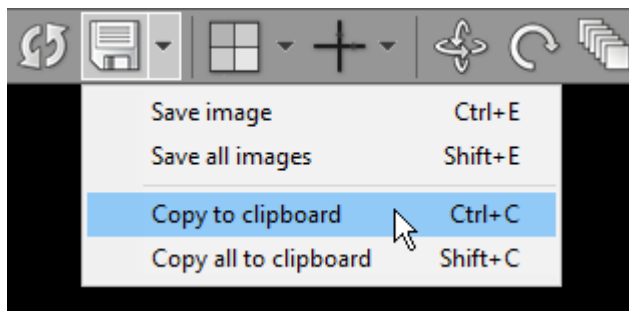
Click the **Export all images** in the **Export** drop-down menu or use the **Shift + E** shortcut to save images from all three viewports combined in one JPEG file.



Copying to the clipboard

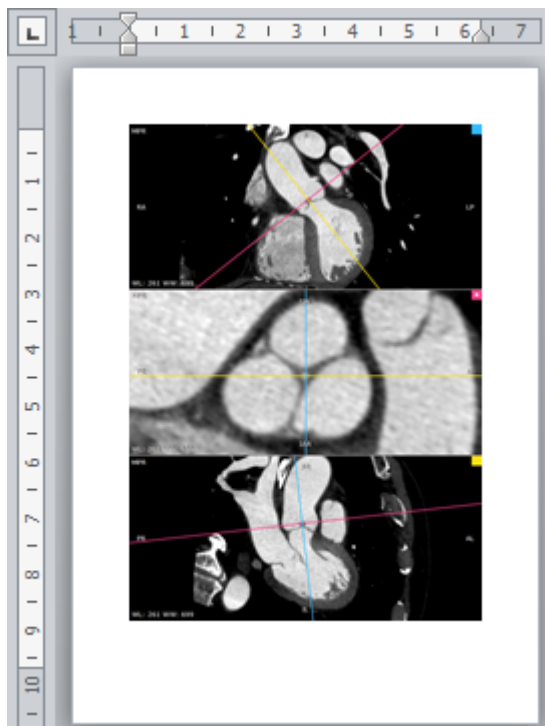
The image displayed in the active viewport can be easily copied to the Windows clipboard and then pasted into other Windows applications such as Microsoft Word, PowerPoint, etc.

Click the **Copy to clipboard** in the **Export** drop-down menu or use the **Ctrl + C** shortcut.



To copy images from all three viewports combined into one bitmap, click the **Copy all to clipboard** in the **Export** drop-down menu or use the **Shift + C** shortcut.

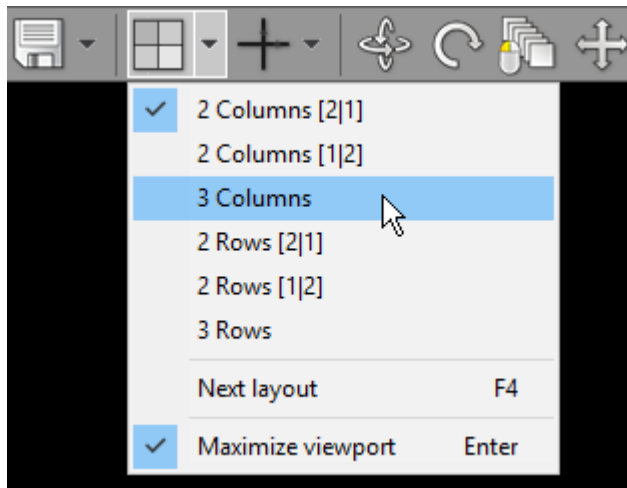
Switch to the application where you want to paste the image and click **Ctrl + V**.



3.7.8 Window configuration

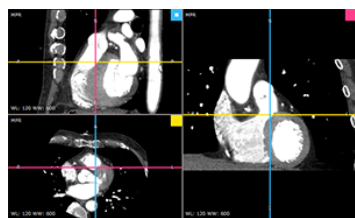
Viewport layout

The default position of viewports in the 3D MPR window can be changed from the **Viewport layout** drop-down menu.

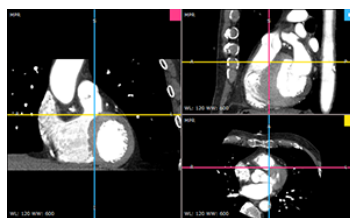


Alternatively, press the **F4** to switch to the next viewport layout.

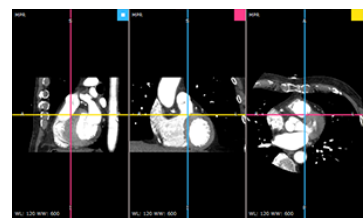
There are six viewport layouts available.



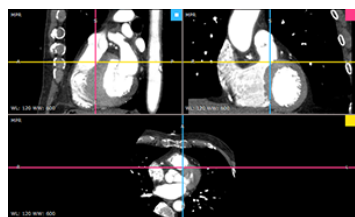
2 Columns [2|1]



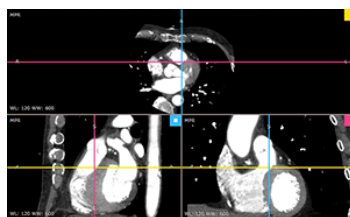
2 Columns [1|2]



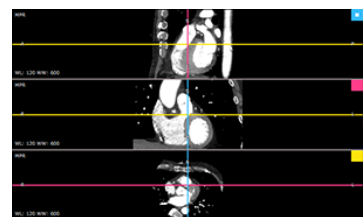
3 Columns



2 Rows [2|1]

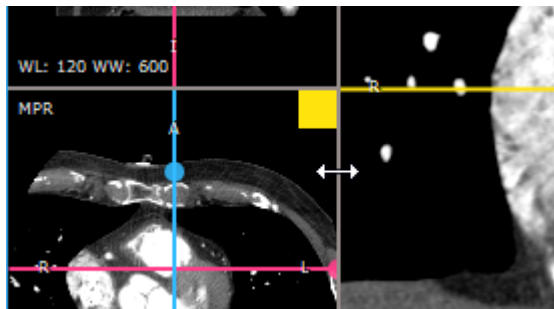


2 Rows [1|2]

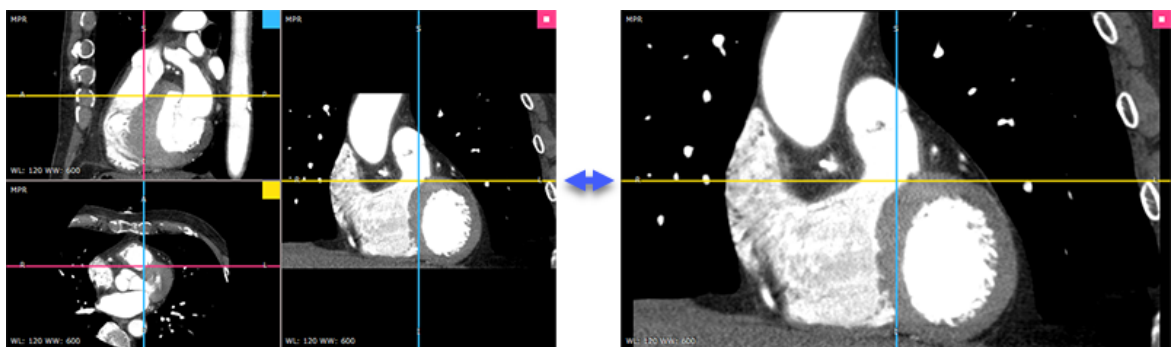


3 Rows

The size of the viewports can be changed by dragging the borders between them.



To temporarily maximize the active viewport, press **Enter** or double-click on the viewport. Repeat this process to restore the viewport to its original size.

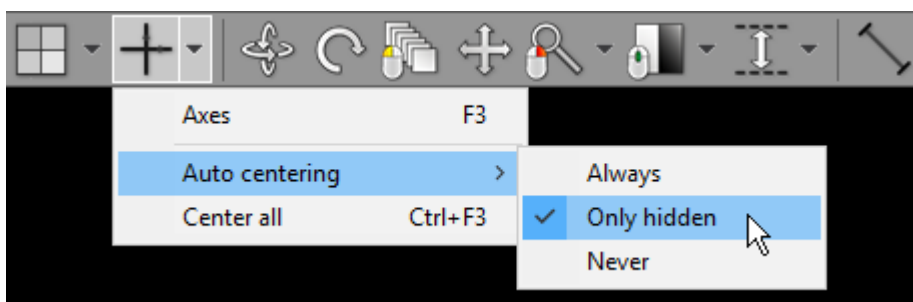


Axes

Click the **Axes** button on the toolbar (or press the **F3** key) to toggle the visibility of the axes in the viewports.

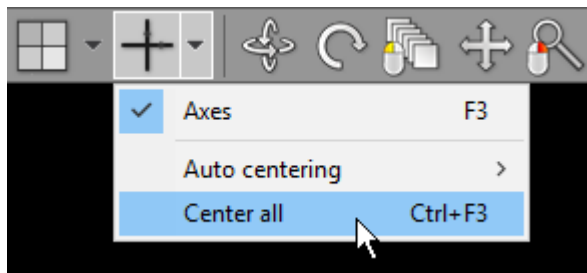


The auto centering mode for the intersection of the axes can be set in the **Axes** drop-down menu.



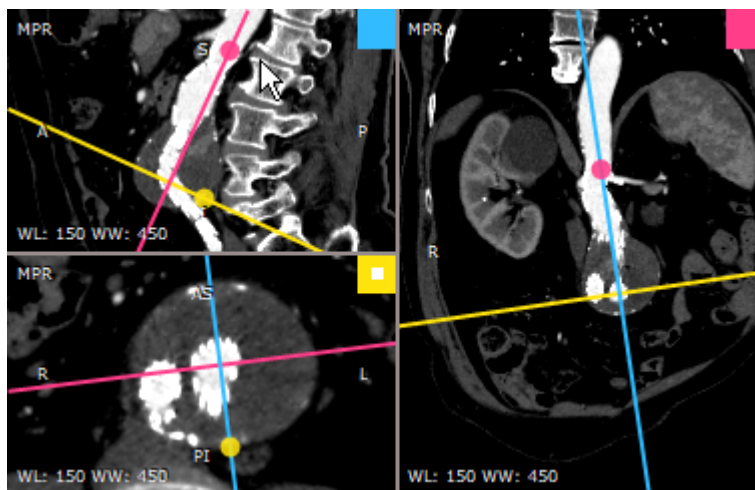
- Always: Centering is performed whenever the intersection is moved off the center.
- Only hidden: Centering is performed only when the intersection is moved outside the viewport.
- Never: Centering is disabled.

To center all axes manually, press **Ctrl + F3** or click the **Center all** menu item.



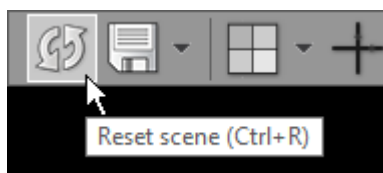
As you move the mouse cursor over viewports, the position of location markers (color dots projected on axes) is updated.

The location markers of the same color represent the same point in the volume and, thus, help identify structures in different viewports.



Resetting scene

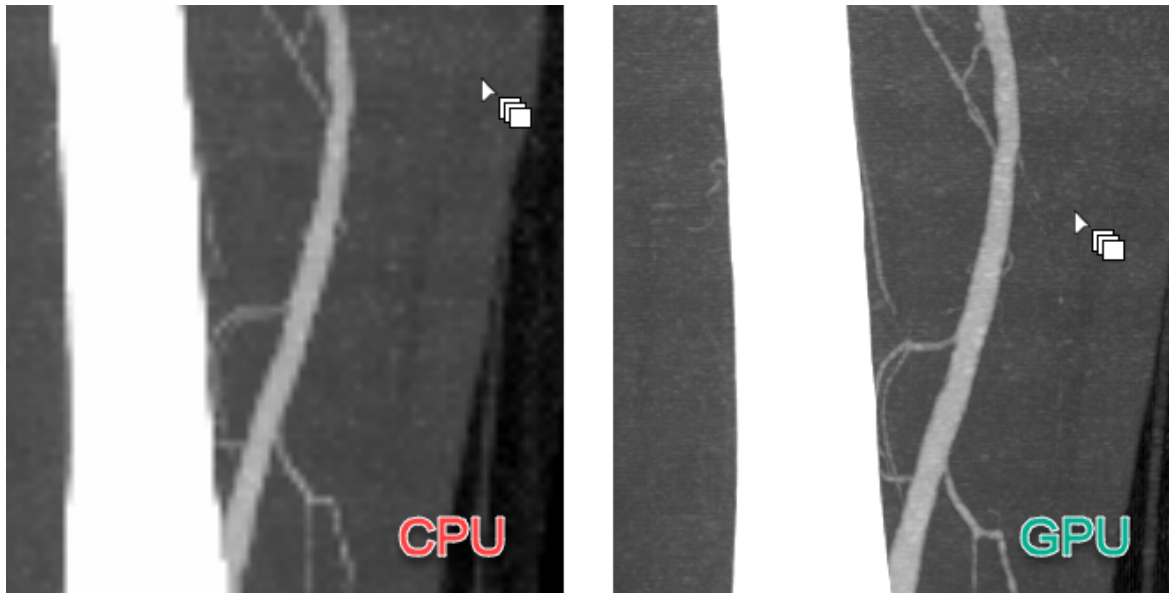
Click the **Reset scene** button on the toolbar (or press **Ctrl + R**) to restore the initial view in the 3D MPR window.



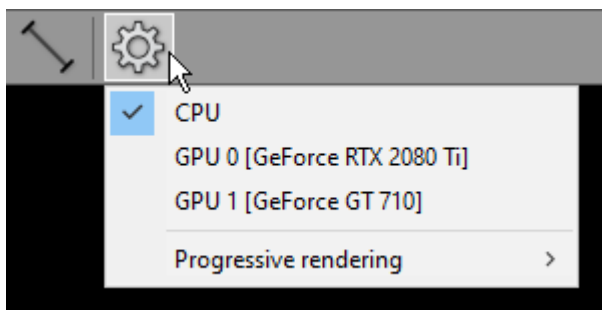
3.7.9 Settings

Enabling GPU acceleration

The [GPU acceleration](#) feature allows you to utilize modern Nvidia GPU to make more fluid and detailed interactions in the 3D MPR window.

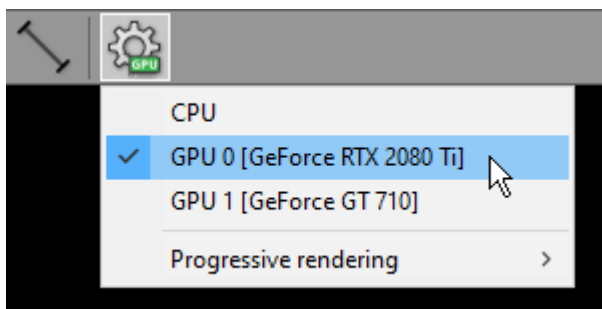


Click the **Settings** button to show the CPU/GPU mode selection menu.



If [a compatible Nvidia GPU](#) is detected in your system, you will be able to select it from the list.

After GPU is successfully enabled, there will be a green GPU indicator overlaid on the settings toolbar button.



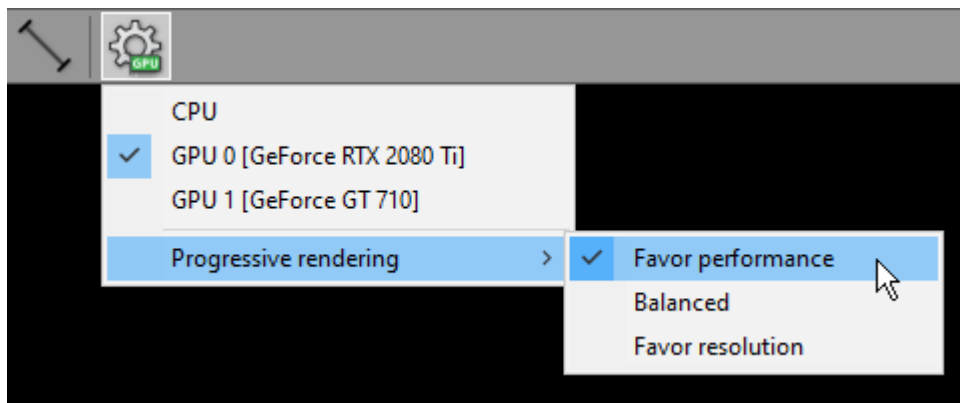
Select **CPU** when you want to switch back to CPU rendering mode.

Progressive rendering

To maintain fluid interactions in the 3D MPR window when the MIP/MinIP/Avg modes are enabled, progressive rendering is implemented. This means that the image quality is worse during interactions and progressively improves as soon as the interactions are finished.

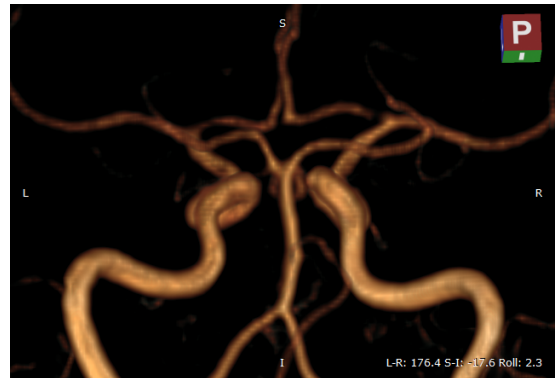
By default, the most fluid mode is used (with the lower image quality during interactions). You can change this and get better image quality with less responsive interactions being the trade-off.

Click the **Settings** button and select **Progressive rendering**. Select **Favor performance**, **Balanced**, or **Favor resolution** to set your desired mode.



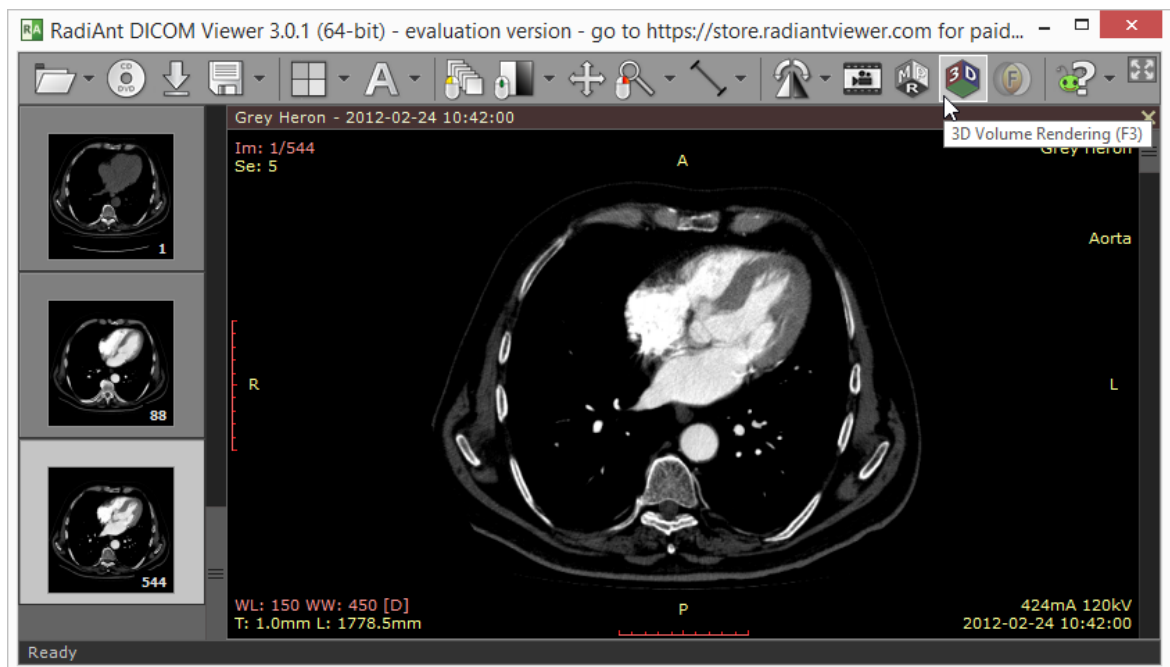
3.8 3D Volume Rendering (VR)

The 3D Volume Rendering tool provided by RadiAnt DICOM Viewer can be used to visualize large volumes of data generated by modern CT/MR scanners in three dimensional space. The different aspects of the data set can be interactively explored in the 3D VR window.

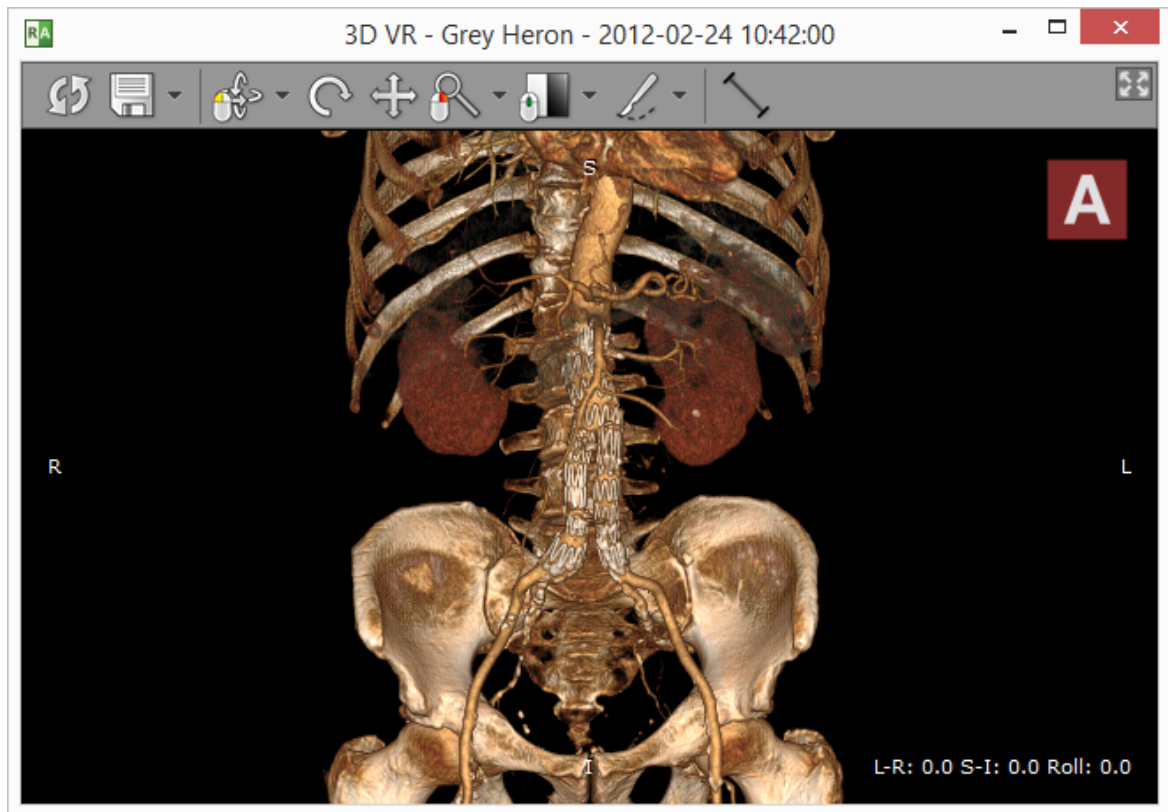


Opening the VR window

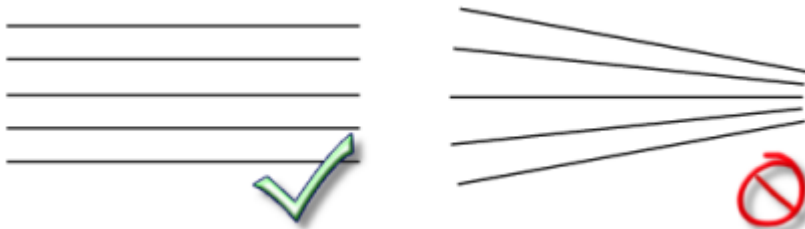
1. Open the volume series in the 2D viewer window and click the **3D Volume Rendering** button on the toolbar, or use the **F3** shortcut.



2. After the series is loaded into memory and preprocessed the VR representation will be displayed in a new window. This process can take a few seconds on slower systems.



Some series cannot be used with the VR tool (e.g. in case of images with nonparallel planes).



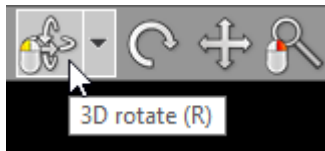
If the images are not spaced evenly within the volume, the missing slices will be interpolated and some visual artifacts may appear in presentation and measurements.

Note that some larger series (e.g. >2000 CT images) require more than 1GB of free memory and 64-bit RadiAnt DICOM Viewer version to be loaded successfully.

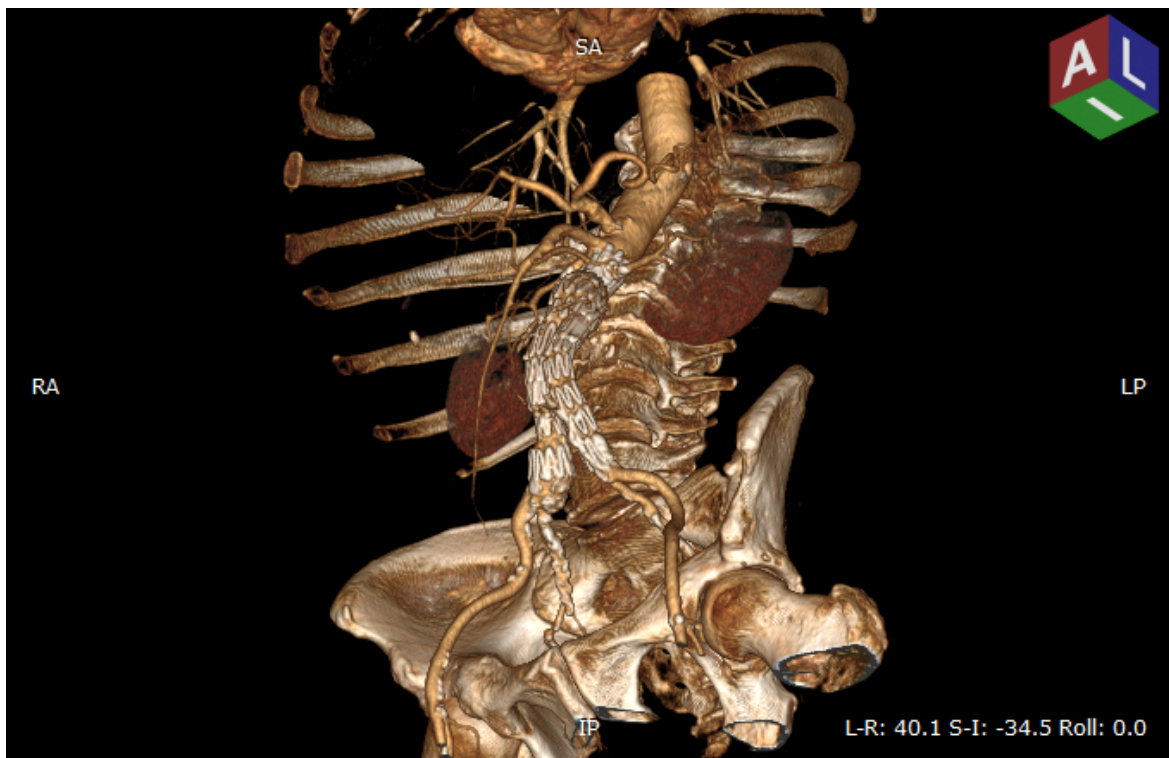
3.8.1 Rotations

3D rotation

Click the **3D rotate** button on the toolbar (or press the **R** key).



Next, press the left mouse button over the image and drag the mouse to rotate the volume around the X and Y axes (parallel to the viewing plane).



By default, the 3D rotate tool is associated with the left mouse button.

On multi-touch devices, touch the image with one finger and drag it to rotate the volume.

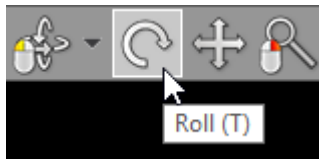
Alternatively, **Arrows (Up, Down, Left or Right)** can be used to perform the 3D rotation.

The orientation cube shown in the upper right corner shows the position of planes facing the viewer.

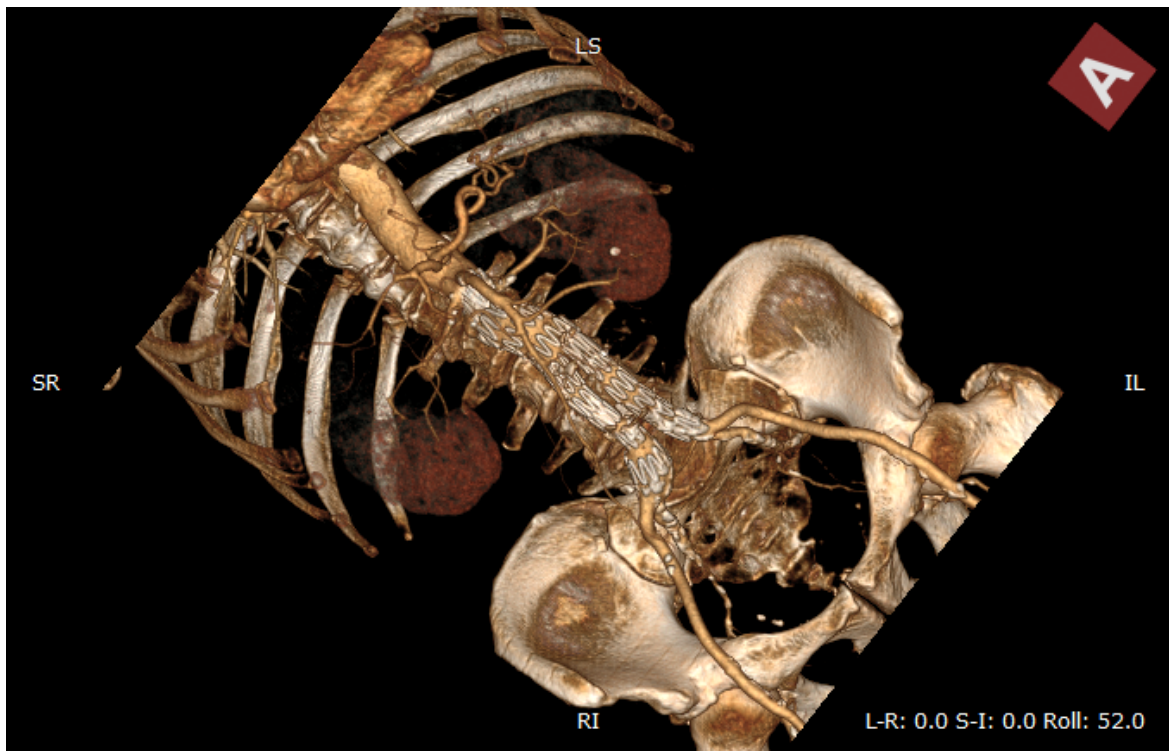
The rotation angles are presented in the lower right corner.

Roll

Click the **Roll** button on the toolbar (or press the **T** key).



Next, press the left mouse button over the image and drag the mouse to rotate the volume around the Z axis (perpendicular to the viewing plane).



Press the **Ctrl + Alt** keys and drag mouse with the left button down, and the roll tool will be active regardless of the current left mouse button association.

On multi-touch devices, touch the image with two fingers and rotate them to roll the volume.

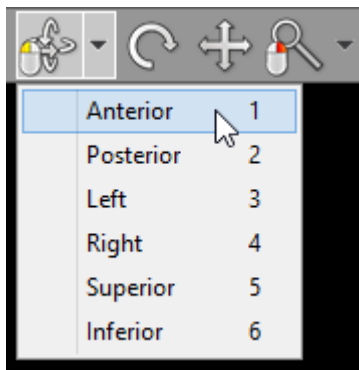
Alternatively, press the **< or >** keys.

Rotation presets

Different rotation presets can be quickly applied by pressing **1** through **6** .

Key	Preset
1	Anterior (front)
2	Posterior (back)
3	Left
4	Right
5	Superior (top)
6	Inferior (bottom)

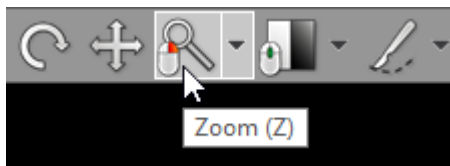
These presets are also available from the **3D rotate** drop down menu.



3.8.2 Changing zoom level and position

Image zooming

Click the **Zoom** button on the toolbar (or press the **Z** key).



Next, press left mouse button over the image and drag the mouse Up to zoom in or Down to zoom out.

By default, the zooming tool is associated with the right mouse button.

Alternatively, the **Ctrl + Plus (+)** and **Ctrl + Minus (-)** keyboard shortcuts can be used to zoom.

On multi-touch devices, touch the image with two fingers and drag them apart to zoom in, or toward each other to zoom out.

Click **Fit volume** or press **Ctrl + 0** to revert the zoom and pan settings and fill the viewport with the image.

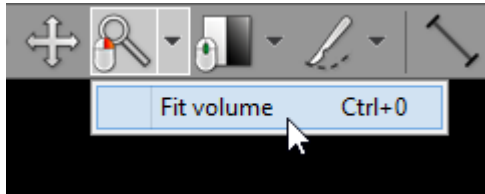
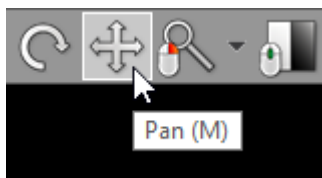


Image panning

When an image is zoomed in, panning can be used to reveal areas lying outside the viewing panel.

Click the **Pan** button on the toolbar (or press the **M** key).



Next, press the left mouse button over the image and drag the mouse to move image around the screen.

By default, the image panning tool is associated with the back (4th) mouse button.

Press the **Shift** key and drag mouse with the left button down, and the panning tool will be active regardless of the current left mouse button association.

Alternatively, **Ctrl + Arrows (Up, Down, Left or Right)** can be used to pan.

On multi-touch devices, touch the image with two fingers and drag them across the panel to move image. Keep the distance between the fingers unchanged to maintain the current zoom ratio.

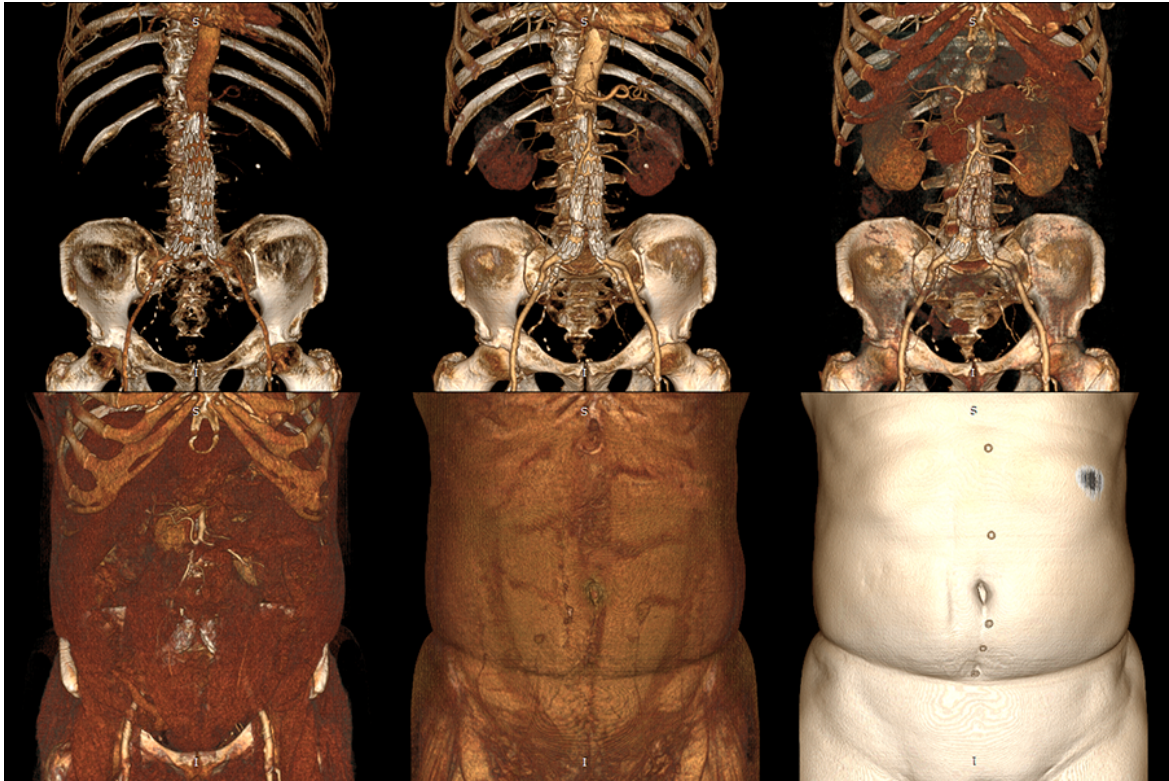
3.8.3 Changing color and opacity

Click the **Adjust window** button on the toolbar (or press the **W** key).



Next, press the left mouse button over the image and drag the mouse to change the range of displayed voxel values.

- Up to display voxels with higher density/intensity values
- Down to display voxels with lower density/intensity values
- Left to shrink the range of displayed voxel values
- Right to expand the range of displayed voxel values

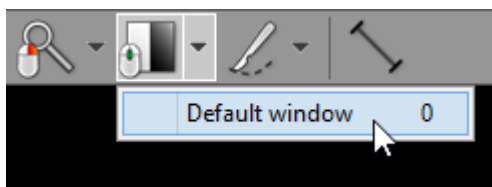


By default, the windowing tool is associated with the middle mouse button.

Press the **Ctrl** key and drag the mouse with the left button down, and the windowing tool will be active regardless of current association.

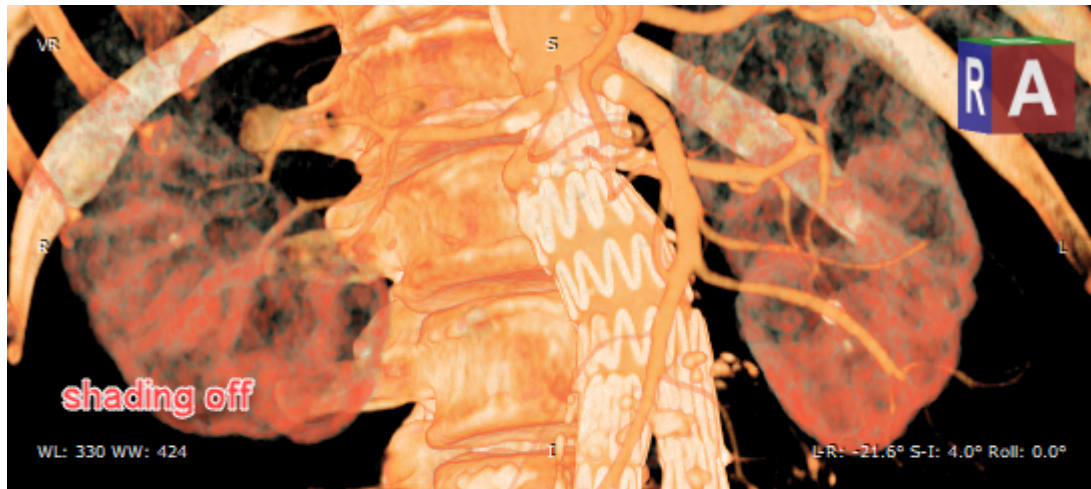
On multi-touch devices, touch the image with three fingers and drag them in the directions described above to adjust window level and width.

Click **Default window** or press **0** to set default window for the current volume.

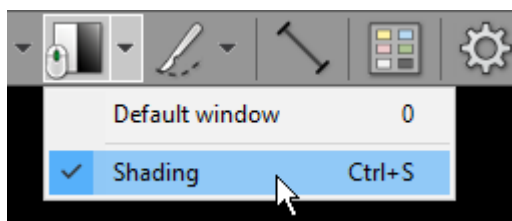


Shading

Shading allows you to visualize volume with a better perception of 3D space.

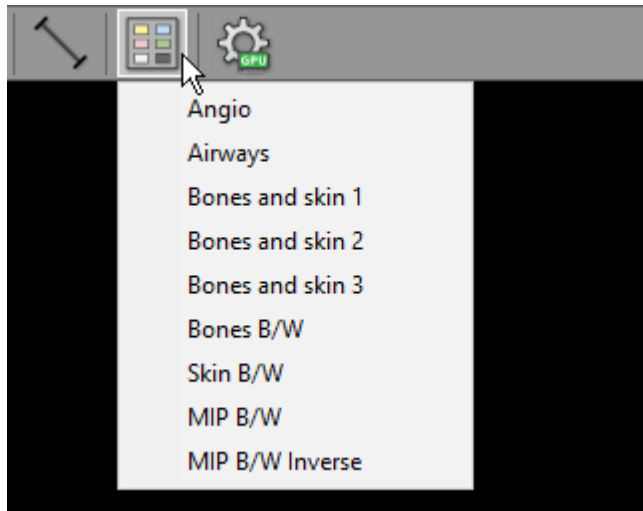


To toggle shading click **Shading** or press **Ctrl + S**.

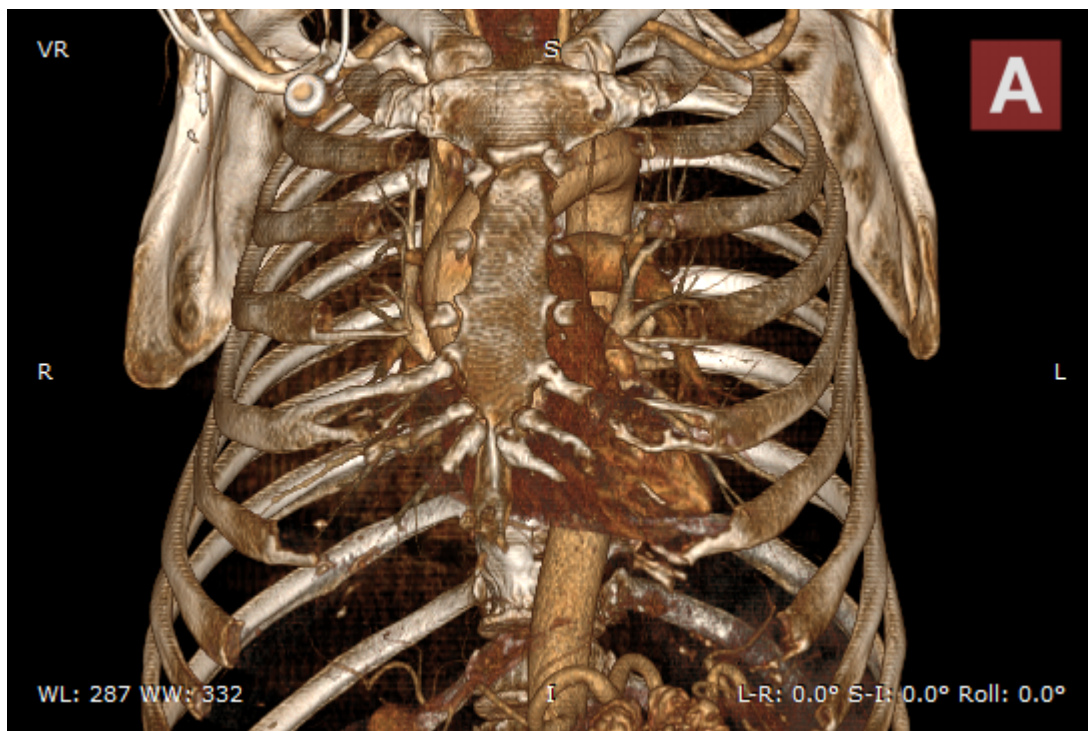


3.8.4 3D presets

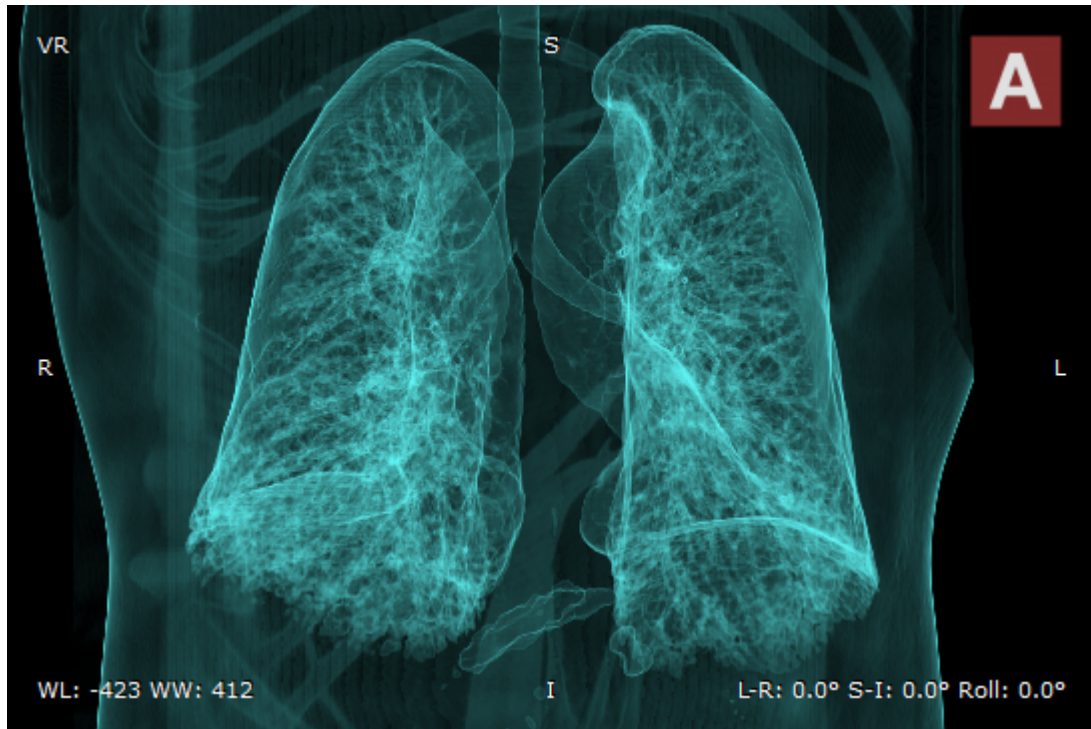
Click the **3D presets** button on the toolbar to show the menu with different image presets, which can be applied to the displayed volume.



Select one of the presets to change the way volume that is visualized.



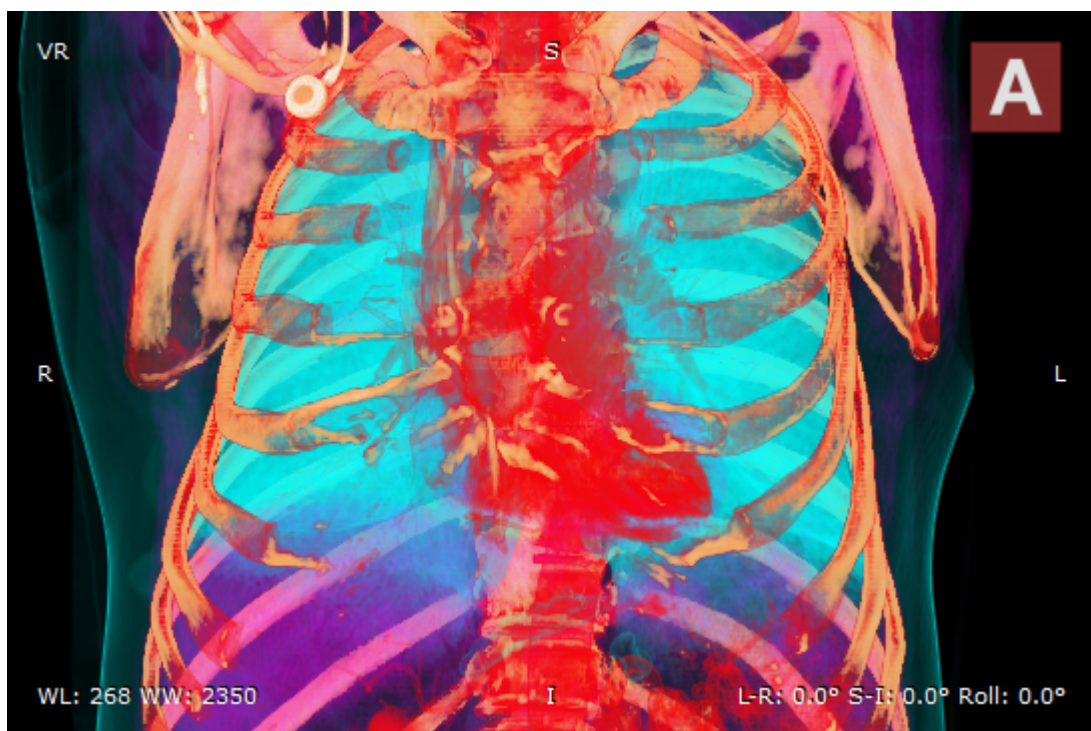
Angio

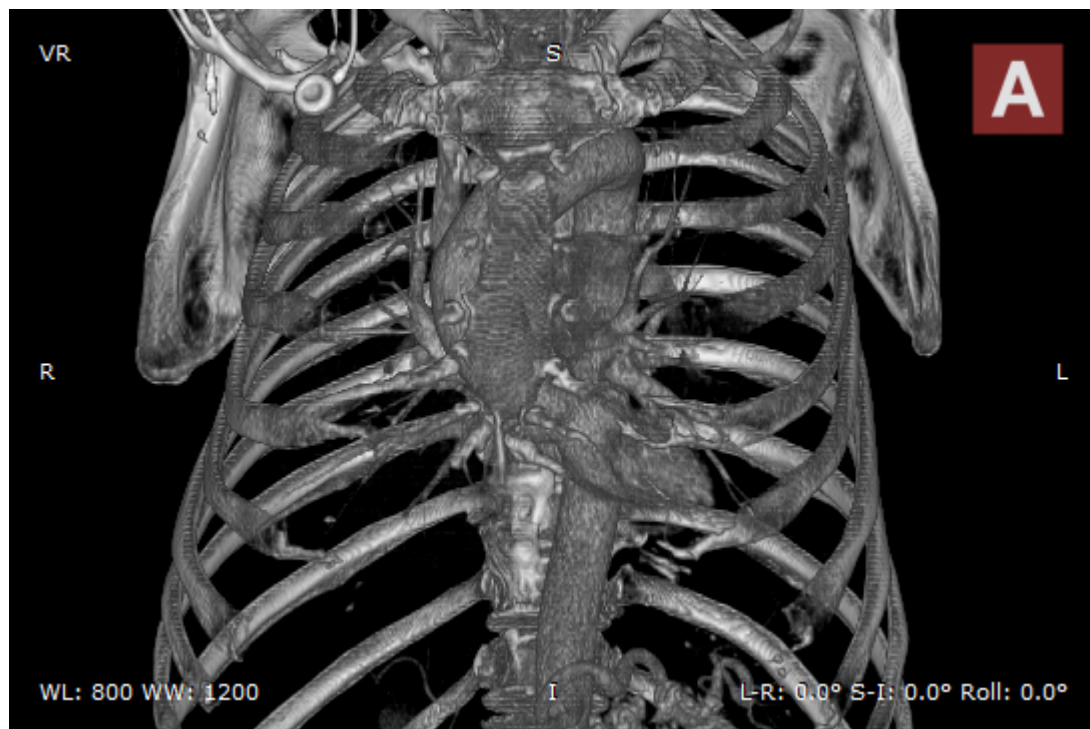
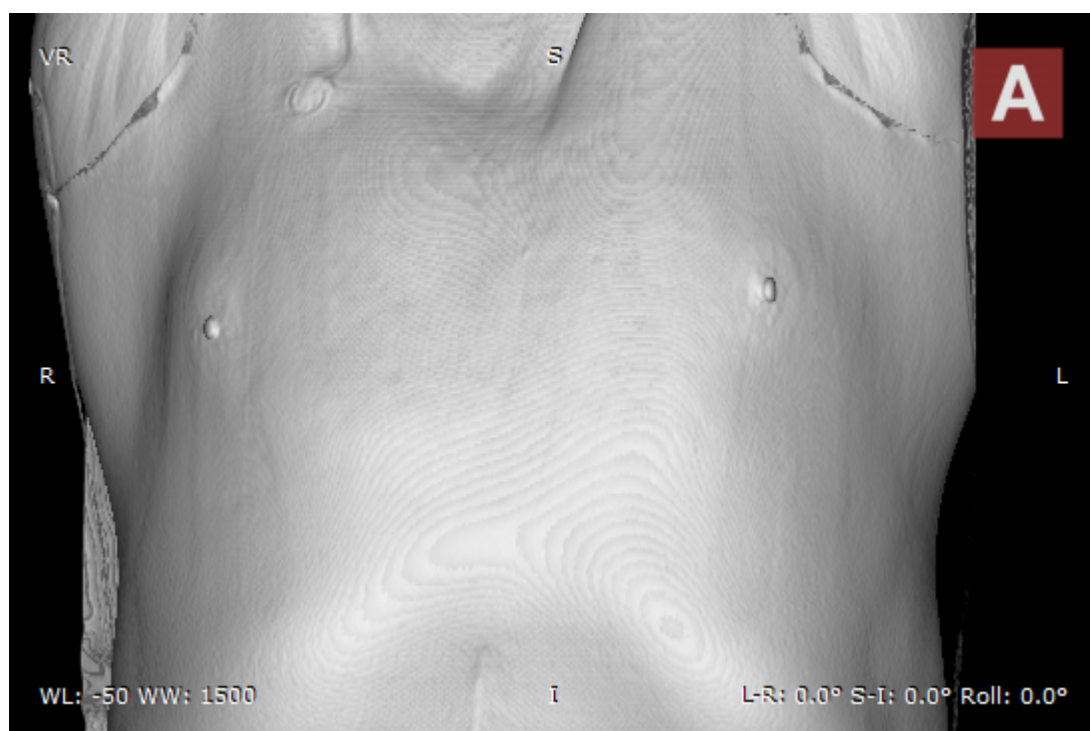


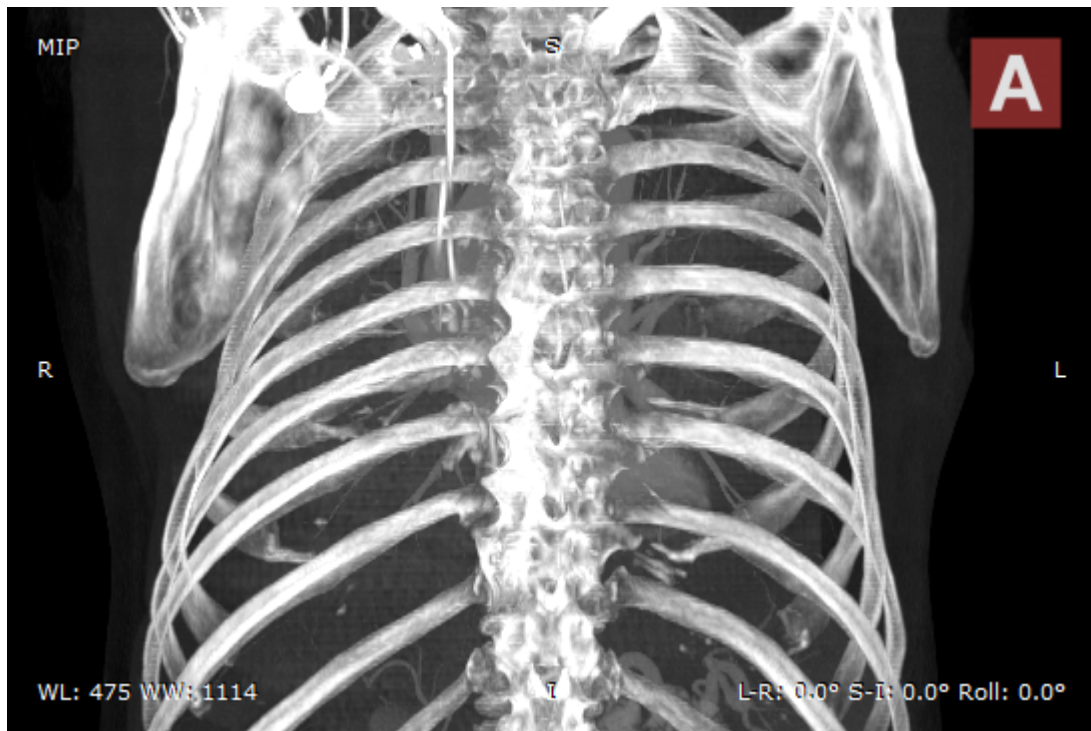
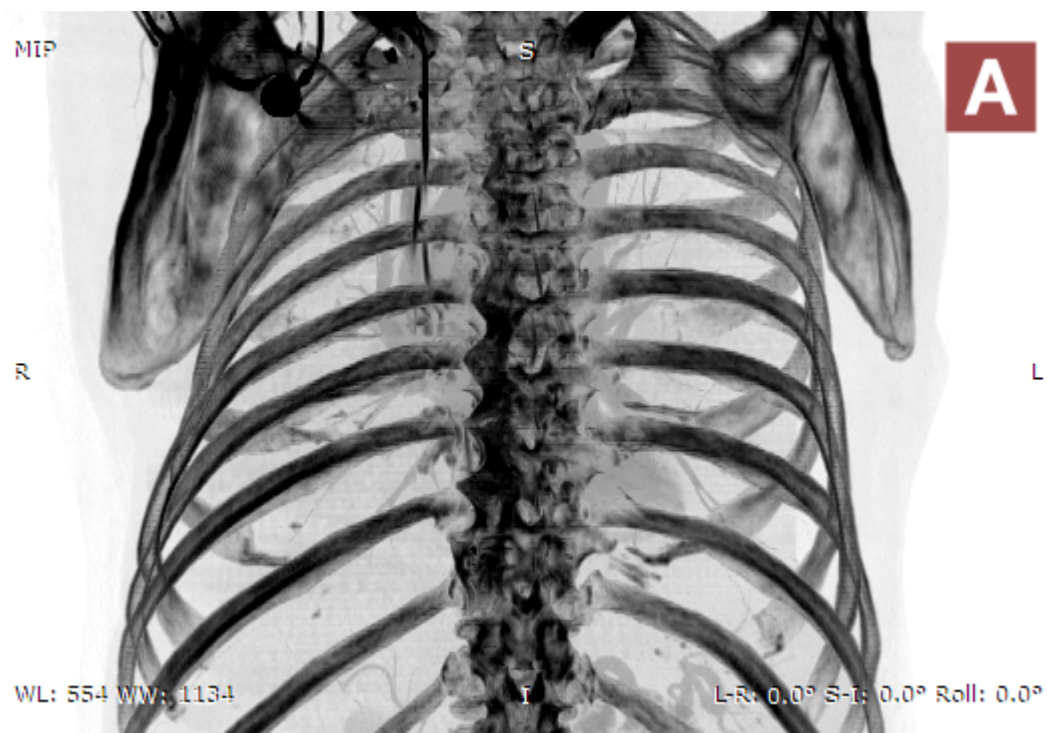
Airways



Bones and skin 1

**Bones and skin 2****Bones and skin 3**

**Bones B/W****Skin B/W**

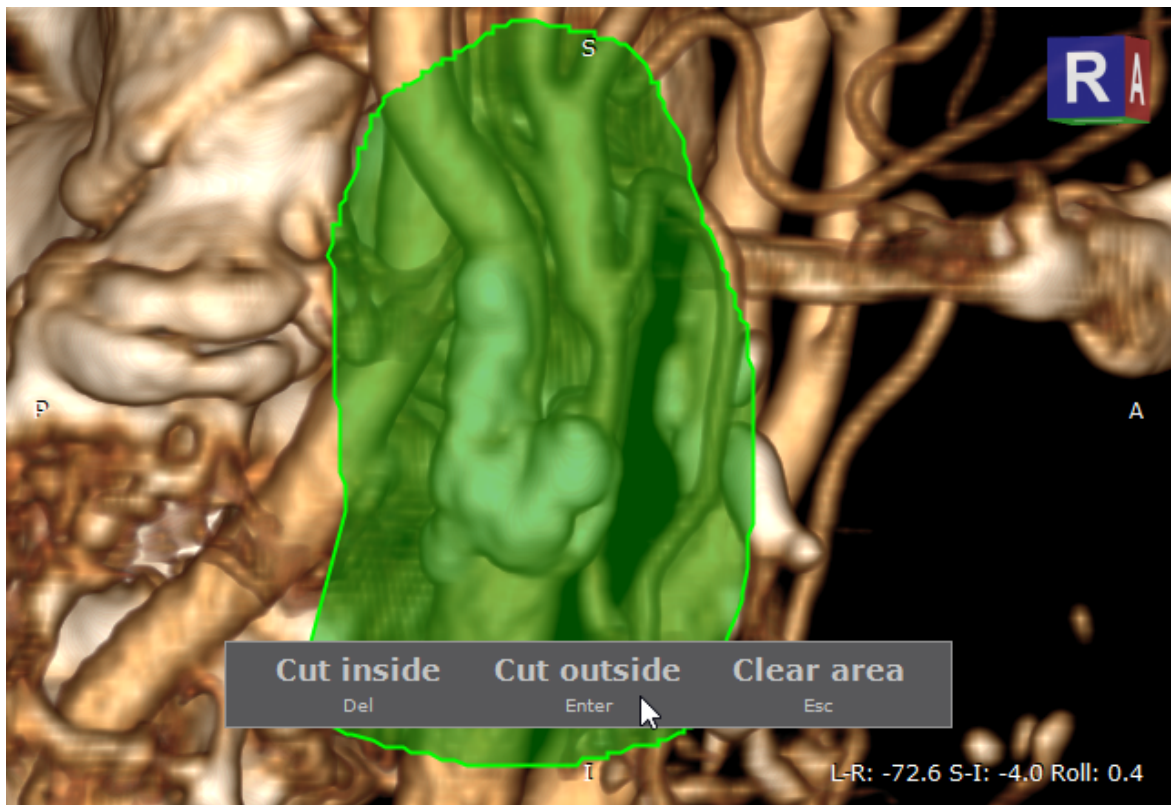
**MIP B/W****MIP B/W Inverse**

3.8.5 Removing unwanted structures

Click the **Scalpel** button on the toolbar (or press the **S** key).

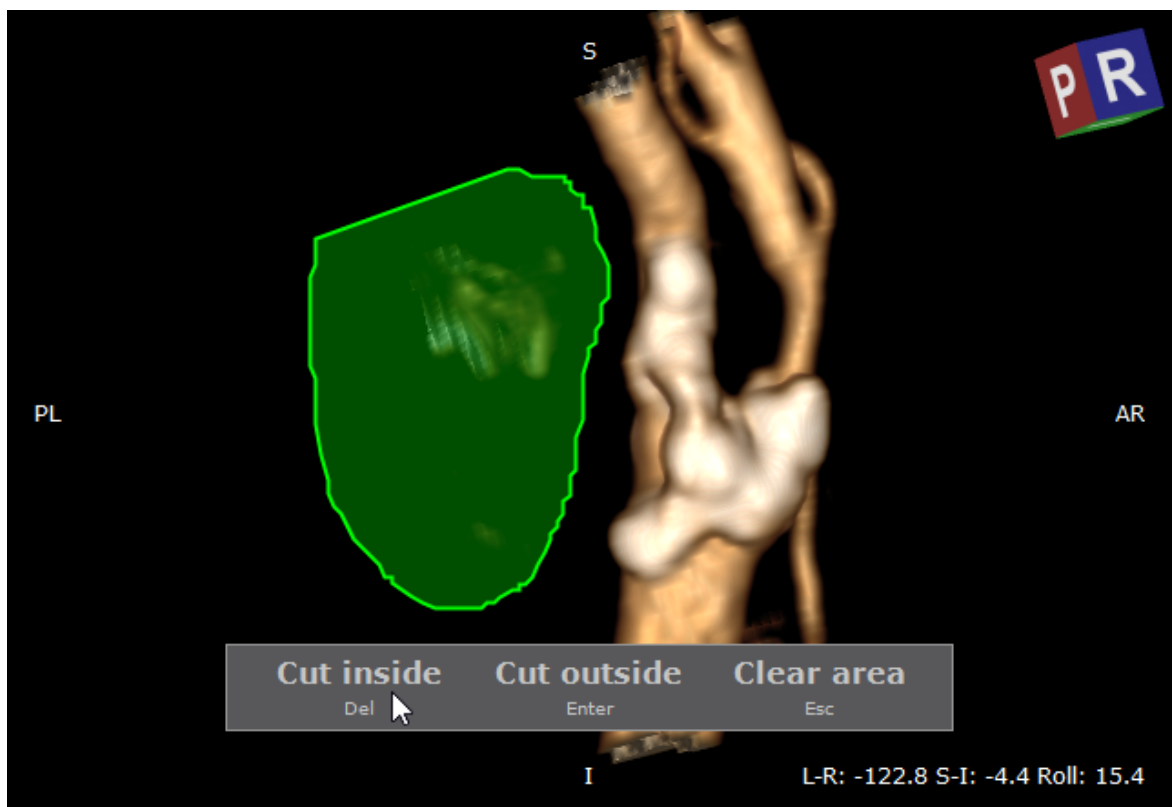
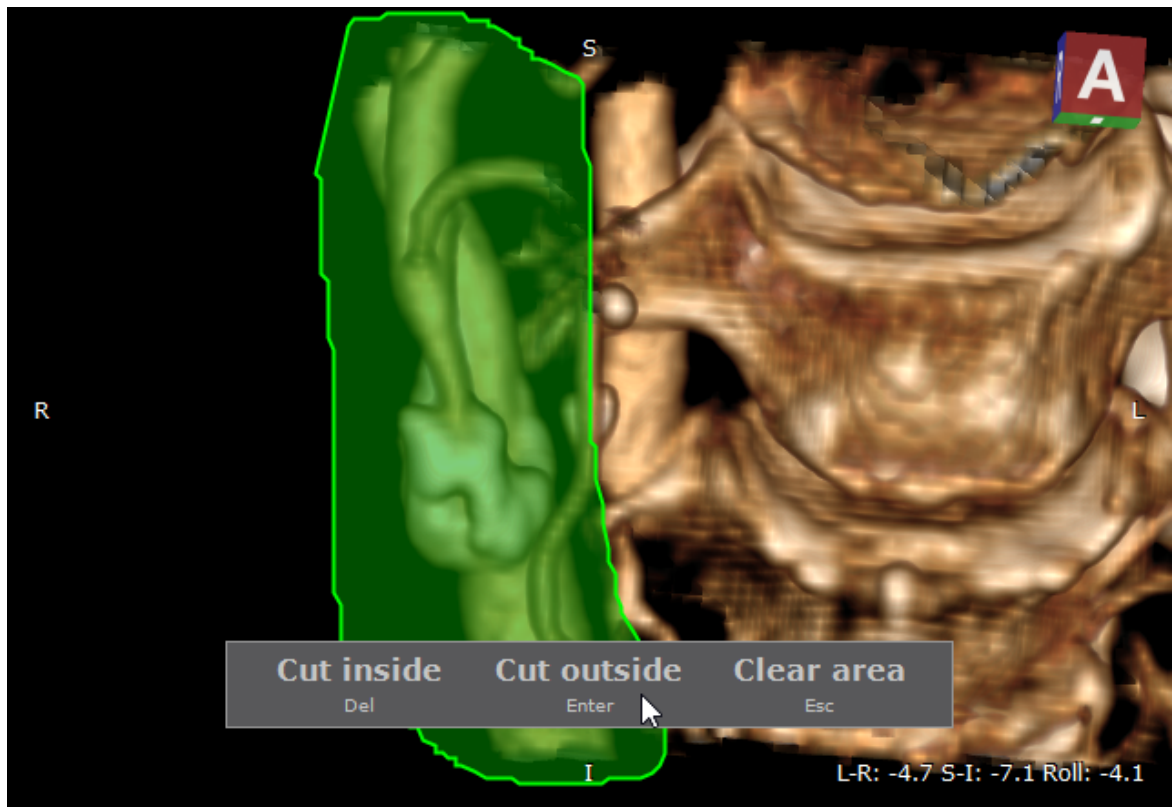


Next, press the left mouse button over the image and draw the area.



- Press **Del** or click the **Cut inside** button to delete structures inside the area.
- Press **Enter** or click the **Cut outside** button to delete structures outside the area.
- Press **Esc** or click the **Clear area** button to clear the area.

Rotate the volume and make additional cuts to remove all unwanted structures from the image.





Press the **Alt** key and drag the mouse with the left button down, and the scalpel tool will be active regardless of current association.

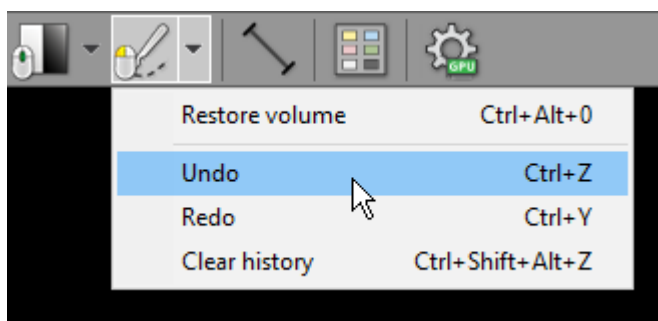
On multi-touch devices, a pen is associated with the scalpel tool by default.

Press **Ctrl + Z** to undo last scalpel action. Press **Ctrl + Y** to redo the scalpel action.

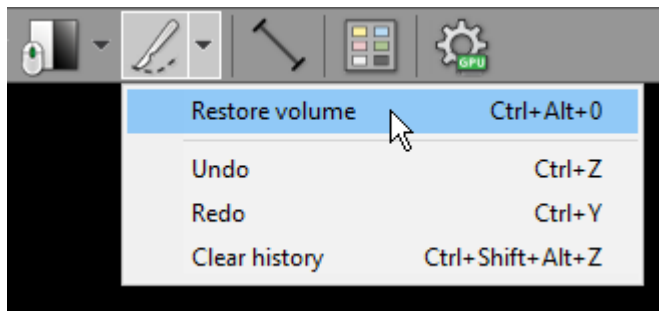
Multiple scalpel operations can cause increased memory consumption by the scalpel undo tool.

Press **Ctrl + Shift + Alt + Z** to clear scalpel history.

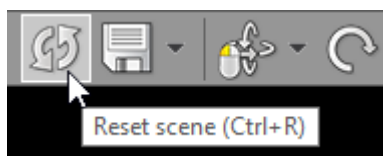
The above operations are also available from the **Scalpel** drop-down menu.



Click **Restore volume** or press **Ctrl + Alt + 0** to cancel all scalpel actions.



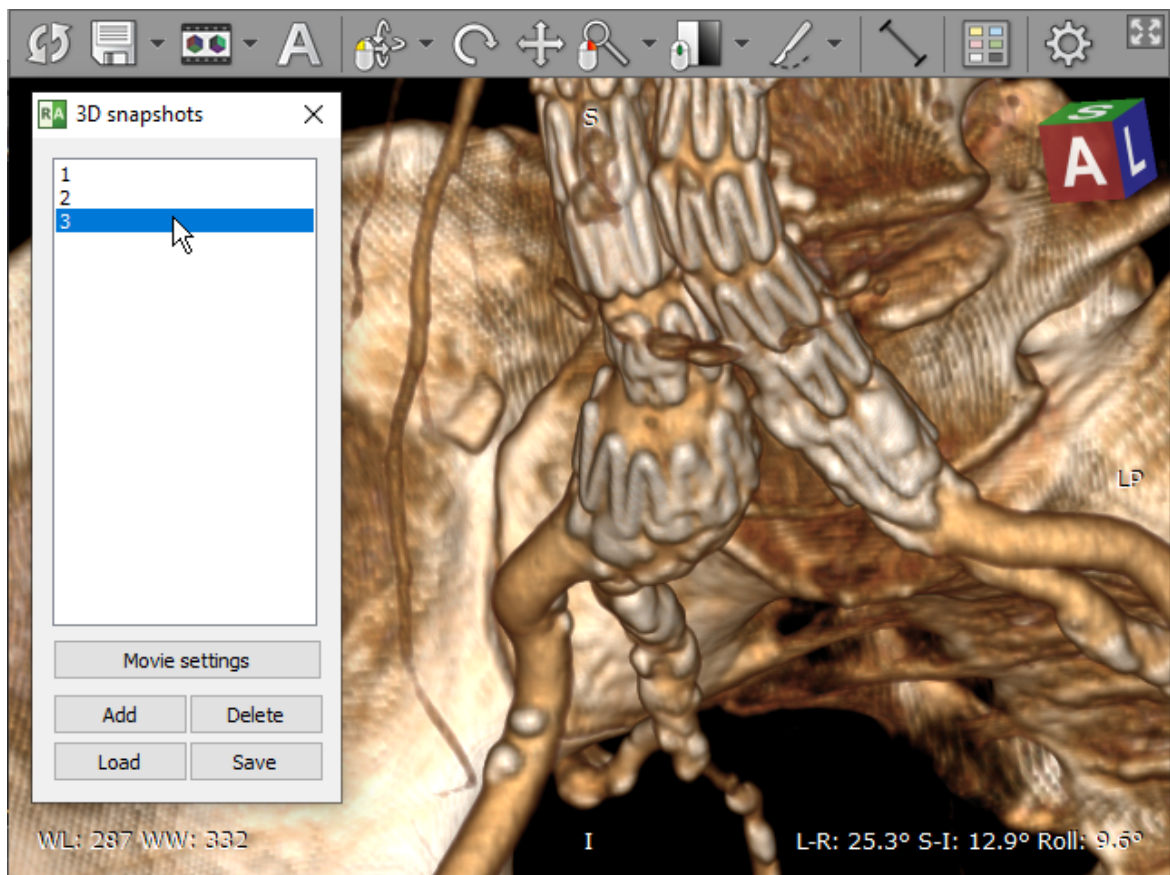
To revert all changes made while exploring the volume (position, zoom, window, scalpel actions) click the **Reset scene** button on the toolbar, or use the **Ctrl + R** shortcut.



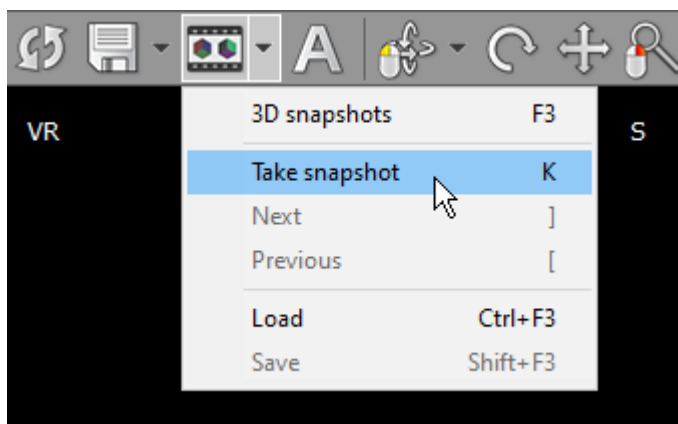
3.8.6 3D snapshots

3D snapshots allow for saving the current state of the 3D VR (Volume Rendering) viewer and a quick restore. The following image settings are stored in a 3D snapshot: position and rotation of the object, zoom factor, scalpel actions, 3D preset (color look-up table), and the range of displayed values (window settings).

These can also be used to create scenarios for [advanced VR movies](#).

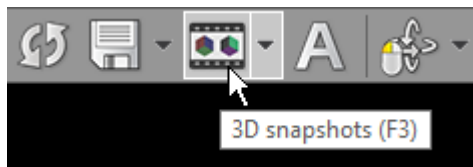


To store a 3D snapshot, press **K** or select **Take snapshot** from the drop-down menu.

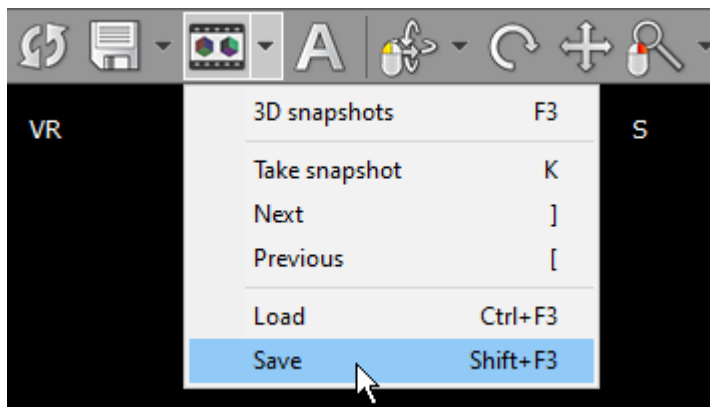


To quickly restore and switch between snapshots, press **]** / **[** or select **Next** / **Previous** from the drop-down menu.

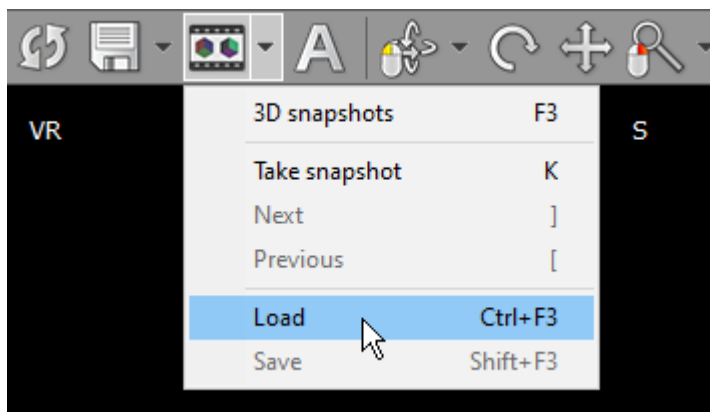
To show the list of stored 3D snapshots, click the **3D snapshots** toolbar button or use the **F3** shortcut.



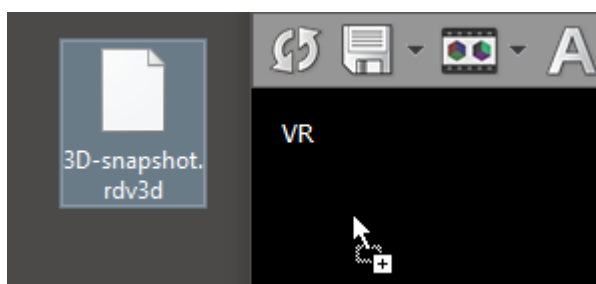
3D snapshots are stored in memory and cleared as soon as the VR window is closed. To store them permanently in a file, select **Save** or press **Shift + F3**. Then select the snapshots file location and press **Save**.



Next time you want to restore the saved snapshots, press **Ctrl + F3** or select **Load** from the 3D snapshots menu. Then browse to the file and click **Open**.



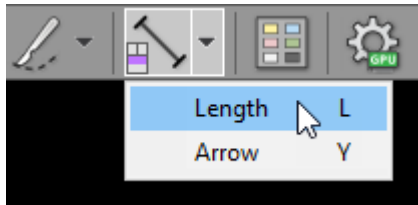
You can also drag and drop the saved snapshot file onto the VR window.



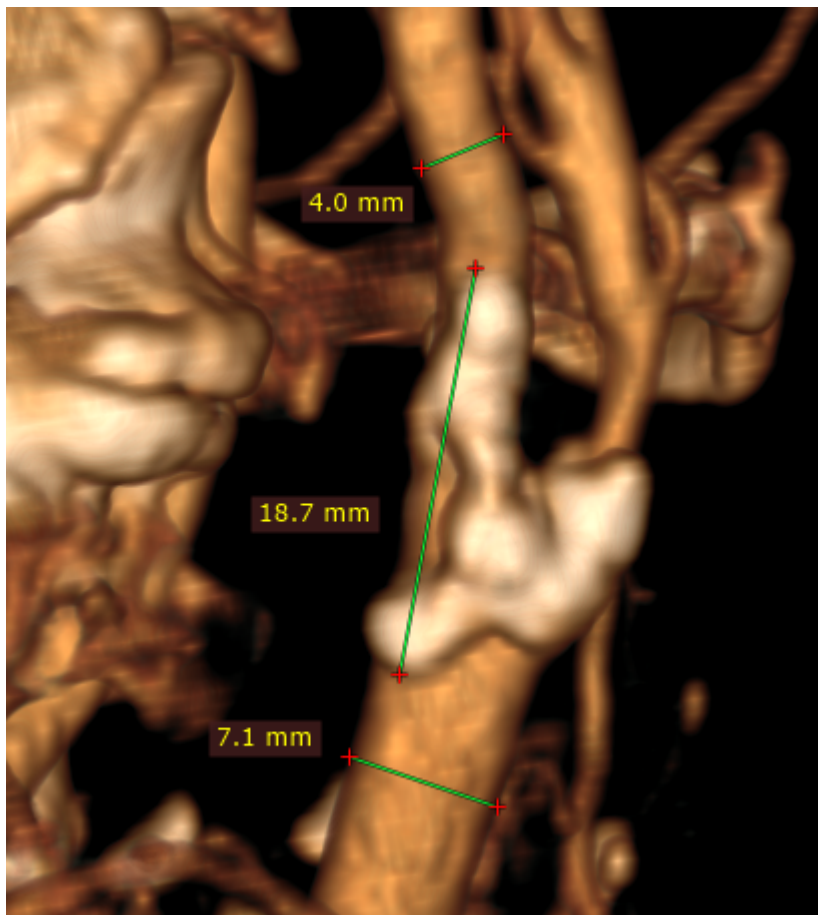
3.8.7 Taking measurements

3.8.7.1 Length

Select **Length** from the **Measurements** drop down menu (or press the **L** key).



Place the cursor over the starting point, then press left mouse button and drag the mouse to draw a segment with length measurement. Release the button to finish drawing.



The distance value will be shown in millimeters.

Note that the length is measured in the viewing plane, which means that different depths of the structures are not taken into account.

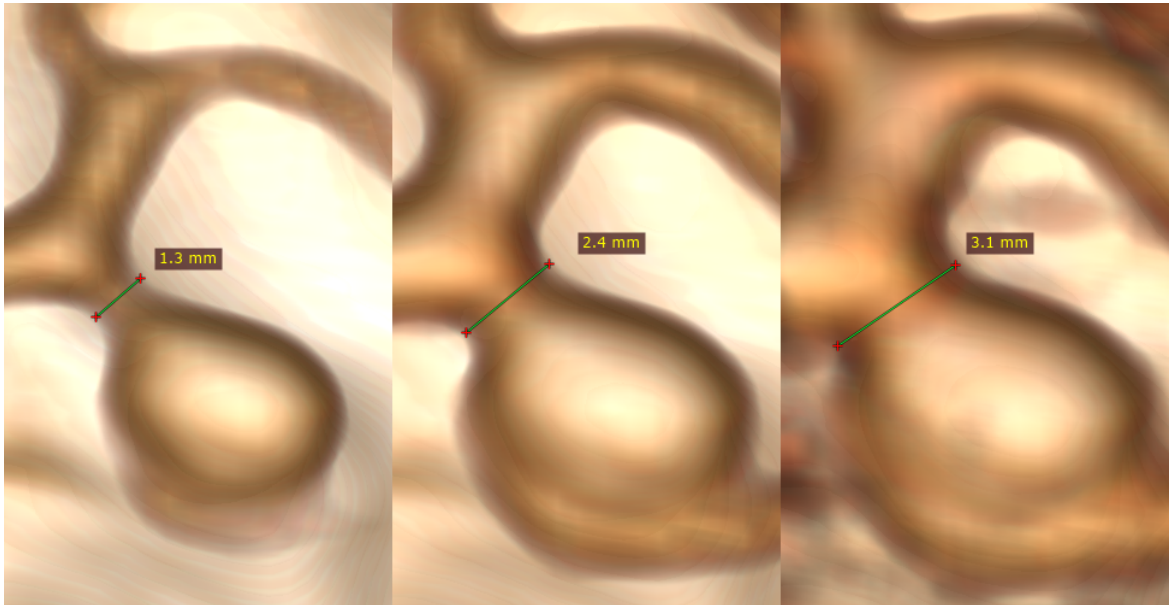
You can move the entire segment or one of its endings by dragging while pressing the left mouse button. The label may be also dragged to a more convenient place if necessary.

By default, the length measurement tool is associated with the forward (5th) mouse button.

Press **Shift** while drawing the segment to make it either vertical or horizontal.

Caveats

The structures may appear thinner or thicker, depending on the window (color and opacity) adjustment.

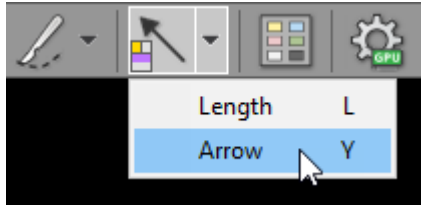


The distance is measured between points lying in the plane parallel to the viewing plane. If the points are located at different depths, the displayed length is shorter than the actual distance.



3.8.7.2 Arrow

Select **Arrow** from the **Measurements** drop down menu (or press the **Y** key).



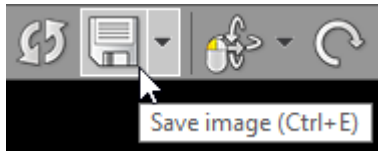
Place the cursor over the starting point, then press left mouse button and drag the mouse to draw an arrow. Release the button to finish drawing.

Read more about [the Arrow tool in the 2D viewer section](#).

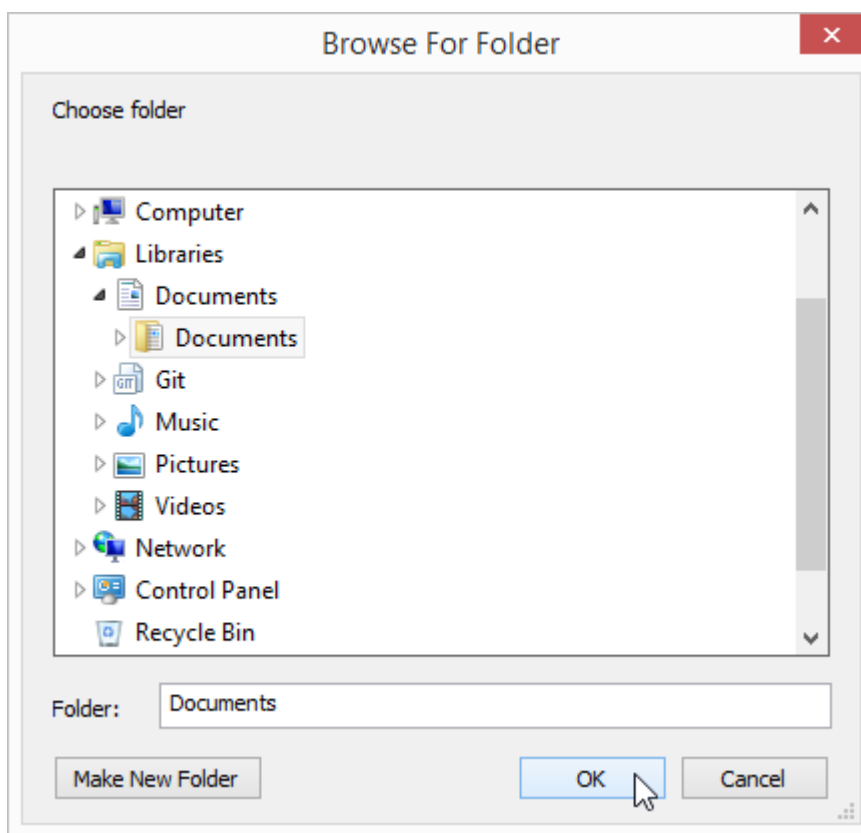
3.8.8 Exporting images

Saving JPEG images

Click the **Export** button or use **Ctrl + E** to save the displayed image as a JPEG file.



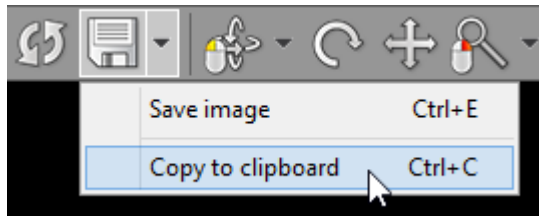
Browse for the destination folder and click **OK** to save the image.



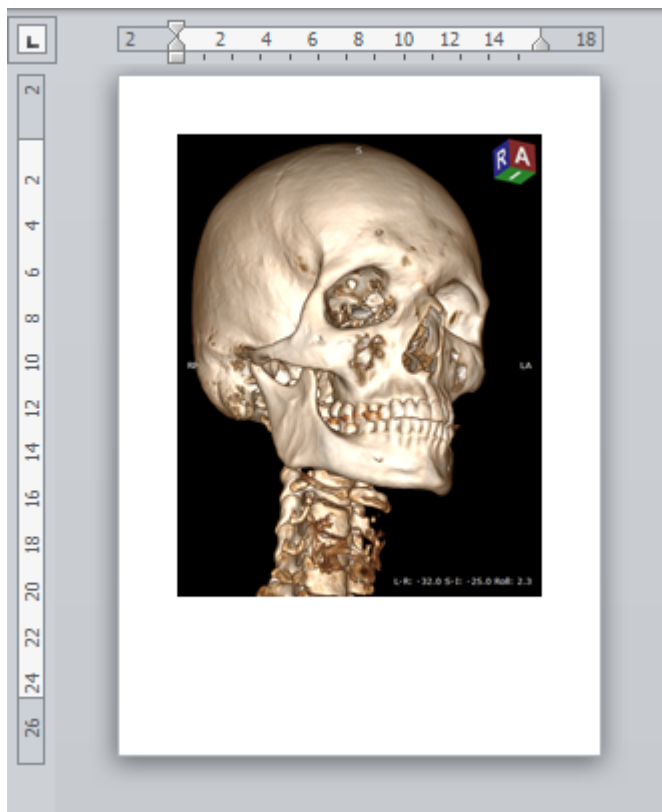
Copying to the clipboard

The displayed image can be easily copied to the Windows clipboard and then pasted into other Windows application such as Microsoft Word, PowerPoint, etc.

Click the **Copy to clipboard** in the **Export** drop-down menu or use the **Ctrl + C** shortcut.

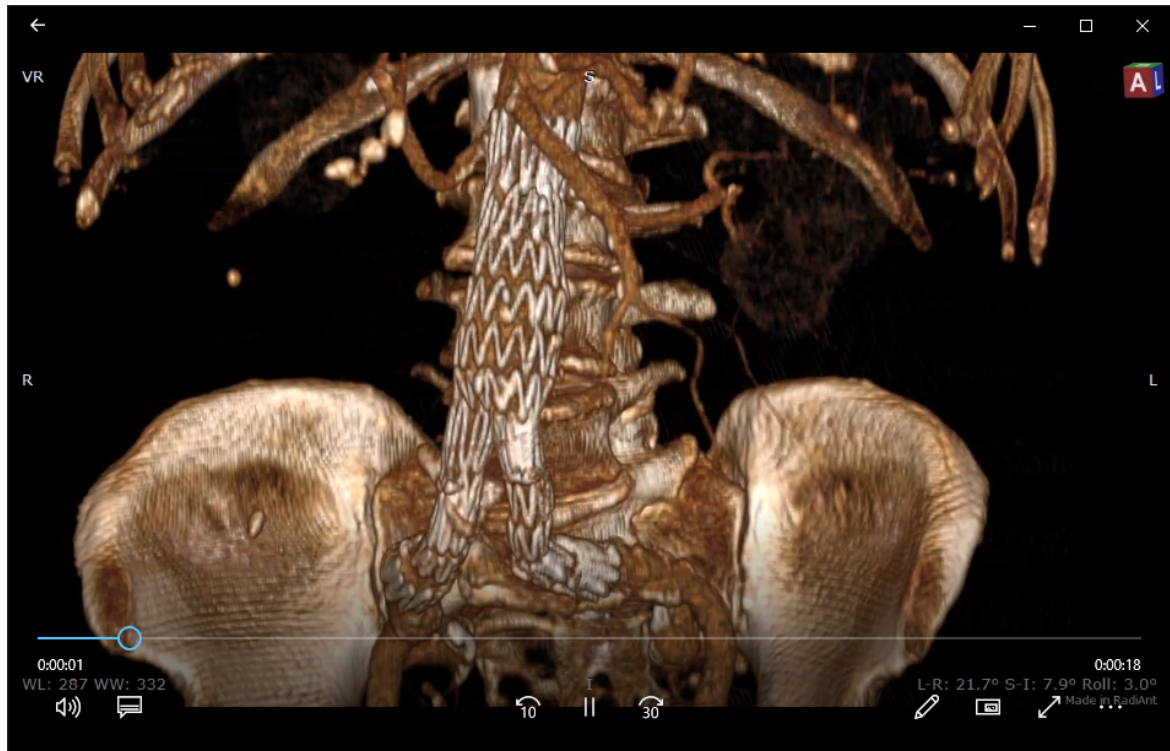


Switch to the application where you want to paste the image and click **Ctrl + V**



3.8.9 Exporting movies

3D volume-rendered objects can be animated and exported as movies.



Two types of movie creators are available:

[Quick movie](#) – allows for exporting movies with 360/180 horizontal/vertical object rotations.

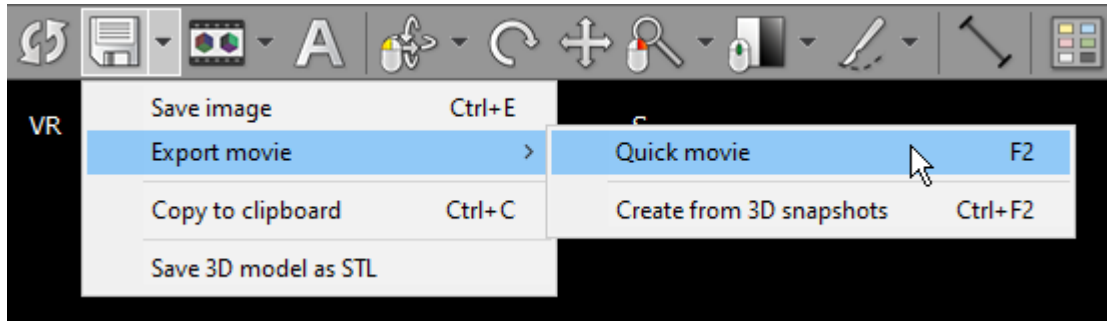
[Advanced movie](#) – facilitates movie creation with arbitrary object rotations and other transitions based on [3D snapshots](#).

Movies can be exported to MP4 files on Windows 7 and newer systems. On Windows XP, only the WMV file format is available.

4K (3840 x 1920) resolution is available only on Windows 10 systems. Older systems allow for exporting videos in maximum FullHD (1920 x 1080) resolution.

3.8.9.1 Quick movie

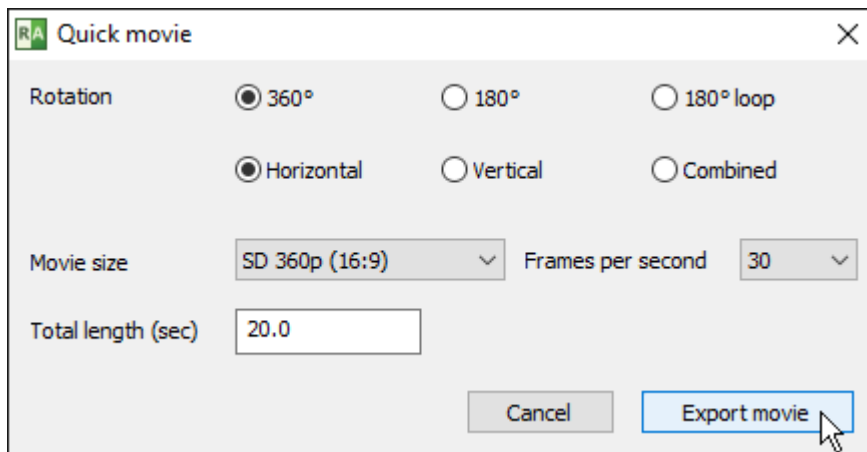
Select **Export movie / Quick movie** from the menu under the export button or press **F2**.



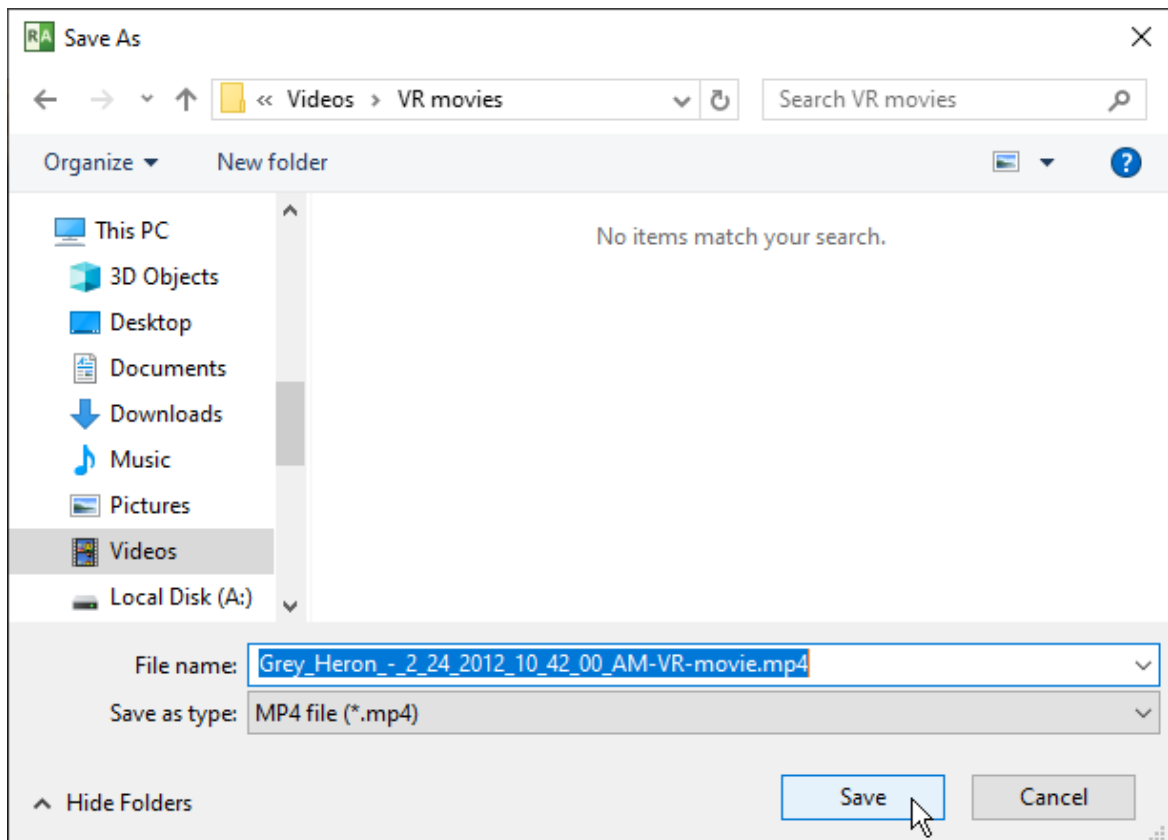
Choose the desired rotation range and plane:

- 360 – a full rotation is performed, starting from the current view
- 180 – the object is rotated 180 degrees, with its current view in the middle of the rotation
- 180 loop – the object is rotated 90 degrees, starting from the current view, then a 180-degree rotation in the opposite direction is performed before a 90-degree rotation then returns the object to its initial position
- Horizontal – object is rotated in the horizontal plane
- Vertical – object is rotated in the vertical plane
- Combined – object is first rotated in the horizontal and then in the vertical plane

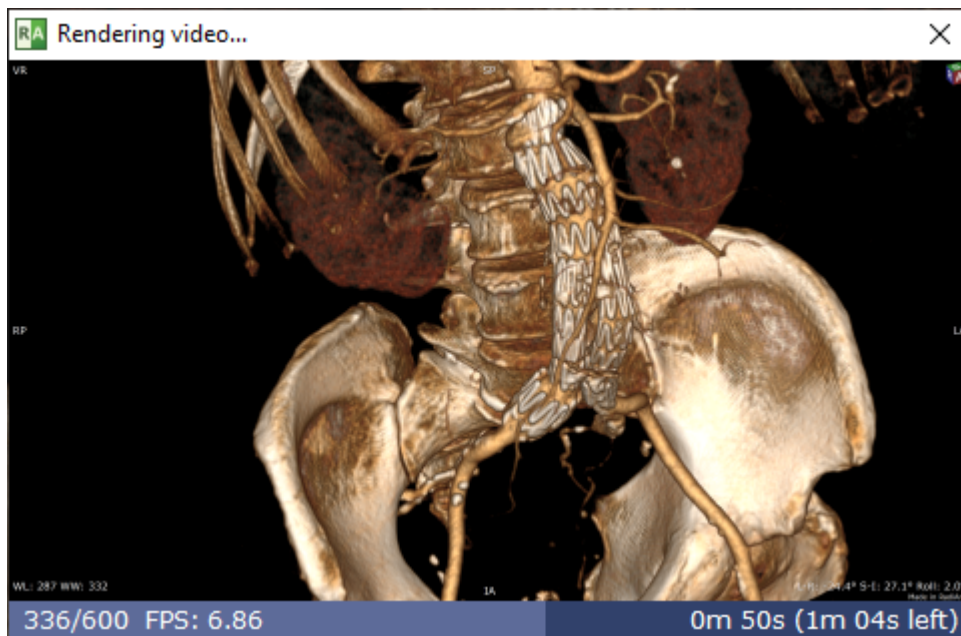
Select movie resolution and speed (frames per second). Enter total movie length in seconds and click **Export movie**.



Choose the exported file location and name, then click **Save**.



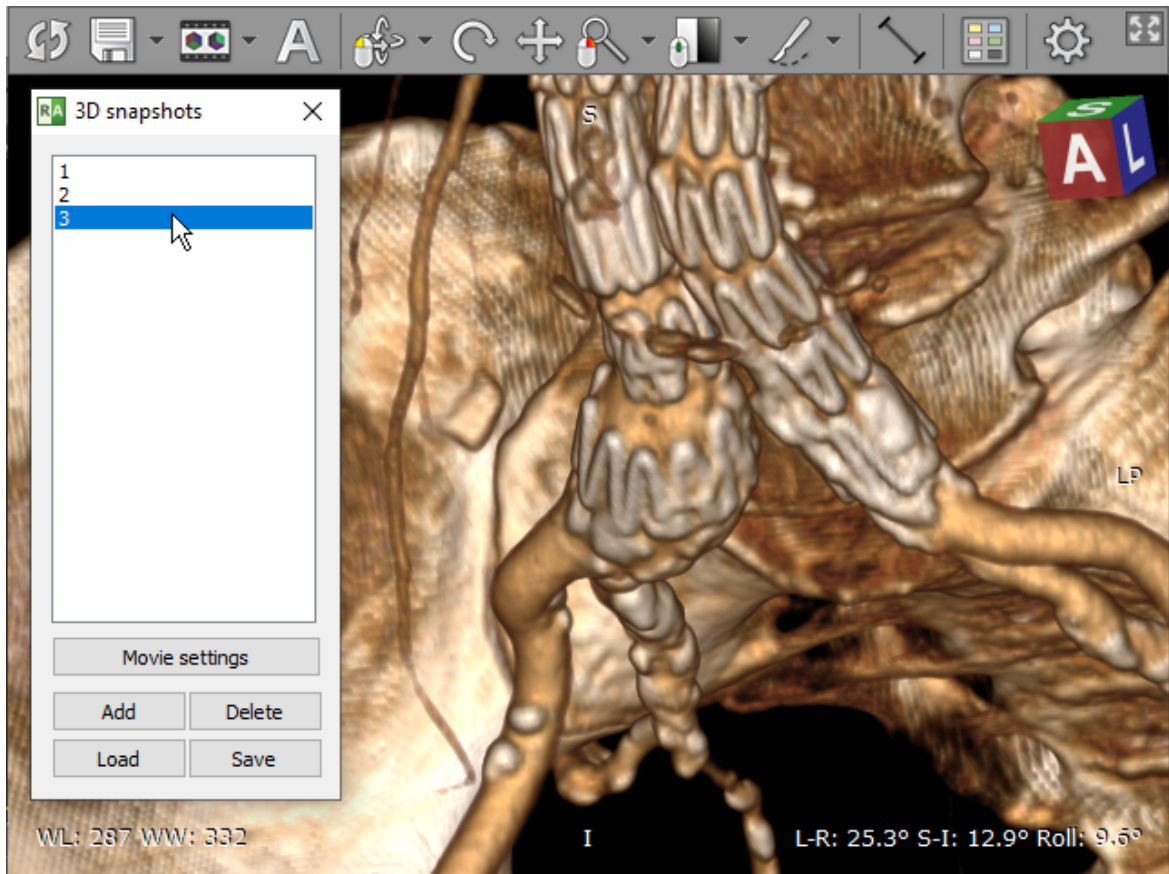
The preview window will show export progress and the estimated finish time.



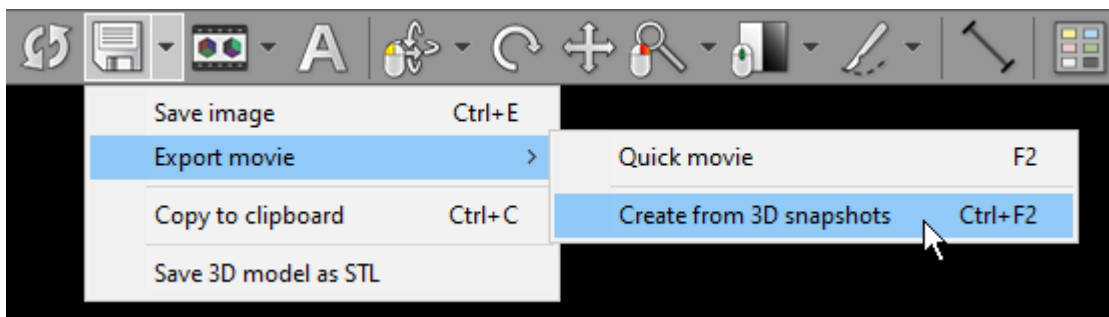
Note: on slower systems without GPU acceleration, when a high-resolution movie with many image frames is exported, the process may take many hours (or even days!) to finish.

3.8.9.2 Advanced movie

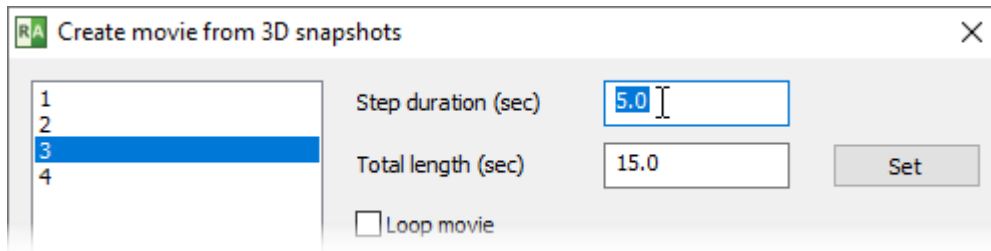
Begin with creating the [3D snapshots](#) that will serve as key-frames in your VR movie. The position, rotation, zoom settings, object colors and scalpel actions will be interpolated so that the transitions appear smooth in your movie.



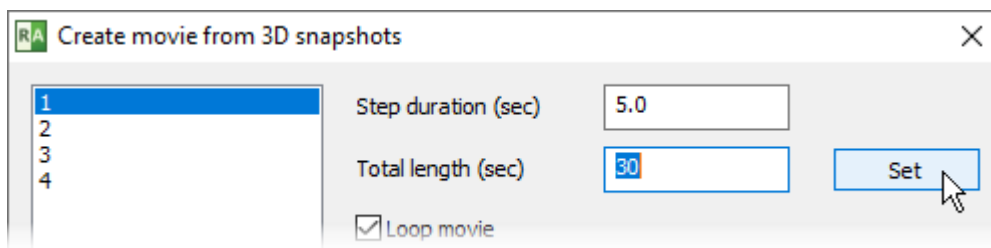
Select [Export movie / Create from 3D snapshots](#) from the menu under the export button or press **Ctrl + F2**.



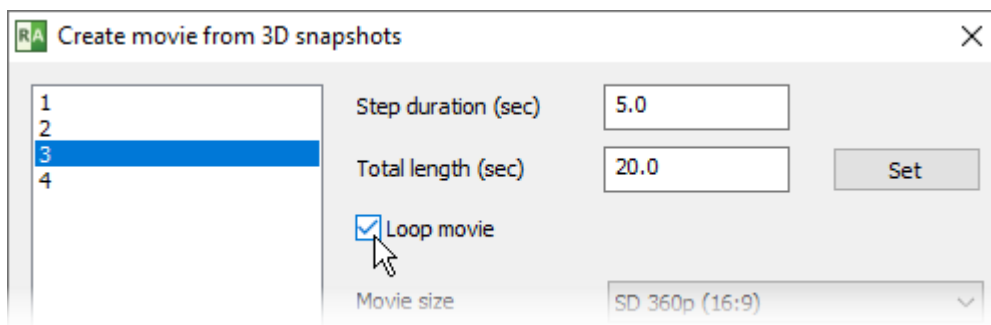
Adjust the length of each step by clicking the snapshot and entering the step duration value in seconds (5 seconds by default).



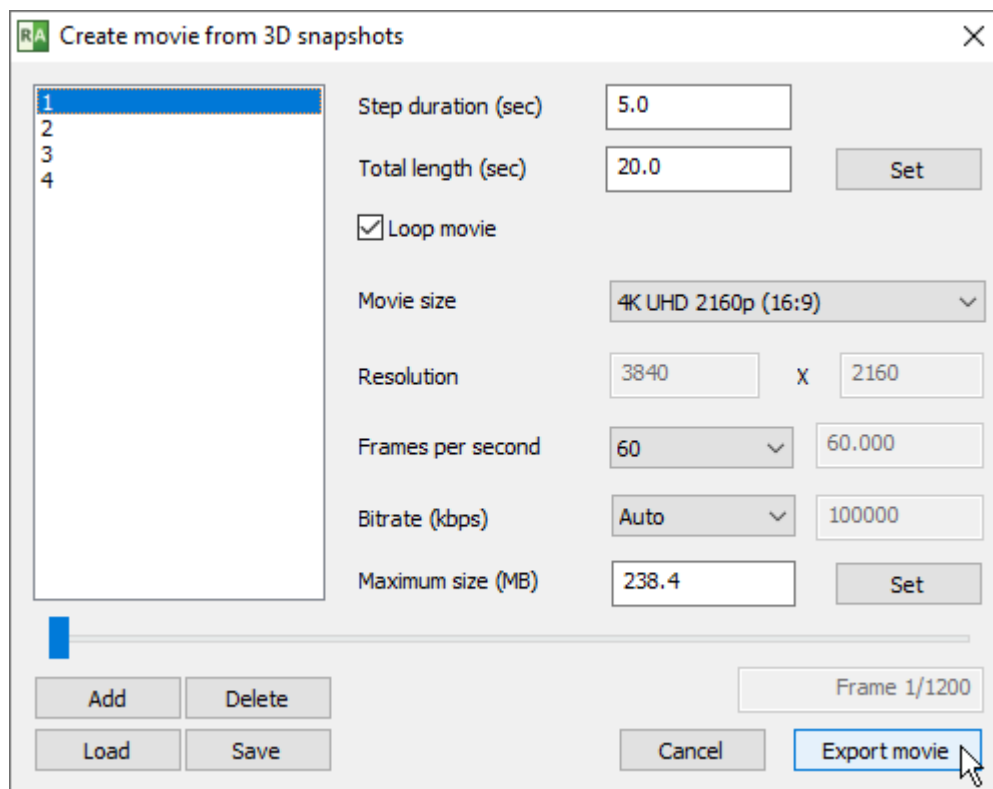
Enter the total movie length in seconds and click **Set**. The individual steps duration will be proportionally scaled to their original values.



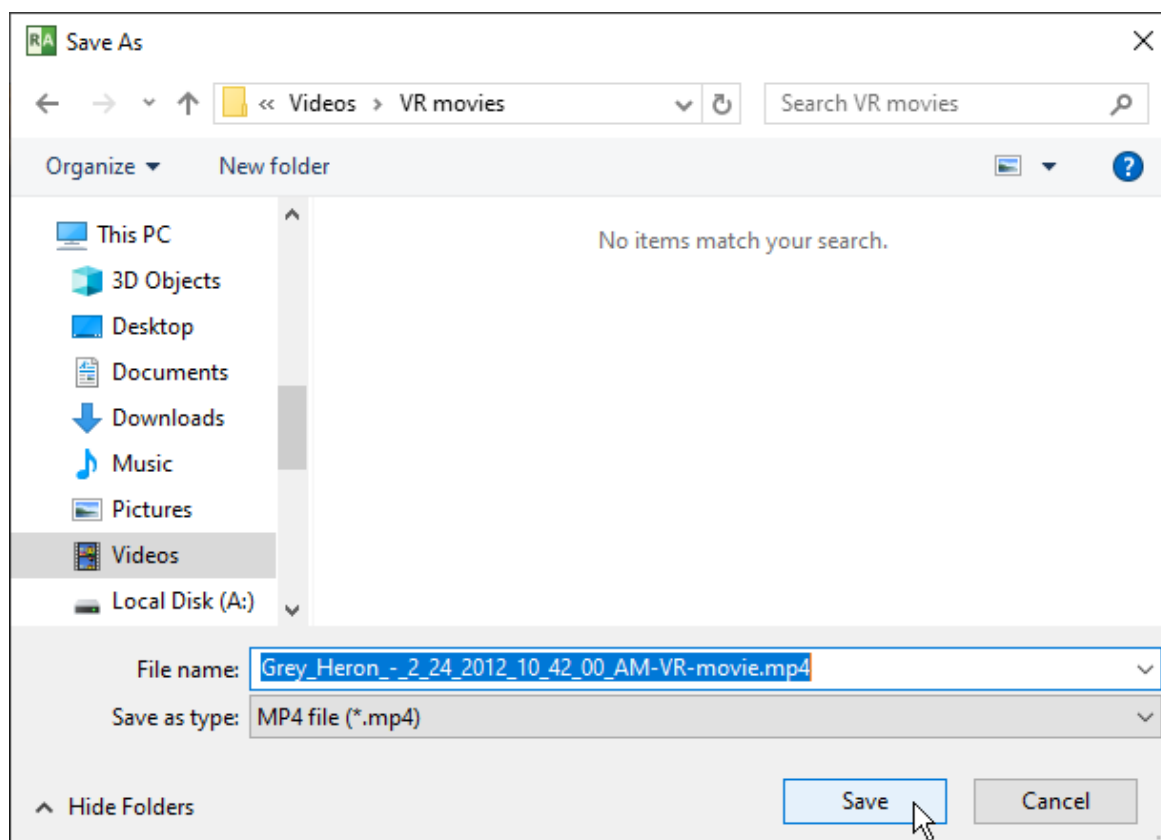
To make the video end with the same image as it begins with, select **Loop movie**.



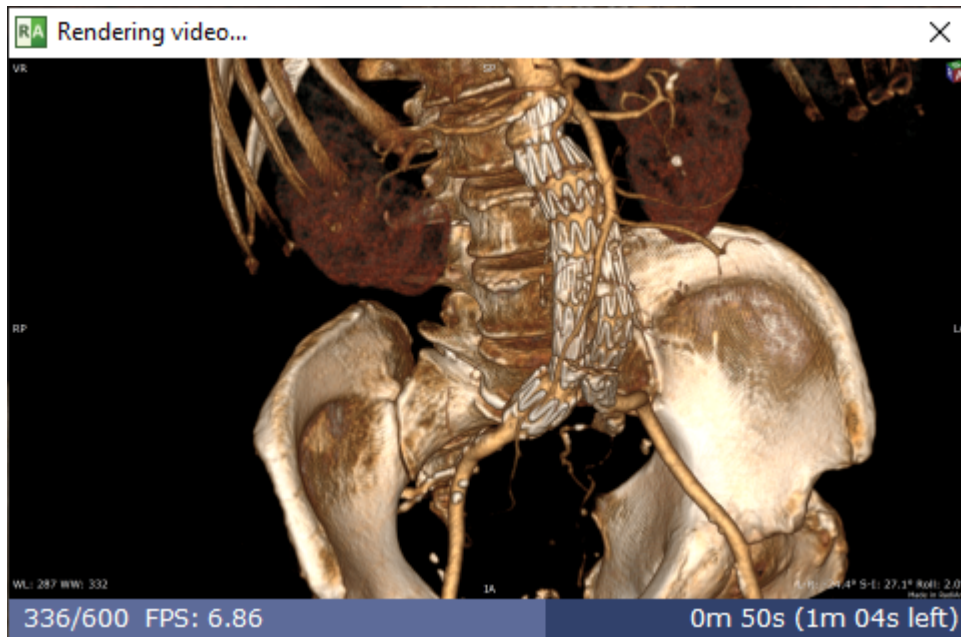
Select movie resolution, speed (frames per second) and bitrate (kilobits per second), then click **Export movie**.



Choose the exported file location and name, then click **Save**.



The preview window will show export progress and the estimated finish time.

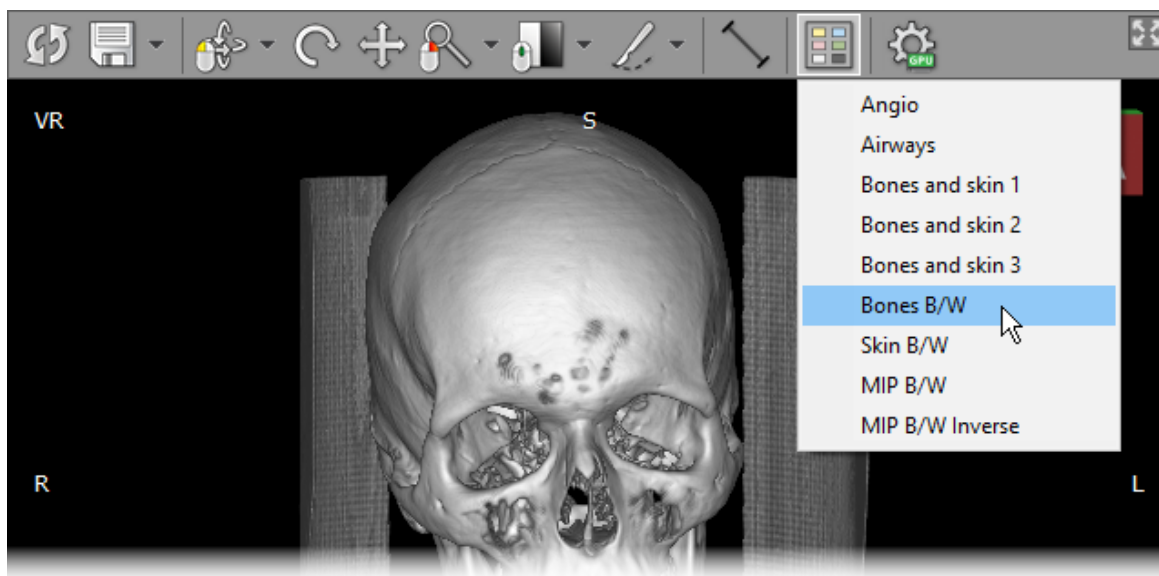


Note: on slower systems without GPU acceleration, when a high-resolution movie with many image frames is exported, the process may take many hours (or even days!) to finish.

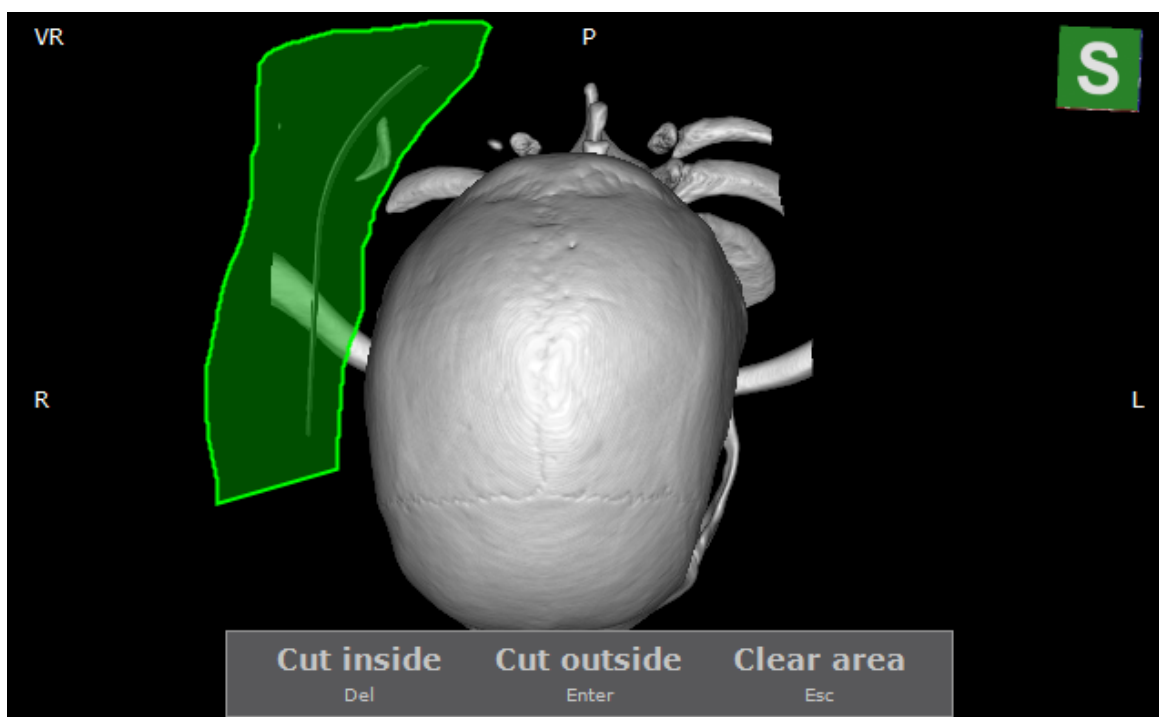
3.8.10 Exporting 3D models

3D models created in RadiAnt can be exported to STL files, which can be opened in alternative 3D modeling software and used for 3D printing.

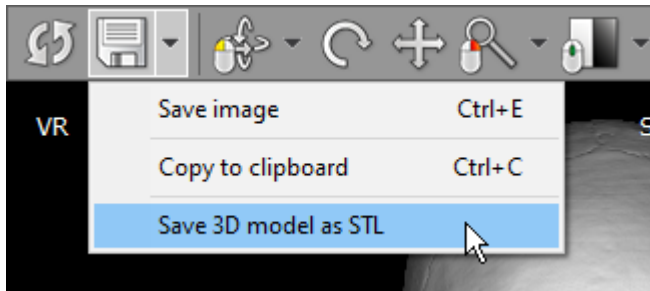
1. Set the 3D preset to either **Bones B/W** or **Skin B/W**.



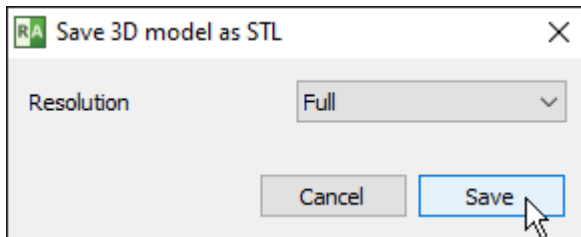
2. Adjust the window parameters and remove any unwanted elements. All visible objects will be included in the STL file.



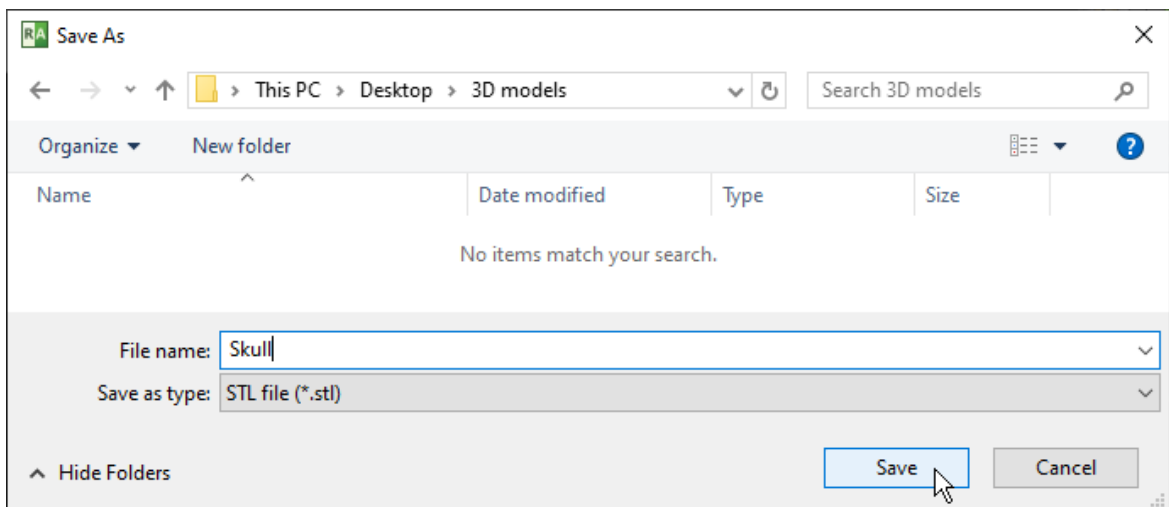
3. Click the **Export** button and select the **Save 3D model as STL** option.



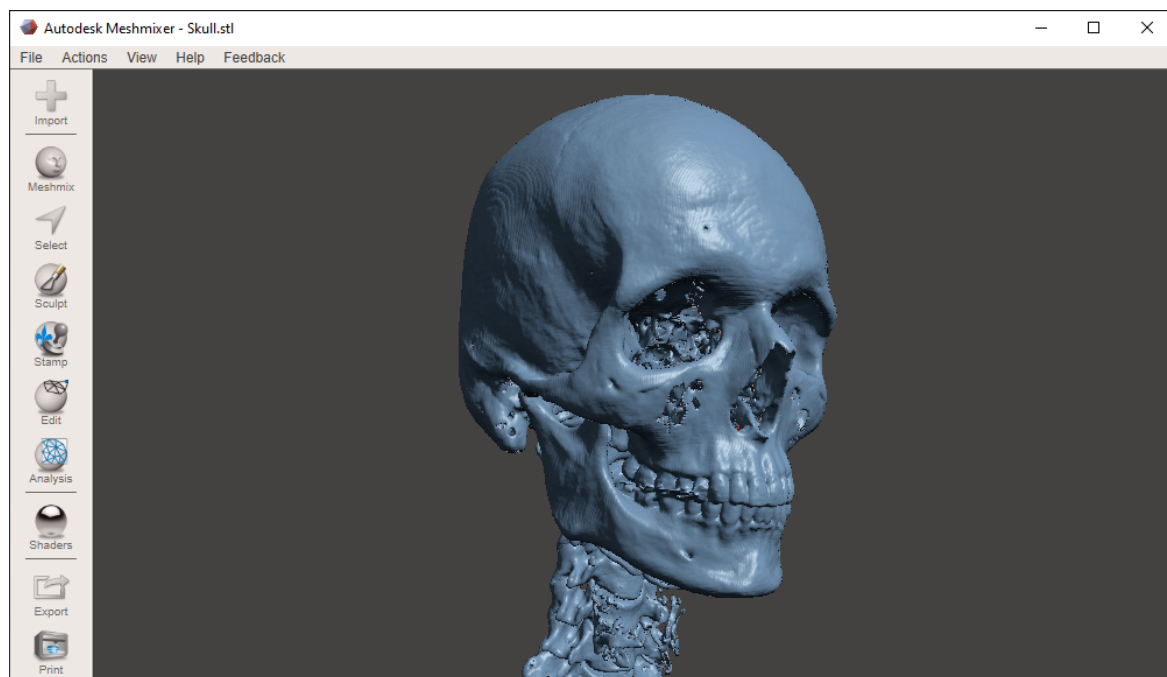
4. Select the resolution of the exported object and click **Save**.



5. Select the destination folder and enter the file name. Click **Save**.

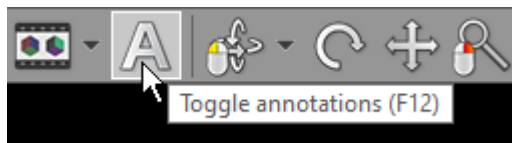


6. You can now open the exported file in third-party 3D modeling/printing software.

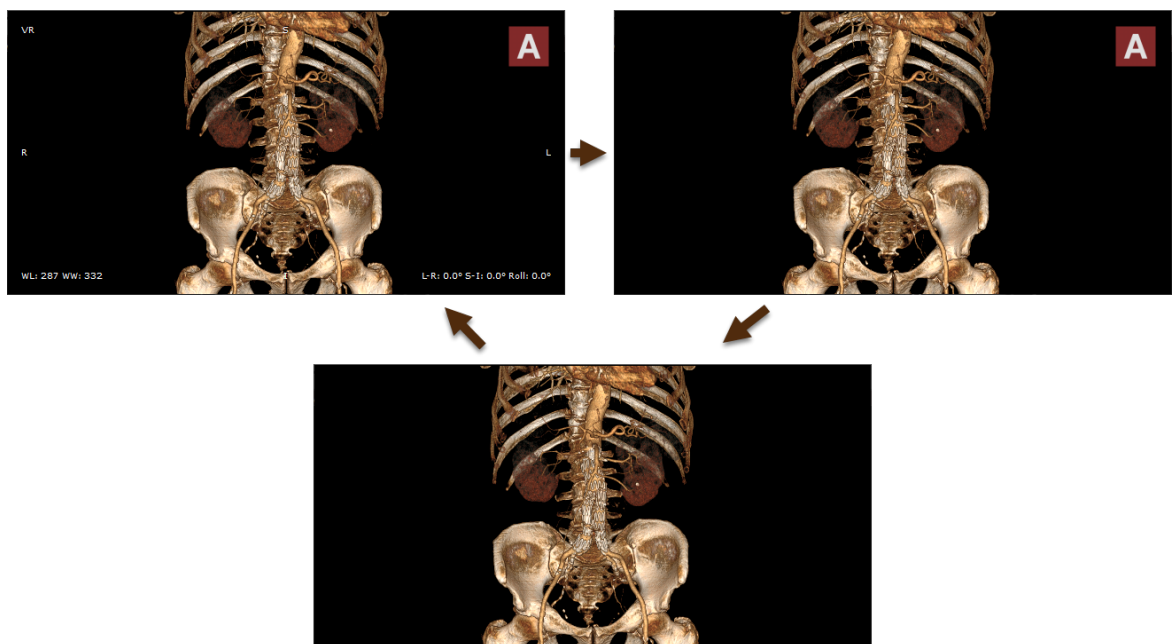


3.8.11 Annotations

Annotations and the direction cube can be turned off and on by clicking the **Annotations** button on the toolbar or pressing **F12** key.



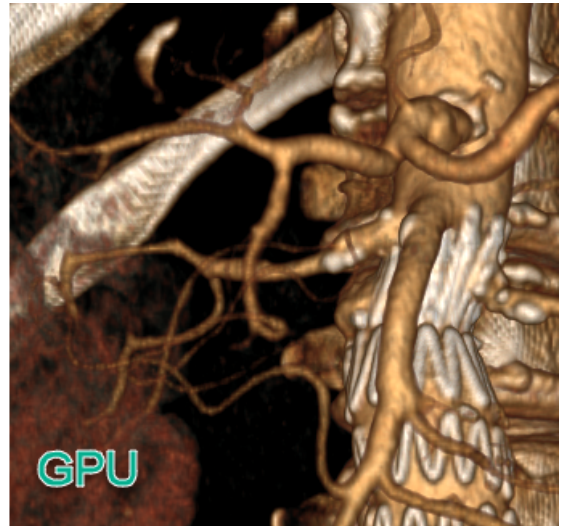
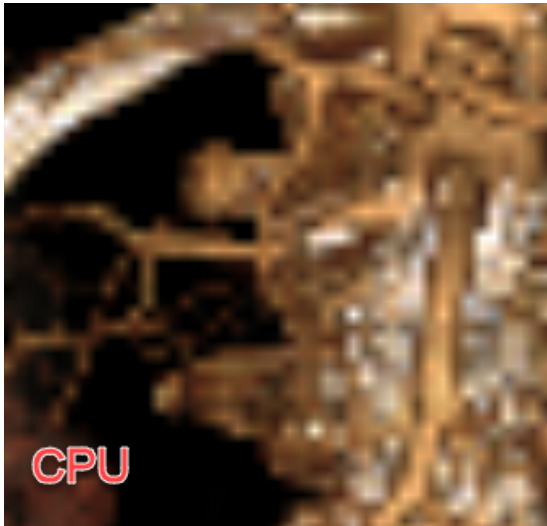
Click the button once to hide annotations, click again to hide the direction cube and leave only the volume-rendered object. To restore the default view, click the button once again.



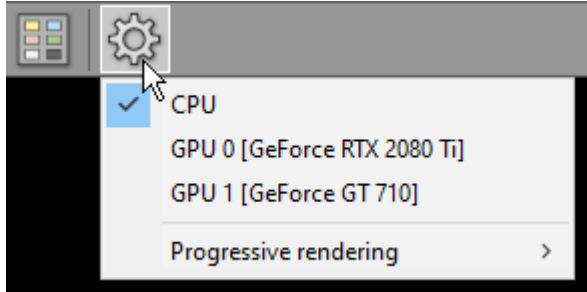
3.8.12 Settings

Enabling GPU acceleration

The [GPU acceleration](#) feature allows you to utilize modern Nvidia GPU to make more fluid and detailed interactions in the 3D VR window.

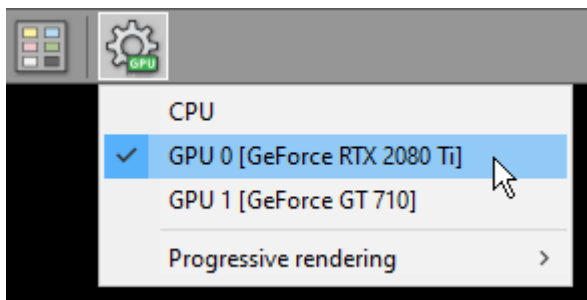


Click the **Settings** button to show the CPU/GPU mode selection menu.



If [a compatible Nvidia GPU](#) is detected in your system, you will be able to select it from the list.

After GPU is successfully enabled, there will be a green GPU indicator overlaid on the settings toolbar button.



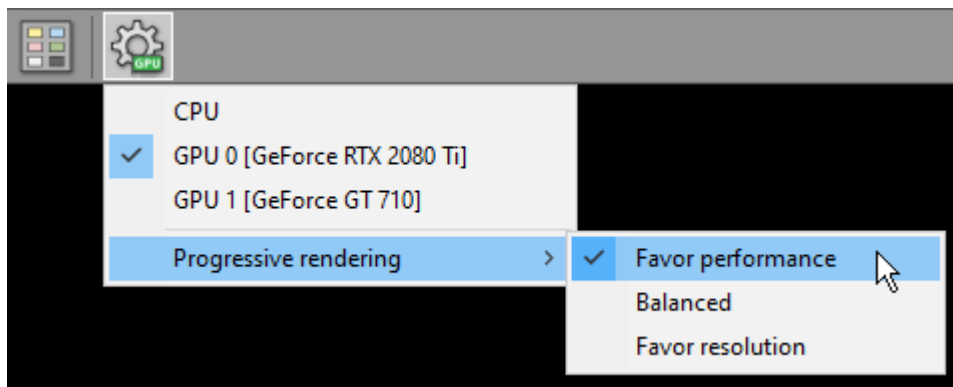
Select **CPU** when you want to switch back to CPU rendering mode.

Progressive rendering

To maintain fluid interactions with the volume-rendered object, progressive rendering is implemented. This means that the image quality is worse during interactions and progressively improves when the object is static.

By default, the most fluid mode is used (with the lower image quality during interactions). You can change this and get better image quality with less responsive interactions being the trade-off.

Click the **Settings** button and select **Progressive rendering**. Select **Favor performance**, **Balanced**, or **Favor resolution** to set your desired mode.

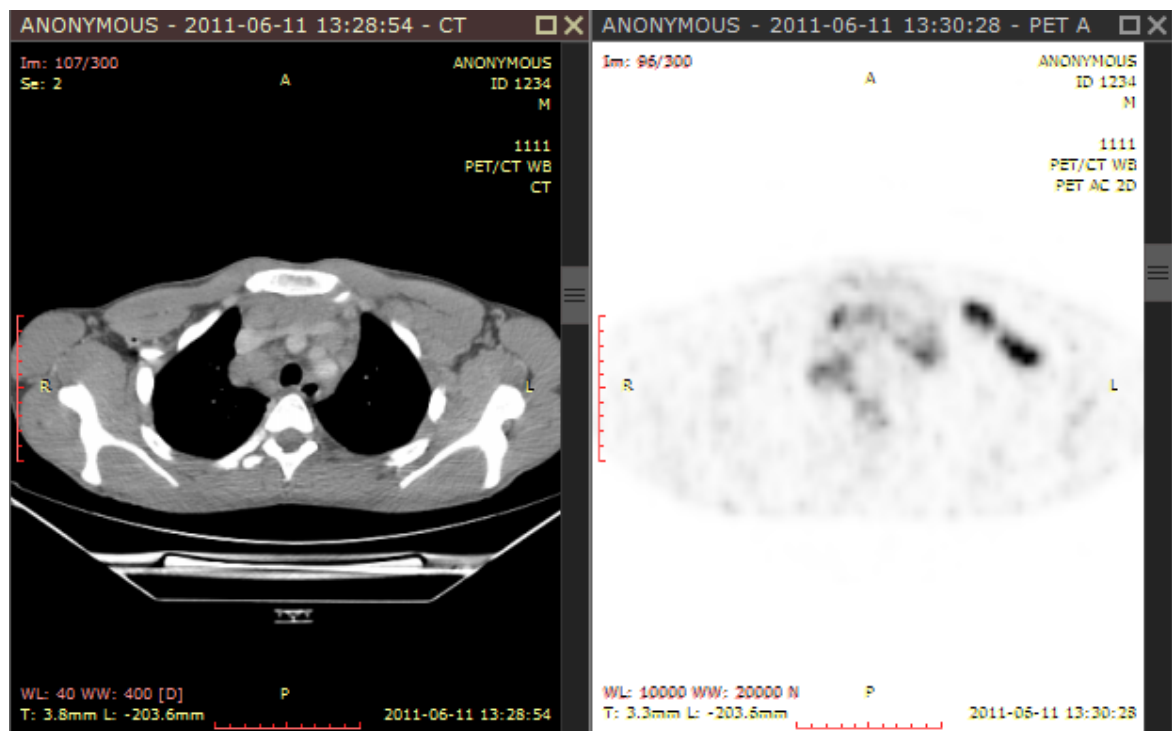


3.9 Image fusion (PET-CT)

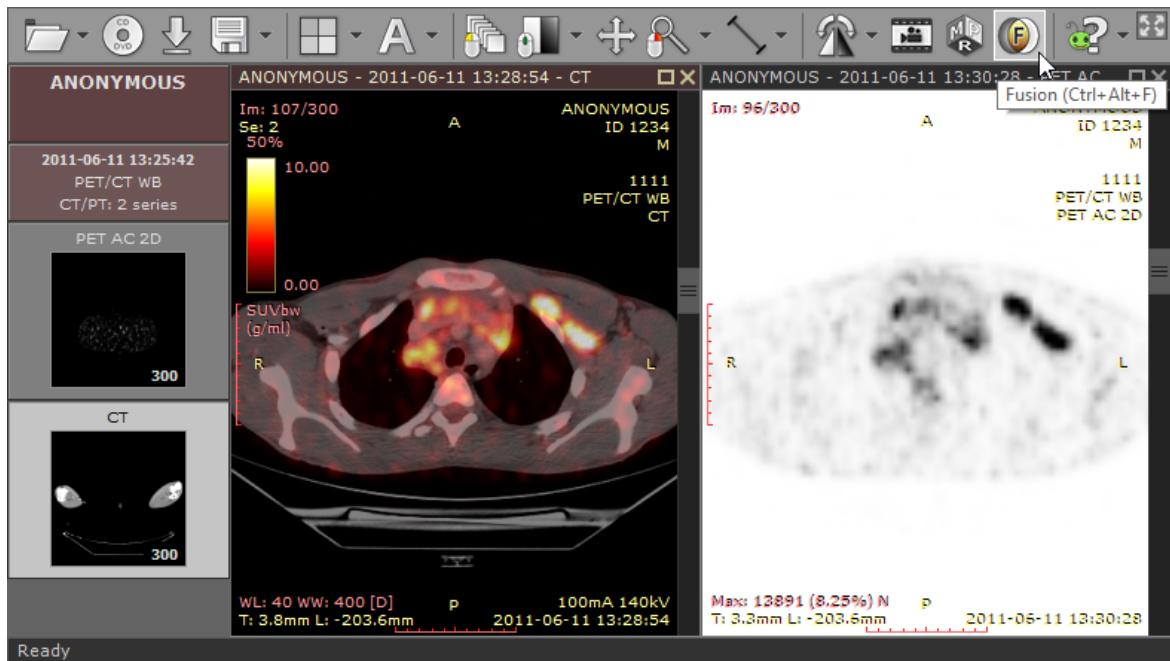
Image fusion allows you to overlay a color-mapped PET image onto a CT scan in order to obtain anatomical references for regions with increased FDG (fluorodeoxyglucose) uptake values. This tool can also be applied to other imaging modalities, such as Magnetic Resonance, (e.g., DWI images can be fused with T1 or T2-weighted scans).

Enabling fusion

- 1) Use the screen splitting tool to open CT and PET series in two panels.
- 2) Activate the panel with CT series by clicking the image it contains or its title bar.

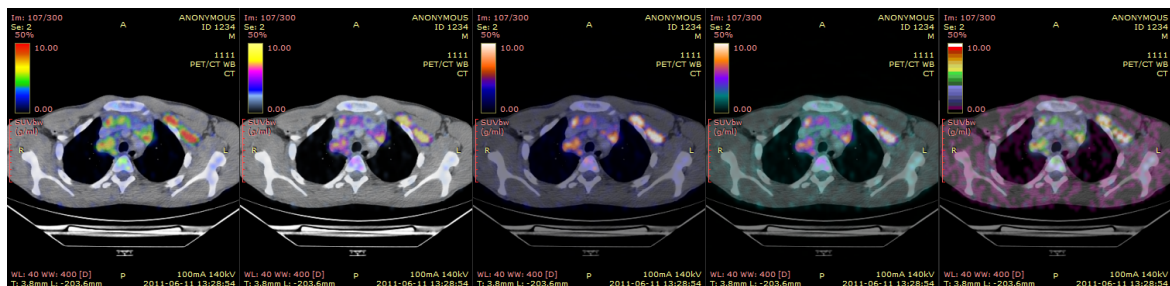


3) Click the **Fusion** button on the toolbar or use the **Ctrl + Alt + F** shortcut.

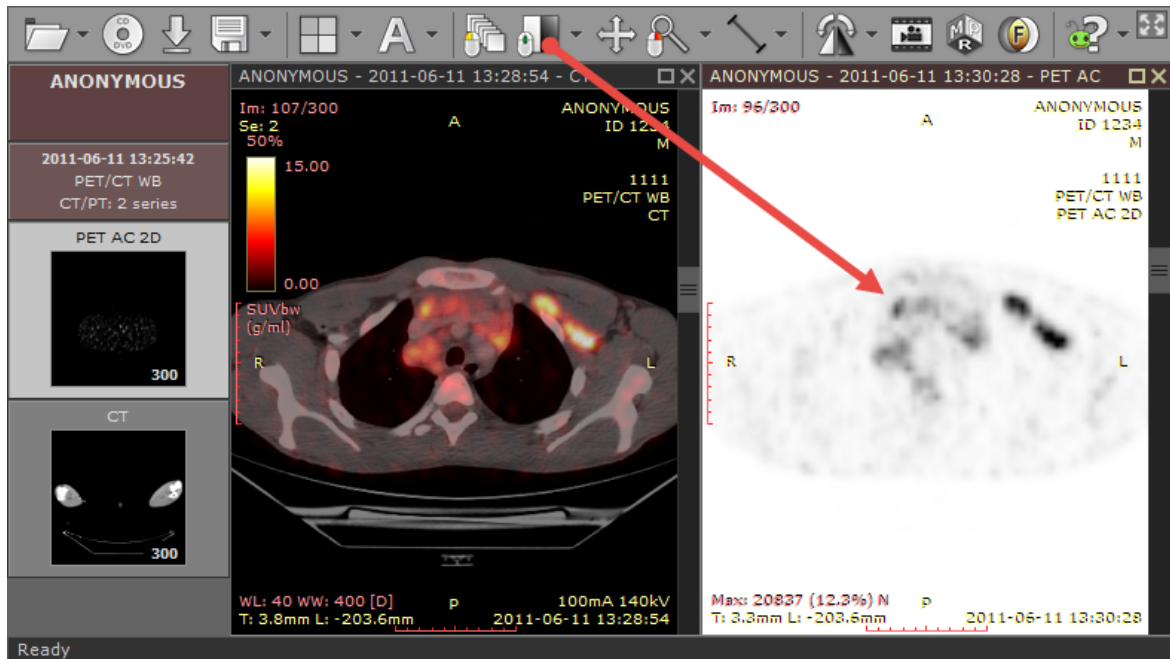


Color scale

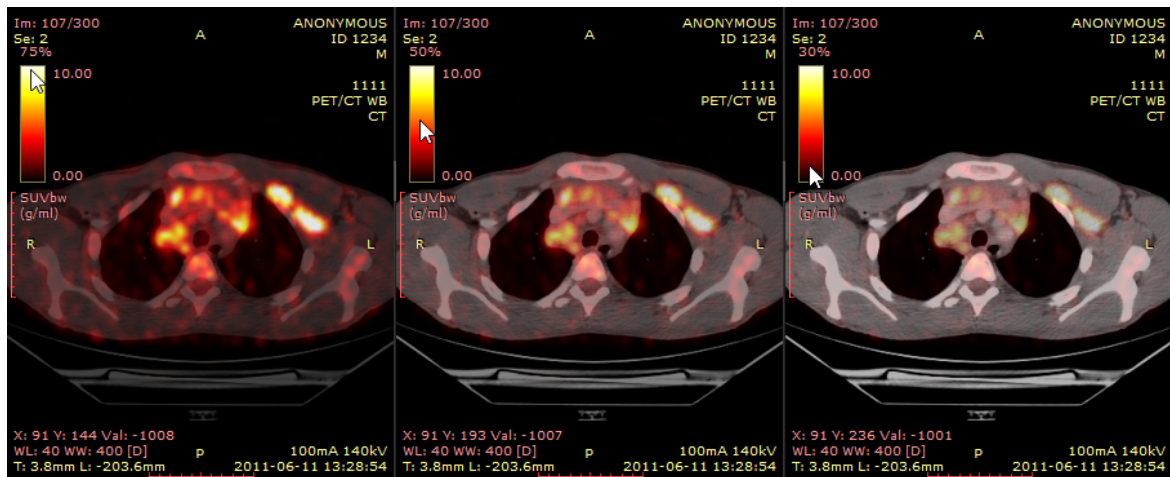
The default color scale used for rendering a fused image is set to "Hot iron". It can be changed by clicking a bar with a color scale to the left of the image.



The range of values represented on a color scale is adjusted by using the windowing tool in the panel with the series used as overlay (PET).

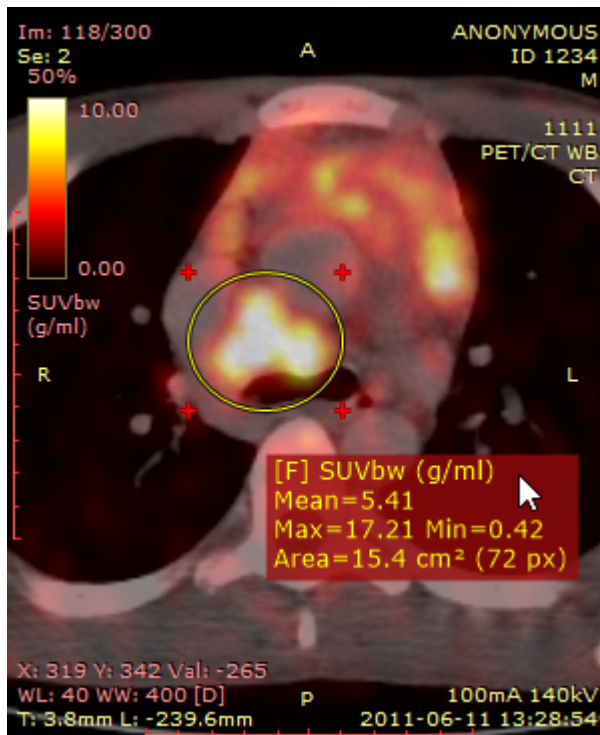


The opacity of fused images is adjusted by pressing the left mouse button over a color scale bar and dragging the mouse up to increase opacity or down to make the fused image more transparent.



SUV measurement

Use the [ellipse tool](#) in the panel with fused images to measure maximum, minimum and average values of SUVbw (Standardized Uptake Value calculated using body weight) for a specified area.



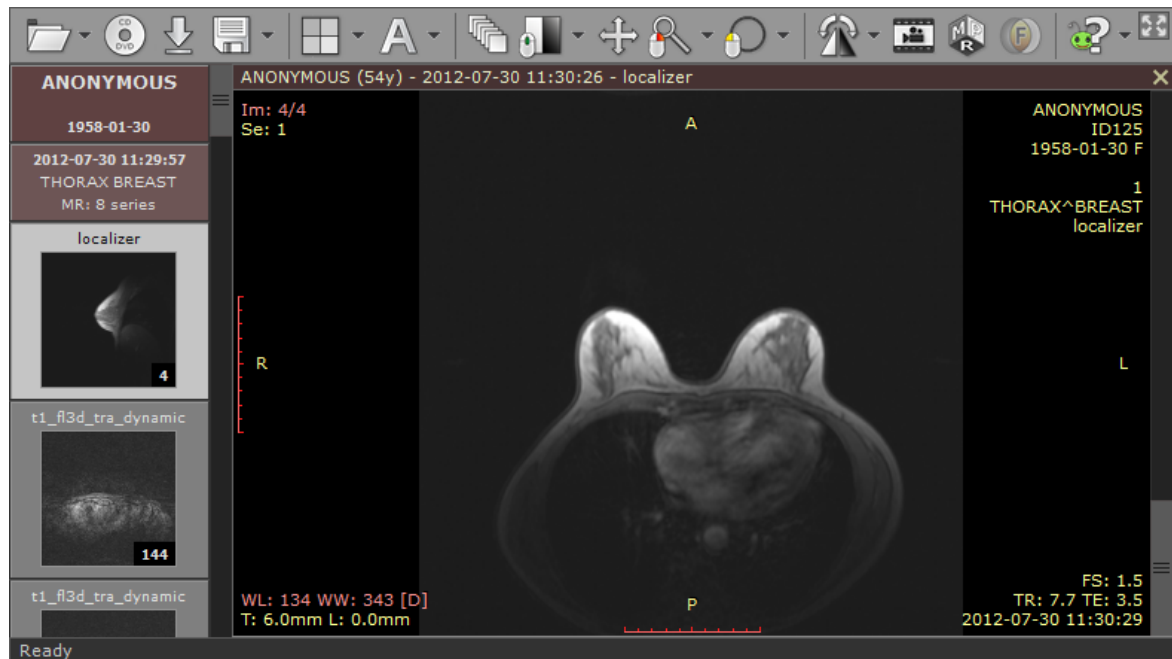
You can learn more about [the SUV measurement in the 2D viewer section](#).

3.10 Time-intensity curves (TIC)

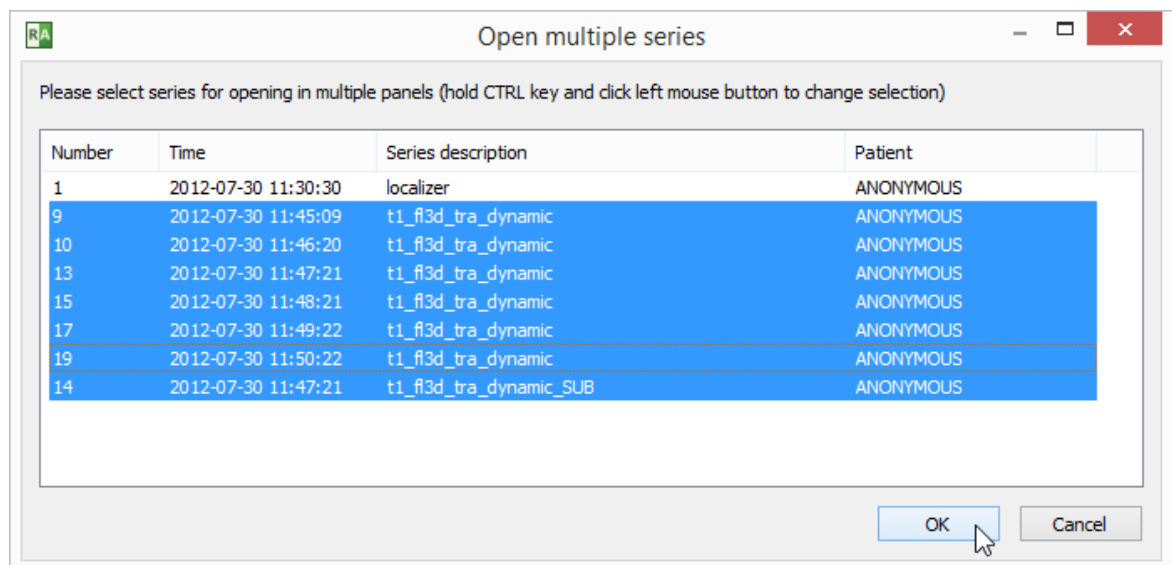
The time-intensity curve tool allows you to visualize the lesions' enhancement behavior (e.g. in Breast MRI) by plotting the signal intensity values over time after the administration of contrast material.

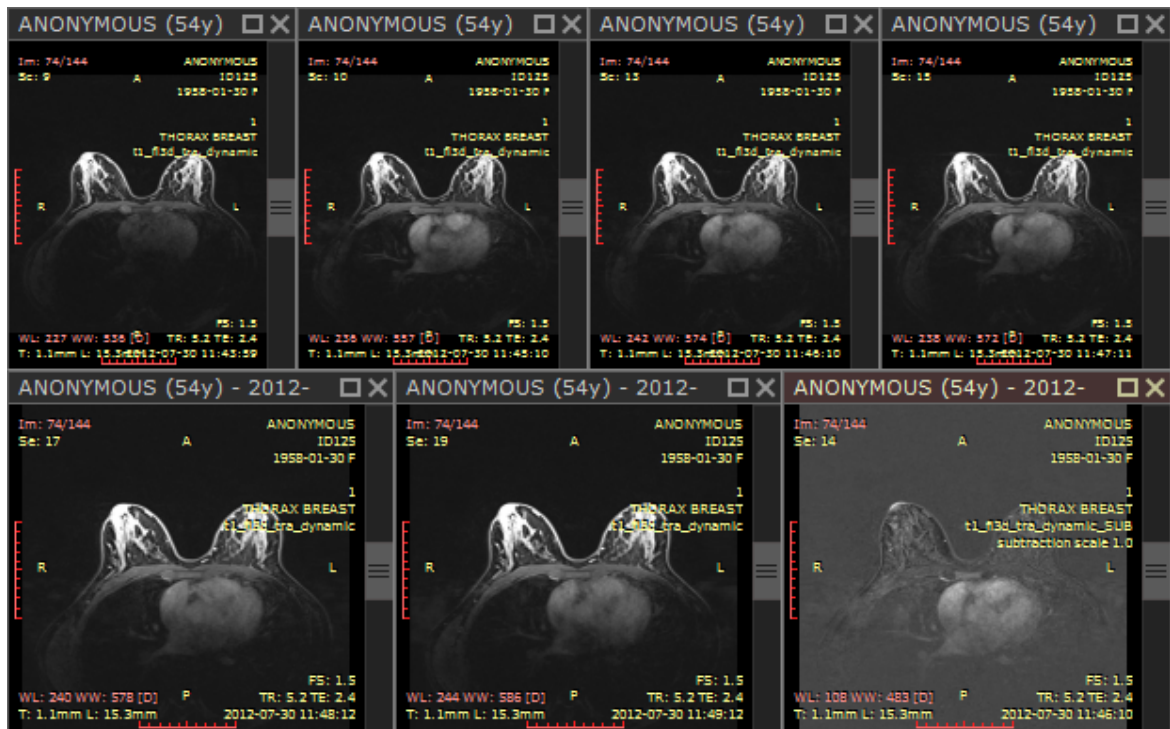
Plotting time-intensity curve

1) Open a study with dynamic sequences.

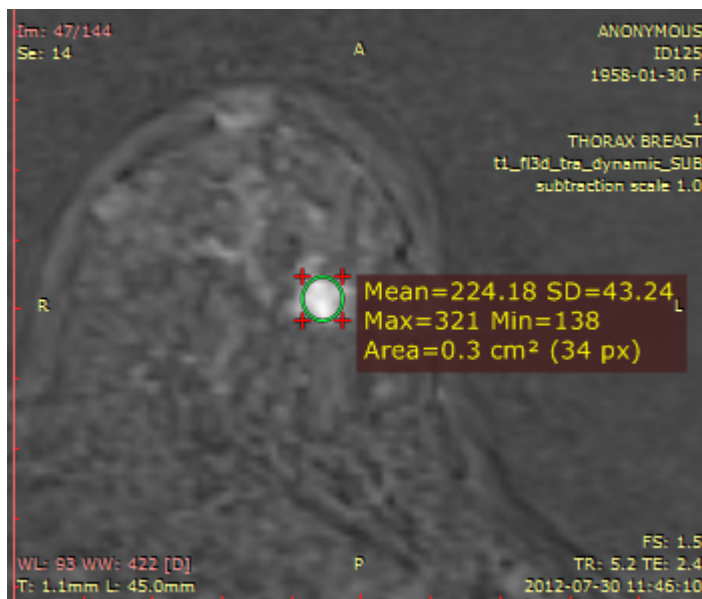


2) Press **F4** to show the "Open multiple series" window, select the dynamic series (including the unenhanced one). A series with subtraction enabled will also come handy to quickly localize lesions.

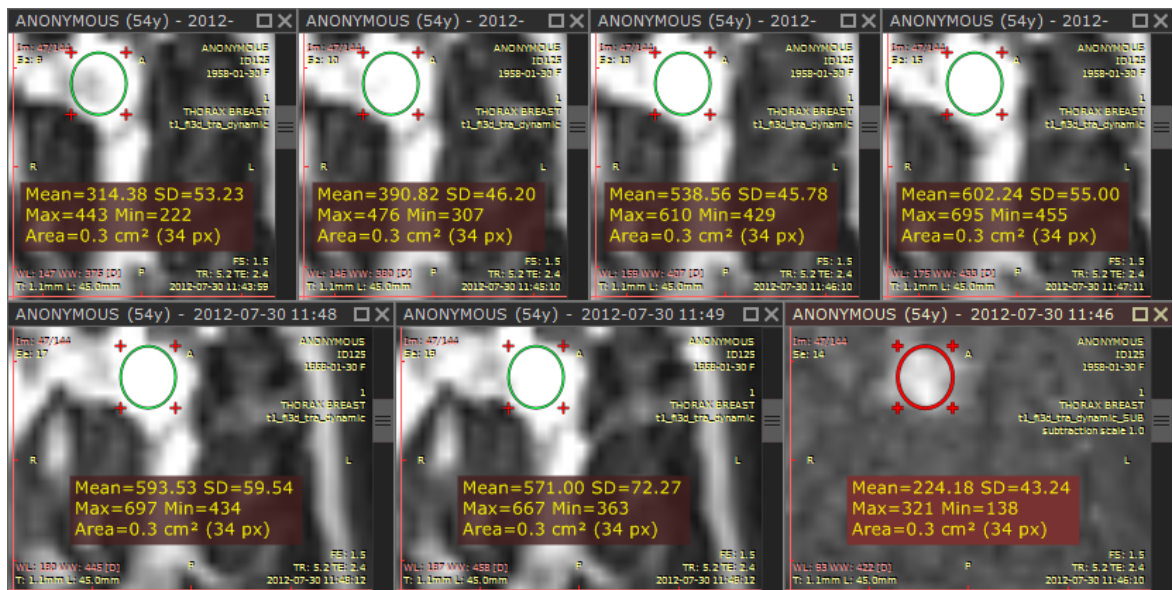




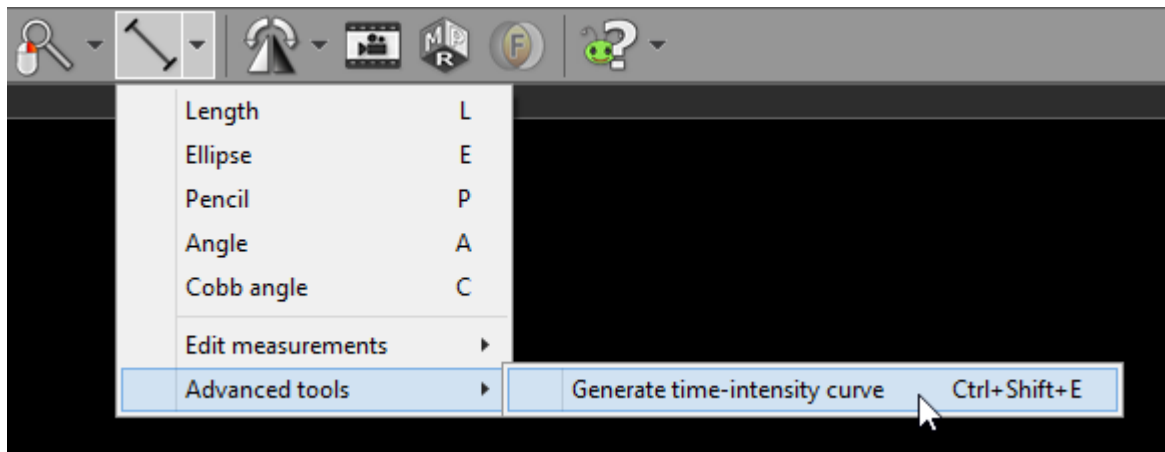
3) Find a lesion that you would like to analyze and draw an ellipse over it.



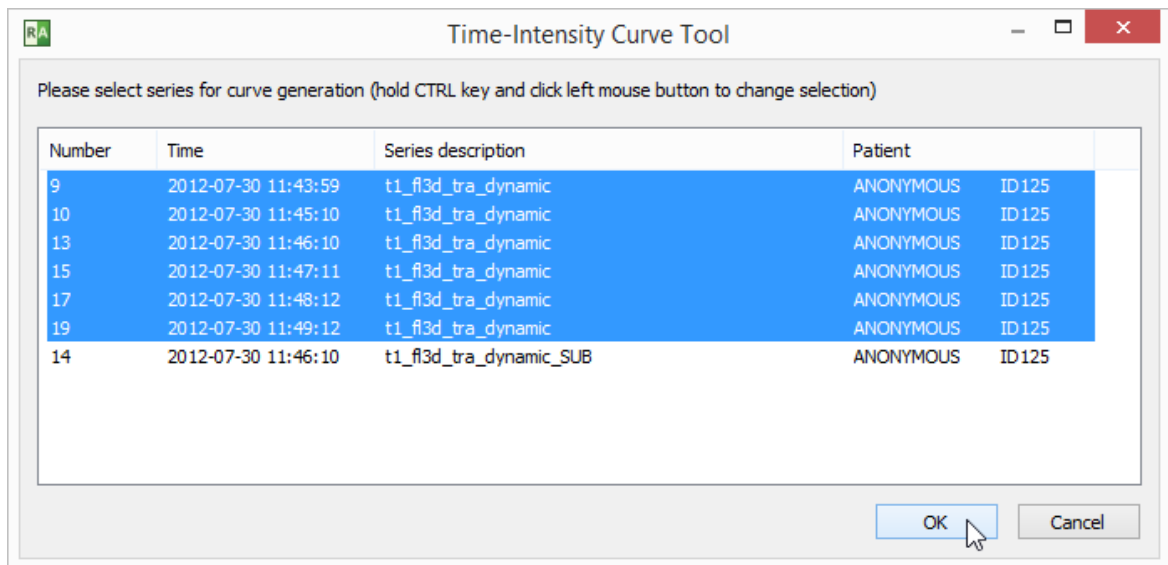
- 4) Quickly duplicate the ellipse ROI into other series by using the **Ctrl + Shift + D** shortcut.



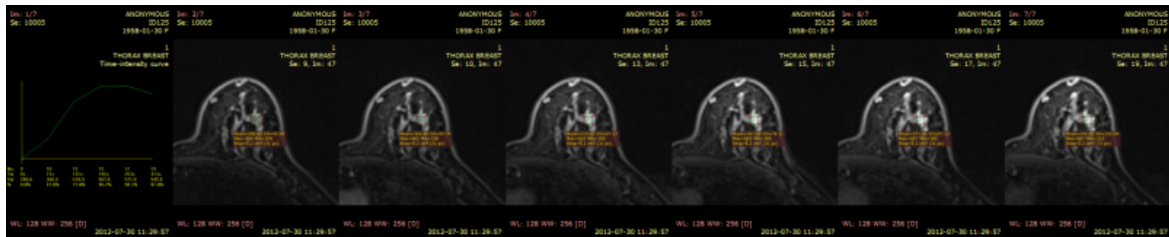
- 5) Select **Time-intensity curve** from **Advanced tools** or use **Ctrl + Shift + E**.



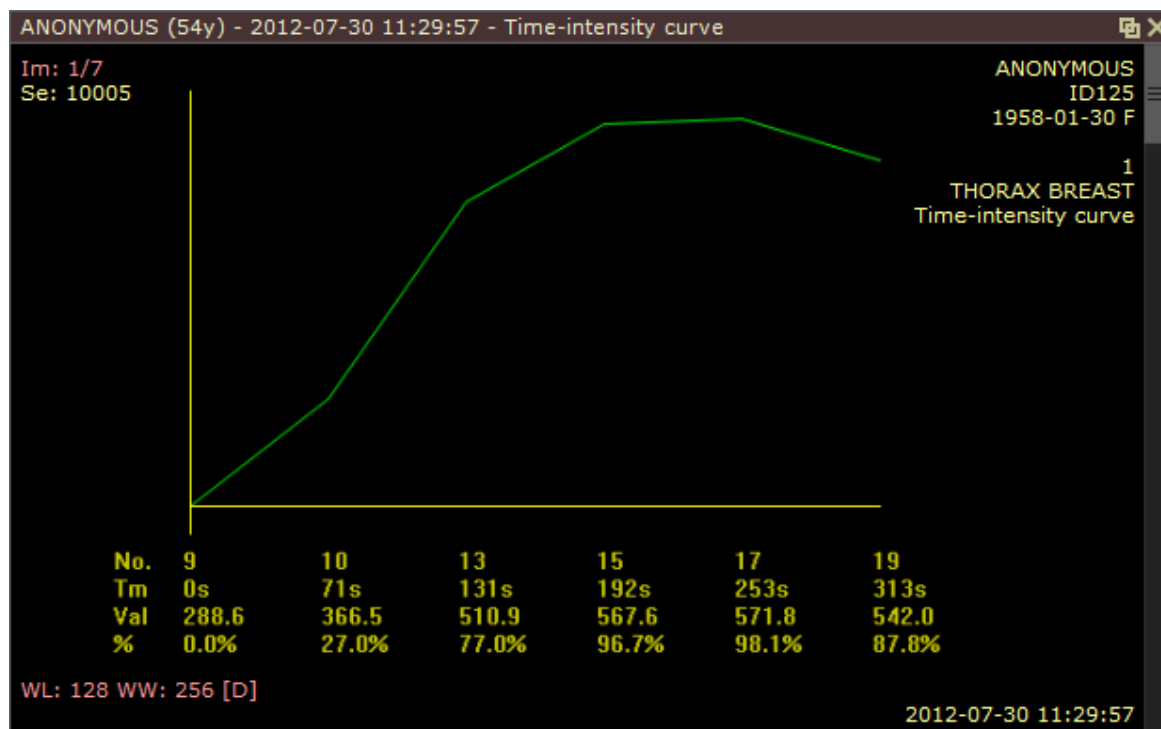
6) RadiAnt DICOM Viewer selects the series for curve generation automatically. Make changes to the selection if you want to use other series. Click **OK** to confirm the selection and generate curve.



7) A new panel will be added. It contains the time-intensity curve and screen captures of the region in dynamic series used for calculations.



8) Maximize the panel (double-click it) to see the detailed curve.



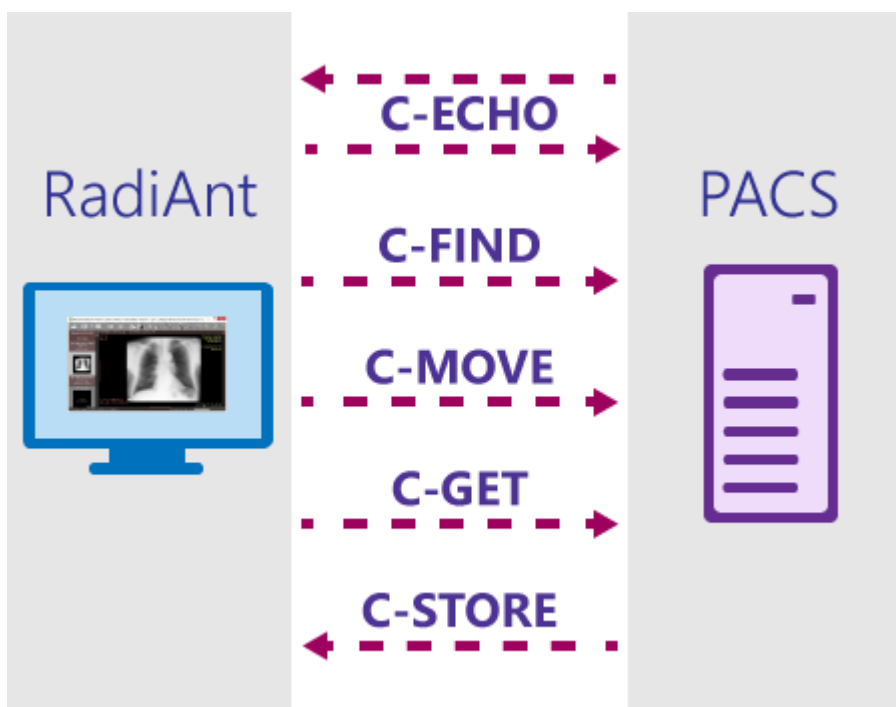
3.11 PACS connectivity

The PACS (Picture Archiving and Communication System) client feature lets the RadiAnt DICOM Viewer query and retrieve studies from other PACS hosts.

Supported service class users/providers are:

- C-ECHO SCU
- C-ECHO SCP
- C-FIND SCU
- C-MOVE-SCU
- C-GET-SCU
- C-STORE-SCP

Received DICOM files can be stored either in a [local database](#) or in a [temporary folder](#) (in such case the files are deleted when RadiAnt closes).

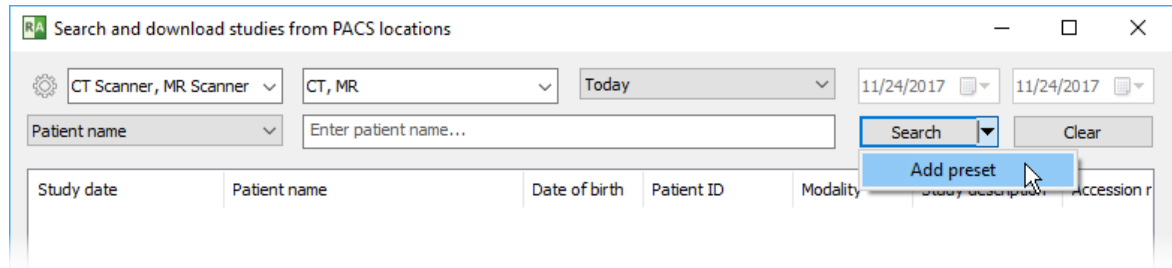


- [Searching and downloading studies](#)
- [Configuration](#)
- [Troubleshooting](#)

3.11.1 PACS search presets

The parameters of any searches you perform on a frequent basis can be saved as presets.

To add a search preset, choose the parameters you want to save (PACS locations, modalities, dates), click the arrow next to the **Search** button, and select **Add preset**.



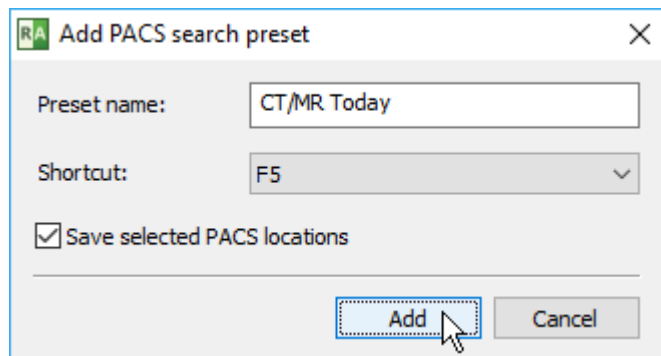
Enter the name of the preset you would like to see displayed in the drop-down menu under the **Search** button.

You can also assign a keyboard shortcut so that you can quickly perform a search with a chosen preset by pressing the **F2 - F12** keys.

Check the Save selected PACS locations box so that the currently chosen PACS locations are saved within the preset.

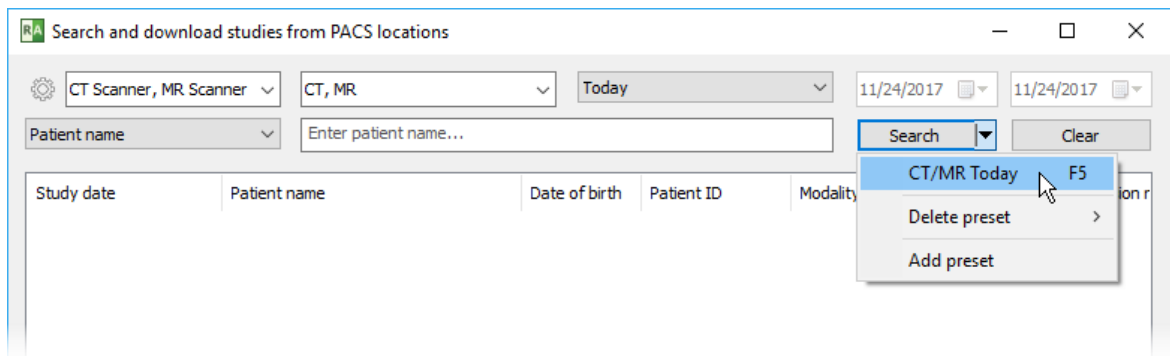
If you leave this box unchecked, the PACS locations will not be changed after the preset is clicked.

Press **Add** to save the search preset. If you hold the **Shift** key down while adding the preset, a spacer will be added before the preset in the drop-down menu.



To perform a search using a saved preset, click the arrow next to the **Search** button and select it from the menu.

You can also use a keyboard shortcut if it was assigned when adding the preset.



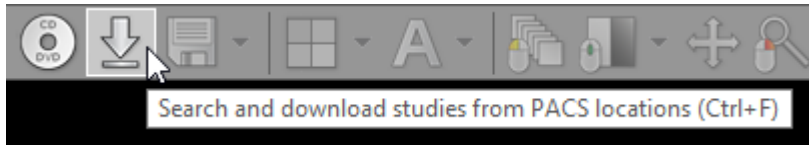
To delete a preset, select **Delete preset** from the drop-down menu and then click the name of the preset you want to remove.



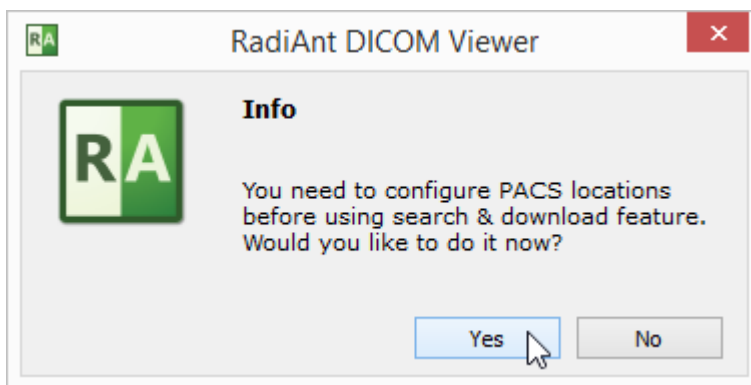
3.11.2 PACS configuration


Basic settings

Open the PACS search and download window:

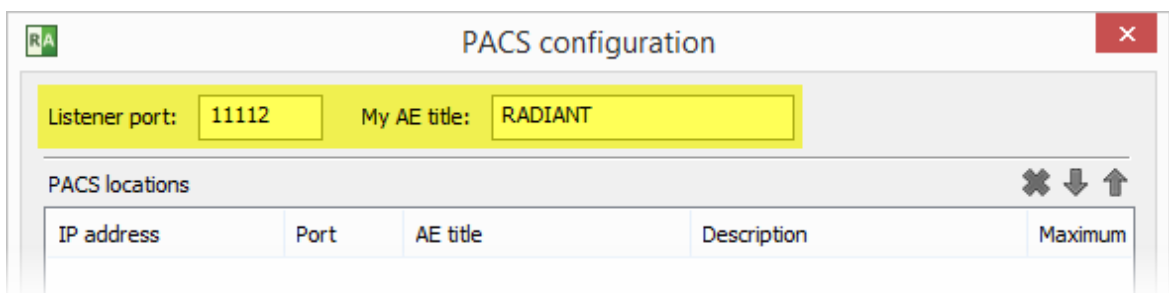


If you do this for the first time, you will be asked to configure PACS settings:



If the configuration was already performed, you have to click the options icon  or use the shortcut **Ctrl + O** to change PACS settings.

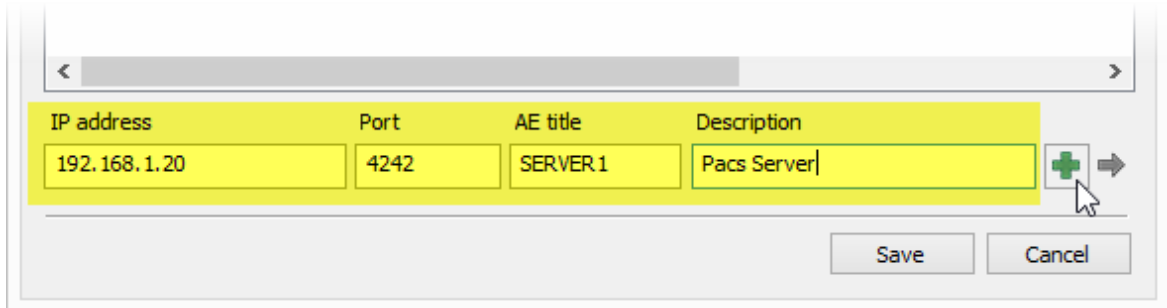
Each networked DICOM application is characterized by three basic parameters: IP address, port and AE (Application Entity) title. The IP address is configured via system network settings. The port on which RadiAnt listens for PACS connections and the AE title are configured in RadiAnt. By default, the port is set to 11112 and the AE title to RADIANT.



Remember to configure your PACS server with the IP, port and AE title of RadiAnt DICOM Viewer. Otherwise, you will not be able to search and download studies to RadiAnt from this server.

Adding a PACS host

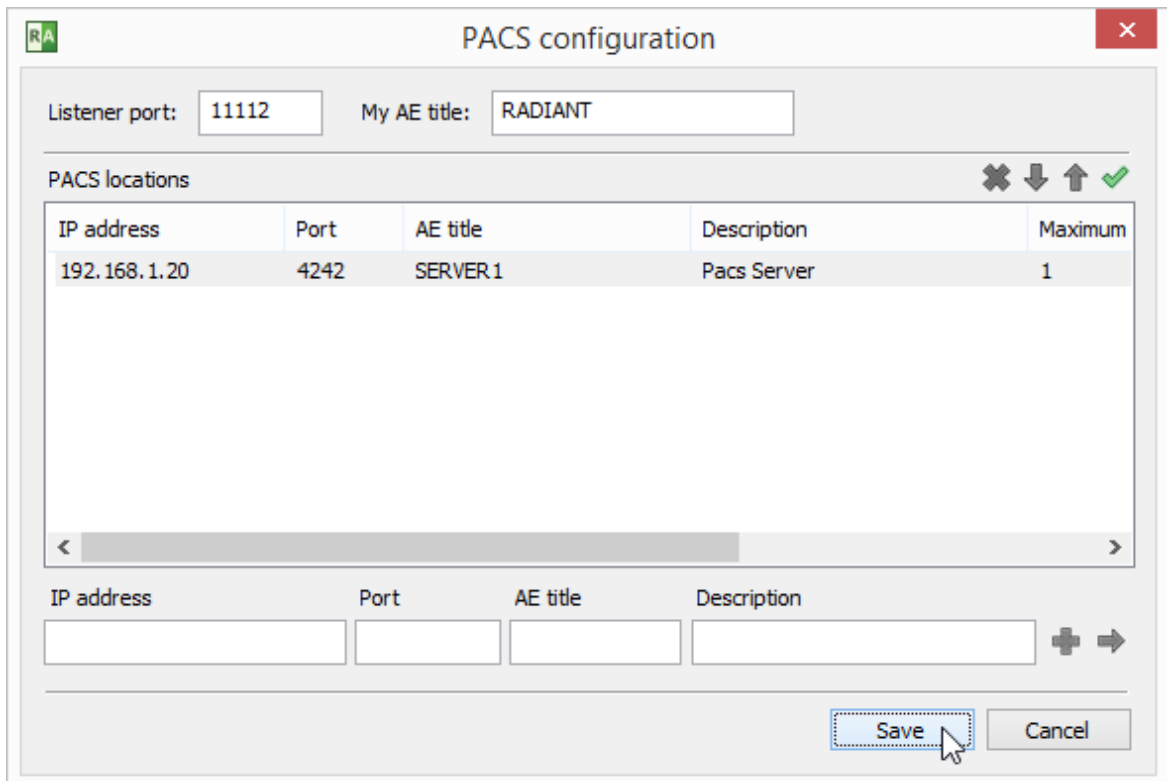
To add a new PACS location, the AE parameters (IP, port and title) of the server are needed. Enter them in the fields below, add a description and press **Enter** or click **Add**.



IP address	Port	AE title	Description
192.168.1.20	4242	SERVER1	Pacs Server

Save Cancel

After clicking **Save**, you are ready to perform your first [search and download](#).



PACS configuration

Listener port: 11112 My AE title: RADIANT

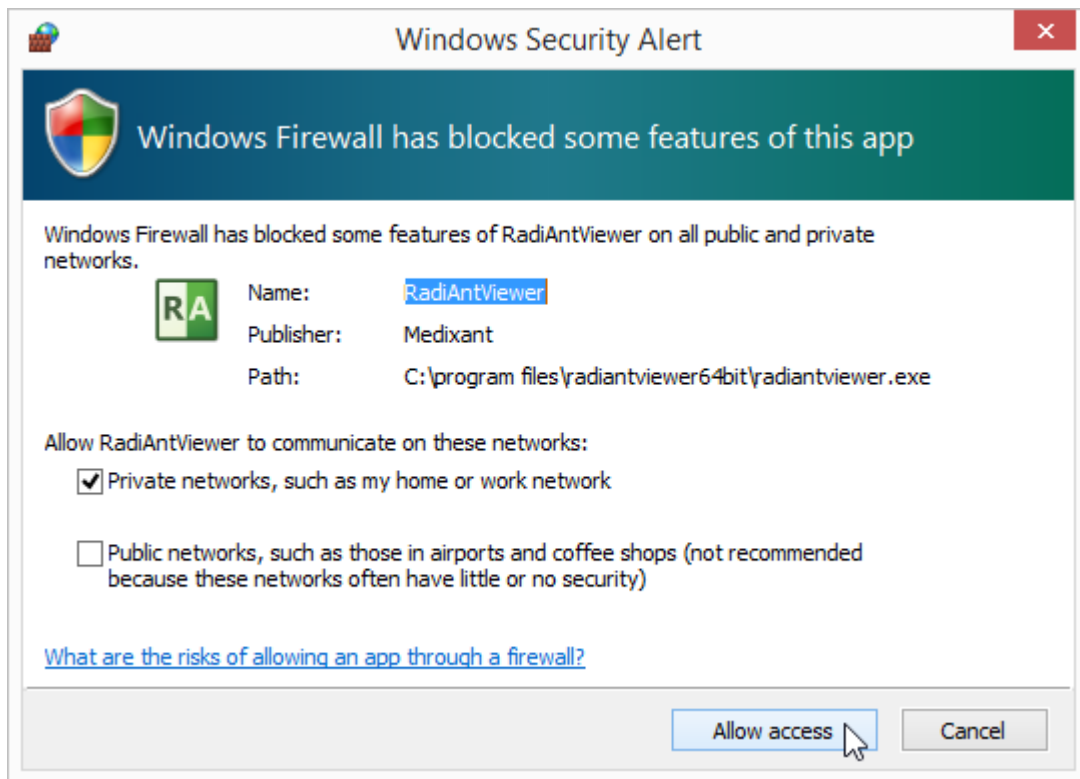
PACS locations

IP address	Port	AE title	Description	Maximum
192.168.1.20	4242	SERVER1	Pacs Server	1

IP address Port AE title Description


Save Cancel

If this is your first configuration and Windows Firewall is enabled, you will be asked to unblock network communication for RadiAnt. Click **Allow access** ; otherwise, you will not be able to download DICOM studies from PACS locations.



Verifying PACS hosts (C-ECHO)

After a new PACS location is added to the list, a proper configuration and network connectivity can be verified using the C-ECHO DICOM service.

Click the  button or press **F2** to perform a DICOM ping (C-ECHO) on all hosts in the list. The locations awaiting verification will be presented with a yellow background. After positive verification, the host's background becomes green. If the connection and association with a host cannot be established, the background turns red.

PACS configuration

Listener port: My AE title:

PACS locations

IP address	Port	AE title	Description	Maximum
192.168.1.20	4242	SERVER1	Pacs Server	4
192.168.1.39	104	CT	CT Scanner	1
192.168.1.40	104	MR	MR Scanner	1
192.168.1.101	4006	AW01	Workstation 1	2
192.168.1.102	4006	AW02	Workstation 2	2

IP address: Port: AE title: Description:

Modifying PACS hosts

To change some parameters of a PACS location, select it in the list, change the desired field and press **Enter** or click the arrow icon

When you have several PACS location configured, you can change their priority in search by selecting them and clicking the up and down arrows (or using the shortcuts **Ctrl + Up** or **Ctrl + Down**).

If several locations are searched at the same time and give results with studies having the same study UID, the location with higher priority will be used to download the study.

To delete the selected location, click the button or press **Ctrl + Del**.

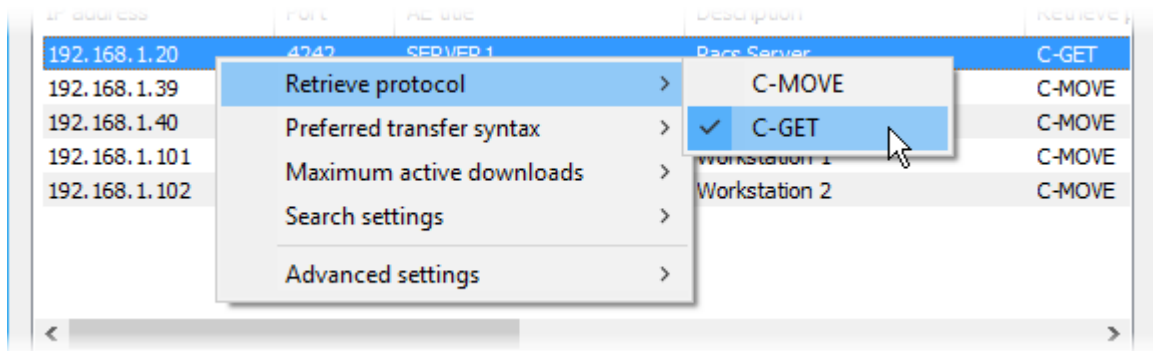
PACS locations

IP address	Port	AE title	Description	Retrieve p
192.168.1.20	4242	SERVER1	Pacs Server	C-GET
192.168.1.39	104	CT	CT Scanner	C-MOVE
192.168.1.40	104	MR	MR Scanner	C-MOVE
192.168.1.101	4006	AW01	Workstation 1	C-MOVE
192.168.1.102	4006	AW02	Workstation 2	C-MOVE

Advanced settings

Click the right mouse button on the selected PACS location to display the pop-up menu.

Select **Retrieve protocol** to switch between C-MOVE and C-GET protocols to retrieve studies from PACS locations.



By default, the C-MOVE protocol is used. It requires that:

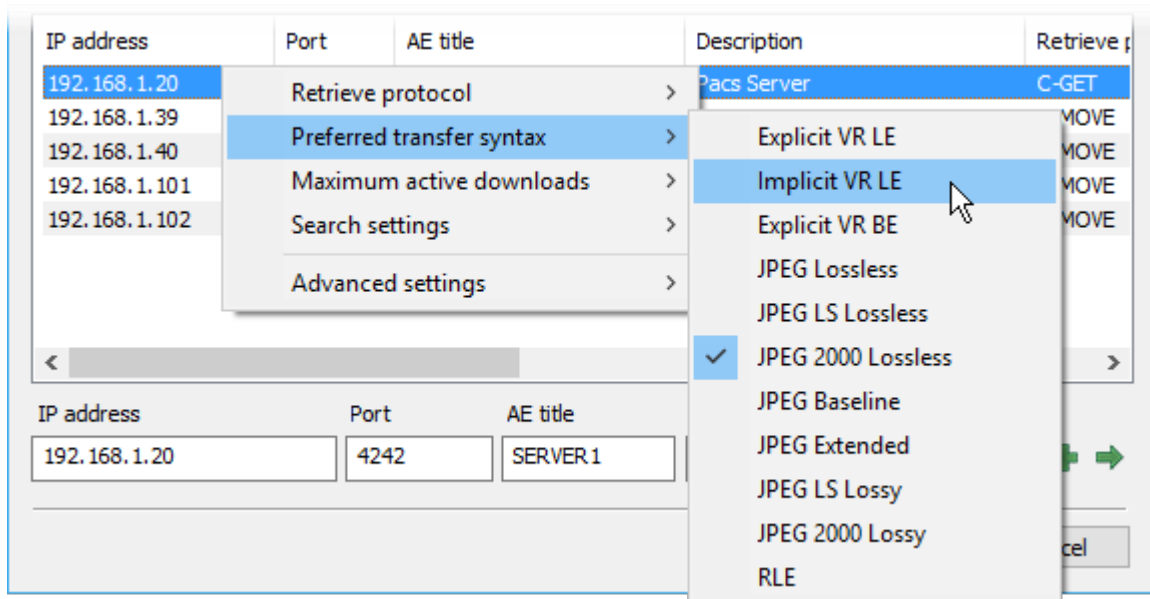
- RadiAnt is able to listen to and accept inbound connections.
- The firewall allows such inbound connections.
- The NAT (if used) is configured to forward the inbound connections to RadiAnt.
- The PACS location is configured with RadiAnt's AE title, port, and IP address (since only the RadiAnt's AE title is sent in the C-MOVE request).

Whereas with the C-GET protocol:

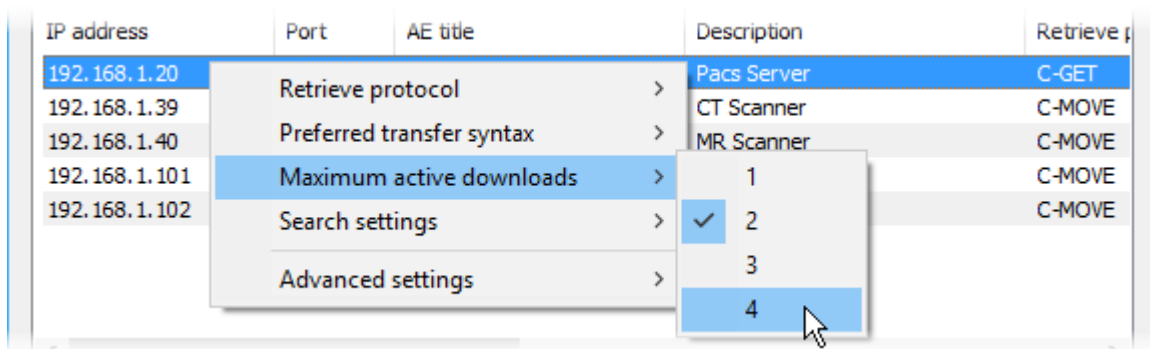
- RadiAnt does not need to be able to respond to inbound connections.
- You do not have to configure firewalls to allow inbound connection or perform NAT.
- There is no need to configure the PACS location so that it knows RadiAnt's AE title, port, and IP address (only if required for access control).

Due to the above advantages, the C-GET protocol can be suitable for use beyond the firewall or NAT; however, unfortunately, it is not commonly implemented in PACS servers.

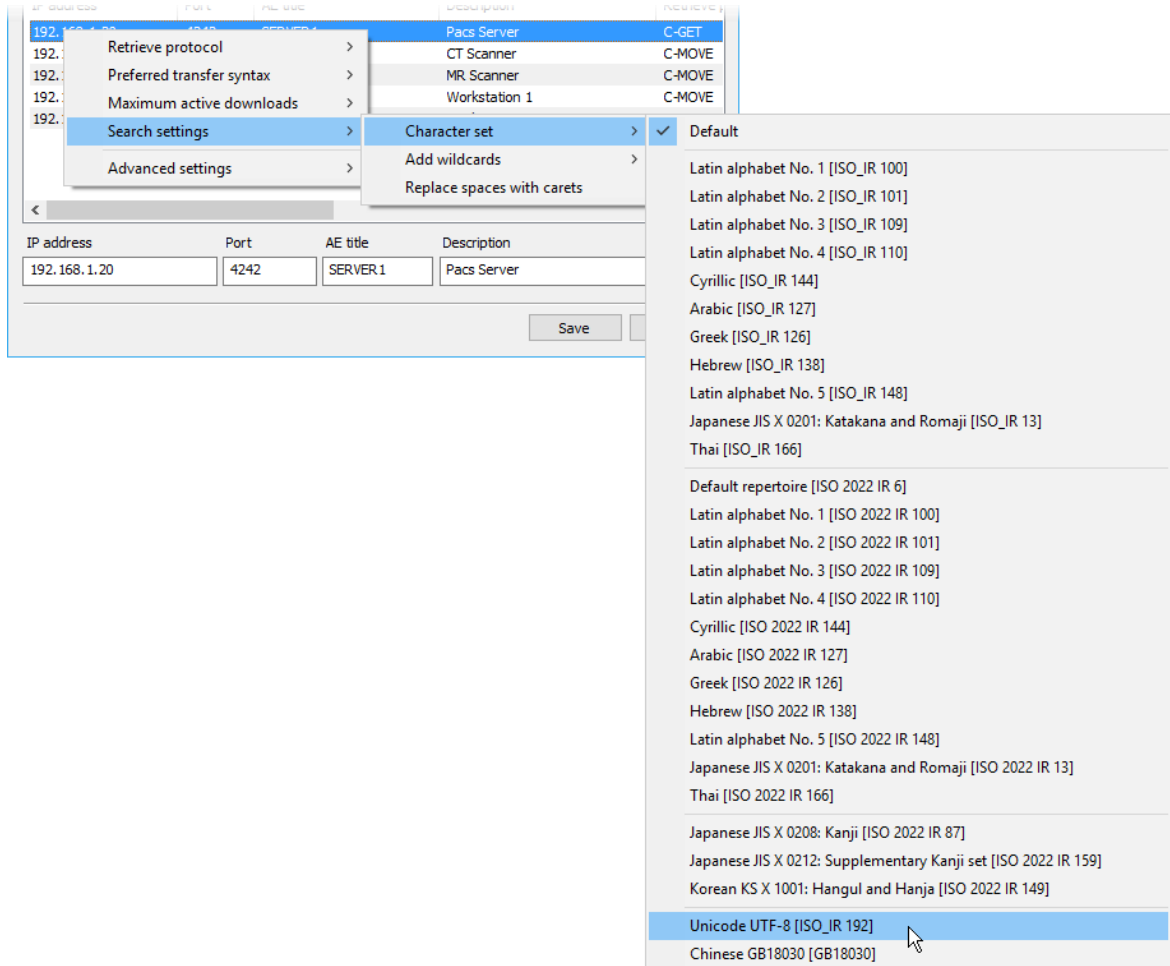
Select **Preferred transfer syntax** to change the encoding used when communicating with a PACS host. By default, the Explicit VR Little Endian transfer syntax is used. However, you may try other encodings if some problems with communication are encountered.



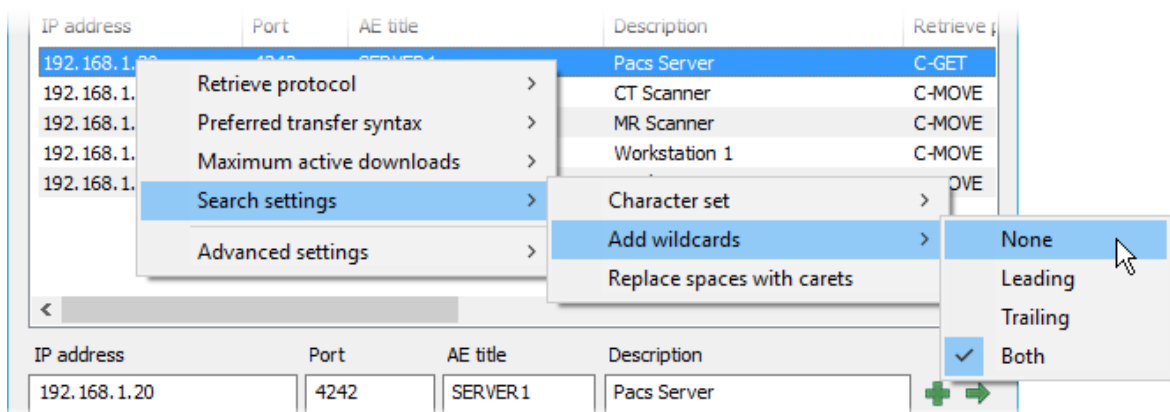
The **Maximum active downloads** option lets you set the limit of concurrent downloads from one PACS host. The default value is 1. Usually, when set to a larger value, it will speed up the transfer of multiple studies. However, changing this value may also lead to connection timeouts and errors, depending on specific PACS server implementation.



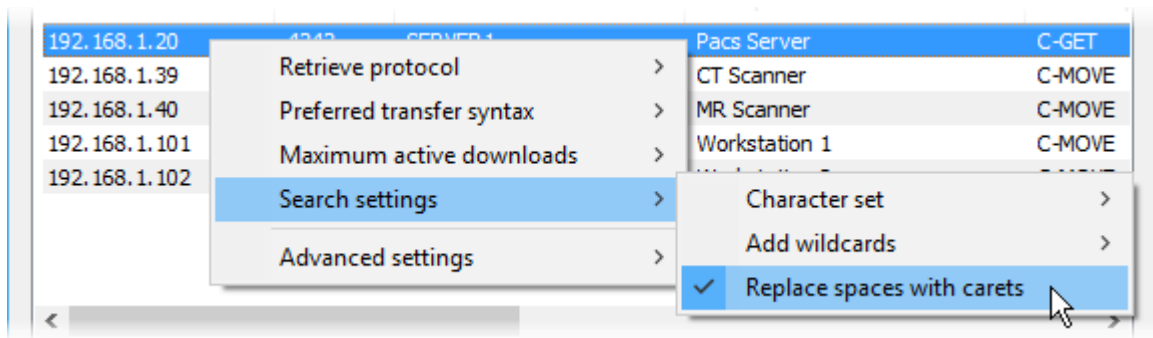
Select **Search settings > Character set** to choose the character encoding used in PACS search queries. By default, searches are performed using the standard ASCII character set. This option allows you search names using non-English characters (note that your PACS server also has to support the chosen character set).



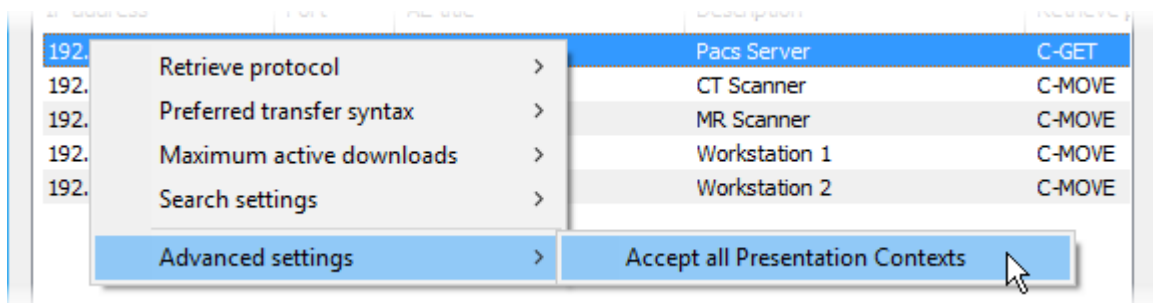
When searching for studies on PACS locations leading and trailing wildcards (*) are automatically added to your queries. This means you only need to type part of the name to view all the results that include the text you entered. This behavior can be changed by using the **Search settings > Add wildcards** option.



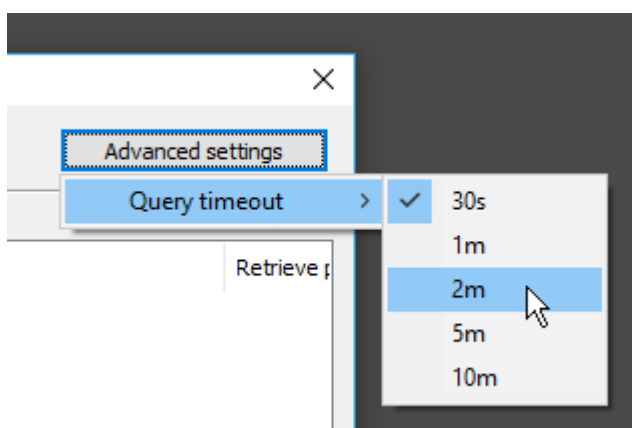
Select **Search settings > Replace spaces with carets** to replace spaces with carets (^) in your PACS queries. This option is disabled by default.



Select **Advanced settings > Accept all Presentation Contexts** to disable rejection of unsupported abstract syntaxes during association negotiation. This option may be required for RadiAnt DICOM Viewer to work with some specific PACS server implementations. It is disabled by default.



Click the **Advanced settings** button and select **Query timeout** to change the maximum wait time for the incoming data after the PACS download is started. Some PACS servers may require a longer time before they retrieve the study from cold storage and start sending it.



3.11.3 PACS troubleshooting

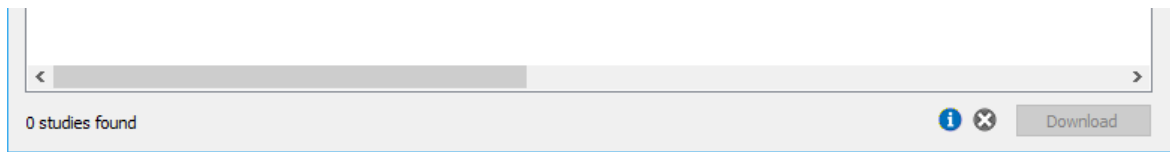
Many different variables can lead to issues with PACS connectivity. However, the symptoms generally fall into two groups:

1. [PACS search does not work](#) (and, consequently, neither do downloads)
2. PACS search yields results; however, trying to download studies always fails. In this group, we can define two subgroups, depending on the retrieve protocol chosen for the PACS location:
 - a. [PACS locations using C-MOVE protocol](#) (default)
 - b. [PACS locations using C-GET protocol](#)

Click the appropriate scenario to see the checklist for your problem.

If the problems with the connection persist, use a local IT support that specializes in the PACS field, as resolving the connectivity problems usually requires direct access to your local network and your PACS server configuration.

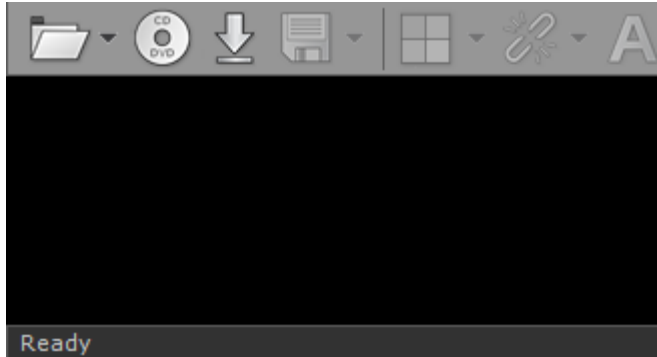
When I press the search button in the PACS Search window, the results area is empty.



1. Check for general network connectivity errors, such as an unplugged network cable, incorrect IP address, network downtime, or similar problem. You should be able to ping one machine from the other.
2. Verify the connectivity between RadiAnt and a PACS host using the [C-ECHO service](#). The connection has to be verifiable in both directions: From RadiAnt to the PACS host, and vice versa. Otherwise, you will not be able to search and download studies from the PACS host.
3. You have to use the proper parameters of your PACS server (IP, port, AE title) in the PACS host configuration.
4. Make sure that your PACS server is configured with your RadiAnt computer's IP, port, and AE title.
5. The port and AE title used in RadiAnt must be unique, which means that you cannot have another DICOM viewer installed on the same machine with the same parameters. You also cannot use the same AE title for DICOM viewers installed on different machines.
6. A fixed IP address has to be assigned to your RadiAnt computer. If you connect from a remote site via a cable or DSL connection with a dynamic IP address, you will not be able to receive DICOM studies.
7. There must be no firewall that blocks the communication:
 - a. From the RadiAnt computer to the configured port on the server.
 - b. From the server to the RadiAnt listener port configured in PACS options.

I can search studies, but when I try to download a study, no images are displayed in the viewer window.

The C-MOVE retrieve protocol is selected for the PACS location.



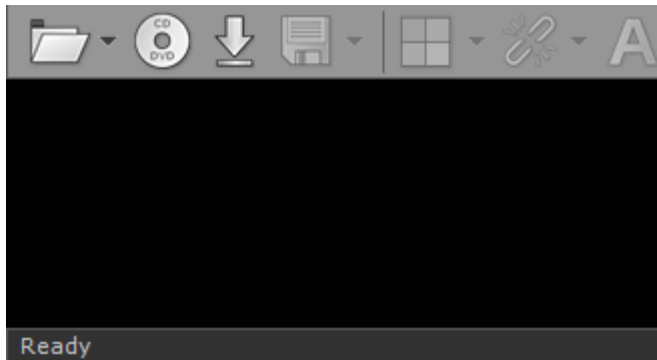
Make sure that [the selected retrieve protocol is C-MOVE](#):

IP address	Port	AE title	Description	Retrieve protocol
192.168.1.20	4242	SERVER1	Pacs Server	C-MOVE

1. Verify the connectivity between RadiAnt and a PACS host using the [C-ECHO service](#). The connection has to be verifiable in both directions: from RadiAnt to the PACS host and vice versa. Otherwise, you will not be able to search and download studies from the PACS host.
2. Make sure that your PACS server is configured with your RadiAnt computer's IP, port and AE title.
3. The port and AE title used in RadiAnt must be unique, which means that you cannot have another DICOM viewer installed on the same machine with the same parameters. You also cannot use the same AE title for DICOM viewers installed on different machines.
4. A fixed IP address has to be assigned to your RadiAnt computer. If you connect from a remote site via a cable or DSL connection with a dynamic IP address, you will not be able to receive DICOM studies.
5. There must be no firewall that blocks the communication from the server to the RadiAnt listener port configured in PACS options.
6. You can try changing the preferred transfer syntax used in communication with the specific PACS host in [RadiAnt PACS settings](#).
7. You may want to try and set the Accept All Presentation Contexts option for the specific PACS host in [RadiAnt PACS settings](#).

I can search studies, but when I try to download a study, no images are displayed in the viewer window.

The C-GET retrieve protocol is selected for the PACS location.



Make sure that [the selected retrieve protocol is C-GET](#):

IP address	Port	AE title	Description	Retrieve protocol
192.168.1.20	4242	SERVER1	Pacs Server	C-GET

1. Make sure that your PACS server supports the C-GET protocol. It is not as commonly implemented as the C-MOVE protocol. The following servers/workstations have been verified to work with RadiAnt using C-GET protocol: DCM4CHEE, DCMTK (dcmqrdb), Horos, Osirix.
2. Make sure that RadiAnt's PC (IP, AE title) is allowed to retrieve studies from your PACS server (check the configuration of the server).
3. You can try changing the preferred transfer syntax used in communication with the specific PACS host in [RadiAnt PACS settings](#).

3.11.4 PACS integration

RadiAnt DICOM Viewer can be integrated with other systems via [command line arguments](#) or [radiant:// URL protocol](#). You can launch the viewer, start downloading specific DICOM studies and display them using [simple commands](#) or by clicking specially crafted [radiant:// links](#) in web browsers.

Use the argument "-pstv" followed by one or more pairs of tag ID/value:

```
radiantviewer.exe -pstv 00080050 "ACCESSION-NUMBER"
```

```
radiant://?n=pstv&v=00080050&v=%22ACCESSION-NUMBER%22
```

1. To download a specific study (StudyUID needs to be passed)

```
radiantviewer.exe -pstv 0020000D "StudyUID"
```

```
radiant://?n=pstv&v=0020000D&v=%22StudyUID%22
```

2. To download a specific series (StudyUID and SeriesUID need to be passed)

```
radiantviewer.exe -pstv 0020000D "StudyUID" 0020000E "SeriesUID"
```

```
radiant://?n=pstv&v=0020000D&v=%22StudyUID%22&v=0020000E&v=%22SeriesUID%22
```

3. To download a specific image (StudyUID, SeriesUID and SOPInstanceUID need to be passed)

```
radiantviewer.exe -pstv 0020000D "StudyUID" 0020000E "SeriesUID" 00080018 "SopInstanceUID"
```

```
radiant://?n=pstv&v=0020000D&v=%22StudyUID%22&v=0020000E&v=%22SeriesUID%22&v=00080018&v=%22SopInstanceUID%22
```

By default, all PACS nodes configured in RadiAnt are searched. You can define only one PACS node by using "-paet" and its AE title:

```
radiantviewer.exe -paet MYPACSAETITLE -pstv 00100020 "PATIENTID"
```

```
radiant://?n=paet&v=MYPACSAETITLE&n=pstv&v=00100020&v=%22PATIENTID%22
```

Downloading multiple studies/series/images

Multiple studies/series/images can be downloaded using only one command by passing several -pstv arguments.

1. Two studies

```
radiantviewer.exe -pstv 0020000D "STUDYUID1" -pstv 0020000D "STUDYUID2"
```

```
radiant://?n=pstv&v=0020000D&v=%22STUDYUID1%22&n=pstv&v=0020000D&v=%22STUDYUID2%22
```

2. Two series of the same study

```
radiantviewer.exe -pstv 0020000D "STUDYUID1" -pstv 0020000E "SERIESUID1" -pstv 0020000E "SERIESUID2"
```

```
radiant://?n=pstv&v=0020000D&v=%22STUDYUID1%22&n=pstv&v=0020000E&v=%22SERIESUID1%22&n=pstv&v=0020000E&v=%22SERIESUID2%22
```

3. Different series from two different studies

```
radiantviewer.exe -pstv 0020000D "STUDYUID1" -pstv 0020000E "SERIESUID1" -pstv 0020000E "SERIESUID2" -pstv 0020000D "STUDYUID2" -pstv 0020000E "SERIESUID3" -pstv 0020000E "SERIESUID4"
```

```
radiant://?n=pstv&v=0020000D&v=%22STUDYUID1%22&n=pstv&v=0020000E&v=%22SERIESUID1%22&n=pstv&v=0020000E&v=%22SERIESUID2%22&n=pstv&v=0020000D&v=%22STUDYUID2%22&n=pstv&v=0020000E&v=%22SERIESUID3%22&n=pstv&v=0020000E&v=%22SERIESUID4%22
```

4. Several images from different series of the same study

```
radiantviewer.exe -pstv 0020000D "STUDYUID1" -pstv 0020000E "SERIESUID1" -pstv 00080018 "INSTANCEUID1" -pstv 00080018 "INSTANCEUID2" -pstv 0020000E "SERIESUID2" -pstv 00080018 "INSTANCEUID3" -pstv 00080018 "INSTANCEUID4"
```

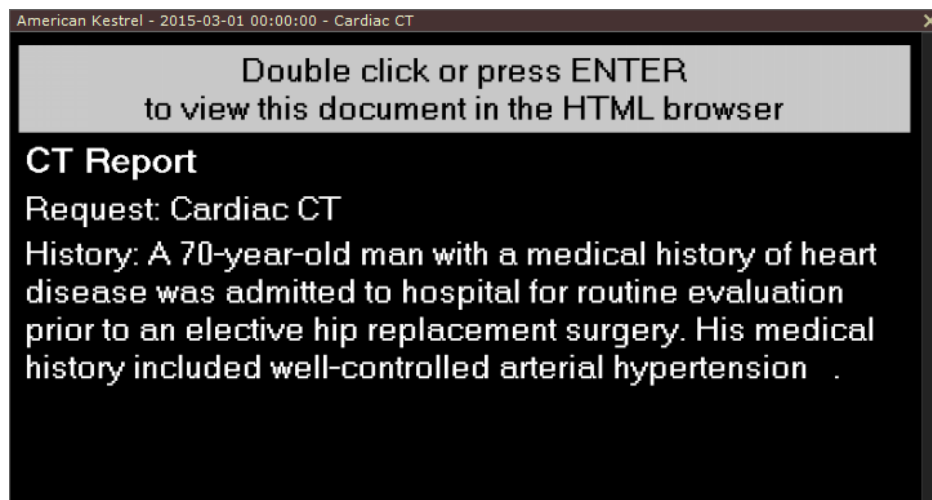
```
radiant://?n=pstv&v=0020000D&v=%22STUDYUID1%22&n=pstv&v=0020000E&v=%22SERIESUID1%22&n=pstv&v=00080018&v=%22INSTANCEUID1%22&n=pstv&v=00080018&v=%22INSTANCEUID2%22&n=pstv&v=0020000E&v=%22SERIESUID2%22&n=pstv&v=00080018&v=%22INSTANCEUID3%22&n=pstv&v=00080018&v=%22INSTANCEUID4%22
```

3.12 Special types of DICOM files

3.12.1 Structured report (SR)

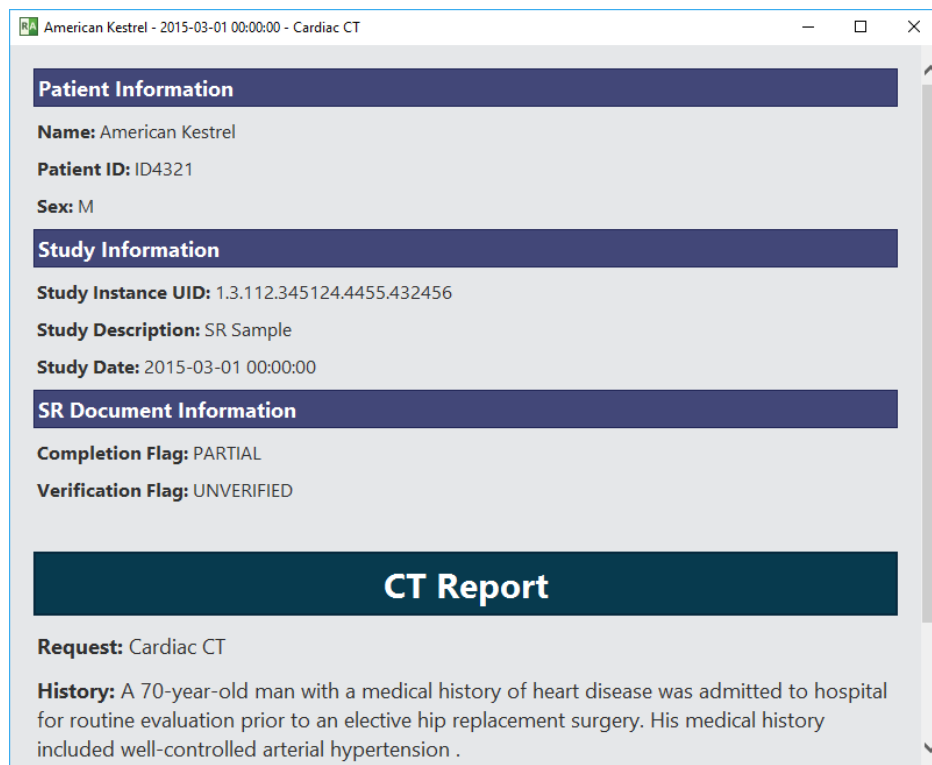
Structured report (SR) files are special type of DICOM files designed for exchanging clinical information and findings.

They are rendered in the viewport as images, but they can be also browsed more conveniently as text.



Press **Enter** or double click the panel with the SR document to open it in the HTML browser.

Press **Ctrl + Enter** or double click the panel with the SR document with the Ctrl key pressed to open it in the external web browser so that the report can be easily printed or saved in the HTML file.

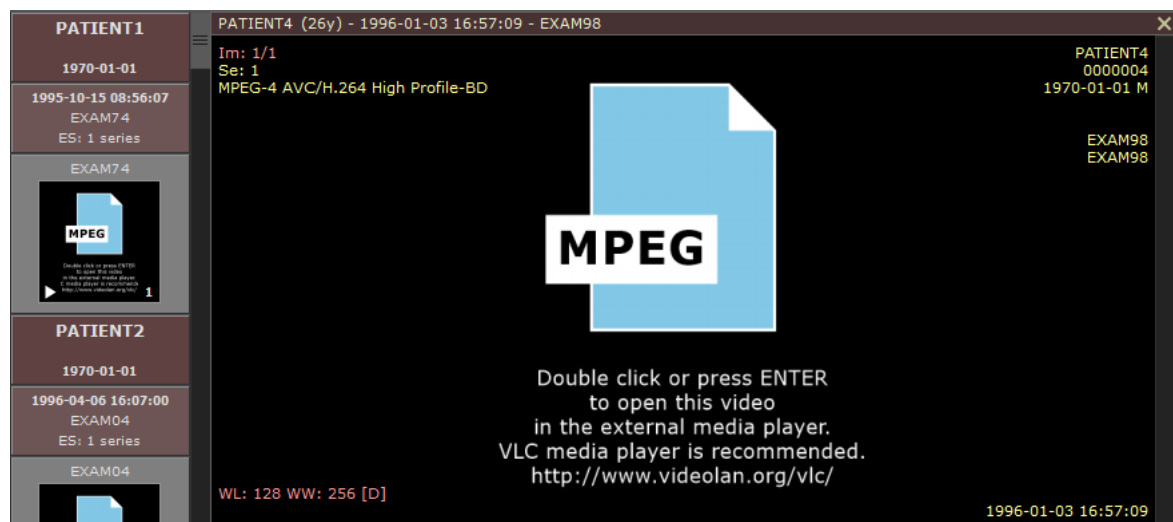


3.12.2 MPEG2/4 video

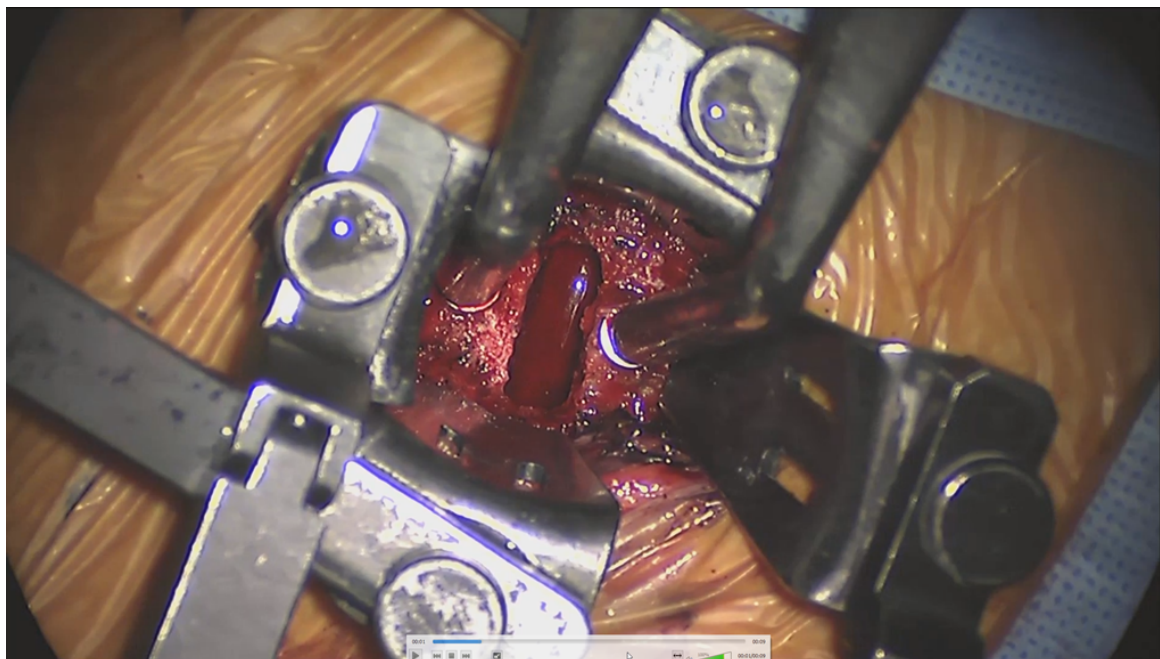
RadiAnt DICOM Viewer can read DICOM files containing video and audio compressed with either MPEG2 or MPEG4 codecs:

Transfer syntax UID	Transfer syntax name
1.2.840.10008.1.2.4.100	MPEG-2 Main Profile Main Level
1.2.840.10008.1.2.4.101	MPEG-2 Main Profile High Level
1.2.840.10008.1.2.4.102	MPEG-4 AVC/H.264 High Profile / Level 4.1
1.2.840.10008.1.2.4.103	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1

They are opened using an external media player. Not all formats can be played using the default Windows media player, hence VLC media player (<http://www.videolan.org/vlc/>), which can play all video formats, is recommended.

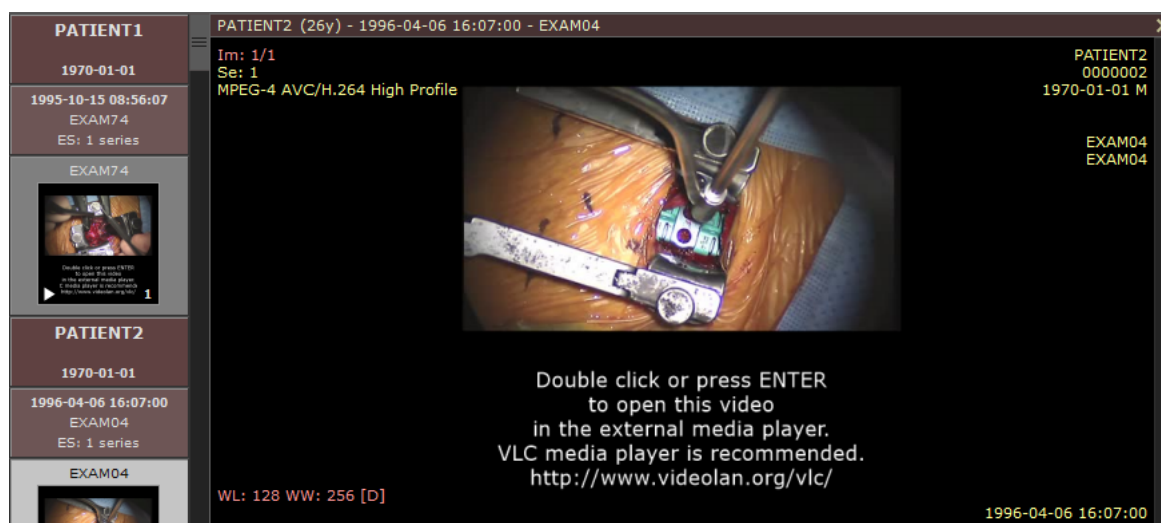


Press **Enter** or double click the panel with the video document to open it in the external media player.



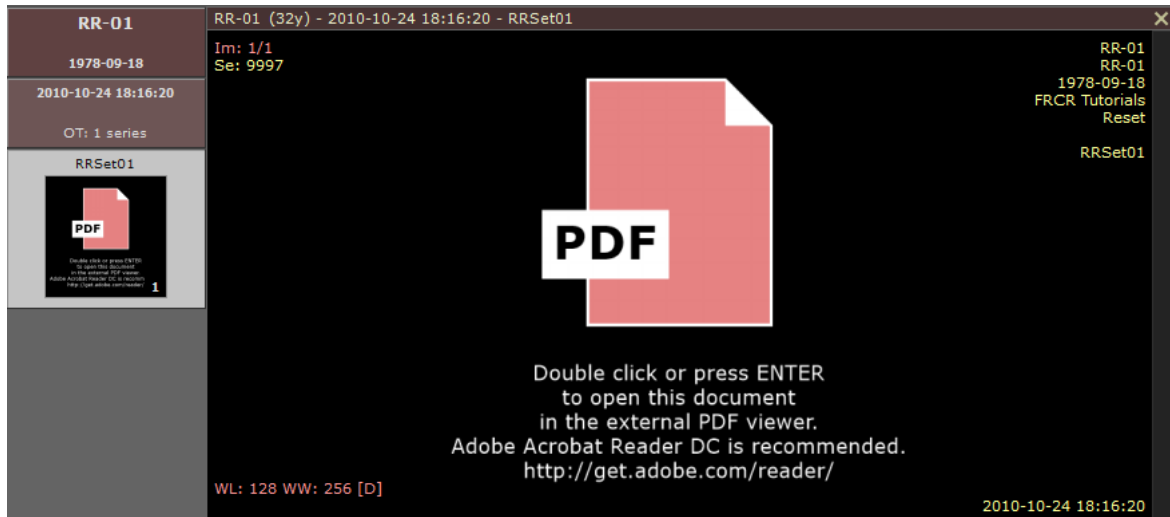
The preview images of video files can be displayed in the series preview pane and in the viewport with the help of the FFMPEG tool.

Just download the static build from <https://ffmpeg.zeranoe.com/builds/> and copy the ffmpeg.exe file to the RadiAnt DICOM Viewer program folder (the location where the RadiAntViewer.exe file was installed).



3.12.3 Encapsulated PDF

The encapsulated PDF documents (SOP Class 1.2.840.10008.5.1.4.1.1.104.1) can be opened in an external PDF viewer.



Adobe Acrobat Reader DC (<http://get.adobe.com/reader/>) is recommended.

Press **Enter** or double click the panel with the PDF document to open it in the external viewer.

3.12.4 DICOMDIR

DICOMDIR is a special DICOM file usually found in the root folder of the CD/DVD media with DICOM studies.

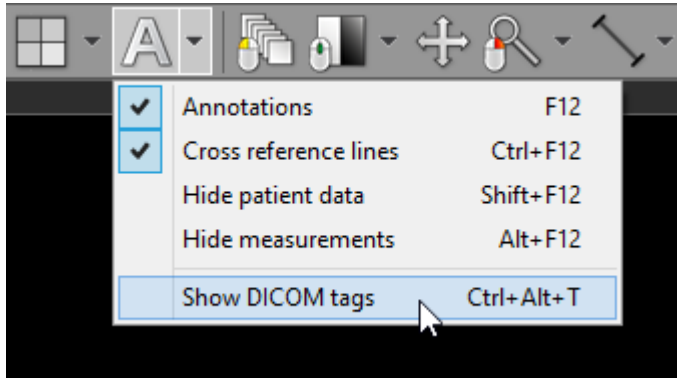
This file includes paths to the DICOM files found on the media.

RadiAnt DICOM Viewer uses DICOMDIRs to quickly generate thumbnail images of all series found on the media.

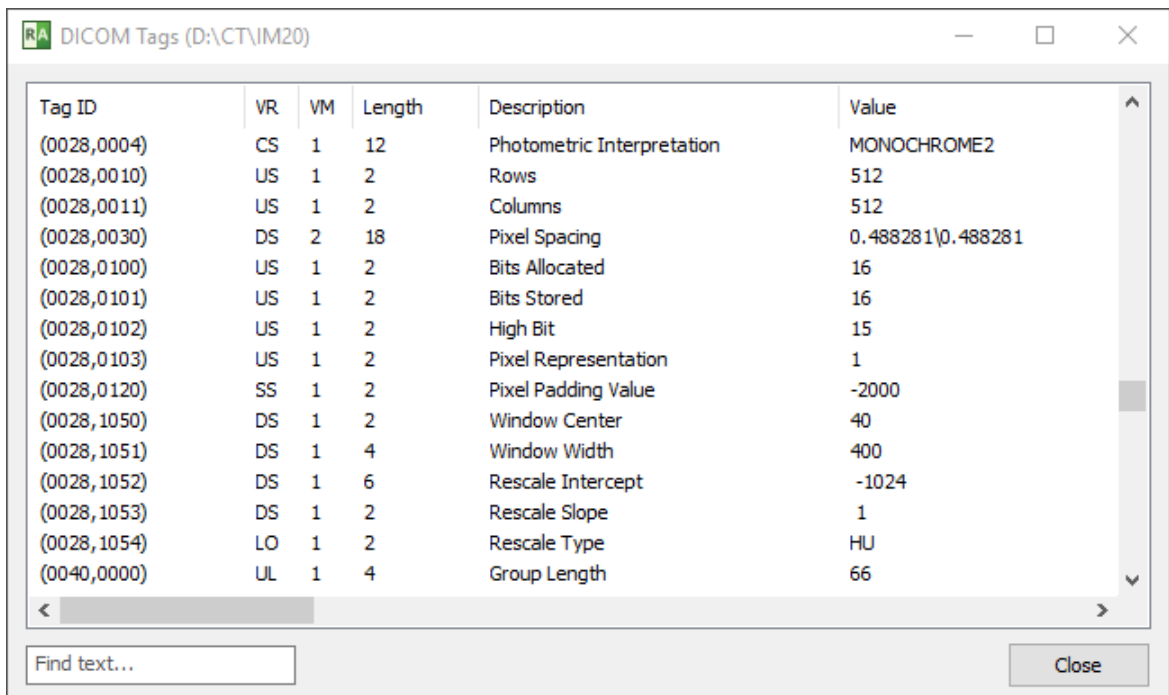
3.13 DICOM tags

Each DICOM file contains much more information than can be displayed as annotations on the image.

To view the DICOM tags associated with the image displayed click **Show DICOM tags** menu item or use **Ctrl + Alt + T**.

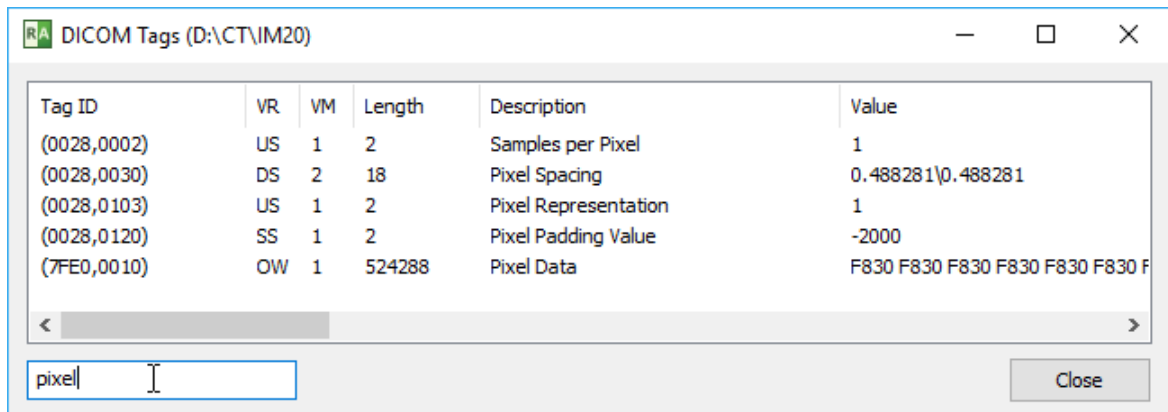


A complete list of DICOM tags, their descriptions and values will be displayed. The file path of the analyzed DICOM file is displayed on the title bar.



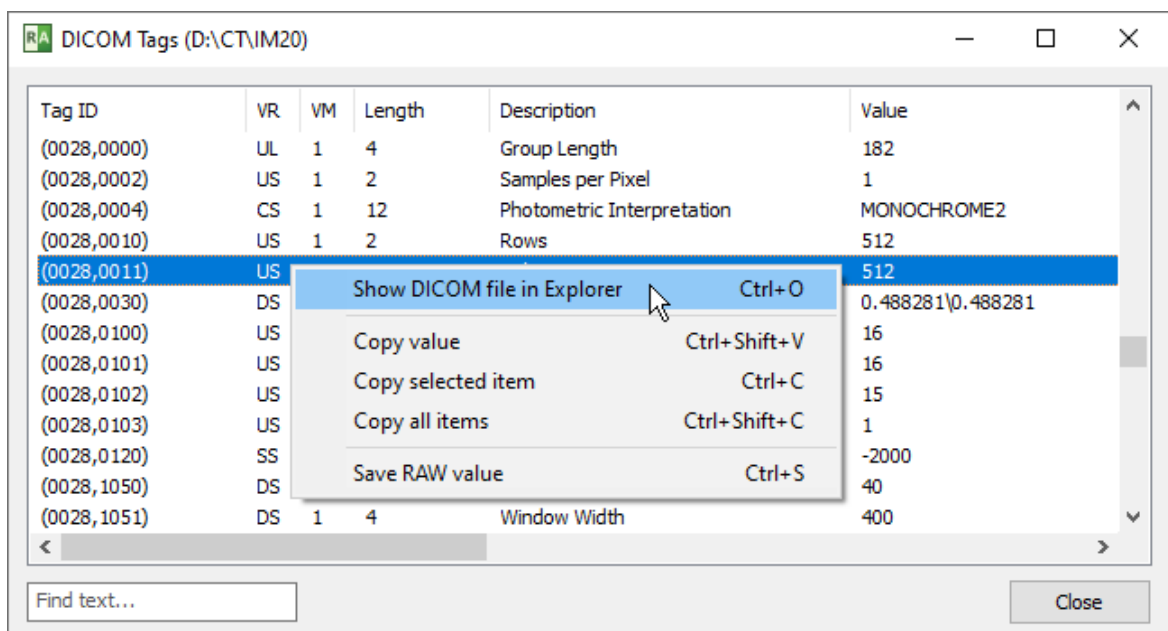
You can search the list of tags for a specific text by entering it in the "Find text..." box in the lower left corner.

The following fields are searched: Tag ID, Description and Value.

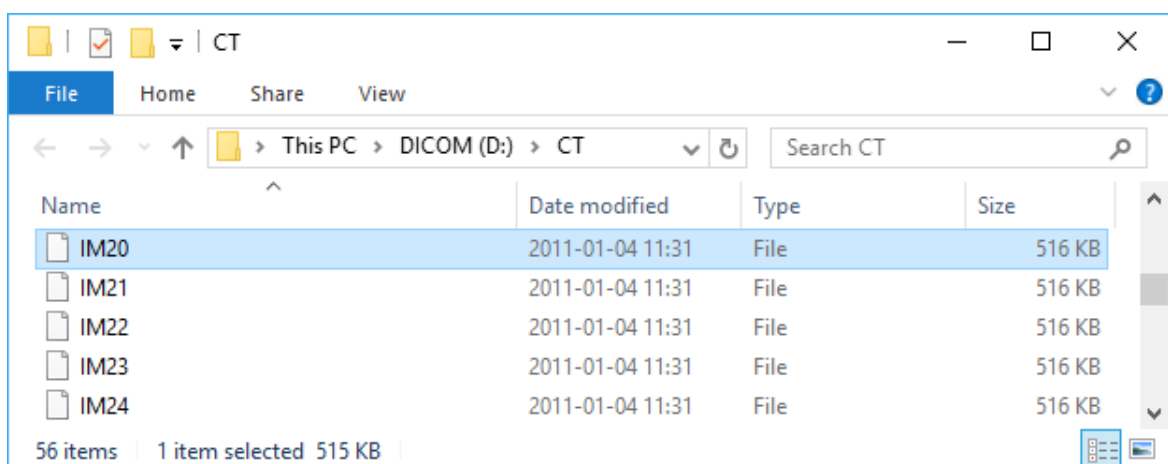


Press **Enter** to clear the text box and show all tags once again.

Click right mouse button on the tag list to show the pop-up menu.



Select **Show DICOM file in Explorer** or press **Ctrl + O** to show the folder with the selected DICOM file in Windows Explorer.



The value of a tag can be copied to clipboard by selecting an item and pressing **Ctrl + Shift + V** or by selecting **Copy value** from the pop-up menu.














To copy all fields of the selected tag, press **Ctrl + C** or click **Copy selected item**.

The entire structure of the file can be copied to clipboard by pressing **Ctrl + Shift + C** or by selecting **Copy all items**.

The RAW value (the exact bytes as stored in the source DICOM file) of the selected tag(s) can be saved to a file by pressing **Ctrl + S** or by clicking **Save RAW value**.

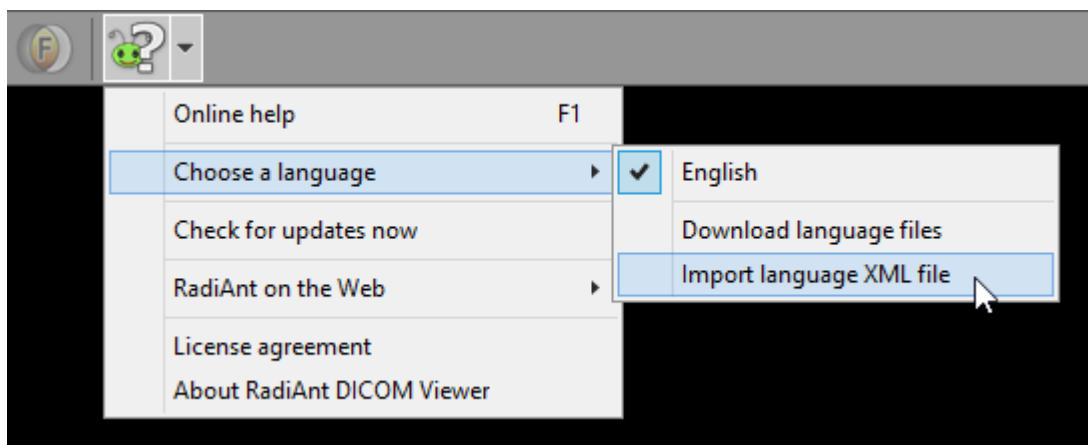
3.14 Changing language

Thanks to our community, RadiAnt DICOM Viewer has been translated into more than 30 languages. The language files (in XML format) are available for download from <https://www.radiantviewer.com/translations/> page.

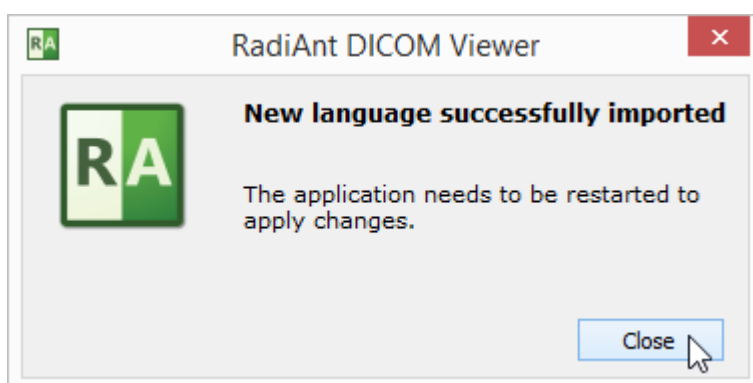
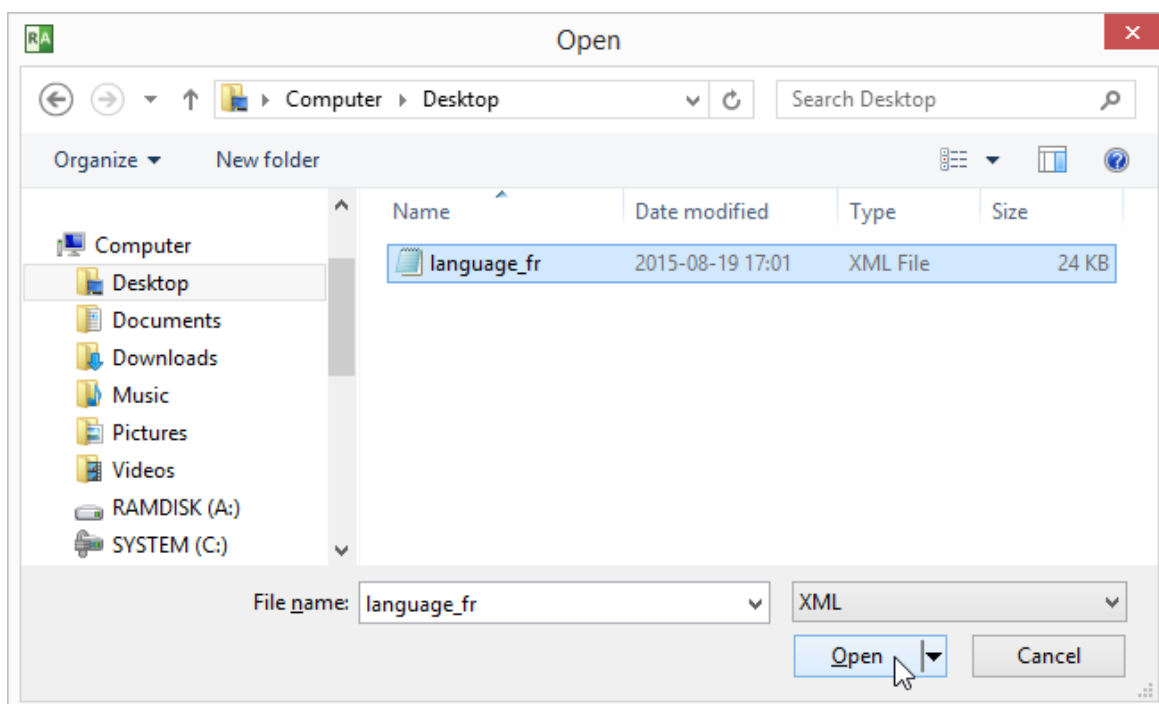
	Dutch/Flemish	Renaat Van den Broeck	2011-04-01	0.35.1.894	Download	Edit	All versions
	French	ISIS SAS	2012-10-10	1.1.8.4646	Download	Edit	All versions
	German	Jens Weber	2012-05-03	1.0.4.4439	Download	Edit	All versions
	Greek	Matsaridis Dimitrios	2013-05-13	1.1.8.4646	Download	Edit	All versions
	Hungarian	Kelemen Kornél	2013-05-29	1.8.6.6744	Download	Edit	All versions
	Indonesian	Jainu	2011-08-24	0.50.2.2501	Download	Edit	
	Italian	Tommaso Bartalena	2013-05-30	1.8.6.6744	Download	Edit	All versions
	Korean	하종만	2012-08-10	1.0.4.4439	Download	Edit	
	Persian	Mahyar Taghizadeh Nouei	2012-08-16	1.0.4.4439	Download	Edit	
	Polish	Maciej Frankiewicz	2012-05-02	1.0.4.4439	Download	Edit	All versions
	Portuguese	Ricardo Freitas	2011-04-16	0.35.1.894	Download	Edit	
	Romanian	Constantin JEMNA	2013-05-13	1.1.8.4646	Download	Edit	
	Russian	Anonymous	2013-05-13	1.0.4.4439	Download	Edit	All versions

Download and save the translation file into a known location.

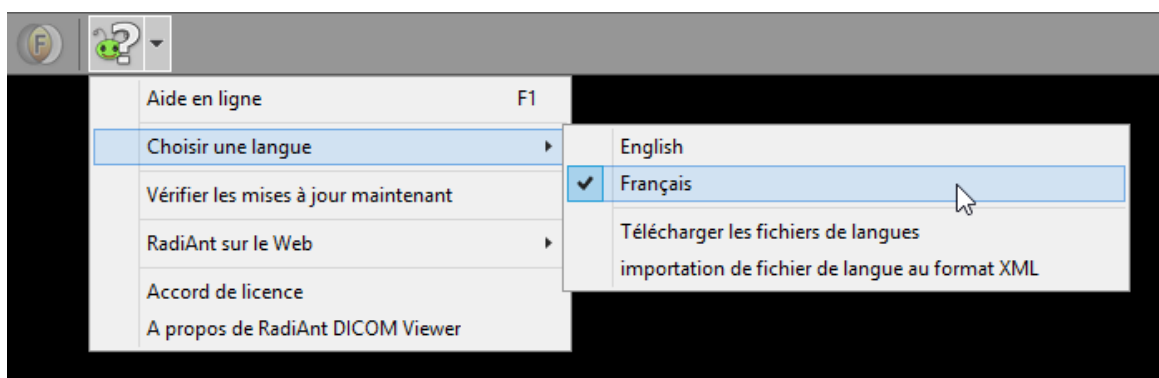
Click an arrow next to the **Help** button and then the menu item **Choose a language** / **Import language XML file**.



Find the downloaded language file and click **Open**.



The new language will be applied after restarting RadiAnt DICOM Viewer.



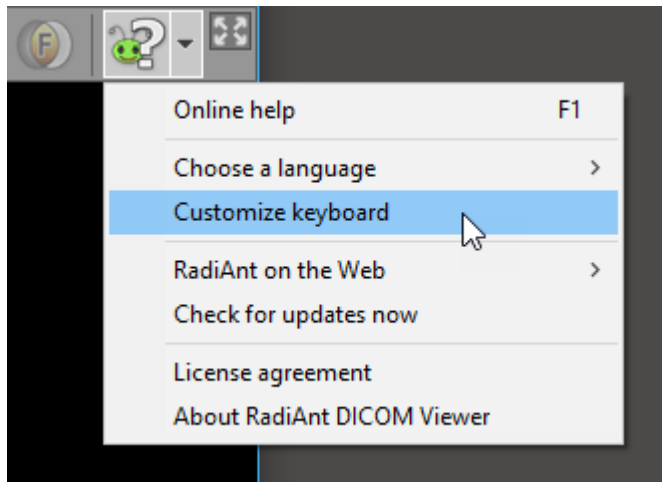
Keep in mind that not all translations are updated for the latest versions of RadiAnt DICOM Viewer. If you use an older one, some texts may remain in English.

Translation files can be edited/updated using the online tool available at <http://www.radiantviewer.com/translation>.

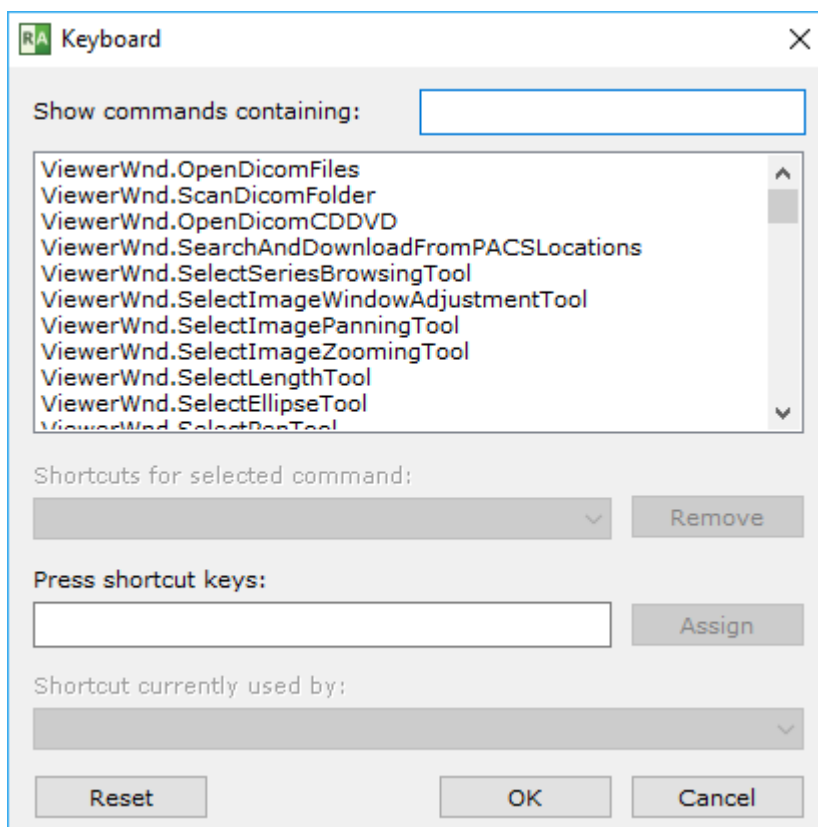
3.15 Keyboard customization

Most of the keyboard shortcuts used in RadiAnt DICOM Viewer can be customized to user's preference.

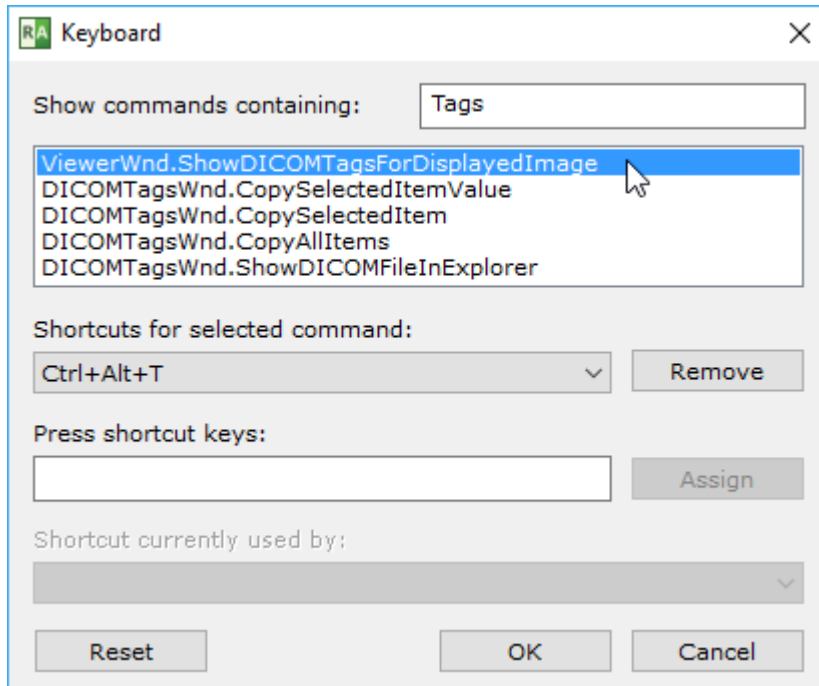
Click an arrow next to the **Help** button and then the menu item **Customize keyboard**.



The keyboard customization window will be opened.

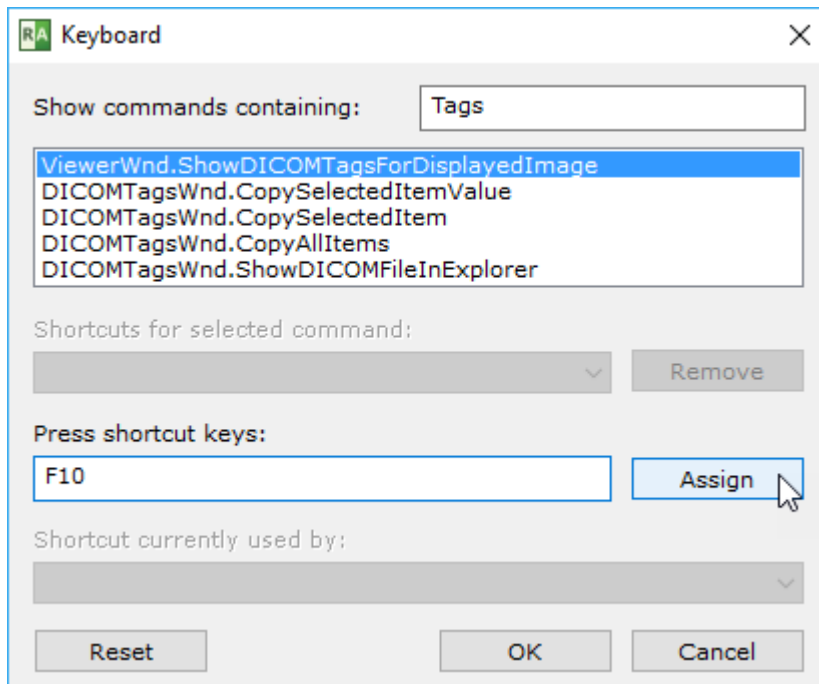


Select the command from the list. You can also use the text box to display only commands containing a specific text.



If you want to remove previously associated shortcut just click **Remove**.

Place the cursor in the field under "Press shortcut keys:" and press the new shortcut key(s). Then click the **Assign** button.



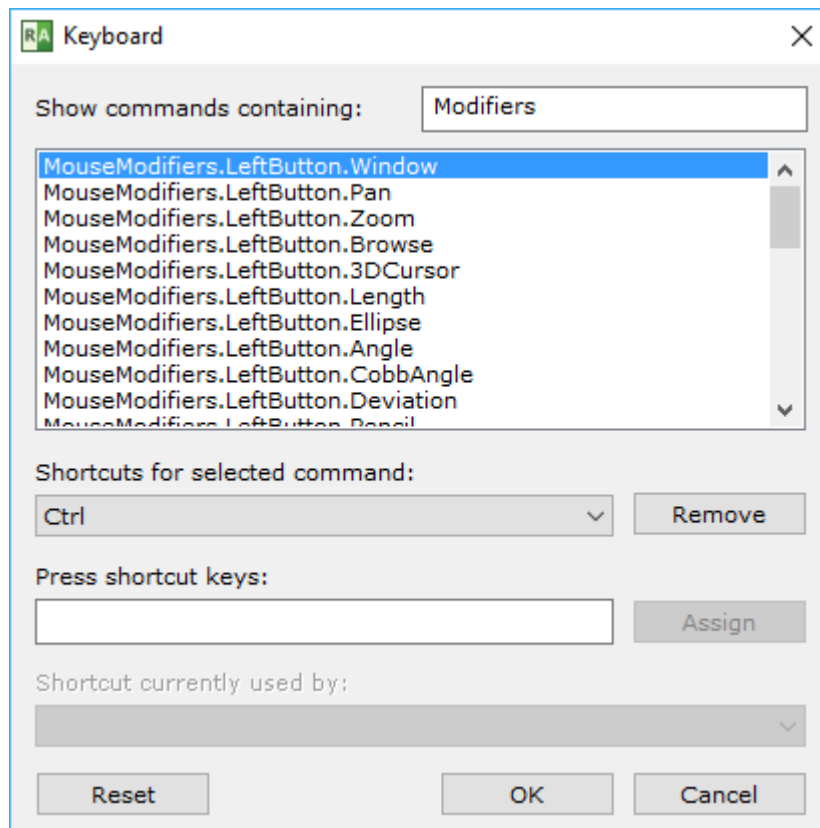
When you're done, remember to click **OK** to save the new shortcuts.

You can always restore the default shortcuts by pressing **Reset**.

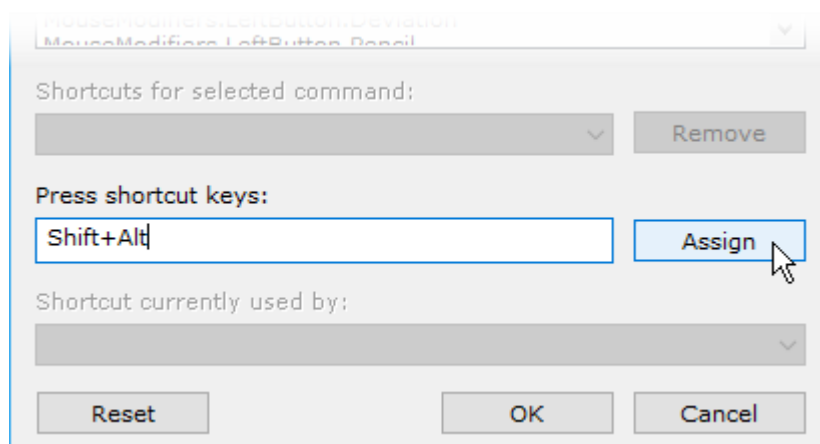
Modifier keys for mouse buttons

The functions associated with mouse buttons can be changed by pressing a modifier key (e.g. Ctrl + Left mouse button – adjusts WW/WL). Check [the list](#) of default modifiers.

These modifiers can be customized in the keyboard customization window. Just enter "Modifiers" into the search box and the list of all available mouse actions will be displayed.

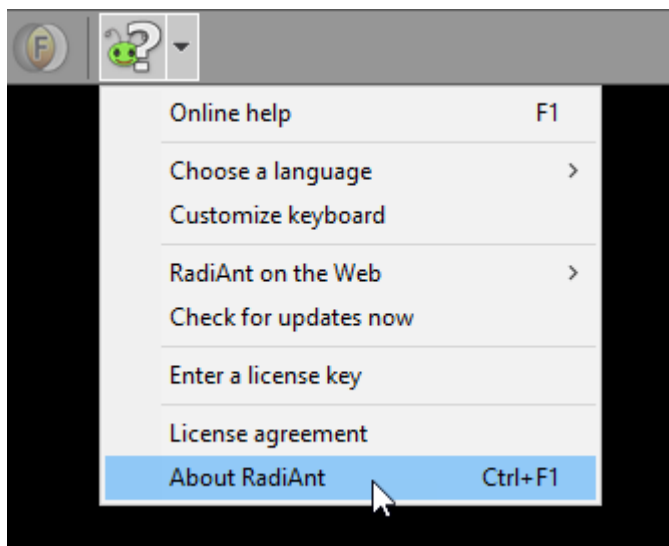


To change a modifier, select specific action, remove its current modifier and press **Ctrl**, **Alt**, **Shift** or their combination in the "Press shortcut keys" text box. Then press **Assign**.

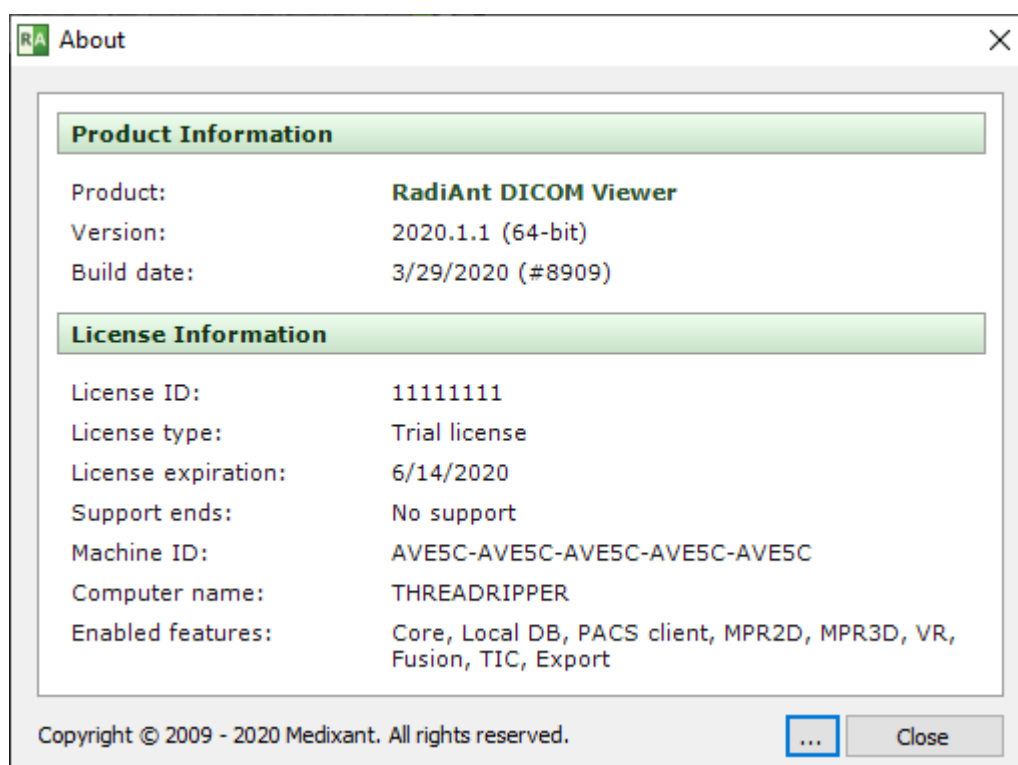


3.16 Program and license information

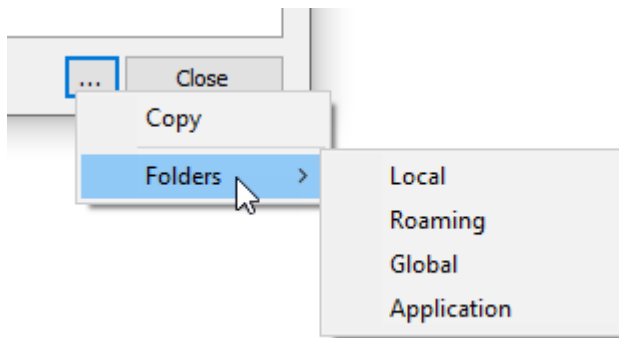
To access the program and license information, click on the arrow next to the **Help** button and then the **About RadiAnt** option, or press **Ctrl + F1**.



The About window will be displayed.



Click on the ellipsis **...** button to quickly copy the displayed information or access the relevant folders in which the configuration and program files are stored.



4 Appendix

4.1 Keyboard shortcuts

2D Viewer window - global keyboard shortcuts	
Ctrl + O	Open DICOM file(s)
Ctrl + Shift + O	Scan DICOM folder
Ctrl + Alt + O	Open DICOM CD/DVD
Ctrl + F	Search and download studies from PACS locations
B	Select series browsing tool
W	Select image window (brightness/contrast) adjustment tool
M	Select image panning tool
Z	Select image zooming tool
L	Select length tool
E	Select ellipse tool
G	Select closed polygon tool
O	Select open polygon tool
A	Select angle tool
C	Select Cobb angle tool
D	Select deviation tool
Y	Select arrow tool
P	Select pen tool
Ctrl + Shift + E	Time-intensity curve tool
Ctrl + Shift + Plus (+)	Increase ROI font size
Ctrl + Shift + Minus (-)	Decrease ROI font size
F12	Toggle annotations
Shift + F12	Toggle all patient data visibility
Ctrl + F12	Toggle cross reference lines
F5	Toggle series synchronization mode
F	Toggle full screen/window mode
Ctrl + Alt + F3	Toggle toolbar and status bar visibility
Ctrl + Alt + F2	Toggle series preview bar visibility
Ctrl + E	Show export to JPEG/BMP/WMV window

F4	Open multiple series
Shift + F4	Close all panels
F1	Show online help
F8	Open default database
Ctrl + F8	Create new database
Shift + F8	Open existing database
Ctrl + N	Open new window
Ctrl + Shift + N	Duplicate window
Ctrl + Alt + F4	Exit RadiAnt

2D Viewer window - local keyboard shortcuts (sent to the active panel)	
Tab	Activate next panel
Shift + Tab	Activate previous panel
Ctrl + F4	Close active panel
Ctrl + M	Maximize/restore active panel
Left Arrow	Display previous series
Right Arrow	Display next series
Home	Display first series
End	Display last series
Up Arrow	Go to previous image
Down Arrow	Go to next image
Page Up	Go 10 images back
Page Down	Go 10 images forward
Ctrl + Arrows	Pan image
Ctrl + Plus (+)	Zoom in
Ctrl + Minus (-)	Zoom out
Ctrl + 0	Fit image into panel
Ctrl + 1	Set zoom to 100% (1 image pixel = 1 screen pixel)
Ctrl + 2	Set zoom to 200%
Ctrl + 3	Set zoom to 400%
Ctrl + 4	Set zoom to 800%
0	Default window (brightness/contrast) setting

1	Full dynamic brightness/contrast
2	2nd window preset (Abdominal for CT images)
3	3rd window preset (Angio for CT images)
4	4th window preset (Bone for CT images)
5	5th window preset (Brain for CT images)
6	6th window preset (Chest for CT images)
7	7th window preset (Lung for CT images)
8	8th window preset
9	9th window preset
F11	Negative
Space	Start/stop cine
Ctrl + C	Copy selected ROI Copy displayed image to clipboard
Ctrl + Shift + C	Copy all ROIs in displayed image
Ctrl + V	Paste ROI(s)
Ctrl + Shift + D	Duplicate ROI in corresponding series
Shift + Alt + D	Duplicate ROI in all images of the series
Del	Delete selected ROI
Shift + Del	Delete ROIs in all visible images
Ctrl + Del	Delete all ROIs in displayed image
Ctrl + Shift + Del	Delete all ROIs in displayed series
Esc	Deselect ROI
Alt + F12	Toggle ROI visibility
Ctrl + [Rotate image 90 degrees counter clockwise
Ctrl +]	Rotate image 90 degrees clockwise
Ctrl + Shift + [Flip horizontal
Ctrl + Shift +]	Flip vertical
Ctrl + Shift + \	Clear transformations
Ctrl + I	Next image filter
Ctrl + Shift + I	Previous image filter
I	Next sharpen filter
Shift + I	Disable filters
Ctrl + Alt + 1	Coronal MPR

Ctrl + Alt + 2	Sagittal MPR
Ctrl + Alt + 3	Axial MPR
F3	3D Volume Rendering
Ctrl + Alt + F	Toggle image fusion
Ctrl + Alt + T	Show DICOM tags for displayed image
Ctrl + F5	Split series
Shift	Hold it during ellipse drawing to make it a circle, hold it while drawing a segment to make it horizontal or vertical
Ctrl	Hold it during ellipse drawing to show actual pixels used for calculations (only in magnified image)
Enter	Open displayed SR (Structured Report) document in the internal HTML browser Open displayed MPEG2/4 video in the external media player Open displayed PDF in the external browser
Ctrl + Enter	Open displayed SR (Structured Report) document in the external HTML browser

Local archive window	
Ctrl + Shift + O	Import DICOM folder
Ctrl + O	Import DICOM file(s)
Ctrl + Alt + O	Import CD/DVD DICOM disc
Ctrl + F	Search and import studies from PACS servers
Ctrl + E	Export selected studies/series
Del	Delete selected studies/series
K	Add keyword to selected studies
Enter	Open selected studies in the active window
Ctrl + Enter	Open selected studies in a new window
Shift + Enter	Add selected studies to the active window
Ctrl + Shift + Enter	Open selected studies in separate windows
Ctrl + F8	Create new database
Shift + F8	Open existing database
Ctrl + N	Open new viewer window
Alt + F	Filter studies
F2	Cycle view (studies/series/images)

3D Volume Rendering window	
Left / Right Arrow	Rotate volume around the Y axis
Up / Down Arrow	Rotate volume around the X axis
< / >	Rotate volume around the Z axis (roll)
Ctrl + Arrows	Pan image
Ctrl + Plus (+)	Zoom in
Ctrl + Minus (-)	Zoom out
Ctrl + 0	Fit volume into panel
0	Default window (color/opacity) setting
Ctrl + S	Toggle shading
Ctrl + R	Reset scene
Ctrl + Alt + 0	Restore volume
R	Select 3D rotate tool
T	Select roll tool
W	Select image window (color/opacity) adjustment tool
M	Select image panning tool
Z	Select image zooming tool
S	Select scalpel tool
Ctrl + Z	Undo scalpel
Ctrl + Y	Redo scalpel
Ctrl + Shift + Alt + Z	Clear scalpel history
L	Select length tool
Y	Select arrow tool
1	Anterior view
2	Posterior view
3	Left view
4	Right view
5	Superior view
6	Inferior view
Ctrl + C	Copy displayed image to clipboard
Ctrl + E	Save image to JPEG file

F2	Create quick movie
Ctrl + F2	Create advanced movie
Del	Delete selected ROI Cut inside area
Enter	Cut outside area
Esc	Deselect ROI Clear area
F12	Toggle annotations/direction cube
F	Toggle full screen/window mode
Ctrl + Alt + F3	Toggle toolbar visibility
F3	Show 3D snapshots
K	Take 3D snapshot
]	Next 3D snapshot
[Previous 3D snapshot
Ctrl + F3	Load 3D snapshots from file
Shift + F3	Save 3D snapshots to file

3D MPR window

Left / Right Arrow	Rotate view around the Z axis (roll)
Up / Down Arrow	Browse volume to back / front
Alt + Up / Down Arrow	Rotate image plane around the X axis
Alt + Left / Right Arrow	Rotate image plane around the Y axis
Ctrl + Arrows	Pan image
Ctrl + Plus (+)	Zoom in
Ctrl + Minus (-)	Zoom out
Ctrl + 0	Fill viewport
0	Default window (color/opacity) setting
F11	Negative
Ctrl + R	Reset view
B	Select browse tool
R	Select 3D rotate tool
T	Select roll tool
W	Select image window adjustment tool

M	Select image panning tool
Z	Select image zooming tool
L	Select length tool
E	Select ellipse tool
G	Select closed polygon tool
O	Select open polygon tool
A	Select angle tool
Y	Select arrow tool
H	Select thickness tool
Plus (+)	Increase thickness
Minus (-)	Decrease thickness
F2	Switch rendering mode
F3	Toggle axes visibility
Ctrl + F3	Center all axes
F4	Next viewport layout
Tab	Activate next viewport
Shift + Tab	Activate previous viewport
Ctrl + C	Copy image to clipboard
Shift + C	Copy all images to clipboard
Ctrl + E	Save image to JPEG file
Shift + E	Save all images to JPEG file
Del	Delete selected ROI
Enter	Maximize / restore active viewport
Esc	Deselect ROI
F	Toggle full screen/window mode
Ctrl + Alt + F3	Toggle toolbar visibility

PACS search window

Enter	Download selected study/studies to the active viewer window (clears previously opened study)
Shift + Enter	Add selected study/studies to the active viewer window
Ctrl + Enter	Download selected study/studies to the new viewer window

Ctrl + Shift + Enter	Download and show selected study/studies in separate windows
Ctrl + P	Find all studies of the selected patient
Ctrl + Del	Cancel all active downloads and searches
Ctrl + O	PACS configuration
Ctrl + L	Show the list of active and finished downloads along with detailed statistics and status messages
F2 - F12	Perform PACS search using saved presets

PACS configuration window

Ctrl + Up	Increase the priority of the selected PACS location
Ctrl + Down	Decrease the priority of the selected PACS location
Del	Delete selected PACS location
F2	Verify PACS locations (C-ECHO)

DICOM tags window

Ctrl + O	Show DICOM file in Explorer
Ctrl + C	Copy selected tag to clipboard
Ctrl + Shift + C	Copy all tags to clipboard
Ctrl + Shift + V	Copy tag value to clipboard
Ctrl + S	Save RAW value(s) of the selected tag(s) to a file

4.2 Mouse functions

2D Viewer window	
Left mouse button + mouse move	Browse images of the series [default setting]
Middle mouse button + mouse move	Adjust image window (brightness/contrast) [default setting]
Right mouse button + mouse move	Zoom image in/out [default setting]
Back (4th) mouse button + mouse move	Pan image [default setting]
Forward (5th) mouse button + mouse move	Length measurement [default setting]
Ctrl + left mouse button click on a thumbnail	Open series in new panel
Ctrl + left mouse button + mouse move	Adjust image window (brightness/contrast)
Shift + left mouse button + mouse move	Pan image
Ctrl + vertical mouse wheel	Zoom image in/out
Vertical mouse wheel	Browse images of the series
Horizontal mouse wheel	Go to previous/next series

3D Volume Rendering window	
Left mouse button + mouse move	3D rotate volume [default setting]
Middle mouse button + mouse move	Adjust image window (color/opacity) [default setting]
Right mouse button + mouse move	Zoom image in/out [default setting]
Back (4th) mouse button + mouse move	Pan image [default setting]
Forward (5th) mouse button + mouse move	Length measurement [default setting]
Ctrl + left mouse button + mouse move	Adjust image window (color/opacity)
Shift + left mouse button + mouse move	Pan image
Ctrl + Alt + Left mouse button + mouse move	Roll

Alt + left mouse button + mouse move	Draw area with the scalpel tool
--------------------------------------	---------------------------------

3D MPR window

Left mouse button + mouse move	Browse volume back/front [default setting]
Middle mouse button + mouse move	Adjust image window [default setting]
Right mouse button + mouse move	Zoom image in/out [default setting]
Back (4th) mouse button + mouse move	Pan image [default setting]
Forward (5th) mouse button + mouse move	Length measurement [default setting]
Ctrl + left mouse button + mouse move	Adjust image window
Shift + left mouse button + mouse move	Pan image
Alt + left mouse button + mouse move	3D rotate
Ctrl + Alt + left mouse button + mouse move	Roll
Ctrl + Shift + left mouse button + mouse move	Change thickness

4.3 Multi-touch operations

2D Viewer window	
Drag one finger over series preview bar	Scroll series list.
Drag one finger over image	Tool chosen in the toolbar (browsing series by default).
Two fingers over image	Pinch to zoom, drag to pan image.
Three fingers over image	Drag up/down to change brightness, drag left/right to change contrast.
Double tap on image	Maximize/restore panel.

3D Volume Rendering window	
Drag one finger over image	Tool chosen in the toolbar (3D rotate by default).
Two fingers over image	Pinch to zoom, drag to pan image, rotate to roll image.
Three fingers over image	Drag up/down/left/right to change color/opacity.
Double tap on image	Toggle full-screen mode.

3D MPR window	
Drag one finger over image	Tool chosen in the toolbar (browse volume by default).
Two fingers over image	Pinch to zoom, drag to pan image, rotate to roll image.
Three fingers over image	Drag up/down/left/right to change window level and width (WL/WW).
Four fingers over image	Drag up/down to change slab thickness.
Double tap on image	Toggle full-screen mode.

4.4 Configuration files

4.4.1 Options.xml

The **options.xml** file can be used to set RadiAnt DICOM Viewer default preferences.

It is located either in the "C:\ProgramData\RadiantViewer" (Windows 10, 7, 8, Vista) or "C:\Documents and Settings\All Users\Application Data\RadiantViewer" (Windows XP) folder.

When RadiAnt DICOM Viewer is used as a patient CD/DVD viewer, the options.xml file can be also placed in the "COMMON" folder on the CD/DVD media.

Default options.xml file:

```
<?xml version="1.0" encoding="utf-8" ?>
<options>
  <zoom>
    <toregion>0</toregion>      <!-- zoom-to-region mode (0 - disabled, 1 -
enabled) -->
    <offcenter>0</offcenter> <!-- the image region pointed by mouse cursor (when
zooming is started) retains its position on screen (0 - disabled, 1 - enabled) -->
  </zoom>

  <browse>
    <scrollwrap>1</scrollwrap> <!-- "endless" scrolling (0 - disabled, 1 - enabled) -->
  </browse>

  <window>
    <presets>
      <!-- window settings - presets -->
      <!-- <i m="CT" i="8" n="Preset 1" ww="70" wl="30"/> --> <!-- m - modality
(CR, CT, MR, XA, MG, etc.), i - shortcut key (2-9), n - preset name, ww - window width, wl - window level
-->
      <!-- <i m="CT" i="9" n="Preset 2" ww="32" wl="30"/> -->
    </presets>
  </window>

  <synchronization>
    <enabled>1</enabled> <!-- automatic synchronization (0 - disabled, 1 - enabled) -->
    <slice>1</slice> <!-- synchronize slice location (0 - disabled, 1 - enabled) -->
    <zoom>1</zoom> <!-- synchronize zoom&pan (0 - disabled, 1 - enabled) -->
    <window>0</window> <!-- synchronize window settings (0 - disabled, 1 - enabled) --
  >
</synchronization>

<updates>
  <notify>1</notify> <!-- notify about new updates (0 - disabled, 1 - enabled) -->
</updates>

<tools> <!-- tools assigned to mouse buttons (1 - browse series, 2 - zoom, 3 - pan, 4 - change
WW/WL, 5 - ROI) -->
  <lmb>1</lmb> <!-- left mouse button -->
  <mmb>4</mmb> <!-- middle mouse button -->
  <rmb>2</rmb> <!-- right mouse button -->
```

```

        <x1mb>3</x1mb> <!-- back mouse button -->
        <x2mb>5</x2mb> <!-- forward mouse button -->
        <mw>1</mw> <!-- mouse wheel (vertical) - valid tools: browse series (1) or zoom (2)
-->
        <mwh>1</mwh> <!-- mouse wheel (horizontal) - disabled (0), change series (1) -->
    </tools>

    <vr>
        <penscalpel>0</penscalpel> <!-- associate the scalpel tool with pen (0 - disabled, 1 -
enabled) -->
    </vr>

    <mpr>
        <autocenter>1</autocenter> <!-- auto center axes in viewports (0 - disabled, 1 -
enabled) -->
        <axisthkpts>0</axisthkpts> <!-- display thickness regulation points on the axis (0 -
disabled, 1 - enabled) -->
    </mpr>

    <cine>
        <autorun>1</autorun> <!-- Cine mode is started automatically for XA and US series
-->
        <fps>10</fps> <!-- default frames-per-second rate for series without predefined FPS
-->
    </cine>

    <loading>
        <autoshow>1</autoshow> <!-- mode of showing first image in viewport (0 - user has
to click a series to show it, 1 - first scanned image file is shown, 2 - after scanning all files, first series
from the preview bar is shown) -->
        <ussep>0</ussep> <!-- show separate thumbnails for single frame ultrasound images
belonging to the same DICOM series (0 - disabled, 1 - enabled) -->
        <desc>0</desc> <!-- study sorting mode (0 - ascending date, 1 - descending date) -->
        <primaryfirst>0</primaryfirst> <!-- add PRIMARY images before DERIVED as
separate series (0 - disabled, 1 - enabled) -->
        <nonimage>0</nonimage> <!-- load non-image DICOM files: PR,KO, etc. (0 -
disabled, 1 - enabled) -->
        <acceptpushed>0</acceptpushed> <!-- accept and display studies pushed from PACS
locations (0 - disabled, 1 - enabled) -->
        <sernum>0</sernum> <!-- show series numbers on thumbnail images (0 - disabled, 1
- enabled) -->
    </loading>

    <disabled>
        <!-- disabled features and toolbar buttons -->
        <!-- <folders/> -->
        <!-- <cddvd/> -->
        <!-- <pacs/> -->
        <!-- <export/> -->
        <!-- <db/> -->
    </disabled>

    <screen>
        <split c="0" r="0"/> <!-- default split screen preset c - columns, r - rows -->

```

```

        <clp>0</clp>    <!-- close panel button behavior (0 - closes panel, 1 - clears panel) -->
    >
        <!-- default position of the viewer window (w - width, h - height, l, t - top left corner's
coordinates, m - window state: 0 - normal, 1 - maximized, f - full screen: 0 - disabled, 1 - enabled) -->
        <!--
        <windows>
            <viewer w="800" h="600" l="0" t="0" m="0" f="0"/>
        </windows>
        -->
    </screen>

    <i18n>
        <!-- <fiso>ISO_IR 192</fiso> --> <!-- define specific character set which overrides
value defined in (0008,0005) SpecificCharacterSet tag for all DICOM files -->
        <!-- <srfiso>ISO_IR 192</srfiso> --> <!-- define specific character set which overrides
value defined in (0008,0005) SpecificCharacterSet tag for SR documents (structured reporting) -->
    </i18n>

    <pacs>
        <!-- define additional PACS search fields -->
        <srcfields>
            <!-- <i id="00081070" n="Operators&apos; name" h="Enter operators&apos;
name..." la="1" ta="1"/> --> <!-- id - DICOM tag id, n - name, h - hint, la - add leading asterisk, ta -
add trailing asterisk -->
        </srcfields>
    </pacs>

    <roi>
        <length>
            <units>0</units> <!-- measurement units (0 - automatic units, 1 - mm, 2 -
cm, 3 - m, 4 - um, 5 - nm) -->
            <precision>2</precision> <!-- number of decimal places displayed -->
            <divide>0</divide> <!-- 1 - a mark is drawn in the middle of the segment -->
        </length>
        <ellipse>
            <center>0</center> <!-- 1 - a mark is drawn in the center of the ellipse -->
        </ellipse>
    </roi>

    <srdocs>
        <imgheader>0</imgheader> <!-- 1 - display image in the header of Structured
Reporting HTML docs (image path: PROGRAMDATA\RadiAntViewer\srlogo.png) -->
    </srdocs>

    <db>
        <showonstart>0</showonstart> <!-- after program is started show: 0 - empty viewer
window, 1 - database window -->
        <autoviewer>0</autoviewer> <!-- automatically display imported files in the viewer: 0
- none, 1 - CD/DVD disc -->
        <autoeject>0</autoeject> <!-- 1 - automatically eject CD/DVD disc after import is
finished -->
    </db>
</options>

```

4.4.2 Overlay.xml

The **overlay.xml** file can be used to change the default annotations displayed over images in RadiAnt DICOM Viewer.

It is located either in the "C:\ProgramData\RadiantViewer" (Windows 7, 8, Vista) or "C:\Documents and Settings\All Users\Application Data\RadiantViewer" (Windows XP) folder.

When RadiAnt DICOM Viewer is used as a patient CD/DVD viewer, the overlay.xml file can be also placed in the "COMMON" folder on the CD/DVD media.

Sample file:

```
<?xml version="1.0" encoding="utf-8" ?>
<sets>
  <set>
    <tl>
      <i r="0" s="1" c="1"/>
      <i r="1" s="2"/>
      <i r="2" s="3"/>
    </tl>
    <tr>
      <i r="0" a="1" s="4"/>
      <i r="1" a="1"><e k="1" i="00100020"/></i>
      <i r="2" s="5"/>
      <i r="3"><e k="1" i="00080080"/></i>
      <i r="4"><e k="1" i="00200010"/></i>
      <i r="5"><e k="1" i="00081030"/></i>
      <i r="6"><e k="1" i="0008103E"/></i>
      <i r="7"><e k="1" i="00204000"/></i>
      <i r="8"><e k="1" i="00324000"/></i>
      <i r="9" s="6" c="1"/>
    </tr>
    <bl>
      <i r="0" s="A"/>
      <i r="1" s="D" c="1"/>
      <i r="2" s="C" c="1"/>
    </bl>
    <br>
    <i r="0" s="9"/>
  </br>
</set>

<set c="1">
  <tl>
    <i r="0" s="e" c="1"/>
  </tl>
</set>

<set m="MR" e="1">
  <br>
    <i r="1" s="7"/>
    <i r="2" s="8"/>
```



```

        </br>
    </set>

    <set m="CT" e="1">
        <br>
        <i r="1" s="F"/>
    </br>
    </set>

    <set m="MG" e="1">
        <tl>
            <i r="3"><e k="1" i="00200062"/></i>
            <i r="4"><e k="1" i="00185101"/></i>
        </tl>
    </set>

</sets>

<!--

<set>          a collection of annotations grouped in four corners of the image panel

<set> attributes:
"m"            modality (a set is considered as default if the "m" attribute is missing)
"c"            c="0" - set defined for static images, c="1" - set defined for CINE mode
"e"            e="0" - set overwrites default set, e="1" - set extends default set

<tl>          top left corner
<tr>          top right corner
<bl>          bottom left corner
<br>          bottom right corner

<i>            single row - can be one of the predefined annotations or a collection of elements (texts
and DICOM tag values)

<i> attributes:
"r"            row index (0 ... n), starting from the panel border (0 - a row closest to the border)
"d"            1 - the row is hidden when anonymization is enabled
"c"            font color: 0 - yellow, 1 - red
"d"            1 - the row is hidden when the included DICOM element(s) is missing

"s"            if present, one of the predefined annotations is used:

01            Current image number and total number of images in the viewport (e.g. "3/237")
02            Current series number (e.g. "Se: 4")
03            Lossy image compression info (e.g. "Lossy compression (JPEG 2000)")
04            Patient name (without ^^^)
05            Patient birthday and sex (e.g. "1952-02-09 M")
06            Rotation/flip info (e.g. "R: 90° CCW F: H")
07            MRI TE and TR times (e.g. "TR: 540.0 TE: 14.0")
08            MRI strength of field (e.g. "FS: 1.5")
09            Image acquisition date and time (or study date and time if acquisition timestamp is not
available) (e.g. "2009-12-03 19:23:12")
0A            Thickness and location of the image (e.g. "T: 5.0mm L: -68.7mm")

```

0B *Positioner angles (e.g. "LAO: 9 CRA: 27")*
0C *Mouse cursor position (in DICOM image coordinates) and value of the DICOM pixel under cursor (e.g. "X: 139 Y: 281 Val: 105")*
0D *Window width and level info, window preset, negative mode (e.g. "WL: 40 WW: 80 [CT Brain]")*
0E *Current real FPS (frames per second) value during CINE run (e.g. "15 fps")*
0F *X-ray tube current in mA and peak kilovoltage output of the x-ray generator(e.g. "330mA 120kV")*
10 *3D cursor position in milimeters (e.g. "X: 28.94mm Y: -6.12mm Z: -487.03")*

<e> *single element (a text or a DICOM tag value)*

<e> attributes:

"k" *1 - DICOM tag value, 2 - text element*

"i" *DICOM tag ID (group and element hex values), valid only if k="1"*

"t" *a text, valid only if k="2"*

an example of a row consisting of the text element and the DICOM tag value:

<i r="3" d="1"><e k="2" t="Body part examined: "/><e k="1" i="00180015"/></i>

-->

4.5 Command-line arguments

radiantviewer.exe	
-f	Open DICOM files (<code>radiantviewer.exe -f "file1" "file2" "file3"</code>)
-fl	Open DICOM files listed in a text file, one file path in each line (<code>radiantviewer.exe -fl "filelist.txt"</code>)
-d	Open DICOM files from folders (<code>radiantviewer.exe -d "folder1" "folder2" "folder3"</code>) This parameter, when used with the CD/DVD autorun version, defines only specific folders for scanning on the CD/DVD media.
-b	Show expanded subfolders tree after starting RadiAnt DICOM Viewer (<code>radiantviewer.exe -b "rootfolder"</code>)
-cl	Close all other opened windows of RadiAnt DICOM Viewer (<code>radiantviewer.exe -cl</code>)
-pstv	Start downloading studies that match a specific DICOM tag/value pair (<code>radiantviewer.exe -pstv 00080050 "ACCESSION-NUMBER"</code> or <code>radiantviewer.exe -pstv 0020000D "STUDYUID"</code>)
-paet	Start downloading studies from the specific PACS host(s), matched by the AE title (<code>radiantviewer.exe -paet MYPACSAETITLE -pstv 00100020 "PATIENTID"</code>)
-wp	Set main window position and size (<code>radiantviewer.exe -wp X Y W H F</code>) X,Y - position, W,H - size, F - flags (1 - W&H specify client area size)
-sp	Set default split screen preset (<code>radiantviewer.exe -sp colnum rownum</code>)
-sf	Hide specific interface elements (<code>radiantviewer.exe -sf F</code>) F - flag (hidetoolbar = 0x0001, hideseriesbar = 0x0002, hidestatusbar = 0x0004)
-tg	Export DICOM meta data to text files (<code>radiantviewer.exe -d "folder_in" -tg "folder_out"</code>)
FILENAME	Open DICOM file(s) (<code>radiantviewer.exe "file1"</code>)
FOLDERNAME	Open DICOM folder(s) (<code>radiantviewer.exe "folder1"</code>)
ZIPARCHIVE.zip	Open DICOM zip archive (<code>radiantviewer.exe "samplearchive.zip"</code>)
DATABASE.rdvdb	Open RadiAnt database(s) (<code>radiantviewer.exe "mycases.rdvdb"</code>)

radcmd.exe

-activateonline	Activate RadiAnt DICOM Viewer automatically with the serial number (radcmd.exe -activateonline SERIALNUMBER)
-reqcode	Get the request code required for manual activation (radcmd.exe -reqcode)
-activate	Activate RadiAnt DICOM Viewer with the code generated in the manual activation service (radcmd.exe -activate ACTIVATION_CODE)
-deactivate	Deactivate RadiAnt DICOM Viewer installation and get codes required in the manual deactivation service (radcmd.exe -deactivate)

4.6 URL protocol

Local RadiAnt DICOM Viewer installation can be controlled using the **radiant://** URL protocol. By clicking special links in web browsers, all actions available via [command-line arguments](#) can be executed.

How can I create radiant:// URLs?

You have to pass command-line arguments (their names and values) via the URL query parameters "n" and "v" respectively.

Special characters (e.g., quotes, spaces) have to be URL encoded.

Sample command-line to URL translations:

```
radiantviewer.exe -d "folder1" "folder2" "folder3"
```

```
radiant://?n=d&v=%22folder1%22&v=%22folder2%22&v=%22folder3%22
```

```
radiantviewer.exe -pstv 0020000D "STUDYUID"
```

```
radiant://?n=pstv&v=0020000D&v=%22STUDYUID%22
```

```
radiantviewer.exe -paet MYPACSAETITLE -pstv 00100020 "PATIENTID"
```

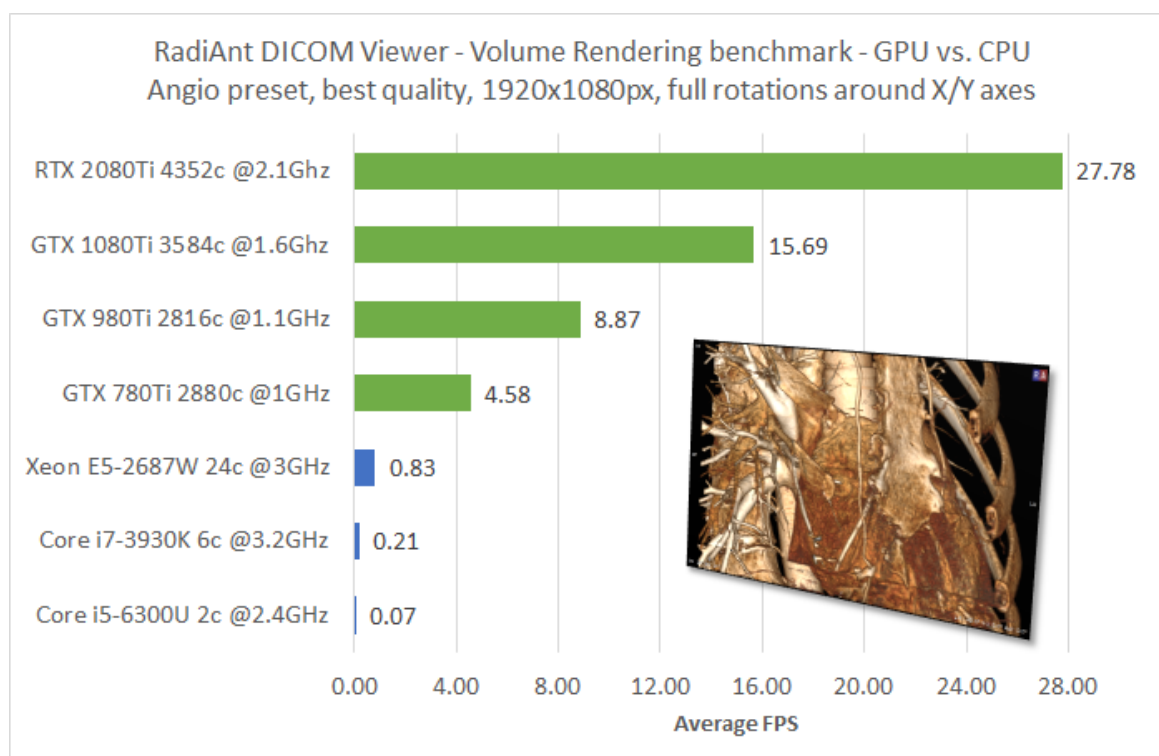
```
radiant://?n=paet&v=MYPACSAETITLE&n=pstv&v=00100020&v=%22PATIENTID%22
```

4.7 Setup arguments

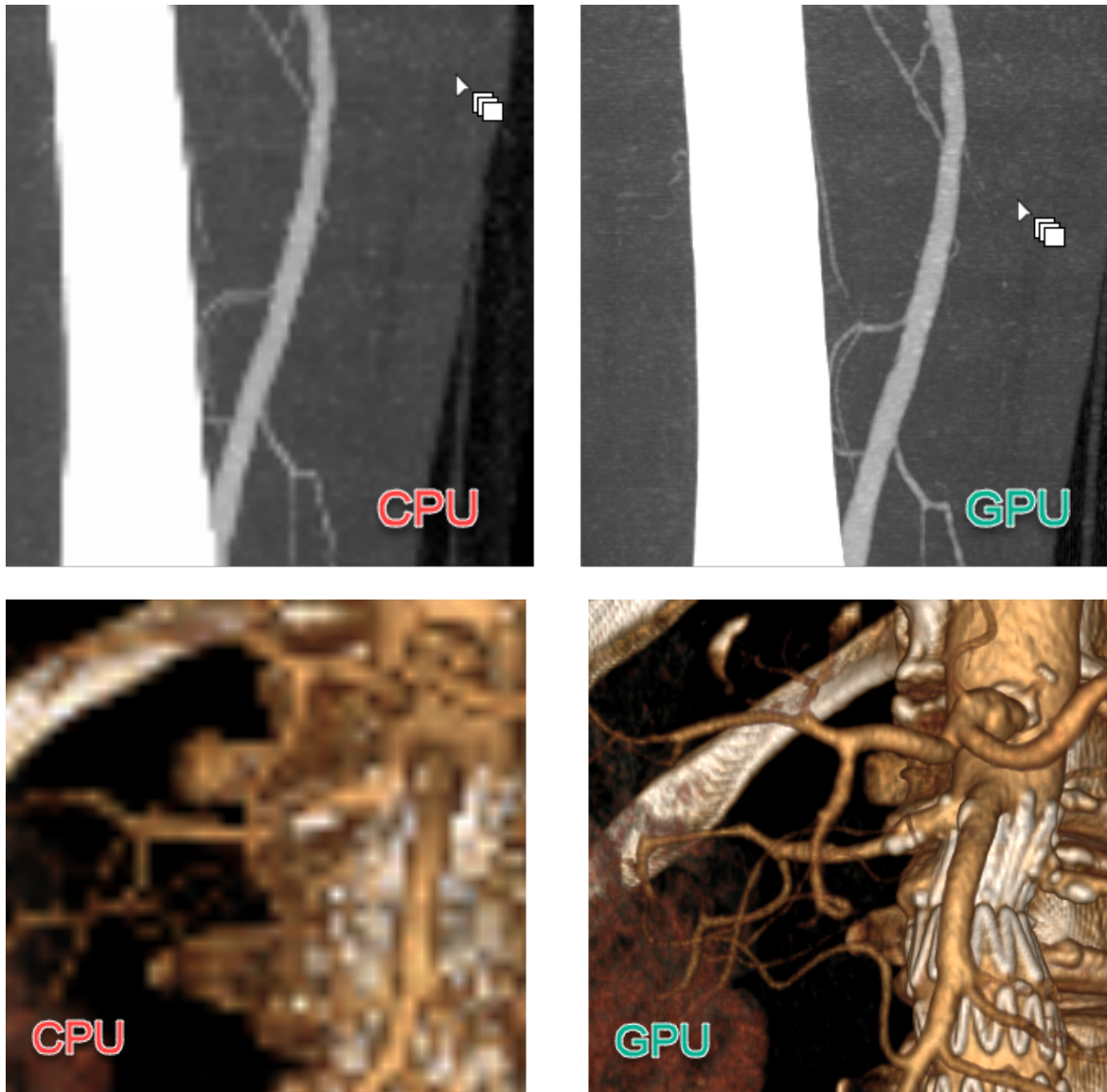
Setup command-line arguments	
/S	Enable silent installation mode
/D	Destination folder (it must be the last parameter used in the command line and must not contain any quotes, even if the path contains spaces)
/LANGFILE	Language XML file path
/LANGUAGE	Setup language (overrides system locale, eg. /LANGUAGE=1033)
/BITS	Installed version (available values: 32, 64, 64ARM)
Sample syntax	radiantsetup.exe /S /LANGFILE="D:\language_es.xml" /D=C:\Program Files\RadiAnt

4.8 GPU acceleration

Recent years have brought tremendous advancements in Graphics Processing Units development. The computing power of the current top-of-the-line graphics cards reaches more than 10 TFLOPS, which is about 100 times more than the average modern desktop CPU.



Three-dimensional reconstruction modes available in RadiAnt DICOM Viewer (3D Volume Rendering; 3D Multiplanar Reformation) are based on algorithms that require tens of billions of mathematic operations per one frame of reconstructed image. When CPU is used for such calculations, progressive rendering has to be used to facilitate the fluidity required for smooth interactions. Only when a user stops volume manipulation can the final image be rendered in best quality. However, if a compatible GPU card is detected in the system, it can be used by RadiAnt DICOM Viewer to crunch the numbers at much faster rates, so that smooth interaction with volume can be achieved at best rendering quality.



GPU rendering mode is automatically enabled in 3D VR and 3D MPR windows when a fast Nvidia graphics card is detected. If a slower card is detected, GPU mode has to be enabled manually.

Prerequisites

- A 64-bit version of RadiAnt DICOM Viewer is required to make use of GPU-accelerated rendering, this mode is not supported in the 32-bit version of the viewer.
- The latest Nvidia drivers should be installed (<http://www.nvidia.com/Download/index.aspx>).
- Nvidia CUDA compatible GPU is required with the compute capability version 3.0 or later:
 GeForce GTX 770, GeForce GTX 760, GeForce GT 740, GeForce GTX 690, GeForce GTX 680, GeForce GTX 670, GeForce GTX 660 Ti, GeForce GTX 660, GeForce GTX 650 Ti BOOST, GeForce GTX 650 Ti, GeForce GTX 650, GeForce GTX 880M, GeForce GTX 780M, GeForce GTX 770M, GeForce GTX 765M, GeForce GTX 760M, GeForce GTX 680MX, GeForce GTX 680M, GeForce GTX 675MX, GeForce GTX 670MX, GeForce GTX 660M, GeForce GT 750M, GeForce GT 650M, GeForce GT 745M, GeForce GT 645M, GeForce GT 740M, GeForce GT 730M, GeForce GT 640M, GeForce GT 640M LE, GeForce GT 735M, GeForce GT 730M, GeForce GTX Titan Z, GeForce GTX Titan

Black, GeForce GTX Titan, GeForce GTX 780 Ti, GeForce GTX 780, GeForce GT 640 (GDDR5), GeForce GT 630 v2, GeForce GT 730, GeForce GT 720, GeForce GT 710, GeForce GT 740M (64-bit, DDR3), GeForce GT 920M, GeForce GTX 750 Ti, GeForce GTX 750, GeForce GTX 960M, GeForce GTX 950M, GeForce 940M, GeForce 930M, GeForce GTX 860M, GeForce GTX 850M, GeForce 845M, GeForce 840M, GeForce 830M, GeForce GTX 870M, GeForce GTX Titan X, GeForce GTX 980 Ti, GeForce GTX 980, GeForce GTX 970, GeForce GTX 960, GeForce GTX 950, GeForce GTX 750 SE, GeForce GTX 980M, GeForce GTX 970M, GeForce GTX 965M, Nvidia TITAN Xp, Titan X, GeForce GTX 1080 Ti, GTX 1080, GTX 1070 Ti, GTX 1070, GTX 1060, GTX 1050 Ti, GTX 1050, GT 1030, MX350, MX330, MX250, MX230, MX150, NVIDIA TITAN V, NVIDIA TITAN RTX, GeForce RTX 2080 Ti, RTX 2080 Super, RTX 2080, RTX 2070 Super, RTX 2070, RTX 2060 Super, RTX 2060, GeForce GTX 1660 Ti, GTX 1660 Super, GTX 1660, GTX 1650 Super, GTX 1650, Quadro K5000, Quadro K4200, Quadro K4000, Quadro K2000, Quadro K2000D, Quadro K600, Quadro K420, Quadro K500M, Quadro K510M, Quadro K610M, Quadro K1000M, Quadro K2000M, Quadro K1100M, Quadro K2100M, Quadro K3000M, Quadro K3100M, Quadro K4000M, Quadro K5000M, Quadro K4100M, Quadro K5100M, NVS 510, Quadro 410, Quadro K6000, Quadro K5200, Quadro K1200, Quadro K2200, Quadro K620, Quadro M2000M, Quadro M1000M, Quadro M600M, Quadro K620M, NVS 810, Quadro M6000 24GB, Quadro M6000, Quadro M5000, Quadro M4000, Quadro M2000, Quadro M5500, Quadro M5000M, Quadro M4000M, Quadro M3000M, Quadro GP100, Quadro P6000, Quadro P5000, Quadro P4000, Quadro P2200, Quadro P2000, Quadro P1000, Quadro P400, Quadro P500, Quadro P520, Quadro P600, Quadro P5000(Mobile), Quadro P4000(Mobile), Quadro P3000(Mobile), Quadro GV100, Quadro RTX 8000, Quadro RTX 6000, Quadro RTX 5000, Quadro RTX 4000, Quadro T2000, Quadro T1000

4.9 Citations

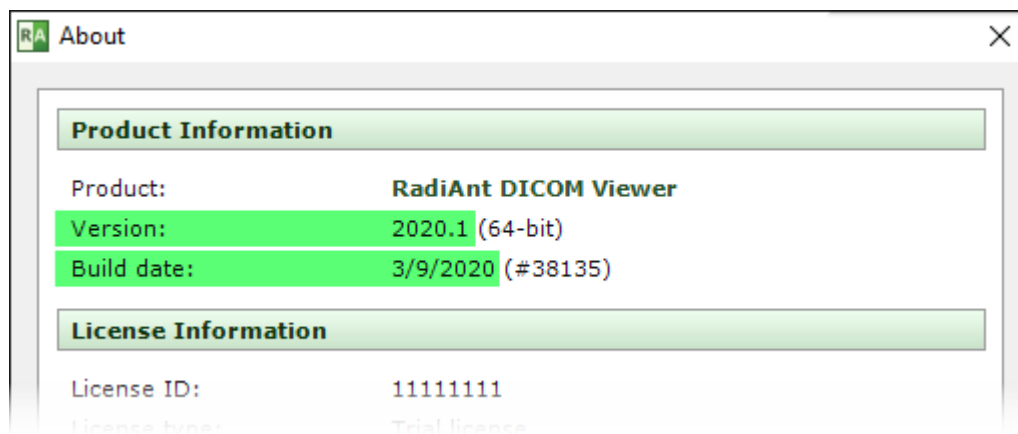
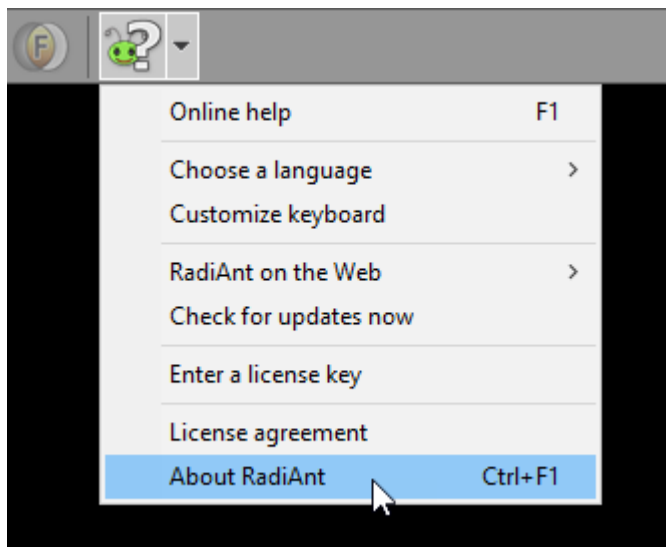
How to cite RadiAnt DICOM Viewer in academic publications:

Medixant. RadiAnt DICOM Viewer [Software]. Version 2020.1. Mar 9, 2020. URL: <https://www.radiantviewer.com>

BibTeX:

```
@software{radiant,  
  author = {{Medixant}},  
  title = {RadiAnt DICOM Viewer},  
  url = {https://www.radiantviewer.com},  
  version = {2020.1},  
  date = {2020-03-09},  
}
```

The publication date and version entries have to be changed to match the version of software you are using. From within the software, click the arrow next to the **Help** button and then select **About RadiAnt**, or use shortcut **Ctrl + F1** to find the version information and the date of build.



4.10 CD/DVD/USB Autorun Package



RadiAnt DICOM Viewer CD/DVD is available as [the Autorun Package](#) for Patient CD/DVD/USB (32 and 64-bit).

This version is intended for distribution on CD/DVD or USB flash media with a DICOM study.

The contents of the archive should be placed in the root folder of the CD/DVD/USB. After the relevant media is inserted, autorun file automatically runs RadiAnt DICOM Viewer, which opens and displays the DICOM files placed on the media.

This version works on both 32- and 64-bit systems. Windows XP SP3, Vista, Windows 7, Windows 8, Windows 8.1, and Windows 10 are supported.

[Software limitations](#)

[Package contents](#)

[Recording DICOM CD/DVD](#)

[Encrypted DICOM CD/DVD/USB](#)

4.10.1 Software limitations

RadiAnt DICOM Viewer CD/DVD can only run from the CD/DVD discs or USB Flash removable drives and display images stored on the media on which it runs. It cannot be started from your local hard drive. Furthermore, DICOM studies cannot be opened from locations other than removable media the viewer was recorded on.

You should use **your own software and hardware** to burn the contents of the autorun package (with the license key file) along with the DICOM study files to the CD/DVD media (or record to USB Flash). We do not provide software that can receive DICOM studies from PACS locations and burn these studies to CD/DVD discs. We simply provide a set of RadiAnt DICOM Viewer CD/DVD files in a zip archive together with the license to distribute these files on the CD/DVDs or USB drives. RadiAnt DICOM Viewer cannot burn CD/DVDs by itself.

The RadiAnt DICOM Viewer CD/DVD does not include all the features that are available in the installable version of RadiAnt DICOM Viewer. Please refer to this comparison table for further information: <https://www.radiantviewer.com/products/>

4.10.2 Package contents

The package contains 32-bit (RA32 folder) and 64-bit (RA64 folder) versions of RadiAnt DICOM Viewer CD/DVD.

There is also the "COMMON" folder, which contains the following subfolders and files:

- "LANG" - [the language XML files](#) with RadiAnt DICOM Viewer CD/DVD translations may be placed in this folder.

- "LICENSE" - contains the license agreements for RadiAnt DICOM Viewer CD/DVD and relevant open-source libraries info.
- "logo.jpg" - can be replaced with your custom logo image (JPEG, 650x300px).
- ["options.xml"](#) - can be edited to change the default settings of the RadiAnt DICOM Viewer CD/DVD.
- ["overlay.xml"](#) - can be edited to change the default annotations that are overlaid on the images.

License key file

After completing the purchase process, you will receive a license key (one key per recording device).

The license key file ("license.radiantlic") must be copied to the "COMMON" folder.

Autorun.inf

After the media is inserted, the "autorun.inf" file automatically opens the RadiAnt DICOM Viewer CD/DVD, which performs a search and opens and displays the DICOM files placed on the media. The search for DICOM files can be narrowed down to the specific folders defined as command-line parameters (-d) in the "autorun.inf" file:

```
[AutoRun.Amd64]
LABEL=RadiAnt DICOM Viewer 64-bit
ICON=RA64\viewer64.exe,0
OPEN=RA64\viewer64.exe -d IMAGES
```

```
[AutoRun]
LABEL=RadiAnt DICOM Viewer 32-bit
ICON=RA32\viewer32.exe,0
OPEN=RA32\viewer32.exe -d IMAGES
```

The viewer may also be started manually using the "run.bat" file. This approach opens the "RA32/launcher.exe" tool which, depending on the user's operating system versions, runs either a 32-bit or 64-bit version of RadiAnt DICOM Viewer CD/DVD.

RadiAnt DICOM Viewer CD/DVD can be opened with a chosen interface language (provided the associated translation XML file is present in the LANG folder).

Users are required to pass the language code after the "-lang" parameter to launcher.exe. Simply replace the contents of the "autorun.inf" file with:

```
[AutoRun.Amd64]
LABEL=RadiAnt DICOM Viewer 64-bit
ICON=RA64\viewer64.exe,0
OPEN=RA32\launcher.exe -lang es
```

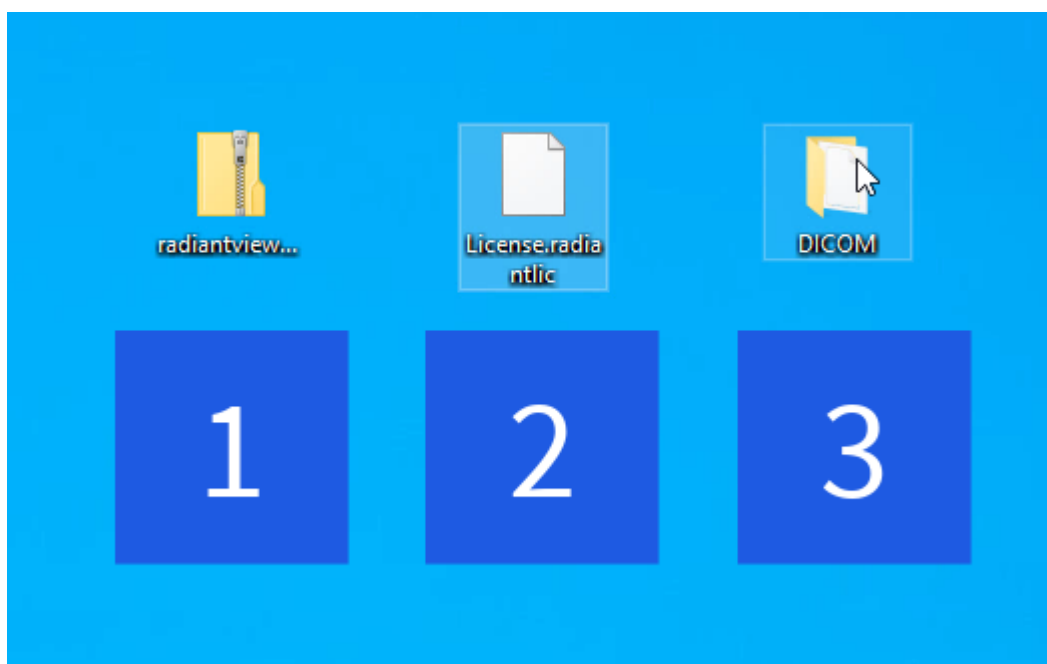
```
[AutoRun]
LABEL=RadiAnt DICOM Viewer 32-bit
ICON=RA32\viewer32.exe,0
OPEN=RA32\launcher.exe -lang es
```

4.10.3 Recording DICOM CD/DVD

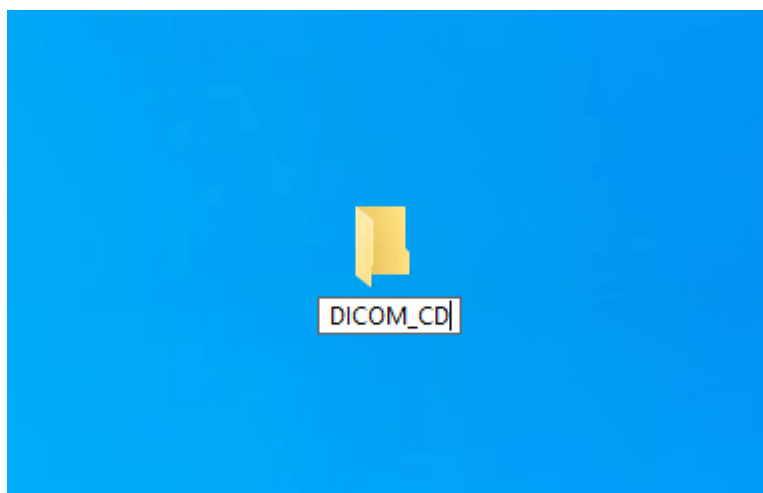
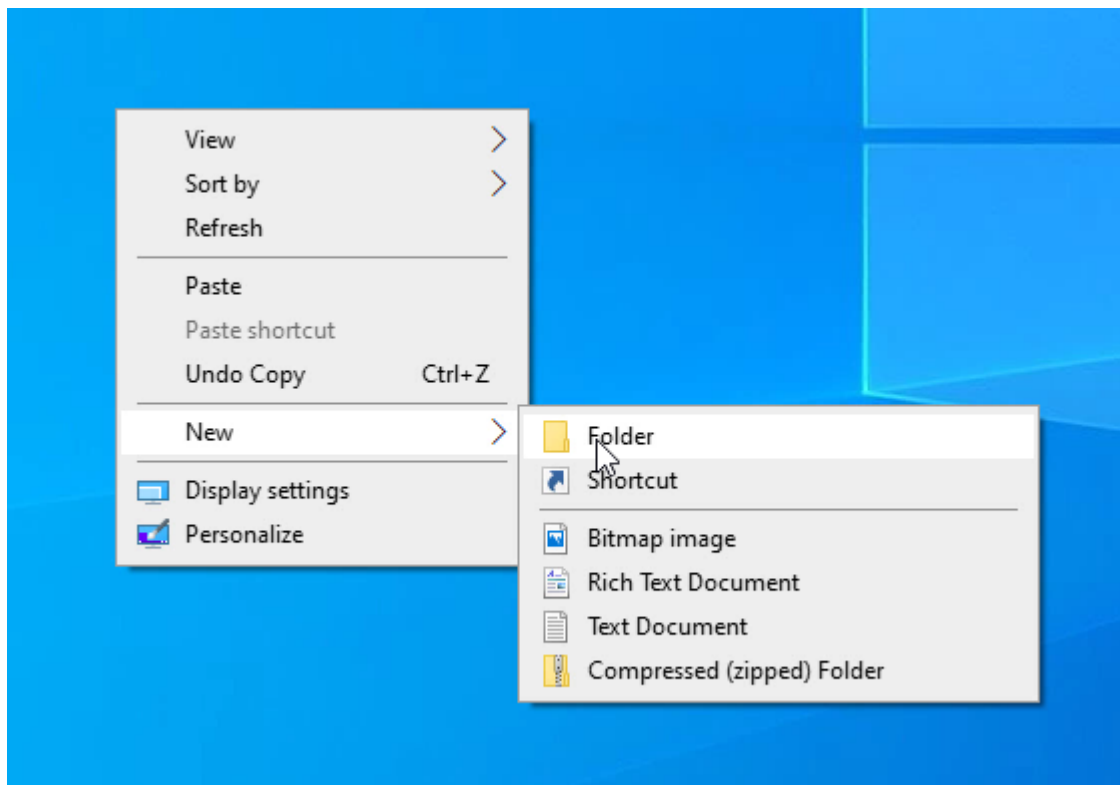
This tutorial is also available as a screencast (external YouTube link):
[How to burn a DICOM CD with RadiAnt DICOM Viewer CD/DVD on Windows 10](#)

You will need the following items to create a DICOM CD:

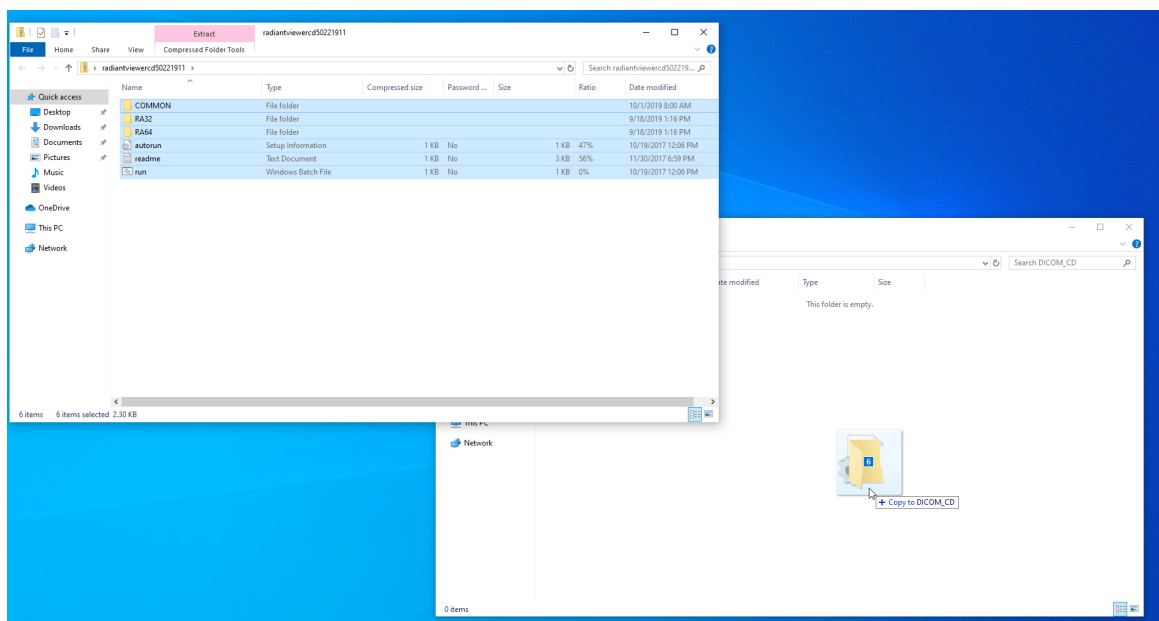
1. The RadiAnt DICOM Viewer CD/DVD autorun package. This can be downloaded from <https://www.radiantviewer.com/products/radiant-dicom-viewer-cddvd/>
2. The License.radiantlic file that was sent to you in the delivery email.
3. The folder with the DICOM study that you want to record.



Create a temporary folder in which you will copy the autorun package, the license key file, and the DICOM files.

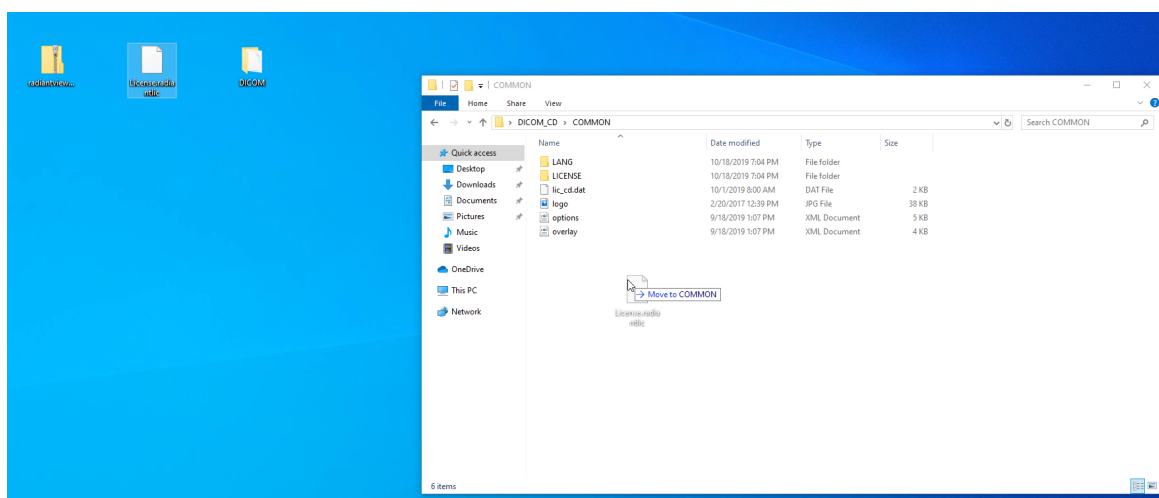


Extract the files from the autorun package to the temporary DICOM_CD folder.

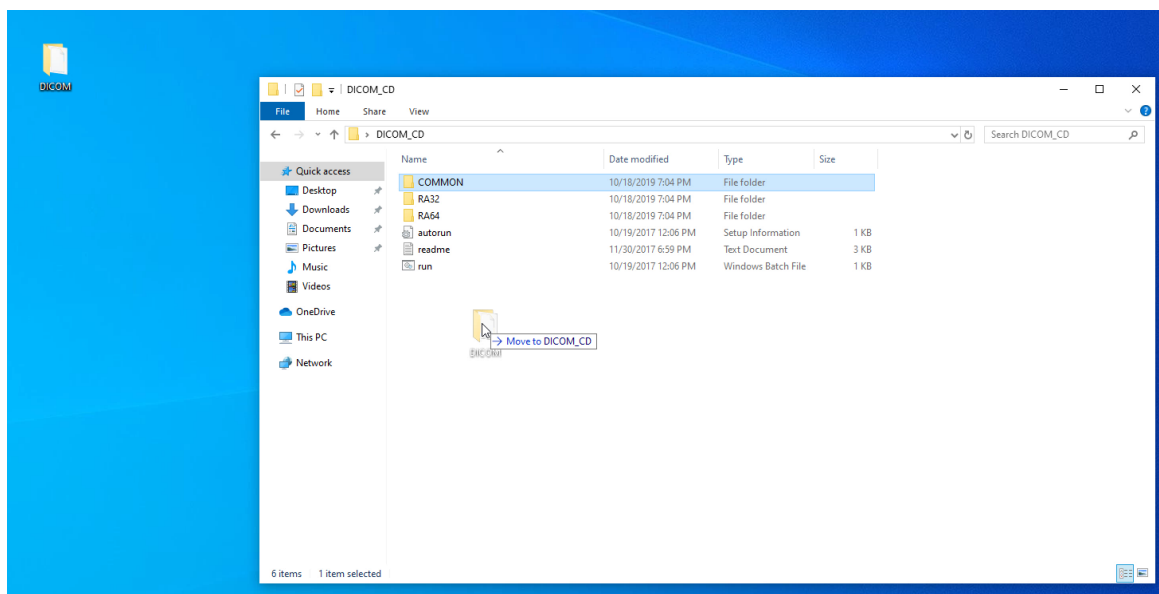


Copy the License.radiantlic file to the COMMON folder.

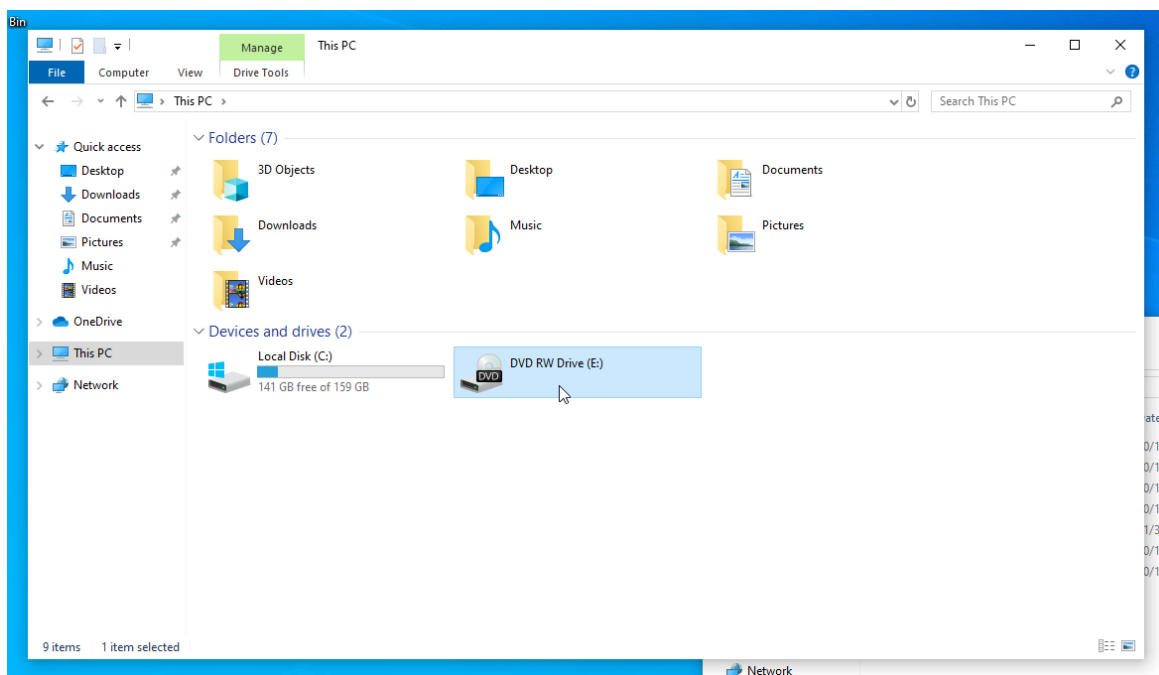
If the license key file was downloaded from the "My Licenses" account, you will need to change its name from license_XXXXXXXXX.radiantlic to License.radiantlic.



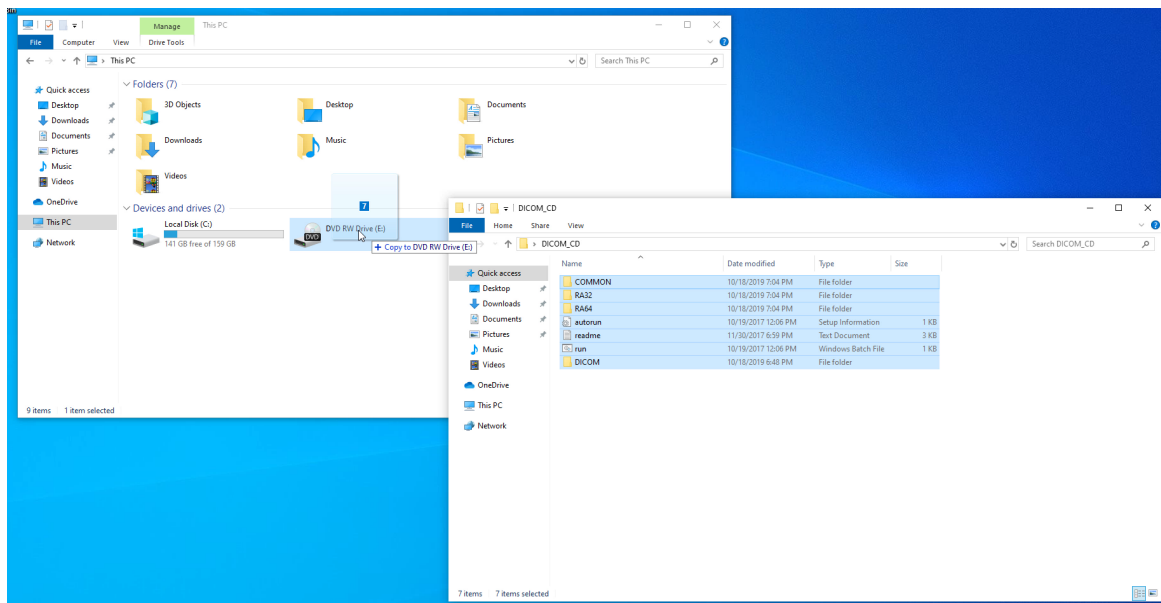
Copy the folder that contains your DICOM files to the temporary DICOM_CD folder.



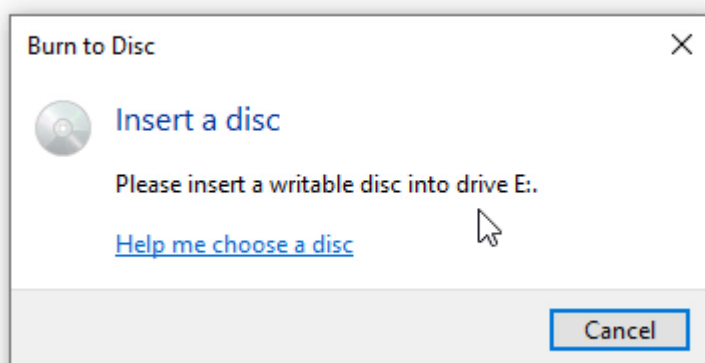
Browse to the CD/DVD recorder in File Explorer.



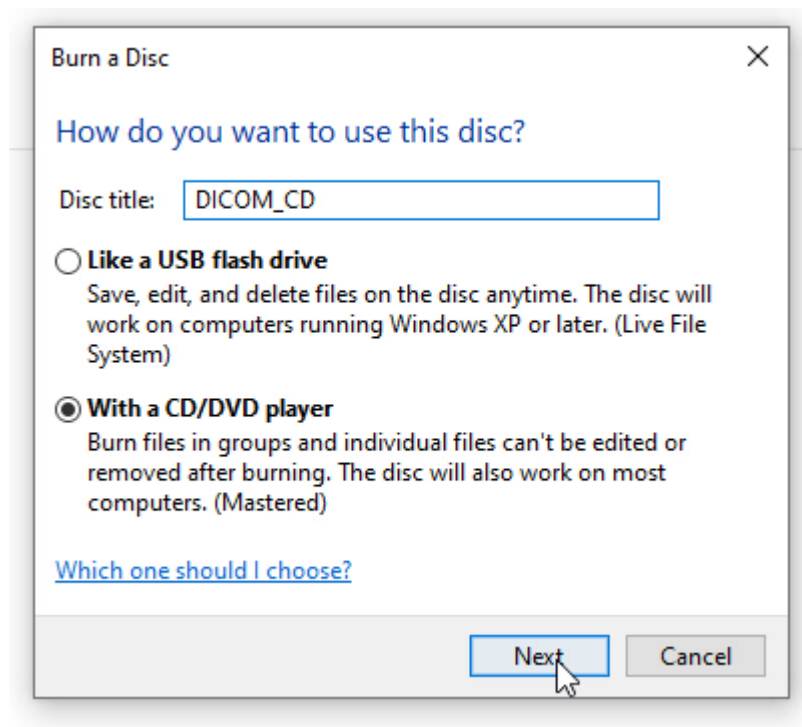
Select all files and folders from the temporary DICOM_CD folder and drag and drop them onto the CD/DVD drive.



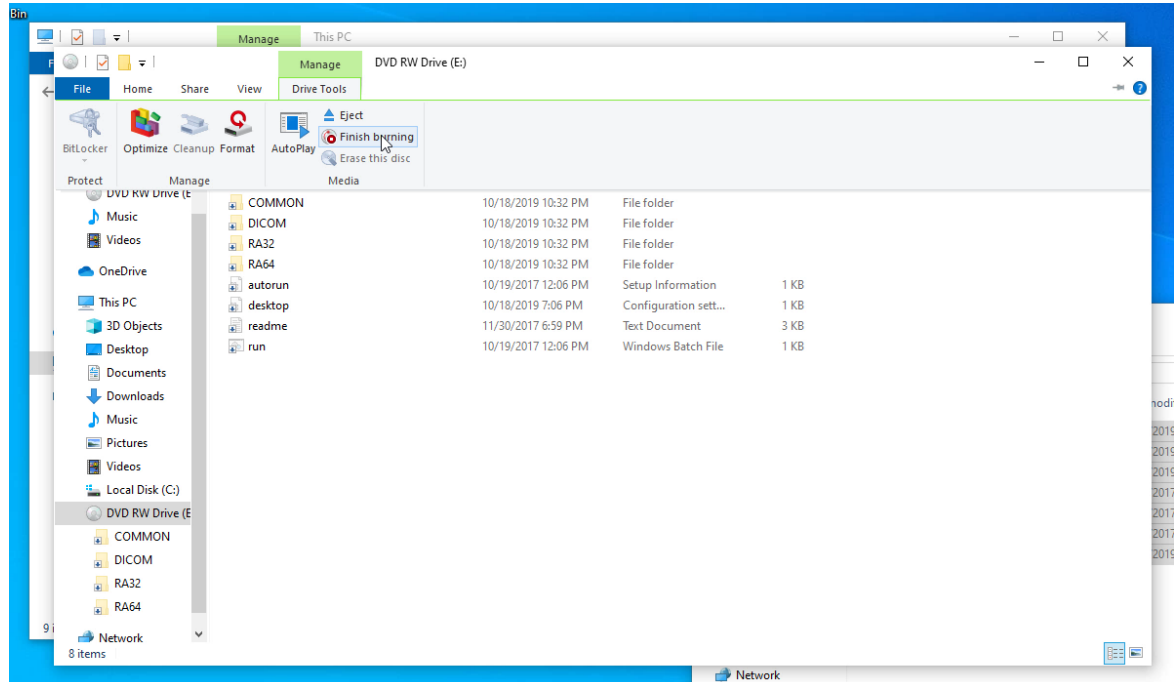
Insert a blank CD/DVD disc into your CD/DVD burner.



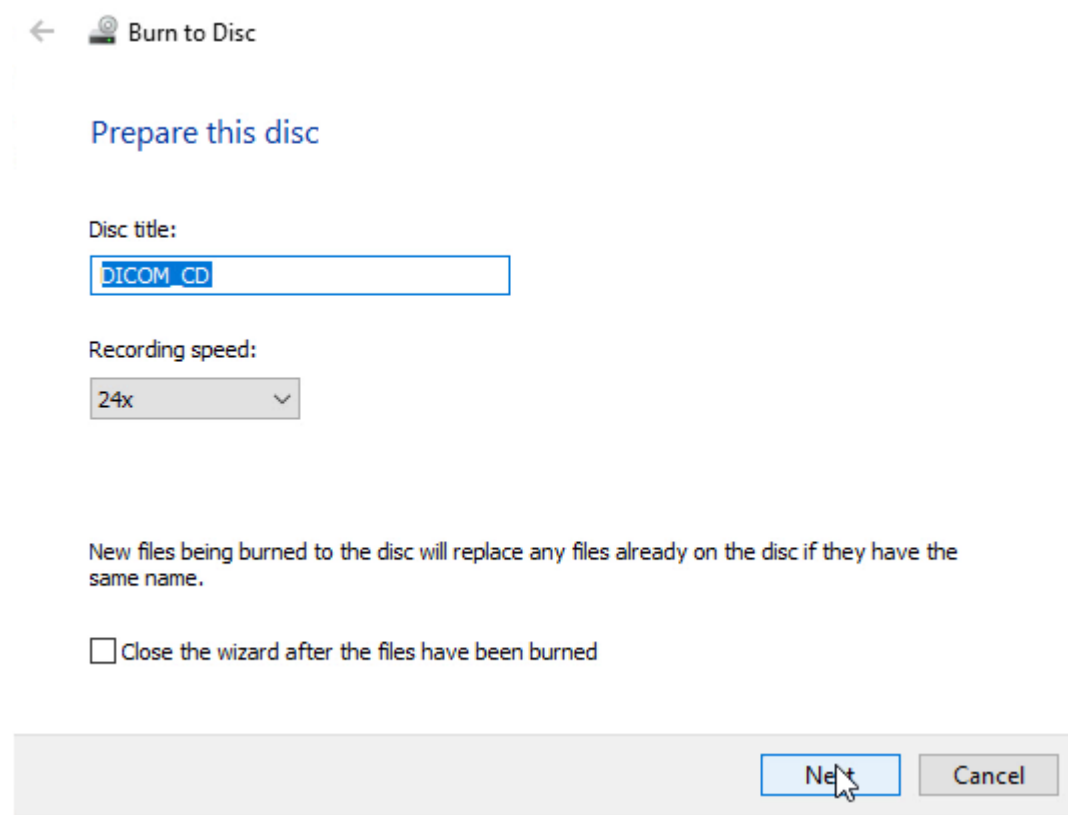
Choose **With a CD/DVD player**, enter the disc title, and click **Next**.




Click **Drive Tools** and **Finish burning** to start the CD/DVD burning process.



Click on the **Next** button, and the CD/DVD burning process will commence.



←  Burn to Disc

Prepare this disc

Disc title:

DICOM_CD

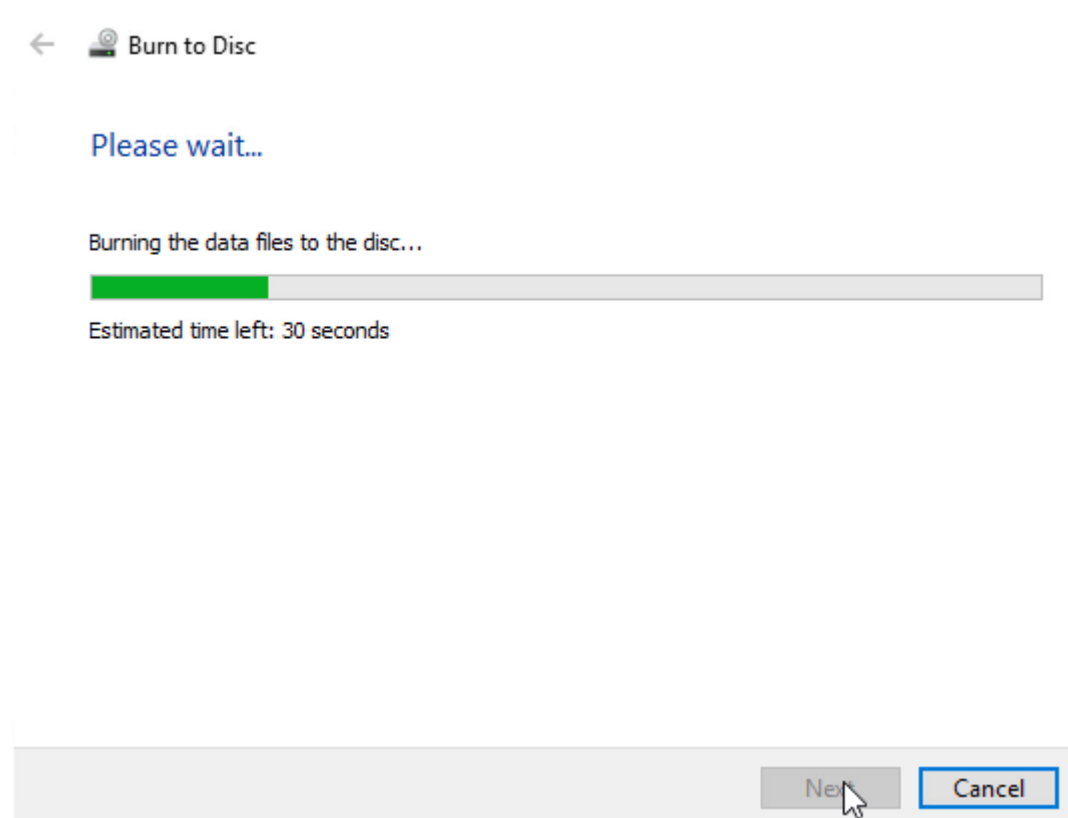
Recording speed:


24x

New files being burned to the disc will replace any files already on the disc if they have the same name.

☐ Close the wizard after the files have been burned

Next Cancel



←  Burn to Disc

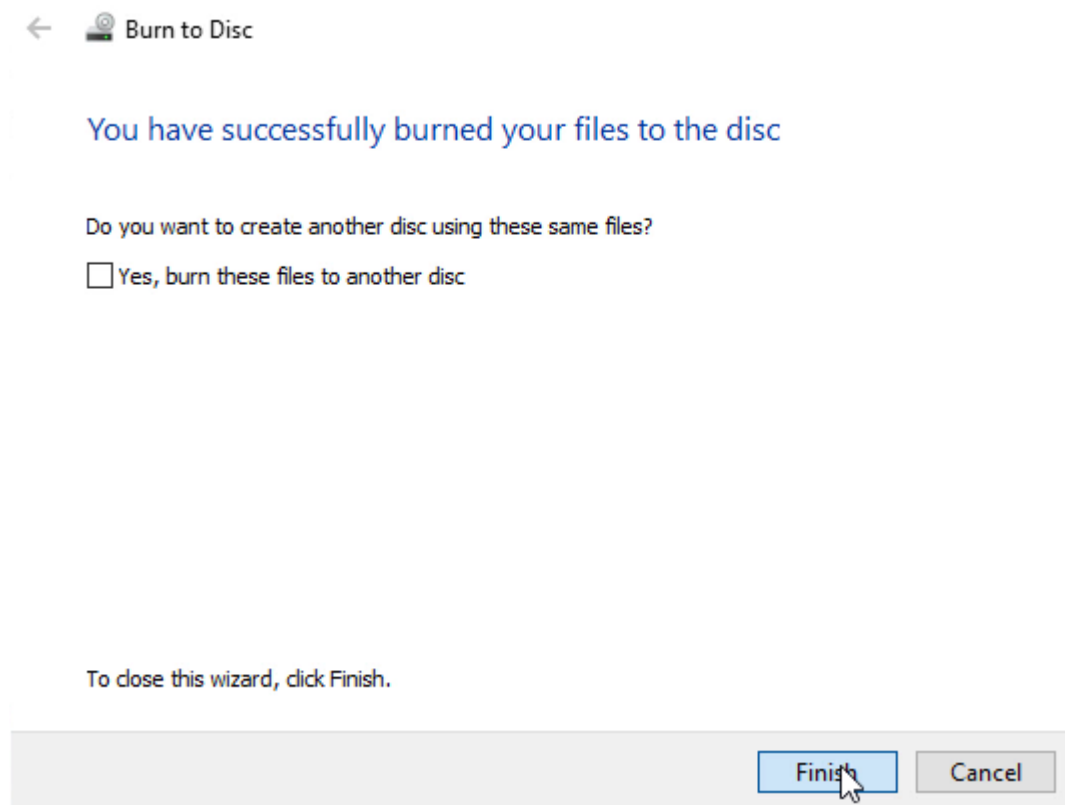
Please wait...

Burning the data files to the disc...

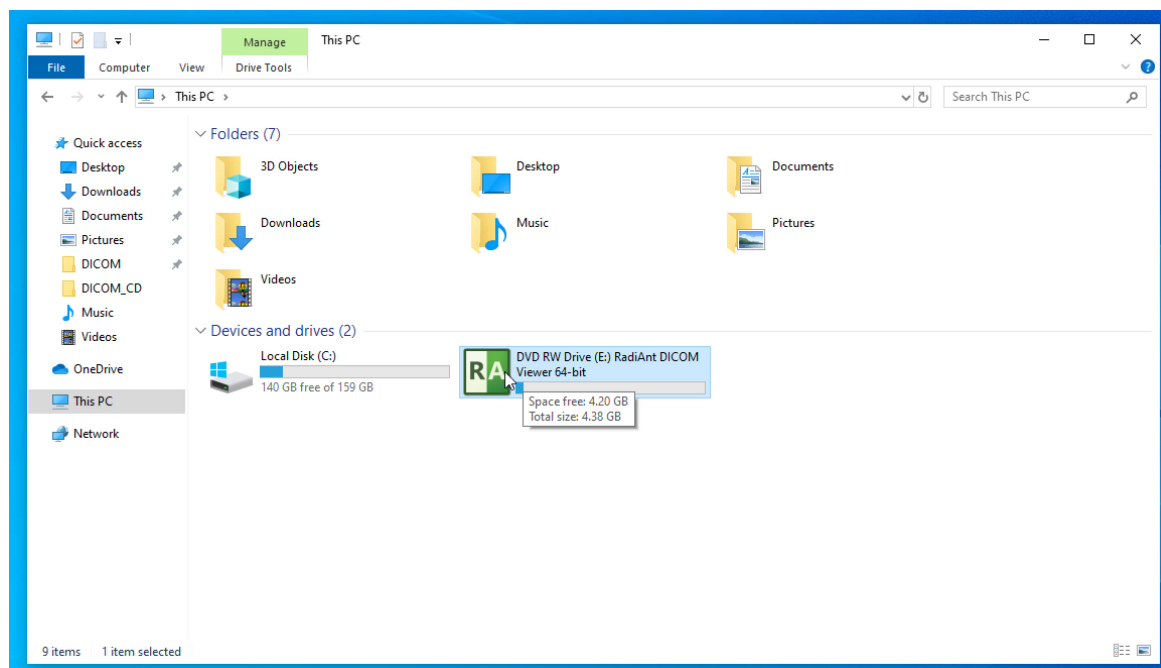
Estimated time left: 30 seconds

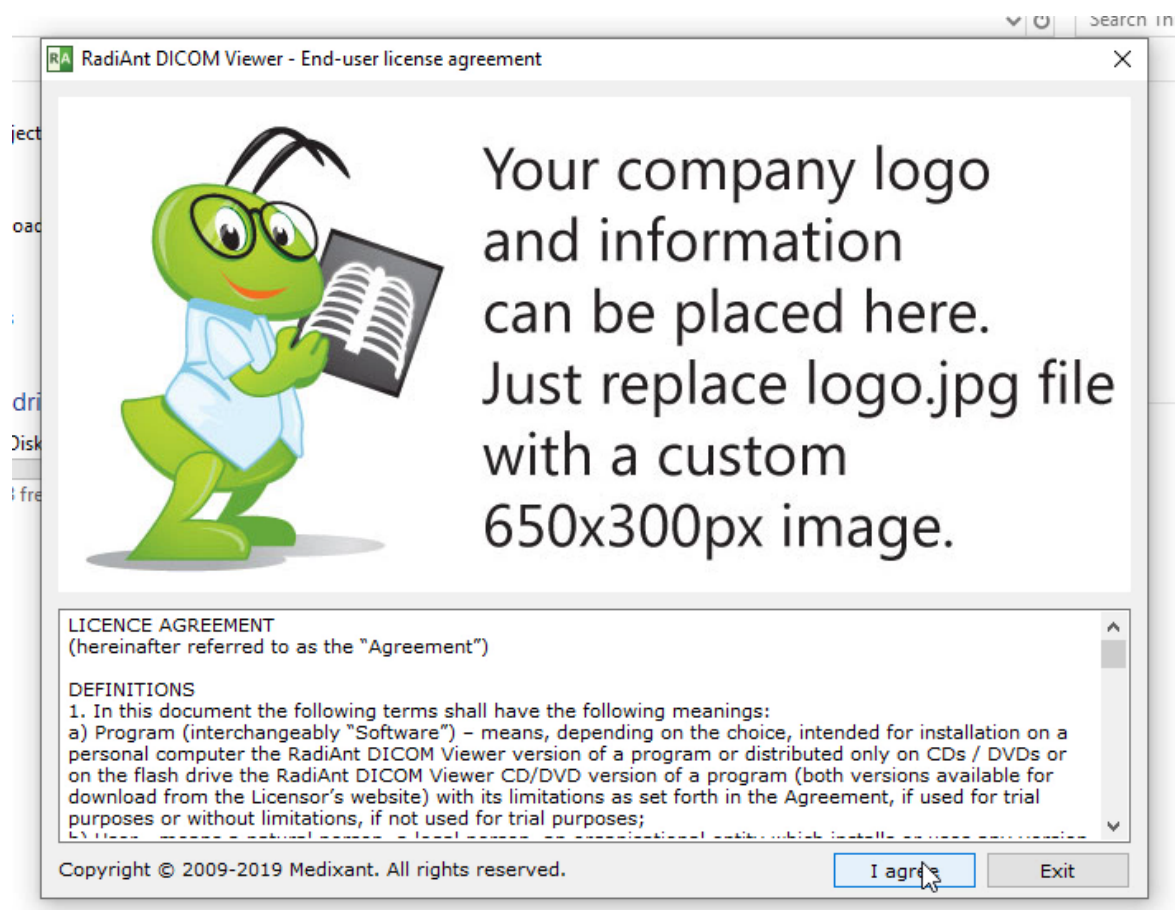
Next Cancel

Click **Finish**, and the CD/DVD will be ejected.

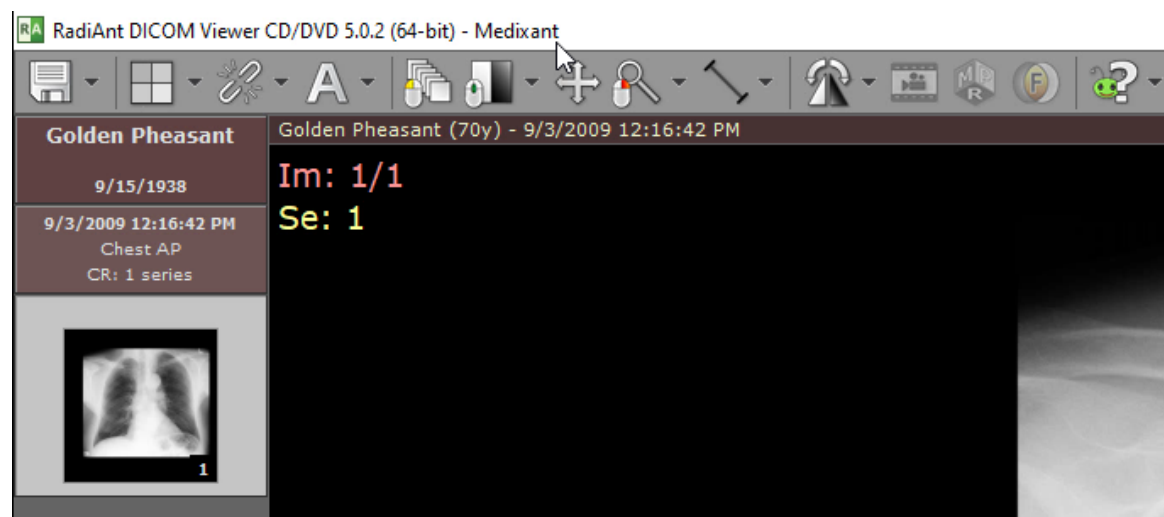


Insert the DICOM disc you just created into the CD/DVD drive to verify it is running correctly.

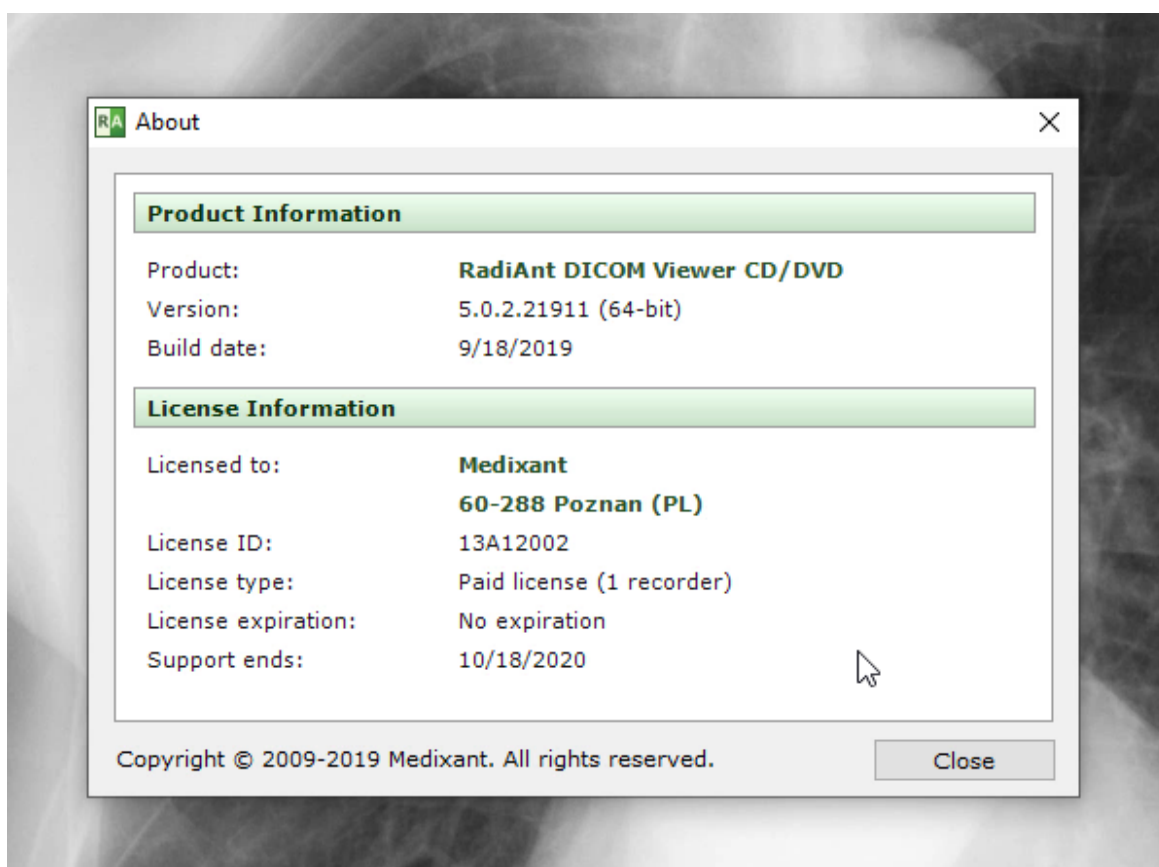
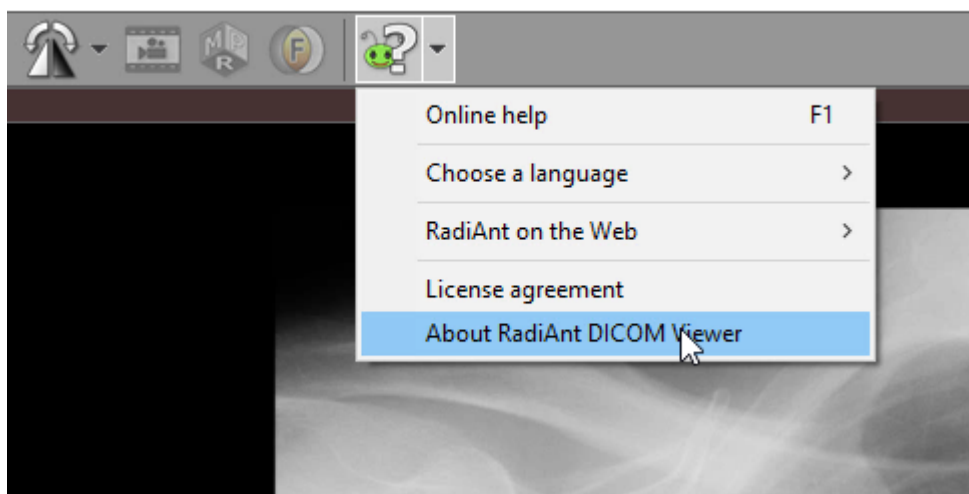




The company name is visible on the title bar.



The license information can be displayed in the About window.



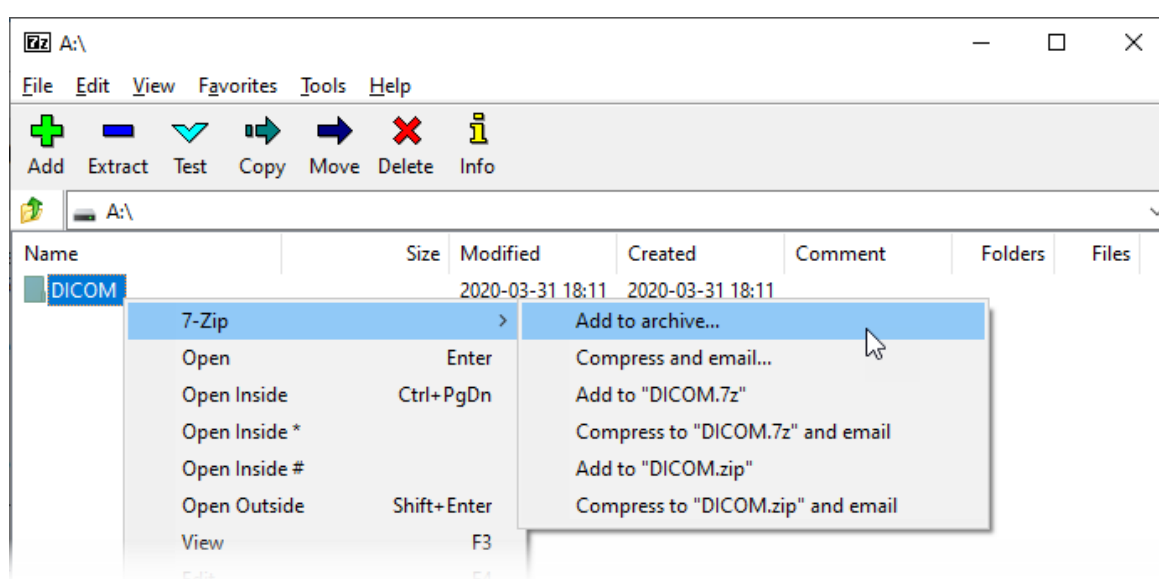
4.10.4 Encrypted DICOM CD/DVD/USB

You can create password-protected DICOM CD/DVD/USB media with the RadiAnt DICOM Viewer CD/DVD serving as the autorun viewer.

It supports the safe AES-256 encryption algorithm (192-bit and 128-bit AES versions are also supported). A free 7-zip archive manager can be used to compress and encrypt files using the AES-256 cipher.

How to create an encrypted DICOM CD

1. Compress the DICOM files you want to record into an unencrypted ZIP file (**container.zip**). This step is optional but adds an additional level of security by preventing unauthorized persons from looking up the file names inside a zip file without a password.



Add to Archive ✕

Archive: A:\
container.zip

Archive format: zip

Update mode: Add and replace files

Compression level: Normal

Path mode: Relative pathnames

Compression method: Deflate

Options

Dictionary size: 32 KB

☐ Create SFX archive

Word size: 32

☐ Compress shared files

Solid Block size:

☐ Delete files after compression

Number of CPU threads: 64 / 64

Encryption

Memory usage for Compressing: 2051 MB

Enter password:

Memory usage for Decompressing: 2 MB

Reenter password:

Split to volumes, bytes:

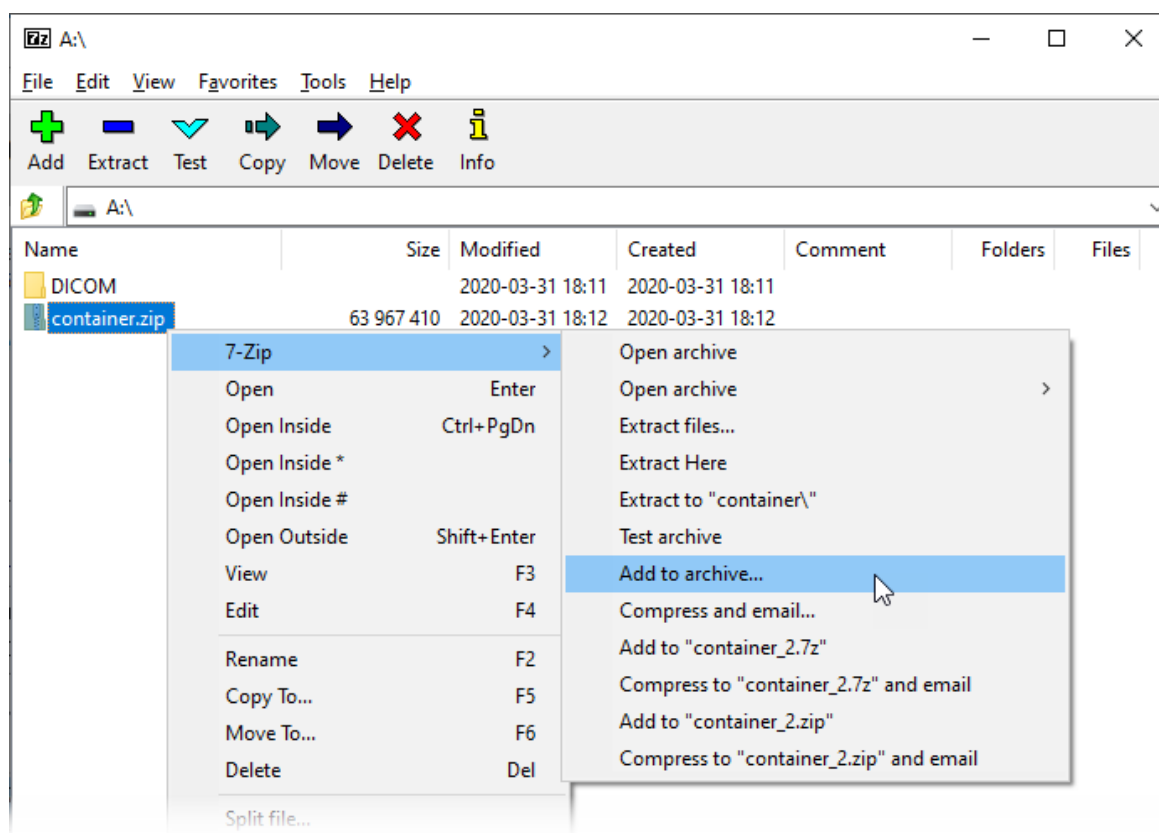
☐ Show Password

Parameters:

Encryption method: AES-256

OK Cancel Help

2. Now compress the **container.zip** file into **dcmdata.zip** file, this time using the AES-256 encryption (provide a safe, long password that contains a combination of uppercase and lower case letters, digits, and special characters).



Add to Archive

Archive: A:\
dcmdata.zip

Archive format: zip

Update mode: Add and replace files

Compression level: Normal

Path mode: Relative pathnames

Compression method: Deflate

Options

☐ Create SFX archive

☐ Compress shared files

☐ Delete files after compression

Dictionary size: 32 KB

Word size: 32

Solid Block size:

Number of CPU threads: 64 / 64

Memory usage for Compressing: 2051 MB

Memory usage for Decompressing: 2 MB

Split to volumes, bytes:

Parameters:

Encryption

Enter password:

Reenter password:

☐ Show Password

Encryption method: AES-256

OK Cancel Help

3. Record the encrypted dcmdata.zip file in the root folder of your CD/DVD or USB Flash.

Name	Date modified	Type	Size
COMMON	3/31/2020 6:01 PM	File folder	
RA32	3/31/2020 6:01 PM	File folder	
RA64	3/31/2020 6:01 PM	File folder	
autorun	10/19/2017 11:06 AM	Setup Information	1 KB
dcmdata	3/31/2020 5:56 PM	Compressed (zipp...	65,528 KB
readme	11/30/2017 5:59 PM	Text Document	3 KB
run	10/19/2017 11:06 AM	Windows Batch File	1 KB

4. When the RadiAnt DICOM Viewer CD/DVD is initiated, you will be prompted to input the password. After the correct password is provided, the files from the media will be decrypted to a temporary folder on the hard drive and opened in RadiAnt. When the program is closed, the temporary folder and associated decrypted files will be deleted. Please note that even though the decrypted files are deleted, they could potentially be recovered from the hard disk through the use of digital forensic tools.

