NX Getting Started Sheets

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AGFA HealthCare

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Getting started with NX

Topics:

- *Introduction*
- *Managing the examination*
- *Selecting and Performing X-Ray Exposures*
- *Performing quality control*
- *About extensive Editing possibilities*

Introduction

In this chapter, you will learn how to work with the NX workstation. NX has a main workflow, which provides an easy touch user interface and high patient throughput. By following this workflow, you will learn how to use NX.

Note: *Depending on your hospital workflow, steps can be not applicable.*

Topics:

- *DR workflow*
- *CR workflow*

DR workflow

1. Open a patient from the RIS or enter patient data manually.

   When a new patient comes in, define the patient info for the exam.
2. Selecting the examinations.

   Set the exposure instructions for the exam.
3. Perform X-Ray exposures.
4. Performing quality control.

   Assess the image quality and prepare the images for diagnosis. Send the images to a hardcopy printer or PACS (Picture Archiving and Communication System).

Note: *Next to this main workflow, you have a wide number of image processing tools in the Editing window.*

CR workflow

1. Open a patient from the RIS or enter patient data manually.

   When a new patient comes in, define the patient info for the exam.
2. Selecting the examinations.

   Set the exposure instructions for the exam.
3. Identifying the cassettes.

   Identify the cassette that carries the exam. You are free to perform X-Ray exposures before or after identification.
4. Digitizing the images.

   The Digitizer sends the images to NX.
5. Performing quality control.

   Assess the image quality and prepare the images for diagnosis. Send the images to a hardcopy printer or PACS (Picture Archiving and Communication System).

Managing the examination

Topics:

- *Opening a patient from the RIS*
- *Manually entering patient data*
- *Composing the examination*
- *Patient categories*

Opening a patient from the RIS

Procedure:

1. In the **Worklist** window:
   - Select an exam from the list (1) and click Start Exam (2).
   - Press the displayed thumbnail.
   - Double-click an exam in the list.

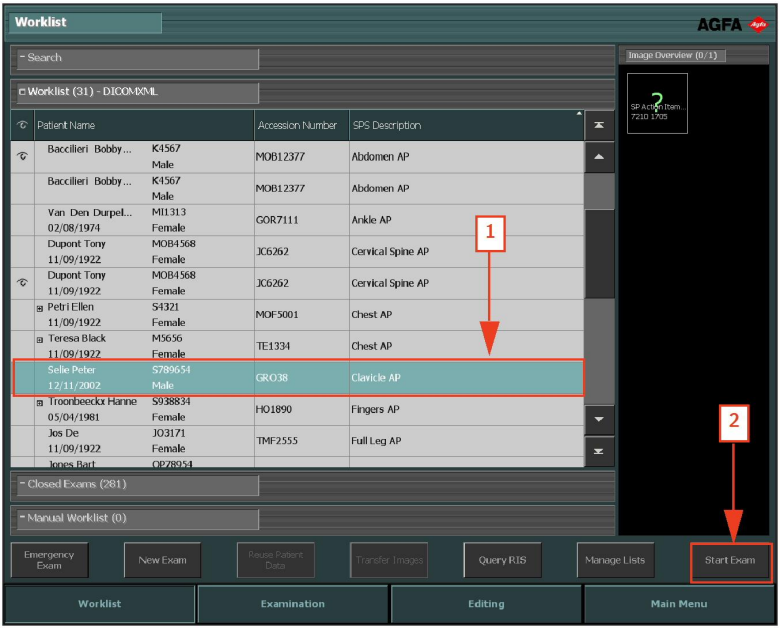

Figure 1: Starting an Examination from the Worklist window

Note: *If your system is configured to interpret protocol codes, the images may be preselected. In that case, the images are automatically added when you click Start Exam.*

2. The patient (1) and exam (2) details are displayed in the **Examination** window.

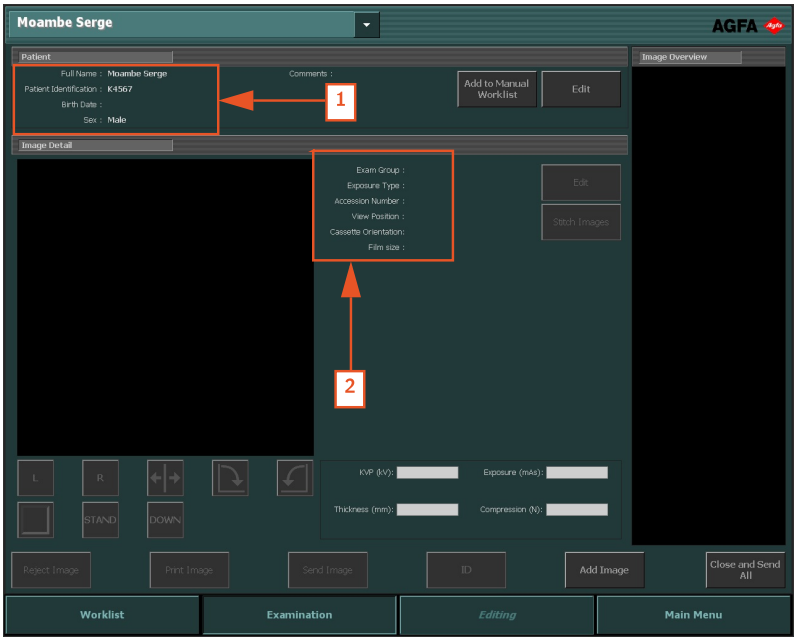

Figure 2: Examination window

Manually entering patient data

1. In the **Worklist** window, click **New Exam**.

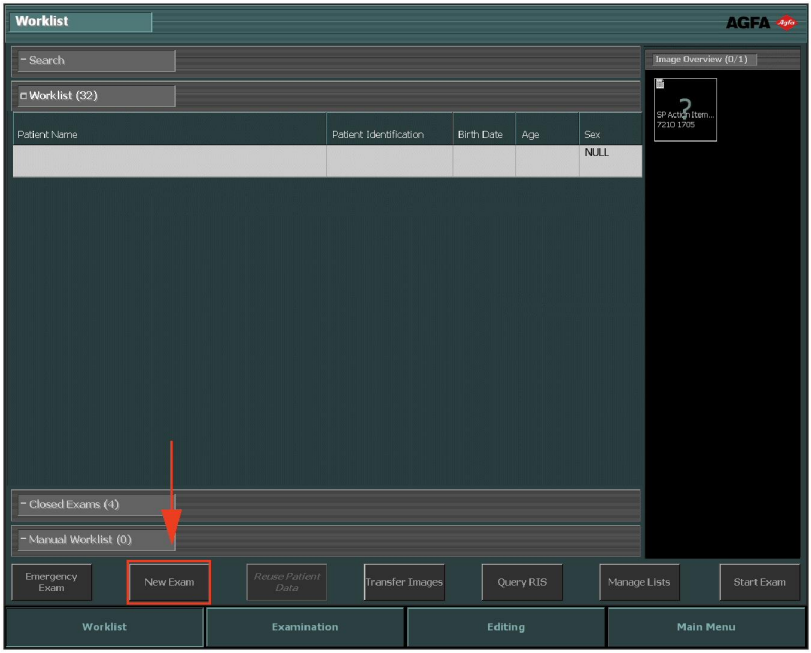

Figure 3: Manually Entering patient data

2. The **Examination** window opens, where you have to fill in the patient information. All fields with an asterisk on the right side are mandatory and must be filled in to be able to continue.

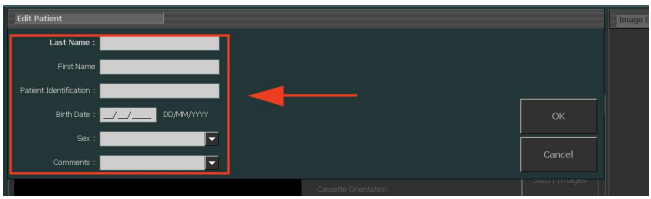

Figure 4: Edit patient pane

3. Click **OK**.

   In case no birth date or age was provided in the patient information, an additional dialog appears asking to select the patient's category.

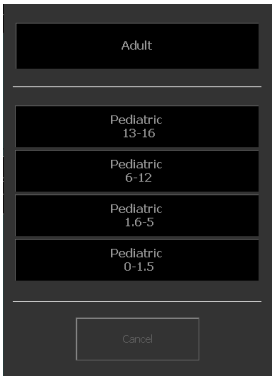

Figure 5: Patient category dialog

4. Select the patient's category and click **OK**.

   The **Add Image** window opens, where you can add the necessary images.

Figure 6: Add Image window

5. Click **OK**.

Composing the examination

1. In the **Examination** window, click **Add Image**.

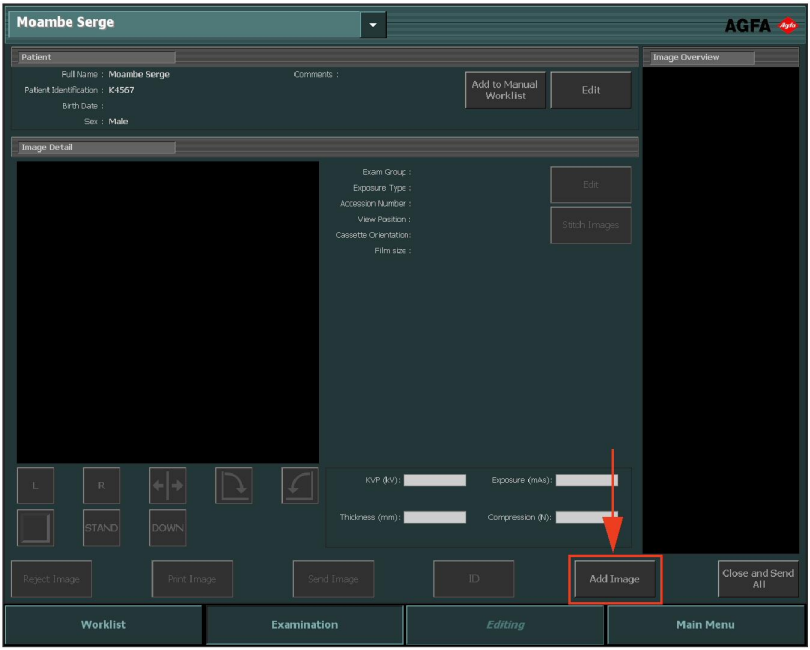

Figure 7: Examination window with Add Image button highlighted

Note: If your system is configured to interpret protocol codes, the images may be preselected. In that case, the images are automatically added when you click Start Exam.

In case no birth date or age was provided in the patient information, an additional dialog pops up asking to select the patient's category.

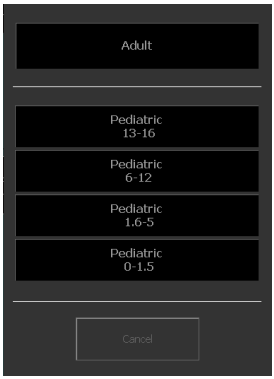

Figure 8: Patient category dialog

2. Select the patient's category and click **OK**.

   The **Add Image** window appears.

Figure 9: Add Image window

Note: *The patient category is automatically selected based on age, calculated from the patient's birth date or on the patient weight, depending on the configuration. Only in exceptional cases, you should change the patient category.*

3. Specify the exam type by first selecting a group, followed by an exposure type. Repeat this step for every additional exposure type you want to add.

Note: On DR environment, the exposure type thumbnails look differently. Refer to "Defining exposures".

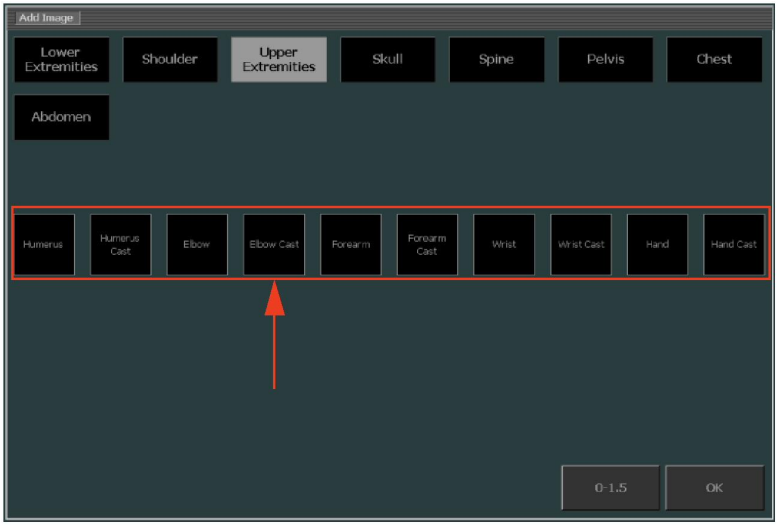

Figure 10: Select Exposure Type in Add Image window

The image thumbnail is added to the image overview.

4. Click **OK**.

Patient categories

The NX Workstation can use patient categories based on patient age and patient weight to apply unique image processing, display settings and exposure parameters.

If patient data like age, birth date or weight are available, a default category is selected automatically. If insufficient patient data are available, the patient category window is displayed when adding images.

Figure 11: Patient category dialogs for age and for weight

Selecting a different patient cateogry

If for a specific patient the default category does not define appropriate image processing, display settings or exposure parameters, another category can be selected while adding the image.

In the **Add Image** window, the patient category button displays the default category.

To select a different patient category:

1. Click the patient category button.

   The patient category dialog appears. A green border indicates if the patient belongs to the categories for adults or for paediatrics, according to the patient data.

2. Select the category that is appropriate for the specific patient.

   The patient category button displays the new category. New images have settings that correspond to the new category.

To make the user aware while adding images that settings will be applied that do not correspond to the patient age or weight entered in the patient data, a small warning sign is displayed in the patient category button and in the **Add Image** button.

Selecting and Performing X-Ray Exposures

The procedure for selecting and performing X-Ray exposures depends on the configuration settings of the NX, the digitizer and the connectivity to the X-Ray modality. The main workflow types are described in the following sections.

Topics:

- *DR workflow*
- *Automated DR full screen sequence*
- *CR workflow*
- *CR workflow with X-Ray generator control*
- *Mammography CR workflow with a connection to the X-Ray generator*
- *Mammography CR workflow with manual entry of X-Ray exposure parameters*

DR workflow

The NX Workstation can be used with a DR system.

For this situation, there is a dedicated workflow to perform exposures.

Procedure:

1. Select the thumbnail for the exposure in the Image Overview pane of the Examination window.

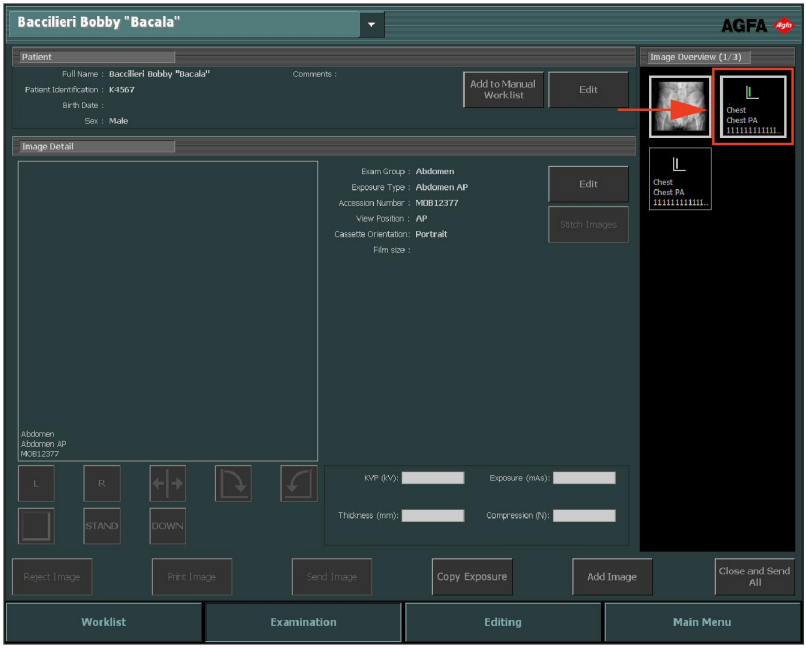

Figure 12: Examination Window with image thumbnail highlighted

The selected DR detector is activated.

The default X-Ray exposure parameters for the selected examination or exposure are sent to the modality.

Note that:

- If another thumbnail is selected before making the exposure, the newly selected DR detector is activated and the default X-Ray exposure parameters for that examination are sent to the modality, overruling the parameters sent previously.

If NX is configured in that way, the Forced Operator Identification window appears.

Figure 13: Forced Operator Identification window

2. In the Forced Operator Identification window, select a name from the list or enter your name and click OK.

Note: *Operator Identification is only requested when you select the first thumbnail. If an examination is performed by several operators, you can adapt the "Operator" field in the Edit Image Detail pane (if this is configured). Refer to "Changing specific image settings".*

3. Check the exposure settings.
   a) Check if the exposure settings displayed on the X-Ray System console are suitable for the exposure.
   b) If other exposure values are required than those defined in the NX exam, use the X-Ray System console to overwrite the default defined exposure settings.

Note: The default X-Ray exposure parameters can be used as a guide but the user must check and correct them if needed. The default X-Ray exposure parameters are defined in the NX Service and Configuration Tool. Refer to the Key User Manual for more information.

Note: You cannot change the X-Ray exposure parameters on the NX Software. This can only be done on the X-Ray System console.

Note: Refer to "Suggested Radiographic References and User Guides" for more information on determining default exposure parameters based on Target Exposure Index and desired image quality.

4. Position the patient and make the exposure.

CAUTION:
Do not select another thumbnail until the preview image is visible in the active thumbnail. The acquired image may be linked to the wrong exposure.

Note: The X-Ray exposure parameters before, during and after the exposure are displayed on the X-Ray System console.

Note: The X-Ray system position parameters before, during and after the exposure are displayed on the X-Ray System console or can be read from the X-Ray system controls.

After the exposure is made, the Examination window looks as follows:

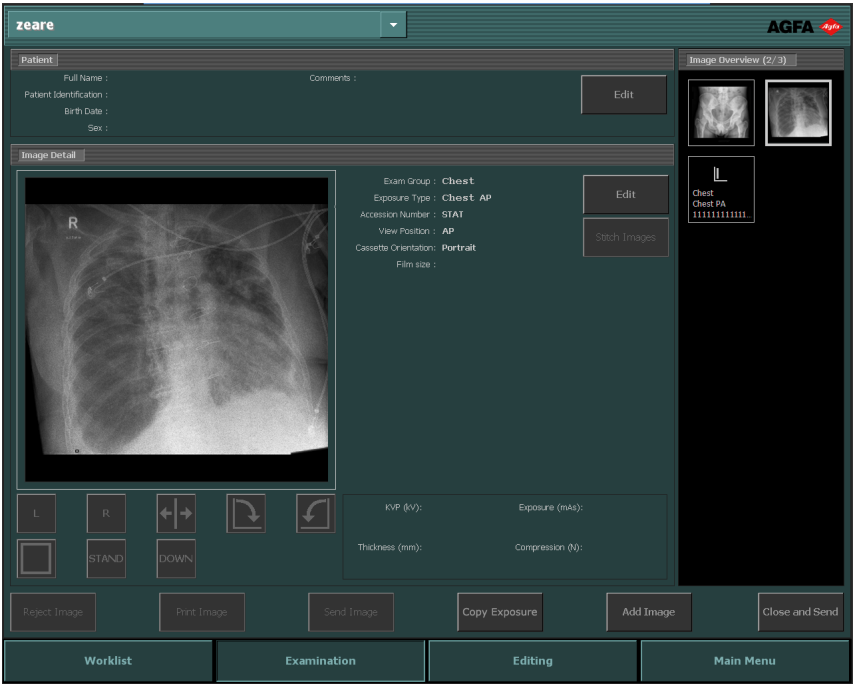

Figure 14: Examination window after making exposure on a DR Detector.

As a result:

- The image is acquired from the DR detector and displayed in the thumbnail.
- If tube collimation is applied, the image is automatically cropped at the collimation borders.
- The actual X-Ray exposure parameters are sent back from the modality to the NX Workstation.
- The X-Ray exposure parameters (such as kV, mAs or DAP) are shown in the Image Detail pane of the Examination window. The list of shown parameters is to be configured.

5. The parameters are stored with the image.

   Parameters can be sent with the image to the archive or printed with the image. They can also be sent out via MPPS.

Automated DR full screen sequence

A predefined sequence of DR exposures can be performed without having to return to the NX Workstation for each new exposure. During the automated workflow, the acquired images and the DR detector status are displayed full screen.

To start an automated DR full screen sequence:

1. In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

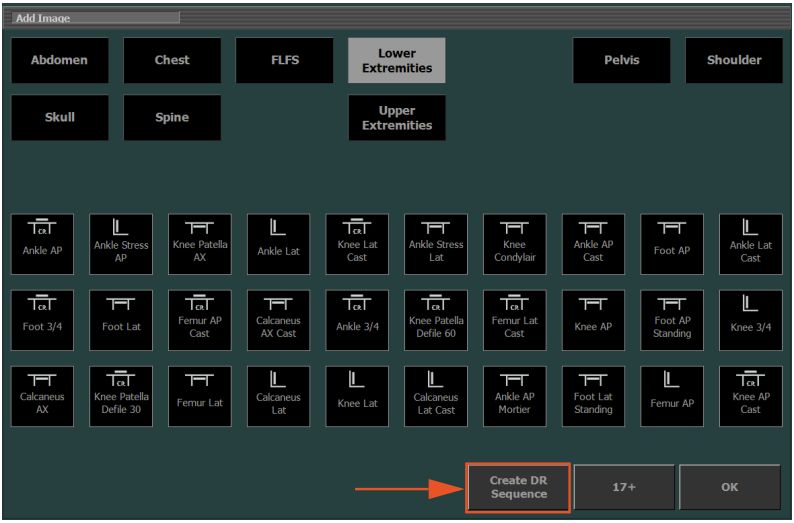

Figure 15: Create DR Sequence button

2. In the **Add Image** window, click the **Create DR Sequence** button.

Note: A predefined automated DR full screen sequence can be set up using the NX Service and Configuration Tool. Refer to the Key user manual for more information.

3. Add the exposures in the required order.

   Images in a sequence are indicated with a small triangular mark in the lower left hand corner of the thumbnail. If an examination contains more than one sequence, the mark is alternating white and black to distinguish the sequences.

4. Select the thumbnail for the first exposure in the Image Overview pane and follow the normal DR workflow.

   If configured, a positioning guidance image and guidance text for making the exposure is displayed.

   After acquiring each image, the image is displayed in full screen mode and the next thumbnail is selected automatically. The color of the DR detector symbol indicates the status of the DR detector.

Figure 16: Examination window in full screen mode

5. After acquiring the last image, click the close button to leave full screen mode.

Figure 17: Close button

Topics:

- *DR detector status*
- *Rejecting an image during an automated DR full screen sequence*

DR detector status

Image	Description
	Grey: The image is planned and the DR detector is in sleep mode. On a thumbnail that is not selected, the status indication is always grey.
	Green: The DR detector is ready to acquire the exposure on the selected acquisition system. Green flashing: The exposure has been performed and the acquisition is ongoing.
	Red: The DR detector is out of order. Red flashing: The selected acquisition system is starting up.

Rejecting an image during an automated DR full screen sequence

The acquired image is displayed in full screen mode.

To reject this image:

1. Click the reject button.

Figure 18: Reject button

   The **Reject Reason** dialog box opens.
2. Select a reason to reject the image.

The acquired image is rejected and a new thumbnail is added to the sequence. The new thumbnail is selected for repeating the exposure.

CR workflow

Topics:

- *Identifying the cassettes*
- *Digitizing the images*

Identifying the cassettes

NX can be configured in such a way that different workflows are followed when identifying cassettes. You can configure NX to use one of these workflows in the NX Service and Configuration Tool.

- Identify a cassette using the ID Tablet. In short, the workflow goes as follows: selecting the thumbnail, inserting the cassette in the tablet and then clicking **ID**.
- Identify automatically using the ID Tablet ('Auto ID'). In short, the workflow goes as follows: selecting the thumbnail and inserting the cassette in the tablet. The ID label will automatically be added to the image and the thumbnail. Refer to the Key user manual, Device Configuration, section ID Tablets.
- Identify in the Digitizer ('Fast ID'). In short, the workflow goes as follows: selecting the thumbnail, inserting the cassette in the Digitizer and then clicking **ID**. Refer to the Key user manual, Device Configuration, section Digitizers.

Procedure:

1. Insert a cassette in the ID Tablet.
2. In the **Examination** window, select the right thumbnail in the Image Overview.

   In the example below, there is only one thumbnail which is automatically selected. If there are more than one thumbnails, the selected one is not necessarily the one that will be performed first; you can select another thumbnail.

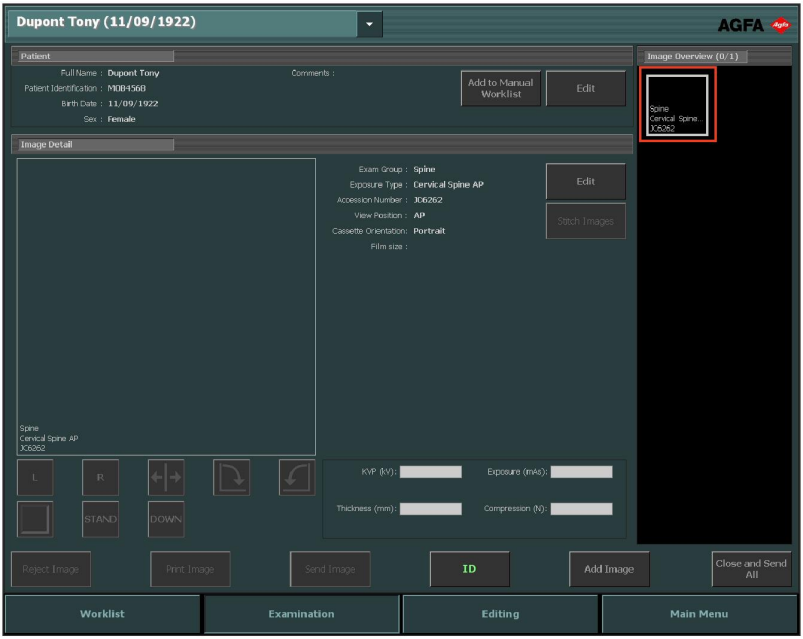

Figure 19: Thumbnail selection in Examination window

3. Click **ID** or press **F2**.

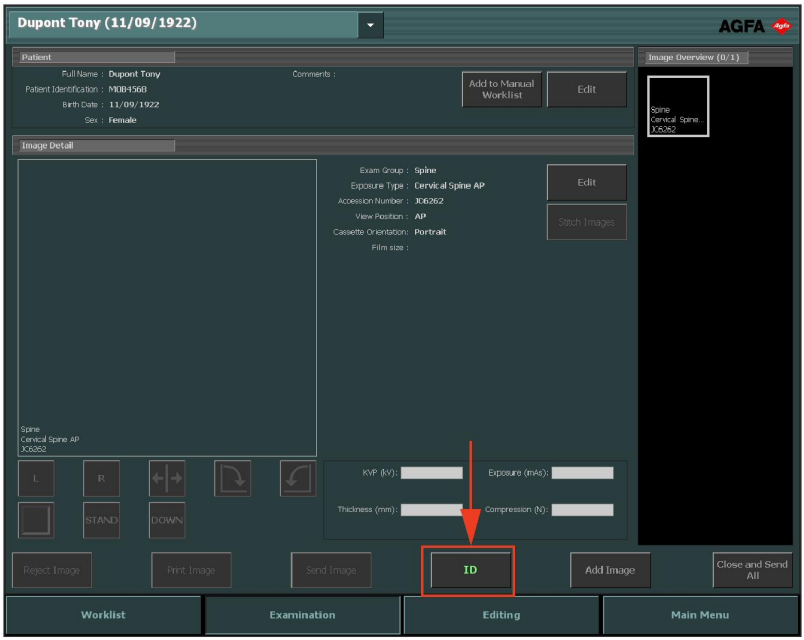

Figure 20: Examination window with ID button highlighted (cassette workflow).

If NX is configured in that way, the Forced Operator Identification window appears.

Figure 21: Forced Operator Identification window

4. In the Forced Operator Identification window, select a name from the list or enter your name and click **OK**.

Note: Operator Identification is only requested when you identify the first thumbnail. If an examination is performed by several operators, you can adapt the "Operator" field in the Edit Image Detail pane (if this is configured). Refer to "Changing specific image settings".

5. The thumbnail is labelled with the code 'ID'. The patient data is written to the cassette.

   - ID label on the thumbnail (1).
   - ID label on the image (2),

Depending on the configuration, the next exposure thumbnail to be identified is now selected.

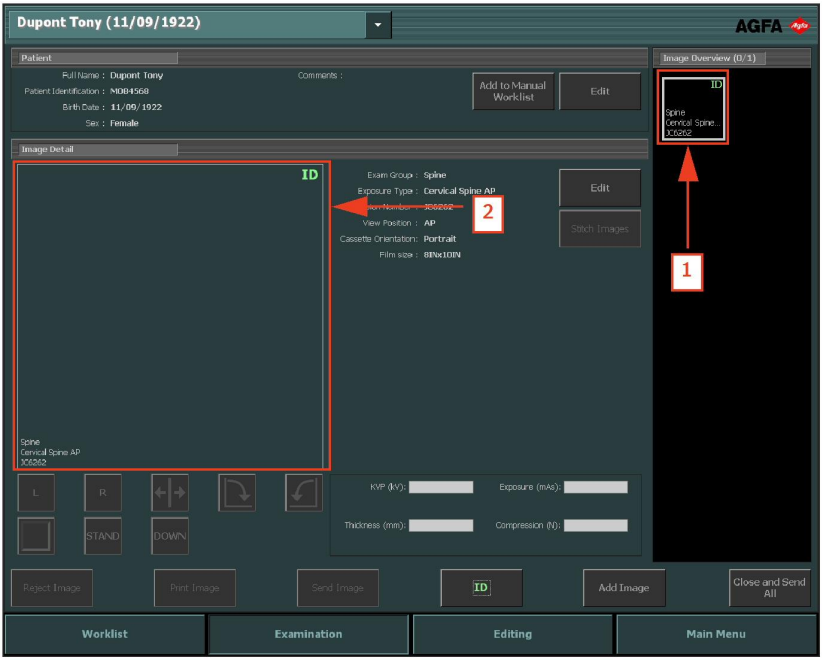

Figure 22: Examination window with identified exposure (cassette workflow)

Note: The identification of the cassette can be performed before or after the X-Ray exposure. Refer to "Identifying a cassette" for alternative identification procedures.

Note: You can also identify cassettes in the Add image window.

Digitizing the images

Procedure:

1. Insert the cassette in the Digitizer.
2. The image will appear in the **Image Overview** pane of the **Examination** window.

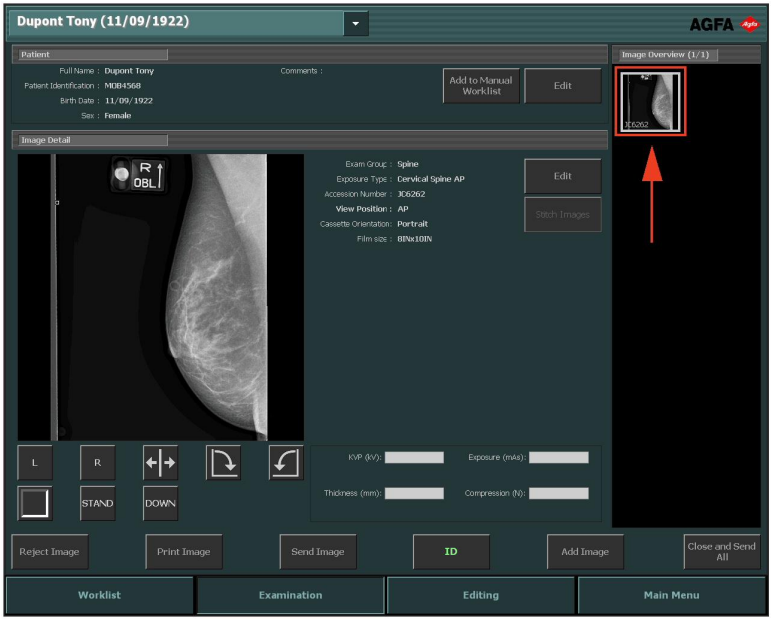

Figure 23: Image appears in Examination window

CR workflow with X-Ray generator control

The NX Workstation can be connected to the X-Ray System Generator to exchange X-Ray exposure settings. This functionality is license-dependent. For this situation, there is a dedicated workflow: identification of the cassettes is performed each time after making the exposure. The other aspects of using the Examination window remain the same as described elsewhere in this chapter.

This workflow also applies when performing a CR exposure on an NX Workstation that is part of a DR system.

Procedure:

1. Select the thumbnail for the exposure in the Image Overview pane of the Examination window.

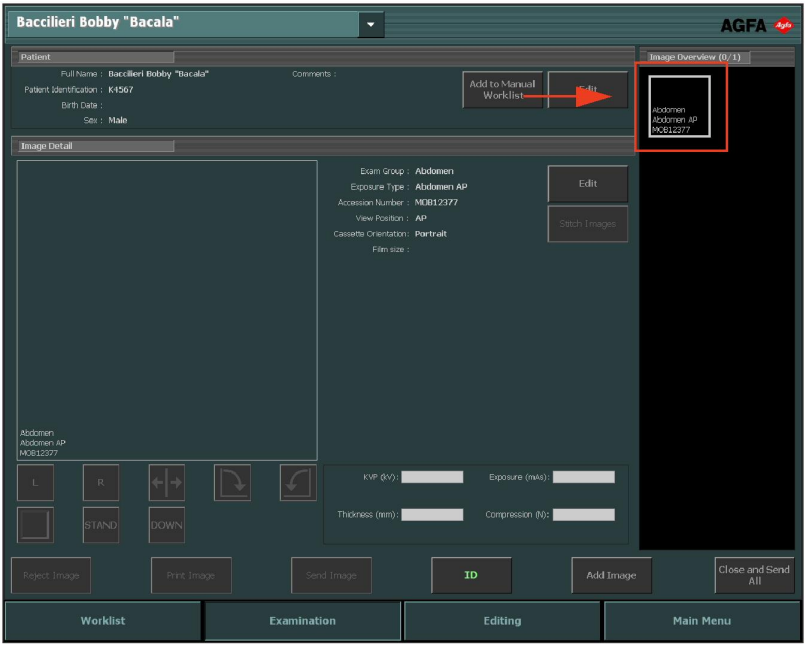

Figure 24: Examination Window with image thumbnail highlighted

The default X-Ray exposure parameters for the selected examination or exposure are sent to the modality.

Note that:

- If another thumbnail is selected before making the exposure, the default X-Ray exposure parameters for that examination are sent to the modality, overruling the parameters sent previously.

2. Check the exposure settings.
   a) Check if the exposure settings displayed on the X-Ray System console are suitable for the exposure.
   b) If other exposure values are required than those defined in the NX exam, use the X-Ray System console to overwrite the default defined exposure settings.

Note: The default X-Ray exposure parameters can be used as a guide but the user must check and correct them if needed. The default X-Ray exposure parameters are defined in the NX Service and Configuration Tool. Refer to the Key User Manual for more information.

Note: You cannot change the X-Ray exposure parameters on the NX Software. This can only be done on the X-Ray System console.

Note: Refer to "Suggested Radiographic References and User Guides" for more information on determining default exposure parameters based on Target Exposure Index and desired image quality.

3. Insert the cassette in the modality, position the patient and make the exposure.

   After the exposure is made, the Examination window looks as follows:

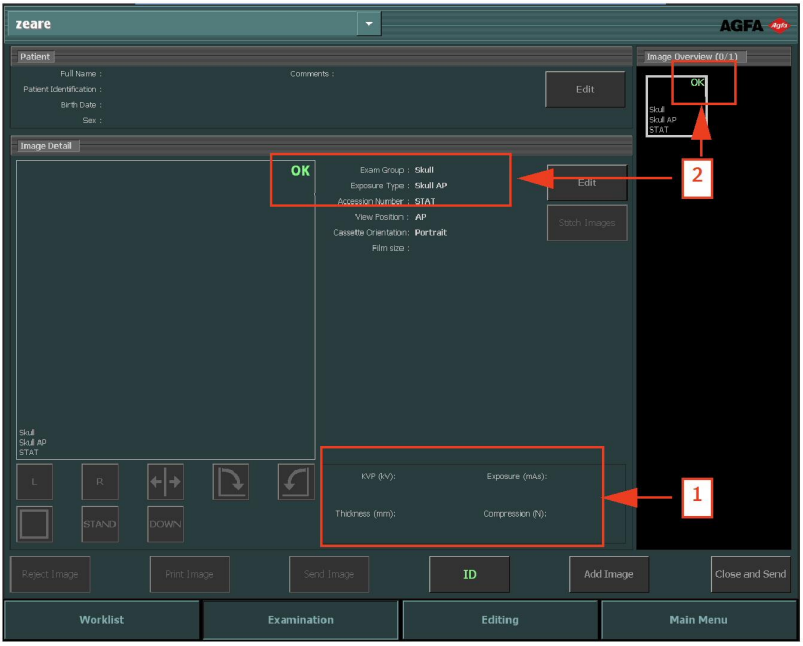

Figure 25: Examination window after making exposure in a connection with the X-Ray modality

As a result:

- The actual X-Ray exposure parameters are sent back from the modality to the NX Workstation.
- The X-Ray exposure parameters (such as kV, mAs or DAP) are shown in the Image Detail pane of the Examination window (1). The list of shown parameters is to be configured.
- A green OK mark appears on all thumbnails for which the exposures are made and for which exposure settings are sent back to the NX Workstation (2).

4. Insert the cassette in the digitizer or in the ID Tablet and click ID in the Examination window.

CAUTION:
Do not select another thumbnail until the preview image is visible in the active thumbnail. The acquired image may be linked to the wrong exposure.

Note: The X-Ray exposure parameters before, during and after the exposure are displayed on the X-Ray System console.

Note: The X-Ray system position parameters before, during and after the exposure are displayed on the X-Ray System console or can be read from the X-Ray system controls.

5. The parameters are stored with the image.

   Parameters can be sent with the image to the archive or printed with the image. They can also be sent out via MPPS.

Note: *You cannot change the default parameters on the NX Workstation.This can only be done on the console. Also, after the exposure is made, parameters cannot be changed on the NX Workstation. They can only be consulted in the Examination window.*

Making multiple exposures on a single cassette

If an image thumbnail is configured for multiple exposures on a single cassette, another set of thumbnails is shown in the image detail pane. Now you have to select one of these thumbnails to send the proper default X-Ray exposure parameters to the modality for each exposure.

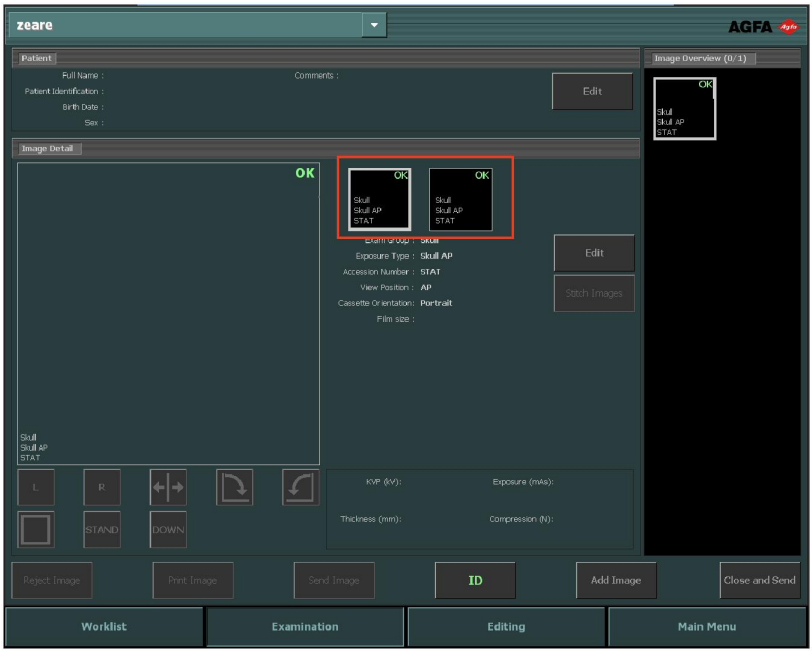

Figure 26: Multiple Exposures on same cassette shown in Examination window.

CAUTION:
Incomplete exposure parameters (kV, mAs) are transmitted to Archive for multiple sub-exposures on one cassette. Only the exposure parameters for one sub-exposure are transmitted. Don't use multiple sub-exposures when the exposure parameters are interpreted by the Archive.

Mammography CR workflow with a connection to the X-Ray generator

The NX Workstation can be connected to the Mammography X-Ray System Generator to exchange X-Ray exposure settings. This functionality is license-dependent.

For this situation, there's a dedicated workflow to identify cassettes: ID one by one workflow is the workflow custom to users that use an ID camera connected to the modality in a film/screen environment.

Procedure:

1. Insert the cassette into the modality, position the patient and make the exposure.
2. Remove the cassette from the table and insert the next cassette.
3. Select the correct thumbnail in the exam overview pane
4. Insert the cassette in the Tablet and click ID in the Examination window. This will link the received exposure settings to the image.
5. Insert the cassette in the Digitizer.
6. Reposition the patient.
7. Make the next exposure.
8. Repeat from 2 until all exposures are made.

Estimated Radiographic Magnification Factor (ERMF)

Mammography images are calibrated based on the Estimated Radiographic Magnification Factor. The calibration factor is received together with the X-Ray generator parameters.

Modifying the Estimated Radiographic Magnification Factor is only possible if the Source Image Distance (SID) is received together with the X-Ray generator parameters.

Mammography CR workflow with manual entry of X-Ray exposure parameters

The NX workstation can be used to enter X-Ray exposure data manually in a mammography workflow.

This functionality is license-dependent. It cannot be used in combination to the X-Ray Device exchanging exposure settings.

The key user has to configure NX so that the X-Ray parameter fields are visible in the NX Image Detail pane.

Note: X-Ray parameters can be updated before the image is archived, printed, sent or rejected.

Procedure:

1. Insert the cassette into the table and position the patient.
2. Make the exposure.
3. Remove the cassette from the table and insert the next cassette.
4. Select the correct thumbnail in the exam overview pane.
5. In the Image Detail pane, enter the X-Ray parameters.

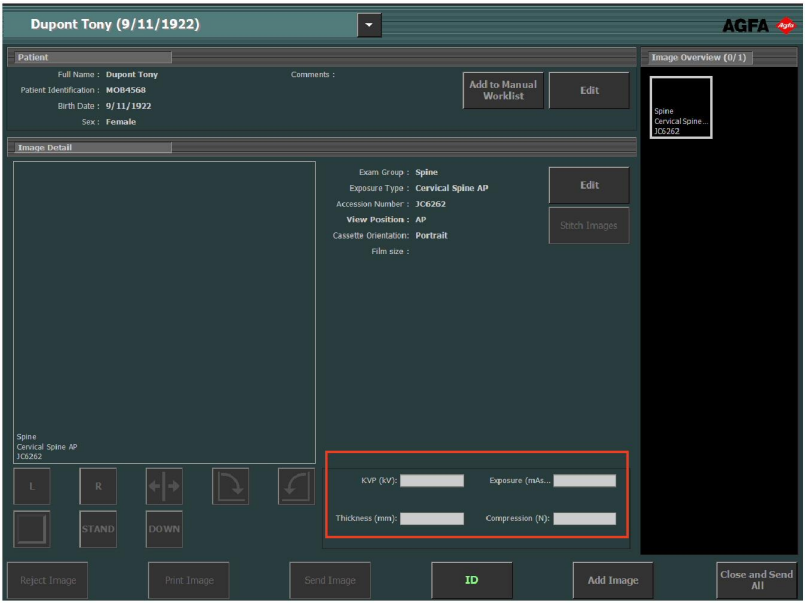

Figure 27: X-Ray parameters in Examination window

6. Insert the cassette in the Tablet and click ID in the Examination window. This will link the entered exposure settings to the image.
7. Insert the cassette in the Digitizer.
8. Reposition the patient.
9. Make the next exposure.
10. Repeat from 3 until all exposures are made.

Estimated Radiographic Magnification Factor (ERMF)

To apply a calibration based on the Estimated Radiographic Magnification Factor

1. Enter the Source Image Distance (SID) in the X-Ray generator parameters.
2. Enter the distance between the plane in which measurements are to be made and the detector.

Performing quality control

Procedure:

1. In the **Image Overview** pane of the **Examination** window, select the image on which you want to perform quality control. (1)

   The image is displayed in the **Image Detail** pane. (2)

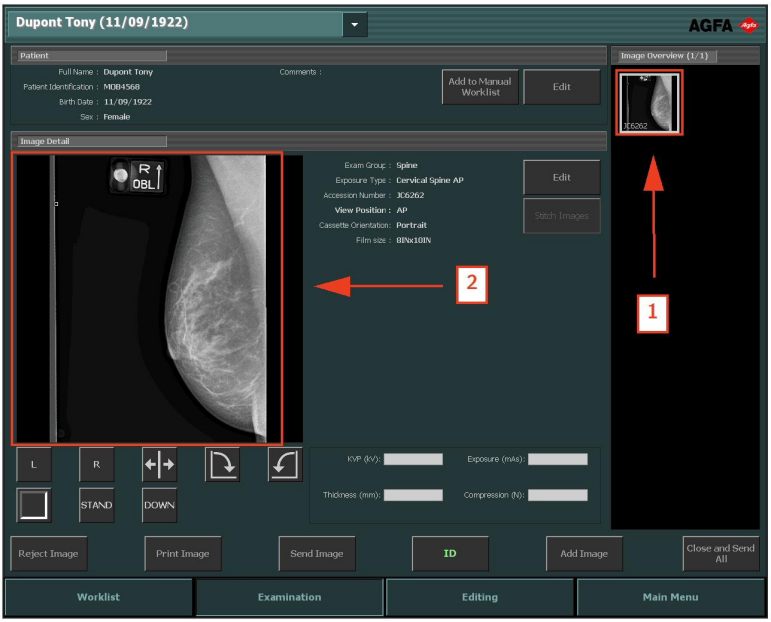

Figure 28: Examination window with image displayed in Image Detail pane

2. Prepare the images for diagnosis by using the tools in the **Image Detail** pane.

   The following table explains the functionality of these tools.

Button	Functionality
 **Figure 29: Left Marker button**	Adds a left marker. Click the button, and then click the image where you want to place the marker. To remove the marker, select it and then press the **Delete** button.

Button	Functionality
 **Figure 30: Right Marker button**	Adds a right marker. Click the button, and then click on the image where you want the place the marker. To remove the marker, select it and then press the **Delete** button.
 **Figure 31: Flip button**	Flips the image around the vertical axis.
 **Figure 32: Rotate Counterclockwise button**	Rotates the image 90° counterclockwise.
 **Figure 33: Rotate Clockwise button**	Rotates the image 90° clockwise.
 **Figure 34: Freehand rotate button**	Rotates the image by an arbitrary angle.
 **Figure 35: Black Border button**	Turns on or off the black borders for masking non-relevant image areas. Turns on or off cropping of the non-relevant image areas of DR images or CR 10-X images.

Button	Functionality
 **Figure 36: Full Screen button.**	Switches the active image to full screen mode.
 **Figure 37: High Priority Marker button.**	Enables you to put a high priority marker on the image. The image gets the highest priority in the printing and archiving queues and a high priority DICOM attribute that can be used to make a selection on the archiving station.

Note: The available buttons depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

3. If all images are OK, click **Close and Send All** or press **F4**.

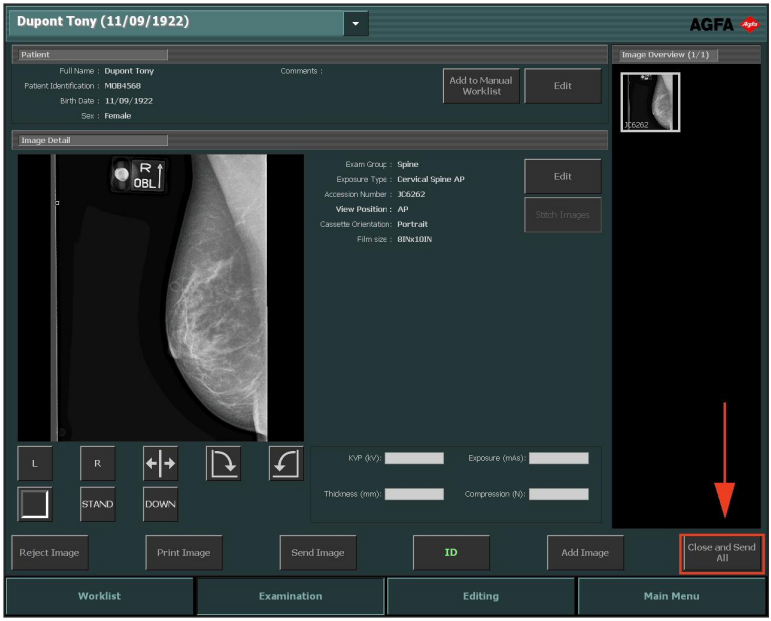

Figure 38: Examination window with Close and Send All button highlighted

If configured, the images are sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

About extensive Editing possibilities

In the **Editing** window, you can perform in-depth operations on an image. In this window, you can also prepare the image for printing.

*Note***:** *The tools available in the editing environment are designed to be used by the mouse pointer. This is the most efficient way to perform these more complex tasks.*

The **Editing** window has two modes:

- Normal mode: focussed on softcopy users; in this mode the print tools are not available.
- Print mode: in this mode the print tools are added to the tools pallet and images are displayed in a WYSIWYG print preview.

*Note***:** *In the NX Service and Configuration Tool you can select the default mode, depending on your workflow (print or PACS).*

The following toolsets are available in both modes. The tools are displayed in several task-specific sections:

- **Select**: general tools to manage the images.
- **Annotations**: add diagnostic annotations to images.
- **Flip-Rotate**: change the geometry of images.
- **Zoom**: change the view of an image.
- **Image Processing**: process images before printing.

The **Print** mode has an additional tool set to prepare the image for printing.