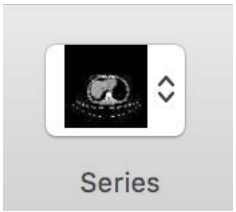

Figure 6.39. The Series list icon from the custom toolbar menu.

Switching patients

If more than one series is available from the database, the Patient icon in the 2D Viewer toolbar (Figure 6.40) allows you to switch to the next and previous patients. Alternatively, you can choose Next Patient or Previous Patient from the dropdown list under the 2D Viewer tab in the top menu. Finally you can use the keyboard shortcut shift + command + arrow (⇧ ⌘ ←) to move between patients.

Figure 6.40. The Patient icon from the 2D Viewer toolbar.

Switching back to database browser

You can return to the database window, using Show Database Window from the File menu. This leaves the 2D Viewer window open but brings the Database window to the front. Alternatively, you can shift click on the Database icon in the 2D Viewer toolbar to perform the same action. If you click on the Database icon without holding down the shift key, all open windows will close except the Database window.

The Series list

2D Viewers have a vertical bar on the left of the window displaying thumbnails of the current series list (Figure 6.41). Clicking on a thumbnail will load that series in the viewer exchanging the current one. The thumbnails can be color coded with green, yellow, red, or white frames (Figure 6.41). A green frame means that this series is loaded and fused in the 2D Viewer window. A yellow frame denotes a series that is loaded but not in the current 2D Viewer window. A red frame means the series is currently loaded and displayed in the 2D Viewer window and a white frame means this series is currently not loaded in any 2D Viewer window.

Figure 6.41: Thumbnails for the Series list in the 2D Viewer window showing the four different colors.

You can hide the Series list by dragging the vertical gray bar separating the thumbnails list from the open viewer to the left. You can also remove the series thumbnails by selecting Series List from the 2D Viewer menu. This action collapses the list and expands the viewer window to cover that area. Be aware that Horos will record that preference and the next time you open a viewer the Series List will not appear. You can make the thumbnail list appear again by reselecting Series List from the 2D Viewer menu. A second method for hiding the Series List is to activate Series List auto-hiding from Viewer Preferences. With auto-hiding set in Preferences, you can make the list visible any time you move your mouse over to the far left of the viewer window.

Holding down the command key (⌘) while clicking on a thumbnail from the Series List allows you to open that new series in a new tiled viewer window. If you have a study with many series, you can easily lose track of the currently loaded series in the Series List. You can automatically re-center the Series List thumbnail on the current series by double-clicking anywhere on the current image.

Workflow

Workspace State

In Horos you can save the “state” of the currently displayed series in the 2D Viewer windows. This is called a workspace state and each study can store one workspace state. It saves the settings for the following parameters:

- *the position of each 2D Viewer window on the screen*
- *pan*
- *zoom*
- *WL/WW*
- *image index*
- *rotation*
- *orientation*

In the 2D Viewer dropdown list you can select Save Workspace State, Load Workspace State, or Reset Workspace State.

When you open a study, Horos checks to see if a workspace state is attached to that study. If so, the workspace state is loaded and the series is displayed as previously saved. Alternatively, you can click the Database button icon in the 2D Viewer toolbar which will close all viewer windows and save the workspace state for that study. You can turn off automatic workspace saving/loading in Viewer Preferences.

Key Images

For many studies, you will want to include certain images in reports or have as easy way to find those images among the many images in a series. Horos allows you to tag key images using the Key Image function of the 2D Viewer Menu or by using the equivalent keyboard shortcut (⌘K). If you have the Key Images icon in your toolbar, clicking on it will also mark the current image as a key image. If you have created a series of ROIs (regions of interest) you can use Mark All ROI Images as Key Images entry in the 2D Viewer menu or by choosing the Mark ROI Images as Key Images in Viewers Preferences.

With one or more key images marked, you can quickly open only those key images from the Database window by clicking the Keys & ROIs button of the database toolbar. Clicking on the right and left arrow keys scrolls you through the key images. You can display only Key Images without ROIs by holding down the option key while clicking on Keys & ROIs button in the Database toolbar. Holding down the shift key and the Keys & ROIs button opens only those key images with ROIs. Once opened, all the key images can be exported as a new DICOM series or printed.

Printing

You can print to standard printers and DICOM printers in Horos. Standard printers are configured using the Print & Fax Preferences of Mac OS X (located in System Preferences). DICOM printers must be added to the DICOM Print list using the Horos Print Preferences (see Chapter 2). Once you have set up the image in Horos, use the zoom and pan features to fill the entire window with the image. You can print the image by selecting the Print icon from the 2D Viewer toolbar or selecting Print or DICOM Print from the File menu. Selecting Print brings up the window shown in Figure 6.42 below. Here you can adjust the Layout from 1x1 with 1 image per page (default) select other options from the dropdown list. Header information can also be

changed. You can add a custom string as the first line at the top of the page, turn on or off the white background on the page behind the image, and turn on or off the printing of the patient and study information.

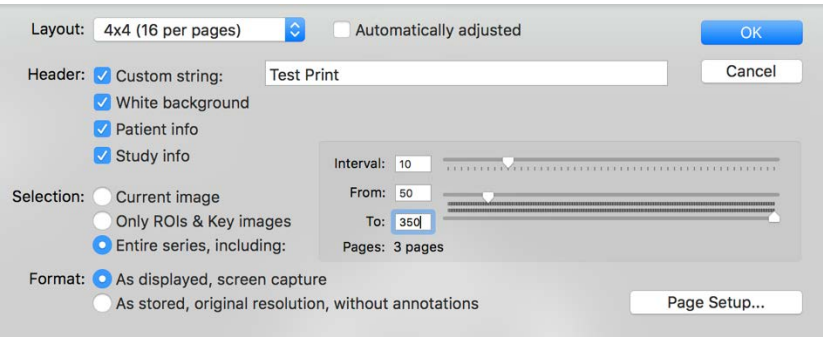

Figure 6.42: Page Set Up options, before printing

In the Selection section, you can choose to print only the current image, a group of Key images or images with ROIs, or the entire series. If you choose the entire series option, you can print every image in the series or adjust the interval to print every 10th image and you can use the From/To sliders to trim the stack. For example, the settings in Figure 6.42 show that 16 images will be printed on each page beginning with image number 50 and ending with image number 350. This will produce a printed page similar to that shown in Figure 6.43. Finally, you can choose to print the images from screen captures (including zoom, rotations, ROIs and pan settings) or the raw image data.

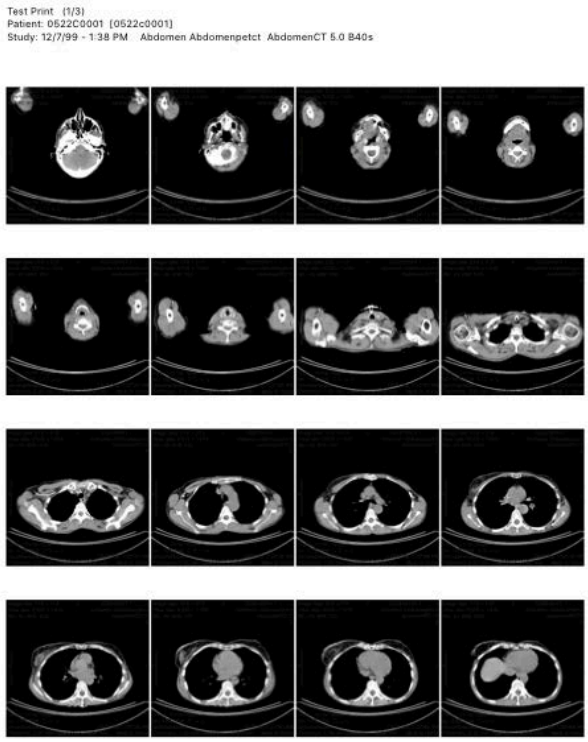

Figure 6.43. A sample page printed from the settings in Figure 6.42.

Selecting Ok sends you to the Print page where you can see a preview of the page and choose to print it or save it as a PDF or PostScript file.

Selecting the DICOM Print option opens a different dialog window (Figure 6.44) with similar options to those described above.

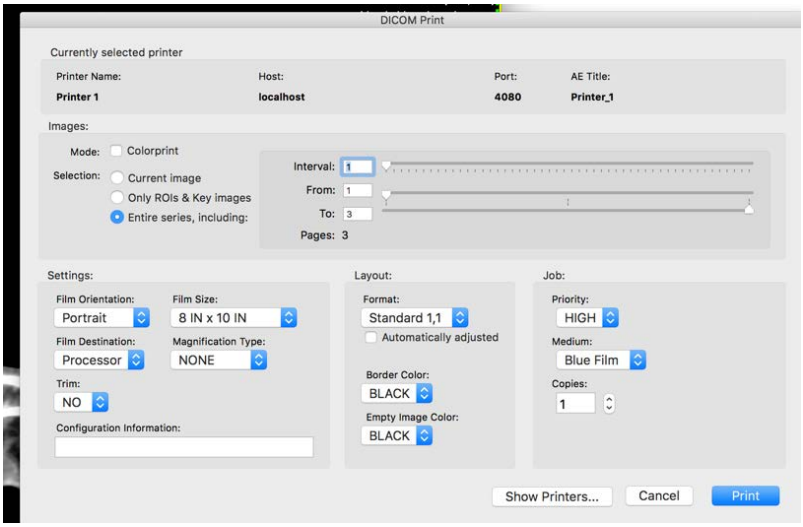

Figure 6.44. The DICOM Print dialog window.

Email

Selecting the Email button from the 2D Viewer toolbar (assuming it has been added to the toolbar) allows you to quickly share the current image from the 2D Viewer via email. The currently displayed image with all of its settings (CLUT, zoom, etc.) will be captured as a JPEG and added as an attachment to your email using the Mail app that comes with the Mac OS (Figure 6.45). You can also access the Email function via the File menus by selecting Export > Export to Email.

Figure 6.45. A sample email with the JPEG image attached.

If you wish to send the entire DICOM file, you must use the Email function available from the Database toolbar.

Magnifying Lens

Occasionally you may want to draw attention to one area of the current image. To do this you can use the Magnifying Lens tool in the 2D Viewer. Pressing the shift key brings up the magnifying lens (Figure 6.46). The magnifying lens uses the image's raw data to magnify the image by 4 times the current zoom level. The diameter of the magnifying lens can be adjusted using the up and down arrows and the zoom level within the lens can be changed with the plus and minus keys on the keyboard. The magnifying lens feature can be turned off in Viewers preferences (See Chapter 2).

Figure 6.46. The Magnifying Lens feature.

Image Export

You can export a screen capture image from a 2D Viewer in standard TIFF or JPEG formats for use in presentation software such as PowerPoint or Keynote. In the File menu select File > Export to TIFF or File > Export to JPEG. You can also copy the image to the clipboard using Edit > Copy and paste it into another software program using Edit > Paste. Finally, you can also drag and drop the image (Figure 6.47) onto the desktop by clicking and holding the mouse button down until a thumbnail of the image appears and then dragging the thumbnail onto the desktop (or onto another open software program). You can hide the annotations on the image (patient information) by using the tab key or by selecting None from the Annotations options in the toolbar. Drag and drop is also available from the database window. Image exports can also be modified in preferences settings (See Chapter 2).

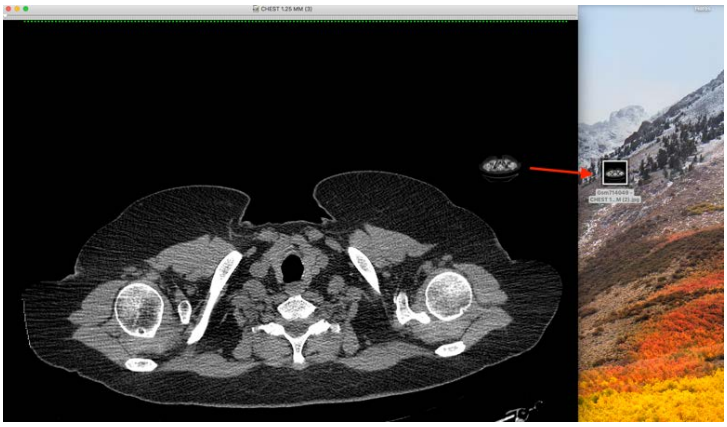

Figure 6.47. The Drag & Drop technique to export an image

Movie Export

You can export a movie of the series by selecting File > Export > Export to Movie or by clicking on the Movie Export icon in the toolbar (Figure 6.48). In either case, Horos brings up the dialog box shown in Figure 6.49, which lets you choose from 2D series, 4D series, Fused series (i.e. a PET-CT), or just Key images in a 2D series. You can also modify the interval and range of the series you wish to include in the movie.

Figure 6.48. The Movie Export icon from the toolbar.

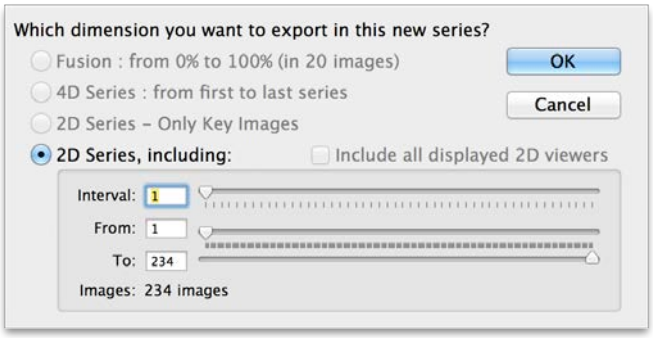

Figure 6.49. The Movie Export dialog box.

If you have several 2D Viewer windows open, clicking on the Include all displayed 2D viewers checkbox in the Movie Export dialog box will create a single movie of the contents of all open windows. In effect, this creates several sub-movies running within a single movie. This type of movie can be very useful for simultaneously viewing the same organ from several planes of view (Figure 6.50). You can hide patient information and other annotations by pressing the tab key during export or by selecting None from Annotations in the toolbar prior to export.

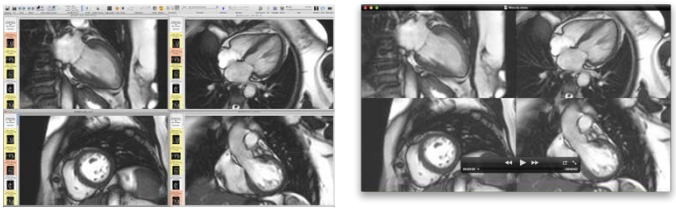

Figure 6.50. The image on the left shows 4 open viewer windows. The right image shows the exported movie file.

Horos exports QuickTime format (.mov) movies by default. QuickTime movies can then be converted to other formats (MPEG4, WMV) using third party conversion software such the Open Source software Any video Converter or HandBrake. Converting to WMV format produces high quality and compressed movie compatible with Windows.

DICOM Secondary Captures

You can create a secondary capture image in DICOM format that are added to the database. Horos creates a DICOM header for these new images containing the information linked to the corresponding patient and study. A new SeriesInstanceUID (0020, 000e) and SOPInstanceUID (0008, 0018) is created to uniquely identify the files for archiving on a PACS or on another DICOM compatible software.

To generate a secondary DICOM capture, select File > Export > Export to DICOM File(s) or click on the DICOM file icon in the toolbar. As with the Movie Export and Print functions described above, you can choose several options from the DICOM Export options dialog box.

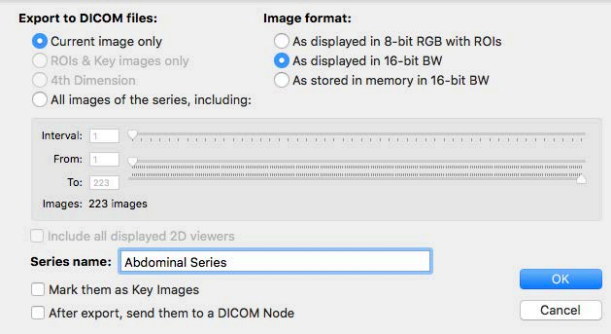

Figure 6.51. The DICOM Export options dialog box.

You can also choose to export only the current image or the entire series as well as ROIs or 4th dimension images if they are available. You can also choose from three image formats:

- As displayed in 8-bit RGB with ROIs - this is a screen capture of the currently displayed image(s), including zoom, pan, ROIs, CLUT, etc. The new image will be encoded in three 8-bit (RGB) channels. In this format, you lose the full 16-bit dynamic.
- As displayed in 16-bit BW - this is a screen capture of the displayed image(s), including zoom, pan, etc. but without the ROIs or CLUT. The image is encoded in a single 16-bit channel, retaining the full 16-bit dynamic: in the case of a CT image you will be able to view a lung window from a screen capture with a mediastinal window.
- As stored in memory in 16-bit BW - this saves the original raw data, without zoom, pan, ROIs, CLUT. The image is encoded in a single 16-bit channel, retaining the full 16-bit dynamic: in the case of a CT image you will be able to view a lung window from a screen capture with a mediastinal window.

As with the Print and Movie export functions, you can truncate the number of images to export in the series using the Interval, From, and To sliders. Finally, there are two additional options that can optimize your workflow. You can choose to mark the newly generated images as Key Images, and you can automatically send them to a DICOM node (See Chapter 9).

Viewing Tools Details

The viewing tools are described in section 6.1. However, this section describes additional details for some of the tools and options in the 2D Viewer.

Window Level & Width Tool

This is a mouse tool that allows you to modify the settings for window level and window width (WL/WW). Click anywhere in the image while holding down the mouse button and move the mouse:

- right to increase the Window Width

- left to decrease the Window Width
- up to increase the Window Level
- down to decrease the Window Level

Window level and window width are also known as brightness and contrast. They are indispensable for viewing large-dynamic DICOM series in black and white. In addition to using the mouse, Horos has a set of predefined settings available through the WL/WW toolbar pop-up menu (Figure 6.52). These presets allow you to quickly move between parameter sets and return to the default WL/WW settings. The presets numbered 1-5 can be triggered using the corresponding number keys on the computer's keyboard. For example, the Abdomen, Bone, and Pulmonary presets are shown in Figure 6.53.

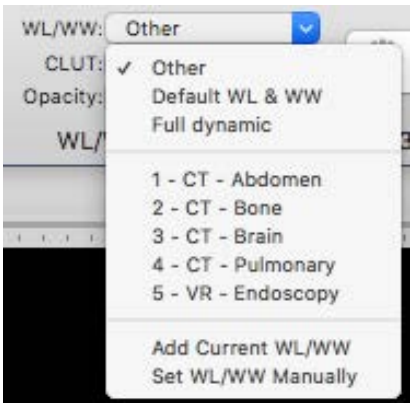

Figure 6.52. The WL/WW popup menu from the toolbar.

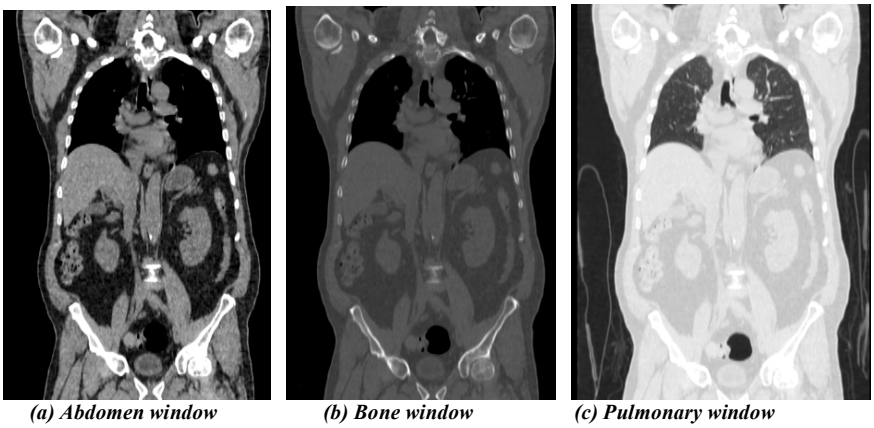
(a) Abdomen window *(b) Bone window* *(c) Pulmonary window*

Figure 6.53 Example of different WL/WW presets for the same image.

The two options at the bottom of the dropdown menu allow you to create your own WL/WW presets by using the Add Current WL/WW option. By default, the current WL/WW values are displayed as annotations on the image. You can also remove an item from this menu by holding down the shift key and simultaneously selecting it from the pop-up menu. As a precaution, you will be asked for confirmation before the selected preset is removed.