iQ-LITE

USER MANUAL

Version 2.6.0 INT EN 002R

CE 0482

IMAGE Information Systems Ltd.

TABLE OF CONTENTS

0 CE CONFORMANCE STATEMENT

IMAGE Information Systems Ltd. does not accept liability for the wrong or unprofessional use of the described software (see the End User License Agreement).

iQ-LITE is part of the iQ-VIEW, which is certified as a medical device for image processing, diagnosis, archiving, and communication according to Council Directive 93/42/EEC concerning medical devices and according to FDA 510(k). Nevertheless, diagnosis can only be made using special high-resolution displays.

All patient names used in this manual are completely fictitious.

Throughout this booklet trademark names are used. Rather than put in a trademark symbol at every occurrence of the trademark name, we state that we are using the names only in an editorial fashion and to the benefit of the trademark owner with no intention of infringing of the trademark.

We assume no responsibility for information and description as far as third-party products are concerned.
We are dedicated to improving and enhancing the software of our medical imaging and communication system. Consequently, the information in this manual is subject to change without notice. Current information about product improving can be received from the iQ-VIEW homepage: http://www.image-systems.biz/products/iq-system-pacs/iq-view.html or IMAGE Information Systems Home Page www.image-systems.biz.

Further inquiries can be addressed to: info@image-systems.biz.

Andreas Knopke, MD Arpad Bischof, MD Mike Thomas Jensen, MA
September 2009

1 INTRODUCTION

iQ-LITE is a portable CD image viewer that enables the user to view, manipulate and print images which have been exported from an iQ-VIEW or iQ-VIEW PRO Workstation.

A copy of iQ-LITE is saved with each set of images and automatically opens when the CD or DVD is loaded on a PC.

iQ-LITE provides a convenient way for physicians and other medical professionals to copy and save patient studies/images processed by an iQ-VIEW Workstation. When providing copies of these studies to referring physicians and/or patients, iQ-LITE provides an integrated, simple way to view the information stored on the CD/DVD – without the use of any 3rd party software.

WARNING:

When receiving medical image data, make sure you know whether compression has been used. If images were lossy compressed, an information will be shown in the text overlay of the image when displayed in the viewer. Also the DICOM header data indicates the form and rate of compression.
Those images have no diagnostic quality and should not be used to make medical findings!

iQ-LITE is only permitted for diagnostic use if all applicable legal requirements in your country are met. Please consult your authorized local distributor before using the application for diagnostic purposes.

1.1 SYSTEM REQUIREMENTS

Minimal system requirements are:

For Microsoft® Windows® 2000, XP and Vista:
(see Microsoft® Windows® 2000, XP and Vista hardware requirements)

- PC with ≥ 300 MHz (min. 1.5 GHz for cardiology) or higher processor clock speed recommended (single or dual processor system); Intel Pentium / Celeron family or AMD K6/Athlon/Duron family, or comparable processor recommended
- Main memory at least 64 MB RAM (64 MB free RAM recommended)
- Hard disk min. 10 GB, with DMA33 ability
- XGA (1024 x 768) or higher resolution video adapter, 24 bit or 32 bit color or at least 8 bit gray output
- Analog color or grayscale display, 17” or 20” for demonstration, high-resolution monitor for diagnosis
- CD-ROM or DVD-ROM drive
- Keyboard and mouse or compatible pointing device

NOTE:

We strongly recommend the Windows classic style on Windows XP computer.
The user should be a local administrator on the computer.

Recommended system requirements are:

For Microsoft® Windows® 2000, XP and Vista:
(see Microsoft® Windows® 2000, XP and Vista hardware requirements)

- 1 GHz 32-bit (x86) or 64-bit (x64) processor
- 512 MB of RAM (64 MB free RAM recommended)
- 20-500 GB fast local hard disk, with DMA33 ability
- Support for DirectX 9 graphics and 32 MB of graphics memory; XGA (1024 x 768) or higher resolution video adapter; 24 bit or 32 bit color or at least 8 bit gray output
- Analog color or grayscale display, 17" or 20" for demonstration, high-resolution monitor for diagnosis
- CD-ROM or DVD-ROM drive
- Keyboard and mouse (mouse with scroll wheel) or compatible pointing device
- Windows® printer

Please also pay attention to the hardware requirements of the supported Microsoft® Windows® Versions:

Microsoft® Windows® XP:
http://www.microsoft.com/windowsxp/pro/evaluation/sysreqs.mspx

Microsoft® Windows® 2000:
http://www.microsoft.com/hk/windows2000/guide/professional/sysreq.htm

Microsoft® Windows® Vista:
http://www.microsoft.com/windows/products/windowsvista/editions/systemrequirements.mspx?wt_svl=10042VHa1&mg_id=10042VHb1

The web content on the CD can be viewed using the following web browsers:

- Internet Explorer Version 4.01 and above
- Firefox version 1.0 and above

2 INSTALLATION AND LICENSING

2.1 INSTALLATION OF iQ-LITE

The iQ-LITE software is usually provided on a patient CD or DVD, or on memory stick. It does not need to be installed. The viewer opens automatically when the medium is inserted into the computer, provided that the auto-run command was written onto the medium and the auto-run function is enabled on the machine.

If the software does not start automatically, select the correct drive (e.g. CD or DVD drive) in the Windows® Explorer and double-click onto the file “Lite.exe” to start the viewer manually.

The web content, if burned onto the CD in addition to the DICOM images and the iQ-LITE viewer, can be accessed by double-clicking onto the INDEX.HTM file.

2.2 LICENSING OF iQ-LITE

The iQ-LITE software does not need a particular license to be run from a medium. When you are provided with a patient CD, DVD or memory stick, you may open the viewer as often as you wish or need. There is no limitation to the running of that software.

However, the iQ-LITE viewer is limited in functionality and features. For the fully functional radiological workstation, including all features, we recommend using iQ-VIEW or iQ-VIEW PRO. If you are interested in purchasing the software, please contact IMAGE Information Systems Ltd. A trial version can be downloaded at www.image-systems.biz.

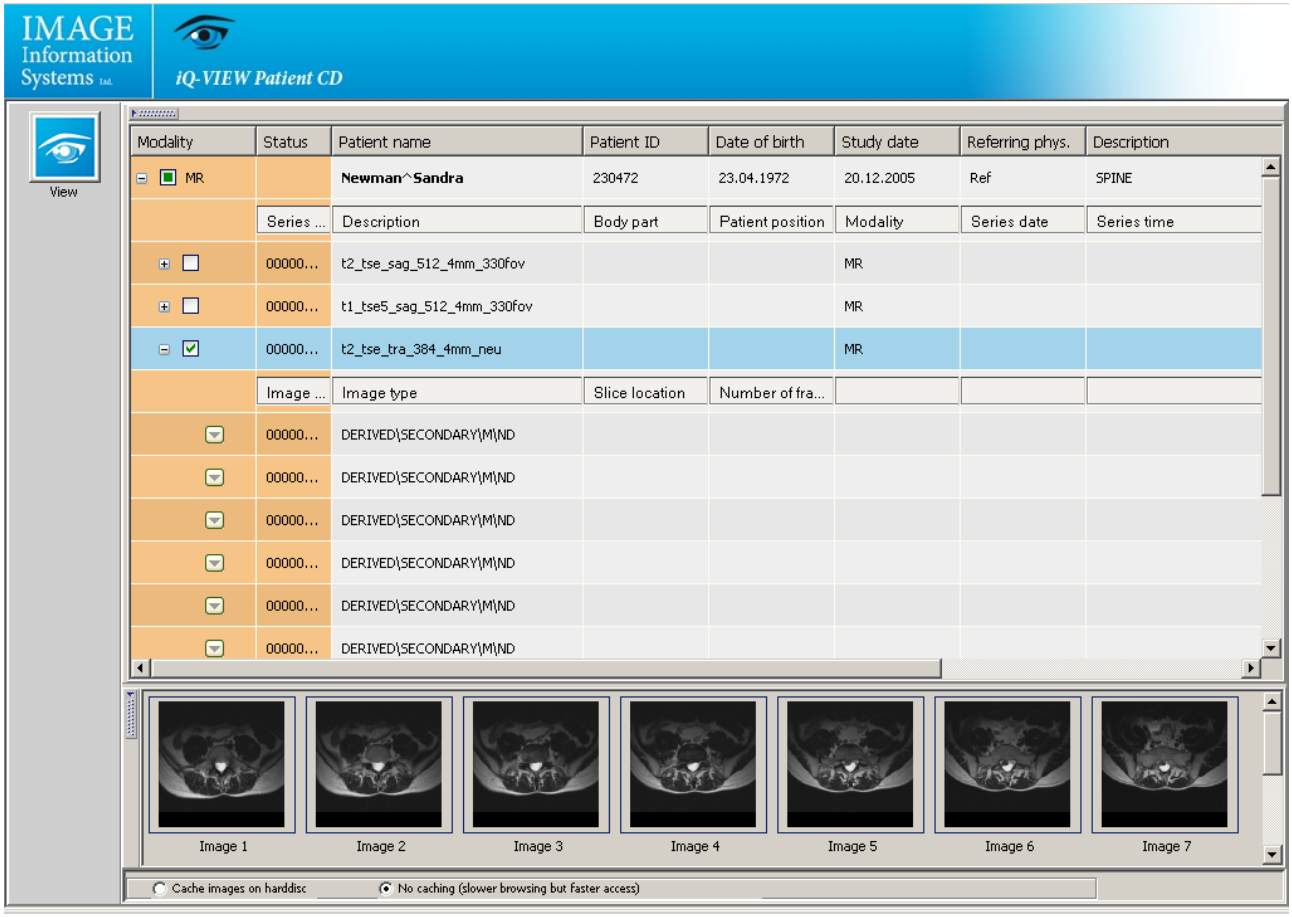
3 CONFIGURATION

There is no need to configure the software before using it. All necessary configuration settings are already provided with the patient CD, DVD or memory stick.

The software includes functions that can be customized for a running viewer session.

4 USAGE OF THE SOFTWARE APPLICATION

4.1 STUDY BROWSER



iQ-LITE study browser

4.1.1 STUDY TABLE

In the study table all studies that are available on the medium (and registered in the DICOMDIR) are shown.

When opening iQ-LITE, only the Study Table will be opened. The Preview Icons panel is closed and may be opened if desired. See below for further information on the use of the Preview Icons panel.

4.1.1.1 NAVIGATING IN THE STUDY TABLE

The study table gives information about a study on three levels:

- Study level = with the most important information provided on study level, such as patient name, patient ID, accession number, study description, referring physician, etc.
- Series level = that gives information about the available series in a study, e.g. series description, modality information, etc.

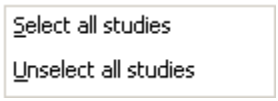
- Image level = that allows access to a preview of all images in a series, including the possibility to use window leveling.

The next lower level is reached by clicking on the "+" box on the far left side. It first opens the study to show the different series with further information. The next expanding with "+" then opens the image level, showing a table of all available images of that series.

 Clicking on the arrow down button will open the chosen image in a preview.

4.1.1.2 SORTING STUDIES IN THE STUDY TABLE

By clicking into the respective entry of the table header you may sort the available studies according to patient name, modality, patient ID, etc. – both ascending and descending. The sorting direction is displayed in the column.

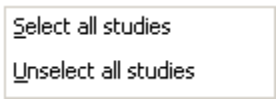


With a right-click on the table header in the study table, a sub-menu opens, where it is possible to reset any sorting and return to the original sorting order (studies are displayed in the order of the day when they are received by iQ-VIEW [only date, but not specific time]) by selecting "Resort sort settings".

4.1.1.3 SELECTING STUDIES AND SERIES

The selection of studies in the study table follows the usual Windows® logic, the selection on series level is a bit different:

- Select an individual study either by simply clicking on the study entry or by marking the checkbox in the first column.
- Multiple studies can be selected either using [CTRL] to mark several studies separately or using [SHIFT] to mark all studies between the first and the last selected one. Alternatively you can also mark the checkboxes of all studies you wish to select in the first column.
- Select an individual series by opening the study, to which the series belongs, down to series level. Mark the checkbox in front of the entry.
- For the selection of multiple series of one study, again open the study, to which the series belongs, down to series level. Select the desired series by simply clicking marking the checkboxes of all series you wish to select in front of the entry.
- In the same way you can also select individual series from different studies.



With a right-click on the table header in the study table, a sub-menu opens, where you can select or unselect all locally available studies.

NOTE:

Selected studies and series are marked either orange when in "Database" mode or blue when in "Network" mode. In addition the checkbox of each study / series in the first column will be marked.

It is recommended to select data either on study level or on series level. When mixing study and series level, selecting series and studies by using the checkbox (instead of a simple click into the line) will be helpful to assure that the entire selection can be loaded into the viewer.

4.1.1.4 LOADING STUDIES AND SERIES INTO THE VIEWER

If only one study or one series is selected from the study list, you can:

- either double-click on the study / series to load it into the viewer, or
- select the study / series and then click on the "View" button.

If more than one study or series (or combination of studies and series) is selected, you need to use the "View" button to load the entire selection into the viewer.

4.1.2 PREVIEW ICONS PANEL

The Preview Icons panel can be opened and closed using the switch  in the upper left corner of that panel.

The preview icons panel shows the preview images of the currently marked study or series. If a study is marked, previews of all series of that study are shown. On series level, more than one series can be selected and the images of this/those series are displayed as preview thumbnails.

NOTE:
The preview icons can only displayed in the preview icons panel if the web content (HTM pages) including the JPEG images was also burned on the medium.

4.1.3 CACHING

If "Cache images on hard disc" is activated, the images from the medium will be temporarily saved to the hard disc. It will therefore take a little longer until they can be accessed.

If "No caching" is checked, the images will be read directly from the medium and are not saved to a temporary directory of the hard disc. Access to such studies is faster but the browsing is slower.

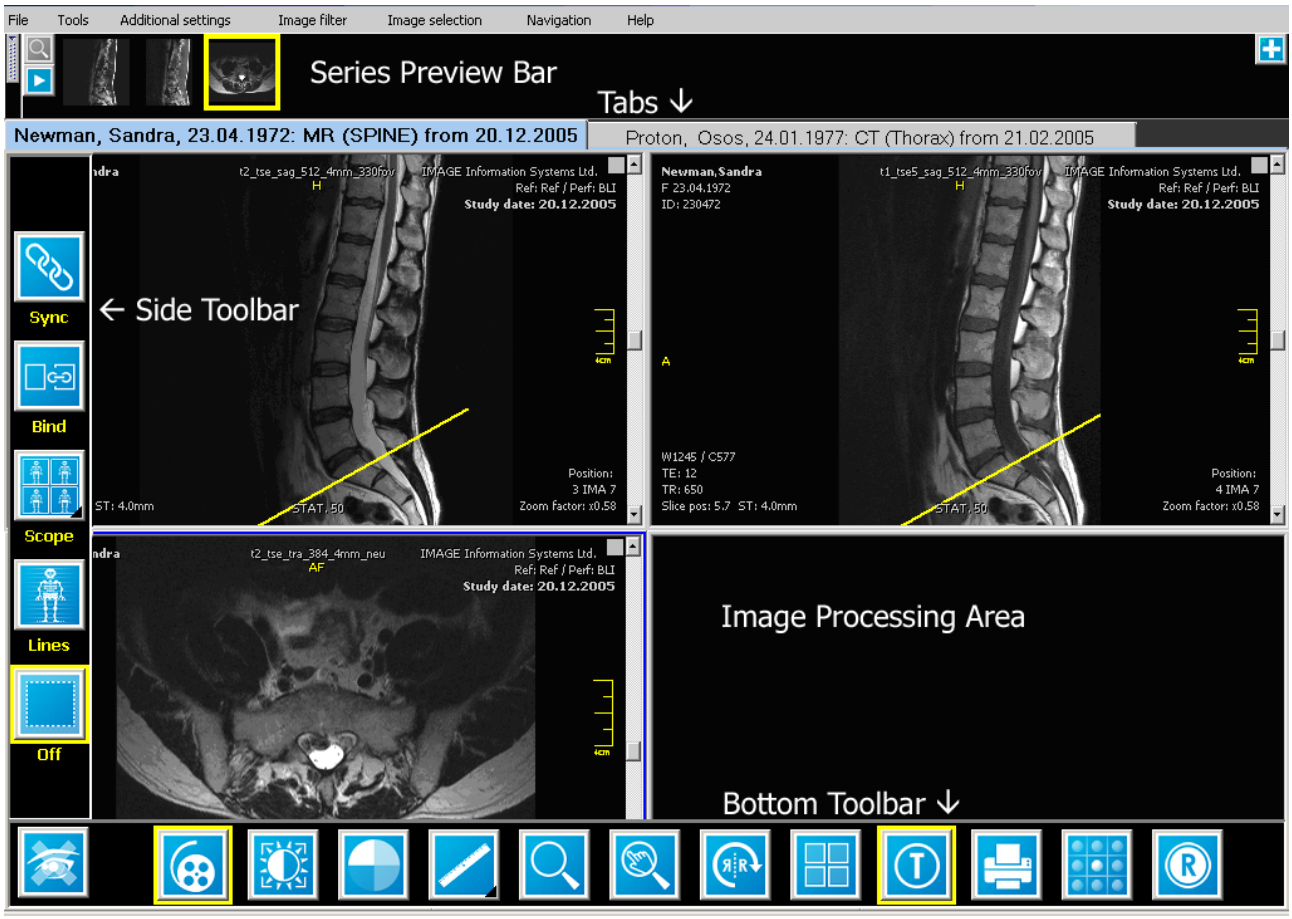
4.1.4 VIEWER

To load a single study or series into the viewer, either select the "View" button or double-click onto the study / series.

For loading multiple studies or series into the viewer, select them in the study list (chapter 4.1.1 Study Table, section 4.1.1.3 Selecting studies and series) and click onto the "View" button.

For detailed information on how to use the viewer application as well as a description of all available features and processing functions, see chapter 4.2 Viewer).

4.2 VIEWER



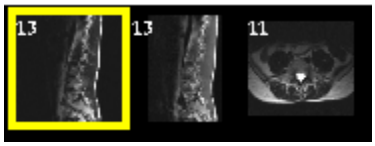
iQ-LITE viewer window

4.2.1 THE SERIES PREVIEW BAR

The series preview bar can be used to get an overview over the studies loaded into the viewer. It gives information about the series of the loaded studies and allows the navigation between studies.

4.2.1.1 INFORMATION IN THE SERIES PREVIEW BAR

The viewer will display either one or two series preview bars. On a single display system, just one preview bar will be displayed when only one study was loaded into the viewer. If several studies are loaded, at first only one preview bar will open with the series information of the first study, but it is possible to open a second one, displaying the next study.



In the series preview bar, all available series of a study are displayed with one thumbnail representing each series. The series currently active in the image processing area will be shown with a yellow frame in the series preview bar for easier orientation.

Each series thumbnail states a number that corresponds with the number of images included in the series. In case of multi-frame images, the number of available frames will be displayed.

4.2.1.2 FUNCTIONS OF THE SERIES PREVIEW BAR

The series thumbnails in the preview bar can be used to populate the views in the image processing area – both on single and dual display systems – by:

- dragging a series from the preview bar to an available view of your choice, or
- double-clicking onto a series thumbnail to load it into the currently active view (blue frame).

Used for querying previous studies of the currently active patient on a connected remote archive. → ONLY AVAILABLE IN iQ-VIEW/PRO.

This button will only be displayed, if more than one study was loaded into the viewer. A click on the forward button will open the next study in the image processing area (on the primary display in dual display systems).

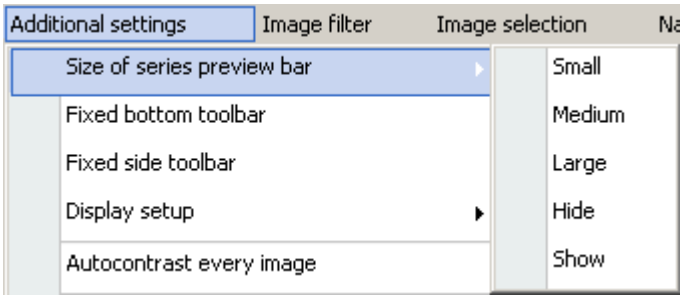
This button will only be displayed, if more than one study was loaded into the viewer. A click on the backwards button will open the previous study in the image processing area (on the primary display in dual display systems).

This button will only be displayed, if more than one study was loaded into the viewer. A click on the plus button, on single-monitor systems, opens a second series preview bar with the thumbnails of the second study loaded into the viewer. If more than two studies are loaded, a click on the plus button opens a sub-menu with all other available studies for selection. On dual display systems, the second preview bar is automatically shown on the second display. A click on the plus button can be used to open further loaded studies.

This button is only displayed, if more than one study was loaded into the viewer and the second preview bar was opened. It is used to close the second series preview bar on single display systems. It is not possible to close the second preview bar when working with dual displays.

4.2.1.3 SIZE OF SERIES PREVIEW BAR

It is possible to configure the size of the series preview bar. Thus, either the space available for the image processing area can be increased by decreasing the size of the preview bar or the use of the preview bar can be made easier by enlarging it, e.g. on high-resolution monitors.



To set the size of the series preview bar:

- Go to the menu “Additional settings”.
- Select the entry “Size of series thumbnail bar”.
- Set the size of the series preview bar to either “small”, “medium” or “large”.

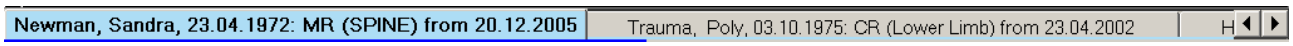
To either hide or show the series preview bar:

- Go to the menu “Additional settings”.
- Select the entry “Size of series thumbnail bar”.
- Hide or show the series preview bar by selecting either “Hide” or “Show”. Alternatively, this can also be done using the switch on the left border.

You can easily hide or show the series preview bar by using the switch on the left side of the series preview bar.

4.2.2 THE STUDY TABS

Between the series preview bar and the image processing area a tab bar is displayed that contains a study tab for each study currently loaded into the viewer.



Each tab states information about the study to easily identify a study among others. It contains (if available):

- the patient’s name,
- the patient’s date of birth,
- the kind of study (modality information),
- the study description, and
- the study date.

The tab of the study currently active in the image processing area is marked in a light-blue.

Clicking on another study tab will load that study into the image processing area (on dual display systems: image processing area of the primary display). If not all study tabs fit on the screen, use the arrow buttons (“<” “>”) to navigate.

4.2.3 THE IMAGE PROCESSING AREA

The image processing area is the main work area of the viewer window in which the loaded images are displayed and processed. Changes (e.g. windowing, zooming/panning, flipping/rotating, etc.) and additions (e.g. measurements and annotations) to images are made in the image processing area.

4.2.3.1 RULER AND ORIENTATION INDICATORS

The ruler on the right side of each view indicates the size of the displayed image (also available in the Print manager). The measurement is given in centimeters (cm), each segment comprising 1 cm; the total length being 4 cm.

The ruler is not shown, if the "Pixel Spacing" attribute is missing in the DICOM header of the image.

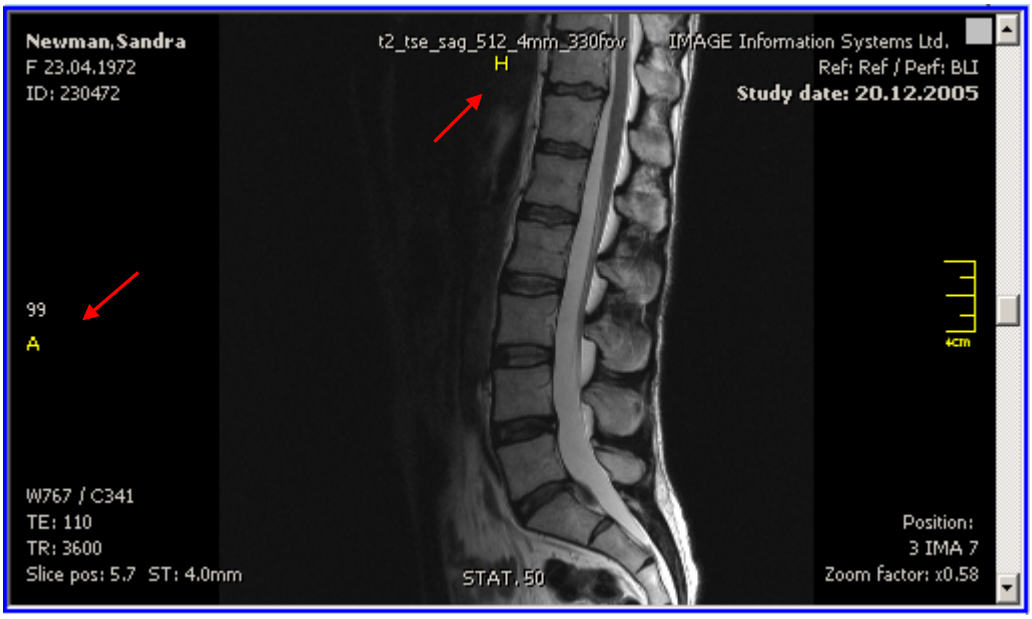


Image with orientation indicators

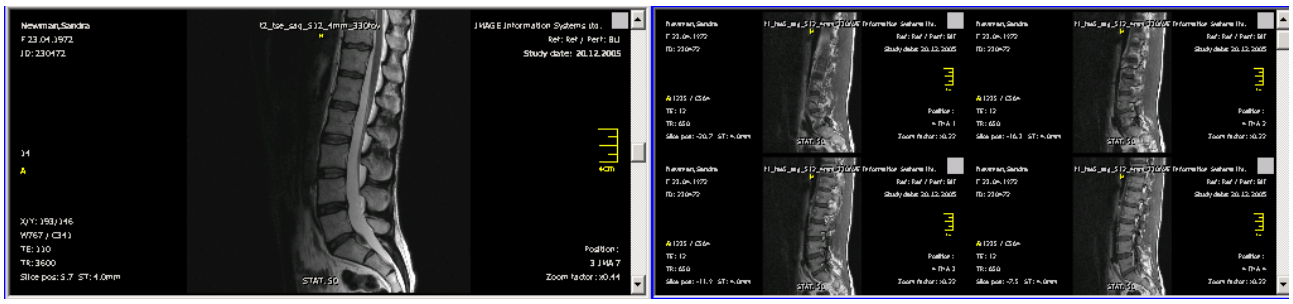
The yellow markers in the images are orientation indicators. Those indicators help to determine the orientation of an image, e.g. right or left, top or bottom. Those indicators will remain in the correct position even if an image is flipped or rotated:

- R = right
- L = left
- H = head
- F = foot
- A = anterior
- P = posterior

Also combinations of these indicators are possible.

4.2.3.2 SCREEN TILING OPTIONS

When a study contains more than one series or the series include several images, it can be helpful to divide the image processing areas into several so-called views. Thus, it is possible to see several series at once or also to compare series with each other. Additionally a series can be split within one view to display all its images or to make visible the individual frames of a multi-frame image.



Screen tiling with series view and tiling on image level

The screen tiling options are accessible either:

- by using the screen tiling button in the bottom toolbar, or
- by selecting the screen tiling entry from the “Tools” menu.

The screen-tiling function allows splitting the image processing area both on series level and on image level. On series level the image processing area will be divided into the selected number of views. On image level the active view itself will be divided into segments.

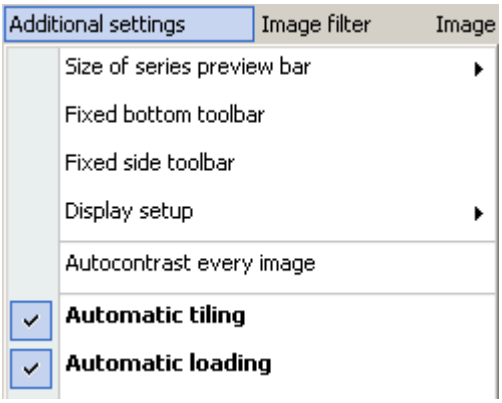
Both on series and on image level, the same tiling options are available:

- 1x1
- 2x1
- 3x1
- 4x1
- 1x2
- 2x2
- 3x2
- 1x3
- 2x3
- 3x3
- 4x3
- 3x4
- 4x4
- 5x5

When accessing the screen tiling options via “Tools” menu or shortcut the same sub-menu will open for the selection of the appropriate tiling.

4.2.3.3 AUTOMATIC TILING AND LOADING

These options are only configurable in the “Additional settings” menu or by defining shortcuts. The settings will be remembered as long as the application remains open. As settings cannot be stored permanently on a medium, any settings changed from the default will not be remembered for the next start of the application.



- "Automatic tiling": During the loading process of a study, the application counts the number of available series and automatically divides the image processing area into the appropriate tiling. The automatic tiling is activated by default and cannot be deactivated.

- "Automatic loading": The viewer automatically loads the different series of one study into the preset tiling: e.g. the first series when working with a 1x1 tiling, two series with a 2x1 or 1x2 tiling. In combination with "Automatic tiling" all available series are loaded automatically in the appropriate tile. If not activated, the image processing area will, at first, remain empty. You will have to load the series manually into the views from the series preview bar (by drag and drop or double-click).

4.2.4 THE BOTTOM TOOLBAR

The bottom toolbar offers the opportunity to easily access the most important image processing functions with just one click.

iQ-LITE toolbar

To open the bottom toolbar, move your mouse to the bottom of the screen. The buttons in the toolbar are mostly self-explaining; some settings are accessible through right-clicking on them. Their individual functions are described in the respective sections of this user manual.

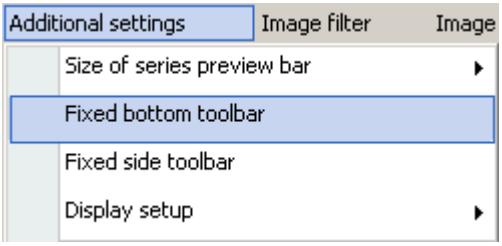
When a tool is selected a yellow frame appears around the button to show that it is currently active. In some cases the yellow frame can also indicate that an image was modified using a particular function:

- A yellow frame around "color remap" means that color scheme changes were made in an image (e.g. inverted).
- A yellow frame around "flipping/rotating" indicates that an image is somehow modified (rotated or flipped). Additional indicators will be added to the text overlay of the affected image(s).
- A yellow frame around "text overlay" is visible when the text overlay is active. This is the case by default when a study is loaded into the viewer.

4.2.4.1 FIXING THE BOTTOM TOOLBAR

Usually the bottom toolbar is hidden to increase the space available for the image display in the image processing area. It only appears when you move the mouse to the bottom of the screen.

But it is also possible to fix the toolbar so that it is constantly displayed and not automatically hidden when the mouse is removed. As settings cannot be stored permanently on a medium, the settings will not be remembered for the next start of the application.



To fix the bottom toolbar:

- Go to the menu “Additional settings”.
- Select the entry “Fixed bottom bar”.

4.2.4.2 THE DEFAULT BOTTOM TOOLBAR

iQ-VIEW comes with a default bottom toolbar containing twelve general image processing tools as well as the “Close viewer” button.

iQ-LITE toolbar

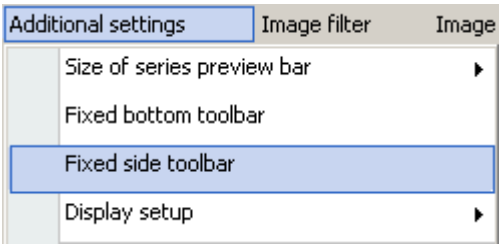
4.2.5 THE SIDE TOOLBAR

The side toolbar contains some additional functions. The buttons in this toolbar are fixed and can neither be removed nor configured. To access this toolbar, move your mouse to the left side of the screen.

4.2.5.1 FIXING THE SIDE TOOLBAR

Usually the side toolbar is hidden to increase the space available for the image display in the image processing area. It only appears when you move the mouse to the left side of the screen.

But it is also possible to fix the toolbar so that it is constantly displayed and not automatically hidden when the mouse is removed.



To fix the side toolbar:

- Go to the menu “Additional settings”.
- Select the entry “Fixed side toolbar”.

If you move your mouse to the left border of the screen, the hidden side toolbar will open and offer the following functions:

4.2.5.2 SYNC

“Sync” synchronizes different series at the current position, even if the images of those series are made of differently thick layers. Activating the button will synchronize all series displayed in the image processing area.

The synchronization of different series is also possible by selecting other views besides the activated one (blue frame). To do that, click into the view with the series you wish to include in the synchronization while holding the [CTRL] key pressed. A yellow frame will be displayed around the view(s). Afterwards click into the activated tile (blue frame) and use your mouse to scroll through the series.

4.2.5.3 BIND

“Bind”: All currently loaded series of one study will virtually be bound together in one view. This allows the scrolling through all series without switching from one view to the next. That means, when browsing through a series and reaching the first or last image, the viewer will automatically switch to the next series, e.g. to easily browse through brainstem and brain tissue as if they were one series or browse through a whole MRI with a lot of sequences.

4.2.5.4 SCOPE

With the “scope” (or viewport) function you can select whether changes in windowing, zooming and panning shall be applied only to the current image or the whole series.

“Series scope”: Windowing, zoom and pan modifications made in the currently active image will not only be applied to that particular image but to the whole series.

“Image scope”: Windowing, zoom and pan modifications made in the currently active image will only be applied to that particular image. The rest of the series will be left untouched.

NOTE:

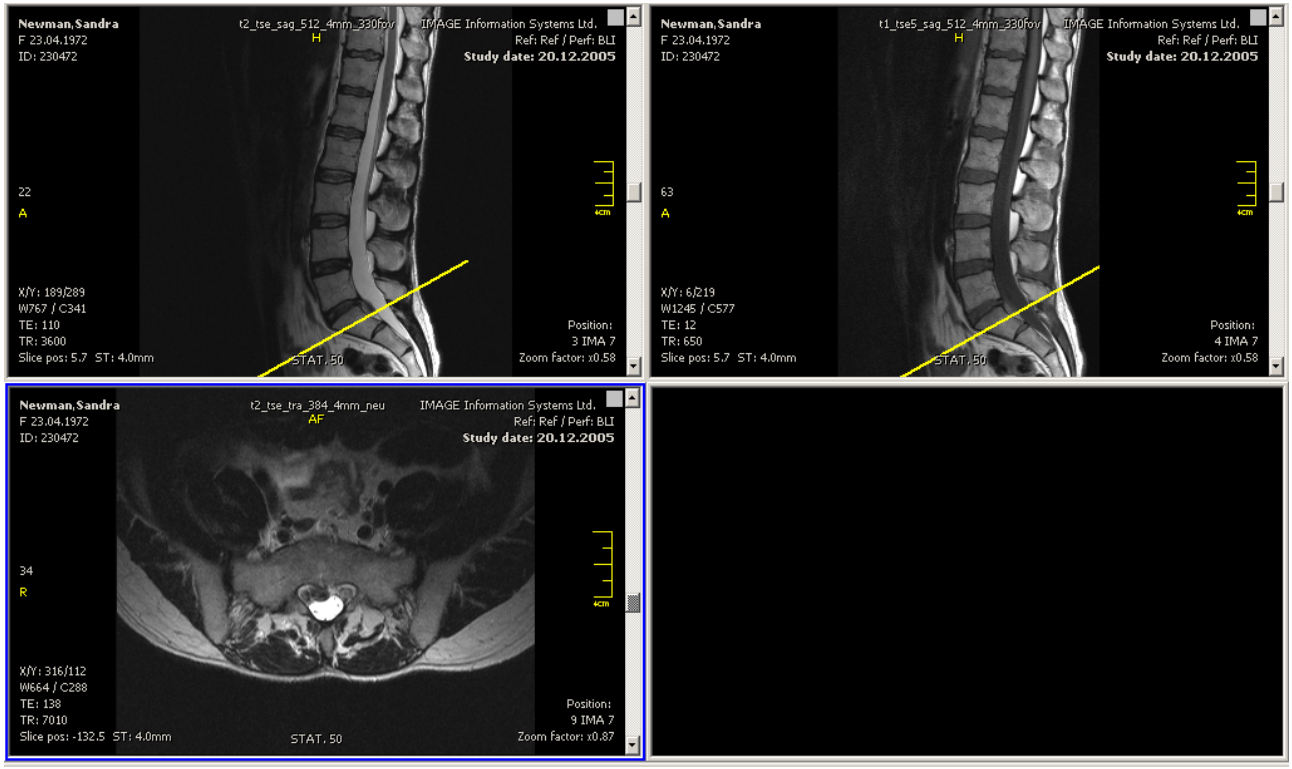
The scope selected for one series will be used for all other series of the same study as well. If the scope selected for one series is changed while processing a different series, the scope-based changes of the first series will be set back.

4.2.5.5 LINES

"Lines": This is a scoutpilot function for easier orientation within a study. It is particularly helpful in multi-slice studies taken in different section planes. When activated, the position of the current slice will be displayed in the other series and section planes.

NOTE:

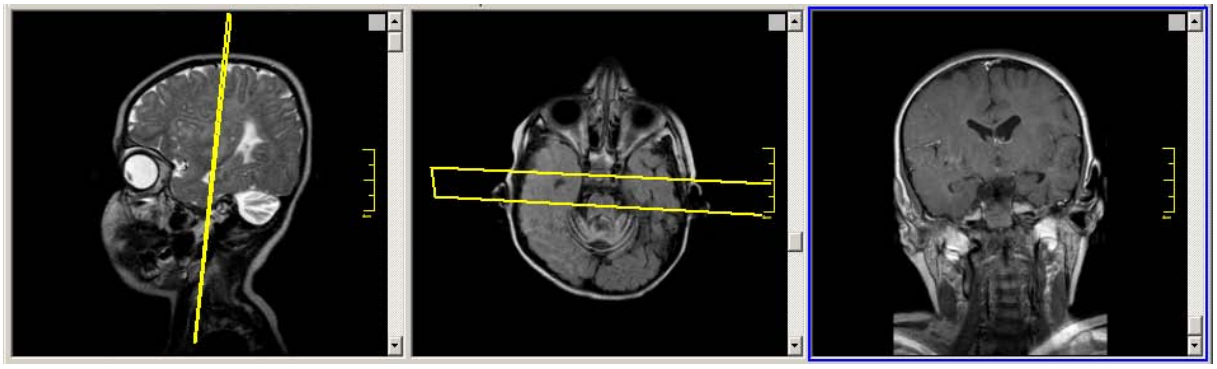
iQ-LITE offers an additional orientation tool – the soutpilot. For information about this tool, see section 4.2.14 Orientation tools.



Lines display

Sometimes the scoutline can turn into a rectangle or parallelogram. This happens when the section planes are oblique.

The following example shows this quite clearly: the third series is the reference series (blue frame). Scoutlines are applied to series 1 and 2. Since the section plane in series 3 is in a non–orthogonal, oblique relation to the other planes, the scoutlines displayed in series 1 and 2 cannot be shown in a line but need to include the obliqueness. They are therefore displayed as parallelograms.

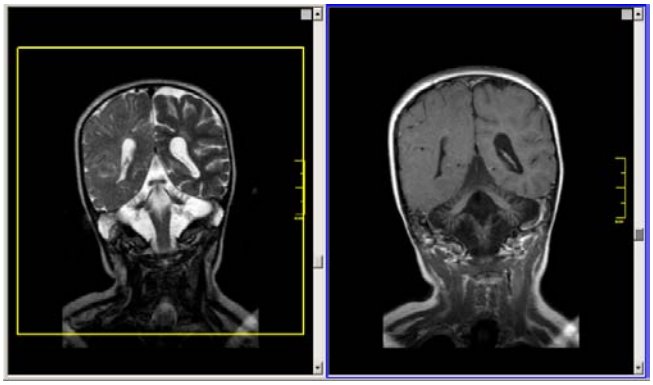


Lines display including obliqueness

Under certain circumstances this oblique lines display may complicate the orientation. The iQ-VIEW workstation therefore offers a 3D position display for easier orientation (not available in iQ-LITE).

In other cases a frame (sometimes incomplete) is shown around a series that seems to have been acquired in exactly the same section as the reference series.

This happens when the field of view and the section alignment are different or if a non-orthogonal cross-section was used. In this case the section plane is again slightly oblique, leading to this lines display. This may especially occur in manually planned MRI exams.



Lines display with differences in viewport

The application checks if the viewport (the field of view plus the section alignment) are mostly identical (tolerance limit +/- 5 pixels). If the viewport is within this tolerance limit, no frame will be displayed.

4.2.5.6 OFF

"Off": All side toolbar functions (Sync, Bind and Lines) are disabled.

4.2.6 THE MENU BAR

The menu bar is divided in different sections:

- "File"
- "Tools"
- "Additional settings"
- "Image filter"
- "Image selection"
- "Navigation"
- "Help"

The main tools and functions listed in the menus are also available as toolbar button. But since not all tools are available in the bottom toolbar, it might become necessary to use the respective menu item instead. Other functions are only accessible using the menus.

NOTE:

Some menu items are grayed out, as these functions are only available in the iQ-VIEW or iQ-VIEW PRO workstations, but not in the iQ-LITE viewer. These functions will not be described in this manual.

Their individual functions are described in the respective sections of this user manual.

4.2.7 CLOSING THE VIEWER AND RETURNING TO THE STUDY BROWSER

4.2.7.1 CLOSING THE VIEWER

The viewer window can be closed in three different ways:

- by clicking on the "x" button of the window,
- by selecting the "Close viewer" button in the bottom toolbar, or
- by going to the "File" menu and selecting the entry "Close viewer"

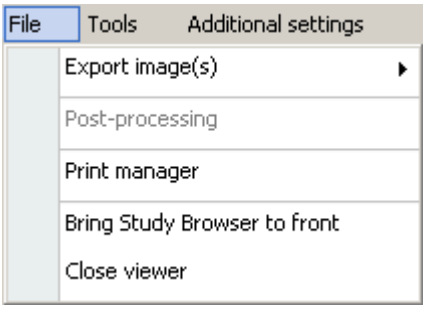
"Close viewer": Closes the viewer window and returns to the study browser (if placed on the same display).

4.2.7.2 BRINGING THE STUDY BROWSER TO FRONT

To return to the study browser it is not necessary to close the viewer. Both applications can run simultaneously and the study browser can be brought to the front without specifically closing the viewer.

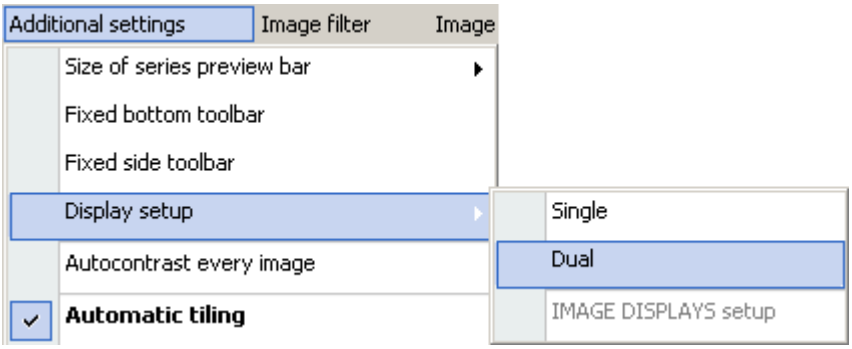
This is possible if viewer and study browser are placed on different displays or if (on a single display) the study browser window is smaller (no full-screen) than the viewer window. Thus, new studies can be selected from the study list and are automatically loaded into the viewer window.

Go to the "File" menu and select the entry "Bring Study Browser to front". This moves the study browser from the background to the front and places the viewer into the background.



4.2.8 DISPLAY SETTINGS

The viewer application can be run on a single display or on a dual display system.

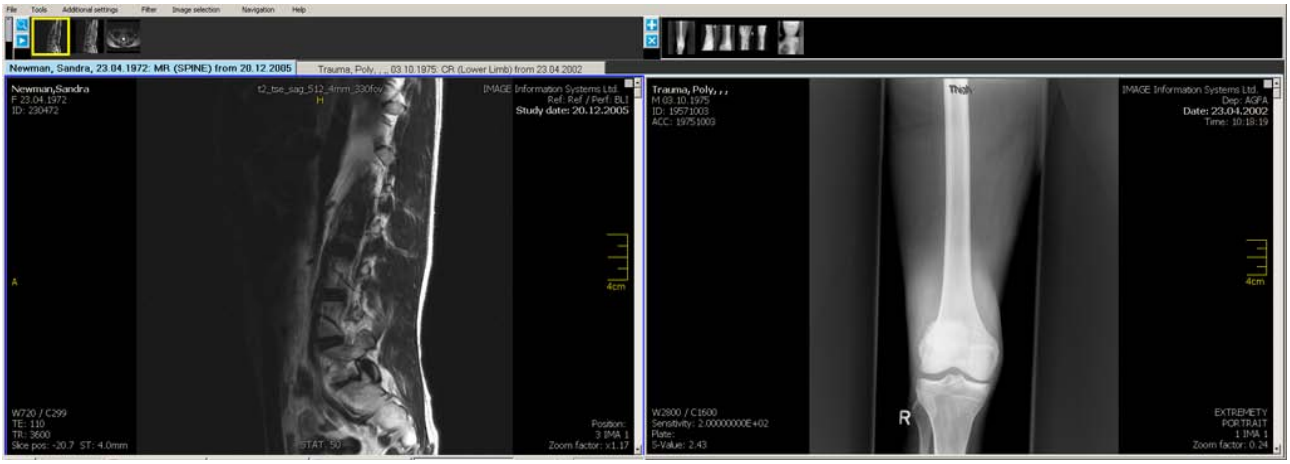


4.2.8.1 SETTING UP THE VIEWER ACROSS TWO DISPLAYS

By default, the viewer is started only on one display. If you have two displays available and connected to your computer, you can set up the viewer across both displays. To do that:

- Go to the "Additional settings" menu and select the entry "Display setup".
- There activate the use of "dual" displays.
- Make sure that the viewer window is not maximized and drag it across the two screens.
- Adjust the position and the size of the viewer window.

As settings cannot be stored permanently on a medium, the dual display settings will not be remembered for the next start of the application. They can only be used as long as the application is kept open.



Two studies loaded in a dual displays setup

4.2.9 TREATMENT OF SINGLE-FRAME AND MULTI-FRAME IMAGES

Multi-frame and single-frame DICOM images are treated equally. The stack and cine mode function is working for both; series of both can be shown in a sequence. It is also possible to display the individual frames of a multi-frame image (sequence) in different tiles, to make a tiling, to select specific frames and to export or print them.

4.2.10 NAVIGATING BETWEEN IMAGES, SERIES AND STUDIES

The viewer offers different ways to navigate between different images, series and studies loaded into the viewer.

The most important navigation options are available both as a menu entry and as a toolbar button. Some options, however, can only be accessed using the “Navigation” menu.

4.2.10.1 THE “NAVIGATION” MENU

The options in the “Navigation” menu may be used to navigate within a series, within a study or even within all studies loaded into the viewer. In addition either the next or the previous patient study from the current study list (in the study browser) can be loaded into the viewer.

Within a series:

- “Next image”: opens the next image in the series in the currently active tile.
- “Previous image”: opens the previous image in the series in the currently active tile.
- “First image in series”: opens the first image of a series in the currently active tile.
- “Last image in series”: opens the last image of a series in the currently active tile.

Within a study:

- “Next series”: opens the next series in a study in the currently active tile.
- “Previous series”: opens the previous series in a study in the currently active tile.
- “First series in study”: opens the first series in a study in the currently active tile.
- “Last series in study”: opens the last series in a study in the currently active tile.

Within studies:

- “Next study”: opens the next study in the currently active tile (if more than one study is loaded into the viewer).
- “Previous study”: opens the previous study in the currently active tile (if more than one study is loaded into the viewer).
- “Next study in study list”: loads the next study from the current study list (in the study browser) into the viewer.
- “Previous study in study list”: loads the previous study from the current study list (in the study browser) into the viewer.

Some of these navigation options are available as default viewer shortcuts.

4.2.11 SELECTING INDIVIDUAL SERIES FOR VIEWING

In the viewer you select individual series via thumbnail in the series preview bar. Either double-click or simply use drag and drop to transfer the series into an available view of the image processing area.

4.2.12 COMPARISON OF STUDIES

When more than one study is loaded into the viewer, you can switch between the available studies by changing the tab. A click on another study tab will load the new study into the image processing area.

If, however, you want to select series from different studies, it is necessary to keep the display in the image processing area and only to add the desired series from another study.

To do that, select the "+" sign in the series preview bar to open the preview bar of the second study. If more than two studies are loaded, a sub-menu will pop up where you can select the appropriate study. The second series preview bar will show the series thumbnails of that study and you can choose the series you need and drag it into the appropriate view in the image processing area (alternatively, you can double-click on it to load it into the currently active view). This is an easy way to manage the comparison of studies.

NOTE:

On dual display systems with two studies loaded, one will be opened on the primary display while the other one will automatically be displayed on the second screen. This makes it even easier to compare different studies with each other.

To compare two studies in a 2x1 mode, use the screen tiling function either in the bottom toolbar or in the menu (for more information see section 4.2.3.2 Screen tiling options) and select the option 2x1 on series level. The views in the image processing area will display the first study. Place the series you wish to compare into the left view. To add the second study to the right view, simply open the second series preview bar by using the "+" button in the series preview bar and select the correct study (if more than one is available). This will display the series thumbnails of the second study but does not change the display in the image processing area. Now drag and drop the desired series to the right view.

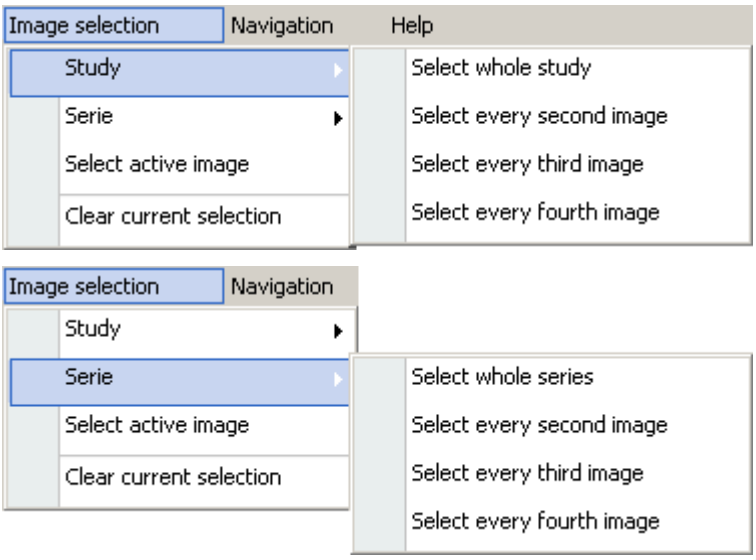
4.2.13 SELECTION OF IMAGES, SERIES AND STUDIES

When images, series or studies shall be exported either to another image format (e.g. JPEG, BMP, TIFF or RAW), to a video file (AVI) or to a Windows® printer, it might become necessary to first mark these images for export. This is the case when:

- only specific images (either from one or several series),
- only several but not all series of a study, or
- data from different studies

shall be exported.

Individual images can be marked or unmarked using the checkbox in the upper right corner of each view. When an image is marked, the checkbox will be marked red. Further selection options are available in the "Image selection" menu:



Using the "Image selection" menu it is possible to mark images on series or on study level. You may:

- select a whole study or series
- select every second image of a study or series
- select every third image of a study or series
- select every fourth image of a study or series

It is further possible to mark the currently active image ("select active image") and to "clear current selection" to reset all selections.

4.2.14 ORIENTATION TOOLS

Especially in multi-slice studies, such as CT or MRI exams, it can become difficult orienting oneself within the different section planes. This is where orientation tools such as scoutpilots and lines displays can become a remedy. iQ-LITE offers several orientation tools to help the users.

4.2.14.1 "LINES" MODE

The "Lines" mode in the side bar (hidden on the left side of the screen) is basically a scoutpilot function that simplifies the orientation in a study by displaying the position of the current slice (active frame) in the other series and section planes. It is particularly helpful in multi-slice studies taken in different section planes and can be activated easily without having to have additional windows open impeding the view onto the image processing area.

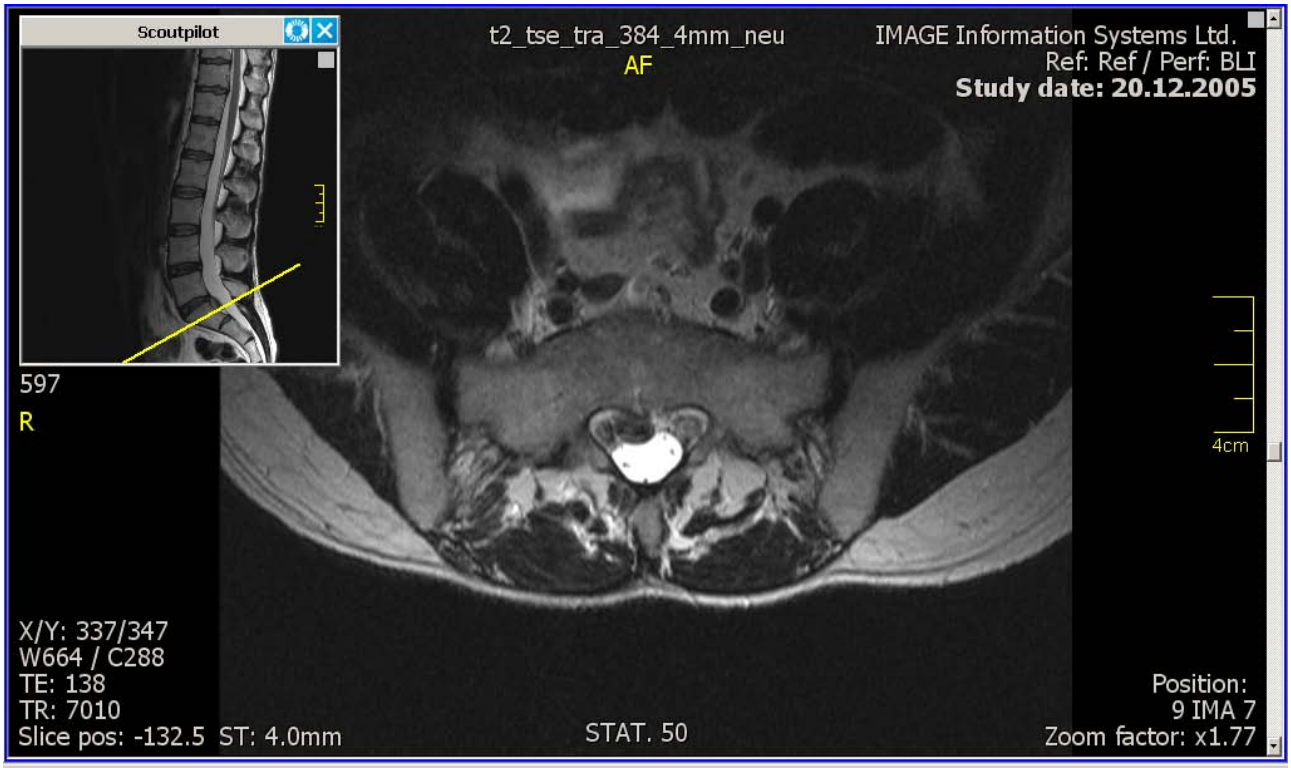
NOTE:

For further details, please refer to section 4.2.5.5 Lines.

4.2.14.2 SCOUTPILOT

The scoutpilot is a position indicator and provides the user with positional information about images. This function allows users to orientate themselves within the series.

The “Scoutpilot” function is accessible using the respective entry in the “Tools” menu.



Scoutpilot example

The scoutpilot window can be moved to another position so that it does not hide the view of the necessary views of the image processing area. Simply drag and drop the window to the desired position. The size of this window, however, is fixed.

When opened, the scoutpilot always shows the currently active image (blue frame).

The image in the scoutpilot can be processed in the following ways:

- Using the center mouse-button (or scroll wheel), it is possible to change the window level.
- With the left mouse-button you can zoom the image when in the zoom zone (border of the image). The mouse pointer turns into a magnifier.
- Also with the left mouse-button you can pan the image when in the pan zone (center of the image). The mouse pointer turns into a hand.

“Refresh”: This button can either be used to reset windowing, zoom and pan changes made in the image or by selecting a new image as the reference image. To do that, simply scroll the view in the image processing area down to the image you want to use as reference. It must be the active image

(blue frame). Afterwards click the scoutpilot's refresh button to update the reference image.

 "Close": Closes the scoutpilot window.

4.2.15 PRESENTATION STATES IN iQ-LITE

Presentation states (PR) are independent DICOM SOP instances containing information on how a particular image should be displayed. Thus, the presentation state may contain, for instance, windowing, zooming and panning values, information about rotation or flipping and other visual display elements defined in the DICOM standard. What presentation states do not contain is pixel data. Therefore PR can only be used in combination with an existing DICOM image.

When a presentation state is applied to an image the image is then displayed with all the visual specifications defined in that presentation state. The advantage of using presentation states is that it is always possible to revert back to the original image because the underlying pixel data of the image is not modified but rather displayed differently.

4.2.15.1 USE OF PRESENTATION STATES IN iQ-LITE

It is important to note that iQ-VIEW – which is the basic for the iQ-LITE viewer – does only support its own presentation states. While images retrieved from other DICOM stations may already contain their own presentation states, iQ-VIEW will currently not be able to make use of these presentation states.

As a result, iQ-LITE media created with the radiological workstation can only contain PR files that have been created and stored with an iQ-VIEW PRO station. Presentation states of other manufacturers will be ignored during the export and will therefore not be placed on the medium.

With iQ-VIEW PRO created PR for studies will also be correctly used within iQ-LITE.

Also in iQ-LITE, modifications made in an image, e.g. window level changes, zooming/panning, flipping/rotating, and adding of measurements and annotations, will be treated as a presentation state. They will, however, only be cached for the current viewer session. They are deleted when the viewer is closed and the next time the images are loaded, they will be displayed again with their original pixel data.

NOTE:

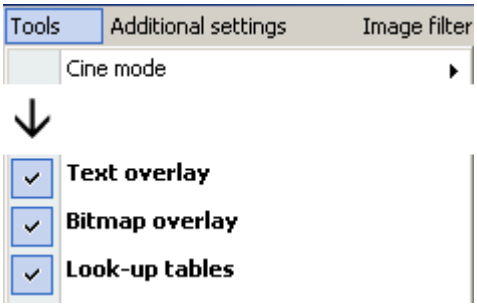
Due to the use of presentation states in iQ-LITE the handling of some image processing features, such as zooming and panning, have slightly changed in comparison to earlier iQ-LITE versions. These adaptations were necessary to adhere to the specifications laid down in the DICOM standard.

4.2.15.2 CLEARING PRESENTATION STATES

It is possible to remove changes made in an image (e.g. windowing, zoom/pan, flip/rotate, etc.). These presentation states can simply be deleted using the "reset" function either as toolbar button or entry in the "Tools" menu. Alternatively, also the entry "Clear presentation states" in the "Tools" menu can be used.

This will also delete measurements and annotations made in the images. These can additionally be deleted manually or the last or all measurements/annotations can be deleted using the appropriate entries in the “Tools” menu. For more details on the treatment of measurements, please see section 4.2.20 Measurement and annotation tool.

4.2.16 OVERLAYS AND LOOK-UP TABLES



4.2.16.1 TEXT OVERLAY

The text overlay for the images, stating patient, study and series information necessary to identify the images displayed in the image processing area, is by default activated. This is done to assure that important information, such as lossy image compression, is always recognized by the user.

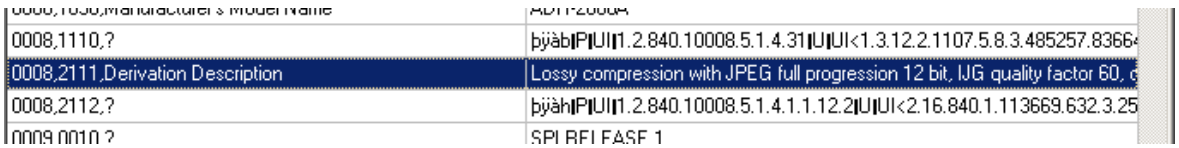
The “text overlay” function to activate and deactivate the overlay information is accessible both as toolbar button and in the “Tools” menu.

“Text overlay”: Is used to hide the text overlay information activated by default. Selecting this function again will reactivate the text overlay.

4.2.16.2 DISPLAY OF LOSSY IMAGE COMPRESSION

If an image displayed in the image processing area was once lossy compressed, this information will be shown in the text overlay. Make sure to activate the text overlay to see the compression information.

The complete compression information is shown in the DICOM header dump of that particular image. See also section 4.2.28 DICOM header information.



WARNING:

Lossy compressed images may have no diagnostic quality. Do not use them for making medical findings!

4.2.16.3 BITMAP OVERLAY

If activated, a potential bitmap overlay in an image is displayed. If you do not wish to see the bitmap overlay, simply deactivate this function. It is independent from the text overlay.

This function can only be accessed using the "bitmap overlay" entry in the "Tools" menu.

4.2.16.4 LOOK-UP TABLES

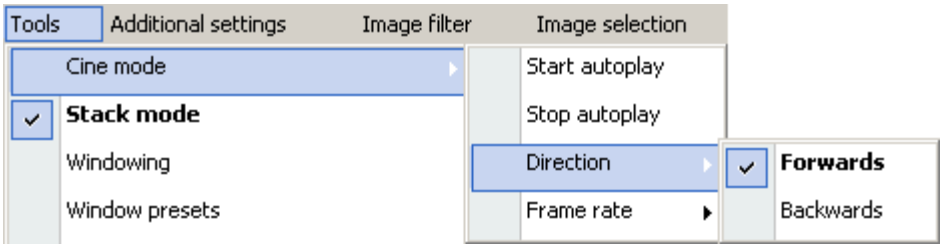
By default this feature is enabled. iQ-LITE is thus able to interpret potentially embedded look-up tables in order to display a DICOM image the way it is displayed on the source machine (another form of center/window information).

This function can only be accessed using the "look-up tables" entry in the "Tools" menu.

4.2.17 CINE AND STACK MODE

Stack and cine mode make it possible to either manually or automatically browse through all images of a series (or even the complete study when used in combination with the "Bind" mode; see section 4.2.5.3 Bind).

Both the stack and the cine mode are available either using the respective toolbar button or the "stack mode" and "cine mode" entries in the "Tools" menu.



4.2.17.1 STACK MODE

The stack mode is always activated by default and can be used even if other processing functions are activated. Browsing through images with the stack mode is possible in different ways:

- Use the mouse scroll-wheel to move through a series. (This function is not available if "scroll zoom" is activated.)
- Use the scrollbar to the right of every view to scroll through a series of images by pulling the controller up and down.

- Use the default shortcuts “arrow down” and “arrow up” to scroll either to the next images or the previous images.

For further navigation options see section 4.2.10 Navigating between images, series and studies.

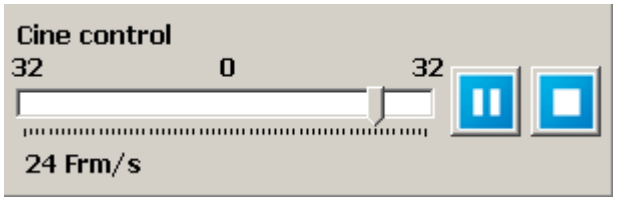
4.2.17.2 CINE MODE

With DICOM multi-frame images (e.g. angiographic or ultrasound images) as well as single-frame images (e.g. CT, MR) you can run the series automatically as a sequence. Either right-click on the “Cine mode” button in the bottom toolbar or select the “Cine mode” entry in the “Tools” menu to access the cine mode sub-menu:

“Start autoplay”: The playing of the cine mode will be started automatically. A separate cine mode player opens where you can control the cine playing.

“Pause autoplay”: With a click onto the pause button, the cine play will temporarily be suspended. A second click restarts the cine play.

“Stop autoplay”: A click onto the stop button will stop the cine play and close the cine mode player.



The “cine control” can be moved to a different part of the screen simply by clicking into it and dragging it into another position.

Further settings:

- “Direction”: The cine can either be played “forwards” or “backwards”. Select the respective entry from the sub-menu or move the controller in the cine mode player either to the right (including the correct frame rate) for forwards playing or to the left (including the correct frame rate) for backwards playing.
- “Frame rate”: Using the entry in the cine mode sub-menu you can select several pre-defined frame rates for the cine run (6, 12, 24, 32 fps = frames per second) or select the default frame rate (the one defined in the DICOM header for multi-frame images; or 25 fps for single-frame images).

The direction and the frame rate can also be steplessly adjusted in the cine control itself, moving the controller.

4.2.18 WINDOWING TOOLS

In many cases, the brightness and contrast in DICOM images are already well-set when the images are created at the modalities. Sometimes, however, it might become necessary to change the window level of images, e.g. when the series is too dark or the contrast is not good enough to see specific tissues.

iQ-LITE offers two ways of changing the center/window level of DICOM images:

- dynamic windowing, and
- the use of window presets.

In iQ-VIEW/PRO there is also the option to use a static windowing. This function is, however, not available for the iQ-LITE viewer.

4.2.18.1 APPLYING WINDOW CHANGES

Using the "Scope" function, described in section 4.2.5.4 Scope, it is possible to apply window changes either to a whole series or to an individual image only:

- Select "Image scope" to only change the center/window values of a particular image.
- Select "Series scope" to apply the windowing changes made in one image to all images of the same series.

NOTE:

Window changes made will be set back when the scope is changed (from series to image or from image to series). You can then apply the windowing again according to the newly selected scope.

4.2.18.2 DYNAMIC WINDOWING

The dynamic windowing is the default form of window leveling in iQ-LITE. Dynamic windowing means that, when windowing within a series, the changes in center/window are calculated on the basis of the original center/window values as they are stated in the DICOM header of each image. As a consequence, all images of a particular series may still have different center/window values. This most often occurs in MR series where the contrast and brightness varies from image to image.

Example: If one image has original W/C values of 700/300 and a second one original values of 730/310, and you increase the window value of the first image by 15 and decrease the center value of that image also by 15 (new: 715/285), also the values of the second image will be increased (window) and decreased (center) by 15 (new: 745/295).

Since dynamic windowing is the default windowing in iQ-LITE, this function can be accessed in different ways:

- Using the center mouse-button (scroll-wheel) by holding it pressed and moving the mouse up/down and left/right. This option is available also if other tools are currently selected
- Selecting the "Windowing (dynamic)" button in the bottom toolbar. The windowing itself is

then done by moving the mouse up/down and left/right while keeping the left mouse button pressed.

- Going to the “Tools” menu and selecting “Windowing”. The handling is then the same as for the toolbar button (see above).

When the windowing function was explicitly activated, the mouse pointer will turn into a specific cursor icon indicating the use of windowing for easier handling.

4.2.18.3 USING WINDOW PRESETS

The second possible form of applying center/window changes to images is real-time window leveling by using pre-defined window presets.

The iQ-VIEW radiological workstation already comes with a number of window presets and users can define their own and add them to the presets list. The configuration file, in which these presets are stored, is also copied to the medium during its creation. Thus, all these presets are also available for use in iQ-LITE. iQ-LITE includes further auto-contrast functions and a ROI window.

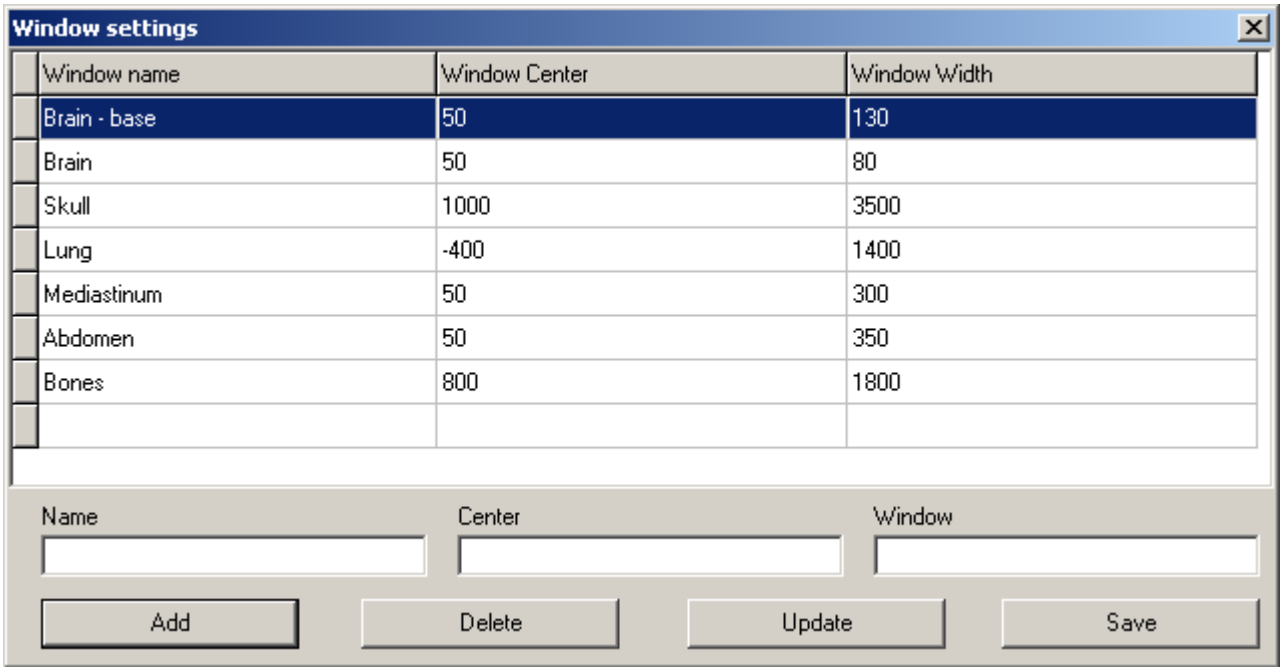
The window presets pop-up menu can be accessed by right-clicking onto the “windowing (dynamic)” or by selecting the entry “window presets” in the “Tools” menu:

You can select between several standard window settings (presets):

- Brain – base
- Brain
- Skull
- Lung
- Mediastinum
- Abdomen
- Bones

Additional or different customized settings may be available in case the iQ-VIEW user has modified or extended the default list.

“Custom settings”:
To either change the existing presets or to add your own, select „custom settings“. A configuration window will open, where you can add further presets (“Add”), delete or modify existing presets (“Clear” and “Update”). After you made the necessary changes, save your settings by clicking on “Save and exit”. Please keep in mind that these settings cannot be stored permanently but can only be used as long as iQ-LITE is not shut down.



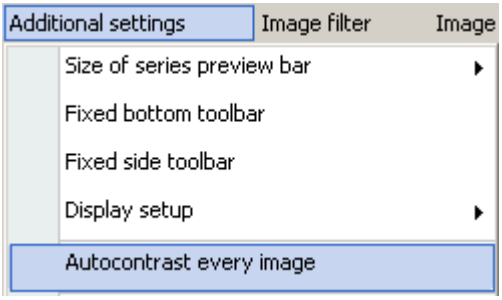
Default window presets

"ROI window":
ROI windowing is an auto contrast in a selected area. It is used especially for CR and RF images to generate an optimal contrast in the region of interest.

"Auto contrast":
This option uses an auto-contrast either on the current image (with "Image scope") or on a whole series (with "Series scope"). The other series remain unaffected.

There is, however, an auto-contrast function available, with which an auto-contrast can be generally applied. If activated, the auto-contrast will be used for all loaded studies, until being deactivated again.

- Go to the "Additional settings" menu.
- Select the entry "Auto-contrast every image".
- All images of the currently selected study will be displayed with an auto-contrast.



NOTE:

The window presets can, of course, also be used in combination with a tiling on image level (several images in one view). However, when displaying a series like this, it will not be possible to apply a window preset to only one image of the series (scope = image). For technical reasons, the selected window preset will be applied to the complete series. If you wish to only change the center/window values of one image using a window preset, please use a tiling on series level.

4.2.19 COLOR REMAPPING

Color remapping assigns a color to each gray tone of an image, therefore rendering any grayscale image (MONOCHROME1 and MONOCHROME2) into color. Thus, areas with low contrast can be better displayed. Color remapping is particularly used in nuclear medicine. This is why iQ-LITE also provides a number of nuclear medical color schemes.

The color remapping options can be accessed:

- by using the "color scheme" button in the bottom toolbar, or
- by going to the "Tools" menu and selecting the entry "color scheme".

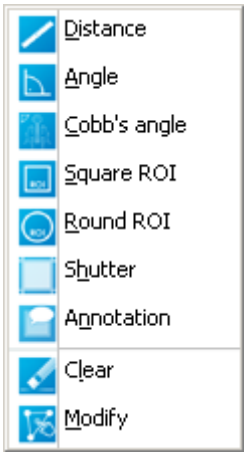
"Color scheme": Offers several general options: normal grayscale output ("B/w"), inverted grayscale output ("B/w negative"), color remapping ("Color remap") and inverted color remapping ("negative color remap"). Additionally, these NUC color schemes are available:

- Hotiron
- Rainramp
- GE_Color
- Gold
- NIH
- NIH_Ice
- Bone
- Cardiac
- Spektrum
- Blackbody

4.2.20 MEASUREMENT AND ANNOTATION TOOLS

iQ-LITE offers a variety of measurement (distances, angles, ROI, etc.) and annotation tools with which it is easily possible to annotate images. The tools are available both as toolbar button and menu entry. To access the tools:

- Go to the "Tools" menu and select the entry "Measurement tools" to access the sub-menu with all functions.
- Use the "Measurement tools" button for the bottom toolbar. A right-click on that button opens a sub-menu where you can find all measurement and annotation functions.



NOTE:

Measurements and annotations can be applied also to rotated and mirrored images. Excluded are only images rotated in a custom angle as this is not defined in the DICOM standard. If images with measurements and annotations are rotated in a custom angle, these changes are momentarily not visible, but they will be restored as soon as the rotation is reset or one of the standard rotation options is selected.

4.2.20.1 DISTANCE MEASUREMENTS

"Distance": This tool is used to measure a distance. To measure a distance, simply click with your mouse on one end of the distance you want to measure and hold the left mouse button pressed until you reach the end point. The result is given in millimeters.

NOTE:

If the result is not given in millimeters but in pixels (pxl), it means that the pixel spacing is missing in the affected image. The pixel spacing value is needed by iQ-LITE to know how big a pixel is in the image. This information is needed to calculate a distance.

4.2.20.2 ANGLE MEASUREMENTS

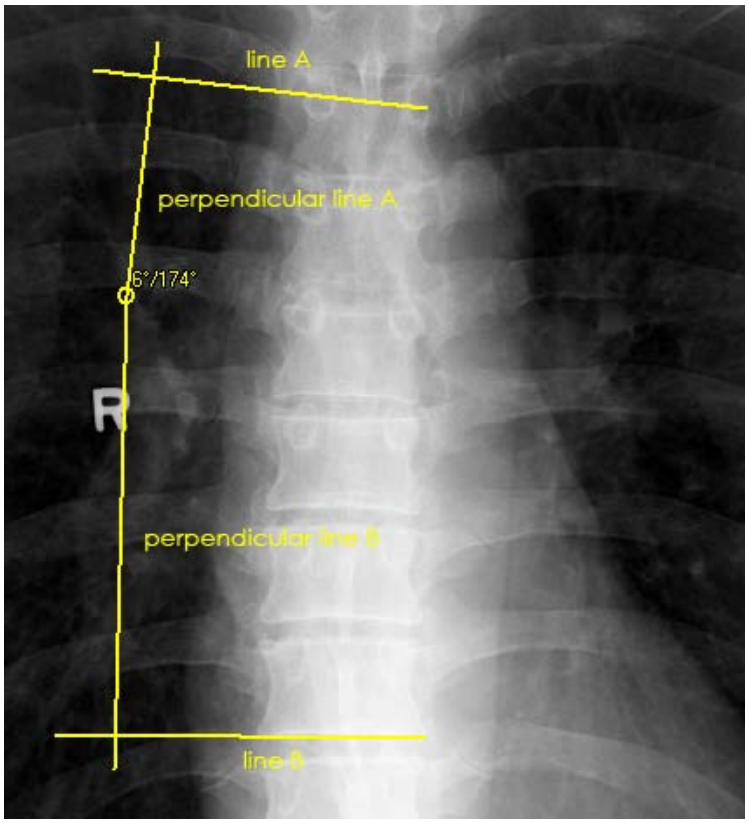
"Angle": This tool is used to measure an angle. To measure angles, draw the first ray like drawing a distance measuring line. The second ray does not necessarily have to subtend the first ray.

4.2.20.3 COBB'S ANGLE MEASUREMENTS

The Cobb's angle is a method of measuring the degree angle of the spinal curve. The technique to measure the scoliosis curve consists of four lines constructing a geometric figure.

"Cobb's angle": First draw a line along the superior edge of the vertebra and extend the line into the margin of the X-ray (line A). iQ-LITE will automatically add the perpendicular line from line A downward. The next step is to draw another line along the inferior vertebra; again extend it into the margin of the X-ray (line B) until the perpendicular line upwards from line B meets the one from

line A. The angle that is formed by the two meeting perpendicular lines is the Cobb's angle.



Cobb's angle measurement

4.2.20.4 SQUARE ROI MEASUREMENTS

"Square ROI": With this tool it is possible to measure the density in a selected rectangular area (ROI). To measure the density of a certain area, select the area you want to measure. A rectangle is drawn over the specified area and the mean, maximum and minimum density value is given. For CT images the results are automatically displayed in Hounsfield Units (HU). In addition, the results state also the standard deviation.

4.2.20.5 CIRCULAR ROI MEASUREMENTS

"Circular ROI": Measuring the density in a selected elliptical/circular area (ROI) is possible using this tool. To measure the density of a certain area, select the area you want to measure. An ellipse/circle is drawn over the specified area and the mean, maximum and minimum density value is given. For CT images the results are automatically displayed in Hounsfield Units (HU). In addition, the results state also the standard deviation.

NOTE:

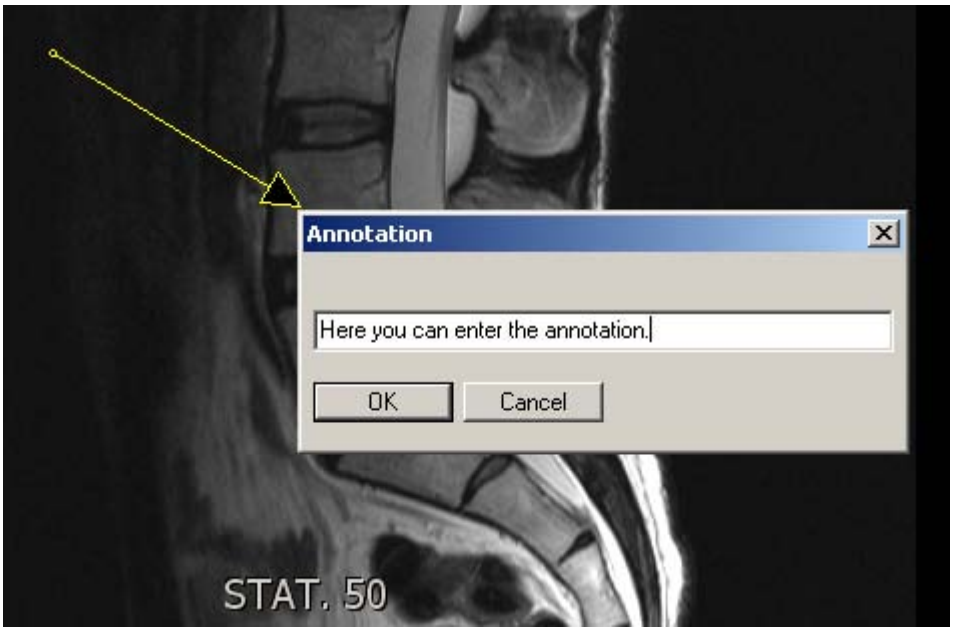
If you want to make sure that the area you draw will be exactly a circle – and not some kind of ellipse, hold the [SHIFT] key pressed while drawing the ROI area with the mouse. The result will be a perfect circle.

4.2.20.6 SHUTTERS

"Shutter": Makes it possible to select a specific area of an image (only rectangular) and to blacken out the rest. The blackened-out areas are not deleted from the image; they are simply hidden.

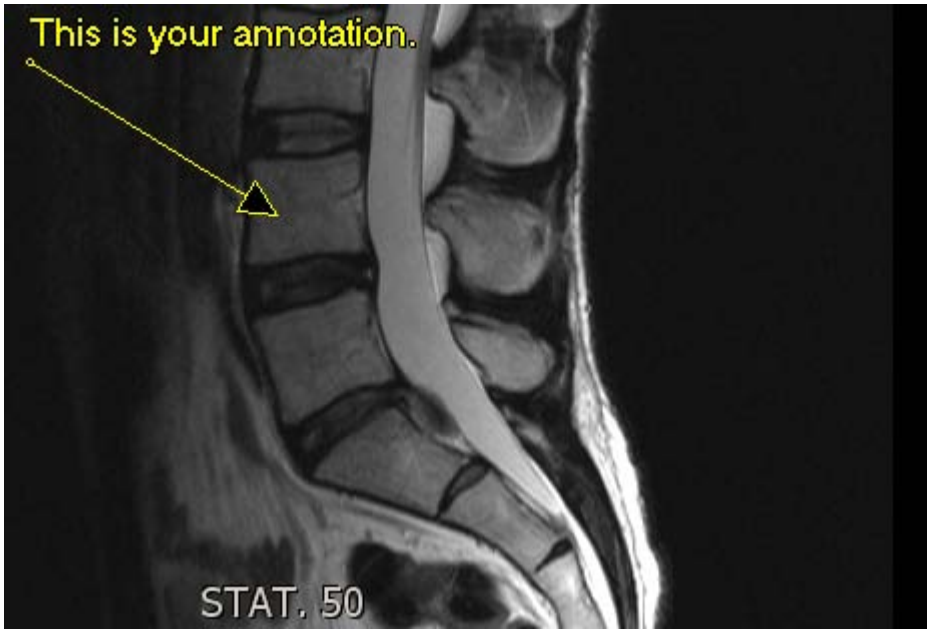
4.2.20.7 ANNOTATIONS

"Annotation": Allows for making annotations in images. Draw a line in the image to the area that shall be annotated, while holding the right mouse-button pressed. An arrow will be displayed and the annotation dialog is opened.



Annotation dialog

Enter the text (displayed only to the border of the image; the longer the annotation the farther on the left side you should start) and press "OK". The annotation will be displayed at the starting point of the arrow.



Example for an annotation

NOTE:

If no text is entered and the edit field is left empty, the arrow will nevertheless be displayed in the images. This is implemented on purpose to allow for only adding an arrow to mark a specific area in the image.

4.2.20.8 ERASING MEASUREMENTS AND ANNOTATIONS

"Clear": Can be used to erase individual measurements or annotations that were made in an image. Select the "Clear" function, then click once onto the measurement or annotation you wish to erase. It turns red. Make another click to remove the measurement or annotation.

Further deleting functions are available in the "Tools" menu:

- "Clear all measurements": Selecting this entry, all measurements made in all studies loaded into the viewer are removed with one click.
- "Clear last measurement": With this entry it is possible to only remove the last measurement made in an image.

4.2.20.9 MODIFYING MEASUREMENTS AND ANNOTATIONS

"Modify": Offers the opportunity to modify already made measurements and annotations. Select the measurement or annotation you need to change. The displayed markers on each measurement and annotation can be used to drag and drop the measurement/annotation into the correct position.

The “Modify” function works as follows:

- **for distance measurements:** Grab the center marker with the mouse to move the whole line into a different position or use the start and end markers of the distance line the change the length and position of the starting and end point.
- **for angle measurements:** Grab the center marker to change the position of where the two lines cross each other or use the start and end markers of each line to move each of the lines into the correct position.
- **for Cobb’s angle:** Use the markers at the end of each line to correct their position; the perpendicular lines will be adapted automatically by iQ-VIEW.
- **for square and circular ROI:** Grab the center marker to move the whole area (rectangular or elliptical/circular) or use the line markers to change the size of the area.
- **for shutter:** The center marker can be used to move the whole shutter. The markers in the lower right corner and the upper left corner offer the opportunity to change the shutter’s size.
- **for annotations:** Grab the center marker to move the annotation arrow or only the arrow tip to change where the tip is positioned. The annotation text field will be opened to give the opportunity to also change the text of the annotation.

4.2.21 MAGNIFYING TOOLS

Integrated into the application is one magnifying tool – the regular “magnifier”. The iQ-VIEW PRO version additionally includes a special “magnifier window” for the magnification of regions of interest in a separate window. This function is, however, grayed-out in iQ-LITE.

4.2.21.1 THE REGULAR MAGNIFIER

The regular magnifying function can be accessed either by using the “Magnifier” button in the bottom toolbar or by selecting the respective entry in the “Tools” menu. Also the creation of a shortcut is possible.

“Magnifier”: After selecting the magnifying function the mouse pointer turns into a magnifying glass. You can move your mouse over the image area you want to magnify. Hold the left mouse button pressed during the process to enlarge the area you are hovering over.

NOTE:

Measurements and annotations made in an image are still visible using the magnifier.

4.2.22 ZOOMING AND PANNING TOOLS

Sometimes individual images or entire series need to be enlarged to improve the visibility of diagnostically relevant tissues and structures. Also moving images around in their views (panning) might become necessary, e.g. to adjust them in height with another series for easier comparison.

Using the “Scope” function, described in section 4.2.5.4 Scope, it is possible to apply zoom and pan changes either to a whole series or to an individual image only:

- Select “Image scope” to only change the zoom factor or position (pan) of a particular image.

- Select “Series scope” to apply changes in the zoom factor or position (pan) made in one image to all images of the same series.

NOTE:

Zoom and pan changes made will be set back when the scope is changed (from series to image or from image to series). You can then apply the windowing again according to the newly selected scope.

4.2.22.1 ZOOM/PAN HANDLING WITH PRESENTATION STATES

It is important to note that the handling of the zoom and pan features in iQ-LITE has changed in comparison to earlier software versions.

Due to the presentation states (PR) now used to display and cache changes in DICOM images also the handling of zoom/pan has changed to adhere to the specifications laid down in the DICOM standard.

Therefore zoom out now only works down to "scale to fit" and not smaller (since this is not defined in DICOM). It is, however, possible to apply a 1:1 zoom also if the images are then displayed smaller than their “fit-in” size.

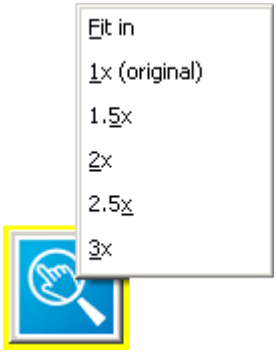
Panning images can still be done also in case that the images were not zoomed but are still scaled to fit. This allows the adjusting of images to the same height in case one is displayed lower than the other.

4.2.22.2 THE ZOOM/PAN FUNCTION

To zoom (adjusting the size) and to pan (moving) images you can either use the “Zoom/pan” button available for the bottom toolbar or select the respective entry in the “Tools” menu.

“Zoom/pan”: When activated, this function can be used to dynamically zoom and pan images using the mouse. The center area of the image acts as a “pan zone” (the mouse pointer turns into a hand icon). If you click into the center and move the mouse up/down/ or right/left, the image will be moved. The periphery of the image acts as “zoom zone” (the mouse pointer turns into a magnifier icon). If you click into the periphery and move the mouse up and down you can steplessly zoom the image.

Additionally, a sub-menu – accessible by right-clicking either onto the toolbar button or right into the image processing area – opens with different zooming presets:



- “Fit in”: This is the default setting. The images are scaled to fit into the available view. The higher the tiling, the smaller the images will be displayed.
- “1x (original)”: The images are displayed in their original size.
- “1.5x”: The images will be zoomed one and a half times their size.
- “2x”: The images will be zoomed two times their size.
- “2.5”: The images will be zoomed two and a half times their size.
- “3x”: The images will be zoomed three times their size.

4.2.22.3 THE SCROLL ZOOM

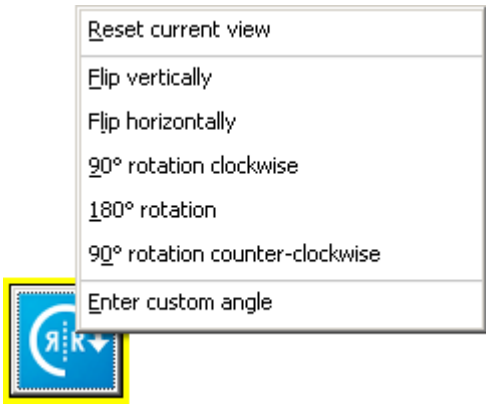
The scroll zoom function is available in the “Tools” menu. Activate the function with a click onto the menu item. Afterwards you can use the scroll-wheel of the mouse to dynamically zoom the currently active image.

4.2.23 FLIPPING AND ROTATION TOOLS

Images loaded into the viewer can either be flipped or rotated or both. When flipping or rotation is applied to an active image, all images of that series will be flipped or rotated in the same way. The scope function does not apply here.

4.2.23.1 THE FLIP/ROTATE FUNCTION

The flipping and rotation options are accessible by using the “Flip/Rotate” button in the bottom toolbar or by selecting the respective entry in the “Tools” menu.



“Flip/rotate”: Activating this function opens a sub-menu containing all available flipping and rotation options:

- “Flip vertically”: will flip all images of the series vertically. A specific marker is added to the text overlay to indicate the flipping. *
- “Flip horizontally”: will flip all images of the series horizontally. A specific marker is added to the text overlay to indicate the flipping.
- “90° rotation clockwise”: will rotate all images of the series in a 90 degree angle to the right.
- “180° rotation”: will rotate all images of the series in a 180 degree angle.
- “90° rotation counter-clockwise”: will rotate all images of the series in a 90 degree angle to the left.

NOTE:

To correctly read the markers given in the overlay, it is important to understand that for presentation states only horizontal flipping is defined. Therefore, when using vertical flipping (as the option is called in iQ-VIEW for better understanding), the marker stated in the text overlay will include a horizontal flipping and a 180° rotation, which is exactly the same as a vertical flip. The marker states: "Flipped hor. Rotation: 180°".

Resetting the flipping and rotation changes can be done using the entry "Reset current view". The images turn to their original position. Alternatively, also the general "Reset" button or the respective entry in the "Tools" menu can be used to reset these modifications.

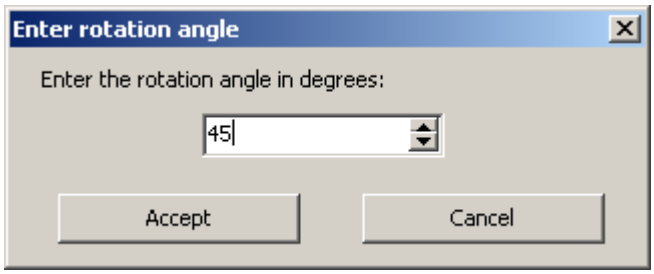
NOTE:

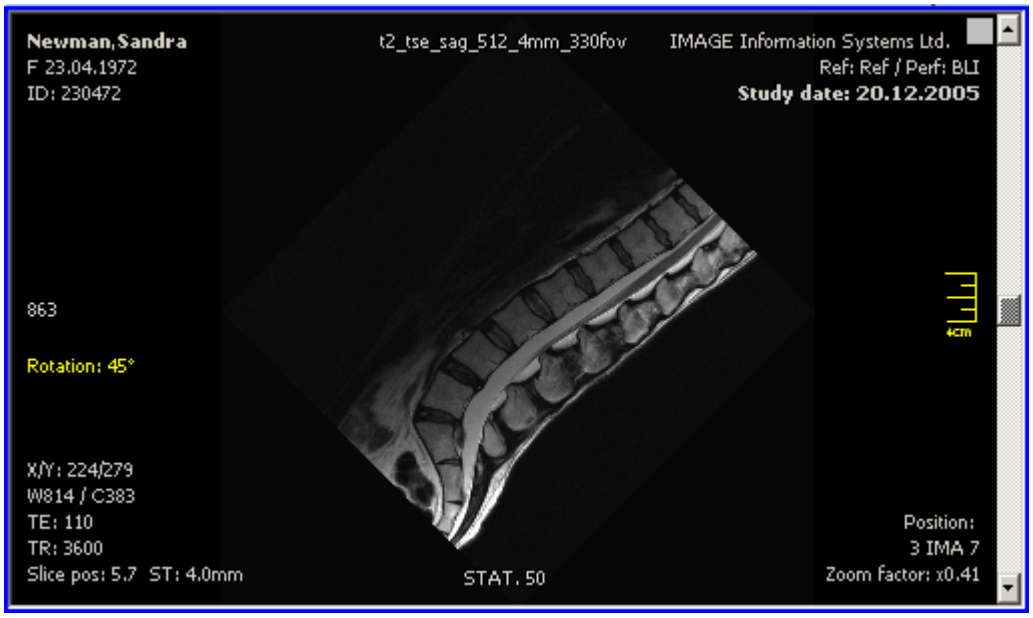
When rotating or flipping zoomed images, any zoom or pan changes will be reset. This also applies to the "reset current view" function within the flip/rotate context menu. However, it is possible to re-apply the zoom after the image has been rotated.

4.2.23.2 USING CUSTOM ROTATION

In cases where the rotation presets are not sufficient or the images only need to be adjusted slightly, e.g. to turn them upright, a customized rotation can be helpful. iQ-LITE offers the option to rotate images in a user-defined way by using the "Enter custom angle" option in the "Flip/Rotate" sub-menu.

"Flip/Rotate": To rotate the image at a self-chosen angle, select "Enter custom angle". A small entry field is opened where you can enter the angle you need. The image (and all images of the same series) will be rotated accordingly.





NOTE:

Please note that it is not possible to draw measurements or shutters or to make annotations in images that were rotated in a custom angle. If measurements or annotations were made in an image before it is rotated, these measurements will no longer be visible. But they are not deleted and are displayed again when the image is rotated using a standard rotation.

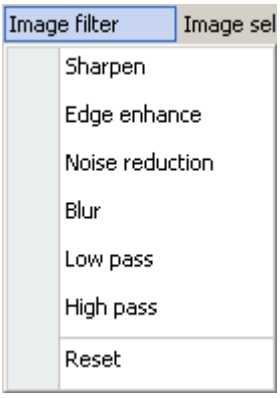
4.2.24 IMAGE FILTER

For the post-processing and quality improvement of images, a number of image filters is available also in the viewer. The available options can be accessed either by using the “Image filter” button in the bottom toolbar or from the “Image filter” menu. Also the creation of shortcuts is possible.

“Set filter”: Click on the button or select the menu entry. A sub-menu opens with the following options:

- Sharpen
- Edge enhance
- Noise reduction
- Blur
- Low pass
- High pass

A “Reset” option allows the resetting of all applied filters and the return of the images to their original.



4.2.25 RESETTING CHANGES IN IMAGES

4.2.25.1 RESET

If modifications made in an image are no longer needed or shall be changed, it is possible to reset the changes and start anew. The reset function is available both in the bottom toolbar (button “Reset”) and also by selecting the entry “Reset current view” in the “Tools” menu.

“Reset”: Selecting the reset function sets back all changes made in an image (e.g. if the image was windowed, zoomed, rotated) and returns to the original image. Also measurements, annotations and shutters are removed using the “reset” function. They can, however, also be deleted separately. Please check section 4.2.20.8 Erasing measurements and annotations.

4.2.25.2 CLEAR CURRENT VIEW

To not only remove the changes made in an image but to empty an entire view in the image processing area, you need to select the respective entry in the menu:

- Go to the “Tools” menu.
- Select the entry “Clear current view”.
- The view will be emptied and is left blank. It can be filled with a new series.

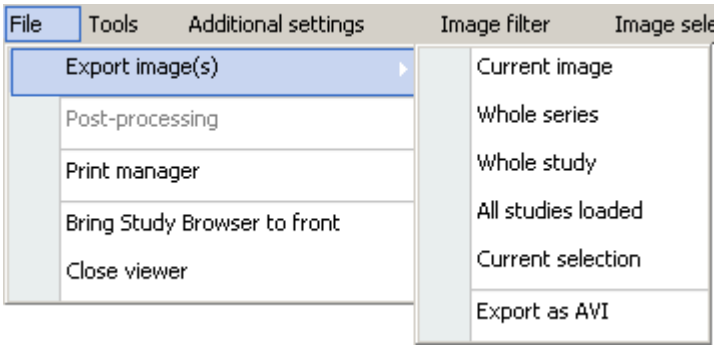
4.2.26 EXPORTING DICOM IMAGES TO OTHER IMAGE FORMATS

DICOM images loaded into the viewer can be exported to other image formats – JPEG, BMP, TIFF and RAW – as well to the video format AVI, for instance for the reason of using them in a case presentation. iQ-LITE will export the images including the modifications applied to them (measurements and annotations, windowing, zoom/pan, flip/rotate, color remap, etc.).

The export options are only available as menu entry. Go to the “File” menu and select the entry “Export image(s)”. A sub-menu offers the following possibilities:

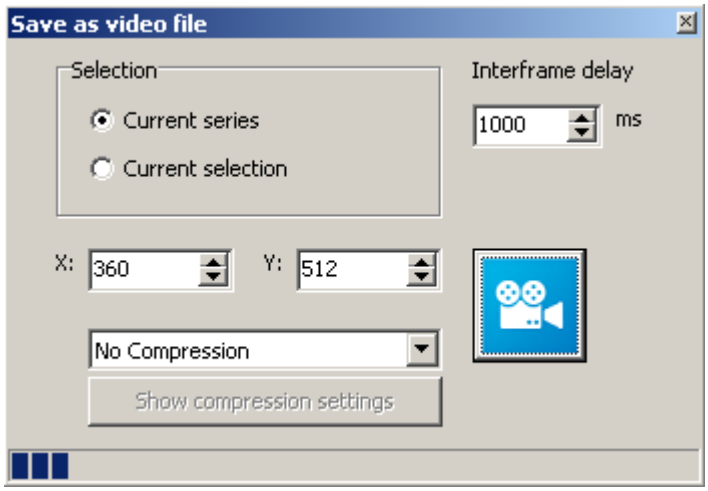
- “Current image”: to only export the currently active image (blue frame)
- “Whole series”: to export the entire series that the current image belongs to

- "Whole study": to export the complete study currently active in the viewer
- "All studies loaded": to export all studies that are currently available in the viewer
- "Current selection": to export a selection of images, series or studies. This selection must be made before using the export function.
- "Export to AVI": allows exporting either the current series or a previously made selection of images.



Exporting images to an AVI file:

This option can be used to export a sequence of images, e.g. an ultrasound series, as a movie file in the AVI format. Select "Export as AVI" and the "Save as video file" dialog will open.



Make the necessary adjustments:

- Select what you want to export. You have the choice between "current series" or "current selection" (this selection must be made before using the export function).

NOTE:

The images will be converted into AVI in the order in which they were selected in the viewer.

- Set the size of the video frame (X and Y for width and height). When changing one value, the other will change accordingly to maintain the proportions of the images.
- Set the "interframe delay" in milliseconds. The interframe delay defines the time passing between two frames. The lower the value, the faster the individual frames will be shown.

- Select “Compression” in case you wish to create a compressed video file. In that case the file will become smaller and more suitable to be included in presentations, for example.

NOTE:

The available options for compressing the AVI files are dependent on the codices you have installed on your system. Therefore the list of compression options may differ from station to station. The manufacturer cannot guarantee the correct functioning of all these codices and therefore recommends using a Windows default codec “cvid Cinepak Codec”. The use of a corrupted, incompletely/incorrectly installed or incompatible codec may lead to undesired effects in iQ-LITE.

After all settings are made, press the “Save as AVI” button to start exporting the selected data as AVI file.

WARNING:

The creation of an AVI file can take a while – depending on the number of images selected to be converted. A progress bar will indicate when the process will be finished. The dialog will close automatically when the AVI file is completed. Please make no interaction, such as clicking the close button (“x”) as this may lead to undesired results.

4.2.27 EXPORTING DICOM IMAGES TO PRINTERS

“Print manager”: All images that have been loaded into the viewer, including secondary captures and structured reports already available on the medium, can be exported – with all their changes in presentation states (measurements and annotations, windowing, zoom/pan, flip/rotate, color remap, etc.) – to the Print manager from where they can be printed on a connected Windows® printer.

For all information on giving out DICOM images on paper printers, please read chapter 4.3 Windows Print.

The print manager can be accessed in either of the following ways:

- Go to the “File” menu and select the entry “Print manager”. The entire study currently active in the viewer is transferred. Alternatively, images can be selected in the viewer to be transferred.
- Click the “Print manager” button available in the bottom tool bar to transfer the current study or a selection into the print manager.
- Use the default shortcut [P] for accessing the print manager window.

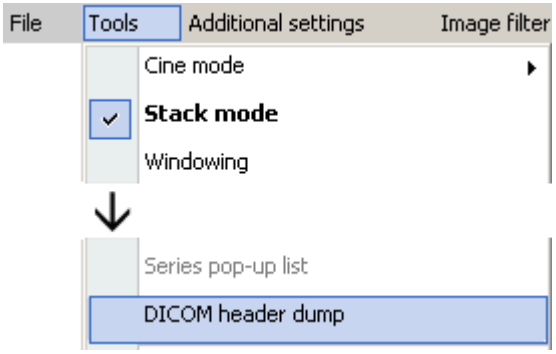
NOTE:

For instructions on how to select images, series and studies in the viewer, see section 4.2.13 Selection of images, series and studies.

4.2.28 DICOM HEADER INFORMATION

The DICOM header of an image shows all DICOM related information about the current image in the image processing area (blue frame), such as patient information, study, series and image information as well as meta tags and other values defining the structure and display of the image.

The DICOM header can be accessed by selecting the entry “DICOM header dump” in the “Tools” menu. It can also be opened using the shortcut [H] in the viewer (default).



Three different tables are available in the “DICOM header viewer”: the “List view”, the “Tree view” and the “Summary”.

4.2.28.1 “LIST VIEW”

It gives an overview of all available DICOM tags (attributes) and their values.

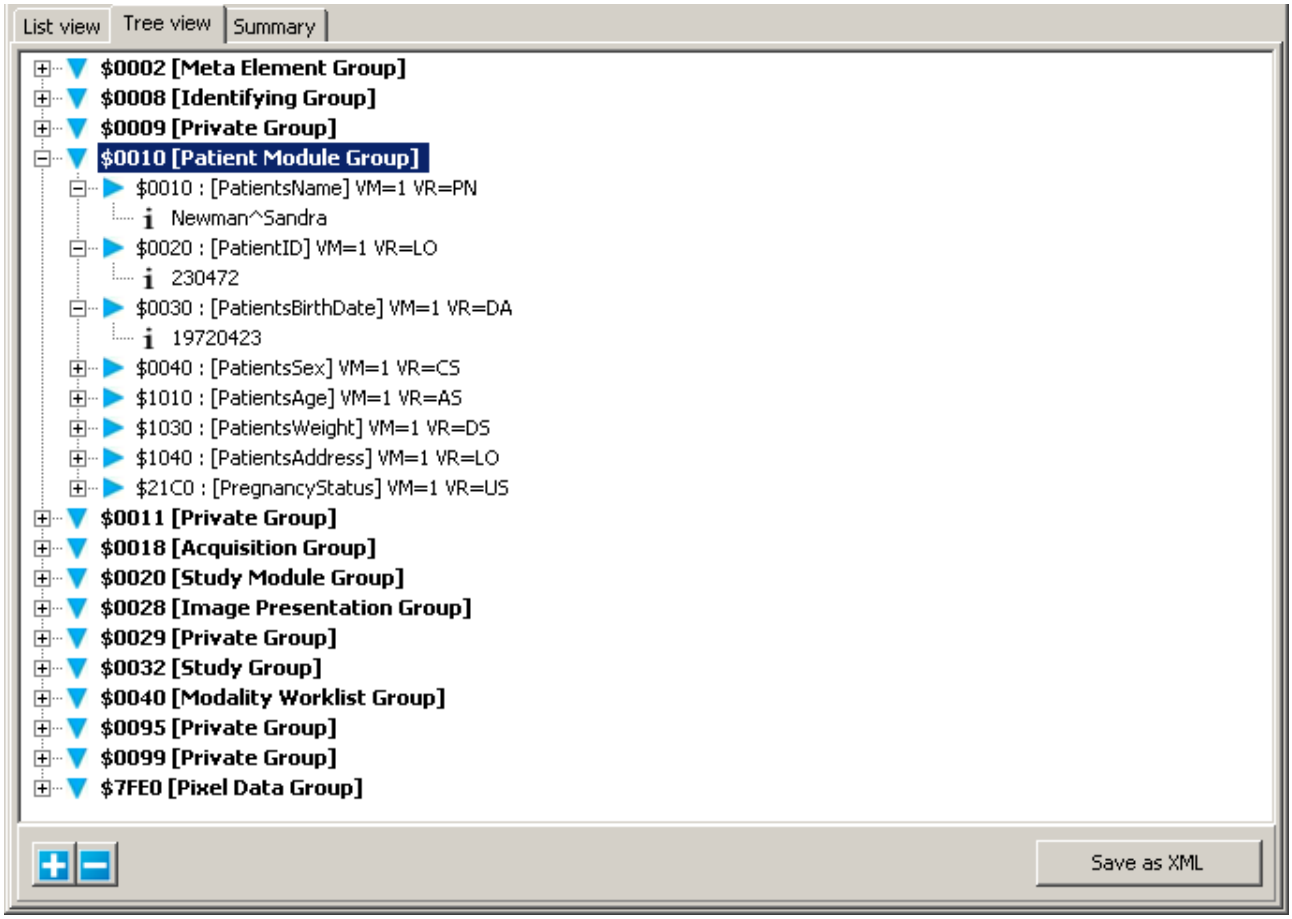
List view | Tree view | Summary

Attribute	Value
0008,0005 [SpecificCharacterSet]	ISO_IR 100
0008,0008 [ImageType]	DERIVED\SECONDARY\M\ND
0008,0016 [SOPClassUID]	1.2.840.10008.5.1.4.1.1.4
0008,0018 [SOPInstanceUID]	1.3.12.2.1107.5.2.6.14044.30000005122107122404600000022
0008,0020 [StudyDate]	20051220
0008,0021 [SeriesDate]	20051221
0008,0022 [AcquisitionDate]	20051221
0008,0023 [ContentDate]	20051221
0008,0030 [StudyTime]	080525.265000
0008,0031 [SeriesTime]	081922.750000
0008,0032 [AcquisitionTime]	081506.989984
0008,0033 [ContentTime]	081922.765000
0008,0040 [ACR_NEMA_OldDataSetType]	0
0008,0041 [ACR_NEMA_DataSetSubtype]	IMA NONE
0008,0050 [AccessionNumber]	100
0008,0060 [Modality]	MR
0008,0070 [Manufacturer]	SIEMENS
0008,0080 [InstitutionName]	IMAGE Information Systems Ltd.
0008,0081 [InstitutionAddress]	
0008,0090 [ReferringPhysiciansName]	Ref
0008,1010 [StationName]	mrsp
0008,1030 [StudyDescription]	SPINE
0008,103E [SeriesDescription]	t2 tse sag 512 4mm 330fov

List view in DICOM header dump

4.2.28.2 “TREE VIEW”

This table gives a more structured overview over the DICOM tags and values of an image. The tags are collected into their respective attribute groups; and groups can be opened to reveal the individual tags and values or be closed. By default the tree is closed.



Tree view in DICOM header dump

In the “Tree view” there is no possibility to modify individual attribute values. For this option, please select the “List view”.

A click on the “+” button opens up the tree with its sections and displays all available attributes with their respective values.

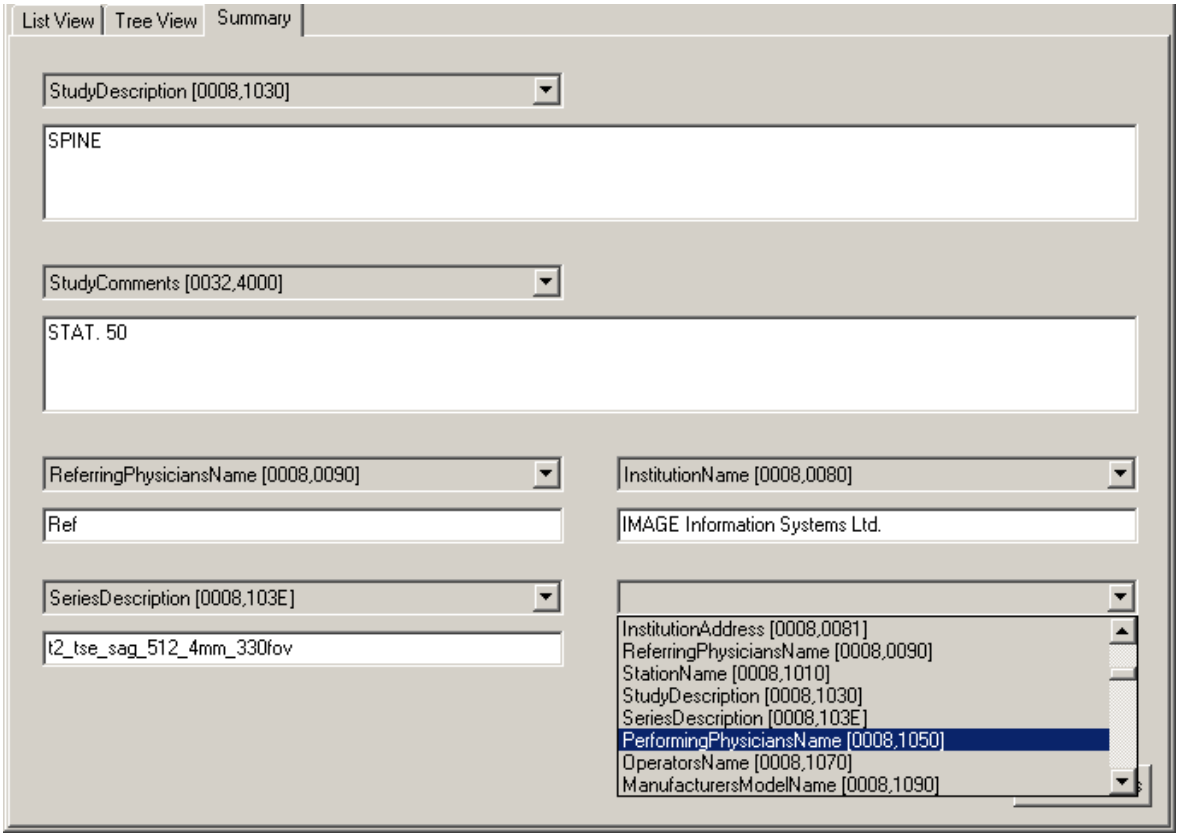
A click on the “–” button closes an open tree.

Additionally the DICOM header data as displayed in the “Tree view” can be saved as an XML file to a directory of your choice (“Save as XML”). This file may also be printed.

4.2.28.3 “SUMMARY”

In the Summary table it is possible to arrange an assortment of DICOM tags, whose values you wish to have available at a glance. As settings cannot be stored permanently on a medium, the settings will not be remembered for the next start of the application.

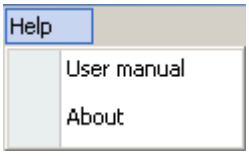
For instance, the text fields or the text overlay displays for some tags, like “Study comments”, might not be long enough to show the whole information. Or you would like to display private tags or Worklist procedure tags. In such cases the “Summary” view offers a solution.



Example of DICOM tag selection in "Summary" view of DICOM header dump

4.2.29 HELP OPTIONS

The help options are comprised under the "Help" menu:



- "User manual": Selecting this entry opens the iQ-VIEW user manual for consultation.

NOTE:

The Acrobat Reader must be installed on the system to open and view the iQ-LITE user manual, which is available as PDF file on the medium (MANUAL.PDF).

- "About": Selecting this entry will open a window in which you receive information about the iQ-LITE software version you have installed as well as contact information in case of questions or bug reports. A mouse-click on the window opens a support email form that can be used in case you wish to contact us for bug reports, technical advice, etc.

NOTE:

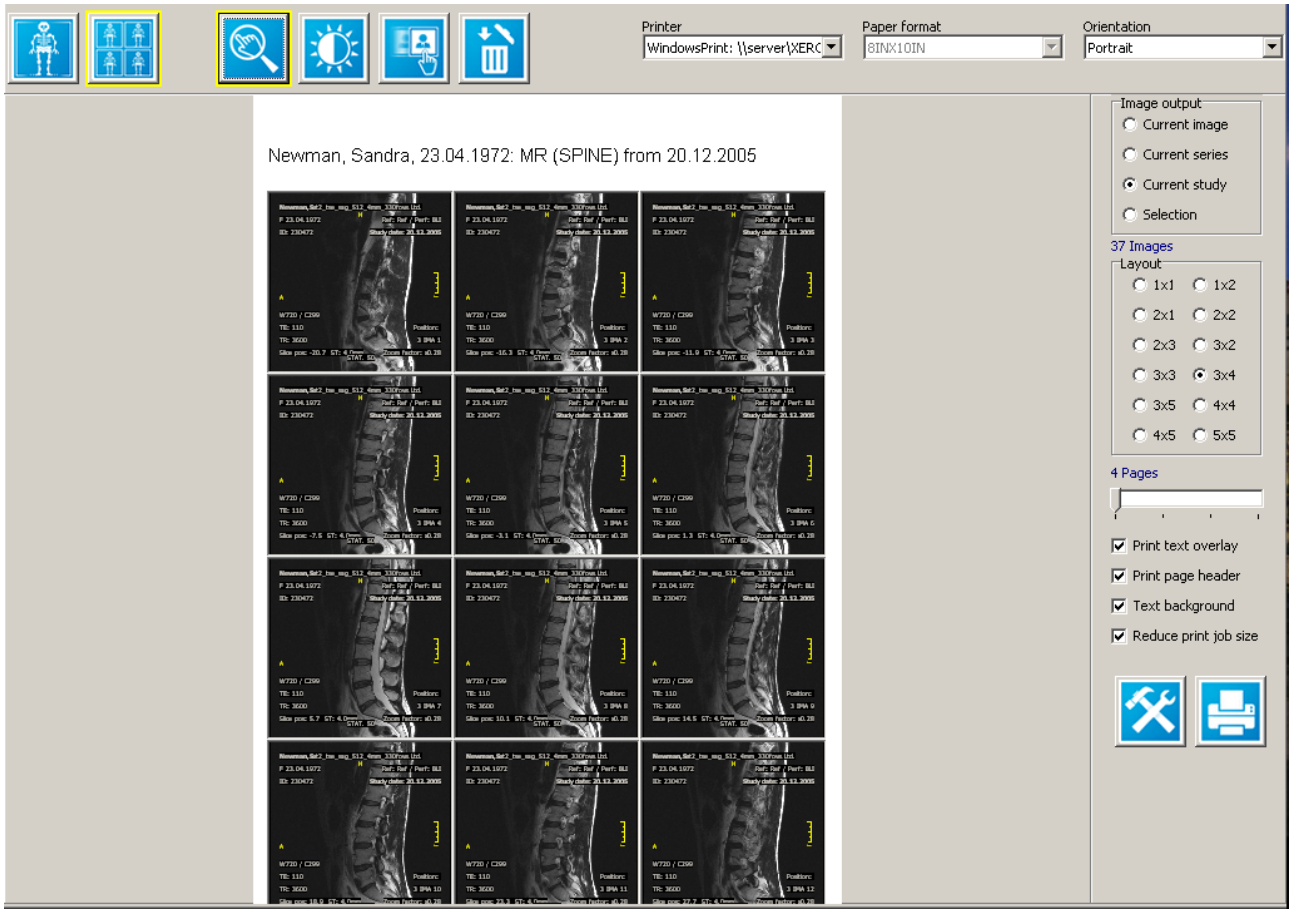
Please note that a standard email client (Outlook, Outlook Express, etc.) must be installed and configured to automatically open an email form.

4.3 WINDOWS PRINT

4.3.1 THE PRINT MANAGER

With iQ-LITE DICOM image data can be exported to paper, using both Windows® print. To print individual images, series or studies on a Windows® printer , the studies must first be loaded into the viewer. From there the Print manager can be accessed.

Click on the “Export” menu in the menu bar and select the entry “Print manager”. Alternatively, you can pull up the print manager window using a shortcut (by default [P]) or by using the available toolbar button (if added to the toolbar). With either method, the print manager will open and transfer the selected images into the preview:



Print manager

Changes made in images during their processing in the viewer are transferred into the print manager as well, so that you can print out the images including their modification, e.g. added measurements and annotations, window level changes, flipping/rotation, zoom/pan.

4.3.2 PRINTER, PAPER FORMAT AND ORIENTATION SELECTION

In the drop-down menus in the upper part of the screen, the printer, paper format and orientation must be selected:

- "Printer": Choose the printer you wish to use to print out the images. You can decide between a Windows® printer either connected locally to your computer or available as a network printer.

Pressing the button "Printer settings" after having selected a specific printer gives you the opportunity to change the settings of that printer. The usual Windows® printer properties will be opened.

- "Paper format": This option is only available for DICOM print. As DICOM print is not available in iQ-LITE, this option is grayed-out.

- "Orientation": Gives you the option to select between portrait or landscape orientation for printing. The print manager preview is changed accordingly.

4.3.3 IMAGE OUTPUT AND LAYOUT SELECTION

On the right side of the screen several options are given regarding output and layout:

- "Image output": Lets you choose what to print out:
  - the current image (the one active in the view of the viewer window),
  - the current series (the series in the active view of the viewer window),
  - the current study, or
  - a selection made previously in the viewer by marking images (with that option it is also possible to select several complete studies or parts of different studies).

- "Layout": Here you can decide how many images you wish to print out on one page. Different page layouts are available for selection.

- "Page controller": The page controller gives information into how many pages the image selection is divided and makes it possible to navigate between the different pages (if more than one is available). Move the controller to the desired page or click into the page controller on the right to move to the next pages (one at a time) or on the left to move to previous pages (one at a time). If you activate the page controller (click into the field), you can also use the mouse over the preview to scroll to other pages.

- "Print text overlay": Will add the text overlay for the images on the print-outs.

- "Print page header": Will add the page headers to the print-outs.

NOTE:

If images from more than one study/patient are selected to be printed, the page header will, nevertheless, only be able to give the details of the first study. Make sure to keep the text overlay activated and to deactivate the display of the page header as this may be confusing.

- "Text background": Activating this option will put a black bar behind all elements of the text overlay. Thus, the white text overlay will always be readable, also if the images are very bright.

4.3.4 EDITING IMAGES FOR PRINTING

Editing of images can be done either on image level or on series level. The selection is made using the "Scope" buttons (except for the drag/drop and the deletion of images):

"Image scope": Select scope on image level if you want to modify (window or zoom/pan) only a single image.

"Series scope": Select scope on series level if you want to modify (window or zoom/pan) an entire series.

To edit the images as shown in the preview on the main part of the screen, you can use the tool buttons. The active tool is displayed with a yellow frame.

"Zoom/Pan": After clicking on the button you can move an image by clicking into the center of it (pan zone) and moving it while holding pressed the left mouse button. The mouse pointer turns into a hand. To enlarge the image, simply click with the left mouse button into the periphery of the image (zoom zone) and move the mouse up (to enlarge) and down (to minimize) while holding the button pressed. The mouse button shows a magnifier symbol. Depending on the scope selection (image or series) either only the selected image will be zoomed/panned or the entire series.

NOTE:

Please note that due to the presentation states (PR) now used to display and cache changes in DICOM images also the handling of zoom/pan has changed to adhere to the specifications laid down in the DICOM standard. Therefore zoom out now only works down to "scale to fit" and not smaller (since this is not defined in DICOM). Panning, however, will still work even if the images were not zoomed first.

"Windowing": You can manually re-render the window level of images by clicking the left mouse button and holding it pressed while moving the mouse up/down or left/right to change brightness and contrast. The mouse pointer turns into a window symbol. Depending on the scope selection (image or series) either only the selected image will be windowed or the entire series.

"Drag/Drop": With this function you are able to move images into another position (tile) when you have chosen a layout with more than one image per page. Note, however, that you can only move images within filled tiles. If, in a 3x3 tiling, only 6 tiles are filled with images, images can only

be switched in the first 6 tiles; the last 3 tiles cannot be used.

"Delete"": This function deletes either single images or entire series, independently from the set scope (image or series). Click on the button to activate the delete function. The mouse pointer will change into an eraser symbol when hovering over an image. The following options are available:

- If only the "current image" is selected, no deletion is possible.
- If the "current series" is selected, you can only delete individual images, but not the whole series.
- If the "current study" is selected, you can decide whether to "remove individual images" or to "remove entire series".
- In case of a "selection", the entire selection of images is treated as if they were from one series. Therefore "remove entire series" will remove all but one image from the preview. Use "remove individual images" instead or readjust your selection in the viewer.

Then either click onto the image you want to delete or onto one image of the series you don't want to print anymore.

NOTE:

One image will always remain in the preview to avoid blank pages.

4.3.5 STARTING A PRINT JOB

"Reduce print job size" = sometimes Windows® print jobs (in the standard Windows® print mode) can become very big (up 100 MB), which may lead to longer transmission times to a Windows® printer. Tick the checkbox to reduce the size of the print jobs.

NOTE:

A reduction of the print job size, achieved by reducing the resolution, may lead to a lower quality of the printouts on some printers.

After you made your printer, paper format and orientation selection, set the correct image output and the layout and edited your images, you are ready to print. Press the "Print" button to send the print job to the selected Windows®.

5 LIST OF ABBREVIATIONS

J2k	– JPEG 2000
AET	– Application Entity Title
C-Find	– DICOM command for search of studies
C-Move	– DICOM command for move of studies
CR	– Computed Radiography
CT	– Computed Tomography
DICOM	– Digital Imaging and Communication in Medicine
DNS	– Domain Name System
DR	– Direct Radiography X-Ray Systems
DX	– Direct X-Ray Systems, e.g. Angiography or Fluoroscopy
GUI	– Graphical User Interface
HU	– Hounsfield Units
IP	– Internet Protocol
LUT	– Look-up Table
Move SCU	– C-Move as Service Class User
MR	– Magnetic Resonance Imaging
NM	– Nuclear Medicine
OT	– Other Title (other DICOM storage class)
Q/R SCU	– Query/Retrieve as Service Class User
RF	– Radiographic Fluoroscopy
ROI	– Region of Interest
SC	– Secondary Capture
STORE SCP	– DICOM store as Service Class Provider
STORE SCU	– DICOM store as Service Class User
US	– Ultrasound
VR	– Volume Rendered, Volume Rendering

6 LIST OF SHORTCUTS

ADDITIONAL KEY + KEY	FUNCTION
Arrow key [UP]	Previous image
Arrow key [DOWN]	Next image
[HOME]	First image in a series
[END]	Last image in a series
[P]	Print manager
[H]	DICOM header dump
[CTRL]	In combination with mouse-clicks into another than the activated viewer tile, will mark the other tile(s). Can be used to synchronize different series.
[S]	Marking/Unmarking of a whole series
[CTRL]+[S]	Marking/Unmarking of a whole study

7 INDEX

T

U

V

W

Z

IMAGE INFORMATION SYSTEMS LTD.
OFFICE 404, 4TH FLOOR | ALBANY HOUSE | 324/326 REGENT STREET | LONDON W1B 3HH | UNITED KINGDOM
TEL. UK: +44 207 193 06 20 | TEL. GER: +49 381 660 80 43 | TEL. US: +1 213 985 35 20
FAX UK: +44 207 976 48 97 | FAX GER: +49 381 203 38 59 | FAX US: +1 213 325 26 30
WWW.IMAGE-SYSTEMS.BIZ | INFO@IMAGE-SYSTEMS.BIZ