



WHITE PAPER

Enterprise Imaging

Image Area Productivity Design

Simple and fast access to specialist tools

1. Introduction

The Agfa HealthCare Enterprise Imaging Suite offers a completely new user interface that is built around Agfa HealthCare's 'NICE' user experience design framework. NICE is a framework of design principles, within which new applications are developed with a high focus on usability and productivity. This focus leads to user interfaces that are intuitive and simple to use, as well as optimized for accomplishing tasks efficiently. All Enterprise Imaging user interfaces share this common language that helps users to learn quickly and work efficiently. NICE user interfaces make users feel empowered.

Within the Image Area special features and interactions have been developed that allow users to perform their tasks with a minimum number of mouse movements, eye movements and mouse clicks. The user can stay focused on the images most relevant to the diagnostic reading. Furthermore, predefined workflows offer relevant tools for increasing productivity and decision processes.

The following pages give examples of the productivity-improving tools, described in three chapters: "Simple and fast access to needed tools", "The user can choose his preferred interaction" and "Productivity-enhancing features".

The remainder of this document will discuss why a workflow engine is particularly suited to fulfill the three prerequisites stated above.

Image Area offers simple and fast access to tools when they are needed. The following sections describe the interactive areas, the context menu, the Clinical sidebar and the Series toolbar.

1.1 Context menu

Each Image Area viewport includes a context-related menu that can be launched with a right mouse click (Figure 1). The context menu has three sections: a generic, user-configurable icon section on top; a modality-specific, user-configurable icon middle section; and a viewport-specific menu section at the bottom. This set-up speeds up access to user-specific features, and provides easily accessible shortcuts to the most common viewport-specific features.

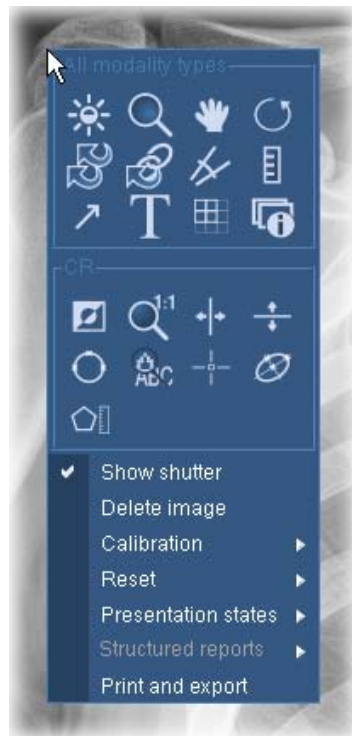


Figure 1 – Example of the context menu Image Area, with its three areas (generic, modality-specific, viewport-specific)

1.2 Clinical sidebar

The Clinical sidebar is located on the side of the Image Area, on the left, right, top or bottom, depending on the user's preference. It offers the user access to all the study-related tools and images when needed (Figure 3). By default, it displays a tab with all study-related series, including all relevant prior studies. Any series dragged from the Clinical sidebar can be dropped into the Image Area, and thus displayed in the desired viewport as well as in series-specific representation (2D, MPR, 3D, etc.). The studies are shown in a structured view, while key images or snapshots become visible with a single mouse click. In addition to the display of the studies, the Clinical sidebar includes tabs with study-related tools such as segmentation tools or a list of grouped measurements (protocols). The user can switch between tabs with a single mouse click. Moreover, the location of the Clinical sidebar, as well as its default display properties, can be defined

in the Hanging Protocol, or driven by the currently loaded modality or body part. More information can be found in the White Paper on Hanging Protocols.



Figure 2 – Study-related Clinical sidebar (available tools plus panel of selected tools)

1.3 Series toolbar

In the Image Area, each viewport has a Series toolbar handle in the bottom center of the image. When the cursor hovers over the Series toolbar handle, the Series toolbar appears (Figure 4). The tools on the Series toolbar can be configured per modality, allowing the user access to contextually relevant tools at the right moment, without unnecessary mouse movements.

The Series toolbar is hidden when it is inactive, with the tools shown only when needed, so the viewport doesn't get overloaded.

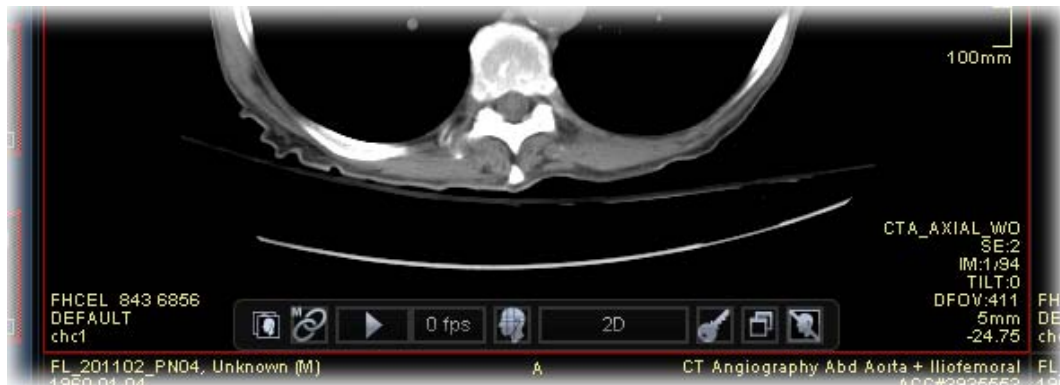


Figure 3 – Context-related Series toolbar, which includes generic as well as CT-related tools

2. The user can choose his preferred interaction

There are many user-configurable interaction possibilities in Image Area that help the user work efficiently. Any direct input device can be configured, and every interaction can be triggered by any key or key combination.

2.1 Support of any direct input device

The Enterprise Imaging solution lets the user configure any direct input device desired (e.g., mouse or keyboard). Analog input values can be mapped to data values, so the user can select what he is familiar working with, allowing him to interact more quickly with the application.

2.2 Trigger any interaction with any key

Any key or key combination can be configured to trigger any interaction the user wishes. This leads to higher productivity, as the radiologist can use his familiar shortcuts. For example, favorite window levels can be mapped to the functional keys, while more advanced users can map image manipulation shortcuts to any external input device, such as a foot pedal or a mammography keypad.

3. Productivity-enhancing features

The workflow-centered user interface design of the Image Area includes a specific set of tools that support productivity in daily routines. Any image can be shown in any viewport. Markups can be displayed on all corresponding images and directly sent to the report, while the user stays focused on the Image Area. The Study stamp shows whether a study is an active or a prior study, as well as whether it is visible in the List Text Area. The report can be brought into view with just one mouse click. Grouped measurement (aka protocols) can ensure that no measurements needed for a report are overlooked. Hanging Protocols arrange images and series logically. The linking tool links series together effectively. The ability to integrate any List Text Area component

into the Image Area supports a fast workflow that doesn't require the user to switch to the List Text Area. Cursor mode makes a point of interest visible in other displayed series, while auto zoom allows the exact placement of an interaction point.

3.1 Any image can be shown in any viewport

In the Image Area, an image can be shown in any viewport at any time (Figure 4). The user can see, for example, the same series with different window level settings at the same time, and can compare the series side by side.

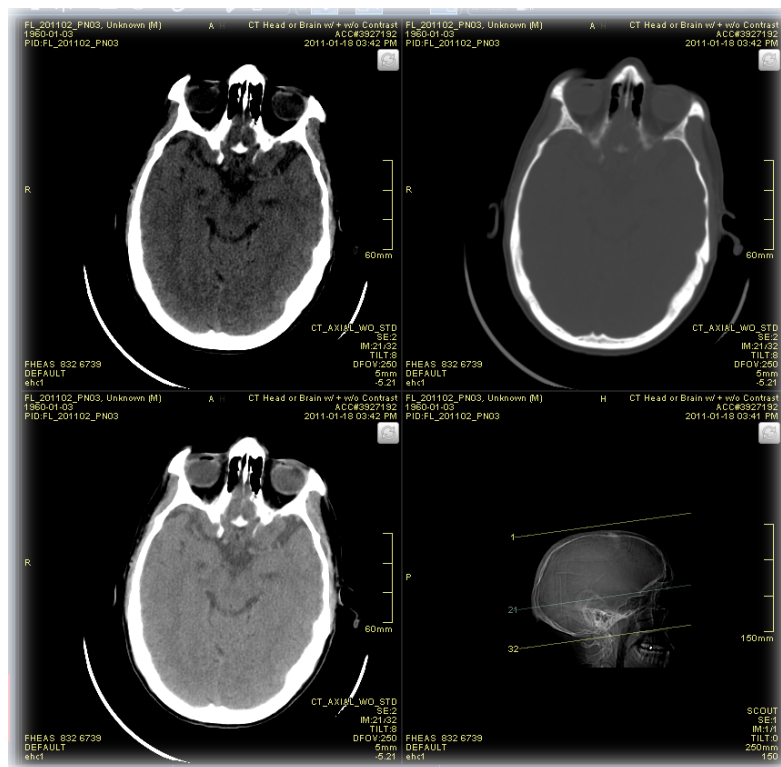


Figure 4 – Same series displayed three times with different window level values

3.2 Markups on all corresponding images or series

Every markup drawn is shared by all series coming from the same acquisition. This means that markups created on one image or series can be seen simultaneously in the List Text Area on all other corresponding images or series (Figure 6). This is also true for 3D. The user doesn't have to redo the markup each time, and can compare it directly on all related images or series being viewed.

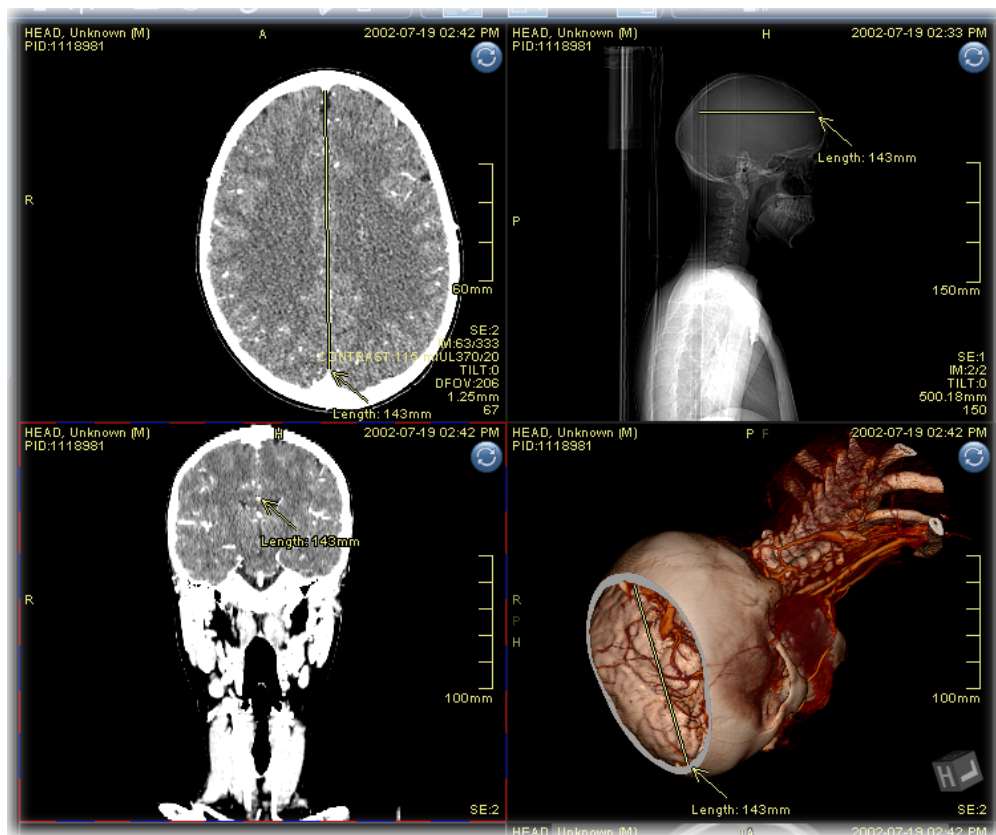


Figure 5 – Length measurement drawn in axial view is displayed and can be edited in all other corresponding views

3.3 Integration of measurements in the List Text Area

Measurements made in the Image Area can be directly added to the report via the Image Area context menu, without manual dictation of the text or input of the values by the user (Figure 6).



Figure 6 – Measurements are added directly via the context menu to the report or measurement section in the List Text Area

3.4 Study stamp

The Study stamp in the Image Area provides three benefits: it shows whether a study is an active or a comparison study; whether the study is also visible in the List Text Area; and whether the report can be brought into view in the List Text Area with just one mouse click (Figure 7).

The user sees immediately if an image or series belongs to an active study (indicated by a blue circle) or a comparison study (indicated by a grey square).

Furthermore, an icon on the Study stamp shows whether the study is also visible in the List Text Area, without the user even looking away from the image.

In addition, the user can bring the report of the study into view with just one mouse click on the corresponding Study stamp. The relevant report tab is opened in the List Text Area, and the icon on the Study stamp changes.



Figure 7 – Different Study stamps statuses (top row = active study; bottom row = comparison study; left row is in sync with the List Text Area; right row is not in sync with the List Text Area and the report can be brought into view by clicking on it)

3.5 No mouse cursor when not needed

When no mouse cursor is needed, e.g., during window leveling or navigating, the Image Area hides it. In this way, no part of the image is covered by the cursor and the user is not unnecessarily distracted. When the user finishes the interaction with the tool (without the cursor) and again requires the cursor, it re-appears at the same position to save unnecessary mouse movements.

3.6 Cursor mode

With Cursor mode, the radiologist is able to see a point of interest in other corresponding displayed series. A visible crosshair displays the point clicked by the user at its center. This allows the user to easily find all corresponding special locations in all available series. The Image Area offers this functionality for 3D views (Figure 8) as well, where the 3D object is auto rotating and cropping.

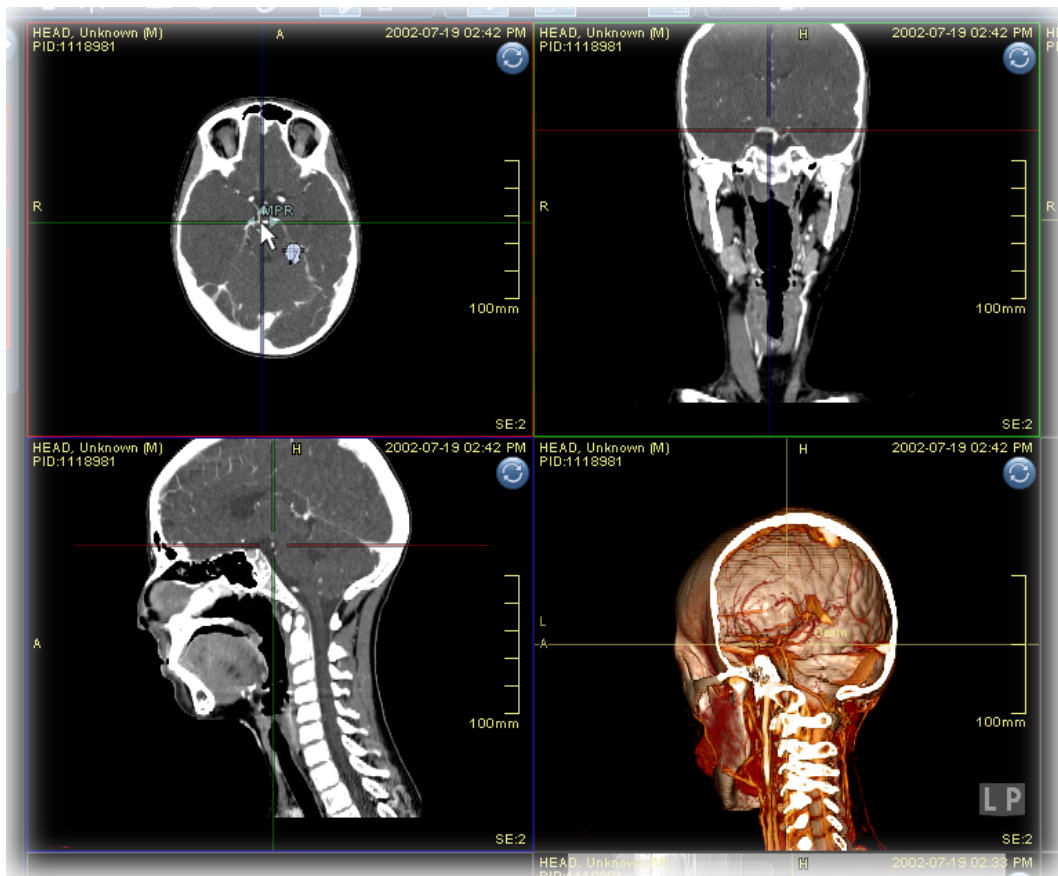


Figure 8 – Selected spatial location in top left image is displayed in all other remaining viewpoints

3.7 Auto zoom

While applying a markup tool in the Image Area, the user can zoom in by holding down the right mouse button. This allows very precise placement of an interaction point, without the need to pan the image to accommodate for the zoom applied.

3.8 Protocols

Protocols pre-define a set of measurements. For example, a sequence of measurements for a report can be configured, eliminating any risk that the user will overlook a required measurement. The application automatically switches to the next measurement, so the user does not even have to determine which measurement is to be done next. No extra mouse movements or clicks in the top toolbar or context menu are necessary. Protocols can also be configured by the user, who can define typical, personal workflows and perform measurements quickly.

3.9 Presentation groups and workflows

The Image Area includes Presentation groups that enable a logical layout and arrangement of images and series. They can automatically control all aspects of how studies are displayed. User interface properties can also be triggered by a Presentation group. Hanging Protocols, sequences of Presentation groups, are optimized for a typical reading workflow, which can be adjusted by the user to suit his personal preferences. Just one click takes the user from one Presentation group to the next in his workflow. The user can make his own Hanging Protocols and Presentation groups with the Presentation group editor (Figure 10).

More information can be found in the White Paper “Hanging Protocols”.

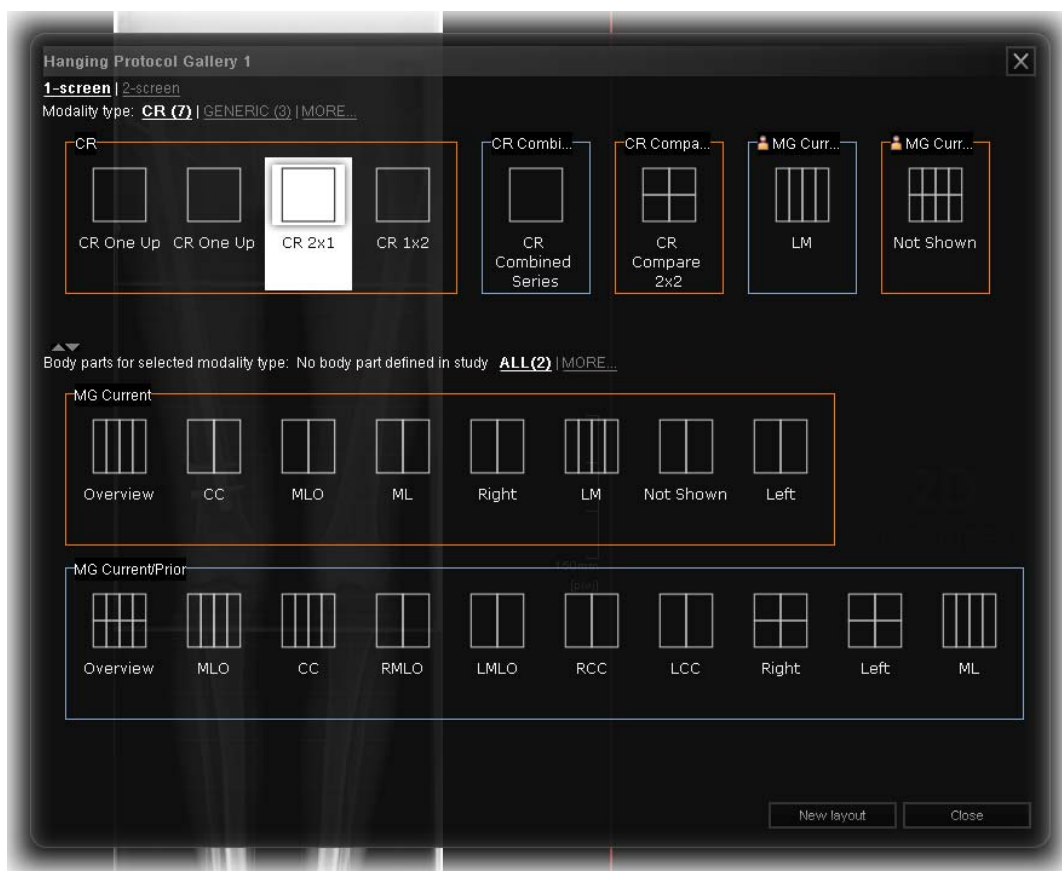


Figure 9 – Hanging protocol gallery displaying all available hanging protocol workflows for CR modality

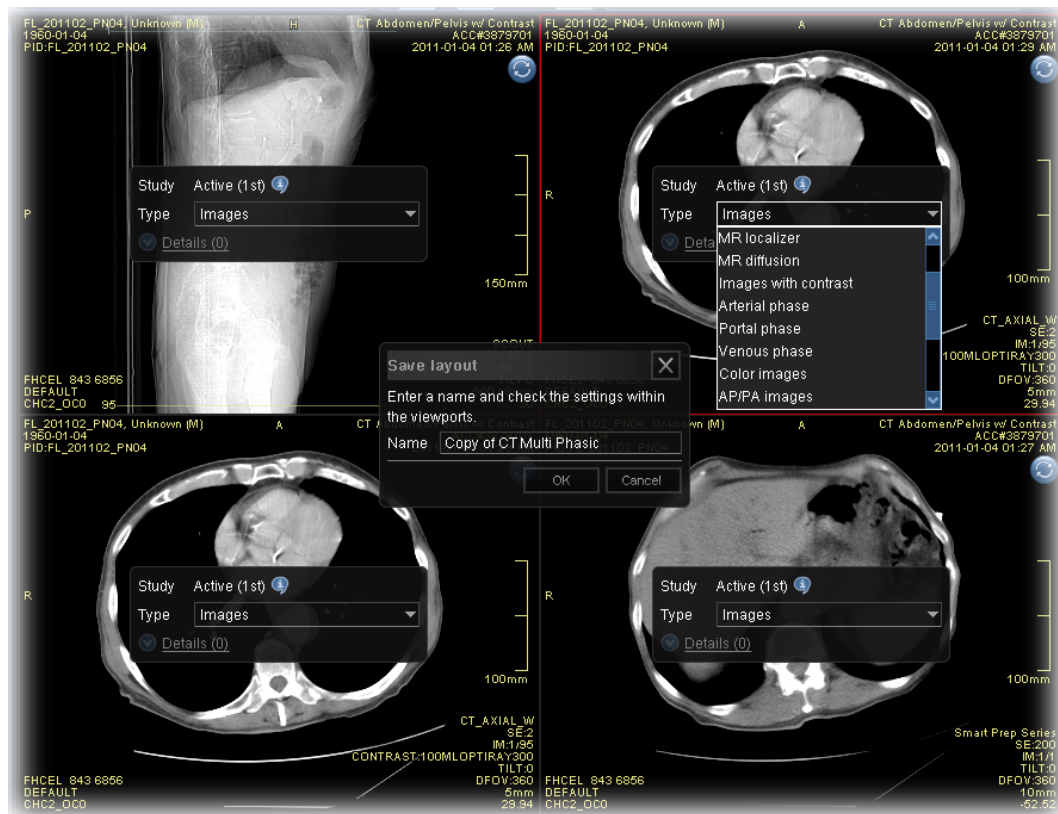


Figure 10 – Presentation group editor for editing or creating Presentation groups

3.10 Linking

The Image Area provides multiple ways to link series together effectively. The Hanging Protocol can define exactly how and which series will be linked. Using a Hanging Protocol-based definition allows image display to closely follow real-life reading workflow scenarios. Diagnostically relevant display modes and visualization methods are linked for enhanced reading speed and accuracy. This can significantly boost the speed and efficiency of comparing multiple and different views of a series.

The user can also activate automatic navigation linking, which automatically links all series that consist of parallel images (e.g., all axial series go into one linking group and all sagittal images into another group). The spatial link is established and maintained for interaction, without the need for any further configuration.

In addition, the user can manually link series and define multiple features, such as window level, to be linked. Several linking groups can be defined for the currently displayed set of images. Manual linking offers the benefits of the entire customization range, from spatial offset settings to the definition of multiple linking groups.

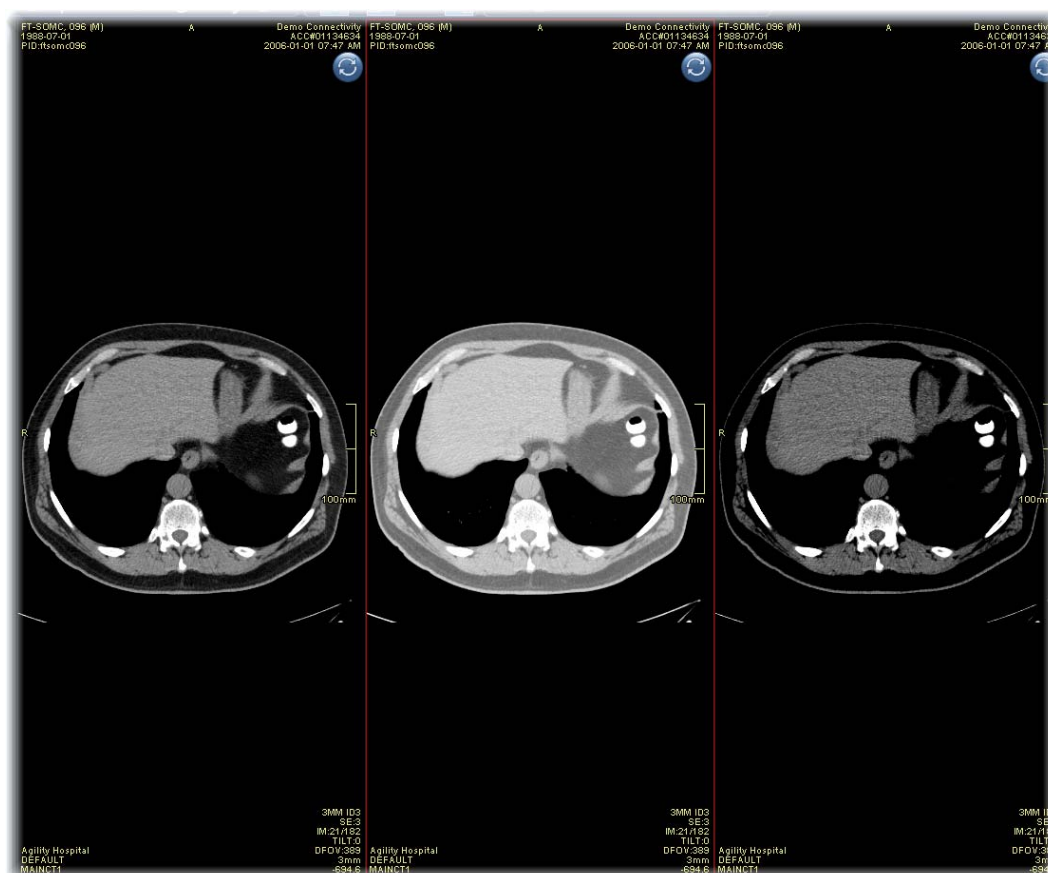


Figure 21 – Three series with linked window levels – changing the window level in one viewport affects all other viewports

3.11 List Text Area features are also available in the Image Area

Any List Text Area components can be integrated into the Image Area. By default, the Cycle list, the Study list and the Task toolbar, which are normally used in the List Text Area, are also available in the Image Area (Figure 13). This means that when the user is working on the Image Area screen, he doesn't have to switch to the List Text Area to use all these functionalities.



Figure 12 – List Text Area tools also available in the Image Area (Cycle list, Study list and Task toolbar)

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