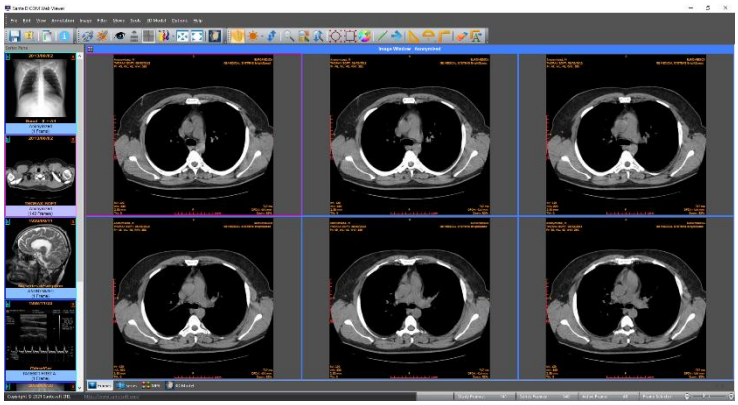
Sante DICOM Viewer CD/DVD

Quick start guide

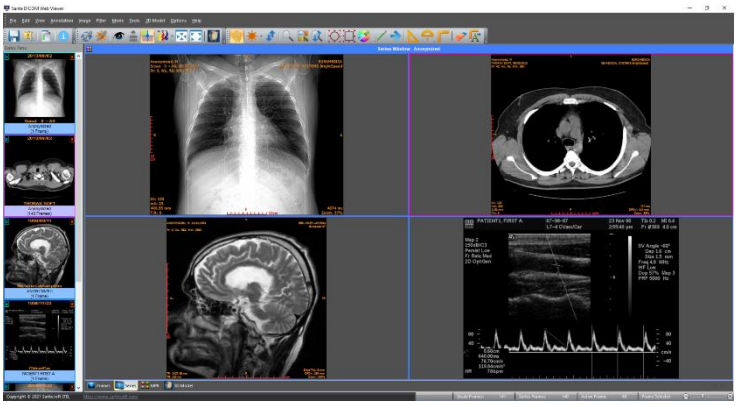
Contents

Overview

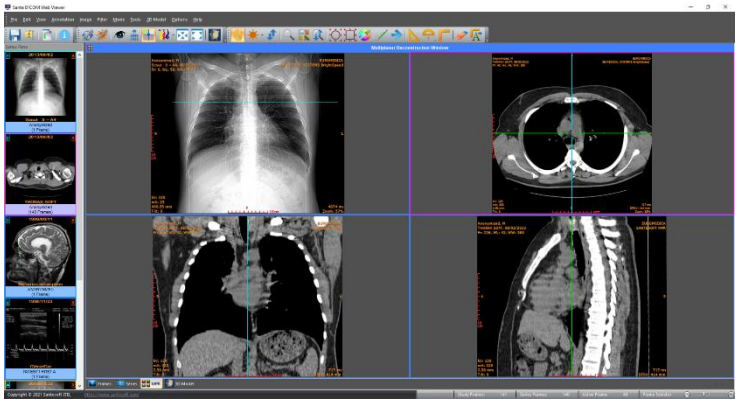
Sante DICOM Viewer Lite is a fully functional, feature rich, free 2D/3D DICOM Viewer.



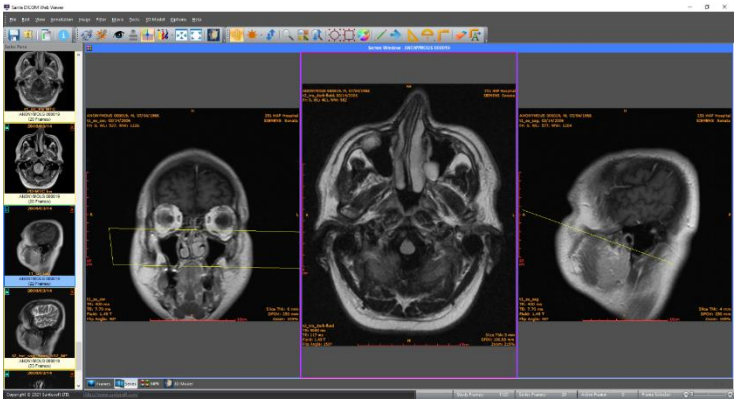
Frame View – 6 Tiles



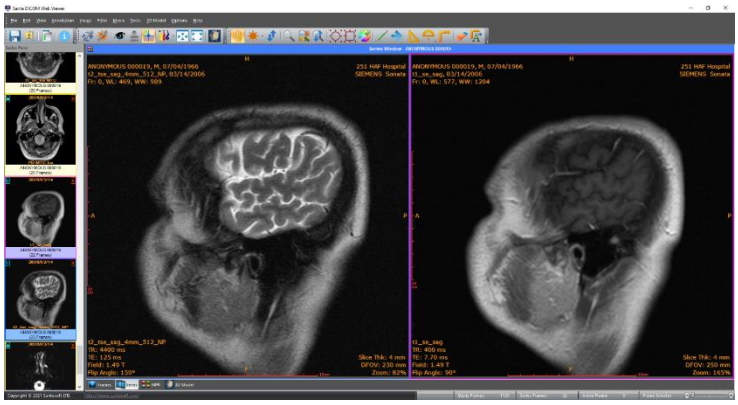
Series View – 4 Tiles



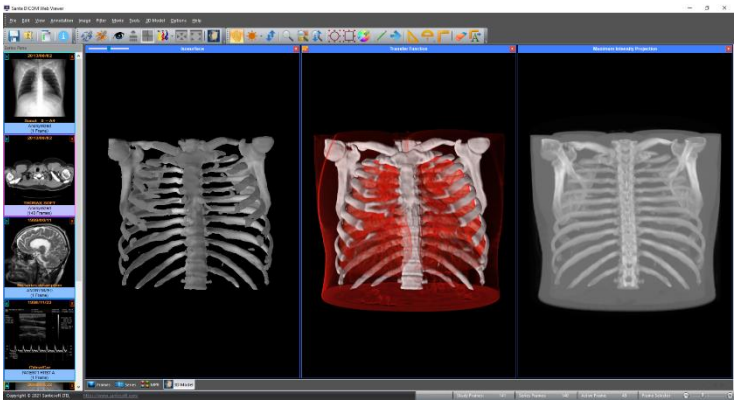
MPR View



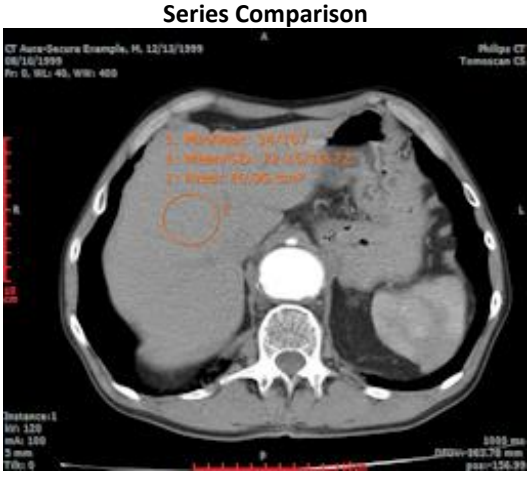
Scout lines – Localizer



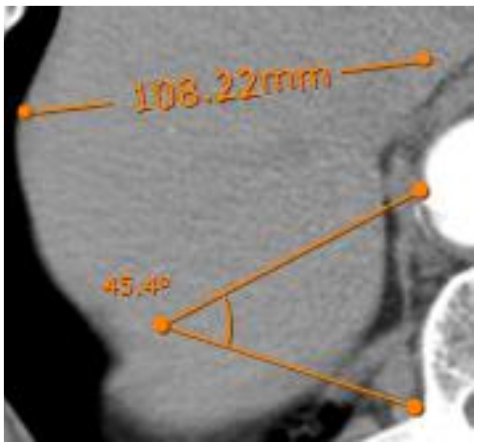
Series Comparison



Built-in 3D Viewer

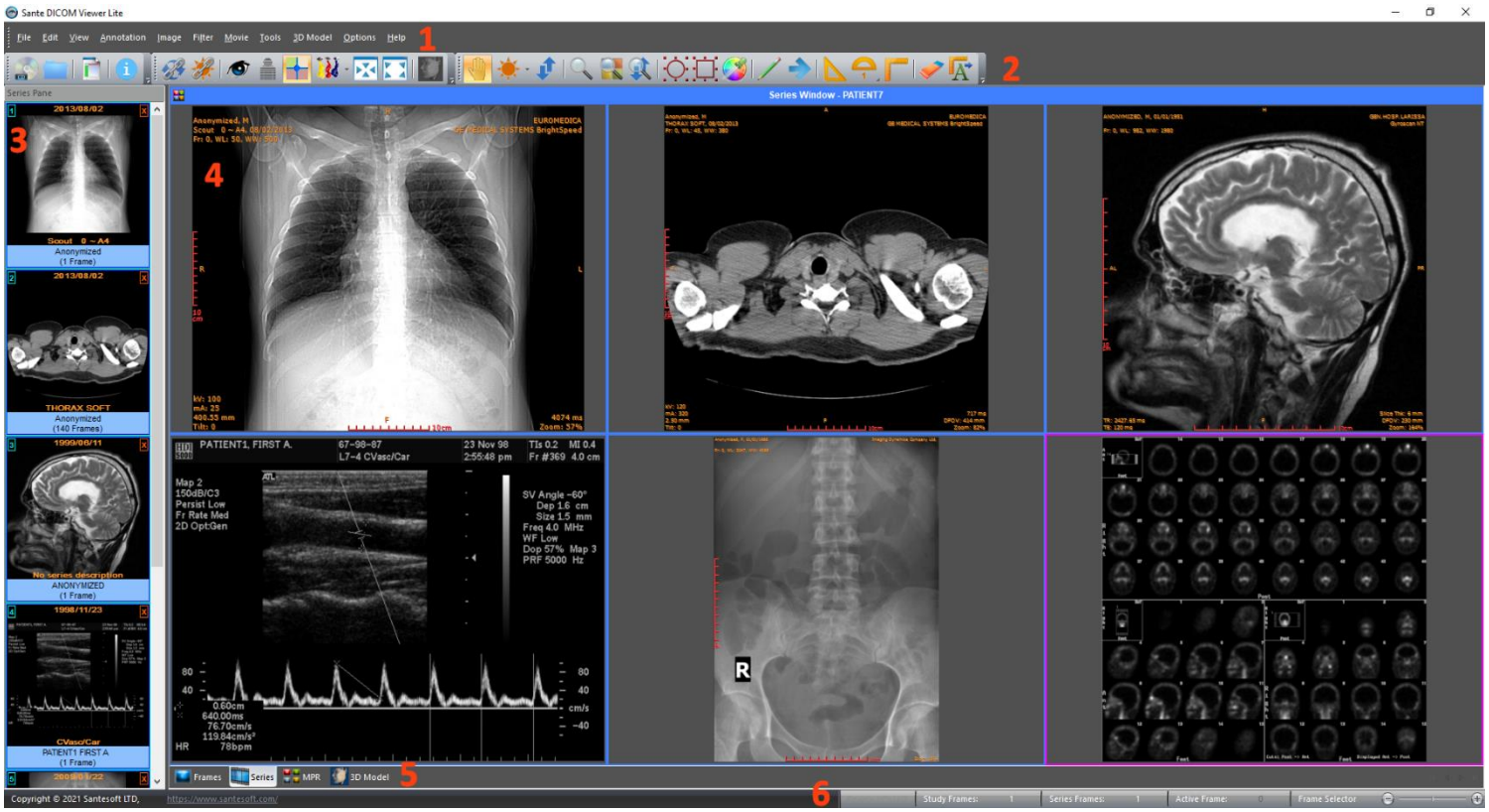


ROI Statistics



Distance and Angle Measurements

The user interface



The program works with DICOM series.

If the user opens a single DICOM file, the program automatically creates a DICOM series with this file in the memory and works with this single-file series. If the user opens a DICOM study the program works with all the DICOM series of this study. The loaded DICOM series are displayed in the series pane **(3)** as thumbnails.

The user interface is divided in 6 parts:

1. The menu bar
2. The toolbars
3. The series pane
4. The main window
5. The Frames/Series/MPR Mode selection tab
6. The frame selection slider

1. Menu bar

The menu bar contains all the commands of the program.

2. Toolbars

The toolbars provide shortcut buttons for the most useful commands of the program.
The program allows the user to add and remove toolbar buttons, so it fits their tastes and preferences.

3. Series Pane

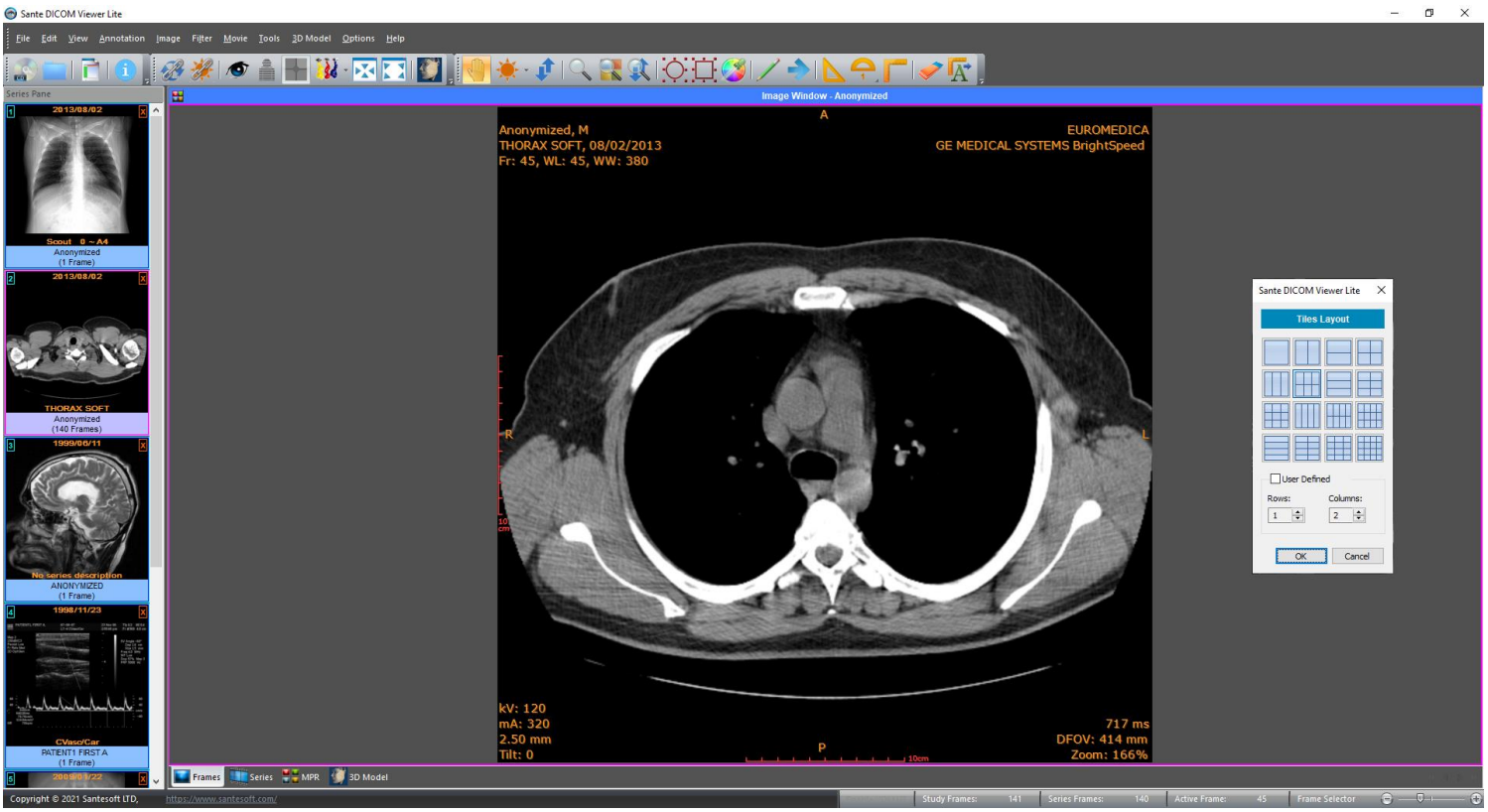
This pane displays a thumbnail for every loaded series. Every thumbnail displays the patient's name, the series description and the number of frames of the series. If the user has loaded a series in the main window, this series is displayed in blue color. Otherwise, is displayed in yellow color. The active series is displayed in magenta color.

4. Main window

The main window is the working area of the user. The main window displays the frames of the active series (Frame mode), or one frame of all the loaded series (Series mode).

The user can select the mode of the main window from the Frames/Series selection tab.

Every mode can have different number of tiles, and the user can select the number of tiles with the **"Options➧Tiles Layout"** menu command.



5. Frames/Series/MPR/3D Model selection tab

If the tab "Frames" is selected the main window displays the frames of the active series (Frame Mode).

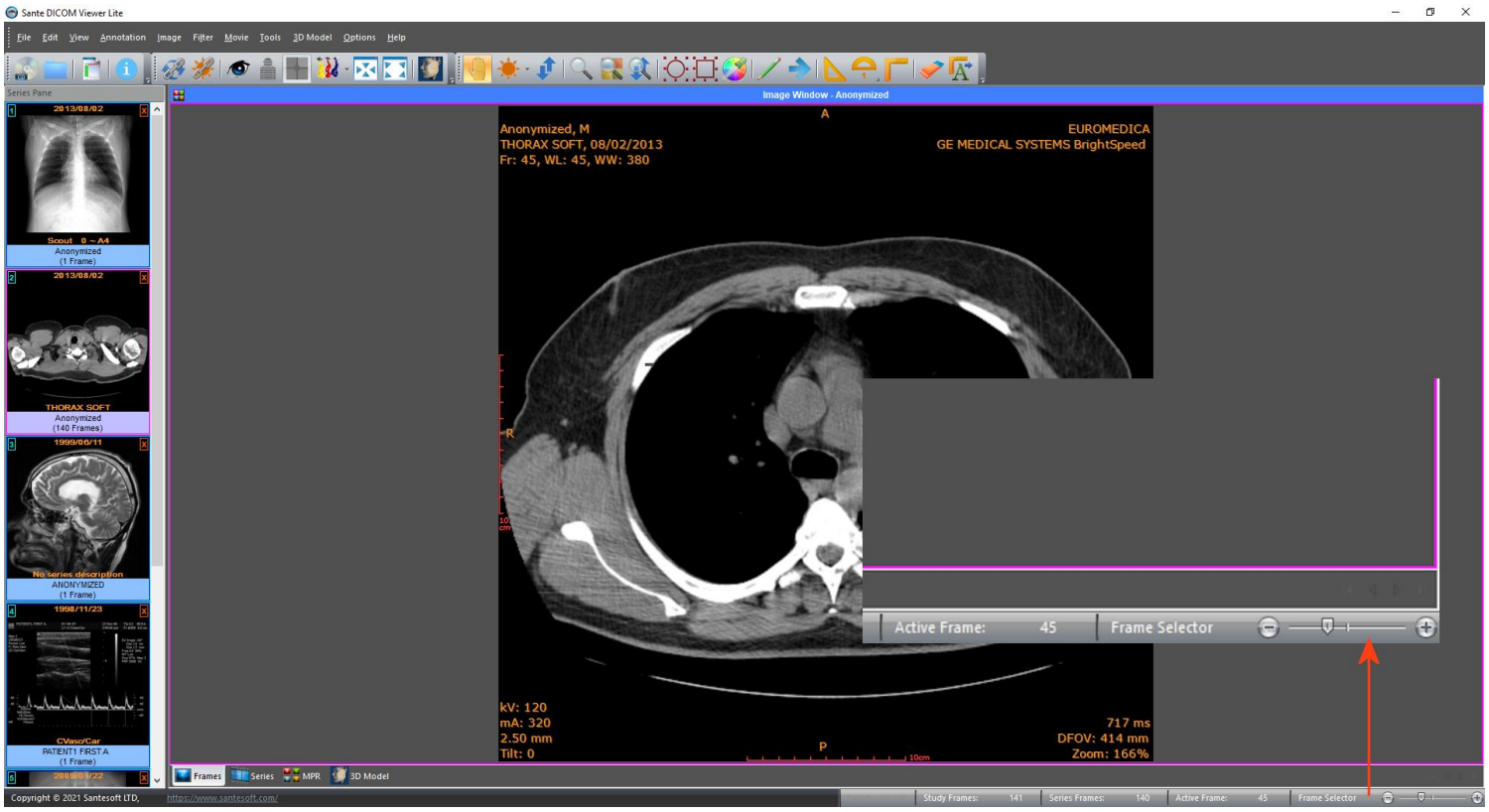
If the tab "Series" is selected the main window displays all the loaded series (Series Mode).

If the tab "MPR" is selected the main window displays the scout image/localizer and the axial/coronal/sagittal volumes of the series (MPR Mode).

If the tab "3D Model" is selected the main window displays a 3D model of the loaded series (3D Model Mode).

6. Frame selection slider

If the active series has many frames, this slider lets the user to select the active frame. Otherwise, is disabled.



The modes of the Main Window (4)

The Main Window **(4)** is divided in tiles and it has four modes:

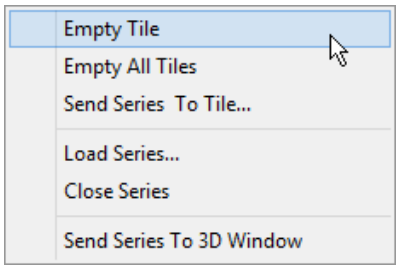
1. The **"Frames Mode"** that displays in its tiles the frames of the same series (the active series).

The user can select the number of the tiles with the **"Options➧Tiles Layout"** menu command.

2. The **"Series Mode"** that displays in its tiles all the loaded in the main window series.

The user can select the number of the tiles with the **"Options➧Tiles Layout"** menu command.

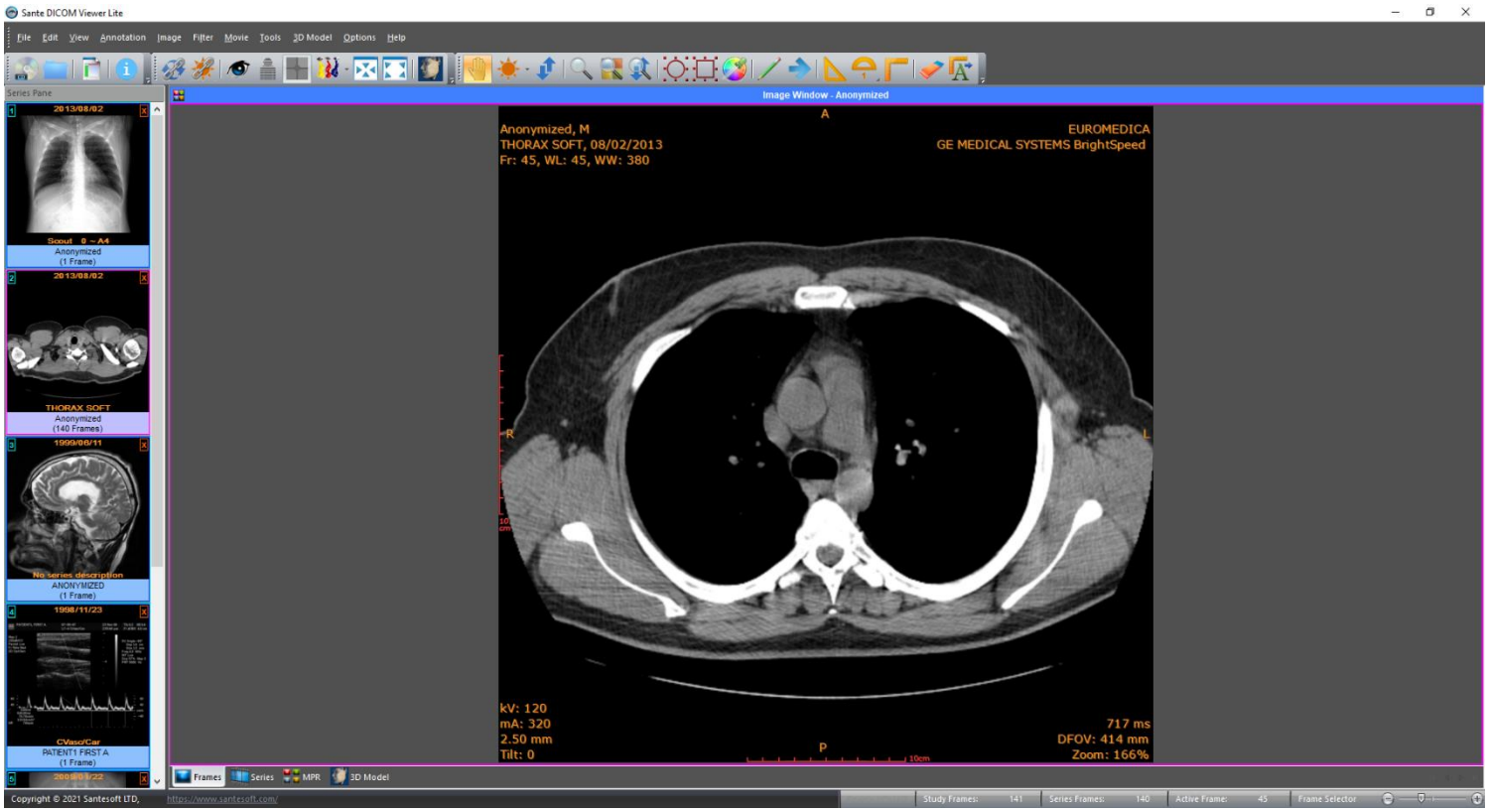
The active series is displayed in the "Series Mode" with a red rectangle around its tile (4). The user can select the active series by clicking its tile in the "Series Mode", or by single-clicking its thumbnail in the series pane. If a series is loaded in the main window, in the upper-left corner of its thumbnail is displayed the number of its "Series Mode" tile. If the user presses the right mouse button in a "Series Mode" tile, a pop-up menu appears and lets the user to empty the tile, empty all tiles, change the series tile, load another series to this tile and close the series that is loaded in this tile. This menu is not available in the "Frames Mode".



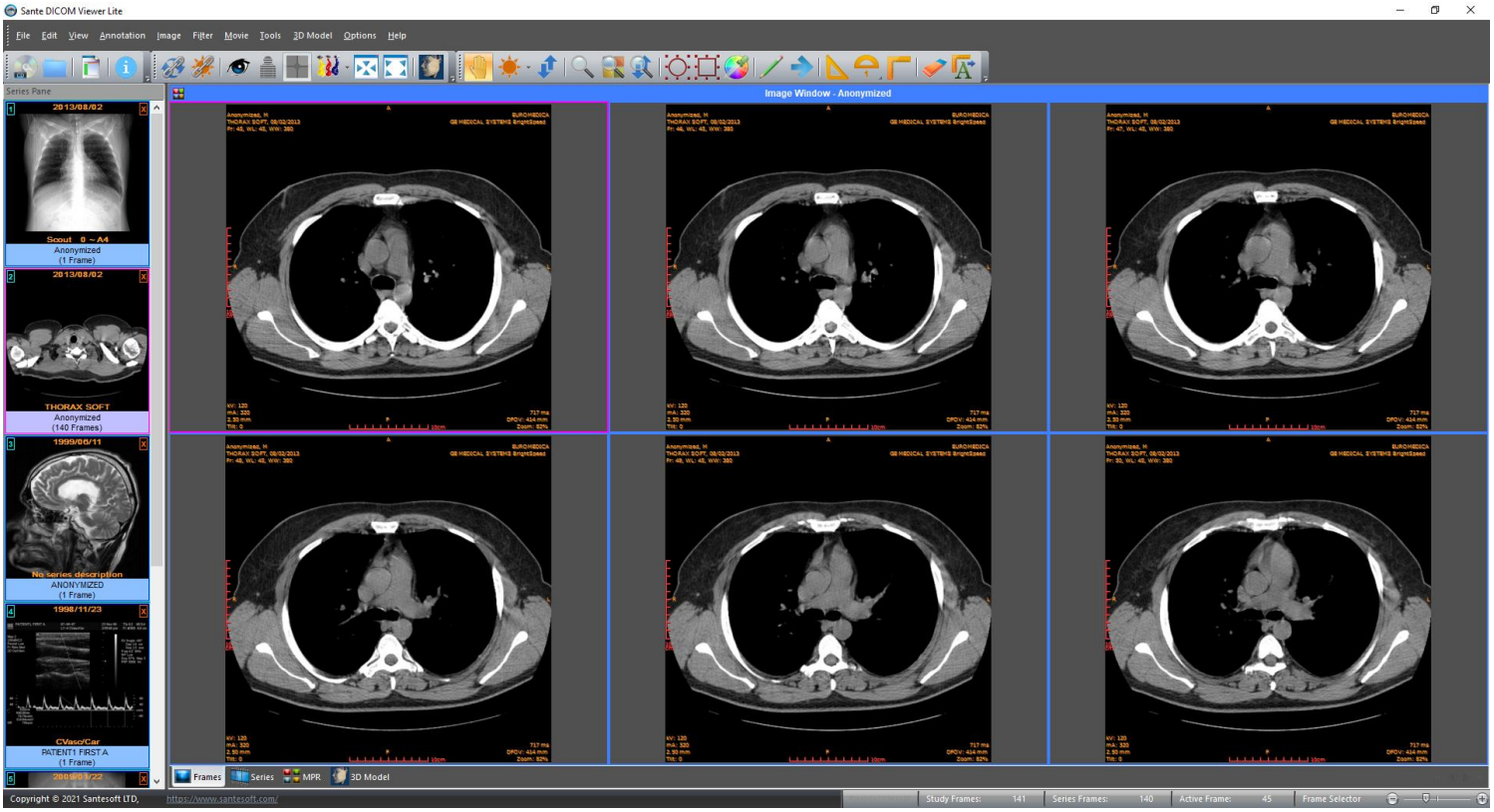
3. The **"MPR Mode"** that displays the scout image/localizer, the axial volume of the series and the volumes of the coronal and sagittal reconstructions of the series.

4. The **"3D Model Mode"** that displays a 3D model of the loaded series.

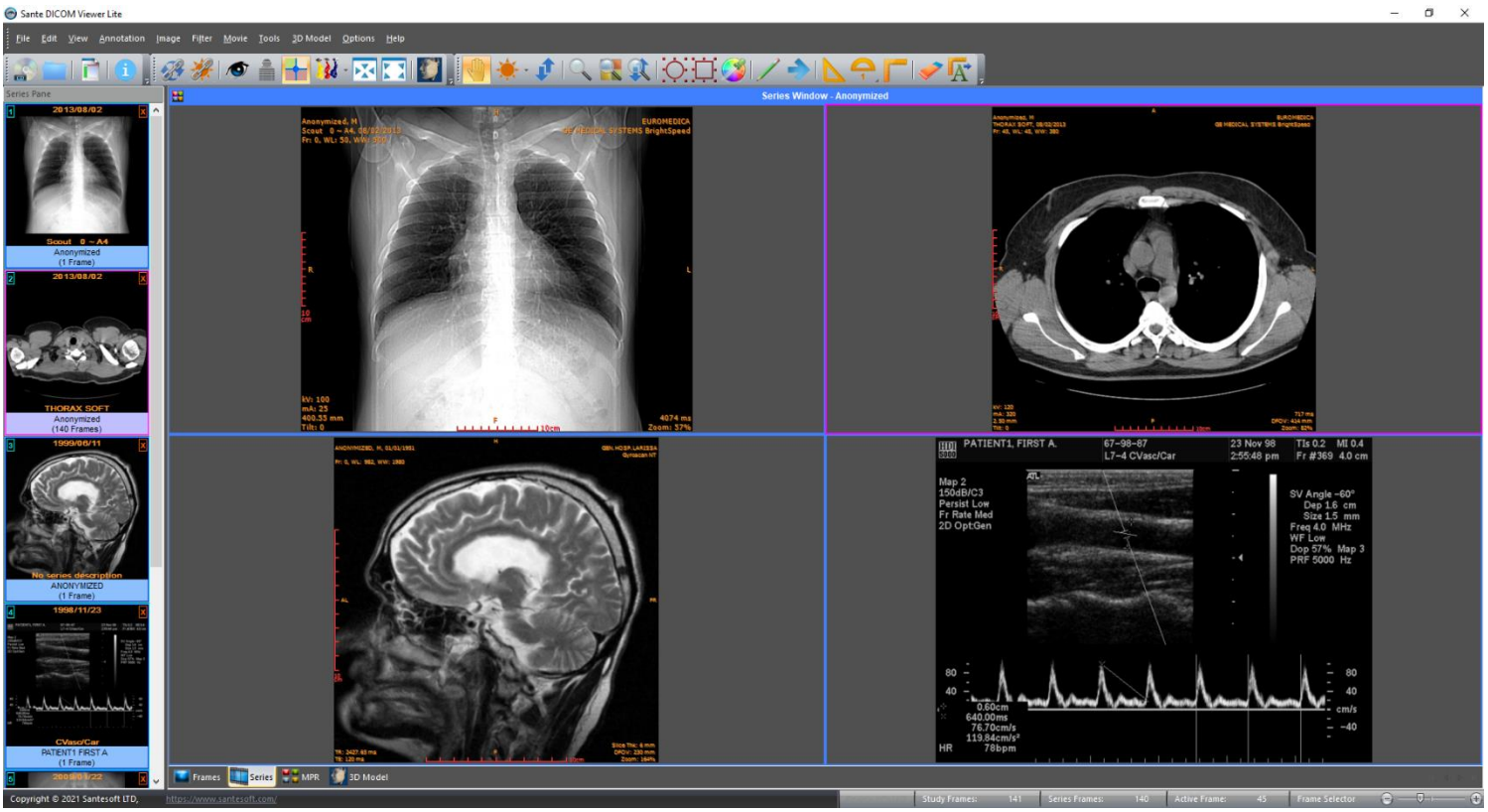
The main window in the frame mode (one tile)



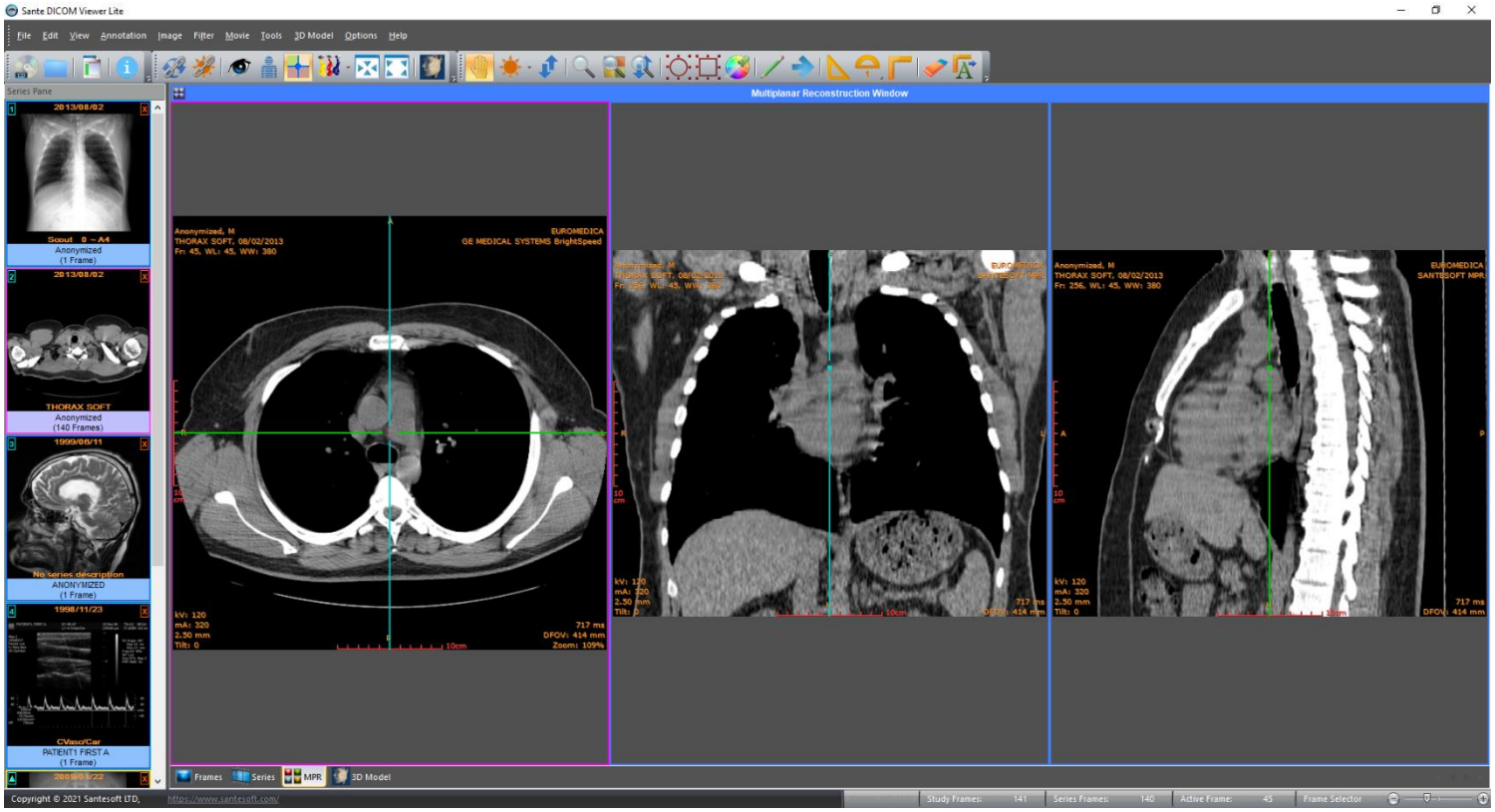
The main window in frame mode (six tiles): Displays six frames of the active series. The number of the tiles is selectable by the user.

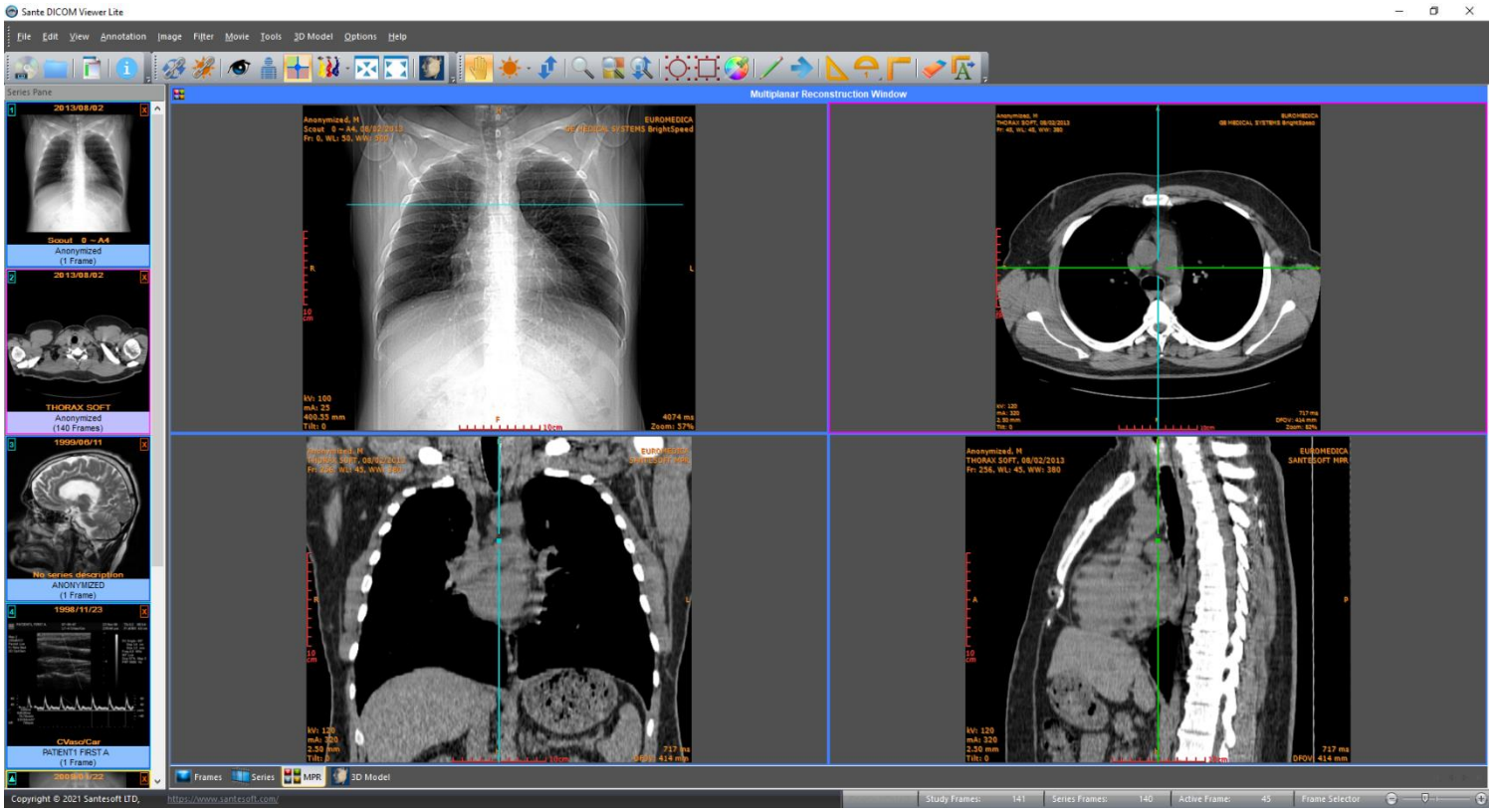


The main window in the series mode (four tiles): Displays four different series. The number of the tiles is selectable by the user. The active series has a **red rectangle** around its **tile**.

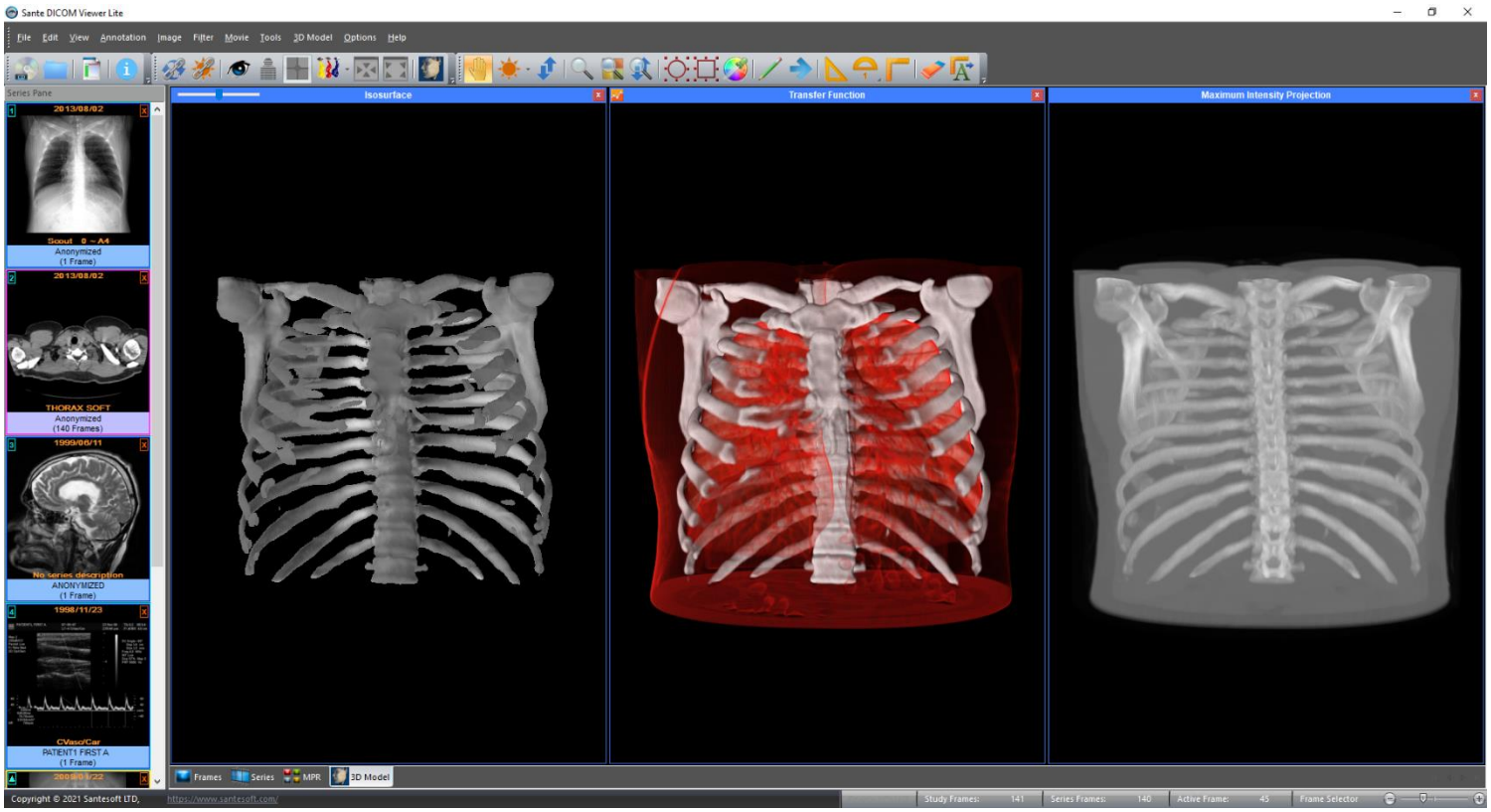


The main window in the MPR mode



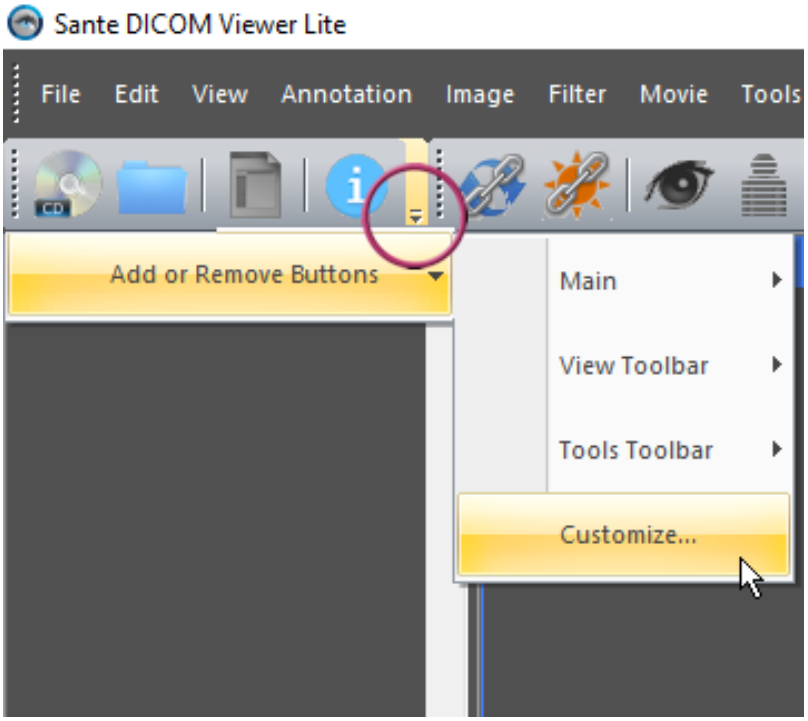


The main window in the 3D Model mode: Displays a 3D Model of the current series.

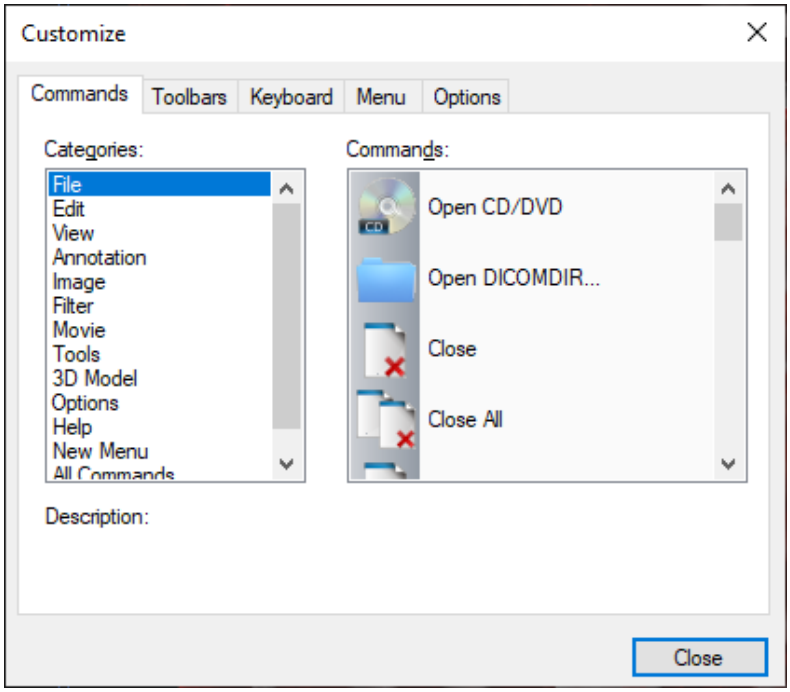


Customize the toolbars

The program allows the users to add and remove toolbar buttons, so it fits their tastes and preferences.
Any toolbar can be quickly customized with the "Add or Remove Buttons" submenu available from the chevron button when it is docked or with a special button in the toolbar caption when it is in the floating state.

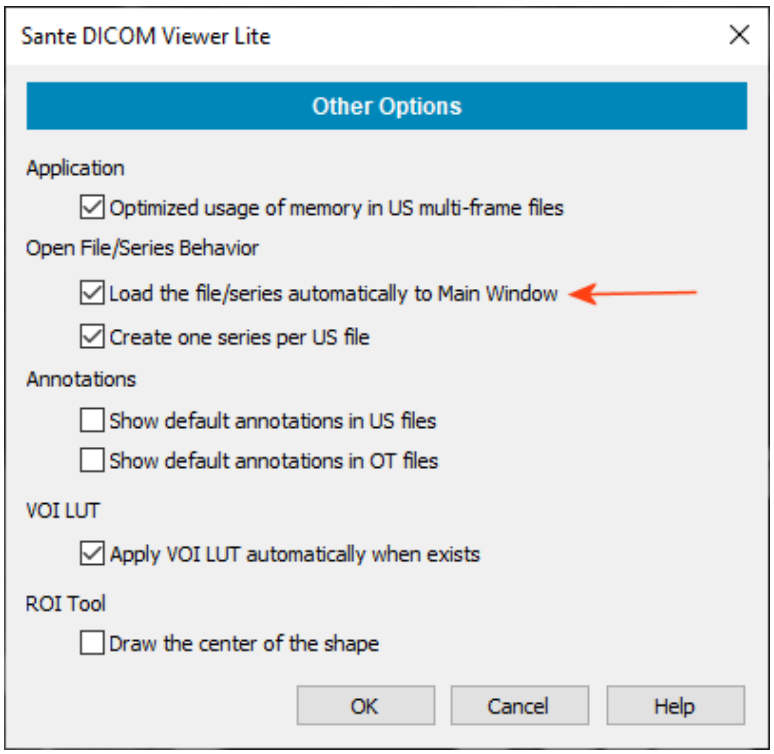


By selecting the menu item **"Customize"** a dialog box appears and allows the user to drag-and-drop buttons from the dialog box to any toolbar.
It allows also the user to drag buttons out of a toolbar, in order to remove them.

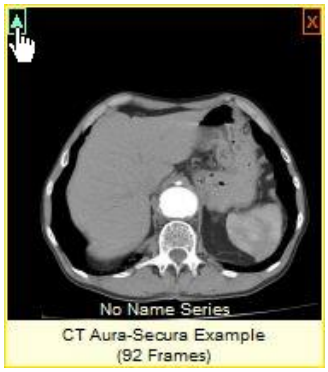


Load a series to the main window

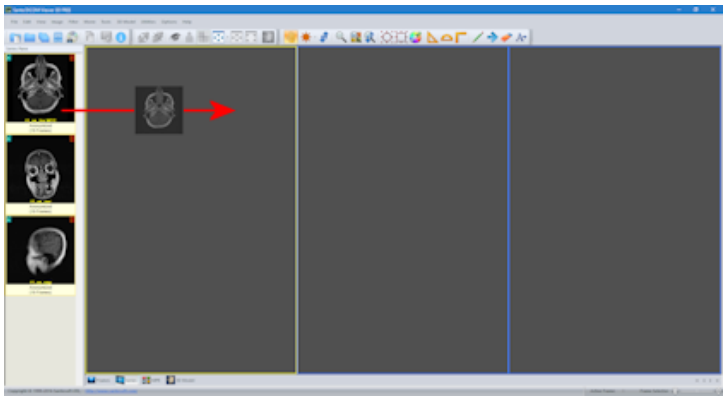
The program automatically loads all the opened series to the main window. If you wish to change this behavior, select the menu command **"Options➧ Other Options"** and uncheck the checkbox **"Load the file/series automatically to Main Window"**

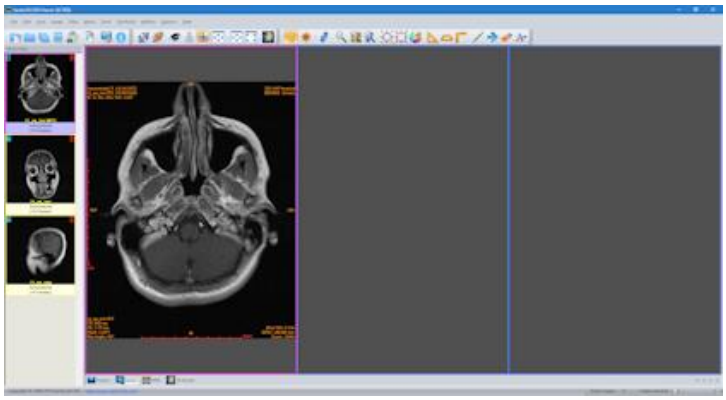


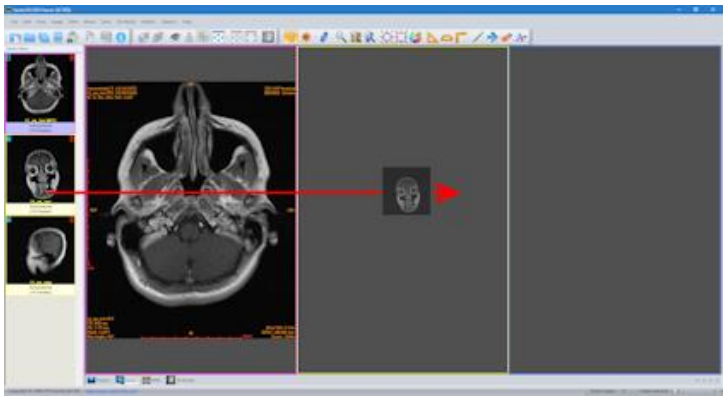
To load a series to the main window use one of the following methods:
1. Double-click the series thumbnail in the Series Pane **(3)**.
2. Click the green rectangle in the upper left corner of the series thumbnail in the Series Pane **(3)**.

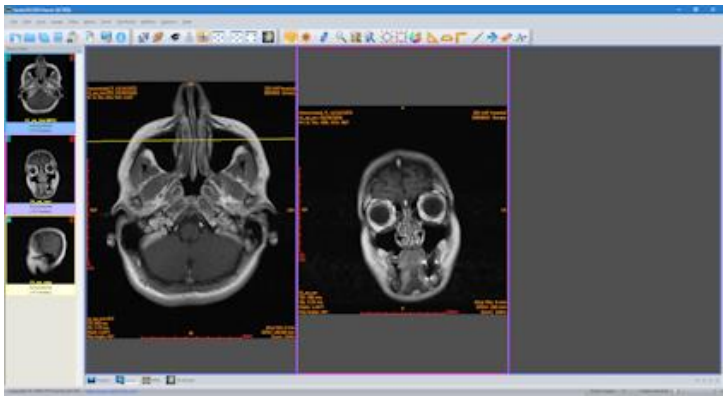


3. Use the **"drag-and-drop"** operation in the Frame Mode, Series Mode or MPR Mode.



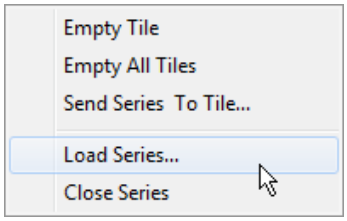






With the "drag-and-drop" in the Series Mode, you can select the tile for every series, thus you can have your series in the desired order. If the destination tile contains already a series, the program replaces the old series with the new one.

4. In the Series Mode, press the **right** mouse button over the desired tile.
A pop-up menu appears and allows the user to load a series in the tile.

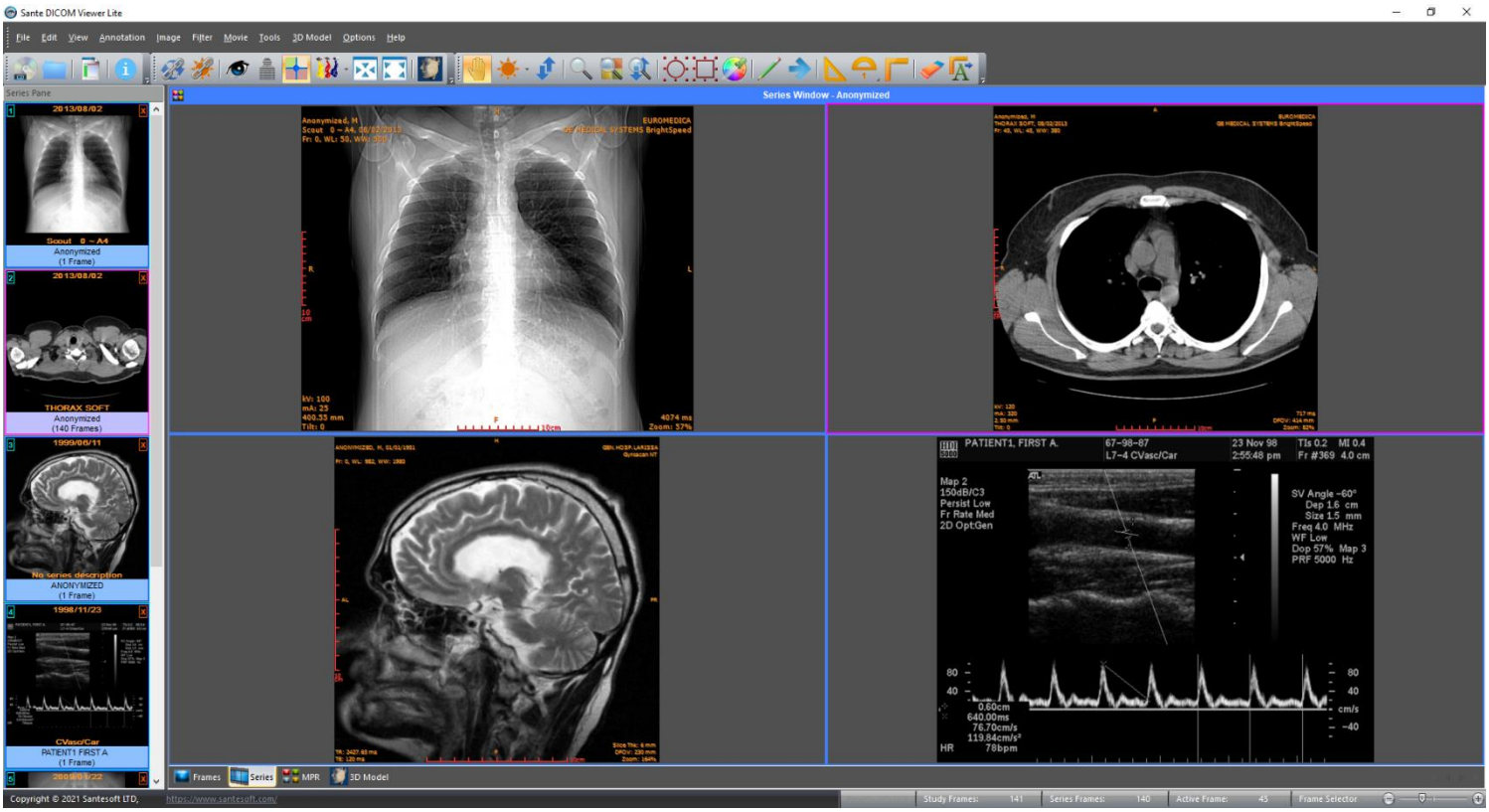


This menu is not available in the other modes.

Set the active series

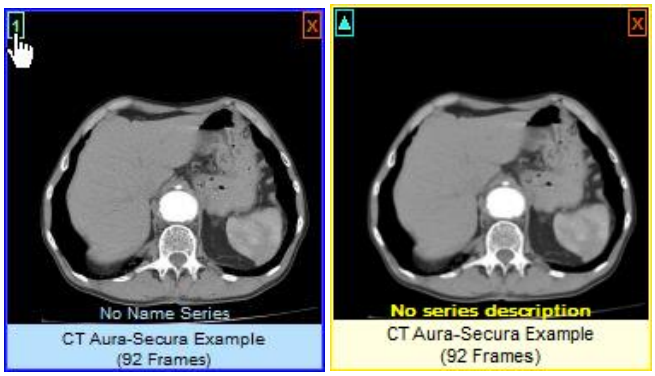
1. Click the series thumbnail of a loaded series in the Series Pane **(3)**.

2. In the Series Mode, press the **left** mouse button over the desired series.
The series becomes active and it has a **red rectangle** around its **tile**.

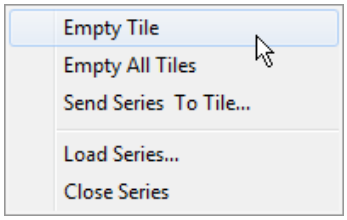


Unload a series from the main window

1. In the upper left corner of the loaded series thumbnail in the Series Pane **(3)** is displayed a number.
This number indicates the tile of the Main Window in the **Series Mode** in which this series is loaded.
Click this number to unload the series from the Main Window. The series remains in the memory and its thumbnail becomes yellow.



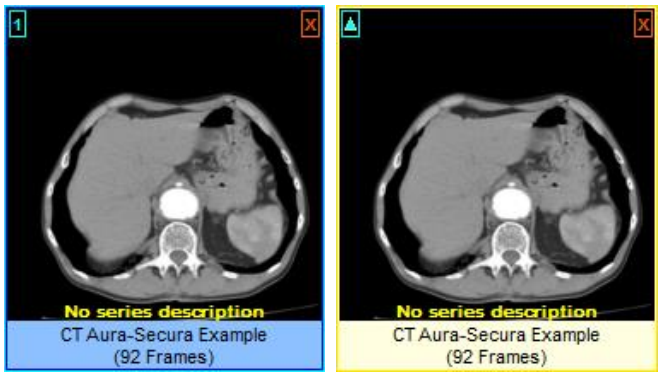
2. In the Series Mode, press the **right** mouse button over the tile of the desired series.
A pop-up menu appears and allows the user to unload the series and empty the tile.



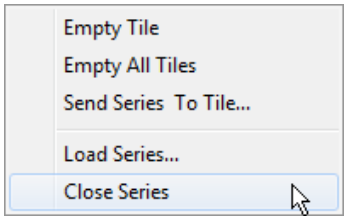
This menu is not available in the other modes.

Close a series

1. To close the active series select the menu command **"File Close"**
2. To close all the series, select the menu command **"File Close All"**
3. To close a specific series, press the red **x** button in the upper right corner of its thumbnail in the series pane **(3)**.



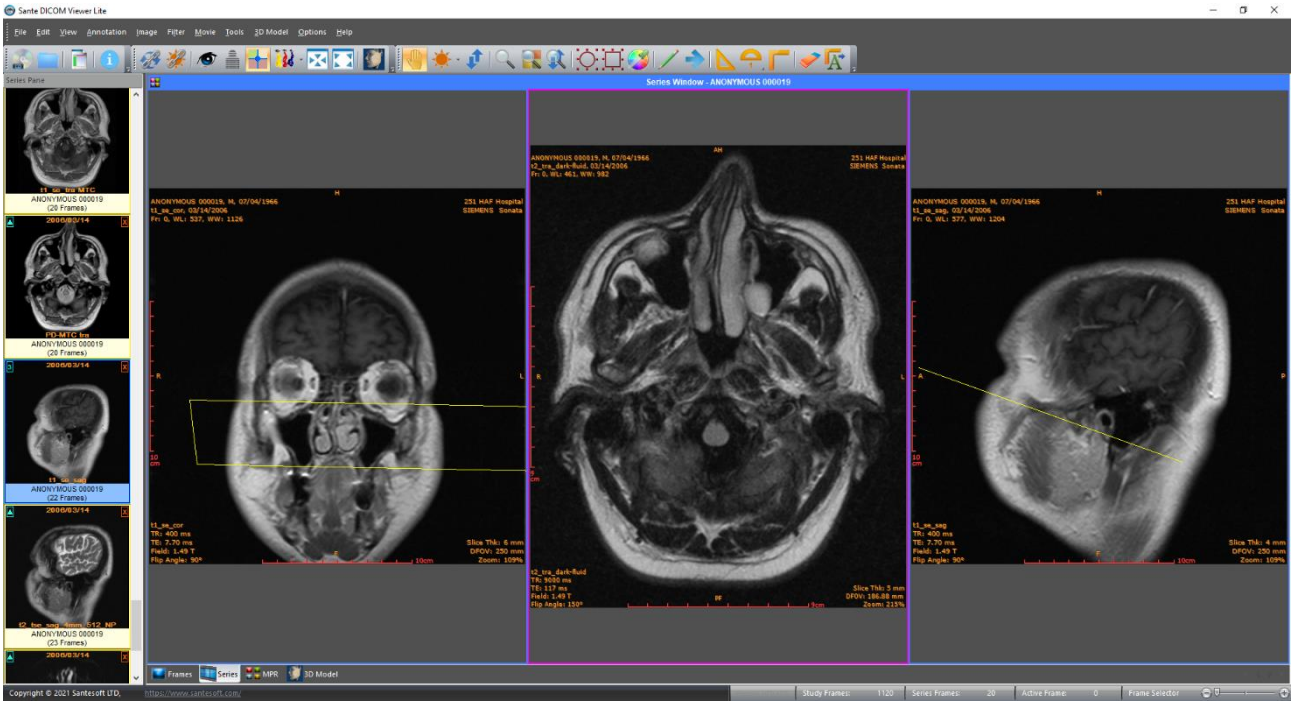
4. In the Series Mode, press the **right** mouse button over the tile of the desired series.
A pop-up menu appears and allows the user to close the series, free the memory and empty the tile.



This menu is not available in the other modes.

The Series Mode

The **"Series Mode"** can display one or more series.
It displays the cross-reference lines between the series, if the series belong to the same study and the same patient.

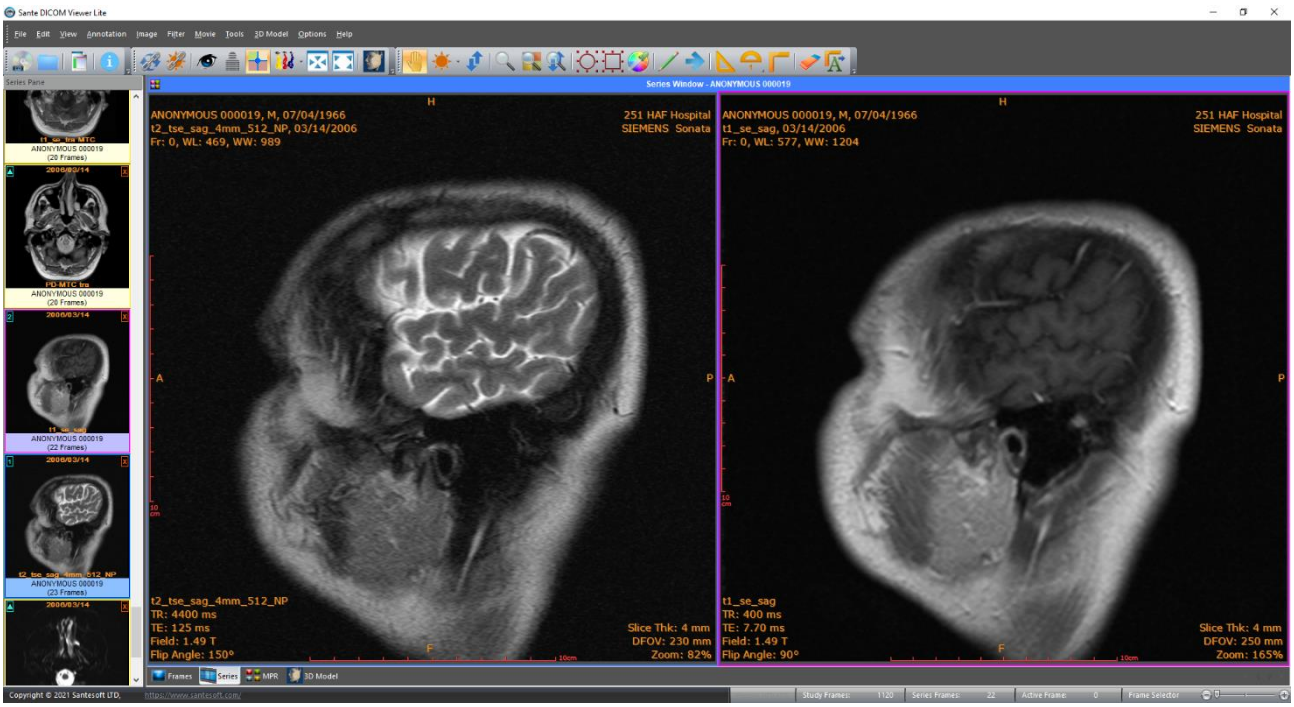


The user can use this mode to compare series, the program provides all the necessary tools for this purpose:

1. Use the menu command **"View➧Synchronized Series Frames"** () to force the program to display the same frame of all the series (the series must have the same orientation).

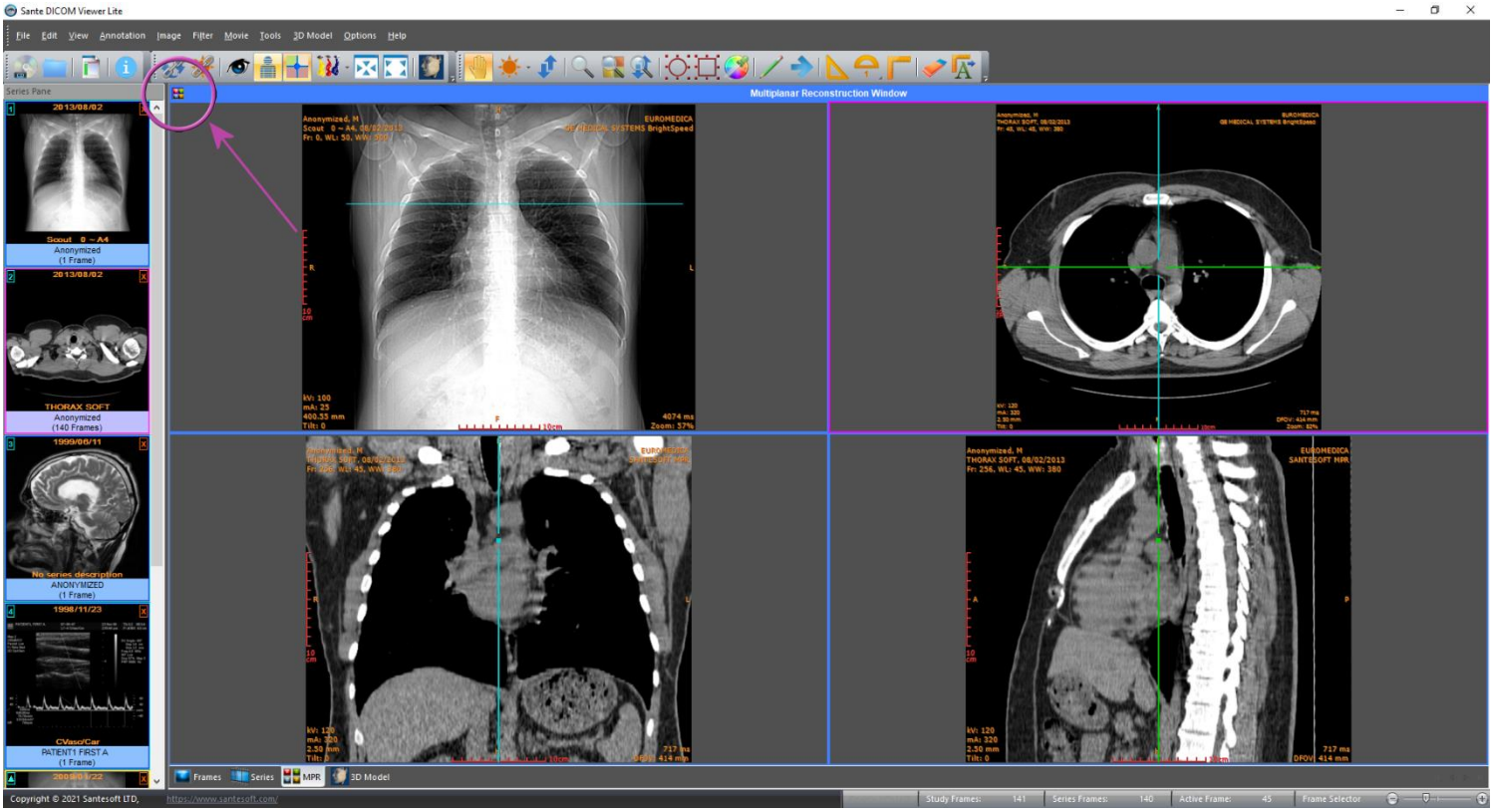
2. Use the menu command **"View➧Synchronized Series Level-Window"** () to force the program to display the images of all the series with the same level-window values.

3. Use the menu command **"View➧Synchronized Field of View"** () to force the program to display the images with the same field of view.

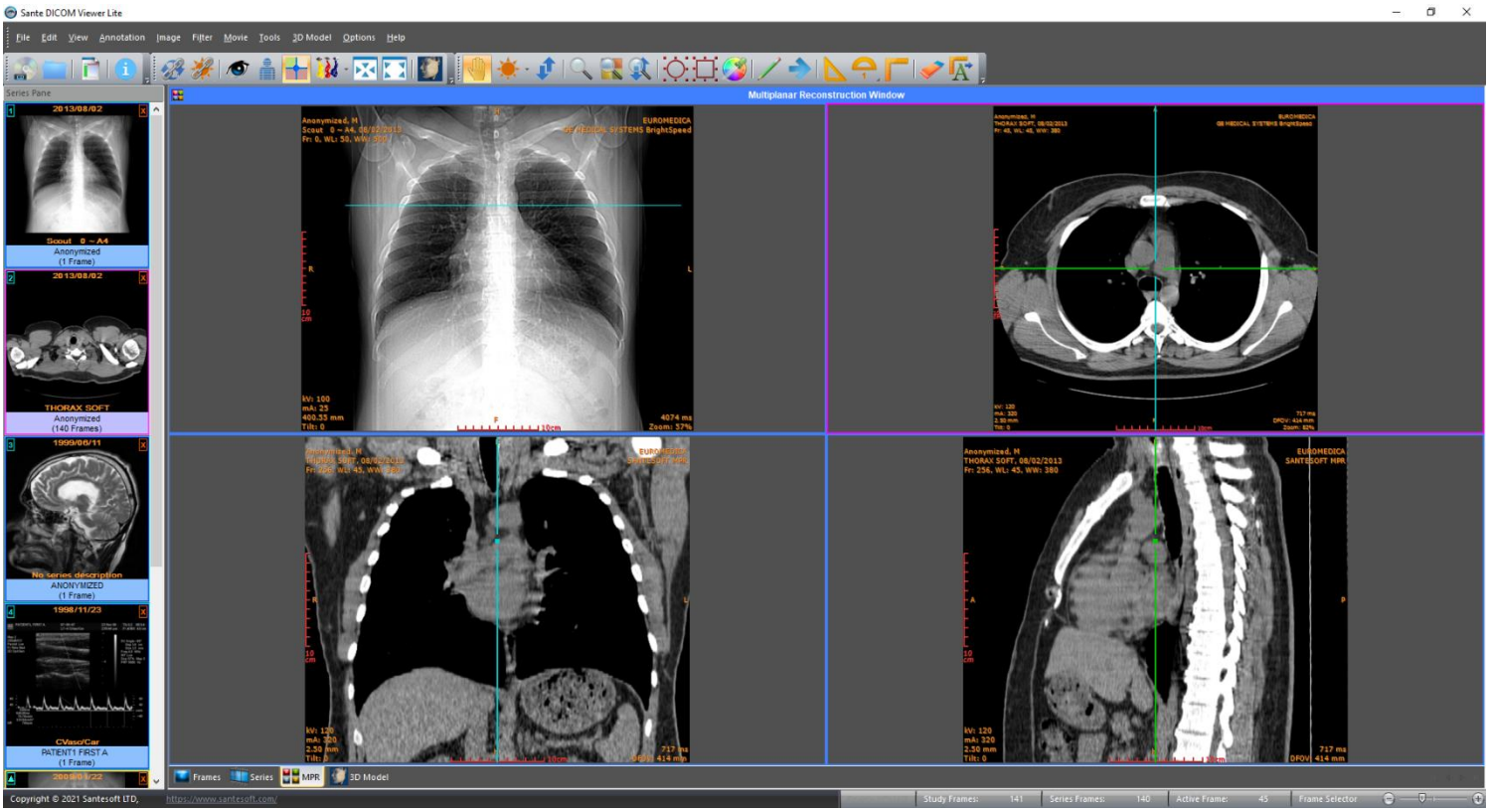


The MPR Mode

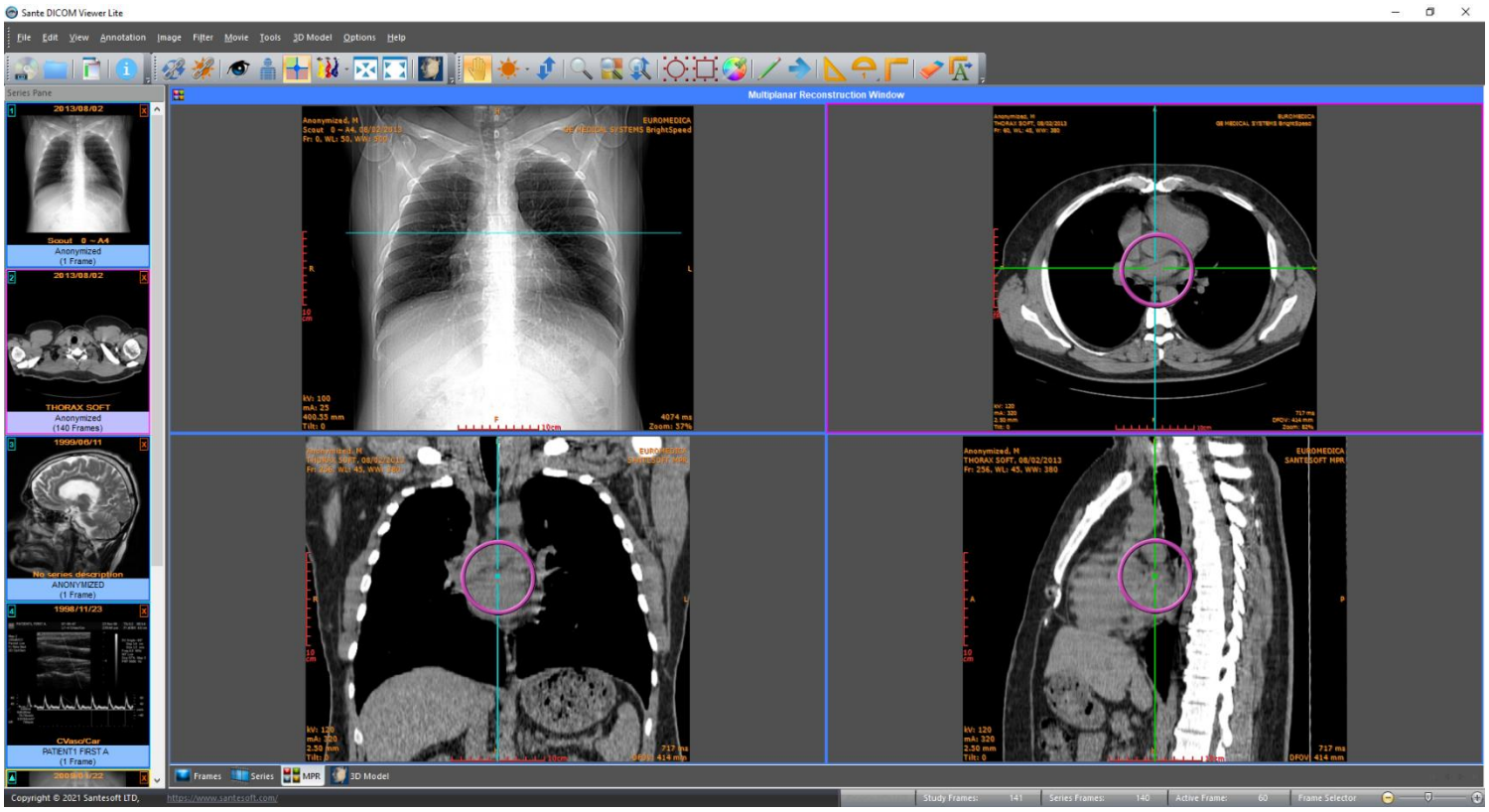
The MRR window can display three or four tiles. The user can switch between the three and four tiles with the button in the upper left corner of the window.



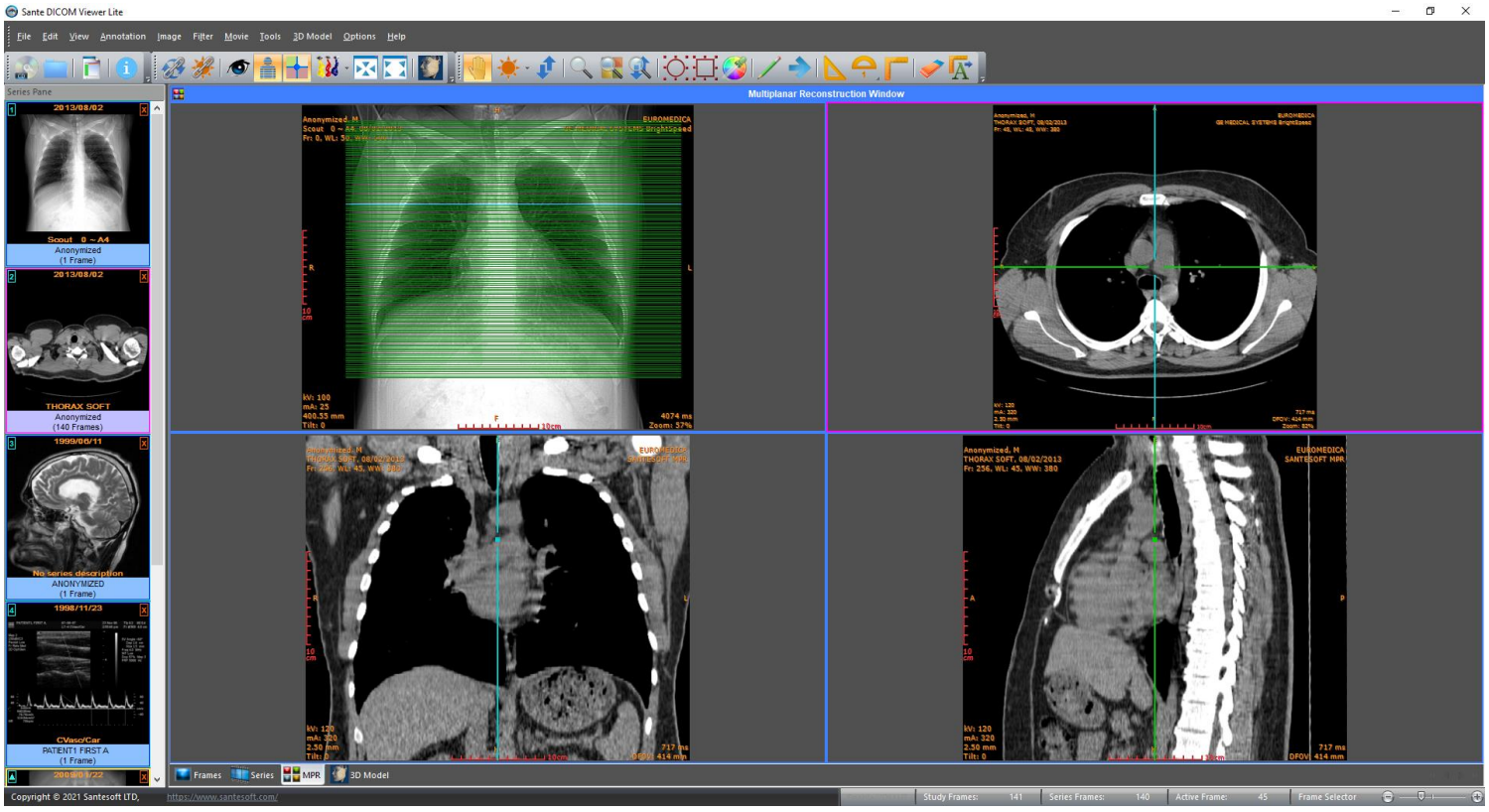
In the three tiles, the **"MPR Mode"** displays the axial series and the coronal and sagittal reconstructions of the series. In the four tiles, the **"MPR Mode"** displays the scout image/localizer, the axial series and the coronal and sagittal reconstructions of the series.



The user can move the cross-reference lines in the axial, coronal and sagittal frames from the points that are indicated in the image below:



The program displays in the scout image/localizer the cross-reference lines of all the axial frames, if the menu command **"View ➡ All Localizer Lines"** is selected.



The 3D Model Mode

The program can create a 3D model from the 2D image data of the files of a DICOM series.

The user can use the menu commands

"3D Model → Create 3D Model"

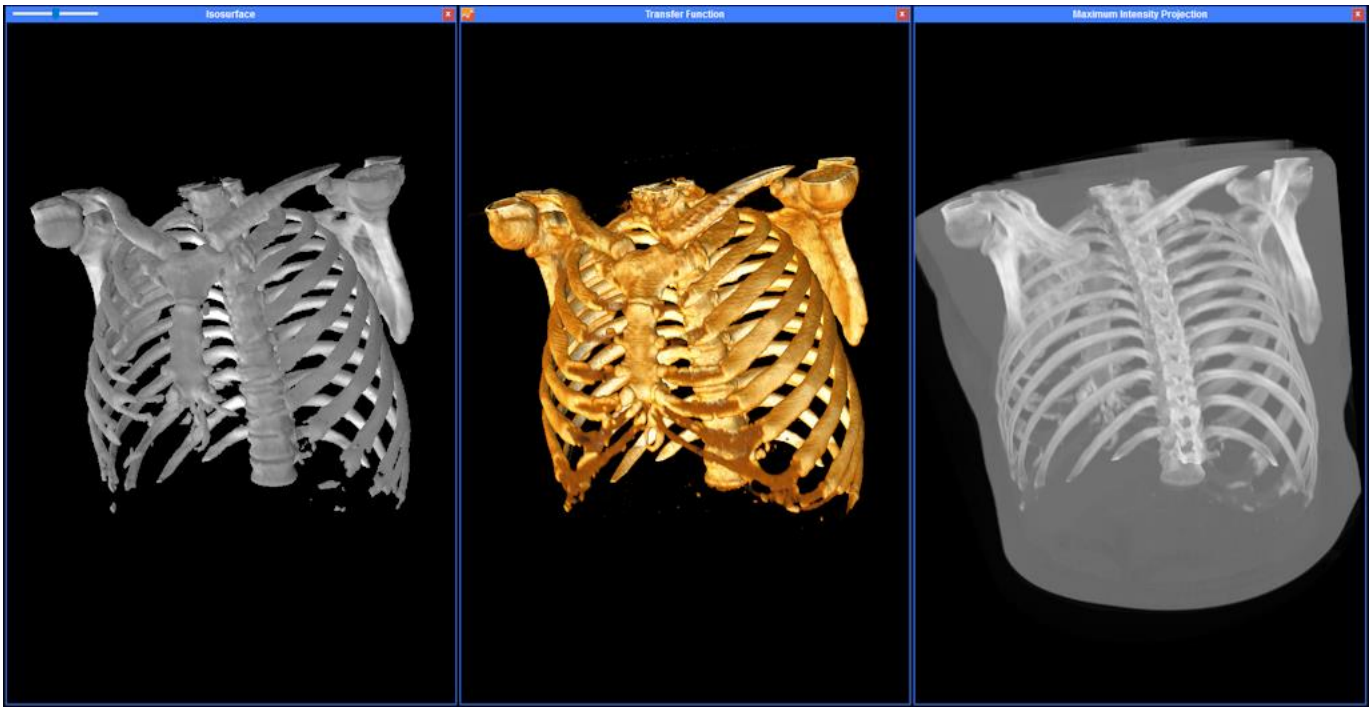
"3D Model → Create 3D Model By Kept Selections"

"3D Model → Create 3D Model By Histogram"

in order to create a 3D model of the current series.

The program offers 3 different 3D rendering techniques: The Isosurface technique, the Maximum Intensity Projection (MIP) technique, and the Transfer Function technique.

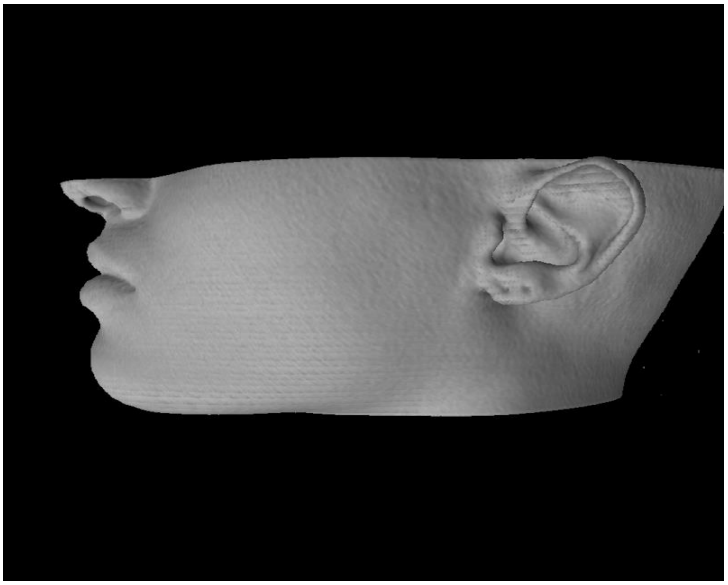
The program can display the 3D model of one, two or all the three techniques simultaneously on the screen.



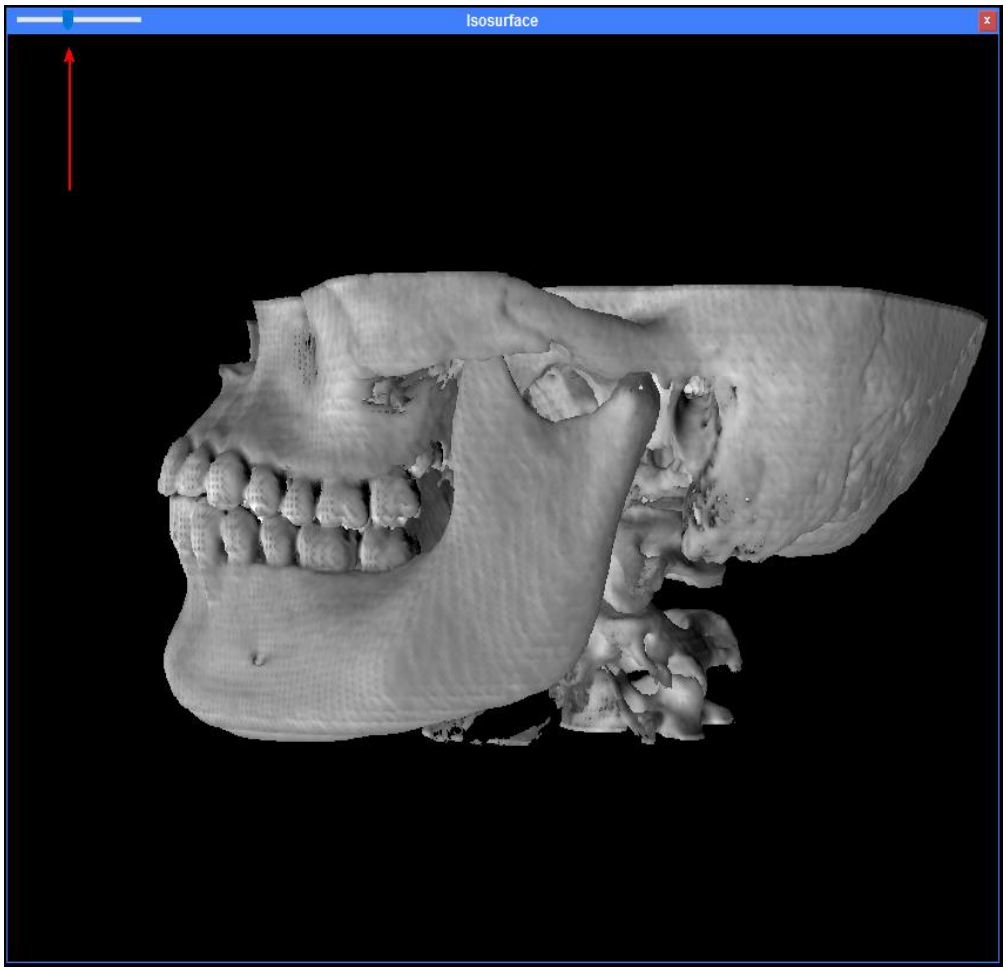
The Isosurface technique

The program uses the marching cubes algorithm to construct the Isosurface model and allows the user to select the isovalue in order to create a model from different parts of the human body.

A model with a middle isovalue and a low isovalue:



In the upper-left corner of the Isosurface window there is a control that allows the user to select the isovalue.



The user can enable this technique with the menu command **"3D Model → Show Isosurface Model"**

The Maximum Intensity Projection (MIP) technique

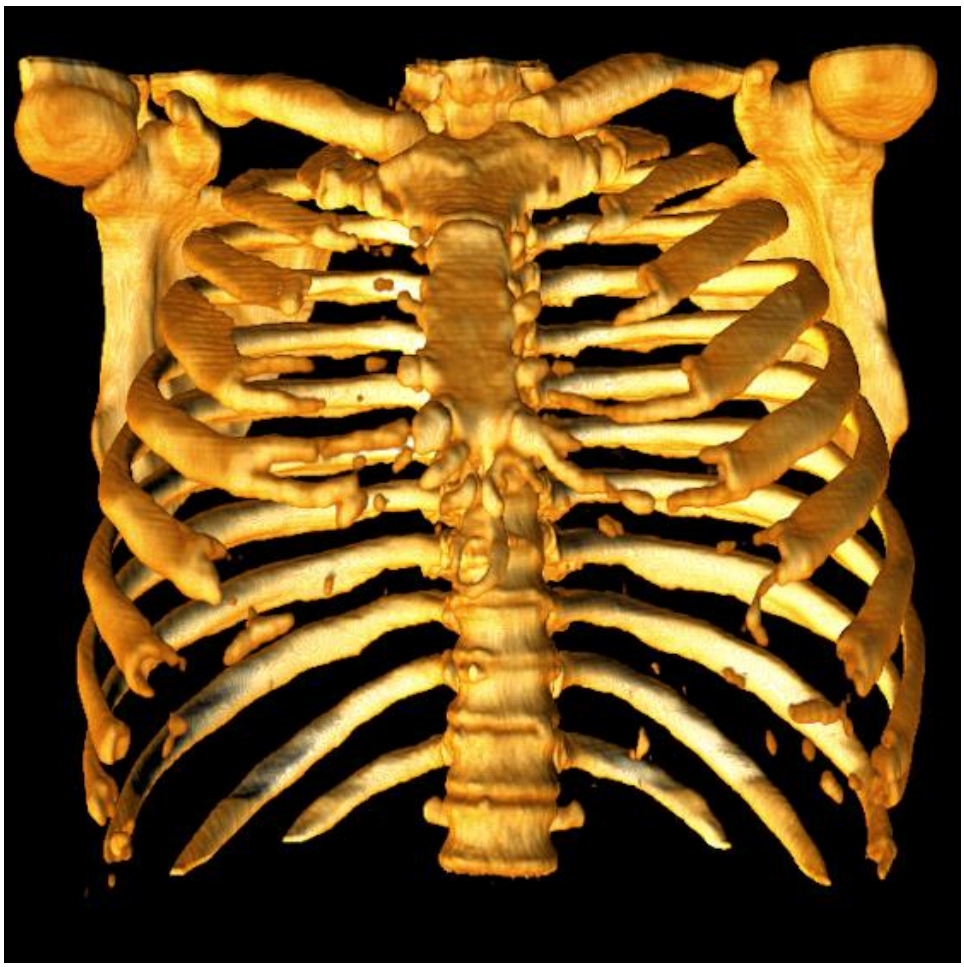
In this technique the program projects in the visualization plane the voxels with maximum intensity that fall in the way of parallel rays traced from the viewpoint to the plane of projection.

A model with the Maximum Intensity Projection (MIP) technique:

The user can enable this technique with the menu command **"3D Model → Show MIP Model"**.

The Transfer Function technique

The Transfer Function technique is a volume ray casting and rendering technique that assigns a different color and a different opacity/transparency value in different ranges of intensity values. This is done with a histogram-based function, the "transfer function". The transfer function consists of a number of control points, and each one of them corresponds to an intensity value and it has an RGB color and an opacity/transparency value. The intensity value of a control point is displayed with its color and opacity/transparency value, and the intensity values between two control points are displayed with the interpolated colors and the interpolated opacity/transparency values of the two control points. With the use of the transfer function, the different parts of the human body are displayed with a different color and a different opacity/transparency value.

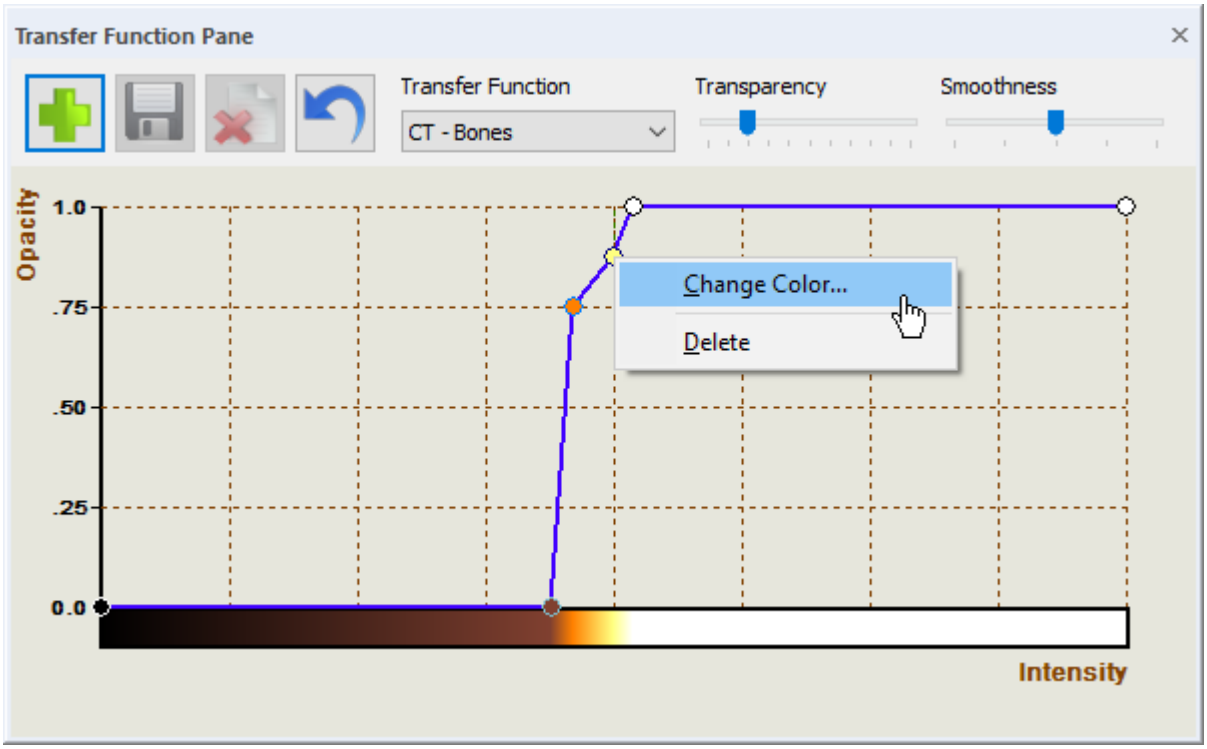


The user can enable this technique with the menu command **"3D Model → Show Transfer Function Model"**

The Transfer Function Pane

The user can design the transfer function with use of the Transfer Function Pane, which allows the user to insert a control point in a specific intensity value, and to define the color and the opacity/transparency value of the control point. The Transfer Function Pane is accessible via the menu command **"View Panes and Status Bar Transfer Function Pane"**.

In the background of the Transfer Function Pane there is the histogram of the image. The transfer function creates a palette of colors that is assigned to the intensity values and it is displayed at the bottom of the graph.



Insert a control point:

Hold down the **Ctrl** key of the keyboard and press the **left** mouse button on the desired point of the histogram.

Change the position of a control point (intensity value):

Press the **left** mouse button on the desired control point and move it left (in a lower intensity value) or right (in a higher intensity value).

Change the position of a control point (opacity value):

Press the **left** mouse button on the desired control point and move it down (for a lower opacity value) or up (in a higher opacity value).

Change the color of a control point:

Press the **right** mouse button on a control point and select the menu item "Change Color".

Delete a control point:

Press the **right** mouse button on a control point and select the menu item "Delete".

Move a portion of the function:

Hold down the **Shift** key of the keyboard, press the **left** mouse button on the desired control point and move it left and right.

The changes are immediately displayed on the 3D model.

Transfer Function Pane controls

The program offers a number of predefined transfer functions as well as user functions that are accessible via the combo box **"Transfer Function"**

Copy button

Use this button to make a copy of the current transfer function. The user can make as many transfer functions as he/she wants.

Save button

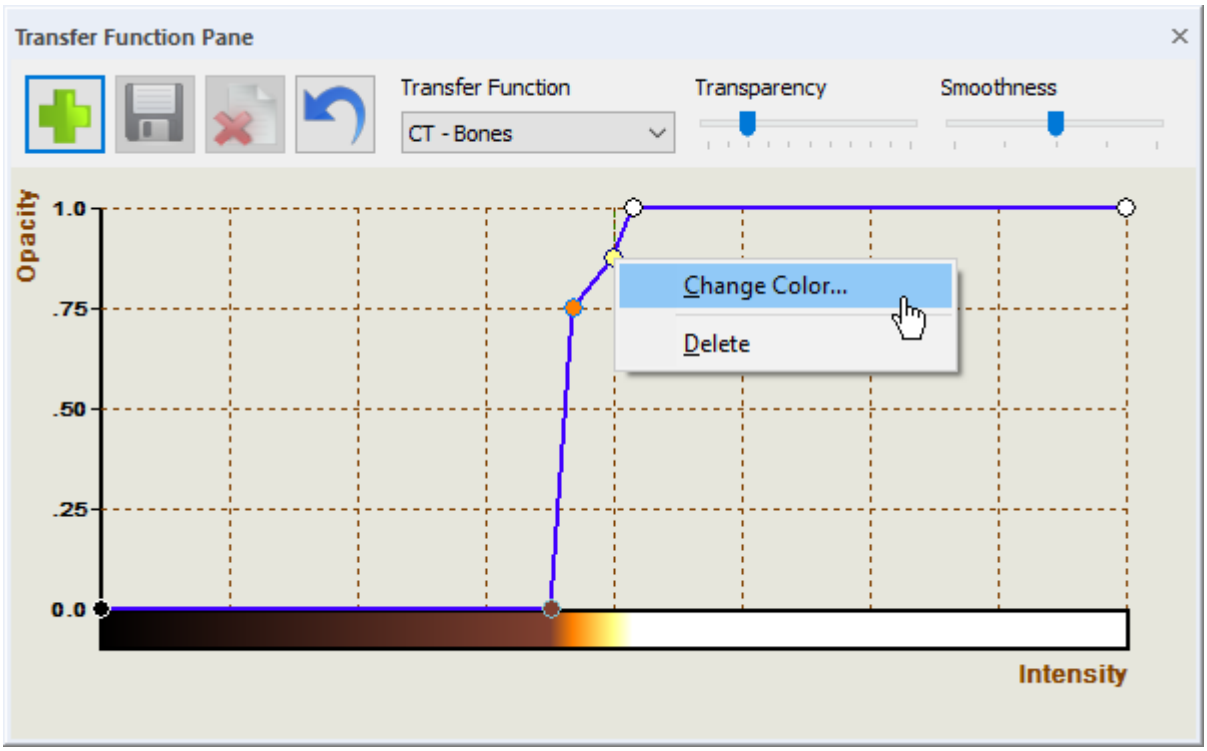
Use this button to save the current transfer function. The user cannot save the predefined transfer functions, but he/she can make a copy of a predefined transfer function, modify it and save it with a different name.

Delete button

Use this button to delete the current transfer function. The user cannot delete the predefined transfer functions.

Invert button

Use this button to invert the colors of the current transfer function. Hold down the **Ctrl** key of the keyboard and press this button in order to invert the entire transfer function.



"Transfer Function" combo box

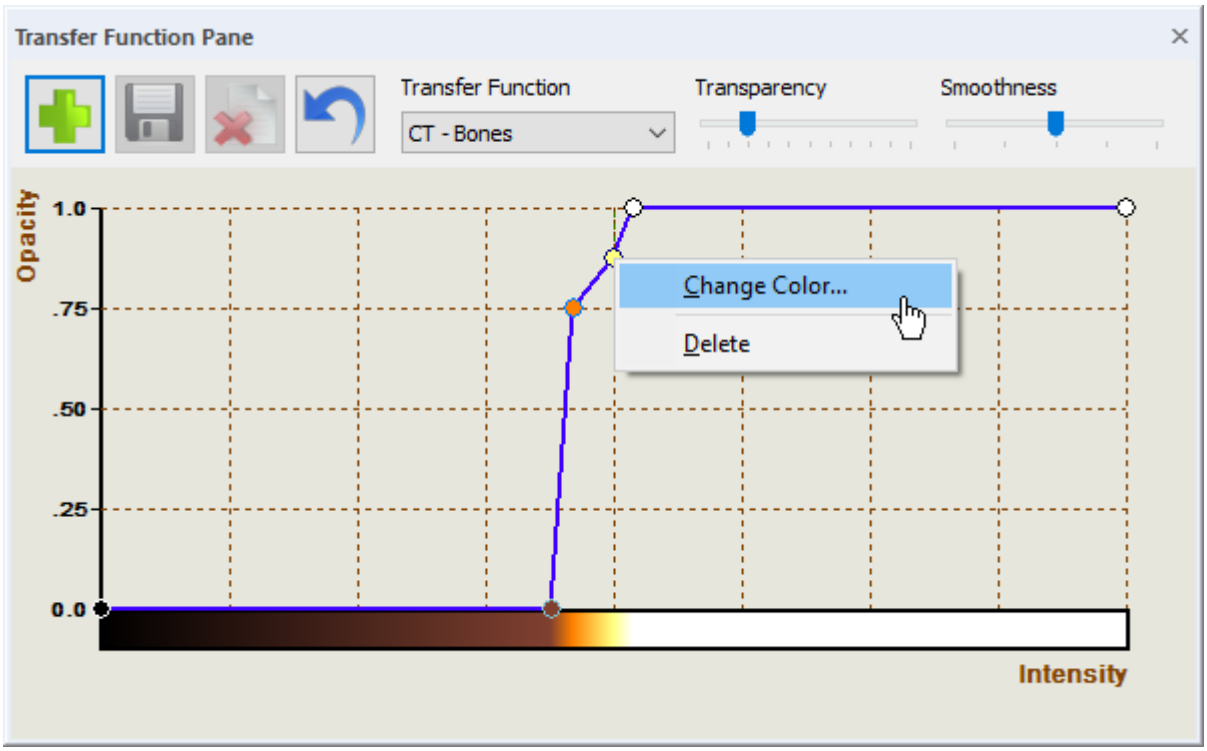
Allows the user to select one of the predefined or user-defined transfer functions.

"Transparency" slider control

Adjusts the transparency of the model. The "Transparency" is a part of the current transfer function and saved with it.

Low transparency value

High transparency value



"Smoothness" slider control
Adjusts the smoothness of the model. The "Smoothness" is a part of the current transfer function and saved with it. A low smoothness value creates a sharp model and a high smoothness value creates a smooth model.

Low smoothness value

High smoothness value

The user can use the menu command **"3D Model Brightness"** to change the brightness of the model

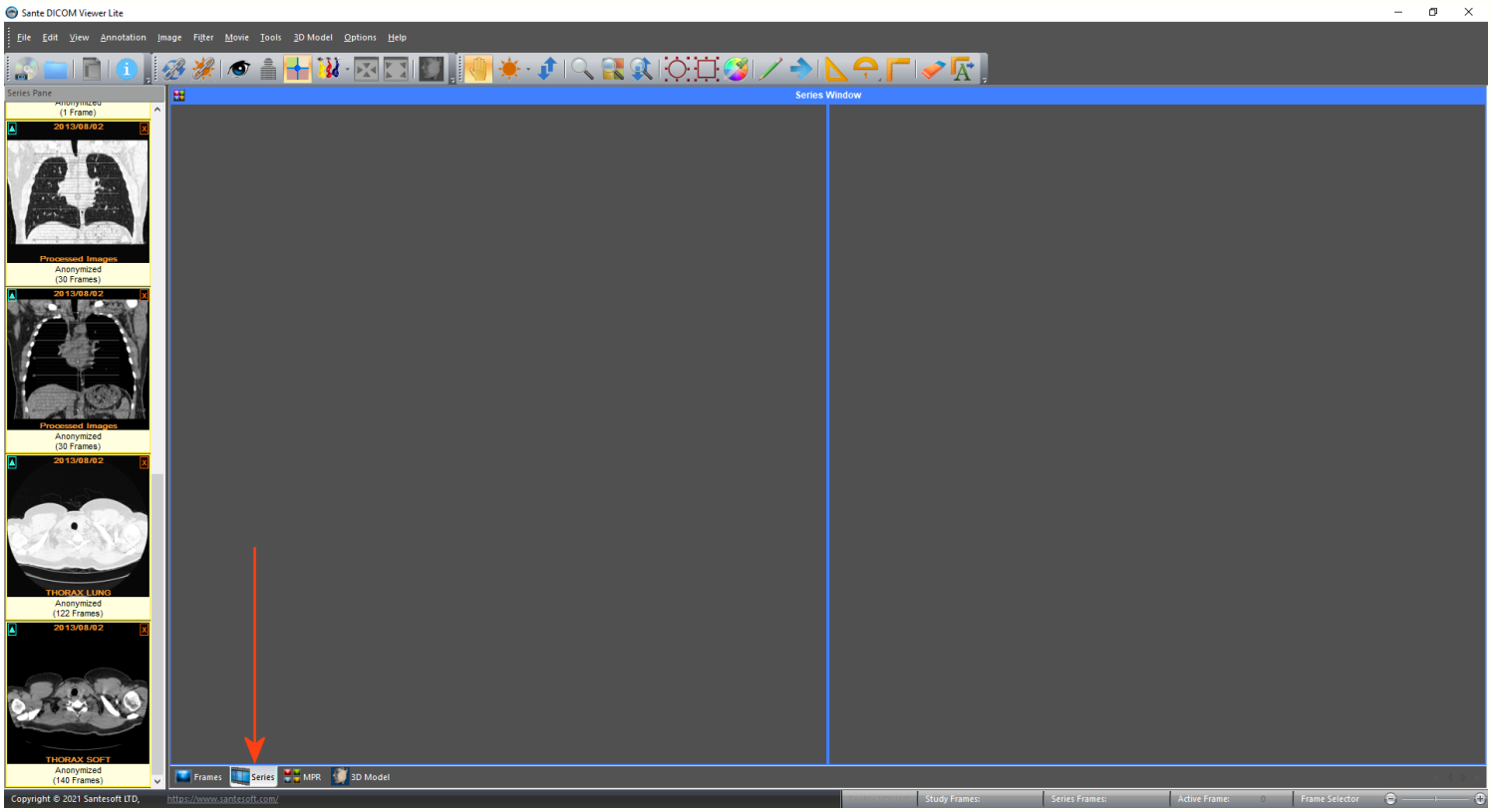
Low brightness value

High brightness value

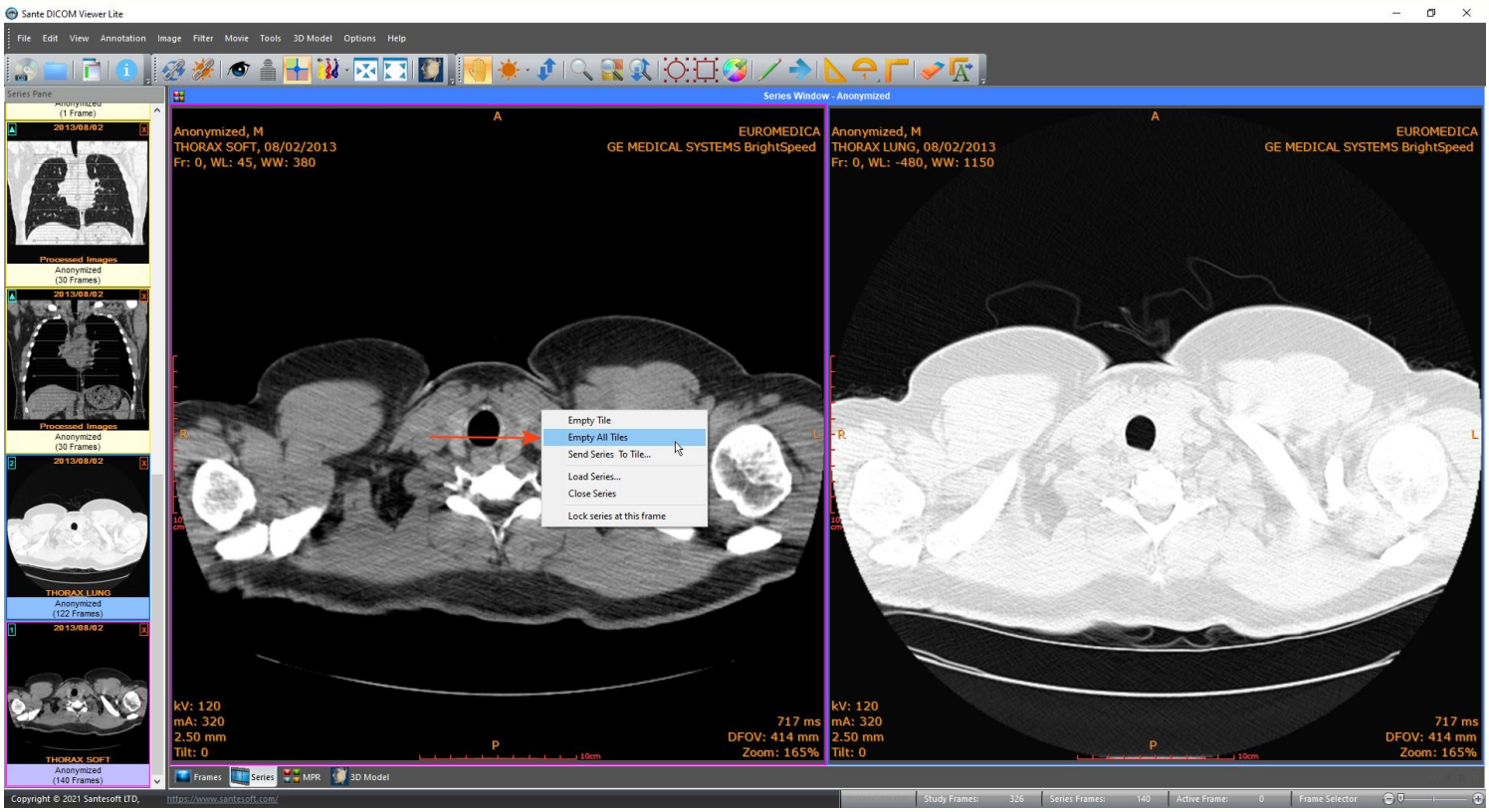
Compare images of different series

Open the series.

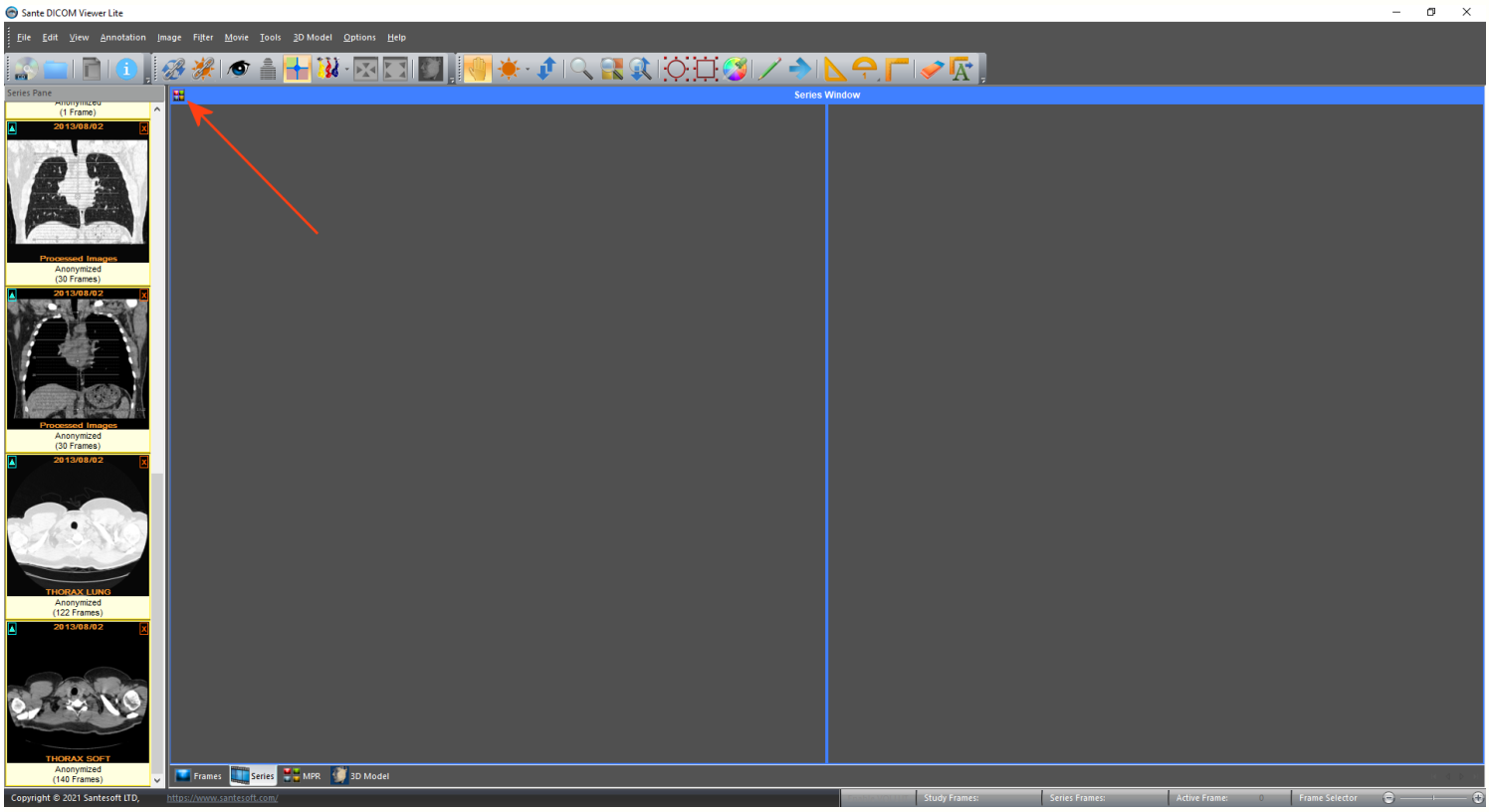
From the **Tab control** select the **Series** View.



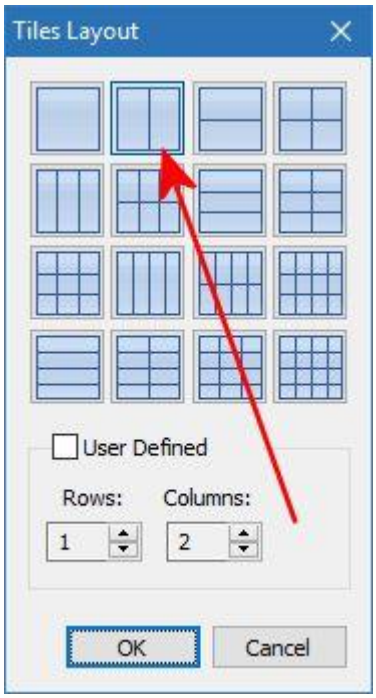
If there are already series loaded in this window, press the **right** mouse button and select the **"Empty All Tiles"** command.



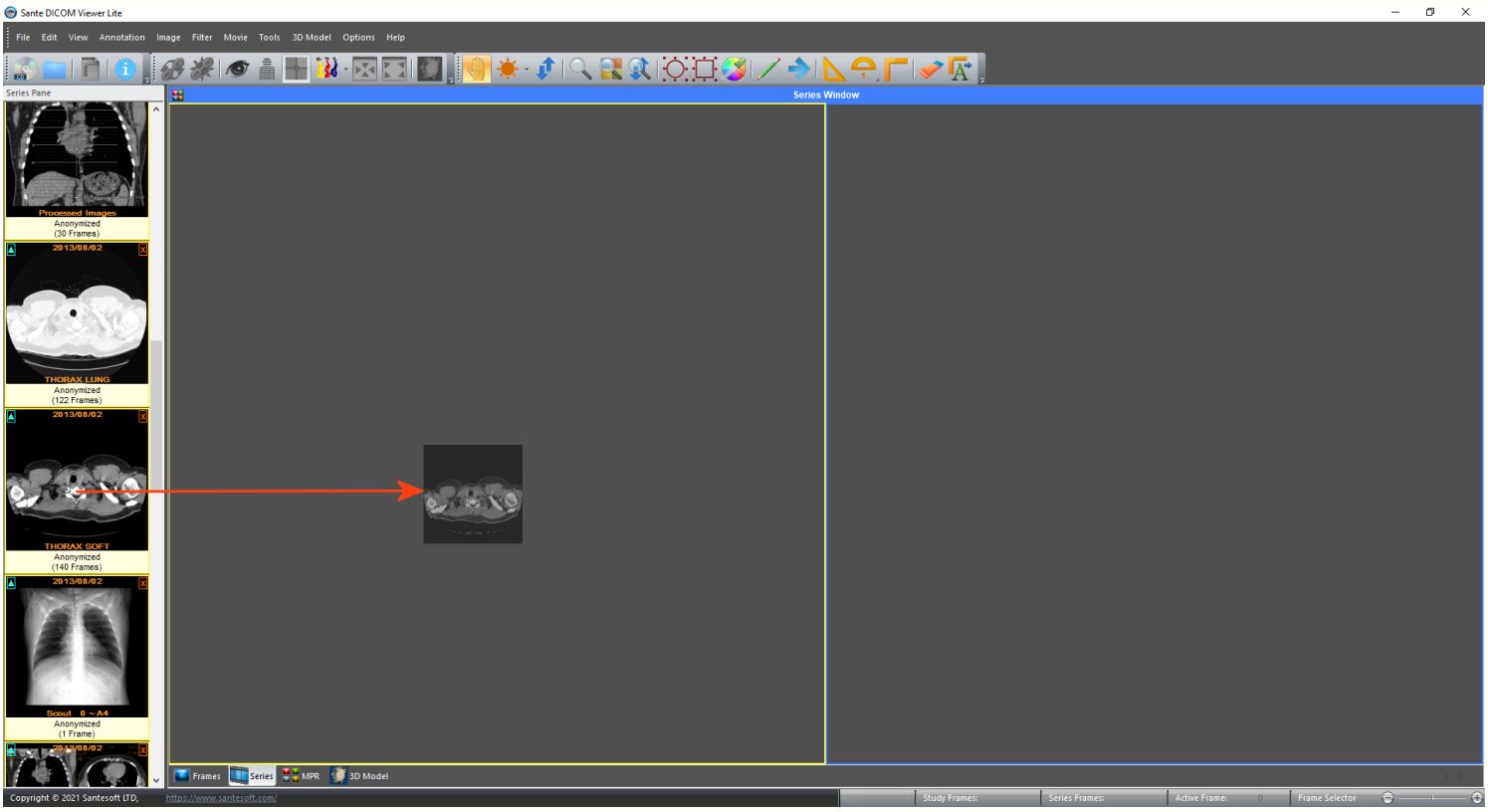
Select the menu command **"Options➧Tiles Layout"** or press the **"Tiles Layout"** button in the upper left corner of the window.

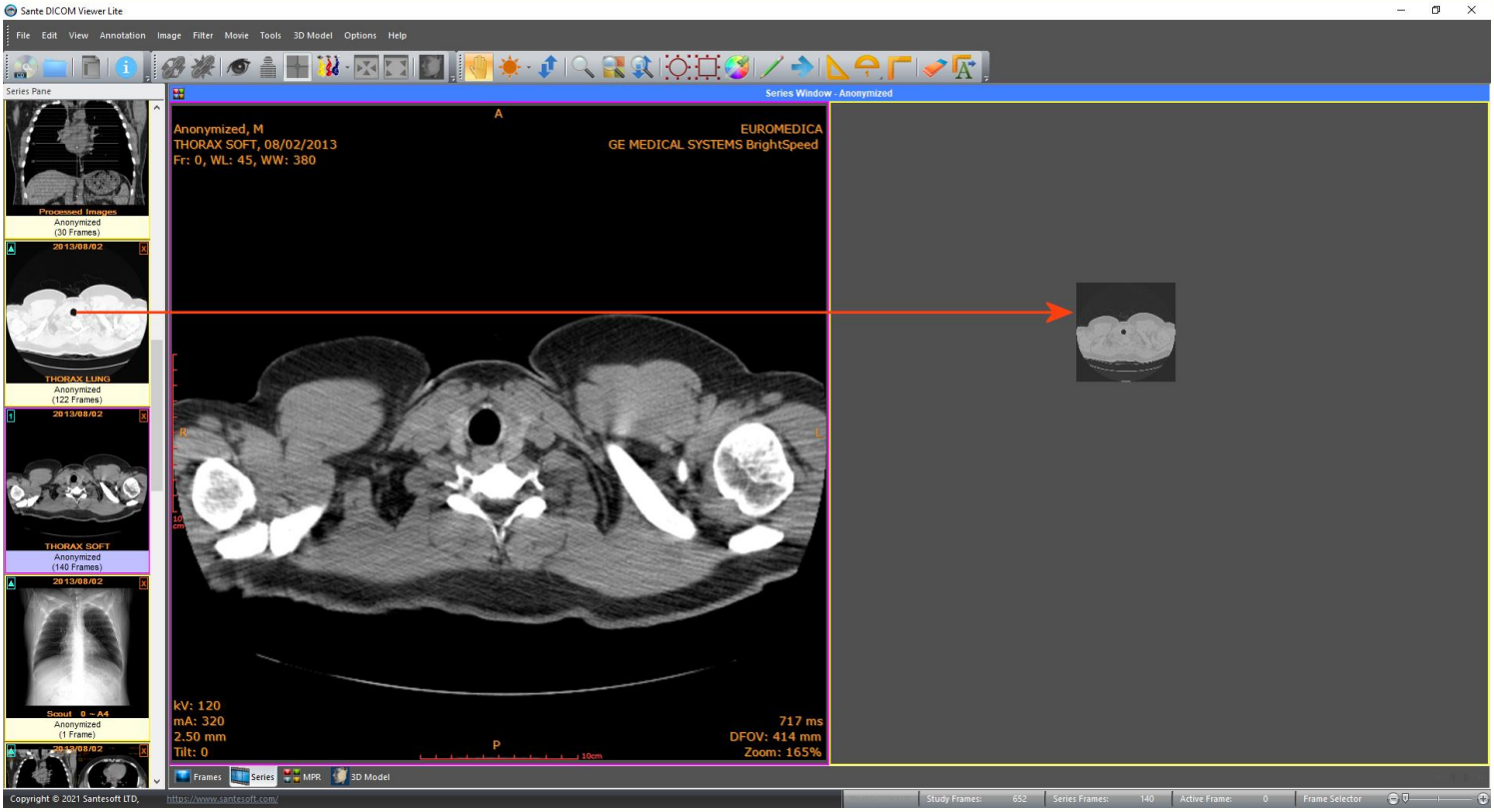


Select the 2 vertical window layout.

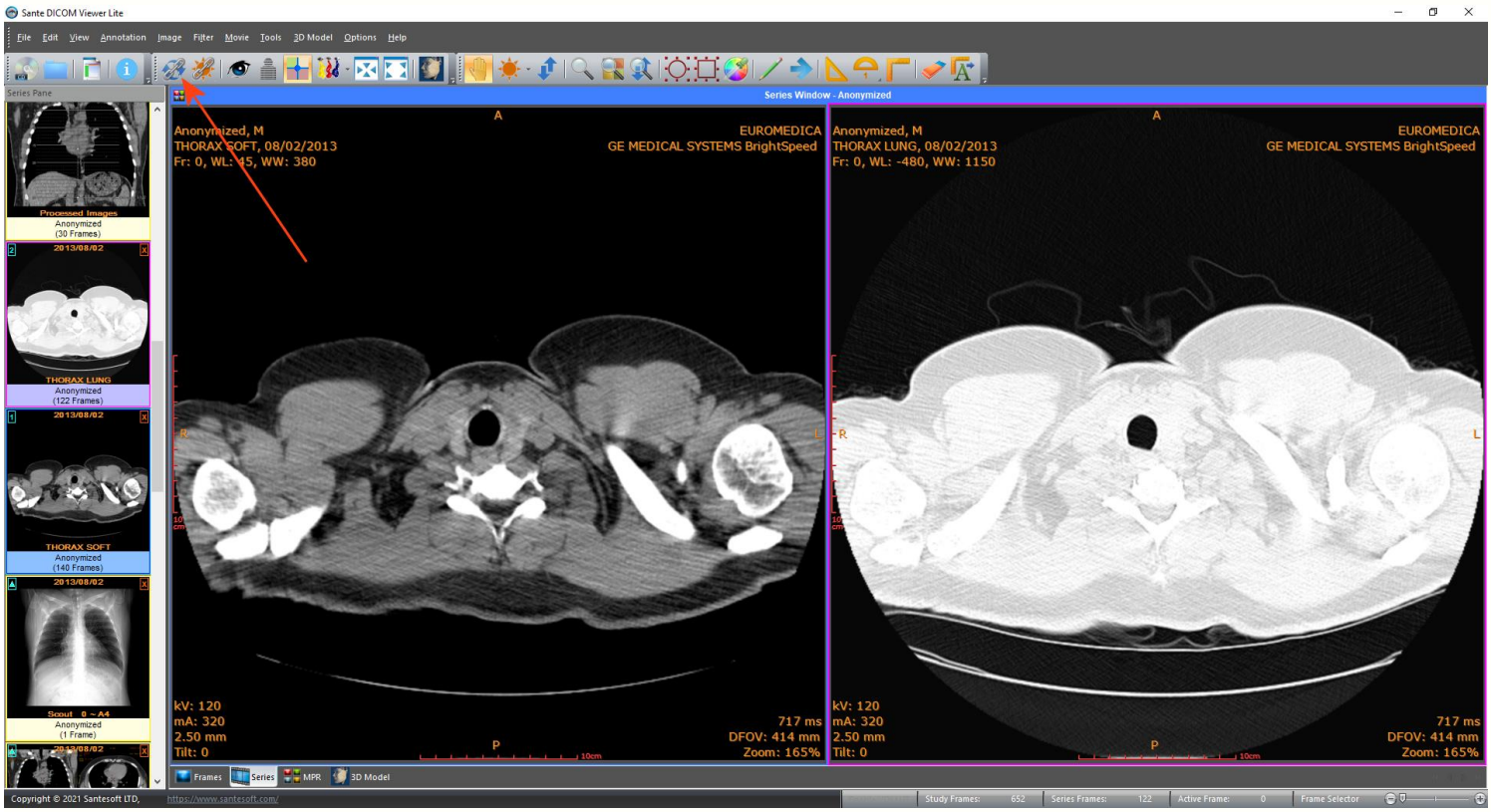


"Drag 'n' drop" the desired series into two views.





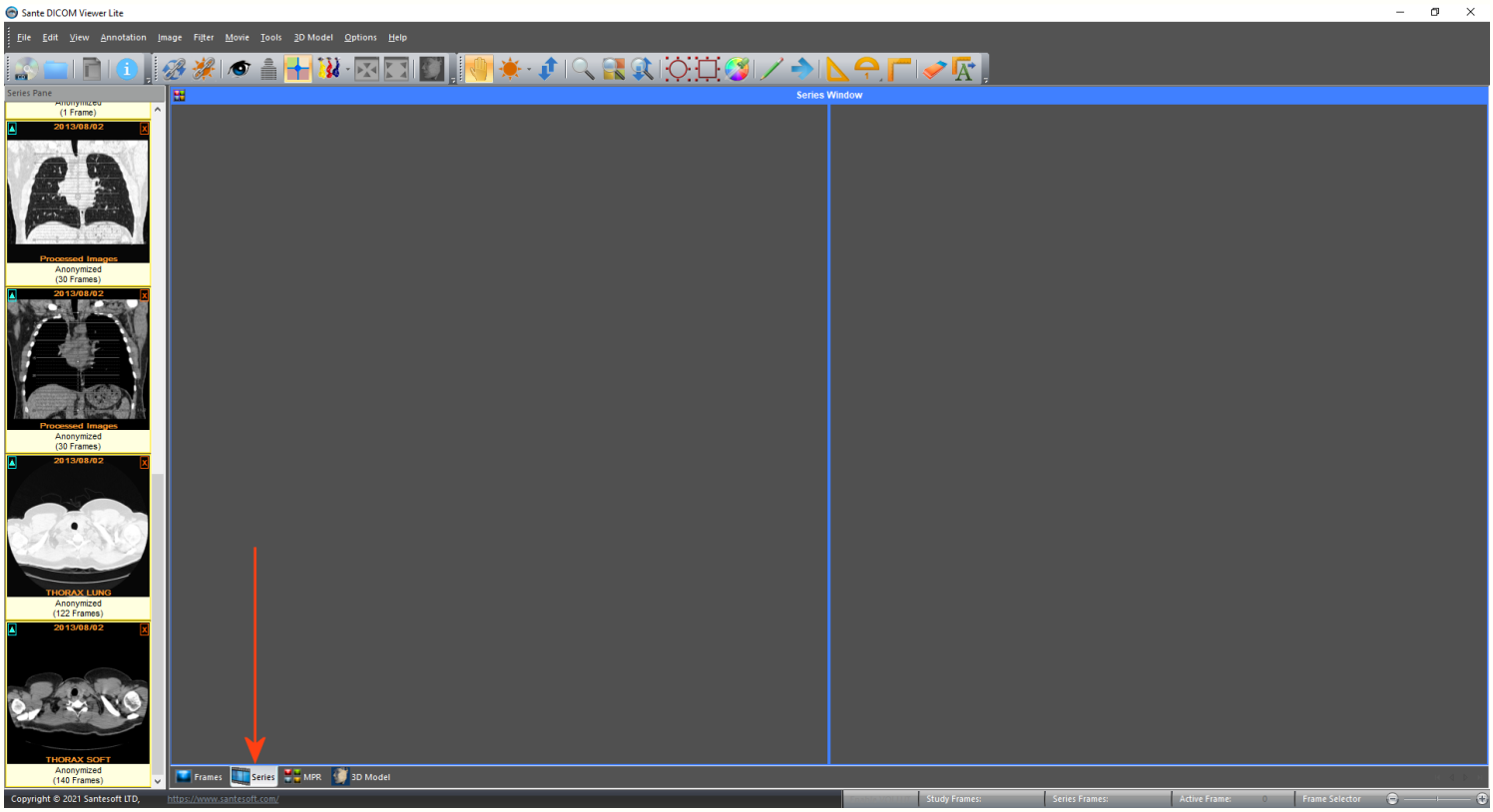
You can synchronize the frames of the two series by selecting the menu command **"View➧Synchronized Series Frames"** or by selecting the corresponding toolbar button.



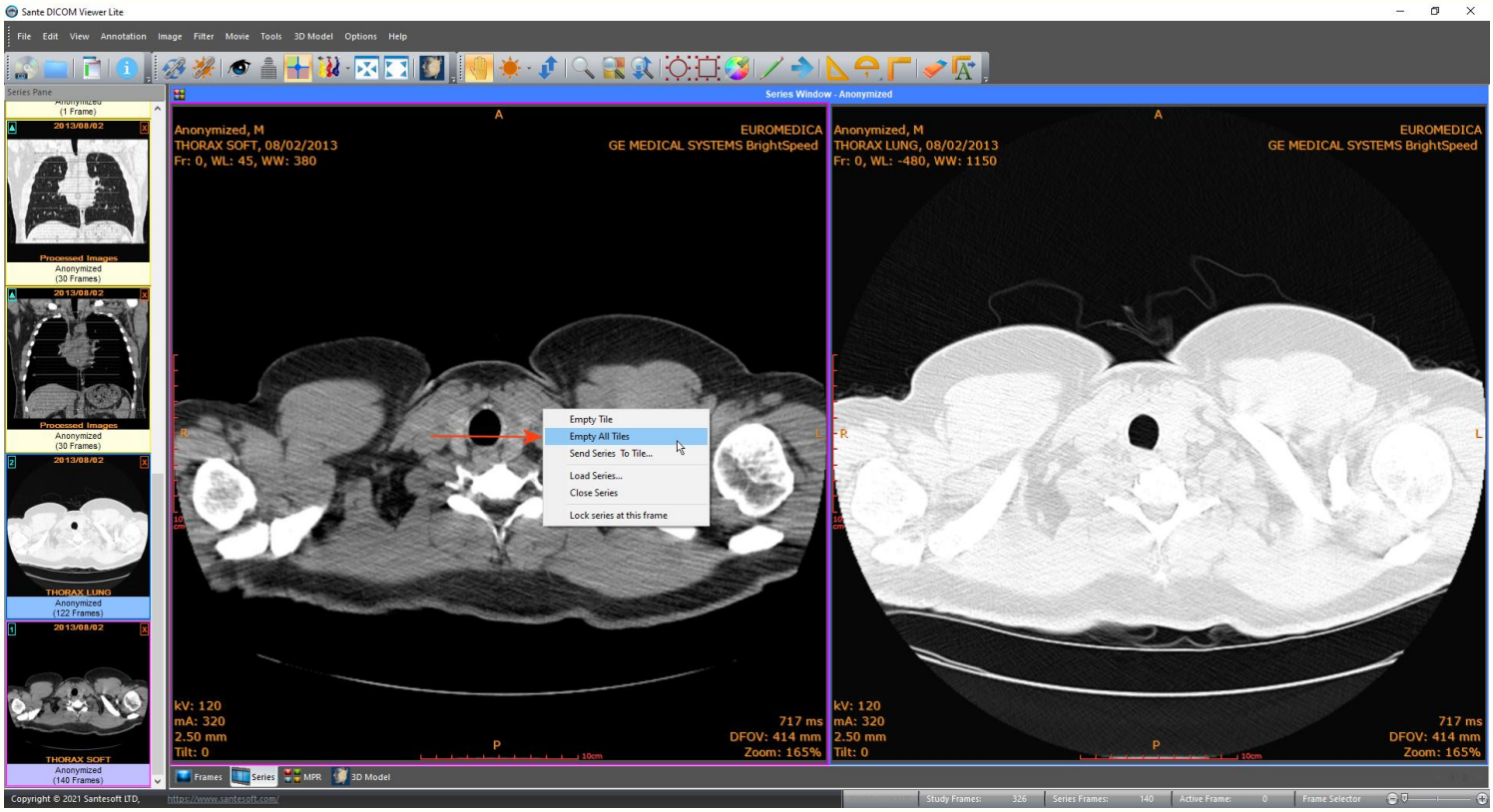
Compare images of the same series

Open the series.

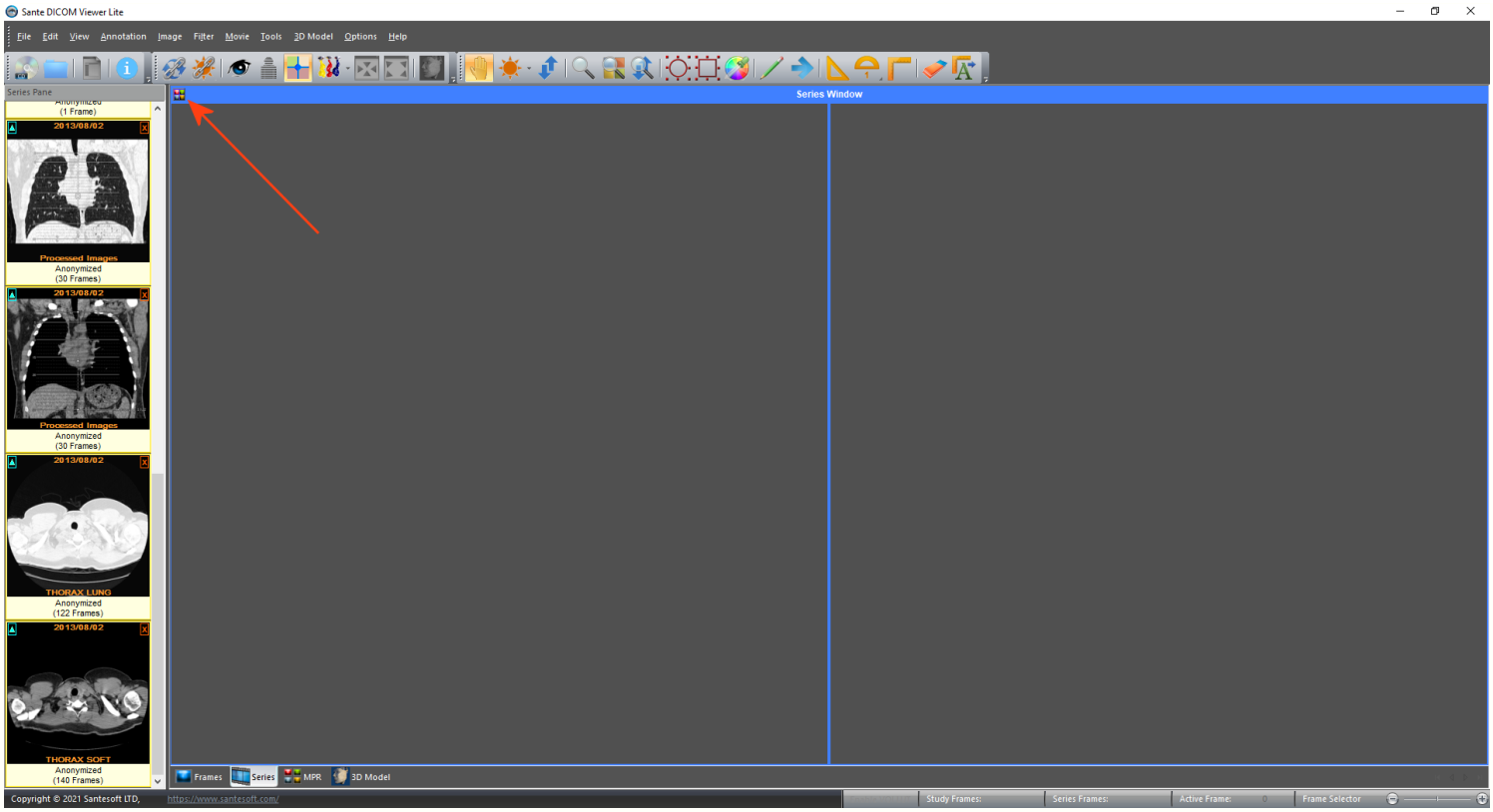
From the **Tab control** select the **Series** View.



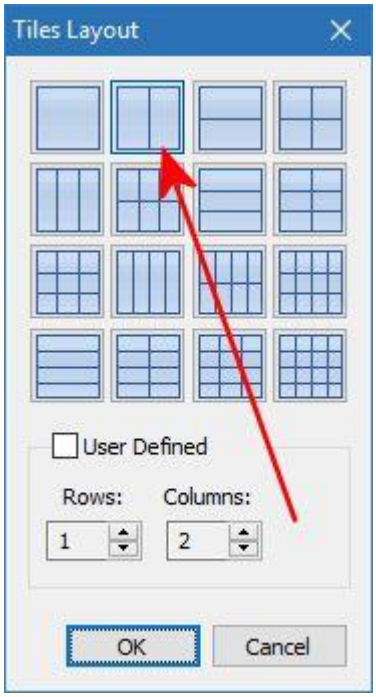
If there are already series loaded in this window, press the **right** mouse button and select the **"Empty All Tiles"** command.



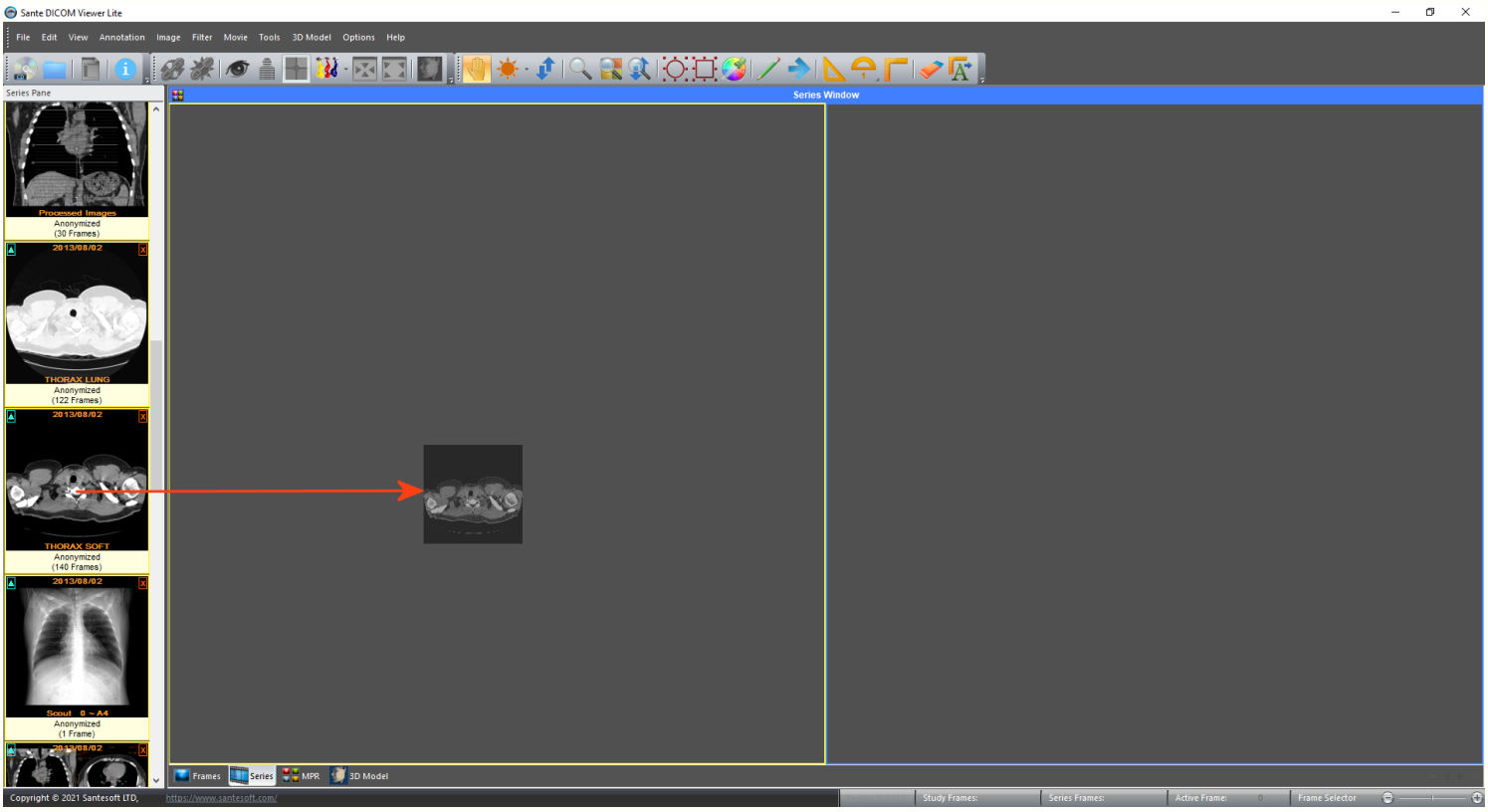
Select the menu command **"Options➡Tiles Layout"** or press the **"Tiles Layout"** button in the upper left corner of the window.

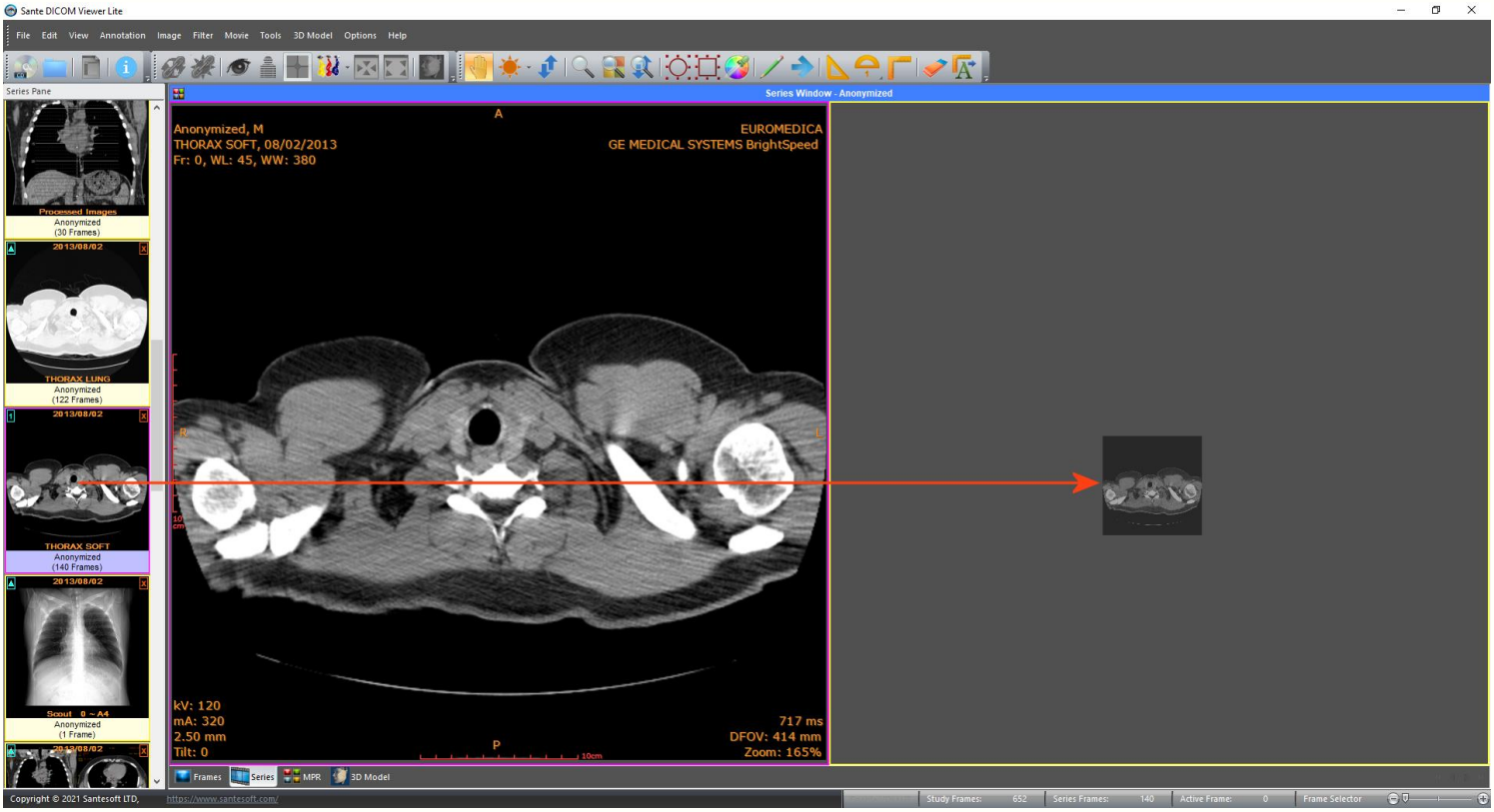


Select the 2 vertical window layout.

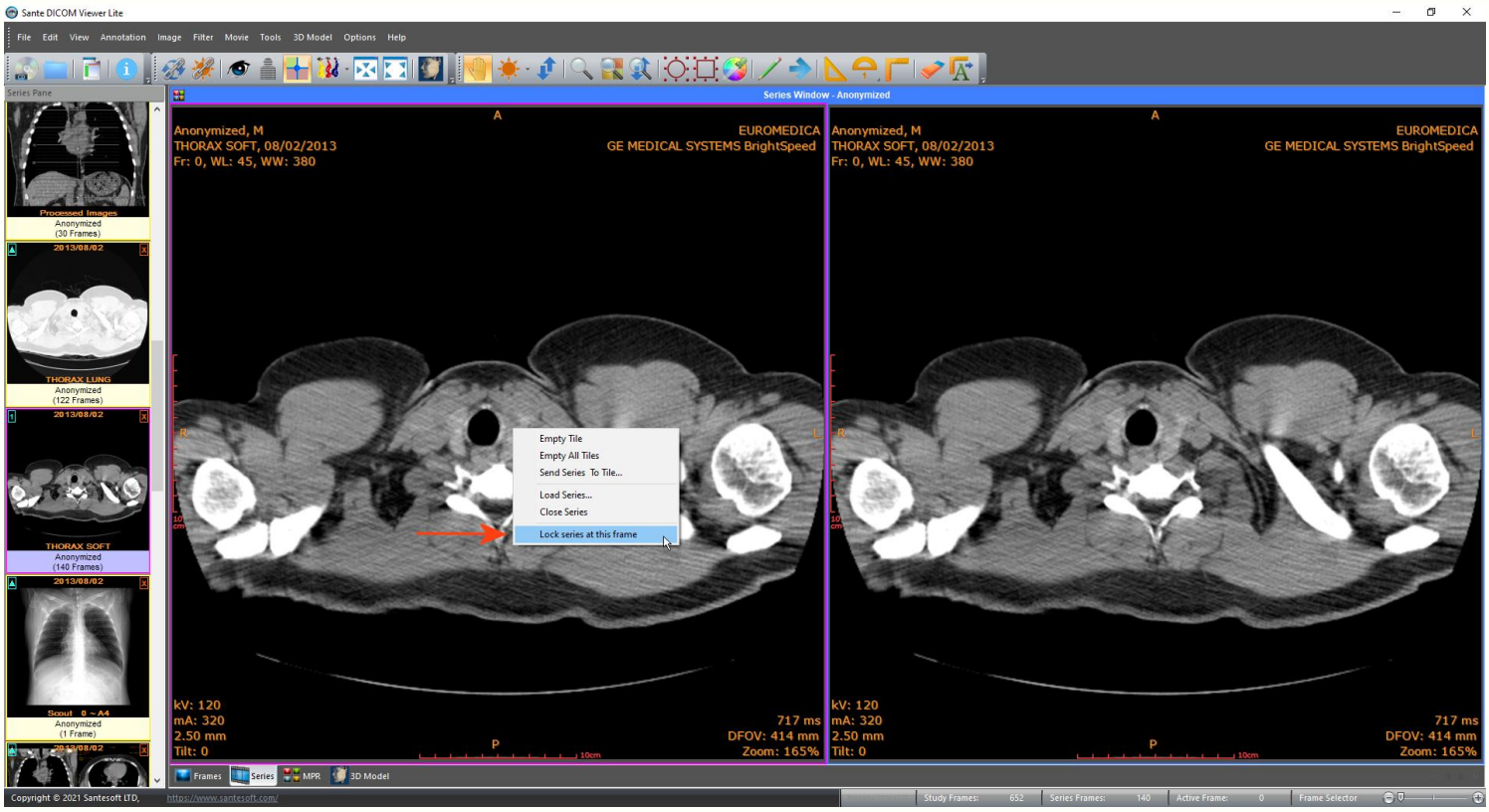


"Drag 'n' drop" the same series into two views.

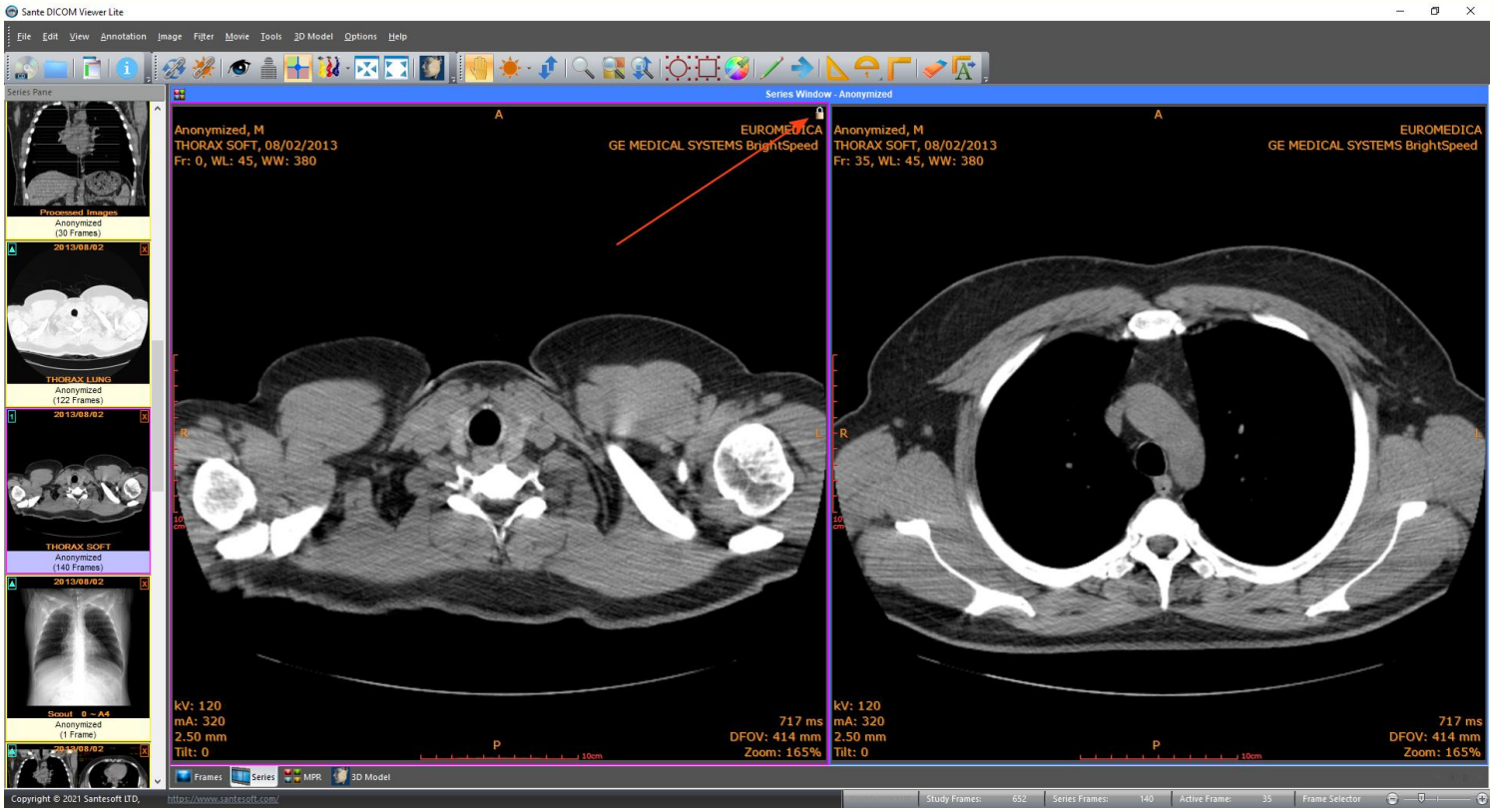




Scroll the series in the desired frame, press the **right** mouse button and select the menu command **"Lock series at this frame"**.



Now the one series view is locked in the desired frame, and the other series view can scroll freely to allow you the comparison of different frames. The locked series displays a lock symbol in the upper right corner of the window.

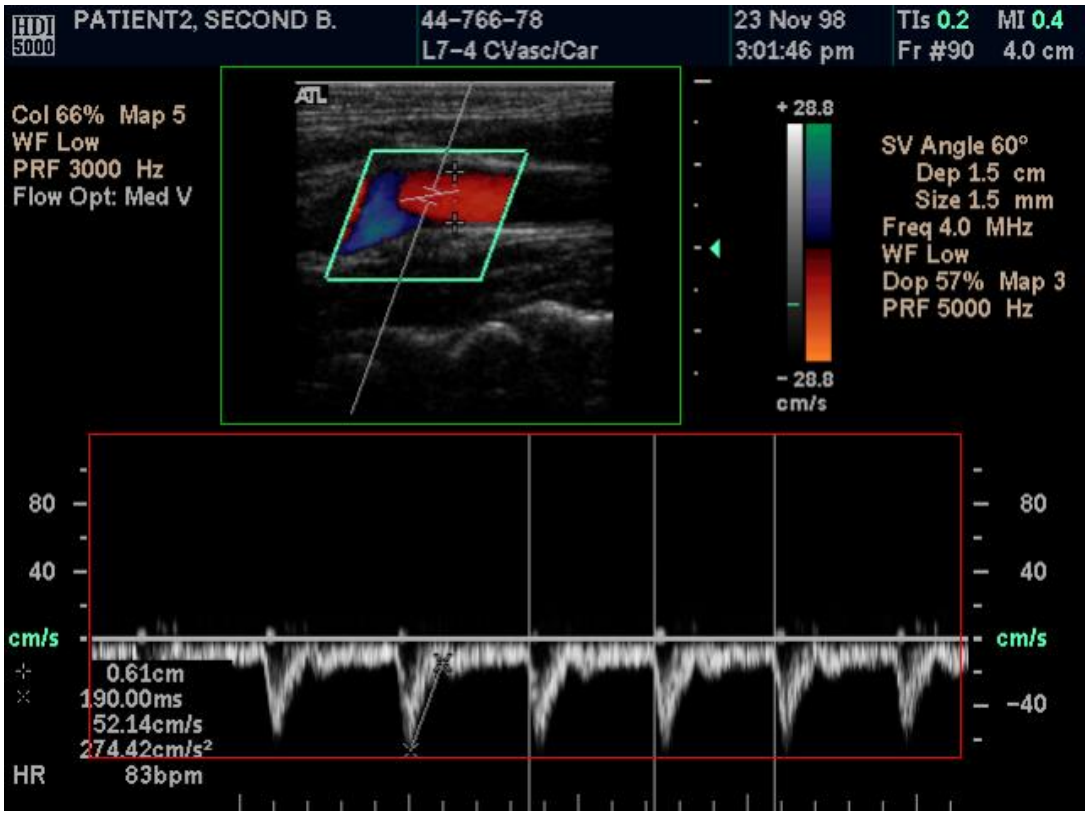


To unlock the series, press the **right** mouse button and select again the menu command **"Lock series at this frame"**.

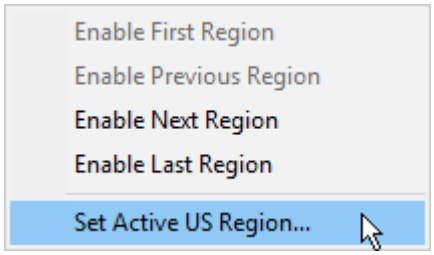
Take calibrated Ultrasound measurements

The program supports the Ultrasound Region Calibration Module (0018, 6011), and it is able to take calibrated distance and area measurements in ultrasound DICOM files.

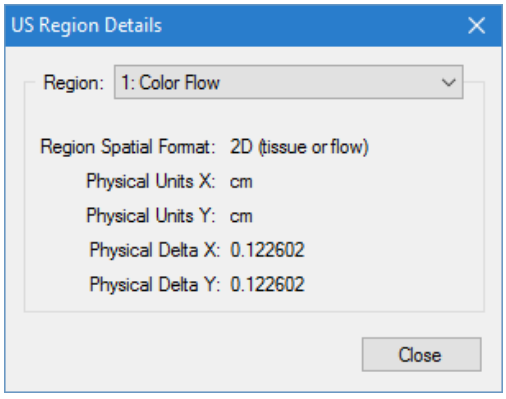
When the user selects the distance measurement tool, one or more rectangles appear on the image. Each one of these rectangles represents a calibrated region. The active region has a green color and the inactive regions have a red color. Within the active (green) region the mouse cursor has a cross shape, and within the inactive (red) region has an arrow shape. The user can take measurements in the active region.



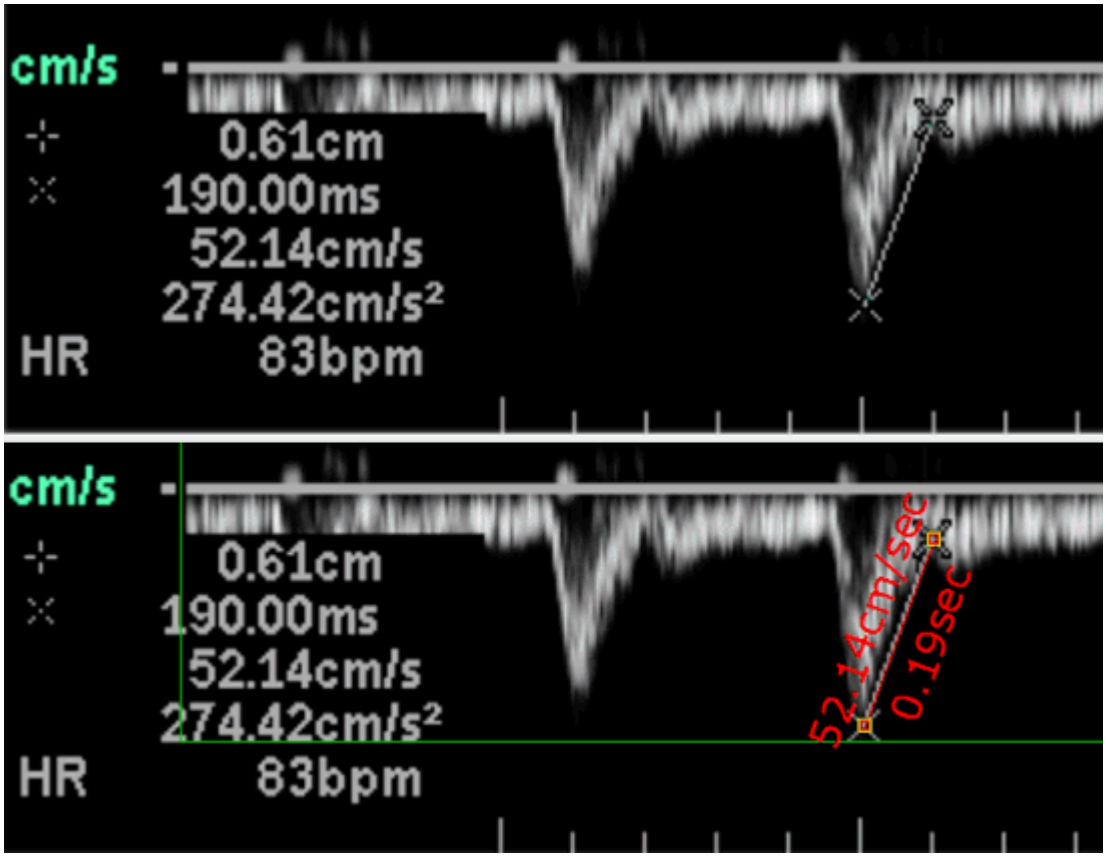
By clicking the right mouse button, a pop-up menu appears and allows the user to select the active region.



By selecting the menu command "View US Region Details...", a dialog box appears and it displays the type, the units and the delta of the active region.

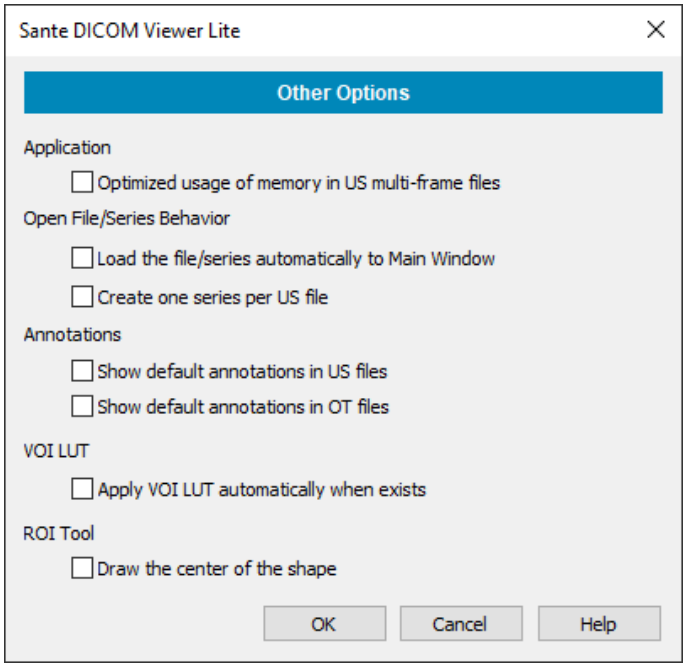


The user can easily check the accuracy of the measurements by taking the same measurement in the ultrasound machine and in the program.



Program Options

Use the menu command **"Options ➧ Other Options"** to view and adjust the options of the program.



Optimized usage of memory in US multi-frame files
This option disables the Undo/Redo functions of the program that consume large amount of memory in US multi-frame files. With this option enabled the program can handle larger US multi-frame files.

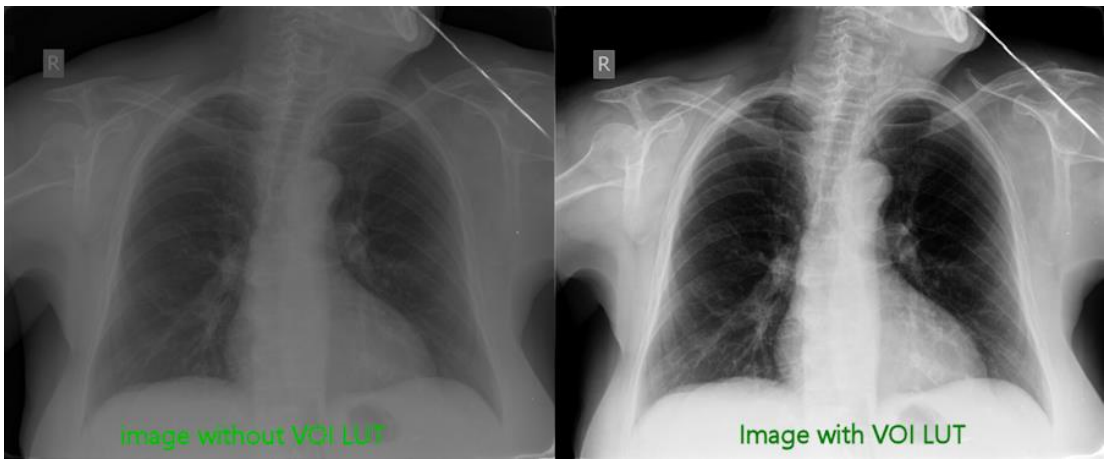
Load the file/series automatically to Main Window
If this option is set and the user opens a file/series, the program automatically load this file/series to Main Window.

Create one series per US file
If this option is set the program creates one series per US file and it displays in the left-hand series pane one thumbnail for every series. Otherwise it creates one series for all the US files that belong to the same series and it displays one thumbnail only in the left-hand series pane.

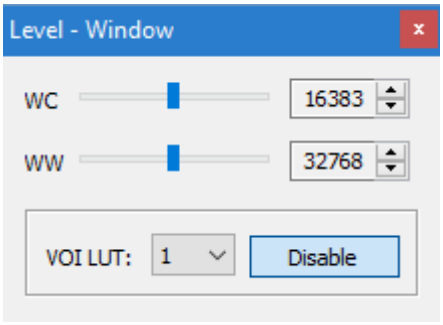
Show default annotations in US files
If this option is set the program displays over the US images the patient name and birthdate, the series ID and date and other information.

Show default annotations in OT files
If this option is set the program displays over the OT images the patient name and birthdate, the series ID and date and other information.

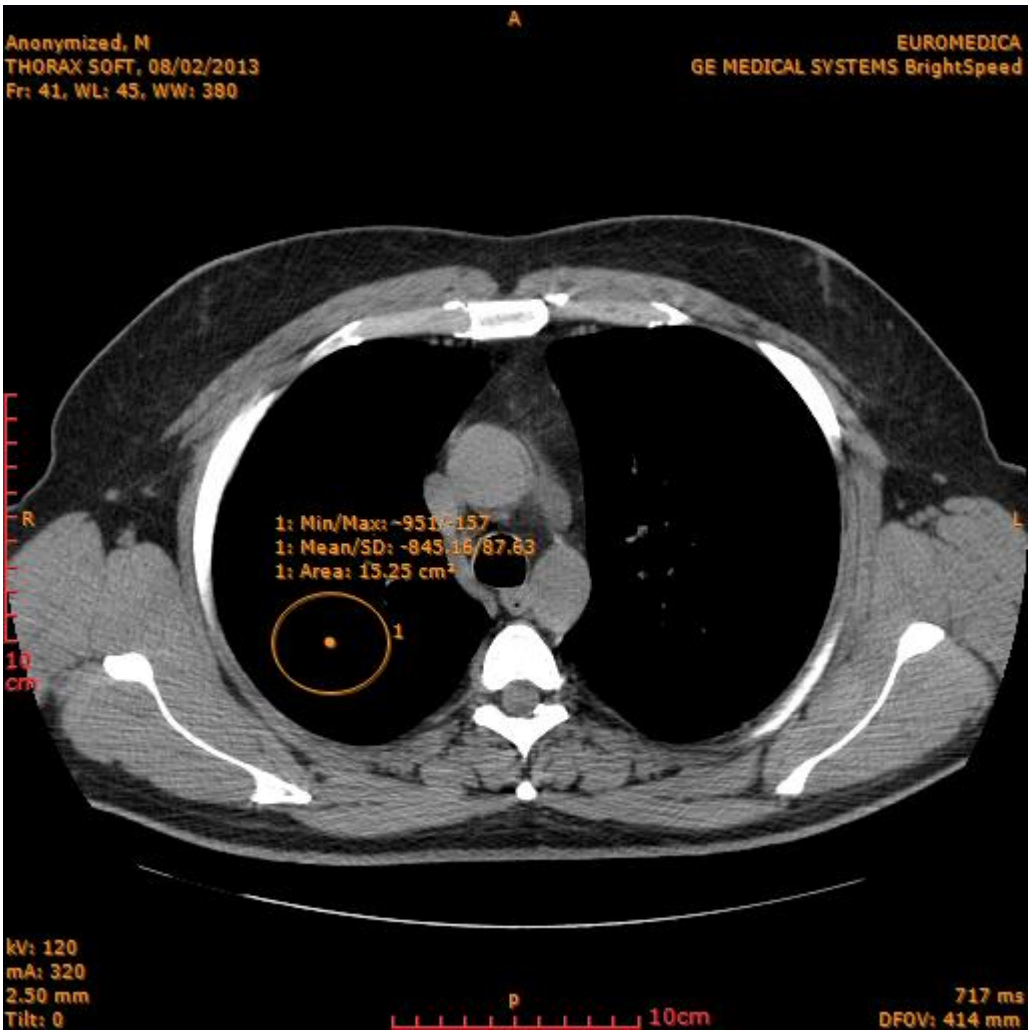
Apply VOI LUT automatically when exists
If the file contains a VOI Look Up Table the program displays the image with this LUT automatically.



If the file contains more than one VOI LUTs, the user can select the active LUT from the Level-Window Dialog Box



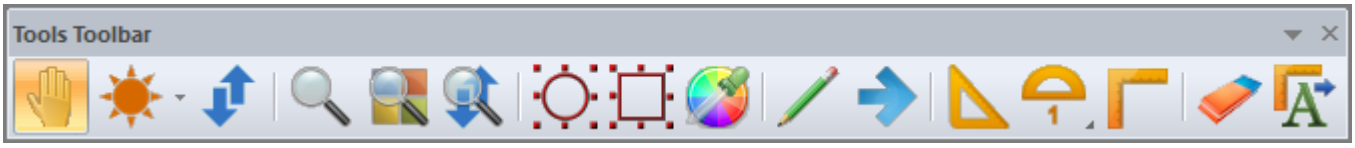
Draw the center of the shape
If this option is set, the program draws the center of the elliptical ROI.



Program Tools

Pan Hand

This tool allows you to pan across the image using the mouse's left button, when the image is larger than the screen. Click on the image and move your mouse in the direction you want to pan.



Level-Window

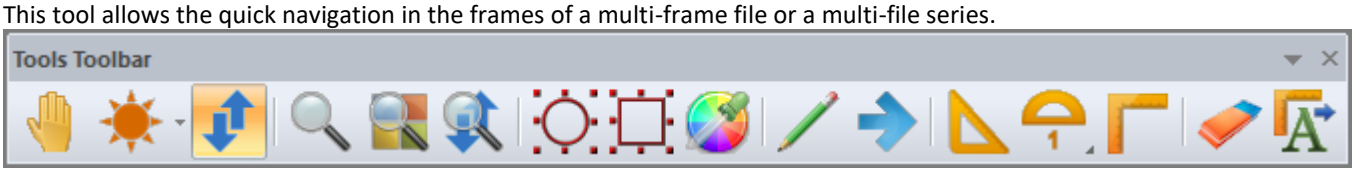
This tool allows you to adjust the Level-Window values of the image by using the mouse left button.

Click on the image and move your mouse upwards and downwards to decrease and increase the level value, or move your mouse left and right to decrease or increase the window value. The level-window tool allows you to modify the brightness and the contrast of the image without changing the actual pixel values, it alters only the way that the pixels are displayed on the screen.

The user can use the Level-Window Dialog Box command of the View menu that allows the user to insert precise values in the level-window fields. The level-window tool does not work with palette images.

Frame Browser

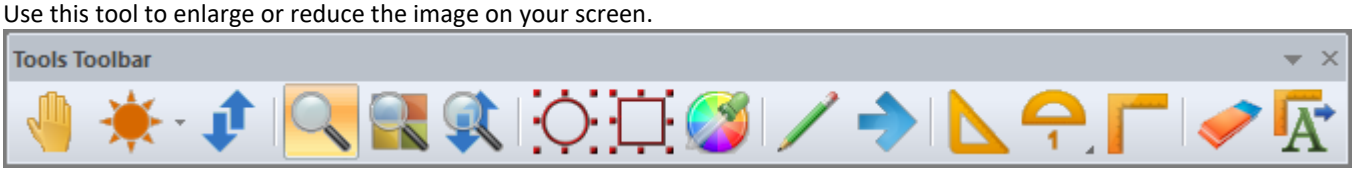
This tool allows the quick navigation in the frames of a multi-frame file or a multi-file series.



Click on the image and move your mouse down to view the next frames or up to view the previous frames.

Zoom In/Out

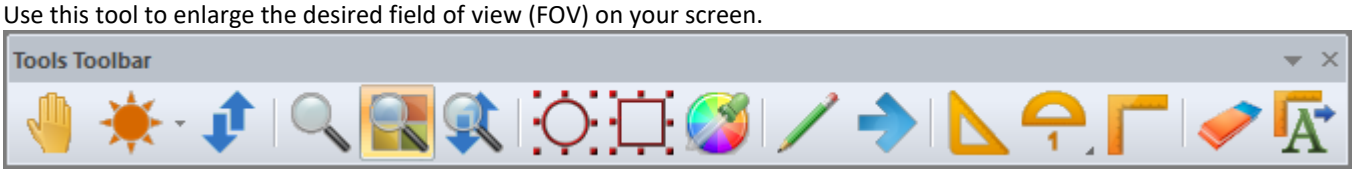
Use this tool to enlarge or reduce the image on your screen.



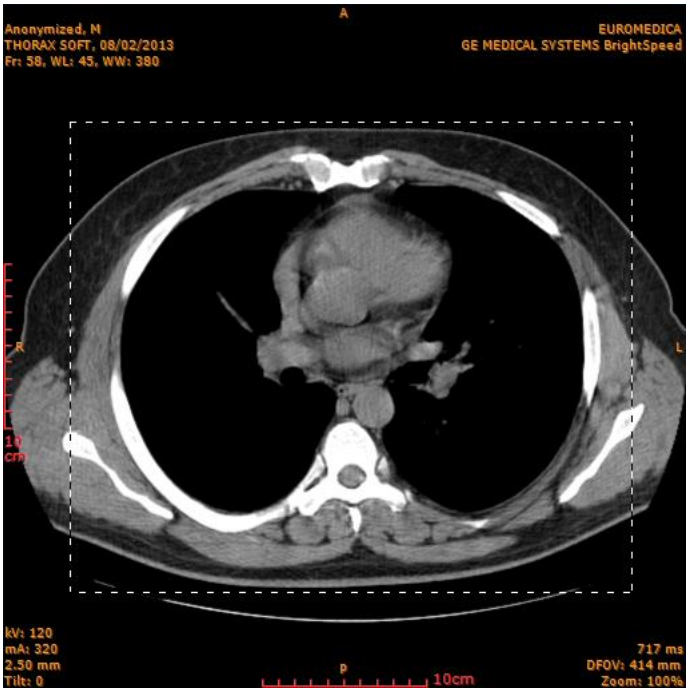
Click on the image to enlarge it by 10%. Press and hold down the **<Ctrl>** key and click on the image to reduce it by 10%.

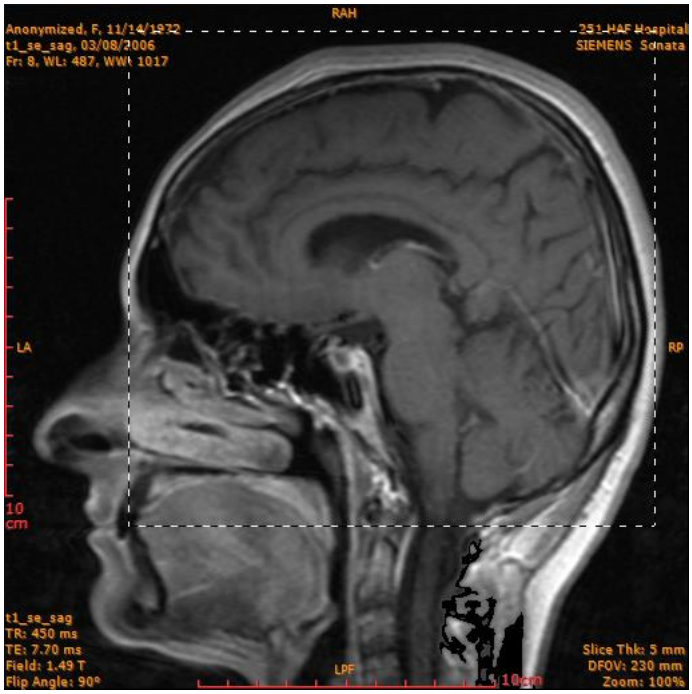
Zoom Window

Use this tool to enlarge the desired field of view (FOV) on your screen.



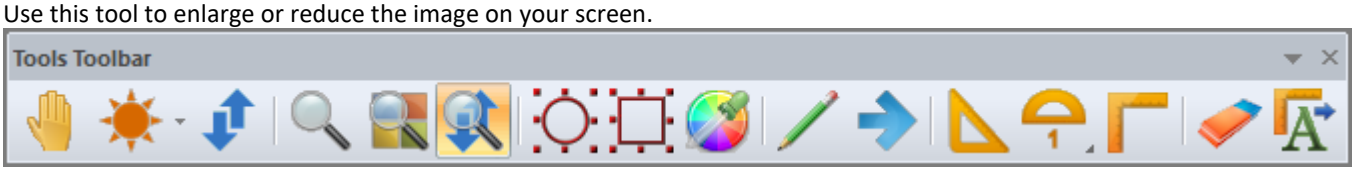
Click on the upper-left corner of the FOV and move your mouse in the lower-right corner of FOV. The program fits the FOV on the screen.





Dynamic Zoom

Use this tool to enlarge or reduce the image on your screen.

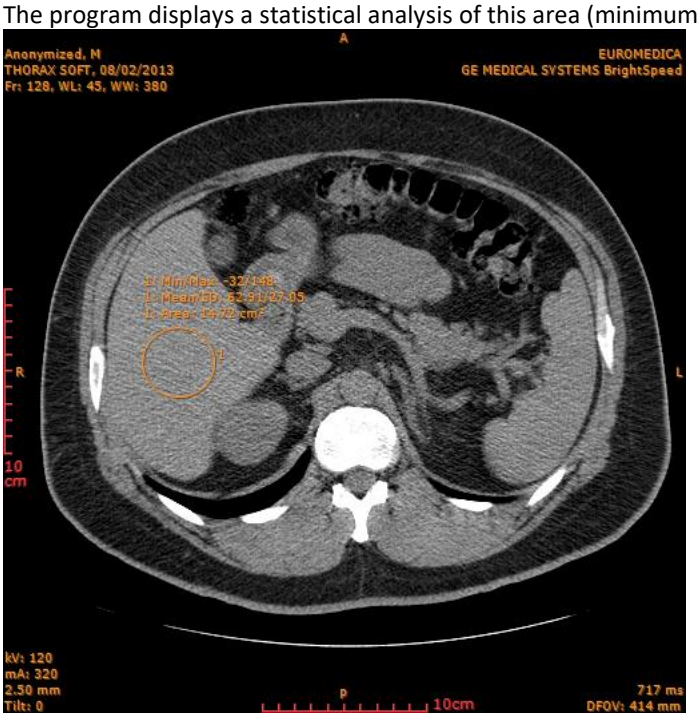


Click and hold down the left mouse button and move the mouse upwards to enlarge the image.
Click and hold down the left mouse button and move the mouse downwards to reduce the image.

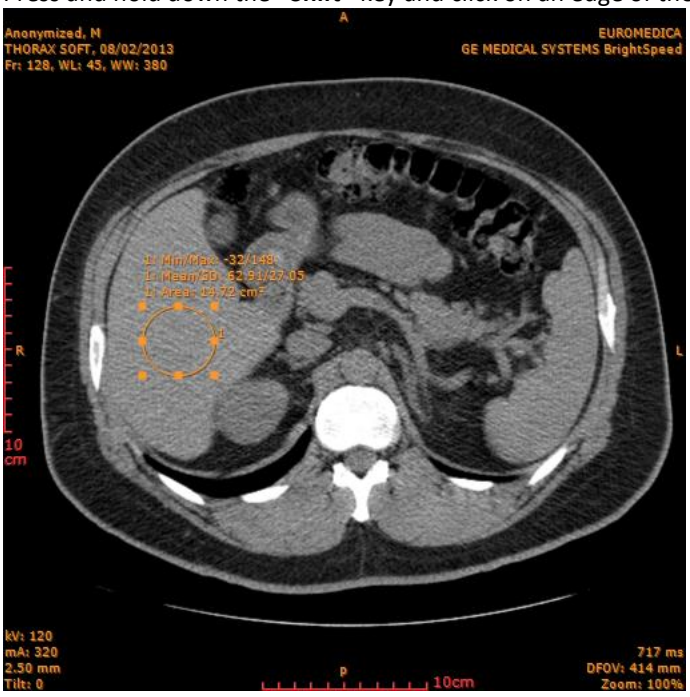
ROI Tool

Use this tool to select a circular area of the image.

The program displays a statistical analysis of this area (minimum and maximum values, mean value, standard deviation and area).



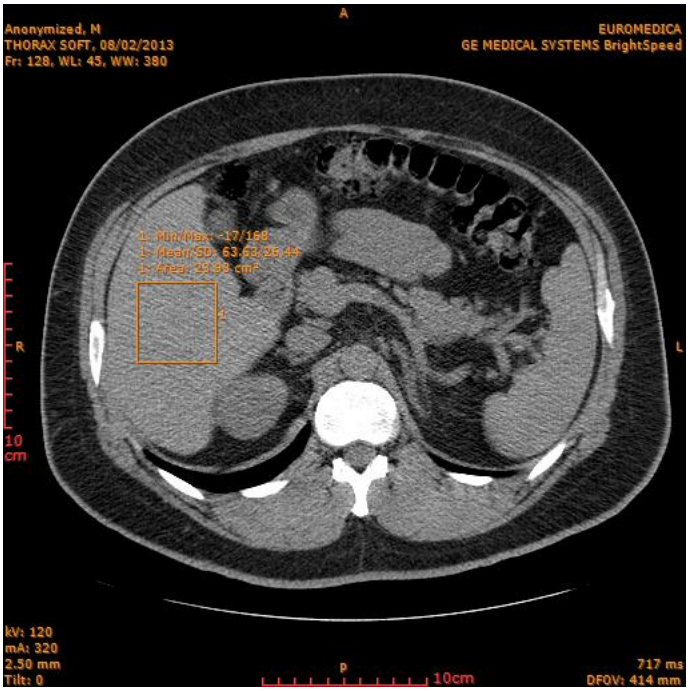
Press and hold down the **<Ctrl>** key, click on the text of the ROI and move it to change the position of the text.
Press and hold down the **<Ctrl>** key, click on an edge of the ROI and move it to change the shape of the ROI.
Press and hold down the **<Ctrl>** key, click on the center of the ROI and move it to change the position of the ROI.
Press and hold down the **<Shift>** key and click on an edge of the ROI to delete the ROI.



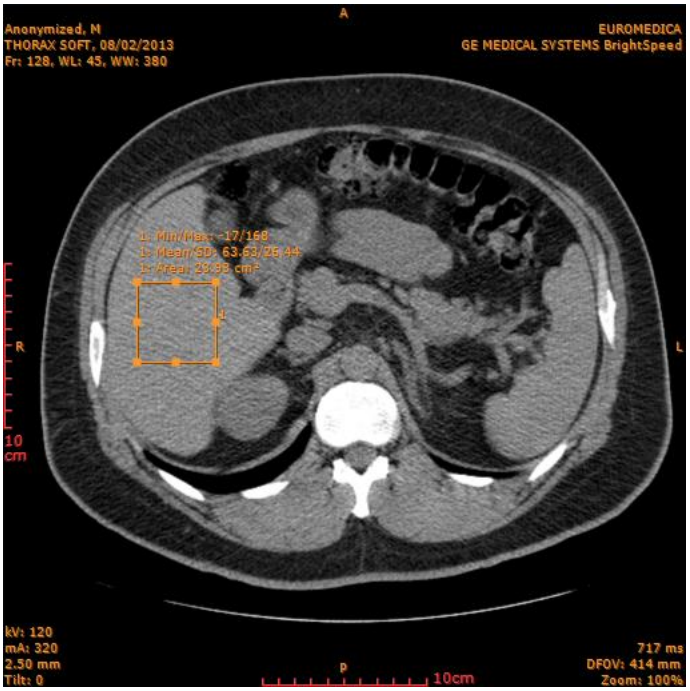
Rectangular ROI Tool

Use this tool to select a rectangular area of the image.

The program displays a statistical analysis of this area (minimum and maximum values, mean value, standard deviation and area).

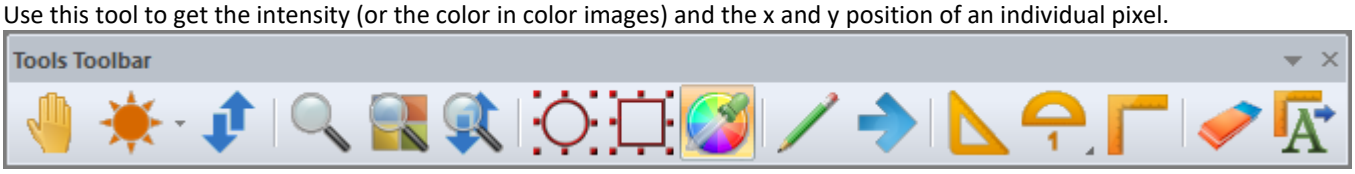


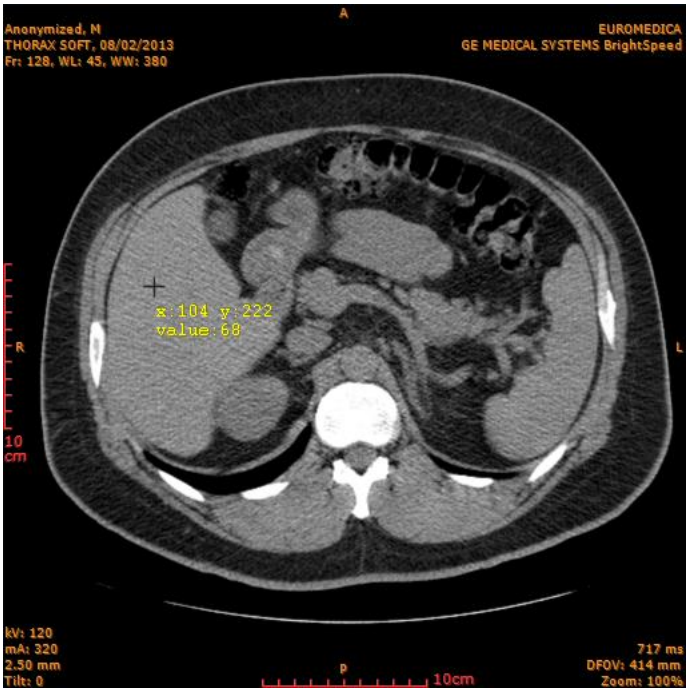
Press and hold down the **<Ctrl>** key, click on the text of the ROI and move it to change the position of the text.
Press and hold down the **<Ctrl>** key, click on an edge of the ROI and move it to change the shape of the ROI.
Press and hold down the **<Ctrl>** key, click on the center of the ROI and move it to change the position of the ROI.
Press and hold down the **<Shift>** key and click on an edge of the ROI to delete the ROI.



Intensity/Color Picker Tool

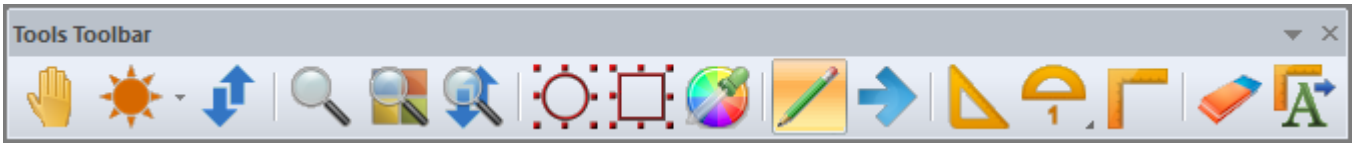
Use this tool to get the intensity (or the color in color images) and the x and y position of an individual pixel.





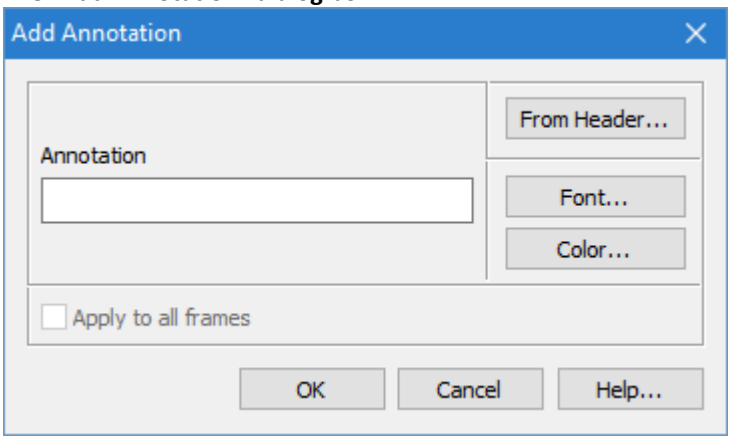
Annotation Text

This tool allows you to insert, modify and delete an annotation text on your image.



Select this tool and click on a point of the image. A dialog box appears and lets you to insert the annotation text in that point.

The "Add Annotation" dialog box



From Header button
Allows you to select a text from the file's header.

Font button
Allows you to select the font of the text.

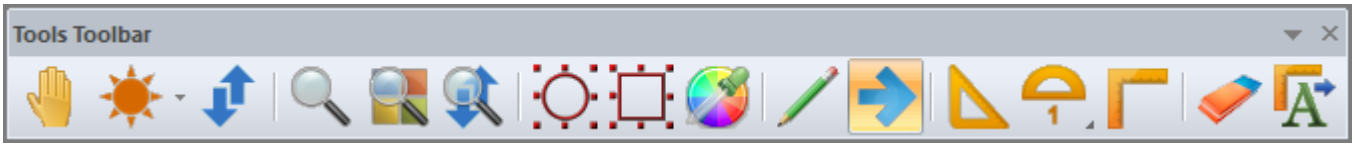
Color button
Allows you to select the color of the text.

To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Annotation Arrow

This tool allows you to insert, modify and delete an annotation arrow on your image.

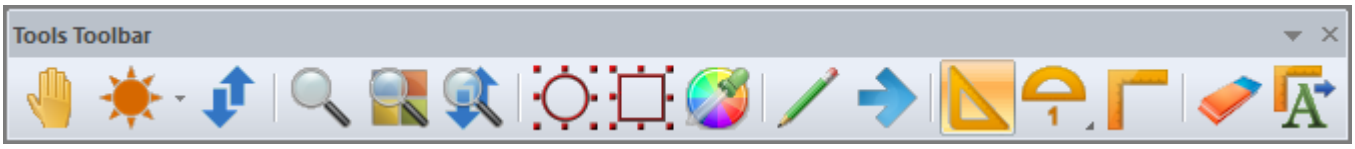


To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Measure Distance

The distance measurement tool allows you to make distance measurements on your image. You can select the units of the measurements from the options menu.

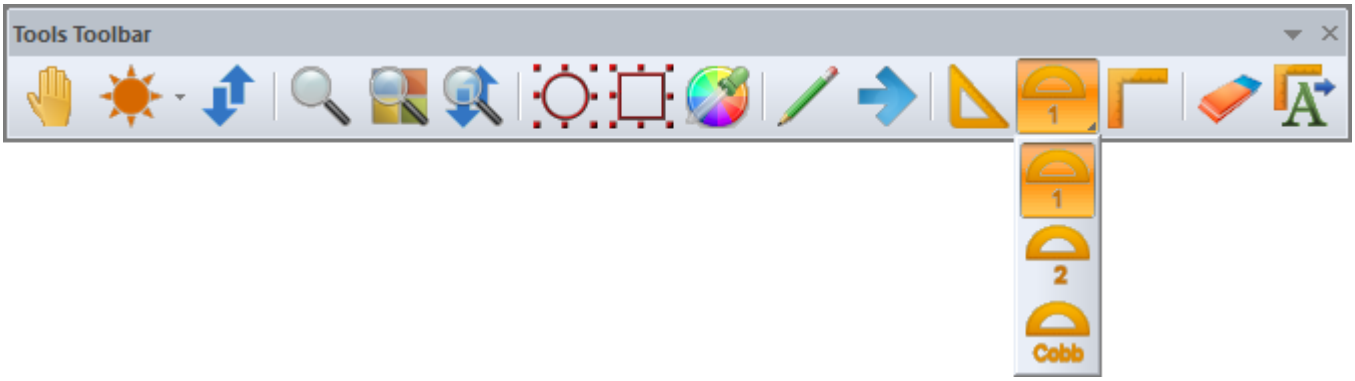


To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Measure Angle (Vertex: 1st point)

The angle measurement tool allows you to make angle measurements on your image.

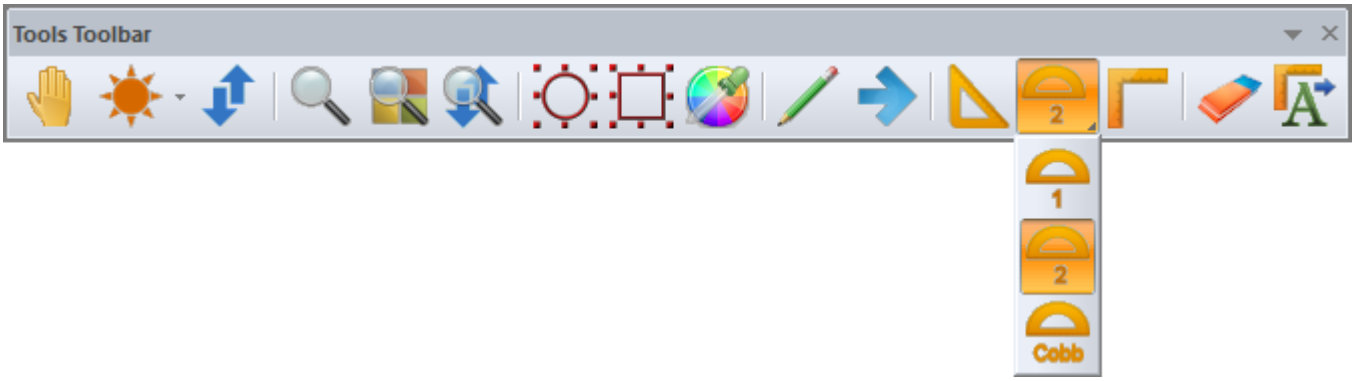


To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Measure Angle (Vertex: 2nd point)

The angle measurement tool allows you to make angle measurements on your image.

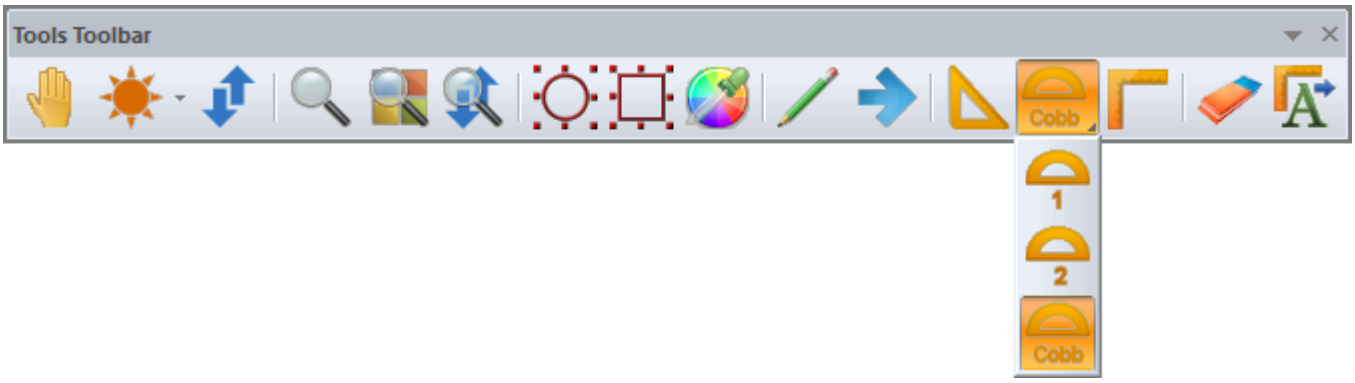


To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Measure Cobb Angle

The angle measurement tool allows you to make cobb angle measurements on your image.
Click in the first point and then click in the second point to create the first side of the cobb angle.
Click in the third point and then click in the fourth point to create the second side of the cobb angle.
The program calculates and displays the value of the cobb angle.

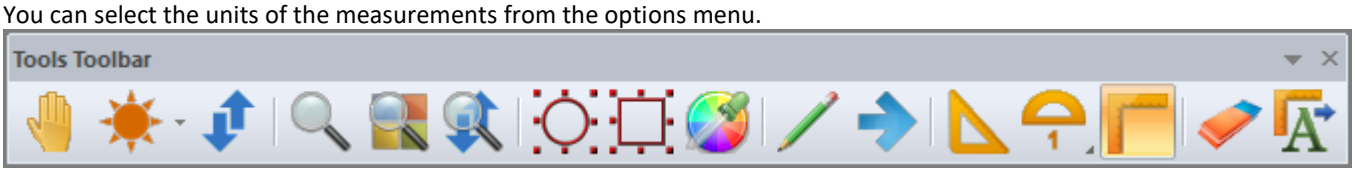


To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Polyline

The polyline measurement tool allows you to make length and perimeter measurements on your image.
You can select the units of the measurements from the options menu.



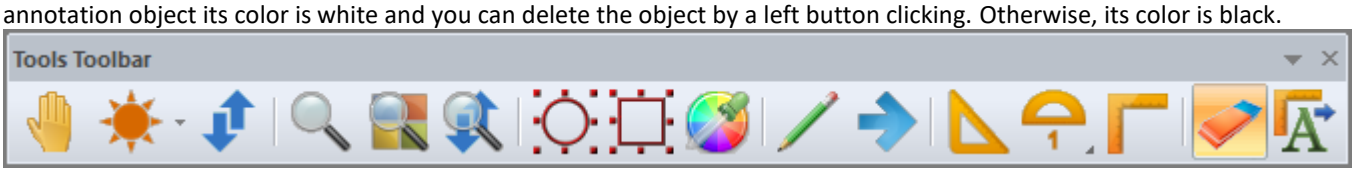
To end the polyline, double-click in the last point.
Right-click in the image to end the polyline without insertion of the last (floating) point.

To **move** an annotation/measurement, press and hold down the **<Ctrl>** key, click on the annotation/measurement, and move it around the image. You can move an annotation/measurement with the Move Annotation/Measurement tool as well.

To **delete** an annotation arrow, press and hold down the **<Shift>** key, and click on the annotation/measurement.
You can delete an annotation/measurement with the Erase Annotation/Measurement tool as well.

Erase Annotation/Measurement

This command enables the erase annotation tool.
Use the erase annotation tool to delete an annotation text, arrow, distance or angle measurement. When the eraser is above of an annotation object its color is white and you can delete the object by a left button clicking. Otherwise, its color is black.



Move Annotation/Measurement

The move annotation tool allows you to select and/or move an annotation (text, arrow, distance, angle, ROI and Rectangular ROI).