



# **LocalEye Viewer, version 9**

*User Manual*



## Table of Contents

<b>1</b>	<b>ABBREVIATIONS .....</b>	<b>4</b>
<b>2</b>	<b>INDICATIONS FOR USE .....</b>	<b>5</b>
<b>3</b>	<b>INTRODUCTION .....</b>	<b>5</b>
<b>4</b>	<b>MAIN TOOLBAR .....</b>	<b>7</b>
4.1	HIDE / SHOW MAIN TOOLBAR'S BUTTONS .....	7
4.2	PATIENTS / STUDIES.....	7
4.3	SAVE / EXPORT .....	9
4.3.1	Export files / images to local disk .....	10
4.3.1.1	Export DICOM files to local disk .....	11
4.3.1.2	Export images in JPG format to local disk .....	12
4.3.1.3	Export series in AVI format to local disk .....	13
4.3.2	Copy images to clipboard .....	14
4.4	ONLINE HELP .....	14
4.5	ABOUT THIS SOFTWARE.....	14
<b>5</b>	<b>IMAGE MANIPULATION TOOLBAR .....</b>	<b>15</b>
5.1	ASSOCIATION OF TOOLS WITH MOUSE BUTTONS .....	15
5.1.1	Select/Stack image .....	17
5.1.2	Zoom area.....	18
5.1.3	Magnifier .....	18
5.1.4	Pan image .....	18
5.1.5	Shutter.....	19
5.1.6	Window / Level.....	19
5.1.7	Select annotation.....	20
5.1.8	Measurement tools.....	21
5.1.8.1	Calibrate measurements .....	21
5.1.8.2	Measure distance .....	22
5.1.8.3	Measure horiz/vert distance .....	23
5.1.8.1	Measure distances and angles .....	23
5.1.8.2	Measure rect area .....	24
5.1.8.3	Measure ellipt area .....	26
5.1.8.4	Measure angle (mode1) .....	27
5.1.8.5	Measure angle (mode2) .....	27
5.1.8.6	Measure density .....	28
5.1.9	Stack image.....	28
5.1.10	Zoom image.....	29
5.2	IMAGE OPERATIONS OPTIONS .....	29

---

5.3	RESET OPERATIONS .....	30
5.4	DISPLAY OPTIONS .....	30
5.4.1	Toggle text overlays .....	31
5.4.2	Display reference lines .....	31
5.4.3	Other display options.....	32
5.4.3.1	Mammo CAD markers .....	34
5.4.4	Show image information .....	36
5.5	ZOOM OPERATIONS .....	38
5.5.1	Zoom in .....	39
5.5.2	Zoom out .....	39
5.5.3	Zoom to fit.....	39
5.5.4	Zoom reset .....	39
5.6	CONTRAST MANAGEMENT OPERATIONS.....	39
5.6.1	Invert.....	40
5.6.2	Auto window .....	40
5.7	GEOMETRIC TRANSFORMATION OPERATIONS .....	40
5.7.1	Rotate +90°.....	40
5.7.2	Rotate -90° .....	41
5.7.3	Flip horizontally .....	41
5.7.4	Flip vertically.....	41
5.8	KEY IMAGES OPERATIONS.....	41
<b>6</b>	<b>REPORTING TOOLBAR .....</b>	<b>42</b>
<b>7</b>	<b>STUDY PANELS .....</b>	<b>43</b>
7.1	STUDY TOOLBAR .....	44
7.1.1	Study-level cine movie toolbar buttons .....	47
7.1.2	Hanging steps and study view presets.....	47
7.1.3	Share through Dropbox .....	48
<b>8</b>	<b>SERIES PANELS .....</b>	<b>55</b>
8.1	SERIES TOOLBAR .....	55
8.1.1	Series-level cine movie toolbar buttons .....	56
8.2	POP-UP MENU .....	57
<b>9</b>	<b>THUMBNAILS PANEL.....</b>	<b>58</b>
<b>10</b>	<b>VIEWER JOBS PANEL .....</b>	<b>59</b>
<b>11</b>	<b>HOW TO REPORT ISSUES .....</b>	<b>59</b>
<b>12</b>	<b>ACKNOWLEDGEMENTS .....</b>	<b>59</b>

---

## 1 Abbreviations

Abbreviation	Description
DICOM	Digital Imaging and COmmunications in Medicine
DLL	Dynamic Link Library
DPI	Dots Per Inch
GUI	Graphical User Interface
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
JAI	Java Advanced Imaging
JRE	Java Runtime Environment
JWS	Java Web Start
LAN	Local Area Network
LUT	Look-Up Table
PACS	Picture Archiving and Communication System
PC	Personal Computer
RAM	Random Access Memory
SR	Structured Report
TCP	Transfer Control Protocol
URL	Uniform Resource Locator

## 2 Indications for use

The LocalEye Viewer software product is intended to be used as a medical image viewer to visualize and review medical multi-modality image data stored on an optical medium (CD or DVD) in DICOM format, as well as eventual related reports.

LocalEye Viewer is NOT intended for diagnostic reading and reporting of medical exams.

Typical users of LocalEye Viewer are trained professionals, including but not limited to radiologists, physicians, nurses and technicians.

## 3 Introduction

The following chapters explain the user features available from the LocalEye Viewer's Graphical User Interface (GUI) and how to exploit the capabilities of this system.

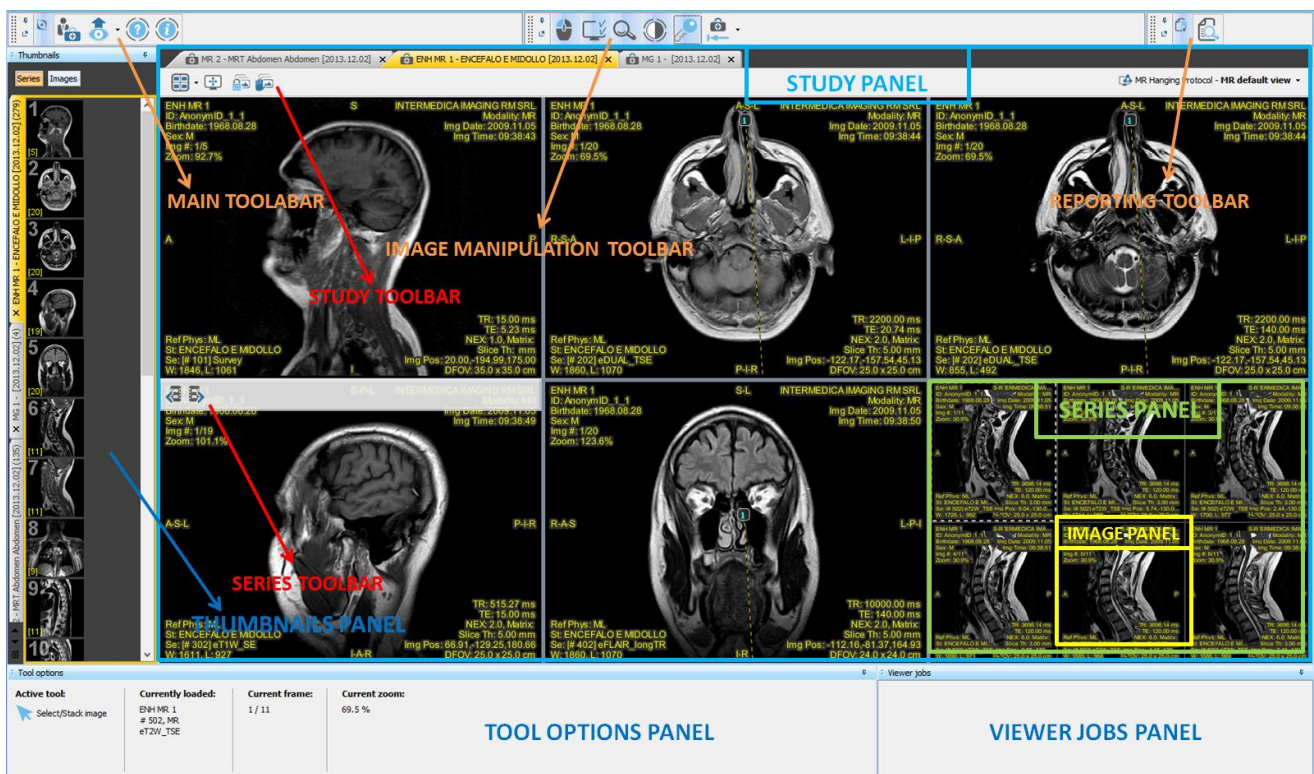
The LocalEye Viewer's GUI is composed of the following main panels and toolbars:

- *Main toolbar*: this toolbar contains buttons which allow performing the most common operations in LocalEye Viewer, such as loading and saving DICOM files, exporting medical images, displaying the list of available patients or studies. Basically, this is the main menu of LocalEye Viewer.
- *Image manipulation toolbar*: this rich toolbar contains buttons representing all operations which can be performed on medical images and all settings which can be applied to the display of those images.
- *Reporting toolbar*: this toolbar contains buttons which allow viewing reports.
- *Study panel(s)*: each study loaded in LocalEye Viewer is displayed in its own dedicated *study panel*. By default, multiple study panels are arranged in a "tabbed" fashion. However, it is possible to manually drag the tab title of each study panel to arrange and dock the panel according to the user's preference (e.g., in a side-by-side fashion). Each study panel has its own *study toolbar*, containing buttons corresponding with study-level options or operations. These operations change depending on the type of the study. Examples of such study-level operations are: setting display mode, viewing study in full-screen mode, toggle automatic series synchronization, toggle manual series synchronization. Also, buttons controlling the cine-playback of multi-frame sequences are available in this toolbar.
- *Series panel(s)*: each study panel contains one or more *series panels*, depending on the series tiling currently set on the study panel. Each series panel contains and shows images belonging to a given

series or sequence. Also, a *series toolbar* is associated with each series panel. This toolbar only appears when moving the mouse pointer in the lower area of the series panel and it allows performing series-level operations, such as switching to previous series, switching to next series, controlling the cine-playback of multi-frame sequences.

- *Thumbnails panel*: this panel displays thumbnail images. The thumbnails may represent the available series or all available images, depending on the user's choice.
- *Tool options panel*: this panel contains the options and information related to the currently active tool. A different image manipulation or analysis tool can be flexibly associated with each mouse button; when a given tool is in use, its specific options and data will be displayed in this panel.
- *Viewer jobs panel*: this is the panel where the progress of the jobs is shown.

The following figure shows a screenshot of LocalEye Viewer's GUI, with the main panels clearly shown:



User is able to drag the above mentioned panels and toolbars and arrange them in a "tabbed" fashion. In this way the Graphical User Interface of LocalEye Viewer will be completely customizable depending on user's preferences and needs.

The following image shows an example of GUI's customization:



The following sections provide a detailed description of each element of the GUI, as well as of the related features.

## 4 Main toolbar

The *Main Toolbar* of LocalEye Viewer acts as its main menu, since it's the access point to all main operations and features supported by the viewer.

#### 4.1 Hide / show main toolbar's buttons

This button may be used to hide or show the other *Main toolbar's* buttons:



## 4.2 Patients / Studies

The *Patients / Studies* toolbar button is shown in the following picture:



If you press the *Patients / Studies* button, the *Find Patients or Studies* frame will appear, as shown in the following picture:

**Find Patients or Studies**

Find...

Filter Patients / Studies / Series

Apply saved search filter: [dropdown]

Patient Name: [contains] [text box] Accession Number: [contains] [text box]

Patient ID: [contains] [text box] Study Description: [contains] [text box]

Referring Physician: [contains] [text box] Modality: [All modalities]

Study Date: Today Last 7 days Last 30 days Any date

From: [dropdown] To: [dropdown]

[Filter] [Clear Filter]

Double-click on a Patient, Study, Series or Image in order to load it:

**Studies (3 displayed)**

Patient Name	Patient ID	Birthdate	Sex	Study Description	Modality	Ref. Physician	Study Date	Study Time	Acc. Num.	Study Status
MR 2	AnonymID_1_5	1947.02.13	M	MRT Abdomen Ab...	MR, KO		2013.12.02	16:07:53	2500000000...	
ENH MR 1	AnonymID_1_1	1968.08.28	M	ENCEFALO E MID...	MR		2013.12.02	16:34:56		
MG 1	AnonymID_1	1969.12.11	F		MG		2013.12.02	17:55:03		

[Load selected]

☒ Auto-close window upon load

This window shows all available studies, series and images.

Depending on the current user's selection, the tree view may display a "Patient / Study / Series / Image" hierarchy (*Patient-root* view) or a "Study / Series / Image" hierarchy (*Study-root* view).

You can double-click on a patient, study, series or image node (for each operation a message asks how you would like to combine the new loaded studies with the existing ones):

- Double-clicking on a patient node (only possible with *Patient-root* view) will cause loading all studies belonging to that patient. A confirmation for such operation is asked by LocalEye Viewer;
- Double-clicking on a study node will cause loading all series belonging to that study;
- Double-clicking on a series node will cause loading all images belonging to that series;
- Double-clicking on an image node will cause loading just that image.



A powerful search filter is also provided to facilitate the search of a particular patient, study or series.

The user may specify a value for a given search parameter, then press the *Filter* button: the “Patient / Study / Series / Image” hierarchy will be filtered and only those nodes matching the search parameter(s) will be displayed. In particular, the following search parameters are supported:

- *Patient Name*
- *Patient ID*
- *Referring Physician*
- *Study Date*
- *Accession Number*
- *Study Description*
- *Modality*
- *Calling AE Title* (only available with the “query” integration model)
- *Called AE Title* (only available with the “query” integration model)

You can apply a previously-saved filter (if any) using the *Apply saved search filter* option.

It is possible to clear the currently-set search parameters by pressing the *Clear Filter* button.

The *Load Selected* button allows loading the selected studies; holding down the *Ctrl* button of the keyboard, you can select several studies at the same time.

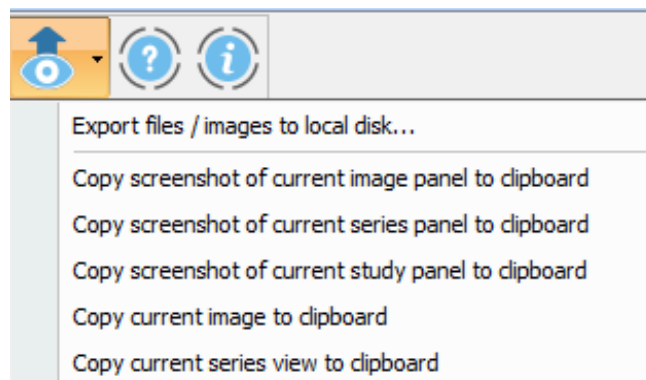
If the checkbox *Auto-close window upon load* is checked, the *Find Patients or Studies* window will be automatically closed after a load operation is triggered on this view.

### 4.3 Save / Export

The *Save / Export* toolbar button is shown in the following picture:

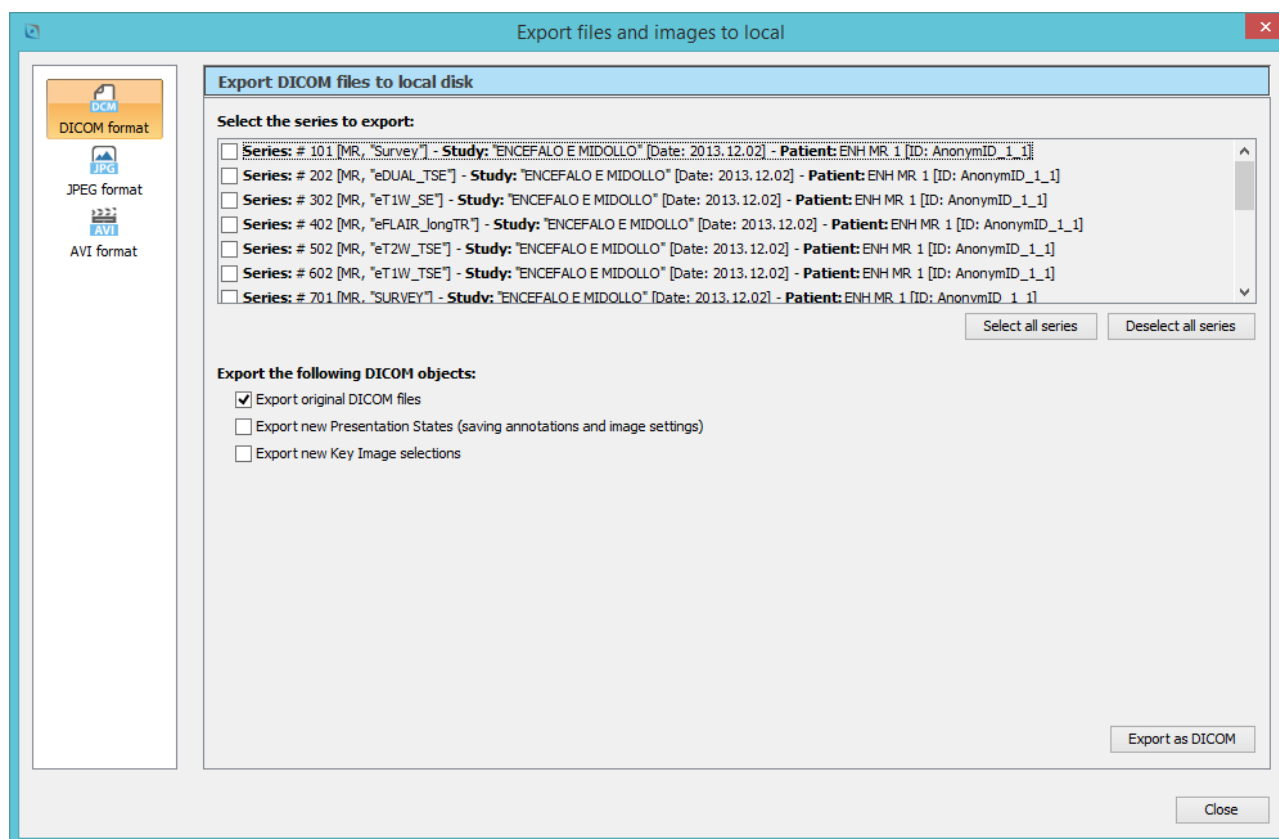


If you press the *Save / Export* button, the *Save / Export* drop-down menu will appear, as shown in the following picture:



#### 4.3.1 Export files / images to local disk

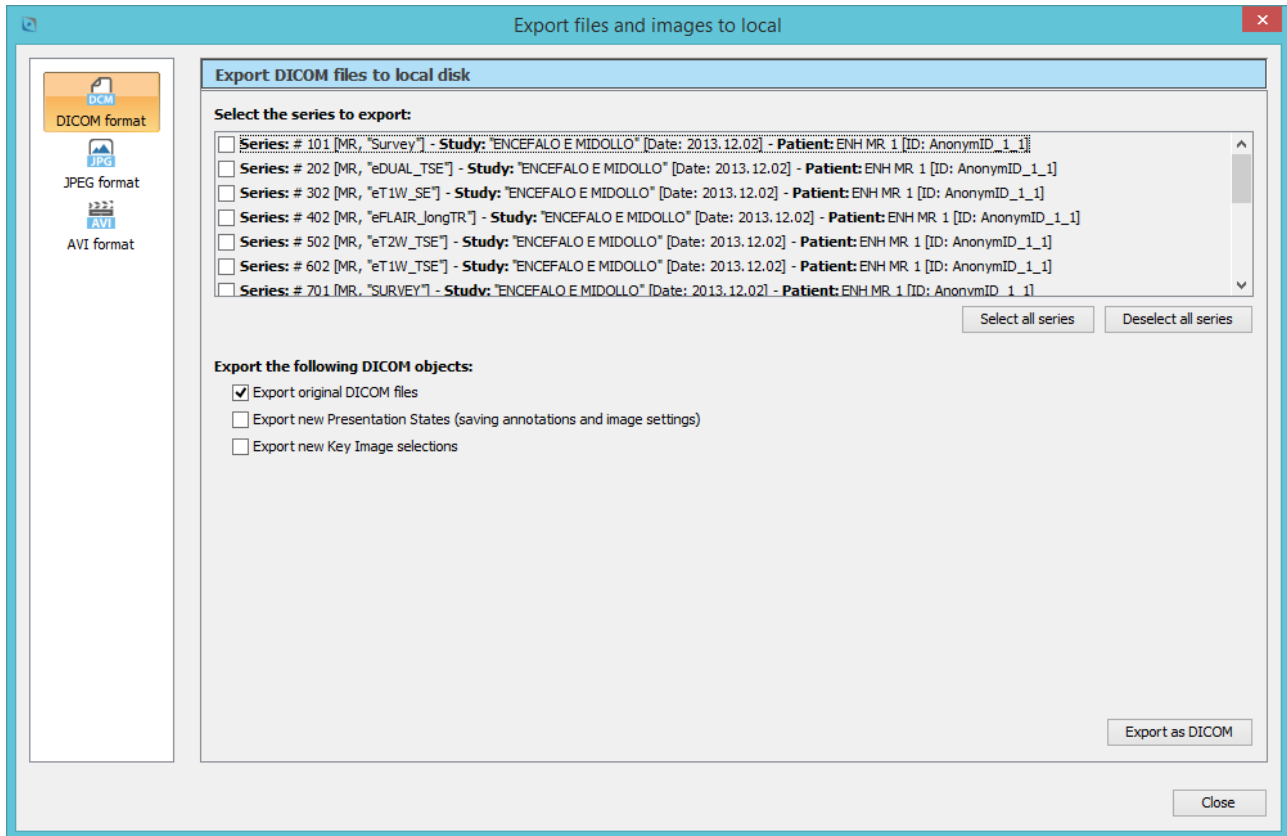
The *Export files / images to local disk...* menu item can be used to export currently-loaded files / images to the local file system or to save to the local file system modifications and settings made on images. If you select the *Export files / images to local disk...* menu item, the *Export files and images to local* dialog box will appear, as shown in the following picture:



Through this dialog, user can select which output format to use for the "export to local disk" operation.

#### 4.3.1.1 Export DICOM files to local disk

The *Export DICOM files to local disk* page can be displayed by selecting the *DICOM format* item from the left-hand list:



This page can be used to export currently-loaded DICOM images to the local file system, or to save to the local file system modifications and settings made on images, through the Presentation State or Key Object Selection DICOM objects.

Through this dialog, user can select which series (among the loaded ones) need to be included in the "export to local" operation.

User can also choose to select all series pressing the *Select all series* button or to deselect all series pressing the *Deselect all series* button.

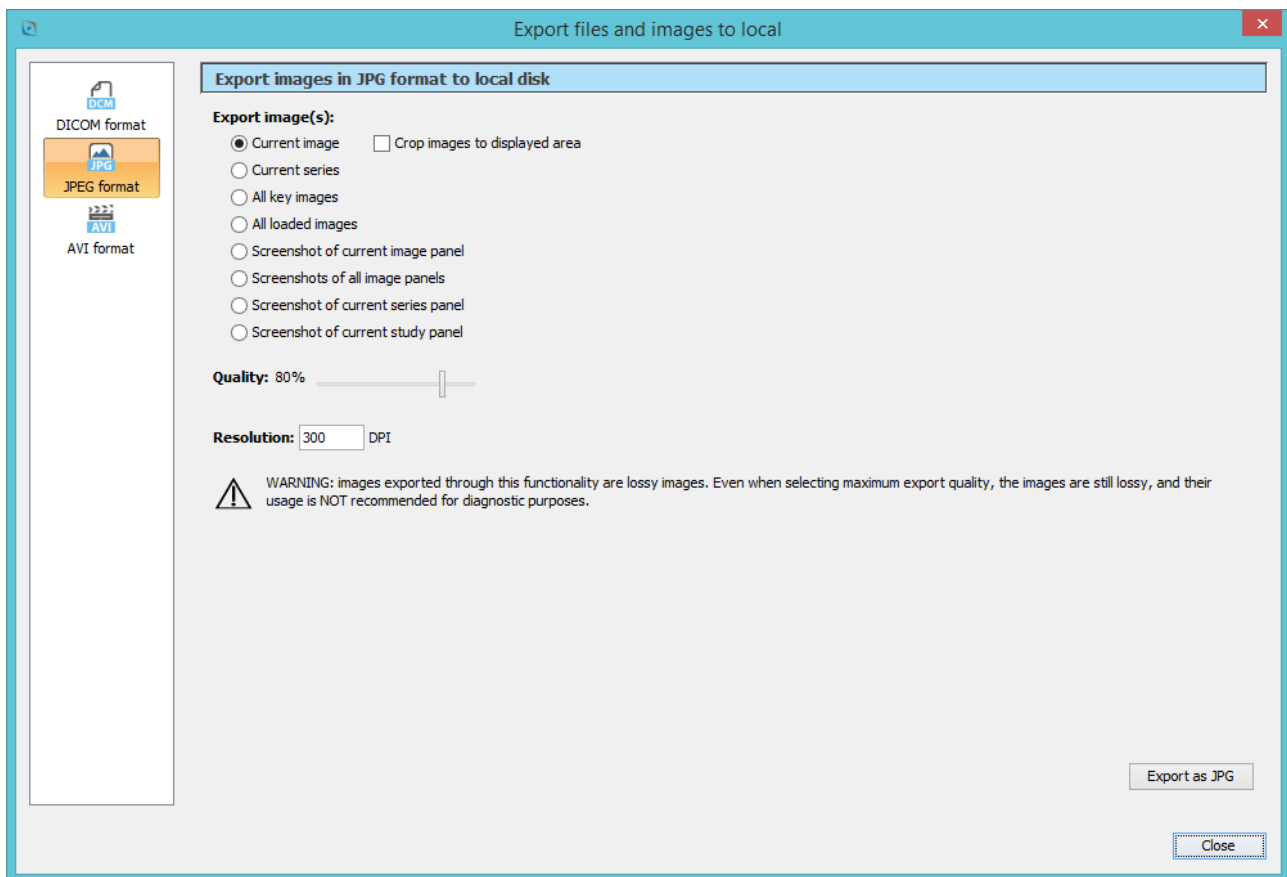
User has also the possibility of exporting the original DICOM files of the series which have been selected in the top list. He can also choose whether to create and export new Presentation States for the selected series. Presentation State objects are able to save and store all settings performed by the user on the medical images, including contrast settings, rotation, flipping, annotations, etc. They don't contain the image, but only the transformations to be applied to images. They are the preferred way to save all modifications and annotations performed on the displayed DICOM images. Usually, the Presentation State files are quite small in size, so the store operation is efficient. In addition, you can choose whether to export the selections

of Key Images for the selected series: this option allows supporting persistence of the Key Image information, which can be maintained the next time the study will be loaded.

When the *Export as DICOM* button is pressed, a *Save file* dialog is shown, through which the user will be able to select the path to be used to save the appropriate DICOM files.

#### 4.3.1.2 *Export images in JPG format to local disk*

The *Export images in JPG format to local disk* page can be displayed by selecting the *JPEG format* item from the left-hand list:



This page can be used to export currently-loaded medical images to the local disk in JPEG format; it allows selecting which images need to be exported in JPEG format, as well as the quality and resolution of the JPEG images to be created.

Also, by selecting the *Crop images to displayed area* option, it is possible to crop images to be exported to the portion which is visible in the currently displayed area. This option is only available when the export selection is set to *Current image* or *Current series*.

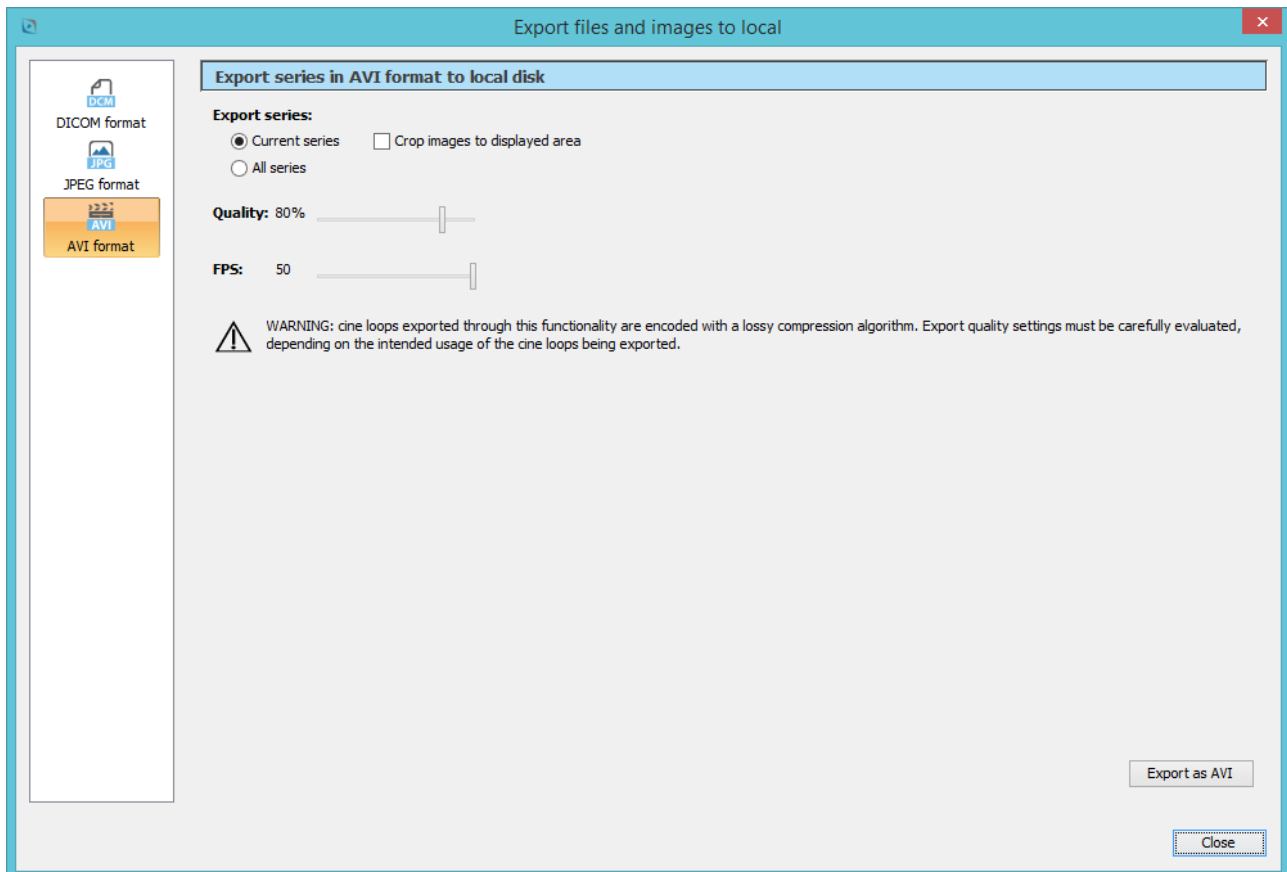
When the *Export as JPG* button is pressed, a *Save file* dialog is shown, through which the user will be able to select the path to be used to save the appropriate JPEG files.



**Warning:** the supported JPEG export format is a *lossy* compression format. Even if a “100 %” quality is specified, the output image is still *lossy*.

#### 4.3.1.3 Export series in AVI format to local disk

The *Export series in AVI format to local disk* page can be displayed by selecting the *AVI format* item from the left-hand list:



This page can be used to export currently-loaded series to the local disk in AVI format, as movies; it allows selecting which series need to be exported in AVI format, as well as quality and frame rate of the AVI movie to be created.

Also, by selecting the *Crop images to displayed area* option, it is possible to crop images to be exported to the portion which is visible in the currently displayed area. This option is only available when the export selection is set to *Current series*.

When the *Export as AVI* button is pressed, a *Save file* dialog is shown, through which the user will be able to select the path to be used to save the appropriate AVI files.

### 4.3.2 Copy images to clipboard

LocalEye Viewer supports a set of *Copy to clipboard* functions, which allow copying medical images to the system clipboard.

The "*Copy screenshot...*" set of functions perform a real snapshot of the content of the on-screen display panels, and copy it to the system clipboard. This implies that in this case the images copied to the system clipboard have the same size of the related on-screen display panels, hence they are influenced by the current screen resolution and display mode.

On the other side, the remaining "*Copy ... to clipboard*" functions copy the medical images to clipboard at their original size.

The *Ctrl+C* keyboard shortcut may be used to copy a screenshot of the current image panel to the system clipboard.

## 4.4 Online help

The *Online help* toolbar button can be used to open LocalEye Viewer's user manual in PDF format. This button is shown in the following picture:



A suitable PDF reading software will need to be available on the client machine in order to ensure proper functionality of this feature.

## 4.5 About this software...

The *About this software...* toolbar button is shown in the following picture.



Pressing the *About this software...* button, the *About this software* window will be shown, as depicted in the following picture:



This window provides general information about the current version of the LocalEye Viewer software module.

## 5 Image manipulation toolbar

The *Image manipulation toolbar* contains buttons representing all operations which can be performed on medical images, and all settings which can be applied to the display of those images.



When moving the mouse pointer over each single *Image manipulation toolbar*'s button, a tooltip text will appear, providing additional information about the function of the underlying button.

### 5.1 Association of tools with mouse buttons

LocalEye Viewer supports a completely flexible association between mouse buttons and image manipulation tools.


The circled button in the picture below may be used to hide or show buttons relative to the association of tools with mouse buttons:

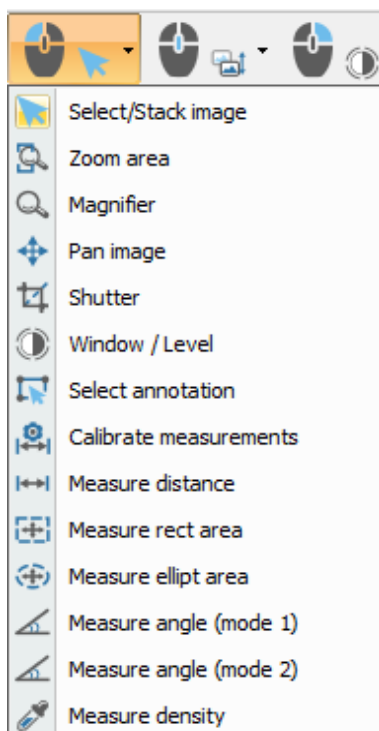



Pressing this button, association of tools with mouse's buttons will appear:



When moving the mouse pointer over each single association of tools with mouse's button, a tooltip text will appear, providing additional information about the function of the buttons themselves.


The *Associate tool with LEFT mouse button* toolbar button (  ) can be used to associate an image manipulation tool with the left mouse button. If you press this toolbar button, the following drop-down menu will appear:

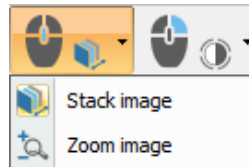


The *Associate tool with RIGHT mouse button* toolbar button (  ) can be used to associate an image manipulation tool with the right mouse button. If you press this toolbar button, the same drop-down menu as above will appear.



Each available image manipulation tool can be independently associated with the left mouse button and with the right mouse button. All combinations of left / right mouse button tools are supported.

The *Associate tool with mouse WHEEL* toolbar button () can be used to associate *Stack image* or *Zoom image* tools with the mouse wheel. If you press this toolbar button, the following drop-down menu will appear:

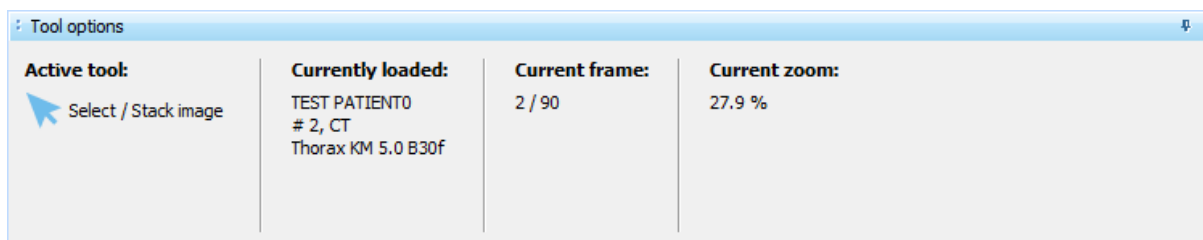


This flexible functionality implies that each single image tool is always usable with a single mouse button. The icon of the tool currently associated with the left and right mouse buttons will appear in the *Image manipulation toolbar*, next to the left, right and wheel mouse button icons. Each image manipulation tool has its own associated *Tool options* panel. When the user starts using an image manipulation tool on a medical image, the *Tool options* panel related to that tool will be displayed and become active. The following paragraphs will describe each image manipulation tool, as well as the options and information available in the *Tool options* panel associated with each tool.

### 5.1.1 Select/Stack image

The *Select/Stack image* tool allows selecting an image panel on a screen, by a single click on the image. To unselect the image you have to click on the image while holding the *Ctrl* key pressed. Also, it is possible to scroll through the images of the series by dragging with the associated mouse button over the image (“stack” operation).

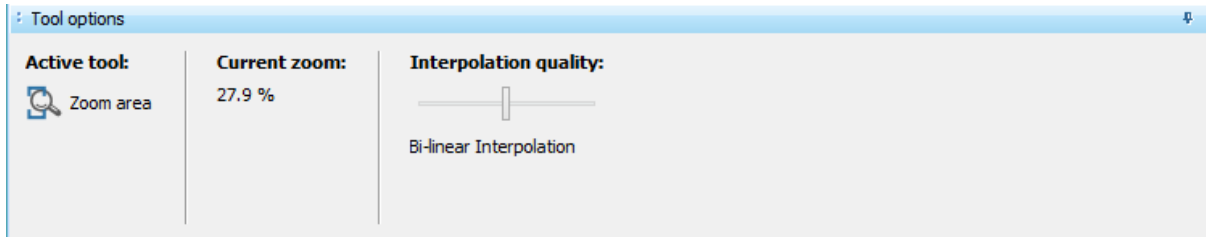
The *Tool options* panel associated with this tool, shown in the picture below, displays basic information about the currently selected image.



### 5.1.2 Zoom area

The *Zoom area* tool allows zooming a specific rectangular portion of the currently selected image. The rectangular region to be zoomed can be selected by dragging with the associated mouse button over the medical image. If the *SHIFT* key of the keyboard is kept pressed, then the zoom area will be forced to a square shape.

The *Tool options* panel associated with this tool is shown in the picture below:

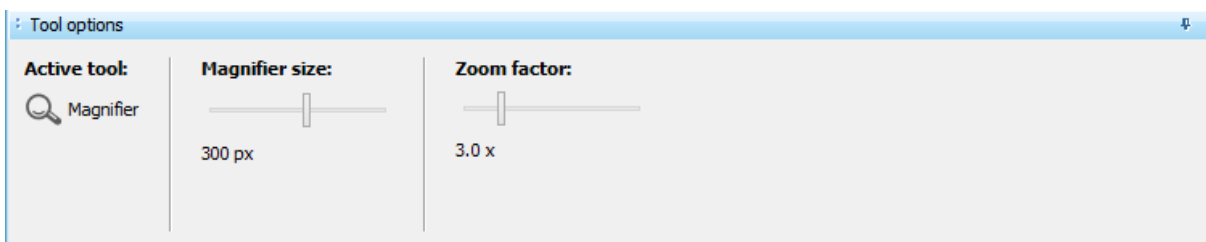


The interpolation algorithm used to zoom images can be chosen by dragging the *Interpolation quality* slider on the *Tool options* panel associated with this tool. Three different interpolation types are supported, providing a speed vs quality trade-off.

### 5.1.3 Magnifier

The *Magnifier* tool allows magnifying a moving portion of the image, by dragging with the associated mouse button over the image.

The *Tool options* panel associated with this tool is shown in the picture below:

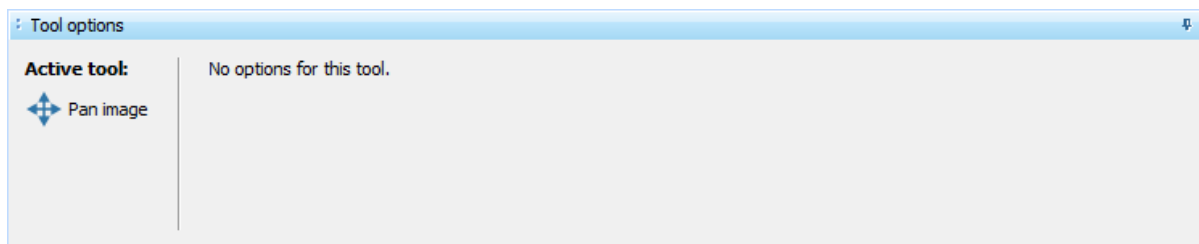


The magnification factor used by the magnifier, as well as the size of the magnifier itself, can be modified by dragging the *Zoom factor* and the *Magnifier size* sliders on the *Tool options* panel associated with this tool.

### 5.1.4 Pan image

The *Pan image* tool allows panning over the currently selected image, by dragging with the associated mouse button over the image.

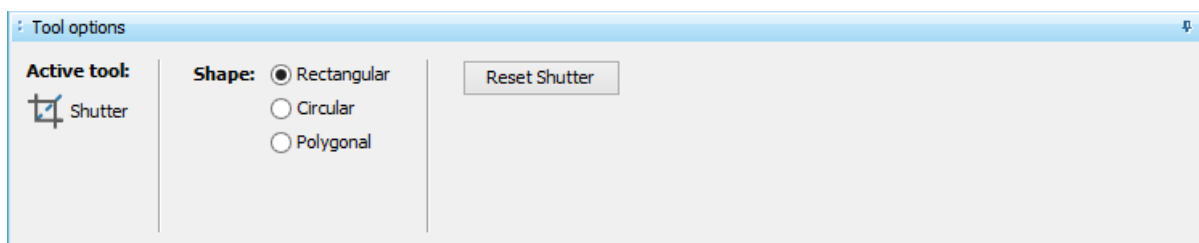
The *Tool options* panel associated with this tool is shown in the picture below:



### 5.1.5 Shutter

The *Shutter* tool allows applying a shutter over the image, i.e., hiding a sub-region of the image, which is not interesting for medical purposes. The shutter is always applied to the entire series.

The *Tool options* panel associated with this tool is shown in the picture below:



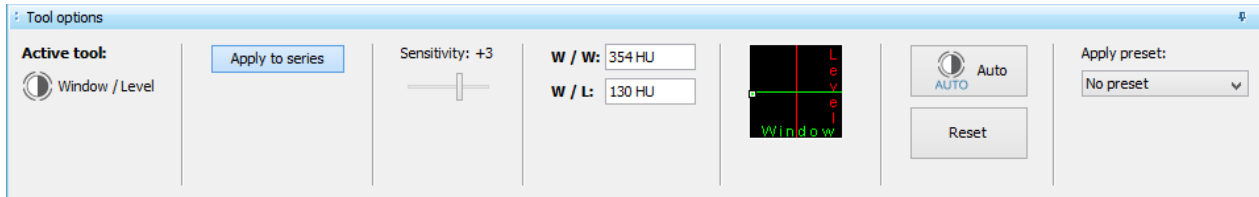
You can select the shape of the shutter to apply on the series by selecting the appropriate *Shape* option in this panel. In order to draw a Rectangular or Circular shutter, it is sufficient to select the *Shutter* tool, to drag with the associated mouse button over the image, and then to release the mouse button when you are satisfied with the size of the shutter. On the other side, if you want to draw a Polygonal shutter, then you need to click the associated mouse button on every point of the polygon contour that you want to define. When you want to define the last point of the contour, double-click the associated mouse button, and the polygonal shutter will be complete.

### 5.1.6 Window / Level

The *Window / Level* tool allows modifying the window width and window level values (also known as "window center") for the gray levels (or colors) of the current image. The Window / Level values are given in Hounsfield Units if the selected image panel contains a CT image.

You may change the Window, Level values by dragging with the associated mouse button over the image.

The *Tool options* panel associated with this tool is shown in the picture below:



If the *Apply to series* toggle button is pressed (i.e., selected) then the Window / Level changes will be applied to the entire series.

It is also possible to change the sensitivity of mouse dragging movements for contrast changes, by dragging the *Sensitivity* slider in this panel.

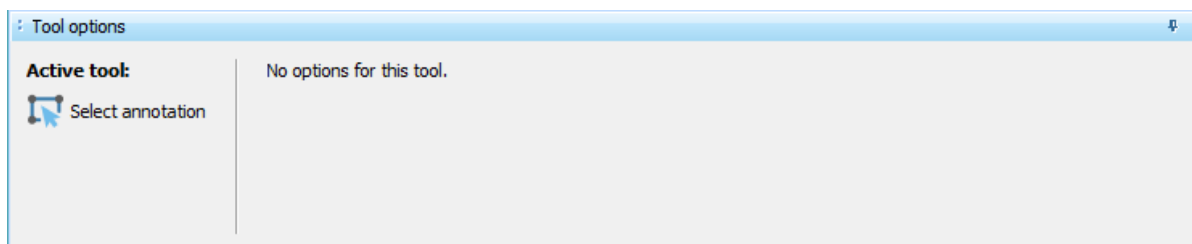
Window width and window level values can also be changed by dragging the mouse pointer on the Window / Level widget (the square with a black background). Right-clicking on the Window / Level widget causes restoring the window/level values contained in the DICOM file (if they are present). You may also change the window/level values by selecting one of the available contrast presets (from the *Presets* drop-down list). Finally, you can manually enter window/level values in the *W / W* and *W / L* text fields, and press *Enter* on your keyboard to confirm and apply them.

Press the *Auto* button in order to apply an automatic “optimal” windowing for the currently selected image. The *Reset* button may be used to restore the original Window / Level setting suggested in the DICOM data set (if present).

### 5.1.7 Select annotation

The *Select annotation* tool allows selecting a measurement or graphical annotation which already exists on the current medical image. Selection of the annotation shape is done by clicking with the associated mouse button over the annotation shape itself. Once the annotation is selected, it is possible to move and modify the shape itself, by dragging with the associated mouse button over specific points of the selected annotation shape. If dragging is started over one of the displayed selection handles (the small red squares), then the shape will be modified, by moving the relevant selection handle point. On the other side, if dragging is started over a generic point of the shape (i.e., not over a selection handle), then the entire annotation is moved, with no modifications to its geometric shape.

The generic *Tool options* panel associated with this tool is shown in the picture below:



Once a measurement or graphical annotation shape is selected, the Tool options panel will reflect the properties of the specific selected shape, and will offer more options. Also, when an annotation is selected, you can delete it by pressing the *Delete* key on the keyboard, or the *Delete* button in the *Tool options* panel. Finally, once an annotation is selected, you can select the previous or next annotation of the current image by pressing the '-' or '+' keys on the numeric keypad of your keyboard.

### 5.1.8 Measurement tools

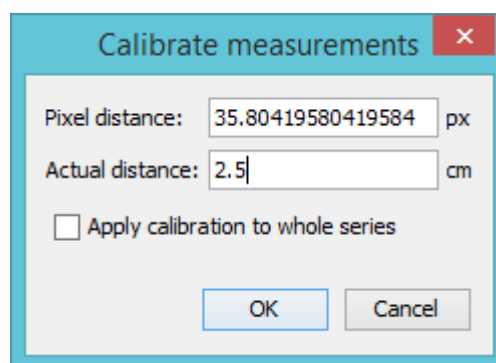
LocalEye Viewer supports several measurements tools, described in the following sub-paragraphs.



**Warning:** measurements taken through the LocalEye Viewer software are based on pixel-to-millimetres calibration information which is read from the DICOM dataset. This calibration information is stored by the modality which originally acquired the medical images. LocalEye Viewer has no mean to guarantee that the calibration information is correct and accurate, hence it has no mean to guarantee that the final measurements taken by the software are actually accurate. It is recommended that the user of LocalEye Viewer critically checks the result of each measurement.

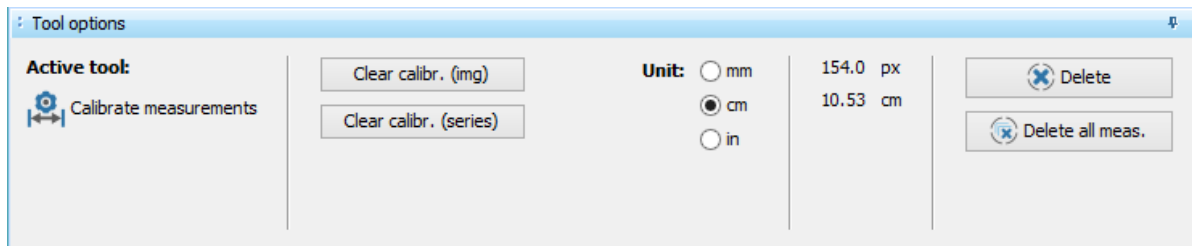
#### 5.1.8.1 Calibrate measurements

The *Calibrate measurements* tool allows calibrating distances, that is, assigning an actual known distance value (in mm, cm or inches) to a given distance measured on-screen, over the image. In order to perform calibration, select the *Calibrate measurements* tool and drag with the associated mouse button over the image, on the distance that you want to calibrate / set. As soon as the drag operation has finished, the *Calibrate measurements* dialog will appear:



User needs to enter the *Actual distance* corresponding to the measured *Pixel distance*. User also has the option of specifying that the following calibration must be applied to the whole series, that is, to all images belonging to the current series. If this option is not checked, then the calibration will only be applied to the DICOM file containing the current image.

The *Tool options* panel associated with this tool is shown in the picture below:

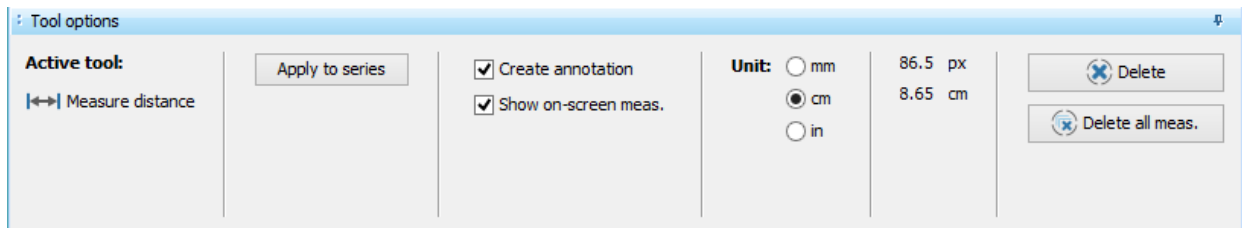


This panel basically allows you to modify the measurement unit used for calibration.

#### 5.1.8.2 Measure distance

The *Measure distance* tool allows measuring linear distances on the selected medical image. The measurement is performed by dragging with the associated mouse button over the image, and releasing the mouse button once you traced the distance that you want to measure.

The *Tool options* panel associated with this tool is shown in the picture below:



The user may choose to create an *annotation* of each measurement, thus leaving a persistent graphic object over the image, by enabling the *Create annotation* checkbox. In addition, the user may choose to add the drawn measurement annotations to all images of the current series, by pressing the *Apply to series* toggle button. If the *Create annotation* option is disabled, the graphic object representing the current measurement over the image will immediately disappear when the measurement is complete (i.e., the mouse button is released).

The user may also choose whether to display an on-screen label of each performed measurement, by checking or unchecking the *Show on-screen meas.* option.

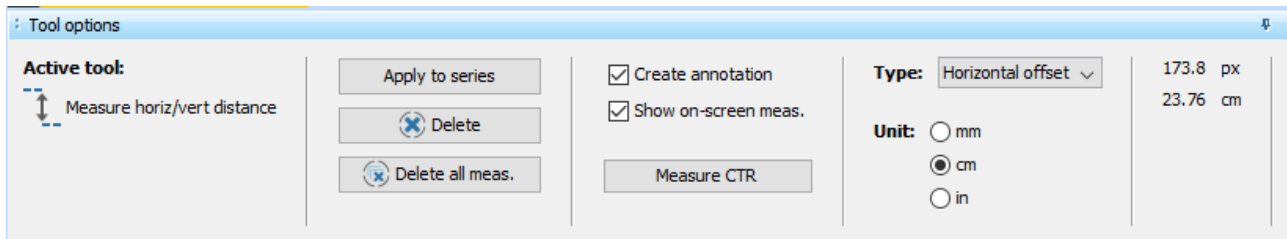
The measurement unit used for measurements may be chosen by selecting the corresponding option (*mm*, *cm*, or *in*) in this *Tool options* panel.

Finally, it is possible to delete the currently selected annotation by pressing the *Delete* button, or to delete all measurement annotations by pressing the *Delete all meas.*

### 5.1.8.3 Measure horiz/vert distance

The *Measure horiz / vert distance* tool allows measuring linear horizontal or vertical distances on the selected medical image. The measurement is performed by dragging with the associated mouse button over the image, starting the dragging operation on the start point and releasing the mouse button on the end point of the vertical or horizontal distance that you want to measure.

The *Tool options* panel associated with this tool is shown in the picture below:



The user may choose whether he wants to compute the horizontal offset (i.e., horizontal distance) or the vertical offset (i.e., vertical distance) between the start and end point which have been identified through the mouse drag operation, by acting on the *Type* drop-down box.

### Computation of the Cardio-Thoracic Ratio (CTR)

The *Measure horiz / vert distance* tool allows computing the value of the Cardio-Thoracic Ratio. Once the appropriate chest xray image is selected, just select *Horizontal offset* in the *Type* drop-down of the *Tool options* panel. Take a first horizontal distance measurement corresponding with the cardiac size, then a second horizontal distance measurement corresponding with the maximum width of the thoracic cavity. Finally, press the *Measure CTR* button, and you will get the value of CTR. According to literature, a value of CTR above 50% is considered abnormal.

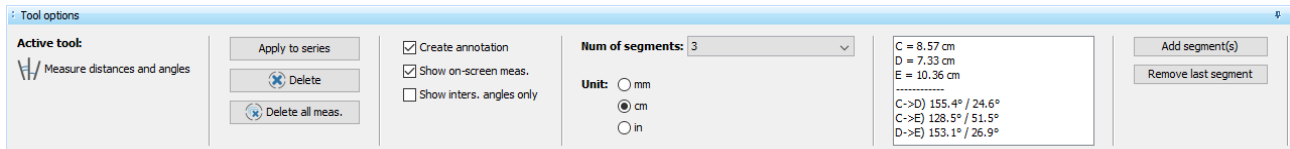


**Warning:** in order to guarantee maximum accuracy, it is recommended that the *Measure CTR* tool is only used on a PA (Posterior - Anterior) chest xray image.

### 5.1.8.1 Measure distances and angles

The *Measure distances and angles* tool allows measuring angles among an arbitrary number of segments, which may be intersecting or not. Also, the distances represented by each segment are computed and displayed. The measurement is performed by dragging with the associated mouse button over the image, in order to trace each segment. A double-click with the associated mouse button will terminate the sequence of segments. Once the sequence is terminated, all distances and angles will be computed and shown.

The *Tool options* panel associated with this tool is shown in the picture below:



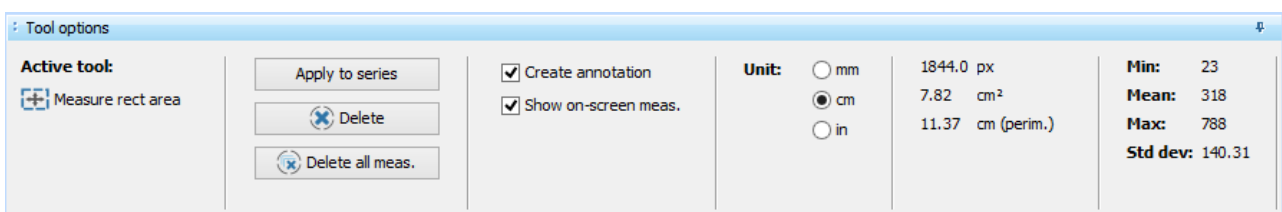
The user may choose whether he wants only angles among intersecting segments are computed and shown, by checking the *Show inters. angles only* option. Also, it is possible to set the number of segments in a sequence to a fixed value, by acting on the *Num of segments* drop-down box: this will eliminate the need for a double-click to terminate the sequence, as the sequence will be automatically terminated once the just-set number of segments will be traced.

Each sequence of segments is independent from other sequences, even on a single image. Once a sequence is terminated, it can still be modified both in terms of position of each single segment and in terms of number of segments: this last aspect can be managed by acting on the *Add segment(s)* and *Remove last segment* buttons (a sequence must be selected first).

#### 5.1.8.2 Measure rect area

The *Measure rect area* tool allows measuring rectangular areas on the selected medical image. Information about the surface, the perimeter, the minimum/maximum/mean density, and the standard deviation of the densities within the rectangular area is provided. The measurement is performed by dragging with the associated mouse button over the image, and releasing the mouse button once you traced the rectangular area that you want to measure. Keeping the *Shift* key of the keyboard pressed will force the area to be exactly square.

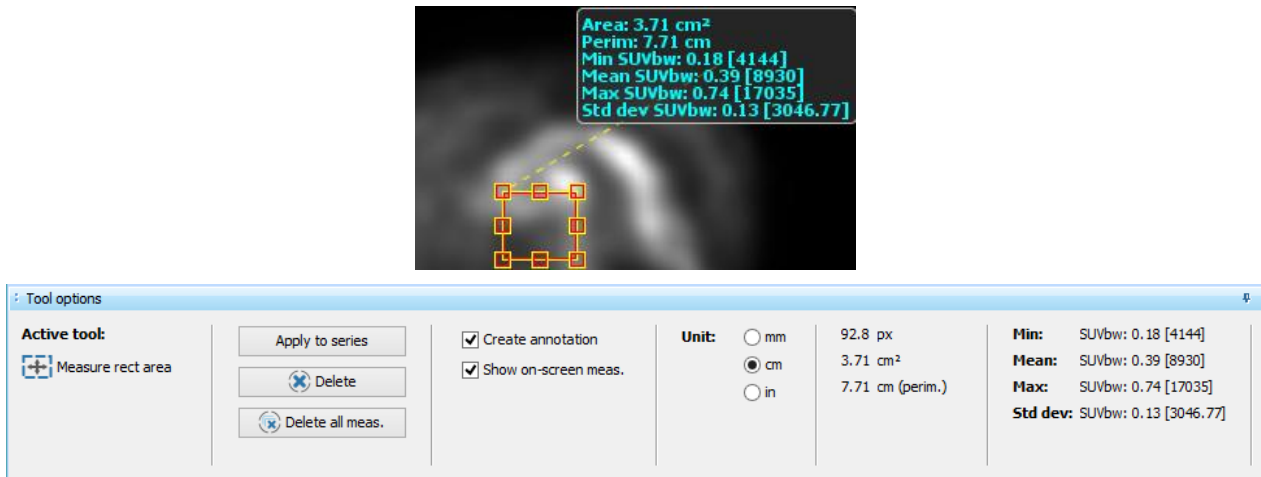
The *Tool options* panel associated with this tool is shown in the picture below:



Please refer to the paragraph about the *Measure distance* tool for an explanation of the options available in this panel.

In addition, as shown in the following screenshots, on PET images containing the appropriate data elements in their DICOM dataset, LocalEye Viewer is able to provide the minimum/maximum/mean SUV, and the standard deviation of the SUV within the selected rectangular area.





SUV (Standardized Uptake Values) is commonly used in PET image analysis. It measures the concentration of a radiotracer in a defined region of interest (ROI), which provides interesting diagnostic information. In particular, LocalEye Viewer computes SUV according to the "SUV Body Weight" algorithm which is based on the following formula:

$$\text{suvValue}[\text{body weight}] = (\text{activityConcentration} / (\text{radionuclTotalDoseBq} * \text{decayFactor})) * \text{patientWeightG}$$

where:

- **activityConcentration:** the pixel value in the image, after processing of Modality LUT.
- **radionuclTotalDoseBq:** the radionuclide total dose, expressed in Bequerels.
- **decayFactor:** the decay factor.
- **patientWeightG:** the patient's weight, expressed in grams.



**Warning 1:** computation of SUV in LocalEye Viewer is based on generally accepted methods and equations, and in particular on the Body Weight equation reported above. However, some institutions may use methods and/or equations that differ from those used by LocalEye Viewer and described in this user manual. Prior to use in a clinical environment, it is important that all equations be confirmed and an independent evaluation be conducted of the SUV values reported by LocalEye Viewer with studies from all PET acquisition devices present at your facility, under typical acquisition conditions.



**Warning 2:** LocalEye Viewer computes SUV only based on the information stored in the image's DICOM dataset. It is the modality technician's responsibility to ensure that all information is correct and accurate. LocalEye Viewer won't compute SUV if some of the data elements which are used to compute SUV are not present or empty in the DICOM dataset.

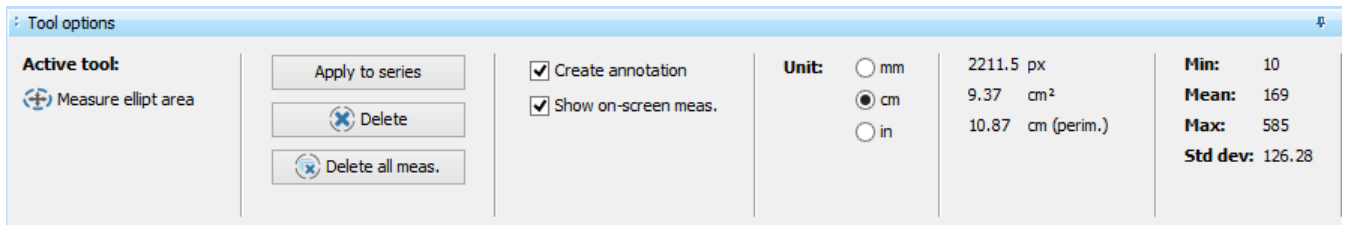


**Warning 3:** LocalEye Viewer does not compute SUV on images that have not been decay-corrected by the acquisition device, because the computed SUV value would not be reliable in that case.

### 5.1.8.3 Measure ellipt area

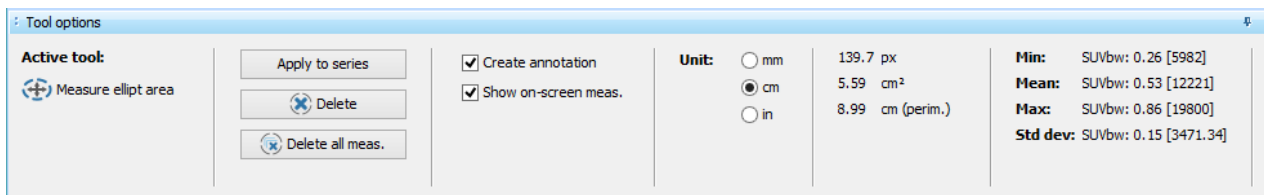
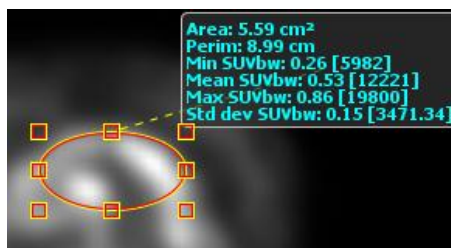
The *Measure ellipt area* tool allows measuring elliptical areas on the selected medical image. Information about the surface, the perimeter, the minimum/maximum/mean density, and the standard deviation of the densities within the elliptical area is provided. The measurement is performed by dragging with the associated mouse button over the image, and releasing the mouse button once you traced the elliptical area that you want to measure. Keeping the *Shift* key of the keyboard pressed will force the area to be exactly circular.

The *Tool options* panel associated with this tool is shown in the picture below:



Please refer to the paragraph of the *Measure distance* tool for an explanation of the options available in this panel.

In addition, as shown in the following screenshots, on PET images containing the appropriate data elements in their DICOM dataset, LocalEye Viewer is able to provide the minimum/maximum/mean SUV, and the standard deviation of the SUV within the selected elliptical area.

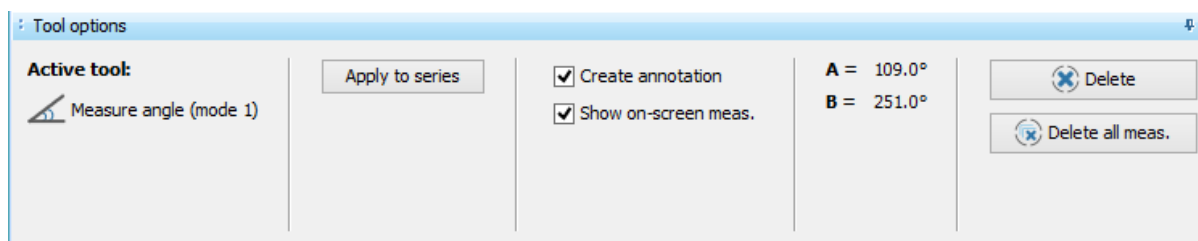


Please refer to the previous paragraph "*Measure rect area*" for details and recommendations about SUV (Standardized Uptake Values).

#### 5.1.8.4 *Measure angle (mode1)*

The *Measure angle (mode 1)* tool allows measuring angles on the selected medical image. The measurement is performed by clicking three times with the associated mouse button over the image; each click identifies one of the three points defining the angle to be measured.

The *Tool options* panel associated with this tool is shown in the picture below:

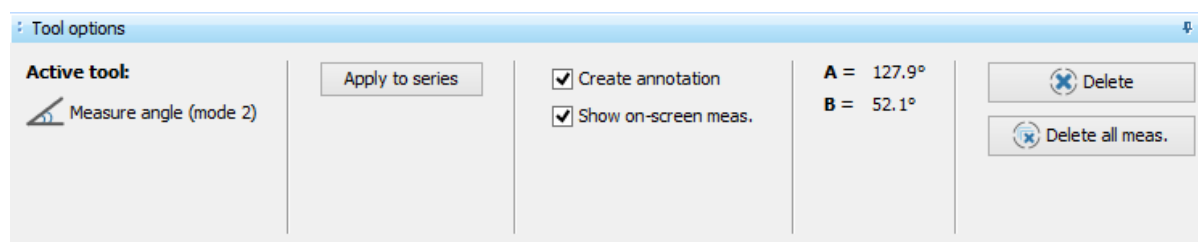


Please refer to the paragraph of the *Measure distance* tool for an explanation of the options available in this panel.

#### 5.1.8.5 *Measure angle (mode2)*

The *Measure angle (mode 2)* tool allows measuring angles on the selected medical image. The measurement is performed by drawing two segments over the image; each segment can be drawn by dragging with the associated mouse button over the image, and releasing it when each segment has the desired properties.

The *Tool options* panel associated with this tool is shown in the picture below:



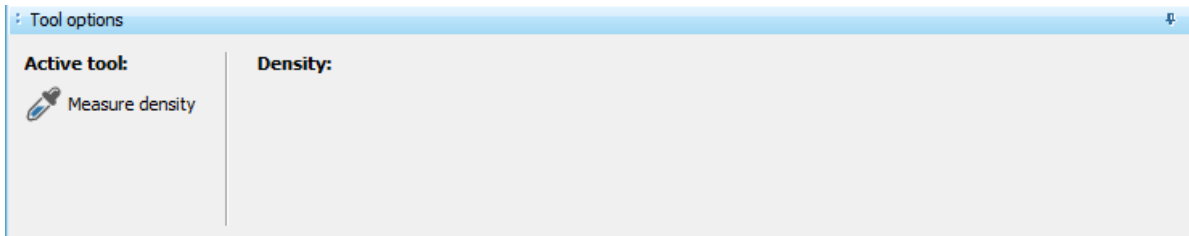
Please refer to the paragraph of the *Measure distance* tool for an explanation of the options available in this panel.

#### 5.1.8.6 Measure density

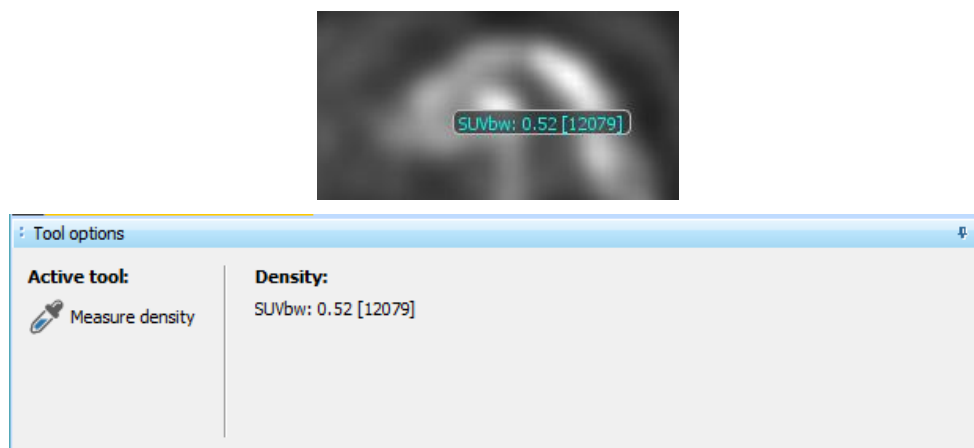
The *Measure density* tool allows measuring densities on the selected medical image.

The measurement is performed by dragging with the associated mouse button over the image. Once the mouse button is released, the density measurement is eliminated.

The *Tool options* panel associated with this tool is shown in the picture below:



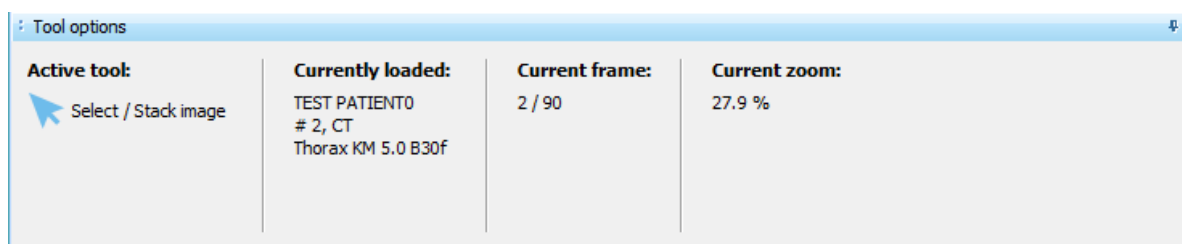
Moreover, on PET images containing the appropriate data elements in their DICOM dataset, LocalEye Viewer is able to provide the SUV for each point which is selected on the image. The value provided in square brackets is the actual detected pixel value, after modality LUT transformation.



Please refer to the paragraph "*Measure rect area*" for details and recommendations about SUV (Standardized Uptake Values).

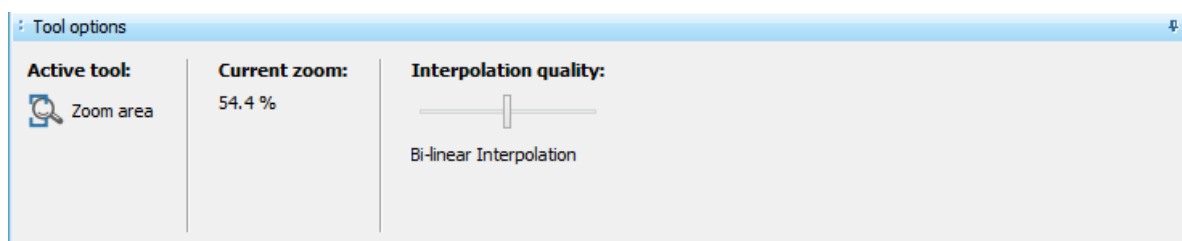
#### 5.1.9 Stack image

If the *Stack Image* tool is associated with the mouse wheel, scrolling the mouse wheel will cause scrolling the images of the current series (equivalent to *Previous frame* and *Next frame* buttons optionally available in the Series toolbar, depending on the viewer configuration). If the *Alt* key on the keyboard is kept pressed while scrolling the mouse wheel, a scrolling of the current scene (i.e., page of images) will happen (equivalent to *Previous scene* and *Next scene* buttons optionally available in the Series toolbar, depending on the viewer configuration).



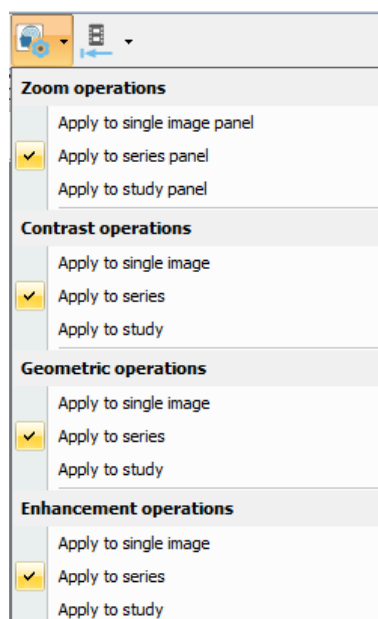
### 5.1.10 Zoom image

If the *Zoom Image* tool is associated with the mouse wheel, scrolling the mouse wheel will cause a zoom in or zoom out operation (depending on the direction of wheel rotation) on the current image.



## 5.2 Image operations options

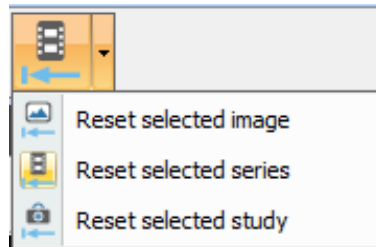
The *Image operations options* button of the *Image manipulation toolbar* allows user to perform the following operations, shown in the drop down menu:



Zoom operations can be applied to a single image panel, to a series panel or to the study panel; whereas contrast, geometric and enhancement operations can be applied to a single image, to a series or to the entire study, depending on the user's preference.

### 5.3 Reset operations

The *Image manipulation toolbar* contains some buttons which allow resetting all changes done on the current image, on all images of the current series, or on all images of the current study. The "reset" toolbar button, may correspond with the Reset selected image, or with the Reset selected series, or with the Reset selected study action, depending on which item is selected in the related drop-down menu, which can be shown by pressing the down arrow next to the "reset" toolbar button:



Here is a short description of each Reset operation available:

- *Reset selected image*: all changes and operations performed on the currently selected image will be reset.
- *Reset selected series*: all changes and operations performed on the current series will be reset.
- *Reset selected study*: all changes and operations performed on the current study will be reset.

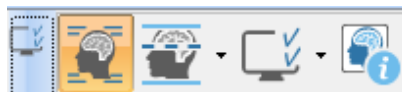
### 5.4 Display options

LocalEye Viewer allows setting some display options in its *Image manipulation toolbar*.

The circled button in the picture below may be used to hide or show some display options:



Pressing this button, display options buttons will appear:




When moving the mouse pointer over each single display tools button, a tooltip text will appear, providing additional information about the function of the buttons themselves.

The following paragraphs will describe each display option.


#### 5.4.1 Toggle text overlays

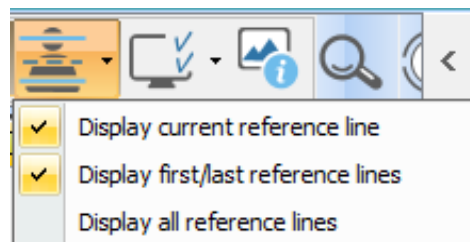


The *Toggle text overlays* toolbar button (  ) allows enabling and disabling the display of textual overlays on the medical images shown on screen. These text overlays contain fundamental information about each image, such as Patient ID, Patient name, Patient sex, Patient birth date, Study date, Study description, Modality used for acquisition, and other acquisition parameters. These acquisition parameters may sometimes be modality-specific.

#### 5.4.2 Display reference lines



The *Display reference lines* toolbar button (  ) allows setting preferences about the display of reference lines (also known as “scout lines”) on CT or MR images. This toolbar button is only enabled with CT or MR images. If you press it, the following drop-down menu will appear:

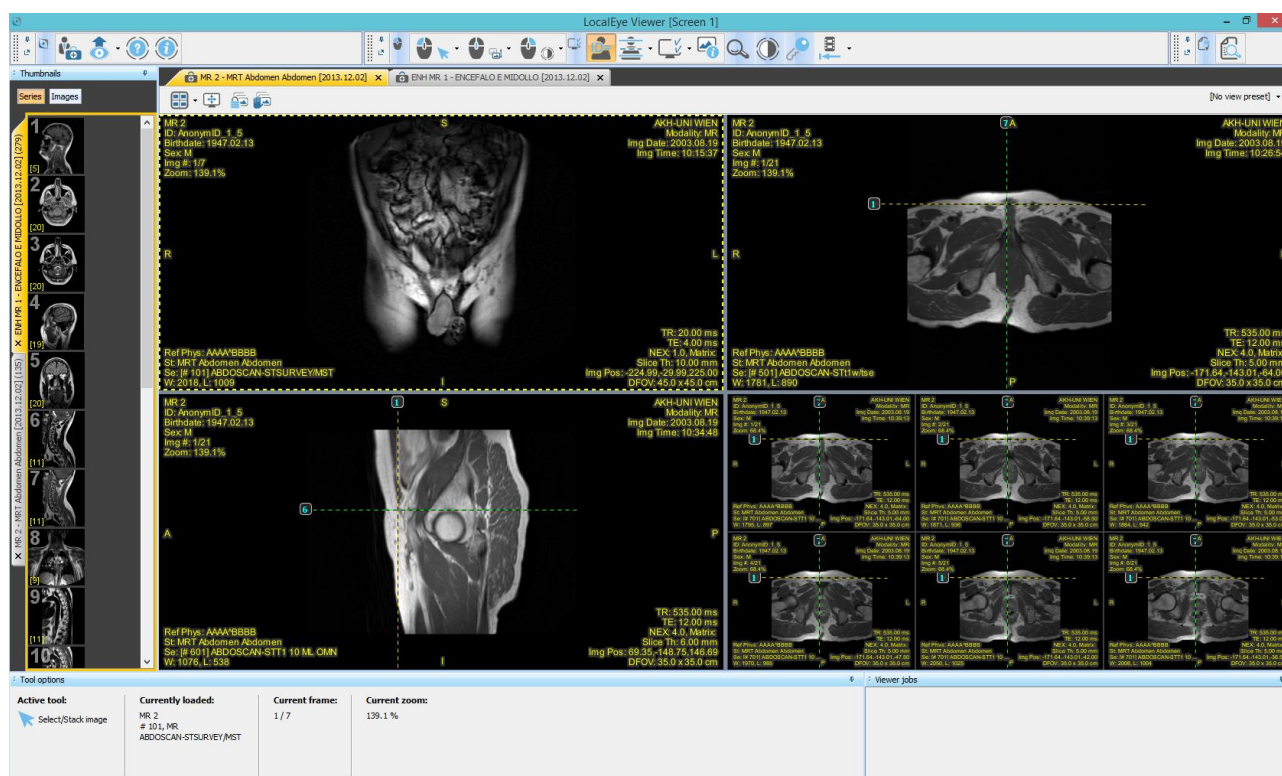


The *Display current reference line* menu item allows enabling and disabling the display of reference lines related to the currently selected image on all other displayed and intersecting series. A reference line indicates the location of an image slice (the currently selected image) on another image of an intersecting plane.


The *Display first/last reference lines* menu item allows enabling and disabling the display of reference lines related to the first and last image of the currently selected series.

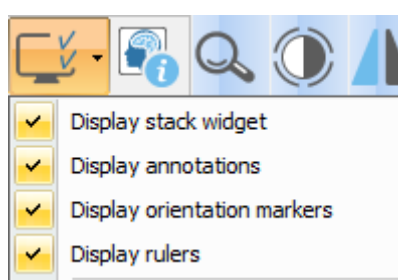
The *Display all reference. lines* menu item allows enabling and disabling the display of reference lines related to all images of the currently selected series.

The following picture shows an example of how reference lines look like on a MR study:



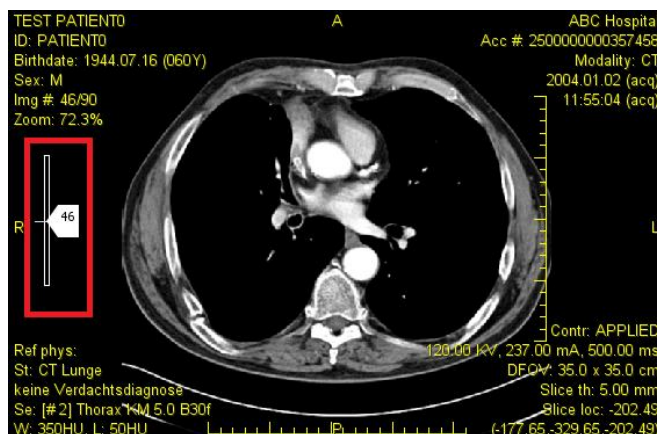
### 5.4.3 Other display options

The *Other display options* button (  ) allows setting additional display preferences, related to the display of a stack widget, annotations, orientation markers and rulers. If you press this toolbar button, the following drop-down menu will appear:

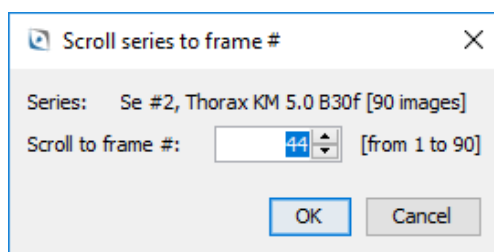


The *Display stack widget* menu item controls display on each image of a widget allowing to quickly scroll across frames of a series.





The user will be allowed to scroll the series by dragging the white cursor labelled with the image number. Moreover, a double click on the cursor will allow the user to manually set the frame he wants to display:



The *Display annotations* menu item allows enabling and disabling the display of measurement and graphical annotations over all the displayed images.

The *Display orientation markers* menu item allows enabling and disabling the display of orientation markers, normally available on CT and MR images, and sometimes on other kinds of images. If the image orientation information is present inside the related DICOM image file, the orientation markers will be displayed at the four edges of each DICOM image. The orientation will be indicated as:

- A: Anterior
- P: Posterior
- I: Inferior
- S: Superior
- L: Left
- R: Right

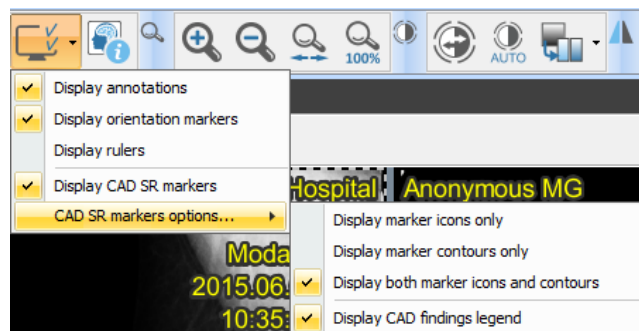
The *Display rulers* menu item allows enabling and disabling the display of on-screen rulers showing actual distances over the displayed images. The rulers show a short tick every 1 cm on the image, and a longer tick every 5 cm on the image. Rulers will only be displayed on images having the appropriate calibration information inside the related DICOM image file.

Finally, the *Display CAD SR markers* functionality will be described in the following paragraph.

#### 5.4.3.1 Mammo CAD markers

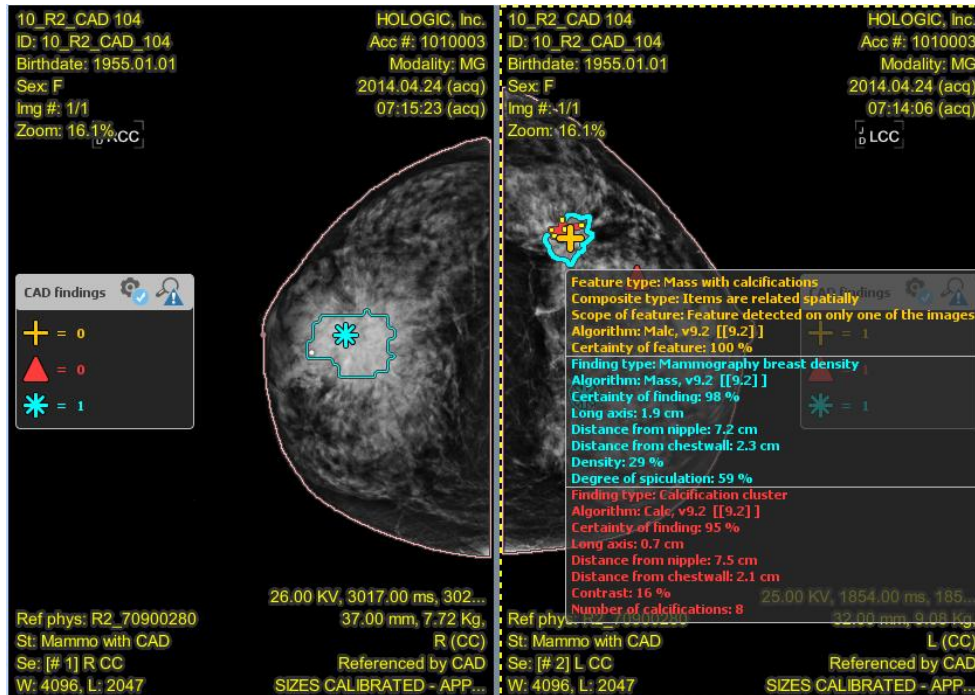
LocalEye Viewer supports decoding and display of CAD findings and markers starting from DICOM Mammo CAD SR files. These files are normally produced by mammography CAD software, and contain encoded information about the detections the CAD software has done on the images of a specific mammographic study.

The display of Mammo CAD markers can be enabled and disabled through the *Display CAD SR markers* menu item, available in the *Other display options* drop down menu, described in the previous paragraph. Moreover, once the *Display CAD SR markers* item is checked, the *CAD SR markers options...* item becomes active as well, as shown in the following image:



From here, it is possible to choose whether to display CAD markers icons only, or CAD marker contours only, or both. In addition, selecting the appropriate checkbox, LocalEye Viewer will show also a legend related to the detected CAD findings.

Here is a screenshot showing two images of a mammographic study on which CAD markers and CAD findings legend are displayed:

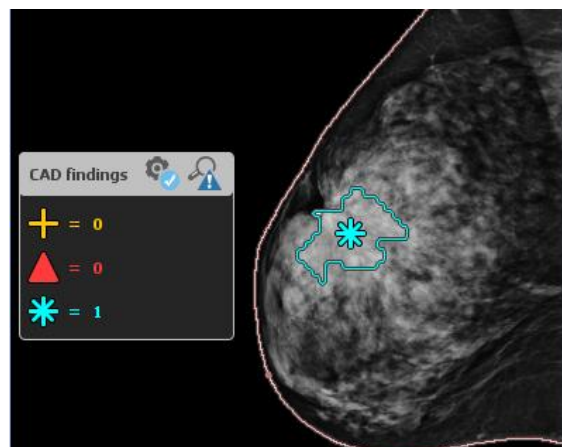


LocalEye Viewer is able to show three different types of findings / features:

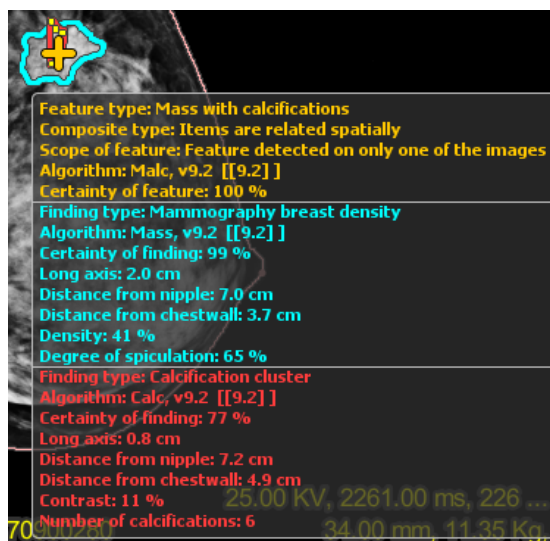
- *Mammography breast density*: associated with the \* icon,
- *Calcification cluster*: associated with the ▲ icon,
- *Mass with calcifications*: associated with the + icon.

While icons are located in the centre of each finding / feature, a contour defines the entire breast area interested by the finding / feature in question. This contour is the same colour as the related icon.

As mentioned above, enabling the *Display CAD findings legend* option from the appropriate menu, a legend showing a summary of the detected findings, will be displayed on the related image.




Finally, moving the mouse over a CAD finding icon or within its contour, a panel providing all the available information about the finding(s) / feature(s) will appear, as shown in the following image:

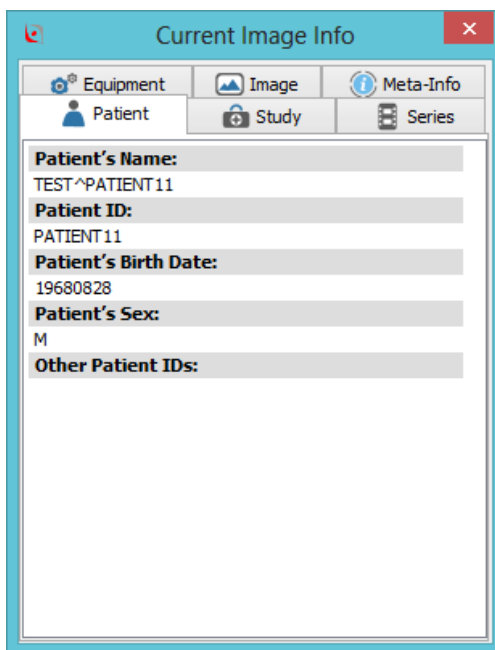


**Important note:** Display of mammo CAD SR markers is disabled upon first display of a loaded study, in such a way not to influence the radiologist's opinion and diagnosis. For safety and diagnostic accuracy purposes, indeed, it is important that the radiologist builds its own diagnostic opinion before seeing the mammo CAD SR markers, which shall only act as an aid and diagnostic support mean.

#### 5.4.4 Show image information



The *Show image information* button (  ) of the *Image manipulation toolbar* allows viewing information about the currently selected image. If you press this toolbar button, the *Current Image Info* dialog box will appear:



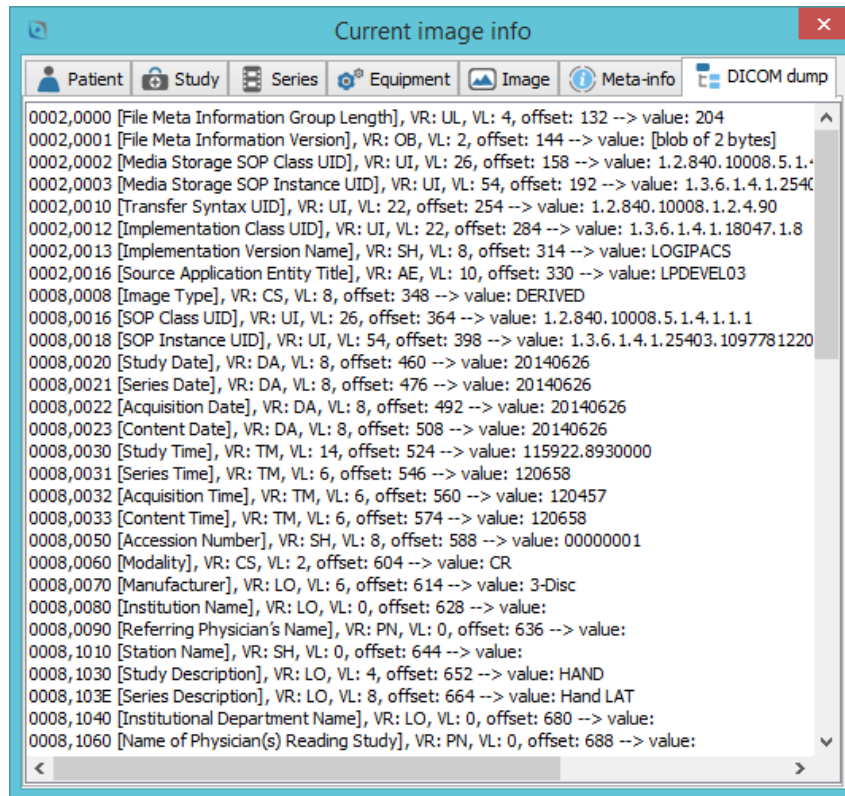
This dialog box is composed of several tabs:

- *Meta-Info tab*
- *Patient tab*
- *Study tab*
- *Series tab*
- *Equipment tab*
- *Image tab*
- *Clinical Trial tab* (if enabled)

These tabs display information extracted from the current DICOM file, i.e., the DICOM file related to the currently selected image.

In particular, the *DICOM dump* tab allows performing the DICOM dump of the selected image or of a file not open in LocalEye Viewer, dragging it in the "dump area". In this second instance, the DICOM dump could be a useful diagnostic tool, when, for some reason, is impossible opening the file.

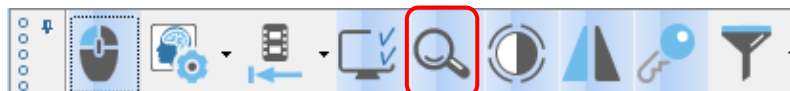
The DICOM dump, indeed, returns all the DICOM data elements related to the selected file/image.



## 5.5 Zoom operations

Several zoom-related operations are available through the *Image manipulation toolbar*.

The circled button may be used to hide or show zoom operations tools buttons:



Pressing this button, zoom operations tools buttons will appear:



When moving the mouse pointer over each single zoom button, a tooltip text will appear, providing additional information about the function of the underlying button.

The following paragraphs will describe each zoom operation tool.

### 5.5.1 Zoom in



Pressing the *Zoom in* toolbar button (  ) the image displayed in the current panel will be zoomed in.

### 5.5.2 Zoom out



Pressing the *Zoom out* toolbar button (  ) the image displayed in the current panel will be zoomed out.


### 5.5.3 Zoom to fit



Pressing the *Zoom to fit* toolbar button (  ) the image displayed in the current panel will be zoomed to fit the size of the panel itself.

### 5.5.4 Zoom reset



Pressing the *Zoom reset* toolbar button (  ) the image displayed in the current panel will be set at zoom 100%, i.e., at its original pixel size.

## 5.6 Contrast management operations

Contrast management operations tools are available through the *Image manipulation toolbar*. The circled button in the picture below may be used to hide or show contrast management buttons:



Pressing this button, contrast management buttons will appear:




When moving the mouse pointer over each single contrast management button, a tooltip text will appear, providing additional information about the function of the underlying button.

The following paragraphs will describe each contrast management operation, corresponding to each button.


### 5.6.1 Invert



Pressing the *Invert* toolbar button (  ) all images of the current series will be contrast-inverted. In other words, the images are transformed into their “negative” images.

### 5.6.2 Auto window



Pressing the *Auto window* toolbar button (  ) all images of the current series will be auto-windowed. In other words, an automatic “optimal” contrast windowing will be applied to images.

## 5.7 Geometric transformation operations

Geometric transformation operations (i.e., rotation and flipping) are available through the *Image manipulation toolbar*.

The circled button in the picture below may be used to hide or show geometric transformation buttons:



Pressing this button, geometric transformation buttons will appear:



When moving the mouse pointer over each single geometric transformation button, a tooltip text will appear, providing additional information about the function of the underlying button.

The following paragraphs will describe each geometric transformation operation, corresponding to each button.

### 5.7.1 Rotate +90°



Pressing the *Rotate +90°* toolbar button (  ) all images of the current series will be rotated clockwise of 90 degrees.




### 5.7.2 Rotate -90°



Pressing the *Rotate -90°* toolbar button (  ) all images of the current series will be rotated counter-clockwise of 90 degrees.

### 5.7.3 Flip horizontally



Pressing the *Flip horizontally* toolbar button (  ) all images of the current series will be flipped horizontally.

### 5.7.4 Flip vertically



Pressing the *Flip vertically* toolbar button (  ) all images of the current series will be flipped vertically.

## 5.8 Key images operations

Functionalities related to the display of “Key Images” are available through the *Image manipulation toolbar*.

The circled button in the picture below may be used to hide or show key images buttons:



This group contains the *View 'key' images in current study* toolbar button:






Pressing this button all images previously marked as “Key Images” will be displayed in the current study panel, each key image in a dedicated image panel.

## 6 Reporting toolbar

LocalEye Viewer allows viewing reports associated with the displayed studies. The *Reporting toolbar* is shown in the following picture:



This button  may be used to hide or show the the *View report(s)...* button  (i.e., to expand or collapse the *Reporting toolbar* itself).

If the *View report(s)...* button (  ) is pressed, the report dialog-box will be show and it will be possible to view the existing report for the current study (i.e., the study of the currently-selected image).

View structured report


Report template: Default

Patient:	Anonymous Patient7 [ID = AnonymID_7], 1900.01.01
Study:	C-SPINE, 2015.01.23
Referring physician:	
Completion flag:	COMPLETE
Verification flag:	VERIFIED
	Smith John [NeoLogica], 2016.04.26, 16:59:54
Content date/time:	2016.04.26, 16:59:54

**MRI report**

Subject:  
Patient

Findings:  
Test

Best illustration of finding:  


Print...

Print preferences...

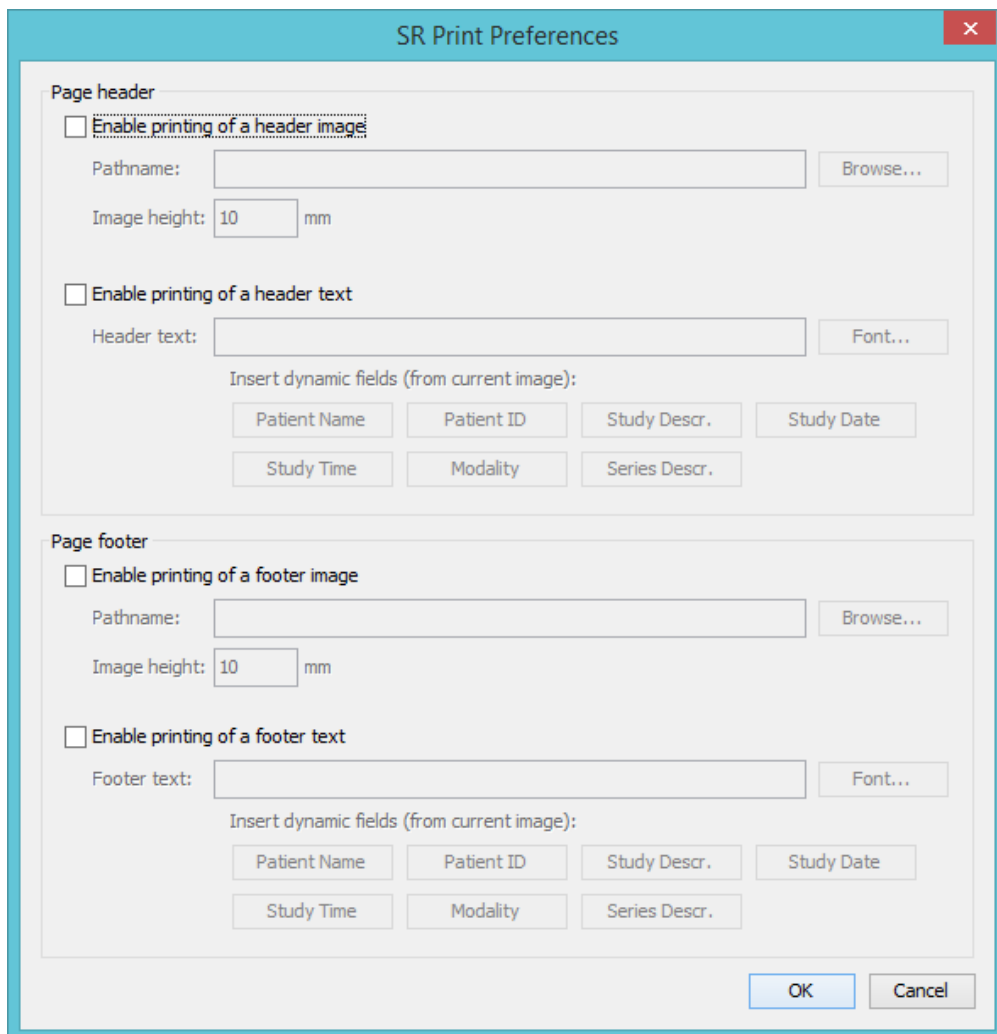
Close

Depending on the viewer's configuration, one or more *Report templates* may be available. Selecting a given report template will affect the way the DICOM structured report is presented to screen and printed to an

output sheet (which information is included in the report, how the text will look like, how each data is laid out to screen / sheet, etc.).

In case multiple DICOM structured reports are available, a selection window will appear, allowing to choose the desired SR. The displayed DICOM structured report may also be printed, through the *Print...* button.

By pressing the *Print preferences...* button, the *SR print preferences* dialog box (in case of DICOM structured report) will be shown, allowing to define a custom header and footer for the printed structured report, including both images and texts:



The **SR Print Preferences** dialog box is divided into two main sections: **Page header** and **Page footer**. Each section contains options for enabling the printing of an image or text, along with fields for specifying the pathname, image height, and header/footer text. Dynamic fields for patient and study information are also available for insertion into the text fields.

**Page header**

- ☐ **Enable printing of a header image**  
Pathname:    
Image height:  mm
- ☐ **Enable printing of a header text**  
Header text:    
Insert dynamic fields (from current image):

**Page footer**

- ☐ **Enable printing of a footer image**  
Pathname:    
Image height:  mm
- ☐ **Enable printing of a footer text**  
Footer text:    
Insert dynamic fields (from current image):

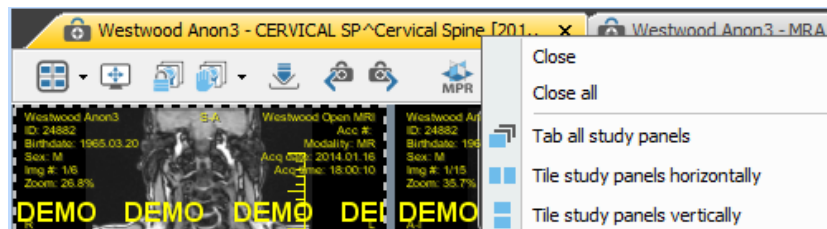
## 7 Study panels

In LocalEye Viewer, each loaded study is displayed in its own dedicated *study panel*, which in turn contains one or more *series panels*. The number and layout of series panels contained in the study panel depends on the series tiling setting (i.e., the number of series columns and series rows).

Once the study is open, and several series are displayed on screen, you can maximize a given series (thus switching to 1x1 series tiling and 1x1 image tiling) by double-clicking on it when the *Select/Stack* tool is associated with the double-clicked mouse button. Then, when you are done with this image, you can double-click again on it in order to return to the previous display mode, and all previously displayed images will be restored on screen.

By default, multiple study panels (corresponding to multiple open studies) are arranged in a "tabbed" fashion. However, it is possible to manually drag the tab title of each study panel to arrange and dock the panel according to the user's preference (e.g., in a side-by-side fashion).

In addition, by right-clicking on the tab title related to a study panel, the following drop-down menu will appear:



As can you see, this menu allows user to arrange study panels on screen in some different ways: study panels can be grouped together in a tabbed fashion, they can be tiled horizontally or they can be tiled vertically.

## 7.1 Study toolbar


Each study panel has its own *study toolbar*, containing buttons corresponding with study-level options or operations. These operations change depending on the type of the study. Here is an example of *Study toolbar* for a Mammo study:

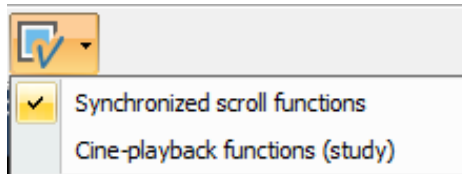


Here is an example of *Study toolbar* for a US Study:




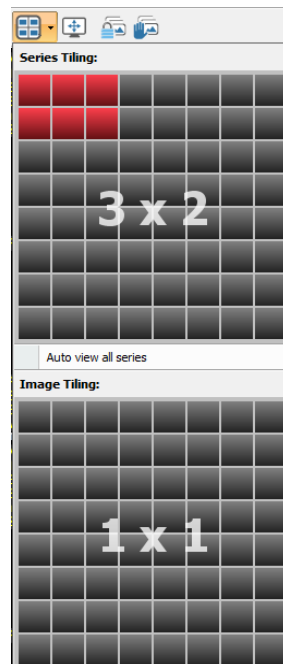
When moving the mouse pointer over each single *Study toolbar* button, a tooltip text will appear, providing additional information about the function of the underlying button.

The above examples show the two default study toolbars for Mammo and US studies with their typical features, however thanks to the *Enable/disable functions* button (  ) it is possible to manually add/remove functionalities to these toolbars. Pressing this button, the following drop-down menu will appear:



Checking or unchecking the desired items of the list, user can add/remove features to/from the toolbars.

If the *Set display mode...* toolbar button (  ) is pressed, the following drop-down menu will appear:





This section allows defining exactly how series and images are presented within this study panel.


*Series Tiling* allows specifying the series tiling for the current study. The series tiling determines how many series will be concurrently visible, and their layout on screen.


If *Auto view all series* item is chosen, then all series are automatically shown and an auto-selected layout will be applied.

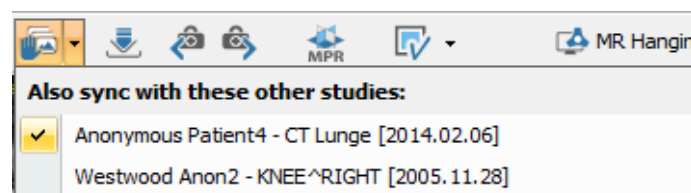
*Image tiling* allows specifying the image tiling for the series panel. The image tiling determines how many images of each series will be concurrently visible, and the layout of images inside the series panel.

If the *View study in full-screen mode* toolbar button (  ) is pressed, the selected study is viewed in full screen. You can exit from the full-screen mode by pressing the *Esc* button on the keyboard: normal-screen mode will then be restored.

The *Toggle automatic series synchronization...* toolbar button (  ) allows synchronizing different CT or MR series whose images (slices) were acquired moving in the same direction (acquisition planes with the same orientation). The synchronization causes a scrolling through the images of these series, in such a way all panels show images related to the same patient coordinates (where available). The reference coordinates, at which all other panels are synchronized, are the ones of the currently selected image panel / series. In order to support synchronization of all series, the image tiling of all series panels is automatically set to 1x1. Once the *Toggle automatic series synchronization...* function is enabled, all scrolling operations will be synchronized across the displayed series. In order to disable the *Toggle automatic series synchronization...* function and the related locked scrolling among series, it is sufficient to click once again on the same toolbar button.

The *Toggle manual series synchronization...* toolbar button (  ) allows manually synchronizing different CT or MR series whose images (slices) were acquired moving in the same direction (acquisition planes with the same orientation). This manual function is useful when it is necessary to manually set the initial "aligned" state among several different series, and/or to synchronize scrolling among series belonging to different studies, even acquired by different modalities: under these conditions, the *Toggle automatic series synchronization...* function won't work. In order to use the manual series synchronization, the user must scroll all relevant series in such a way they all show images related to the same patient coordinates. When synchronized scrolling among several studies is necessary, the user shall select a given study, then click on

the arrow-shaped drop down button (  ), placed next to the *Toggle manual series synchronization...* toolbar button. A drop-down menu will appear, allowing user to choose the other studies (in addition to the current one) to synchronize with.





In case of cross-study manual synchronized scrolling, before activating the synchronization, the user must scroll all relevant series of each study, in such a way they all show images related to the same patient coordinates.


Once all relevant series have been scrolled in such a way to represent an initial "aligned" situation, it is possible to press the *Toggle manual series synchronization...* button in order to lock scrolling of all those series in a synchronized way. The scrolling position of each series in the moment when the *Toggle manual*

*series synchronization...* button is pressed is considered to be the initial reference point. In order to disable the *Toggle manual series synchronization...* function and the related locked scrolling among series, it is sufficient to click once again on the same toolbar button.


### 7.1.1 Study-level cine movie toolbar buttons

Cine movie buttons allow obtaining a playback of all cine sequences belonging to the current study.

You can start (*Play cine movie* button ) or stop (*Stop cine movie* button ) the cine-playback of all cine-sequences currently displayed within the current study panel. While the movie is playing, you can also

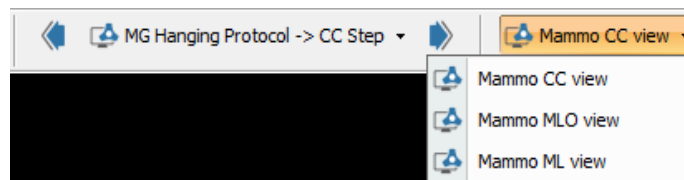
pause playback of all displayed cine-sequences by pressing the *Pause cine movie* button .

It's possible to modify the speed of the playback for all displayed sequences by dragging the dedicated slider.

The *Apply default FPS (movie speed)* button (  ) allows setting the predefined playback speed for all displayed cine-sequences, according to the information optionally available in the DICOM datasets.

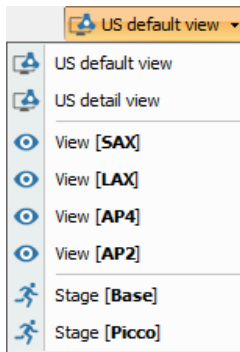
### 7.1.2 Hanging steps and study view presets

The picture below shows the "*hanging steps*" and the "*view presets*" dropdown boxes, which are located at the right side of the study toolbar:




In case "*hanging steps*" are defined within a hanging protocol, it will be possible for the user to easily iterate through all "*hanging steps*" which are present within the hanging protocol, also in a next/previous fashion, through the arrow buttons shown in the image above. Switching to a different hanging step is a viewer-wide operation, which may have an effect on what is hung on all available monitors.

The *view presets* drop-down menu allows for quick application of certain hanging presets to the current study panel, with a single click. Normally, this menu displays the hanging views contained in the hanging protocols matching with the current study, which can be applied at user's will.



For some particular kinds of studies, special hanging functions are available in the view presets drop-down menu. For instance, in case of ultrasound "echo stress" studies, user will be able to select hanging of series "by view" or "by stage". When selecting a given "view" from the drop-down menu, LocalEye Viewer will display all series related to that view, and will arrange the series tiling automatically in order to contain all series related to that view. In the same way, selecting a given "stage" from the drop-down menu, LocalEye Viewer will display all series related to that stage, and will arrange the series tiling automatically in order to contain all series related to that stage.

### 7.1.3 Share through Dropbox

The *Share study through Dropbox* () toolbar button allows sharing the current DICOM study with a remote recipient (e.g., for a consultation, second opinion, etc.) by exploiting the sending user's Dropbox and a cloud viewing infrastructure based on NeoLogica's viewing software. This cloud-based viewing infrastructure has been called "Exams Sharing Portal (ESP)".

Clicking on this button, a step-by-step Share through Dropbox wizard is started, as shown in the following picture:



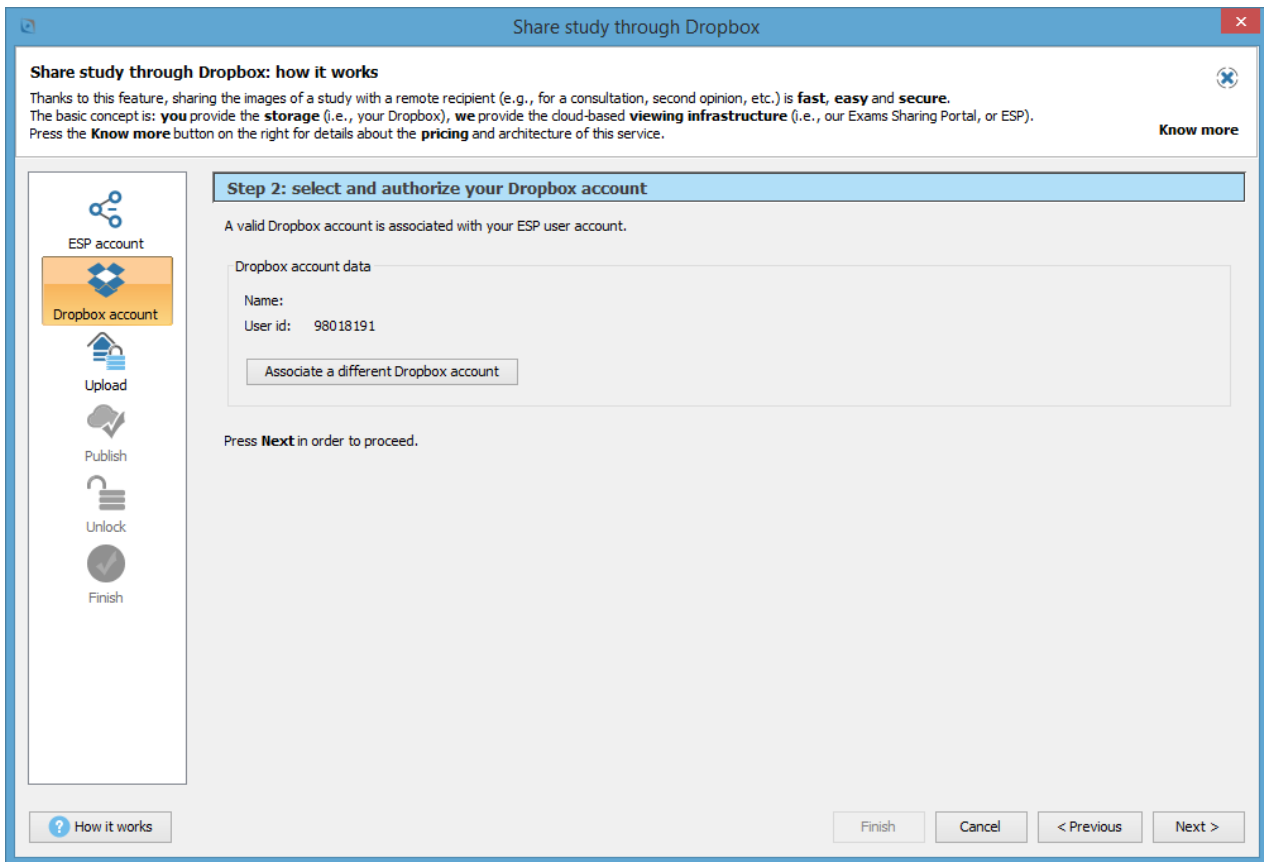
The screenshot shows a window titled "Share study through Dropbox" with a close button in the top right. Inside, there's a section "Share study through Dropbox: how it works" with explanatory text and a "Know more" link. A sidebar on the left contains icons for "ESP account", "Dropbox account", "Upload", "Publish", "Unlock", and "Finish", with "ESP account" currently selected. The main area is titled "Step 1: login to the Exams Sharing Portal (ESP)". It contains the text: "Currently you are not logged in to the Exams Sharing Portal (ESP). Please choose how to proceed." Below this are two radio buttons: "I already have a user account on the Exams Sharing Portal (ESP): I will login now" (selected) and "I don't have a user account on the Exams Sharing Portal (ESP) yet: I will create it now". Under the selected option, there's a section "ESP user account data" with input fields for "Your email:" and "Password:", each with a blue 'X' icon to its right. A link "I forgot my password" is next to the password field. Below the inputs, it says "Press **Next** in order to login to the ESP using the above account data." At the bottom are buttons for "Finish", "Cancel", "< Previous", and "Next >".

The first step of this wizard allows user to authenticate on the Exams Sharing Portal by entering email and password related to his ESP account. If the user does not have a user account on the ESP yet, he can create a new one selecting the appropriate option, as shown in the following screenshot:

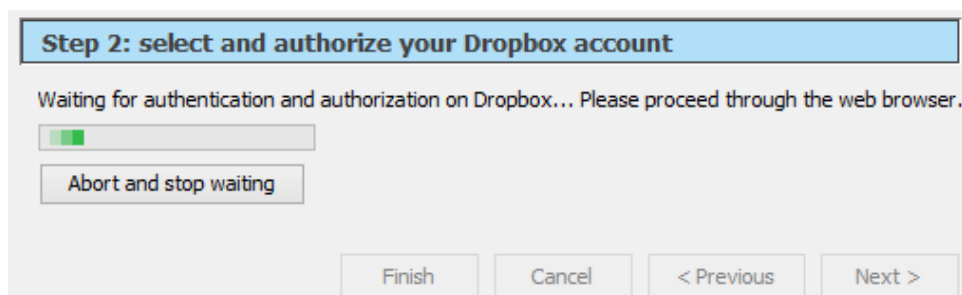
This close-up shows the "I don't have a user account on the Exams Sharing Portal (ESP) yet: I will create it now" radio button selected. Below it, the "ESP user account data" section has input fields for "Your email:", "Password:", and "Password (repeat):", each with a blue 'X' icon. A note states: "Password shall be at least eight (8) characters long. This password, together with the email address entered above, will be used to login to the Exams Sharing Portal." At the bottom, it says "Press **Next** in order to create a user account on the ESP using the above account data." and shows the "Finish", "Cancel", "< Previous", and "Next >" buttons.



Once user has successfully logged in to the ESP, LocalEye Viewer stores his login data, so that he will be able to auto-login upon later usages of the *Share through Dropbox* functionality.

Clicking on the *Next* button, the page related to the second step of the wizard will appear:



Once user has authenticated on ESP, an attempt will be made to authenticate on Dropbox. If automatic authentication succeeds, user can choose to proceed with that Dropbox account, as shown in the image above. Otherwise, if automatic authentication on the user's Dropbox is impossible or fails, or user just wants to associate a different Dropbox account, an authentication and authorization step takes place on Dropbox, as you can see in the images below:





Sign in to Dropbox to link to RemotEye Suite

Email

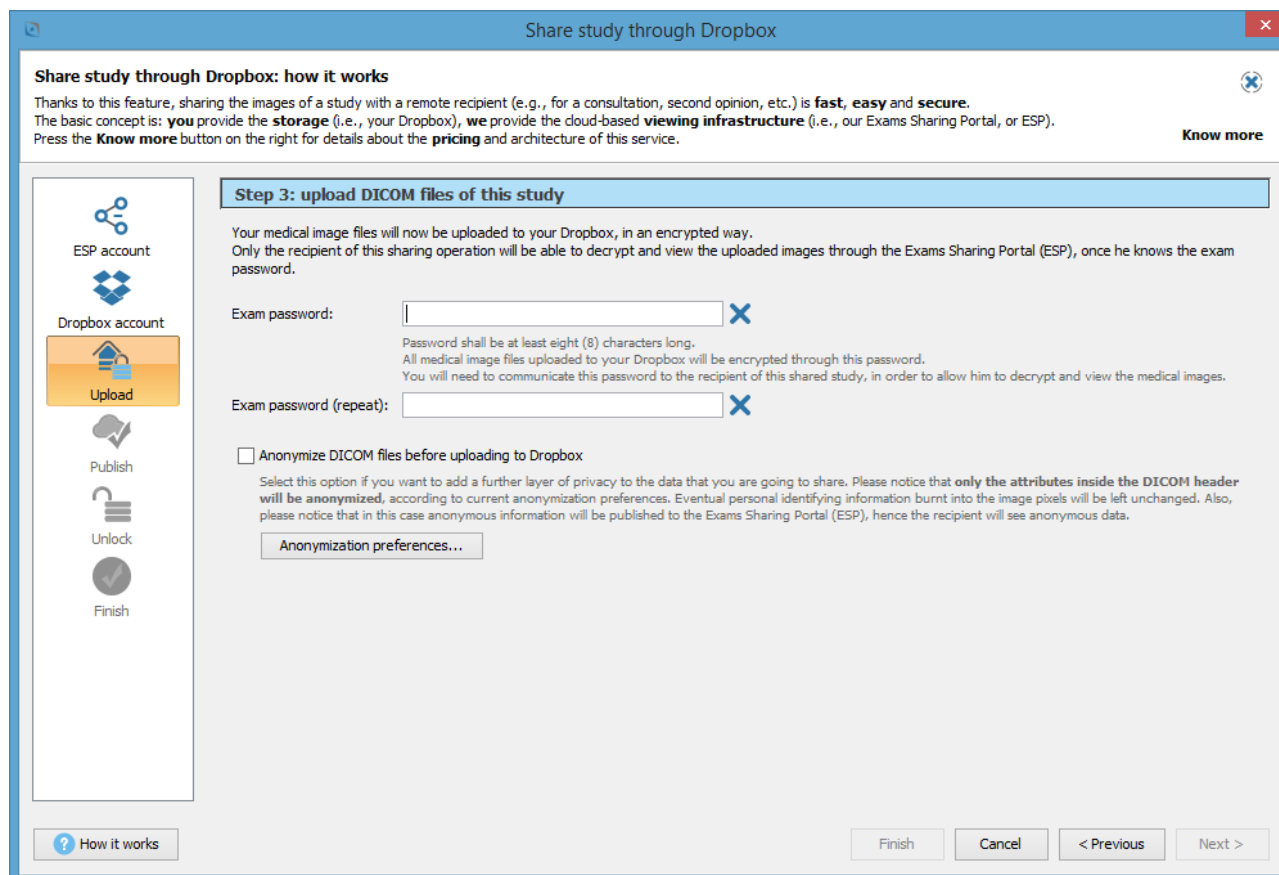
Password

[Forgotten your password?](#) [Sign in](#)

---

[New to Dropbox? Create an account](#)

Once user has logged in to the ESP, and access to user's Dropbox is granted, LocalEye Viewer is ready to upload current study's DICOM files to Dropbox.




**Share study through Dropbox: how it works**


Thanks to this feature, sharing the images of a study with a remote recipient (e.g., for a consultation, second opinion, etc.) is **fast, easy and secure**. The basic concept is: **you** provide the **storage** (i.e., your Dropbox), **we** provide the cloud-based **viewing infrastructure** (i.e., our Exams Sharing Portal, or ESP). Press the **Know more** button on the right for details about the **pricing** and architecture of this service.

**Step 3: upload DICOM files of this study**

Your medical image files will now be uploaded to your Dropbox, in an encrypted way. Only the recipient of this sharing operation will be able to decrypt and view the uploaded images through the Exams Sharing Portal (ESP), once he knows the exam password.

Exam password:  

Password shall be at least eight (8) characters long.  
All medical image files uploaded to your Dropbox will be encrypted through this password.  
You will need to communicate this password to the recipient of this shared study, in order to allow him to decrypt and view the medical images.

Exam password (repeat):  

☐ Anonymize DICOM files before uploading to Dropbox

Select this option if you want to add a further layer of privacy to the data that you are going to share. Please notice that **only the attributes inside the DICOM header will be anonymized**, according to current anonymization preferences. Eventual personal identifying information burnt into the image pixels will be left unchanged. Also, please notice that in this case anonymous information will be published to the Exams Sharing Portal (ESP), hence the recipient will see anonymous data.

[Anonymization preferences...](#)

**Navigation:** [How it works](#) [Finish](#) [Cancel](#) [< Previous](#) [Next >](#)

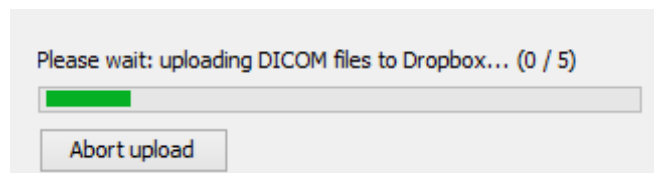
In this step, user is prompted to choose a password needed to encrypt all DICOM files which will be uploaded to his Dropbox. This password must be at least 8 characters long, and user will need to communicate it to the recipient of the shared study. Through this password, indeed, the recipient will be able to decrypt and view the medical images.

In addition, selecting the option *Anonymize DICOM files before uploading to Dropbox*, a further layer of privacy will be added to the data that user is going to share.



**Important note:** please consider that only the attributes inside the DICOM header will be anonymized, according to the anonymization preferences. Eventual personal identifying information burnt into the image pixels will be left unchanged. Also, please notice that in this case anonymous information will be published to the Exams Sharing Portal (ESP), hence the recipient will see anonymous data.

At this point, LocalEye Viewer is ready to encrypt and upload all DICOM files related to the current study to user's Dropbox. During the upload of DICOM files to Dropbox, a progress bar shows the current progress of the whole upload procedure, which may be very lengthy. User can choose to abort and stop the upload operation.



Once the upload to Dropbox of all DICOM files of the study has successfully completed, the "Publish to Exam Sharing Portal" step takes place:

The screenshot shows a window titled "Share study through Dropbox" with a close button in the top right. Inside, there's a section "Share study through Dropbox: how it works" with explanatory text and a "Know more" link. Below this is a vertical sidebar with icons for "ESP account", "Dropbox account", "Upload", "Publish" (highlighted in orange), "Unlock", and "Finish". The main area is titled "Step 4: publish to Exams Sharing Portal (ESP)". It contains text explaining that the exam will be published to the ESP and available to the recipient. A text input field for the recipient's email address is shown with the example "someone@somedomain.com" and a blue 'X' icon. Below this is a checkbox for "Transmit exam password to recipient by email" with a warning message. A large text area for a "Note for the recipient of this shared exam (optional)" is also present. At the bottom, there are buttons for "Finish", "Cancel", "< Previous", and "Next >".

Here, it is necessary to enter the email address of the recipient, which will be used to send him a notification email, informing him about the availability of a shared study for him on the ESP. This email will provide the recipient with an appropriate link, as well as login information, which will enable him to access the exam's images. Also, this email address will be used to create the recipient's user account on ESP, if not already existing. Finally, it is possible to send the exam password to the recipient directly by email, by selecting the *Transmit exam password to recipient by email* option.



**Warning:** transmitting the exam password to the recipient by email may be insecure. If you want to ensure maximum security, please leave this option unselected, and transmit the password to the recipient through a different mean (e.g., phone call).

Finally, user can type a note for the recipient of the shared exam through the appropriate box.

At this point, clicking on the *Next* button LocalEye Viewer will publish the current study to the Exams Sharing Portal (ESP).

Once the study has been successfully published to ESP, user can choose whether to use one of his existing credits (if available) to unlock viewing of the study, or to purchase new credits to unlock the study on behalf of the recipient, or rather to leave the recipient the task of unlocking the study at a later stage.

Share study through Dropbox

Share study through Dropbox: how it works

Thanks to this feature, sharing the images of a study with a remote recipient (e.g., for a consultation, second opinion, etc.) is **fast, easy** and **secure**. The basic concept is: **you** provide the **storage** (i.e., your Dropbox), **we** provide the cloud-based **viewing infrastructure** (i.e., our Exams Sharing Portal, or ESP). Press the **Know more** button on the right for details about the **pricing** and architecture of this service.

Know more

ESP account

Dropbox account

Upload

Publish

Unlock

Finish

Step 5: unlock viewing of the shared study on ESP (optional)

In order to unlock viewing of this shared study on the Exams Sharing Portal (ESP), a **ESP credit** shall be associated with this sharing operation.

You currently have **34** credits remaining in your ESP account.

Please choose how you prefer to proceed:

☐ I want to use 1 of my existing credits to unlock viewing of this study

☐ The recipient will take care of unlocking viewing of this study

How it works

Finish

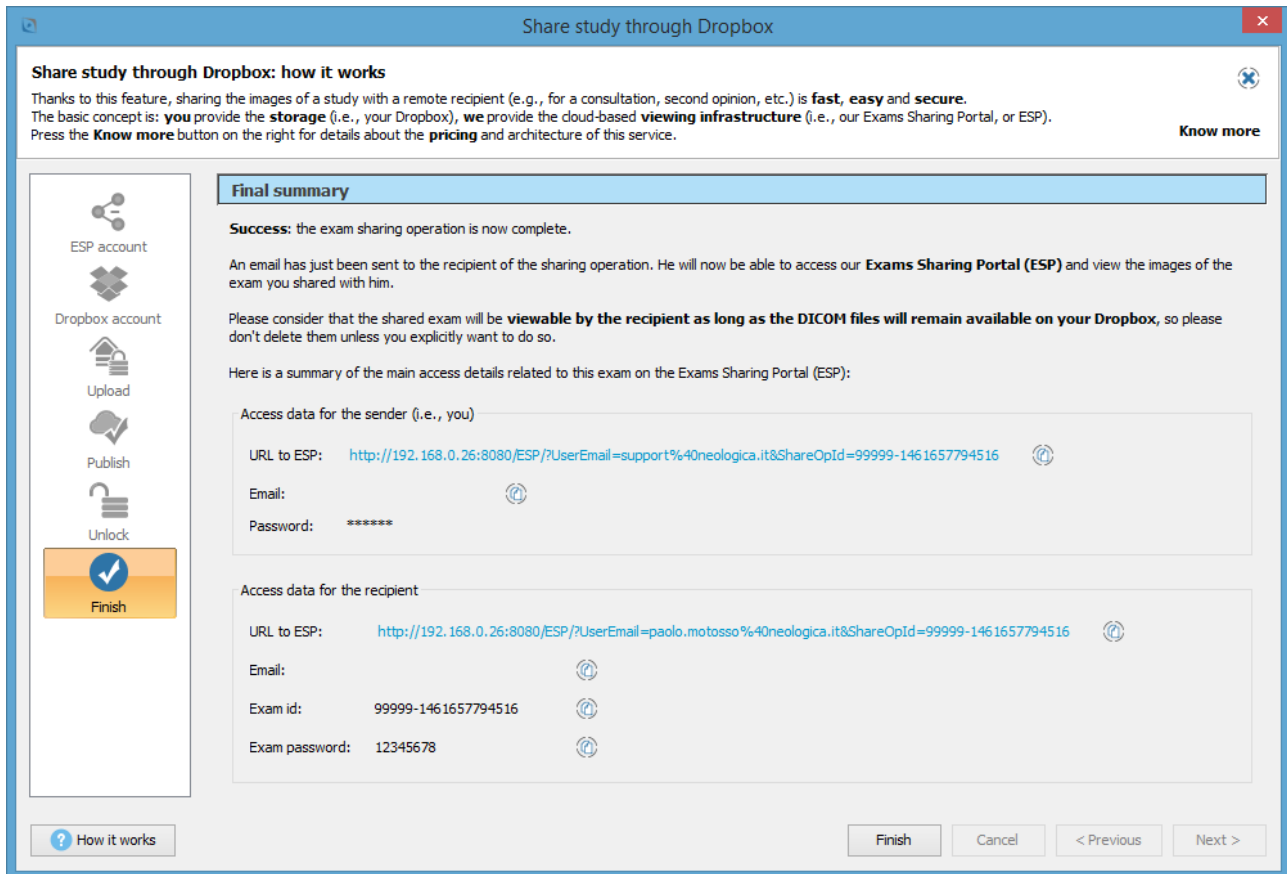
Cancel

< Previous

Next >

Once a user has unlocked a shared exam, that exam will be online and viewable (by both the sender and the recipient) as long as the sender will keep it in his own Dropbox, for an unlimited number of times.

Once the unlock step has been done or skipped, the exam sharing operation is complete, and LocalEye Viewer provides a final summary:



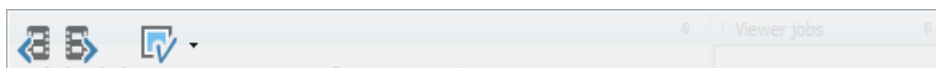
## 8 Series panels

LocalEye Viewer is able to display several different series in each *study panel*, depending on the currently-set series tiling. Each one of these series will be displayed in a dedicated *series panel*. In turn, each series panel can show one or more images of the associated series, depending on the *image tiling* set on the series panel itself (i.e., the number of image columns and image rows).

### 8.1 Series toolbar

Each series panel has its own *series toolbar*, containing buttons corresponding with series-level options or operations. Normally, this series toolbar is hidden, and will only appear when the user moves the mouse pointer in the lower portion of the series panel.


The buttons appearing on the series toolbar change depending on the type of series. Here is an example of how the series toolbar appears for a typical MR series:

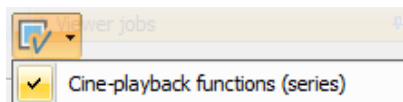




Here is an example of the series toolbar looks like for a cine-sequence of a US study:



When moving the mouse pointer over each single toolbar button, a tooltip text will appear, providing additional information about the function of the underlying button.




The above examples show the two default series toolbars for MR and US studies with their typical features, however thanks to the *Enable/disable functions* button (  ) is possible to add/remove functionalities to these toolbars. In particular user is able to activate cine-playback functions also for series whose toolbars, by default, don't include this kind of features. Pressing this button, the following drop-down menu will appear:




The *Previous series* toolbar button (  ) and *Next series* toolbar button (  ) are used to scroll to the next or previous series, if multiple series are currently loaded into LocalEye Viewer.


### 8.1.1 Series-level cine movie toolbar buttons

Cine movie buttons allow obtaining a cine-playback of all images / frames belonging to the current series or multi-frame sequence.

You can start (*Play cine movie* button  or *Ctrl+P*) or stop (*Stop cine movie* button  or *Ctrl+S*) the playback of the movie. While the movie is playing, you can also pause playback by pressing the *Pause cine movie* button  (or again CTRL+P).


It's possible to modify the speed of the playback by dragging the dedicated slider. Next to the slider the actual speed of the playback is indicated.

The *Apply default FPS (movie speed)* button (  ) allows setting the predefined playback speed for a given cine-sequence (according to the information coming from the DICOM dataset, if available).


Pressing the *Play once* button (  ) the frames 1 to N (where N is the total number of frames in the current series) are displayed in rapid sequence, then the playback is stopped.





Pressing the *Looping* button (  ) the frames 1 to N are displayed in rapid sequence, then the playback begins again from frame 1 and so on (frame sequence: 1,2,...,N,1,2,...,N,1,2,...).

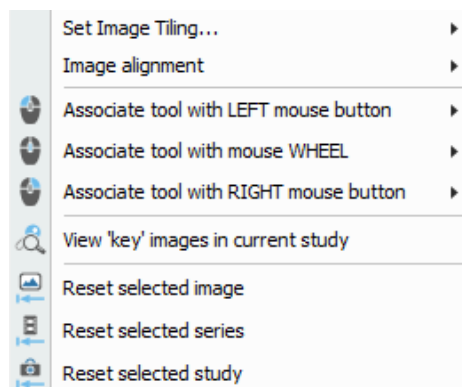


Pressing the *Sweeping* button (  ) the playback sequence is as follows: 1,2,...,N,N-1,N-2,...,2,1,2,...,N... (forward and backward).

## 8.2 Pop-up menu

LocalEye Viewer features a pop-up menu on images, which allows a fast selection of common tools, functionalities and options.

In order to show the pop-up menu it is necessary to right-click on a non-empty image panel while keeping the *Ctrl* key of the keyboard pressed. Since LocalEye Viewer allows a flexible association of image tools to both left and right mouse buttons, pressing *Ctrl* on the keyboard is necessary, in addition to right-clicking, to display this pop-up menu.

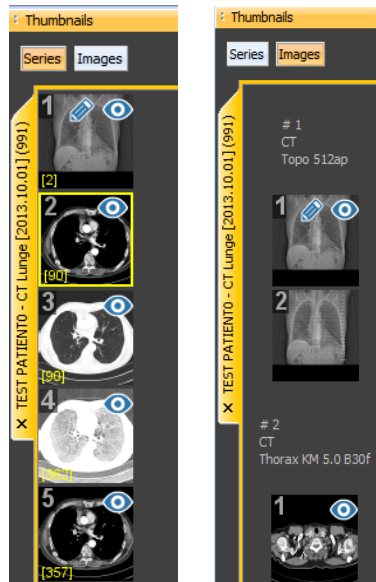


LocalEye Viewer also supports a faster association of the tools with the left , right and wheel mouse buttons. In order to change the tool associated with the left mouse button, press the left mouse button while keeping the *Shift* key pressed on the keyboard. In order to change the tool associated with the right mouse button, press the right mouse button while keeping the *Shift* key pressed on the keyboard. Finally, in order to change the tool associated with the wheel mouse button, press the wheel mouse button while keeping the *Shift* key pressed on the keyboard.

The pop-up menus are particularly useful when operating in full-screen mode, since most functions may be accessed without the need for the main toolbars.

## 9 Thumbnails panel

The *Thumbnails* panel displays thumbnail images:





If the *Series* option button is selected on the *Thumbnails* panel, then each thumbnail image will represent a series currently loaded in LocalEye Viewer, and the number of displayed thumbnail images for each study will be equal to the number of series currently loaded in LocalEye Viewer for that specific study. The thumbnails are grouped by study.

On the other hand, if the *Images* option button is selected on the *Thumbnails* panel, then each thumbnail image will represent a single image currently loaded in LocalEye Viewer, and the number of displayed thumbnail images for each study will be equal to the total number of images currently loaded in LocalEye Viewer for that specific study. Also in this case the thumbnails will be grouped by study and series.

Drag&drop of images or series from the *Thumbnails* panel to the study panel(s) is supported. You can also select multiple thumbnails in the *Thumbnails* panel, by the Windows-usual *Shift-click* or *Ctrl-click*, and then dragging & dropping all selected images or series (depending on the active mode) to the Study panel.

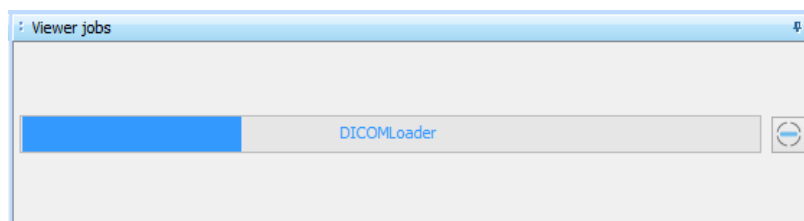
Double-clicking on a thumbnail will load the double-clicked series or image into the currently selected image panel. Double-clicking on a series thumbnail while pressing the *Alt* key on the keyboard will load the study panel with the scene starting at the double-clicked series. Double-clicking on the tab related to a particular study, will hang the study, following the rules of the first matching hanging protocol.

The thumbnails will be marked by symbols to identify the series or images displayed on the main study panel(s): while the  symbols identify the series or images currently displayed (i.e., hung on screen) in RemotEye Viewer, the  symbol indicates the currently-selected series.

The thumbnail panel may be hidden or shown by clicking on the pin icon appearing at the top right of the panel itself.

## 10 Viewer jobs panel

In the *Viewer jobs* panel the progress of the jobs is shown. The image below shows an example of DICOM files loading.



## 11 How to report issues

In case you encounter issues or you detect a malfunctioning while using the LocalEye Viewer software, please report the problem to the NeoLogica Support Staff.

NeoLogica uses a ticket-based online support system. In order to report a problem, please browse to the following web address:

<https://www.neologica.it/Support>

You will then be able to open a new "support ticket", and specify the details of the issue you have detected. The NeoLogica Support Staff will analyze the reported issue and will reply promptly, then making every effort to solve the issue in the shortest possible time.

## 12 Acknowledgements

LocalEye Viewer relies on the CharLS library in order to decode JPEG-LS-compressed images.