Radlink GPS **Radlink DR Pro**

Galileo Positioning System™/DR Pro User Guide for Radiological Imaging

Software Version 3.8

December 6, 2019
Revision Q

Reference Only

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THE PURPOSE OF AUTO-X IS TO ACCELERATE THE IMAGE ANALYSIS PROCESS. THE SURGEON IS STILL EXPECTED TO VERIFY THAT THE CHOSEN LANDMARKS ARE SATISFACTORY FOR FINAL ASSESSMENT. THE SURGEON'S CHECKLIST MEASUREMENTS WILL VARY BASED ON DIFFERENCES IN LIMB POSITION AND PELVIC TILT.

THE TRADEMARKS ASSOCIATED WITH DEPUY, ZIMMER BIOMET, STRYKER, MICROPORT/WRIGHT MEDICAL, MEDACTA, AND DJO IMPLANTS ARE THE PROPERTIES OF THEIR RESPECTIVE OWNERS.

Warning!

Please avoid hard shutdown (unplugging power cable) to Radlink GPS, this may result in IRREVERSIBLE damage to the hardware and software.

Revision History Table

Effective Date	Software Version	Revision Level
Nov. 8, 2012	3.6	A
July 7, 2014	3.7	B
Aug 31, 2014	3.8	C
May 12, 2015	3.8	D
Aug. 1, 2016	3.8	E
Oct. 5, 2016	3.8	F
Oct. 18, 2016	3.8	G
Nov. 18, 2016	3.8	H
Mar. 2, 2017	3.8	J
May 30, 2017	3.8	K
Nov. 7, 2017	3.8	L
Apr. 4, 2018	3.8	M
June 27, 2018	3.8	N
Dec. 7, 2018	3.8	P
Dec. 6, 2019	3.8	Q

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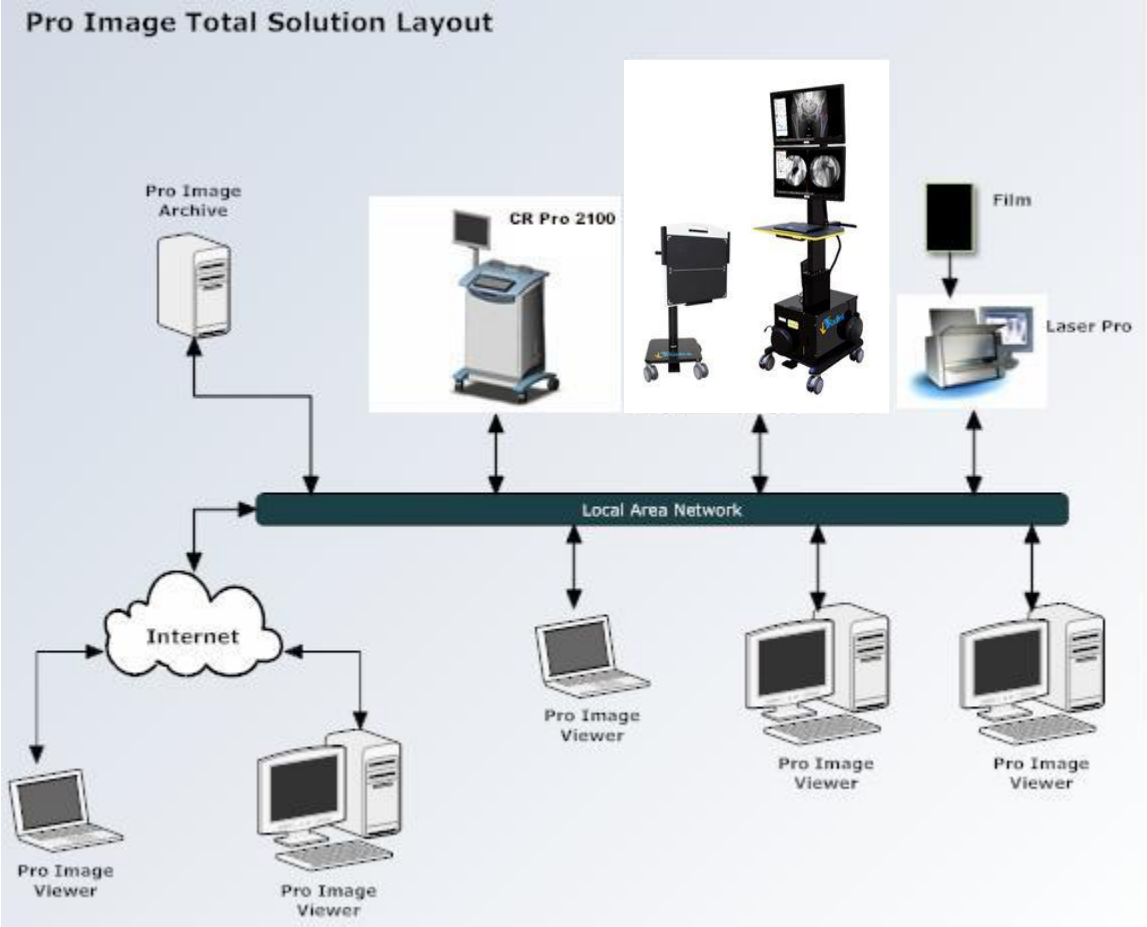
Introduction

The Radlink Radiological Imaging Software allows the operator to create studies and to manipulate and enhance x-ray images using a Radlink GPS. It also provides the means for archiving or forwarding to other facilities for further evaluation and archiving.

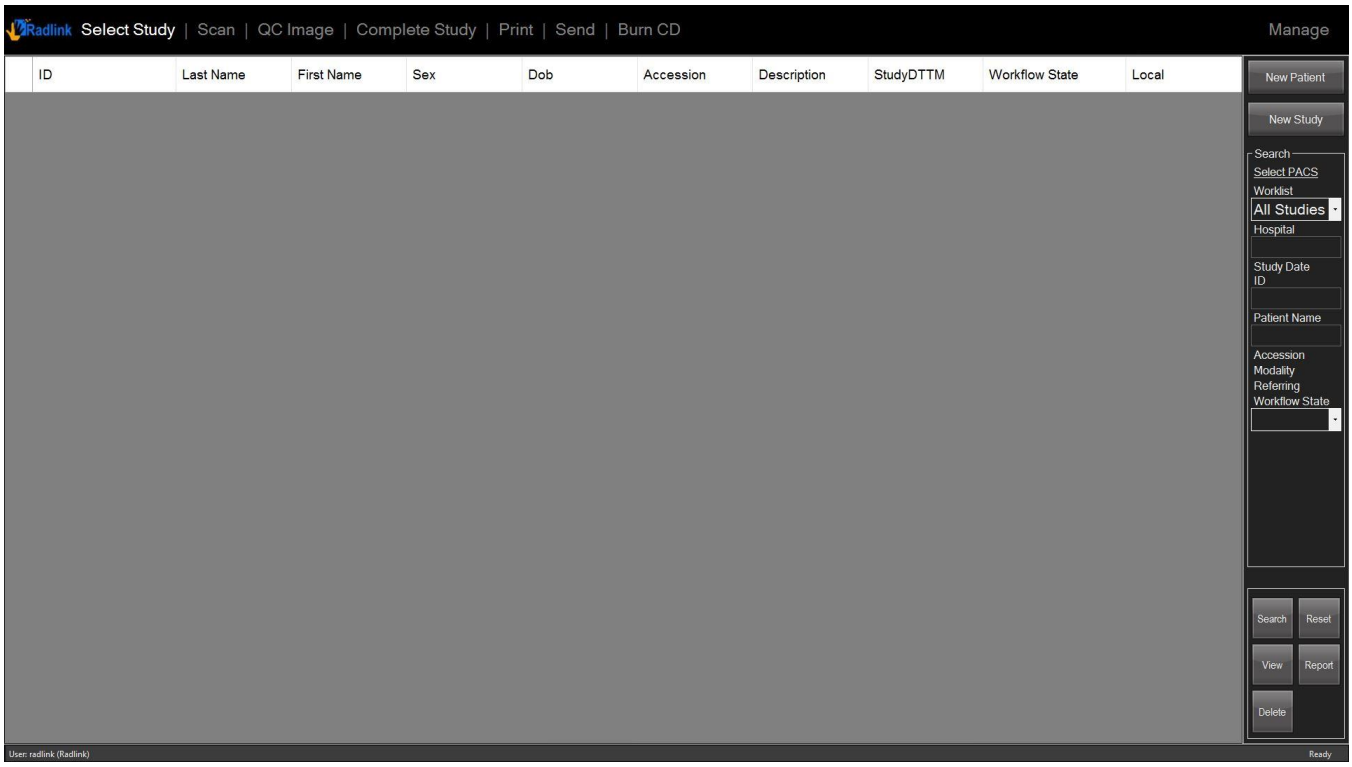


It is recommended that this entire guide be read completely before proceeding with the installation.

Software Configuration

Configuring the System Mode

1. Click the **Manage** tab located at the top of the display.

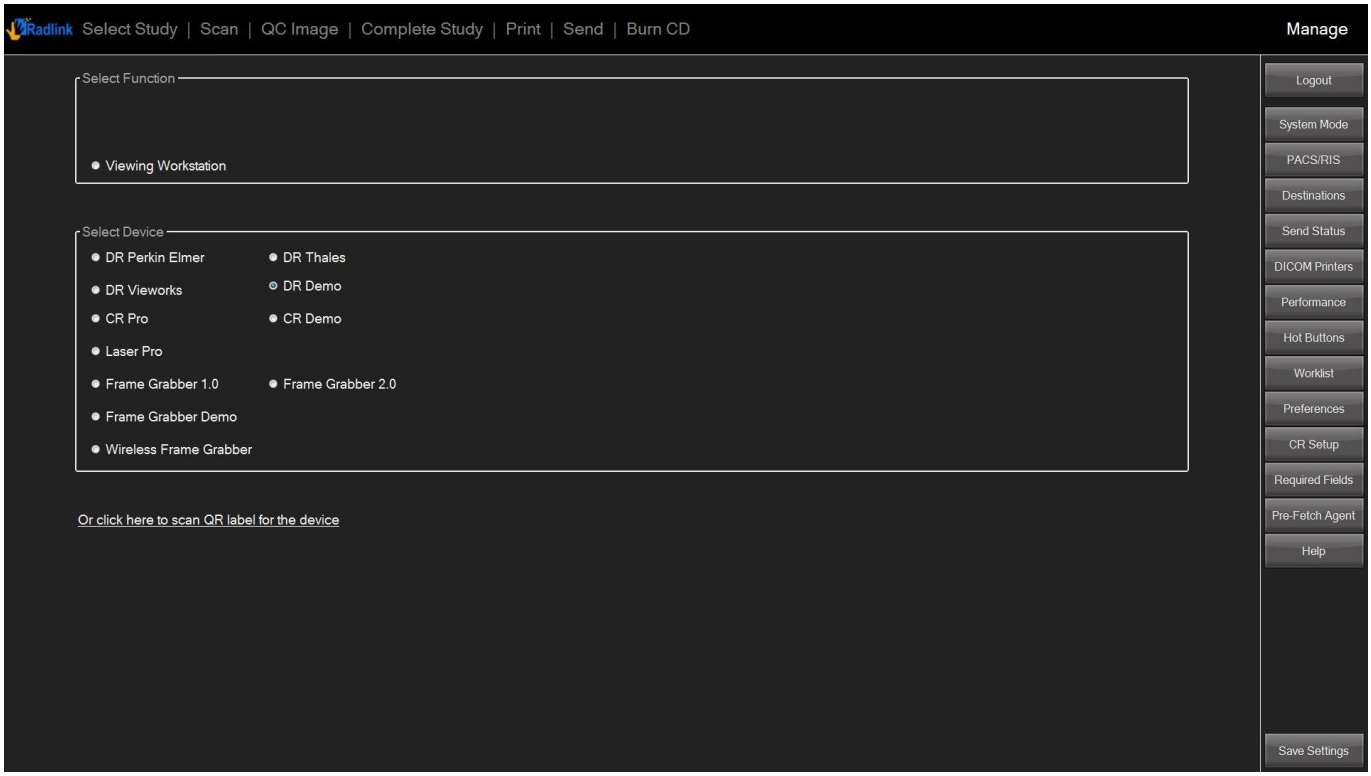


Configuring the System Mode (continued)

2. Setting system mode.

   You could set it up manually or by scanning the QR label on the device that you want to connect.

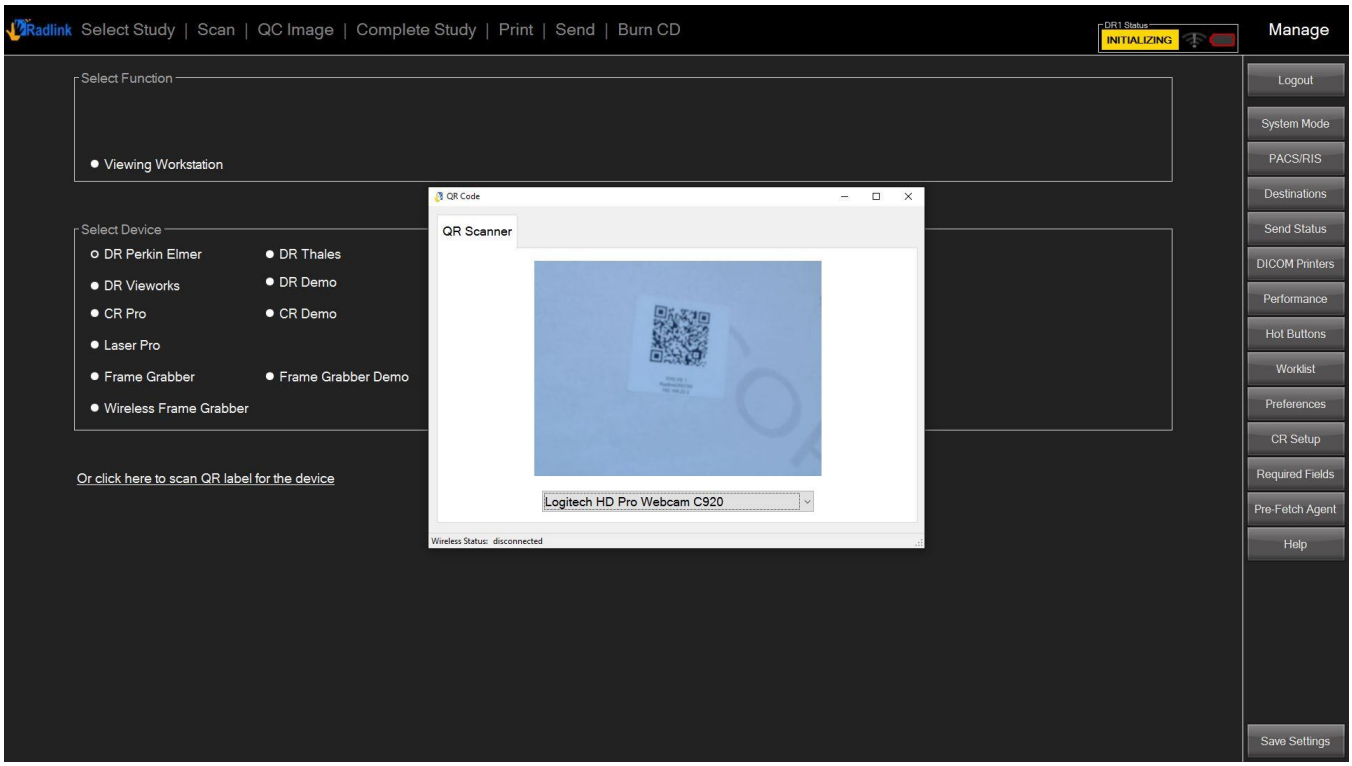
   Manual setup: If not already selected, select the **Image Acquisition** and **DR Perkin Elmer (or DR Vieworks, DR Thales)** buttons, then select **Save Settings**.



The Acquisition software for human acquisition is now enabled.

Configuring the System Mode (continued)

Setup by scanning QR label: Click “Or click here to scan QR label”, then scan the QR label. The software will automatically connect to the access point.

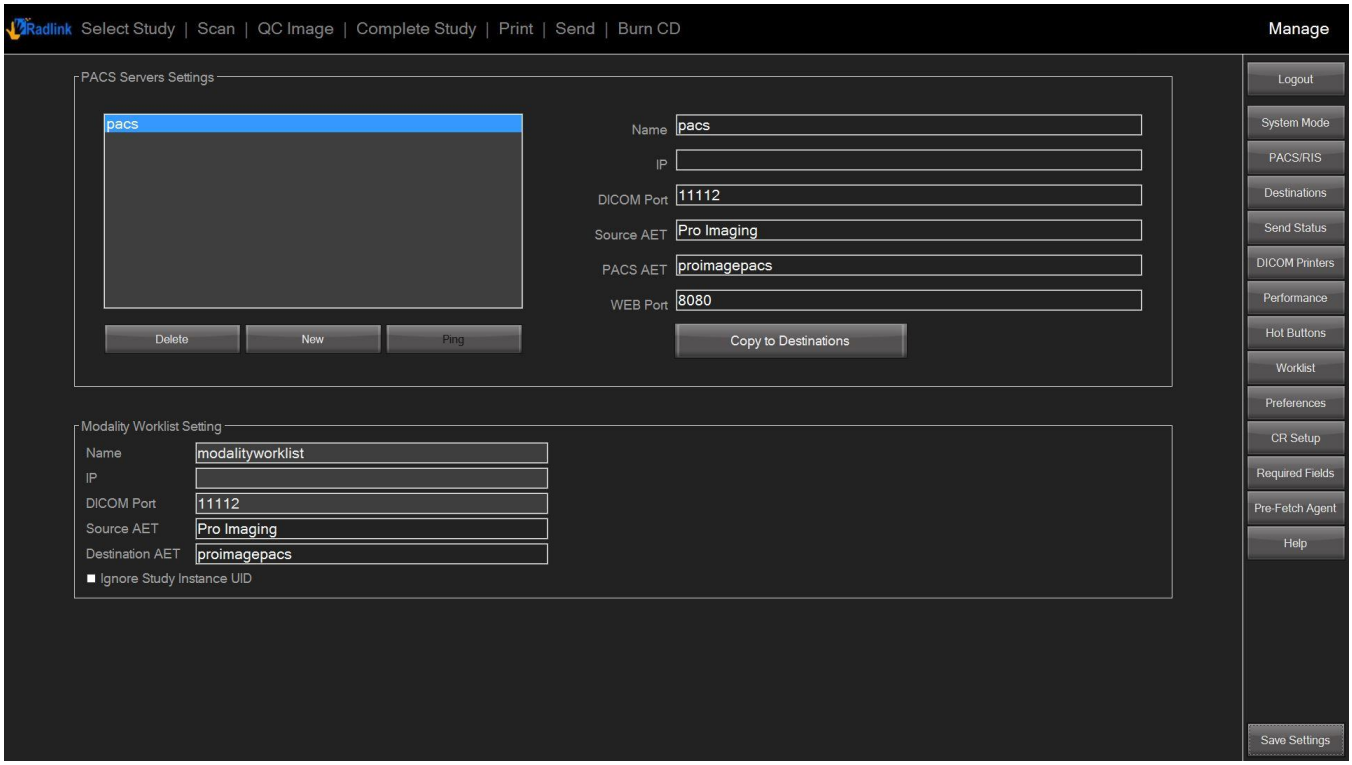


Configuring the PACS Server Settings

Setting the PACS Server Settings allows the GPS to view images from a Radlink PACS system.

Note: If the intended PACS server is not a Radlink PACS server then the IP field of the PACS Server Setting section should be left blank.

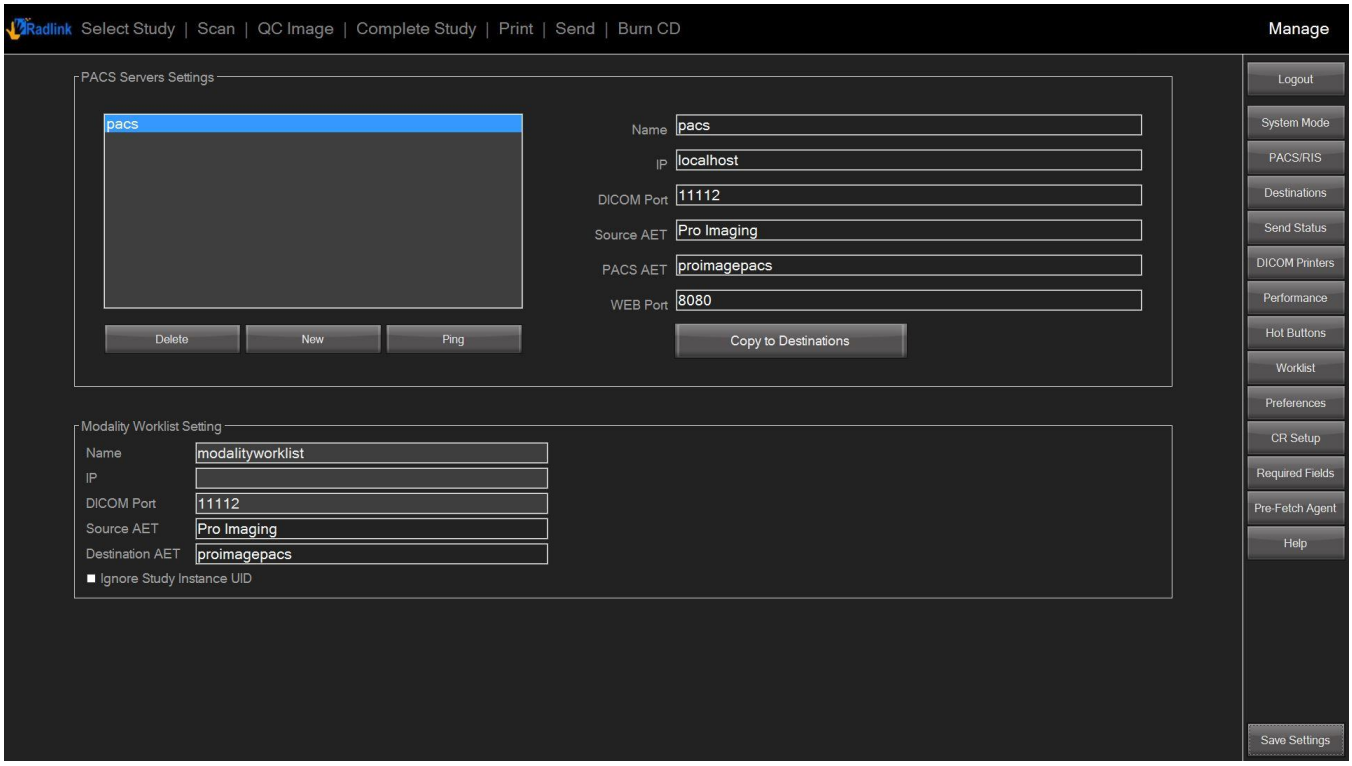
1. Click the **Manage** button then **PACS/RIS** button.



The PACS Server Setting and Modality Worklist Setting window is displayed.

Configuring the PACS Server Settings (continued)

2. For a Radlink GPS, enter **localhost** into the IP field and click **Save Settings**.



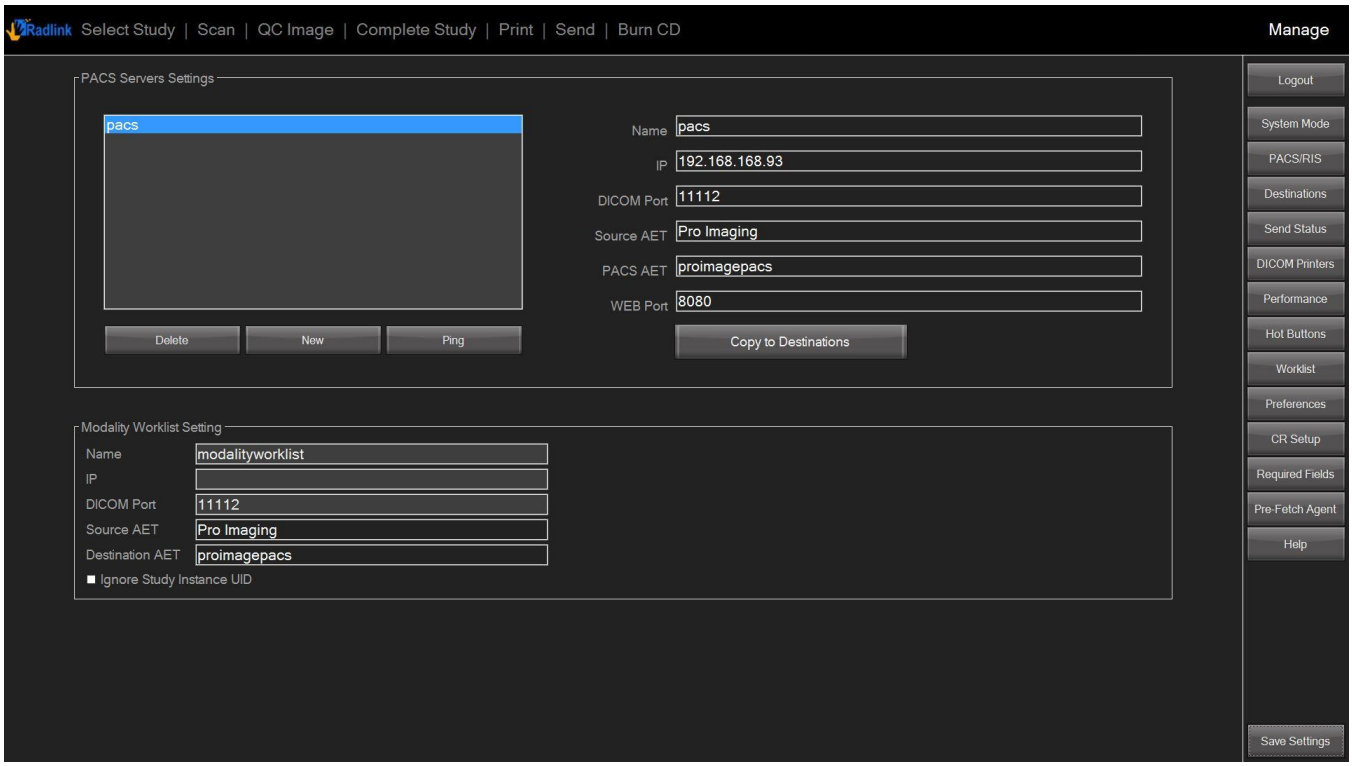
The Acquisition software is now enabled to communicate with the Radlink PACS server.

Below is an explanation of the fields:

IP: The physical network node address of the PACS server.
DICOM Port: The logical port of the PACS server.
Source AET: **A**pplication **E**ntity **T**itle of the Radlink device
PACS AET: AET of the PACS server
WEB Port: Default Web server port of a Radlink PACS.
Compression: Provides the ability to save viewed images to: C:\Users\GPS User\ViewPro\images. The following compression formats are available: None, Lossless, Lossy High Quality, Lossy Medium Quality, and Lossy Low Quality. Note: the PACS may need to be upgraded with the latest software version to support this feature.

Configuring the PACS Server Settings (continued)

3. For a Radlink GPS, enter the PACS server information and click **Save Settings**. Contact your IT person if you need help in determining your settings.



The Acquisition software is now enabled to communicate with the Radlink PACS server.

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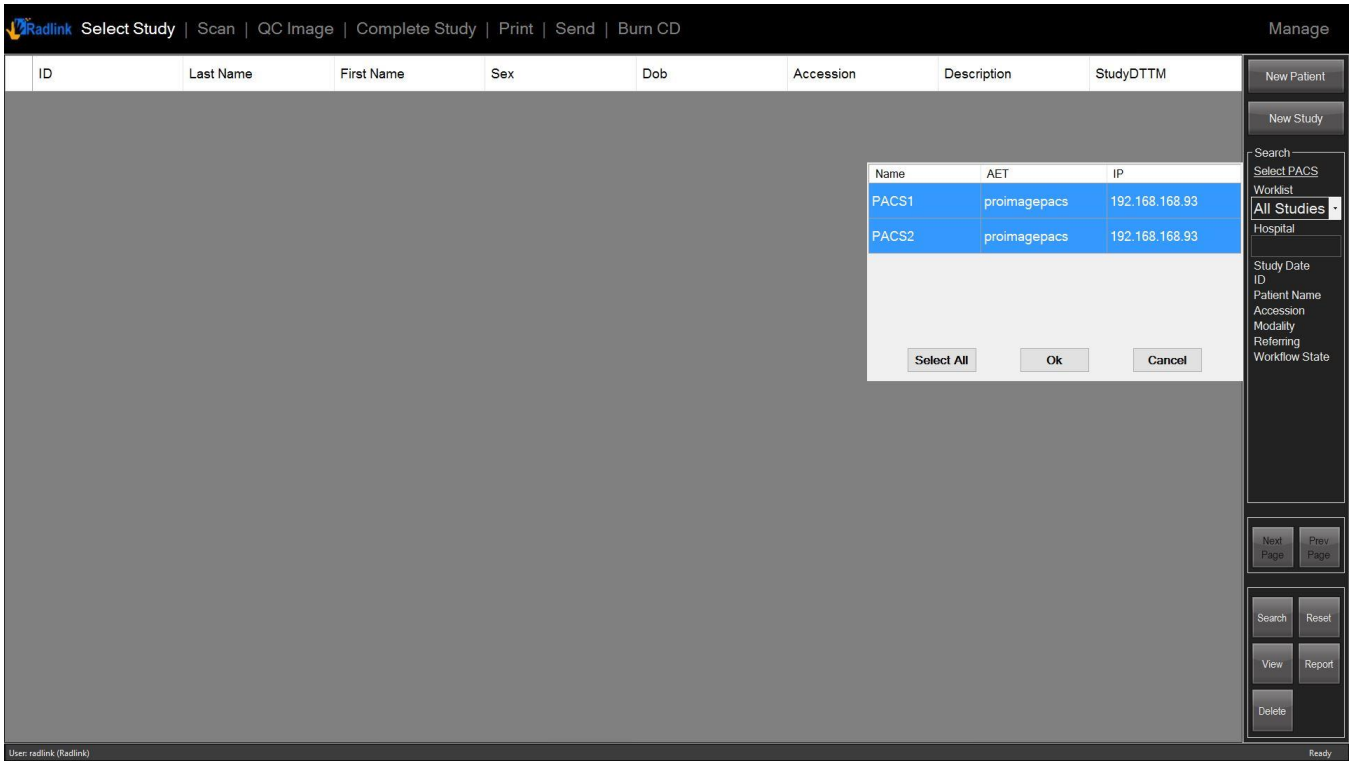
DICOM Port: The logical port of the PACS server.
Source AET: **A**pplication **E**ntity **T**itle of the Radlink device
PACS AET: AET of the PACS server
WEB Port: Default Web server port of the PACS.
Compression: Provides the ability to save viewed images to: C:\Users\GPS User\ViewPro\images. The following compression formats are available: None, Lossless, Lossy High Quality, Lossy Medium Quality, and Lossy Low Quality. Note: the PACS may need to be upgraded with the latest software version to support this feature

Query by multiple PACS Servers

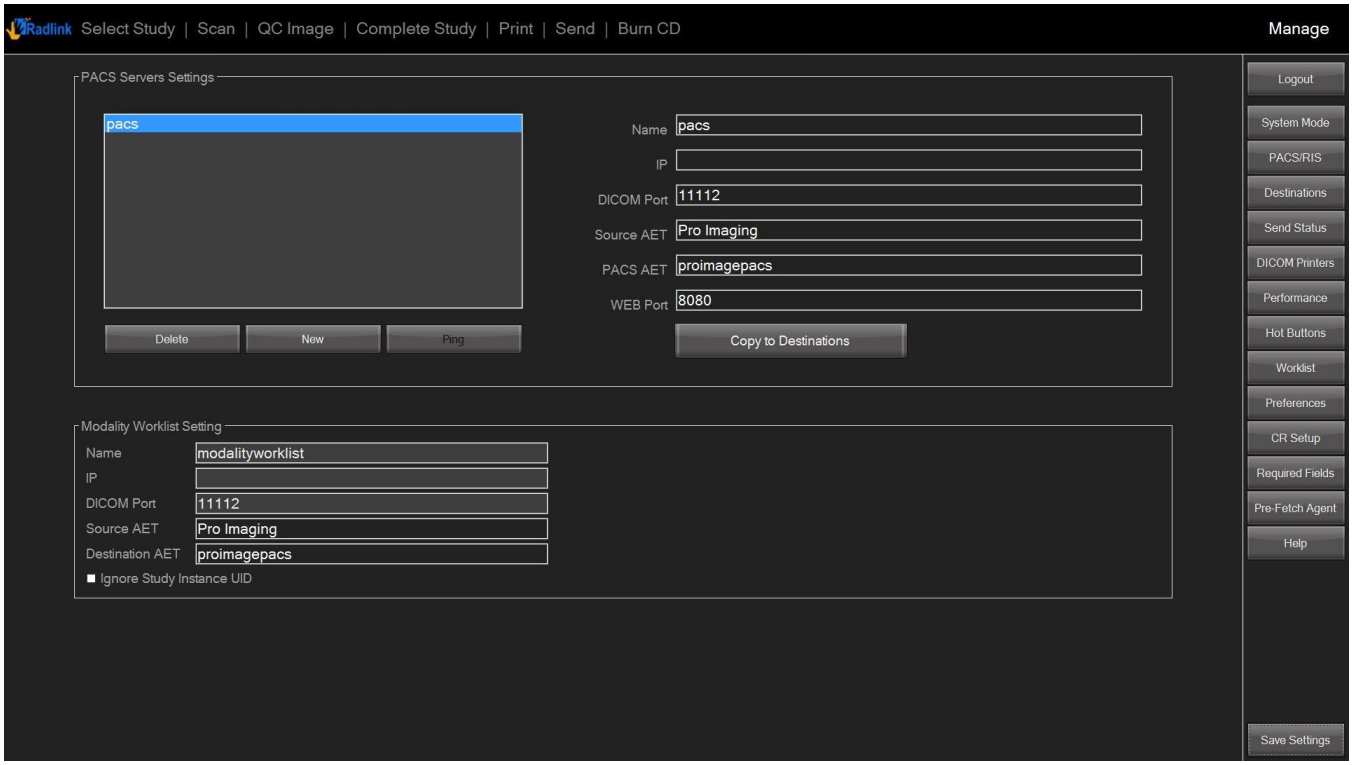
1. Choose “Select Study”, click “Select PACS”. Choose the PACS that you want to query. Or you can click “Control” while choose PACS to select multiple PACS. Then click “OK”. From now on, the query will be conducted on you select PACS.



Configuring the Modality Worklist Setting

Setting the **Modality Worklist Setting** fields allows the selection of pre-filled patient information. The following assumes that the modality worklist has already been setup.

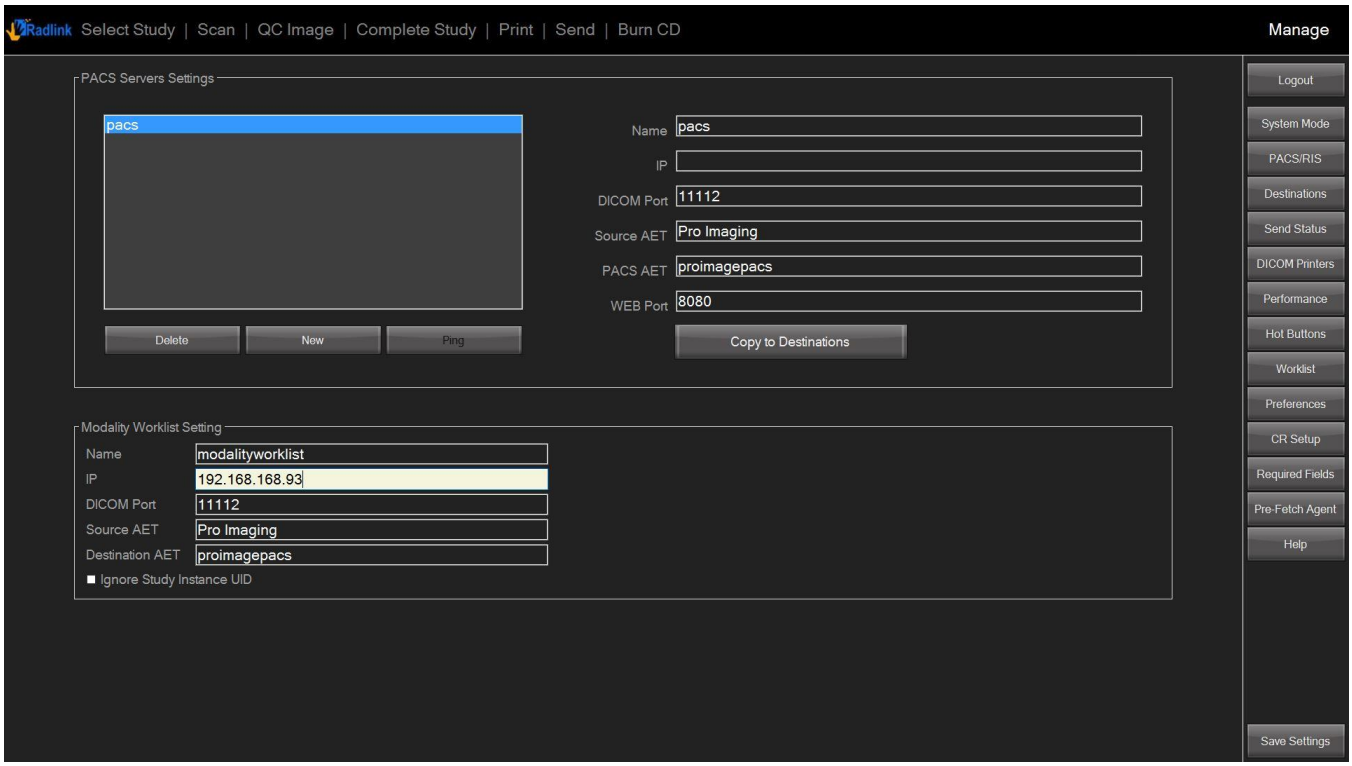
1. Click the **Manage** button then **PACS/RIS** button.



The Modality Worklist Setting window is located below the PACS Server Setting window.

Configuring the Modality Worklist Setting (continued)

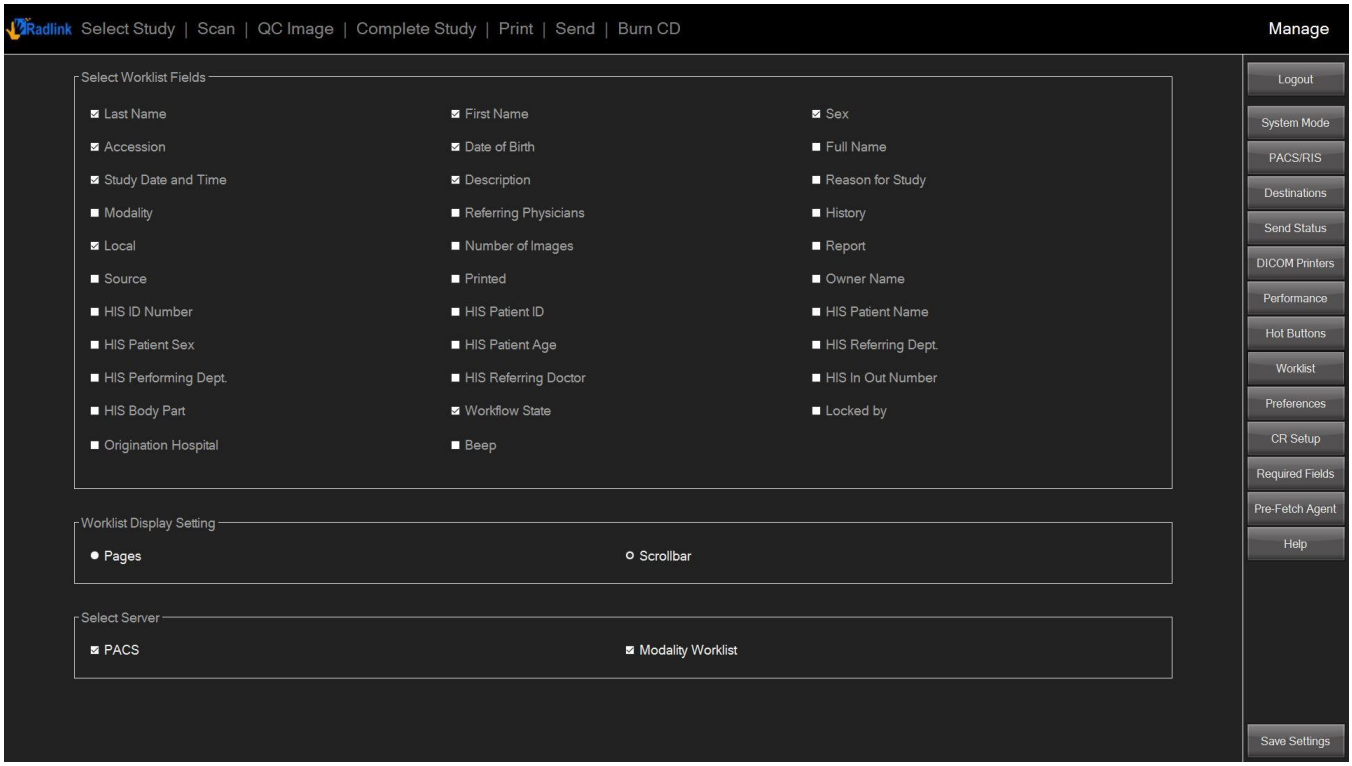
2. Enter the PACS server information and click **Save Settings** button. Contact your IT person if you need help in determining your settings.



The PACS IP address has been entered in the Modality Worklist Setting section.

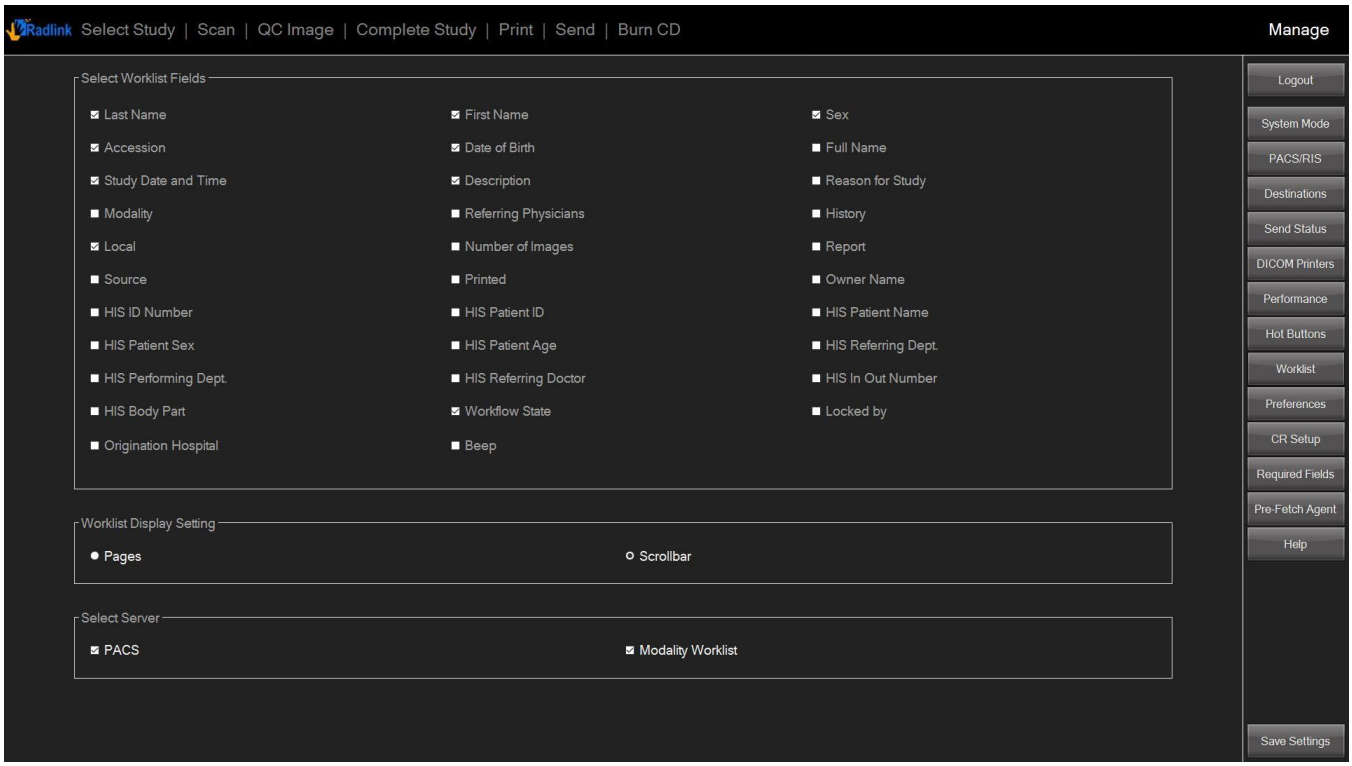
Configuring the Modality Worklist Setting (continued)

3. Click the **Manage** button then **Worklist** button.



Configuring the Modality Worklist Setting (continued)

4. Select **Modality Worklist**

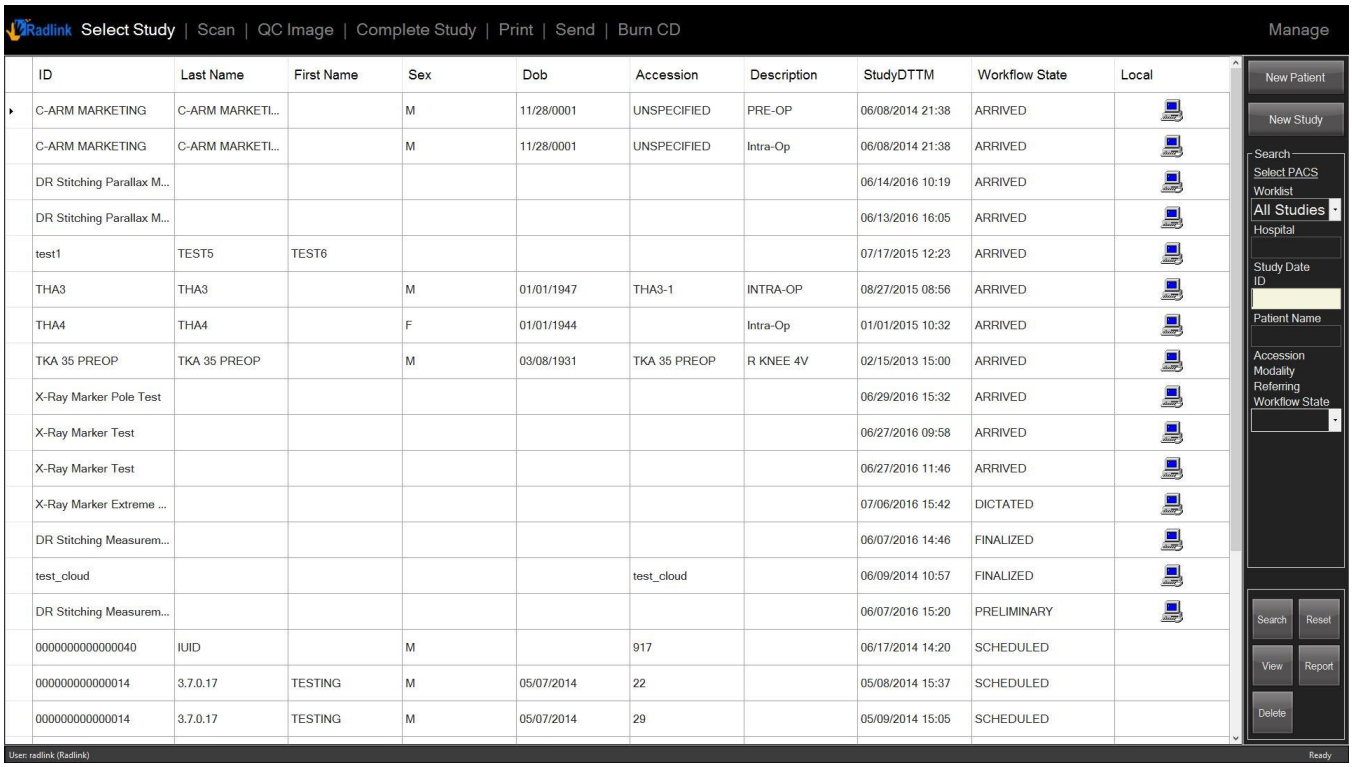


The Modality Worklist setting is selected.

Note: Software Version 3.8 allows the use of both PACS server and Modality Worklist server at the same time.

Configuring the Modality Worklist Setting (continued)

5. Click **Select Study**
6. Set **Worklist** to **All Studies**



Any pre-defined modality worklist studies are displayed.

Note: For modality worklist servers that don't issue a study instance ID, the server's accession number will be used instead.

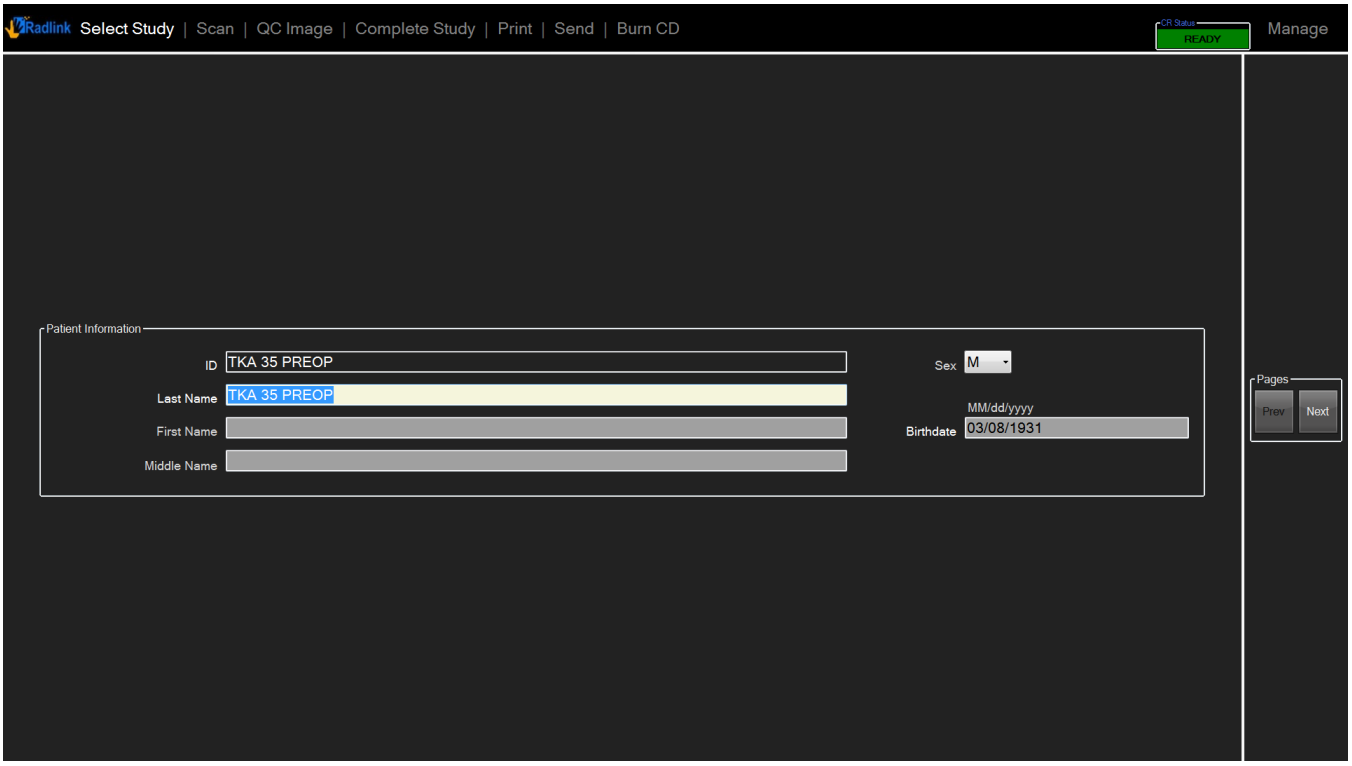
Configuring the Modality Worklist Setting (continued)

7. Select the desired study

Note: Instead of viewing an image, the scan view is displayed – saving the time of creating a new patient or study and having to enter the corresponding information. Select the body part and techniques and select **Start DR**.

Configuring the Modality Worklist Setting (continued)

8. To verify the predefined patient information, select **Change Info**



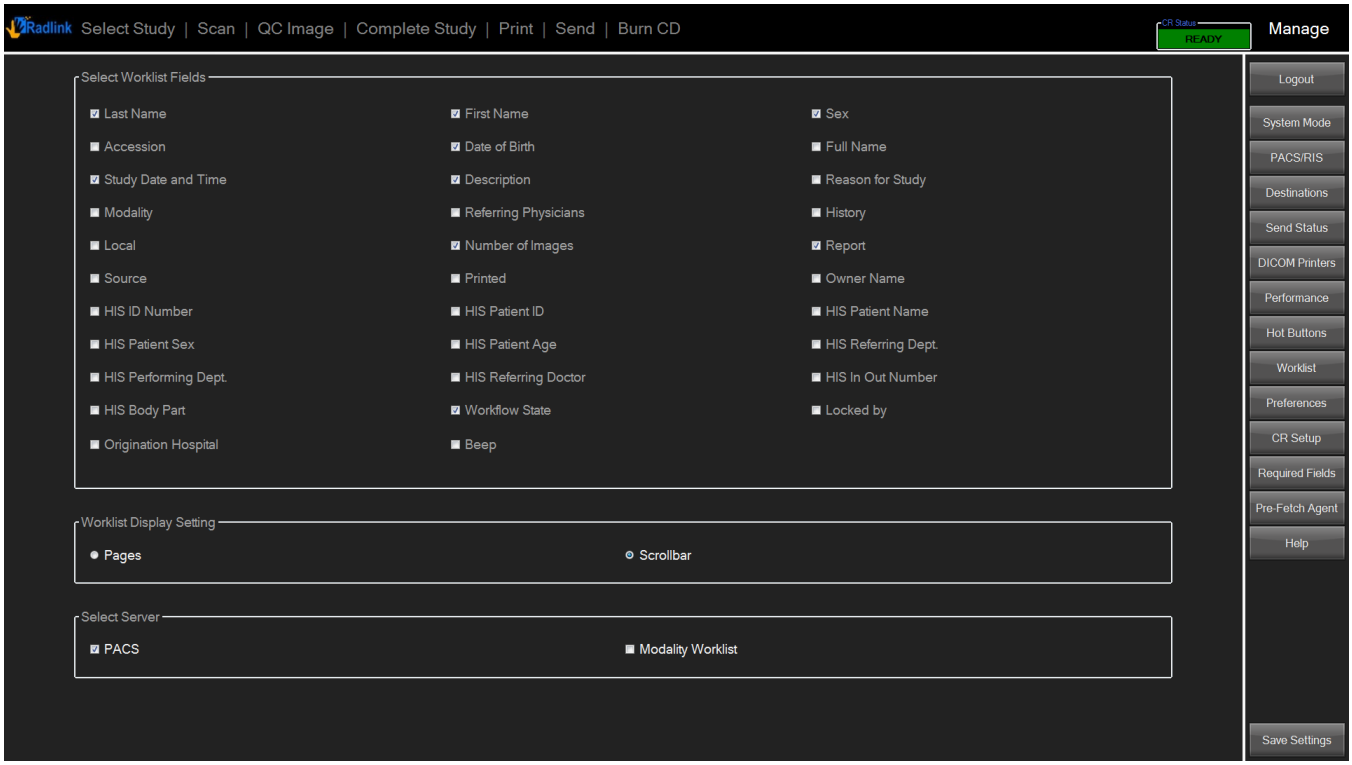
Note: The Patient Information is already entered.

The same would apply to the Study Information fields if they were also pre-filled.

Optional scrollbar on Worklist page

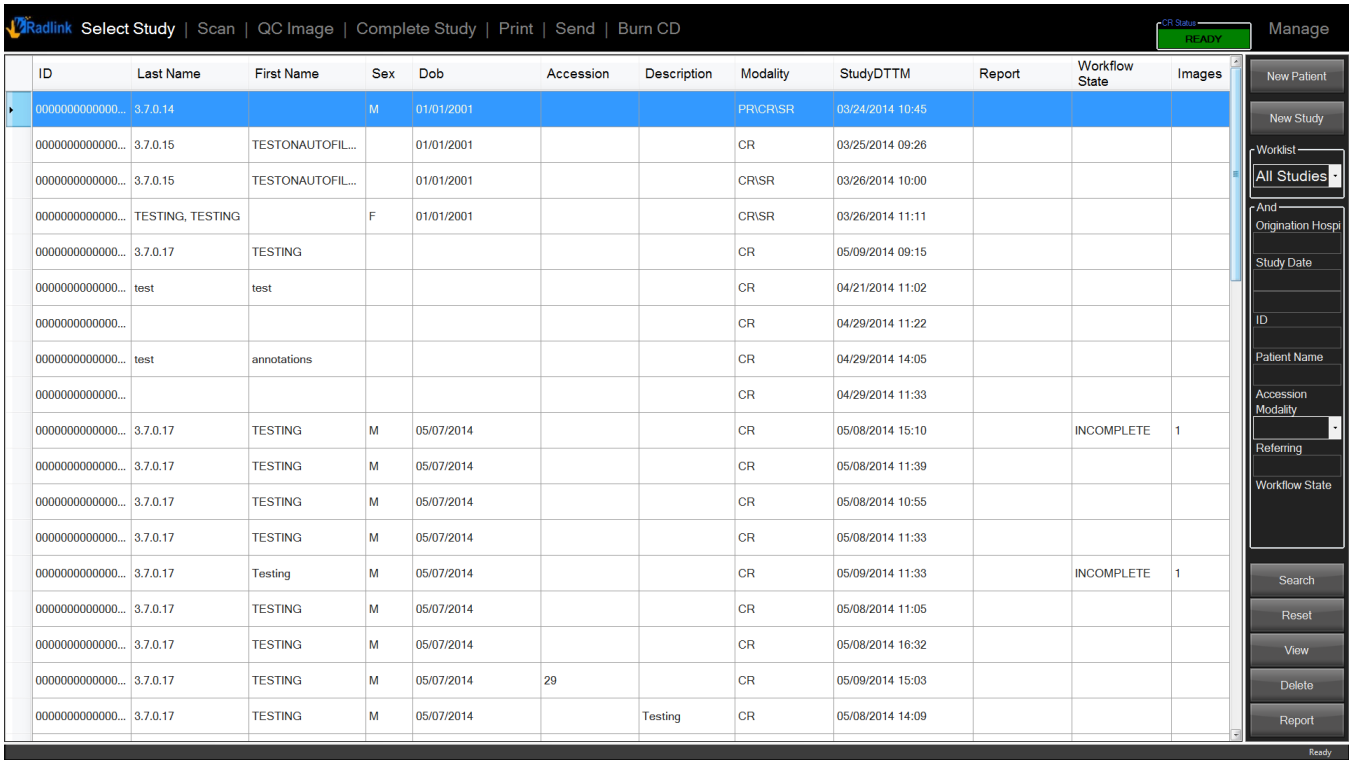
You may use scrollbar on worklist page instead of viewing the worklist in pages.

1. Click the **Manage** button then **Worklist** button, select **Scrollbar** under worklist display setting.



Optional scrollbar on Worklist page (continued)

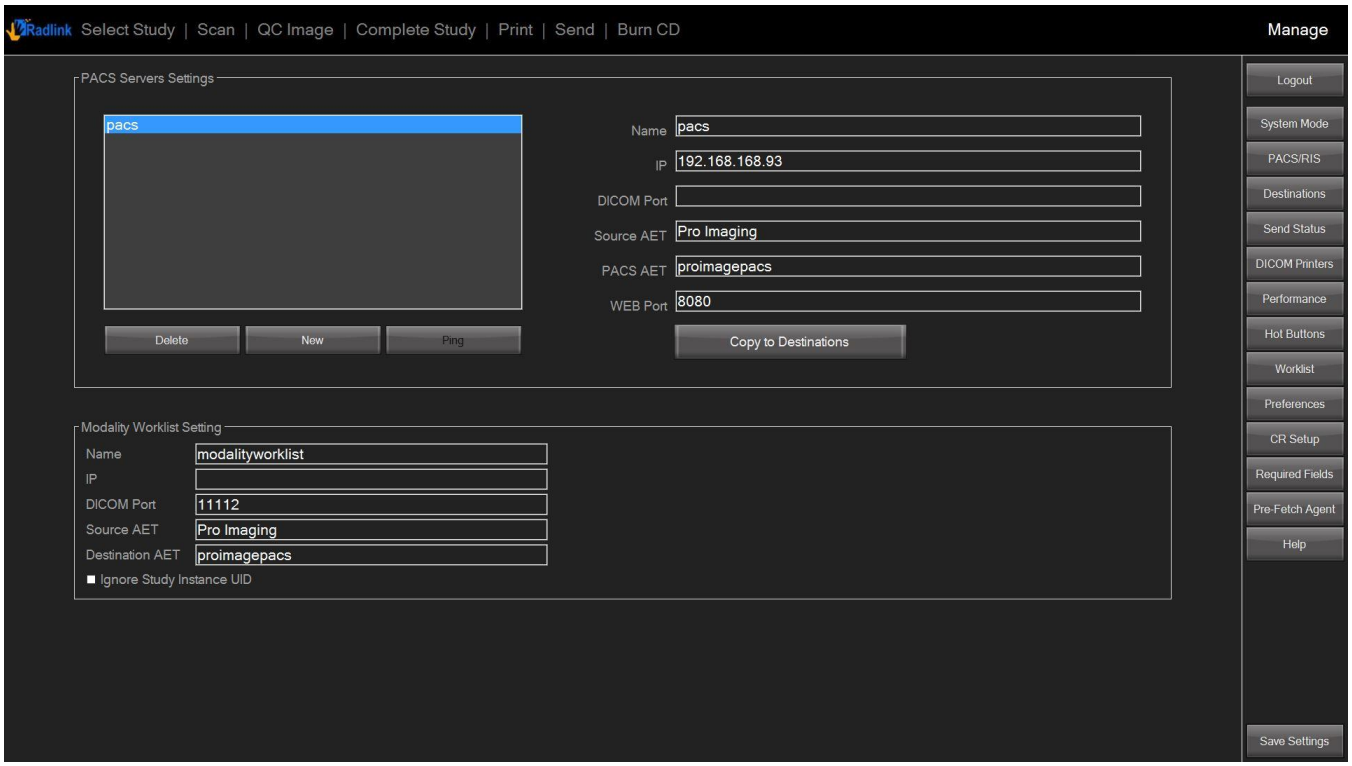
1. Use the scrollbar in Select Study window to scroll up and down the studies.



Worklist query via HTTP

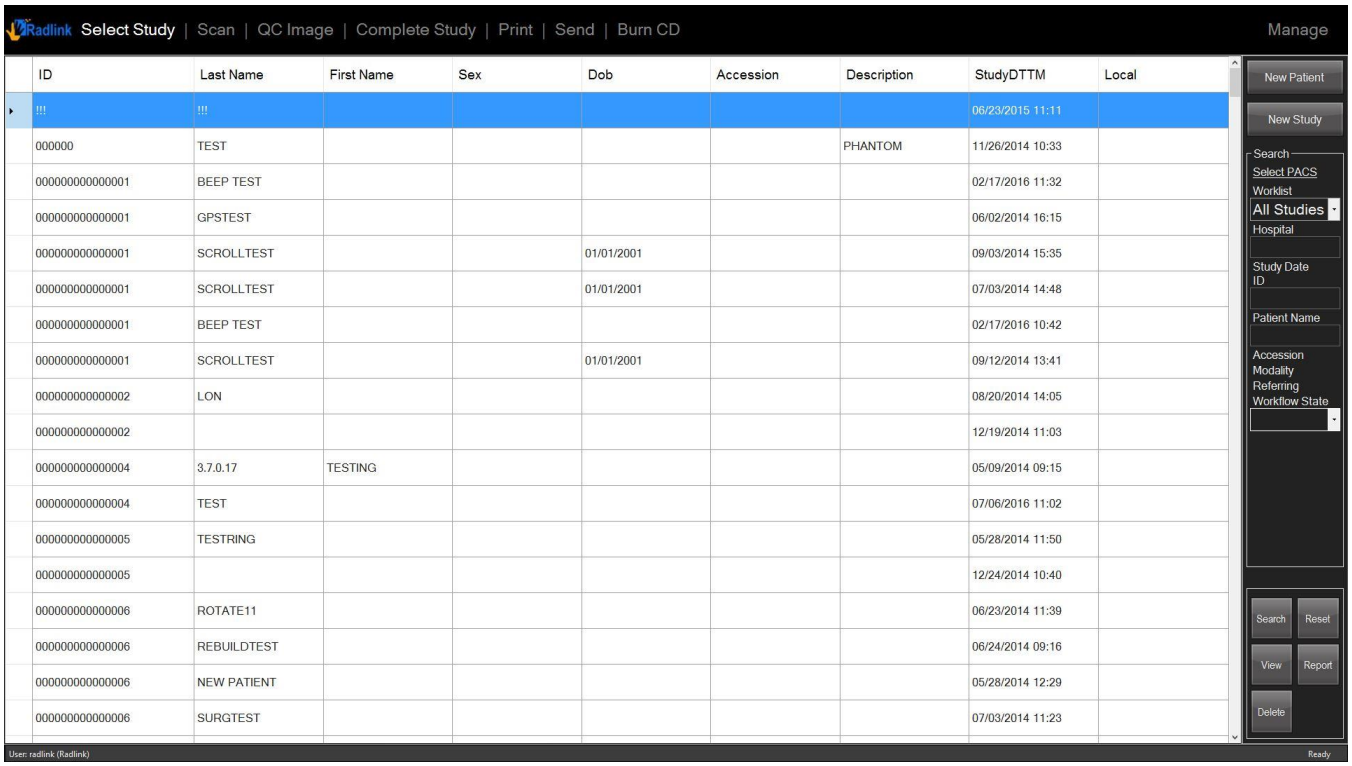
ViewPro allows worklist query via HTTP instead of DICOM

1. Click the **Manage** button then **PACS/RIS** button
2. Leave **DICOM Port** blank
3. Select **Save Settings** in the bottom right corner



Worklist query via HTTP (continued)

1. Click **Select Study** button
2. Change the **Worklist** to Search **All Studies**

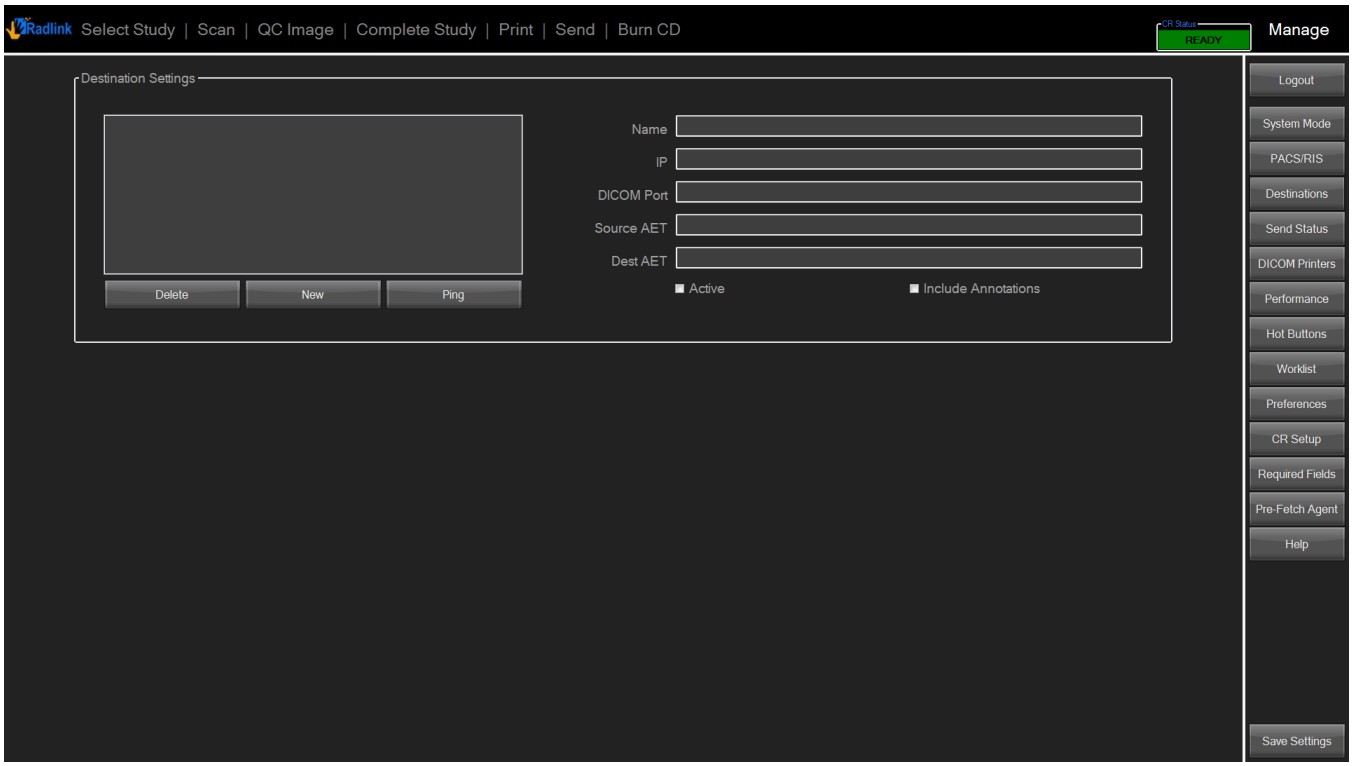


Results of all studies will be brought up as usual.

Setting up Destinations

The destination settings allow you to specify where to store DICOM images after scanning.

1. To specify a destination, click the **Destinations** button.



The **Destinations** window is displayed.

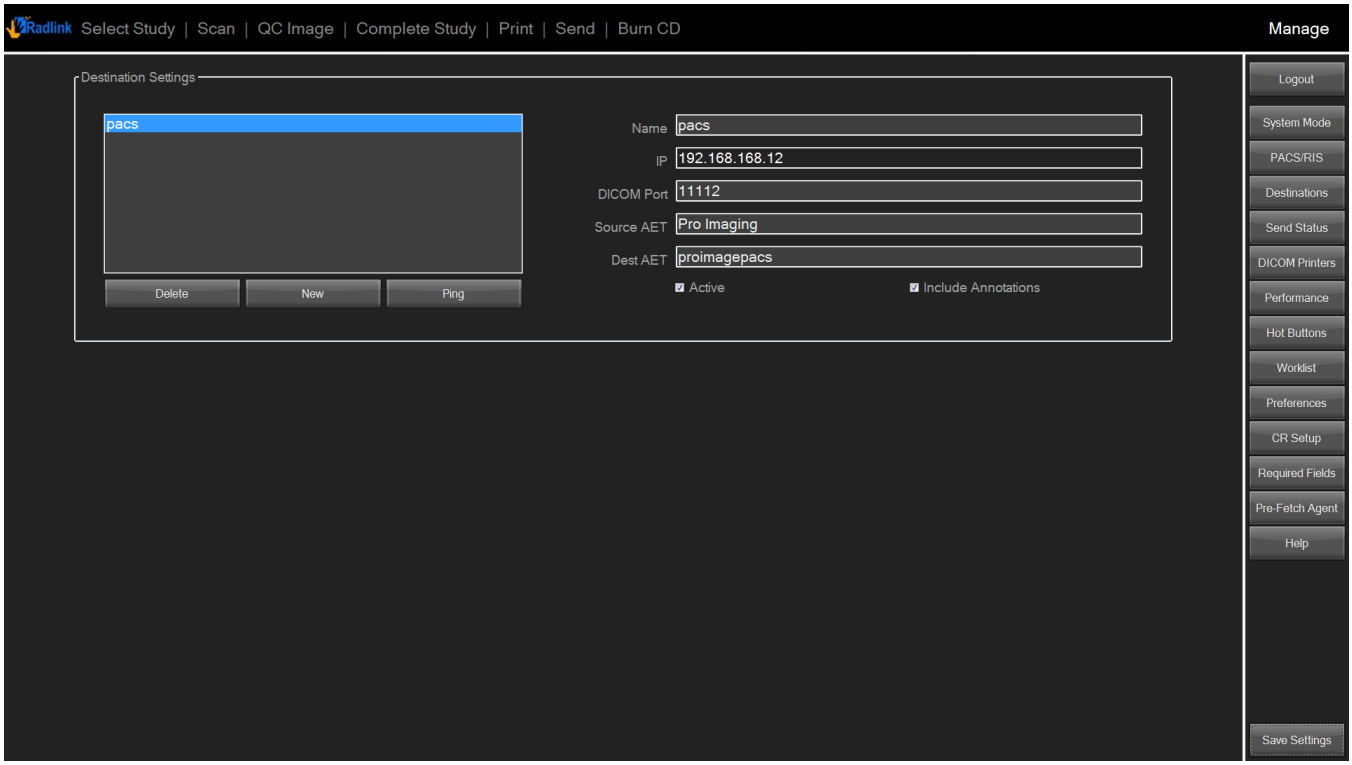
Setting up Destinations (continued)

To add a new destination:

1. Click the **New** button, and then enter the **Host** name, **IP**, **DICOM Port**, **Source AET**, and **Dest AET** fields.

2. Select the **Active** checkbox.

3. Check that all entered information is correct and click **Save Settings**.



For a GPS, the following are typical settings to store images on the internal PACS:

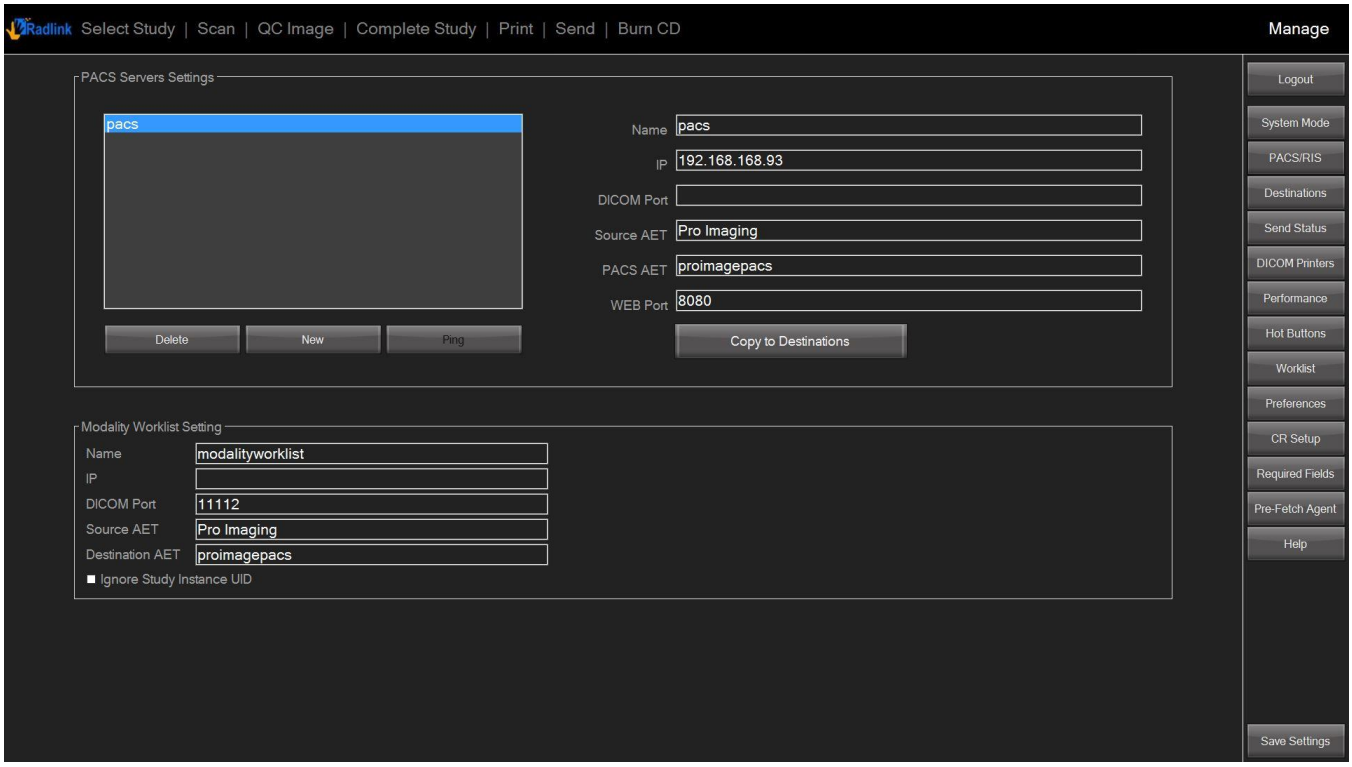
Name: The name of the destination (user defined)
IP: The physical network node address of the PACS server
DICOM Port: the logical port of the PACS server
Source AET: AET of the Radlink Device
Dest AET: AET of the PACS server

Setting up Destinations (continued)

To use the same setting for destination as the PACS server:

1. Click the **PACS/RIS** button, if the PACS server setting fields has been entered, click **Copy to Destination**

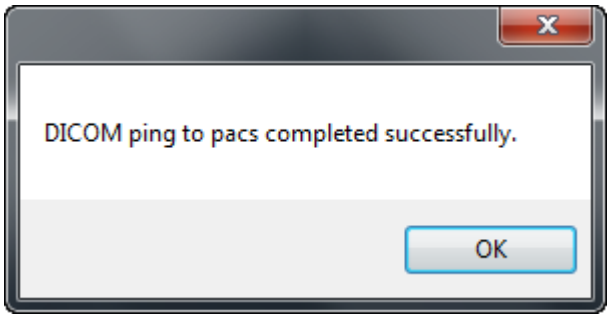
2. The information is now saved to **Destination**



Setting up Destinations (continued)

To test the connectivity of the Destination:

1. Click the **Ping** button to ensure that the Destination settings are correct. If successful, the following window will be displayed:



Additional destinations may be added in a similar fashion.

2. Select the **Active** checkbox. All the hosts listed with the **Active** checkbox highlighted will be sent images after they are scanned and **Complete Study** is clicked. Any hosts which don't have the **Active** checkbox highlighted will be ignored.

3. Select the **Include Annotations** checkbox to include annotations draw on the image.

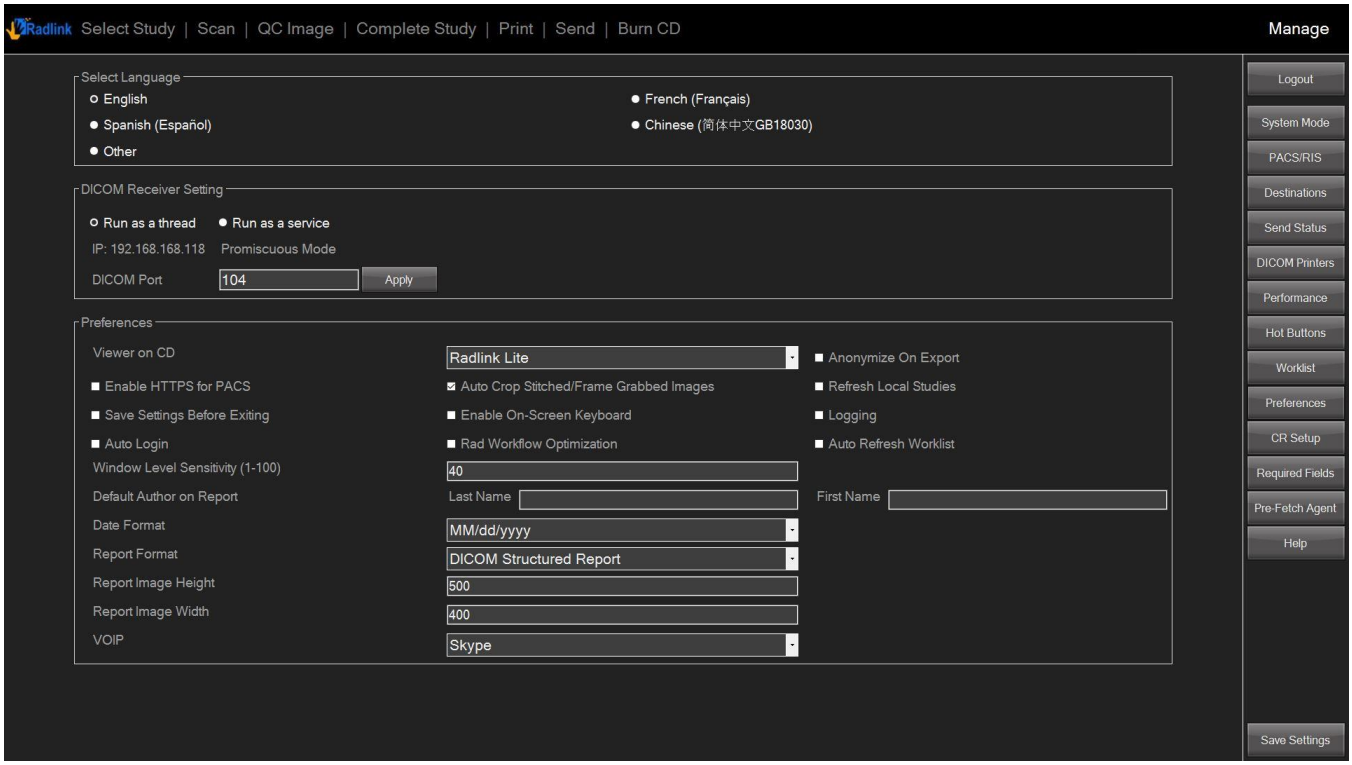
4. Select **Save Settings.**

Setting up DICOM Receiver
(optional – purchased separately)

A DICOM receiver allows the reception of DICOM images from any networked DICOM storage device such as another Viewing Workstation or GPS.

To setup a DICOM Receiver:

1. Start the Pro Imaging software on the PC or GPS that you wish to send images
2. Click **Manage**
3. Click **Preferences**



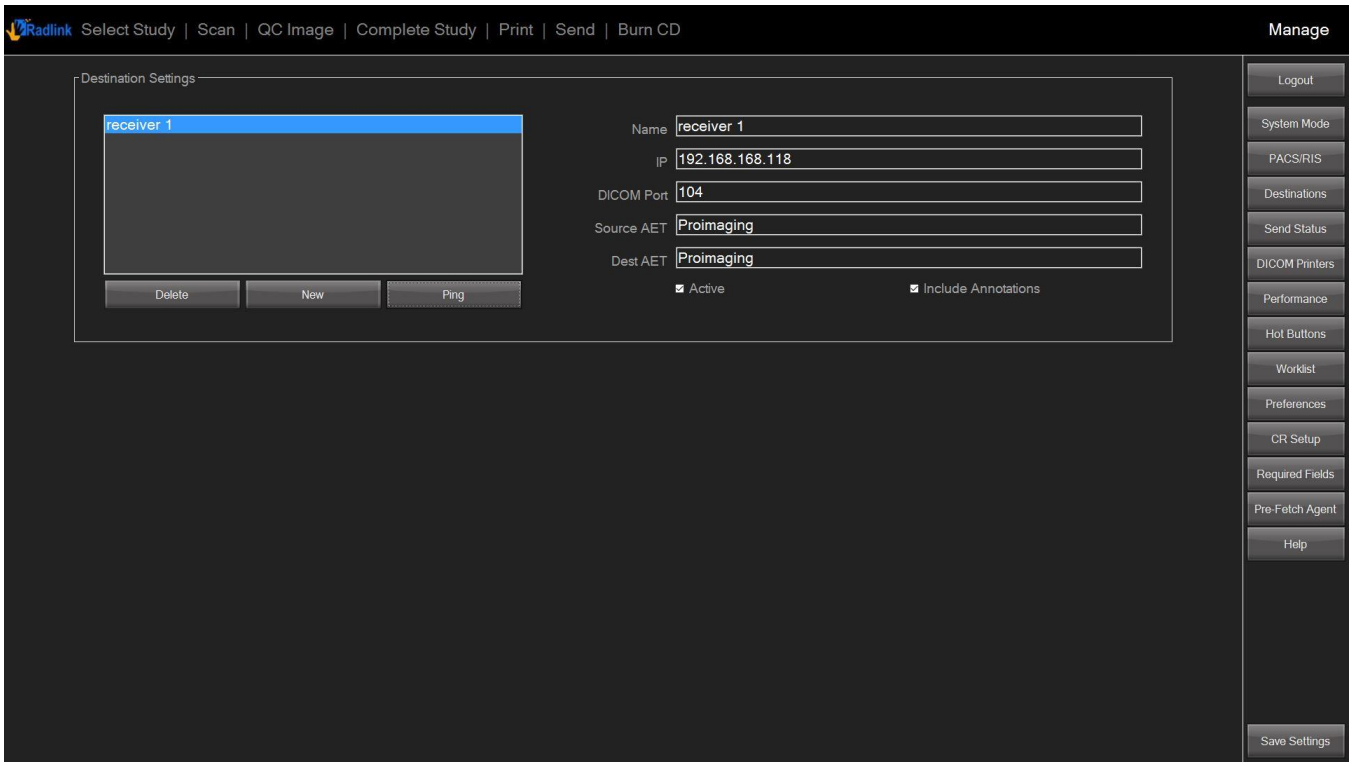
The **DICOM Receiver Settings** are displayed in the center section.

Setting up a DICOM Receiver (continued)

4. At the sender location, click the **Destinations** button.

5. Click the **New** button. Edit the **NewHost** name to identify the new destination, and then enter the **IP** and **DICOM Port** fields.

6. Select the **Active** checkbox.



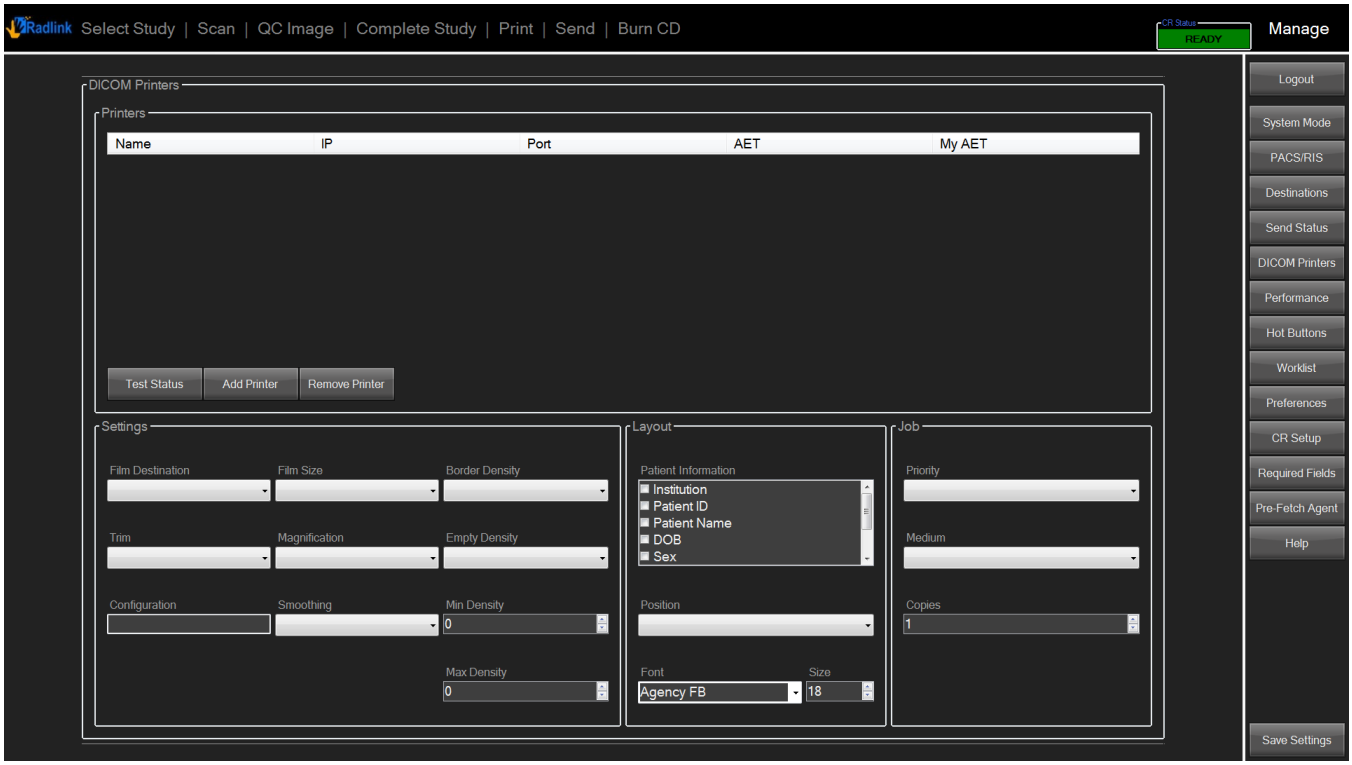
You may wish to click **Ping** to ensure that your connection to the receiver is enabled.

Assuming your ping is successful (See Page 24 to determine if your Ping is successful), now when **Complete Study** is selected, studies will be sent to the Receiver location.

Setting up DICOM Printers

To enable DICOM printing and configure the DICOM printer:

1. Select the **DICOM Printers** button.

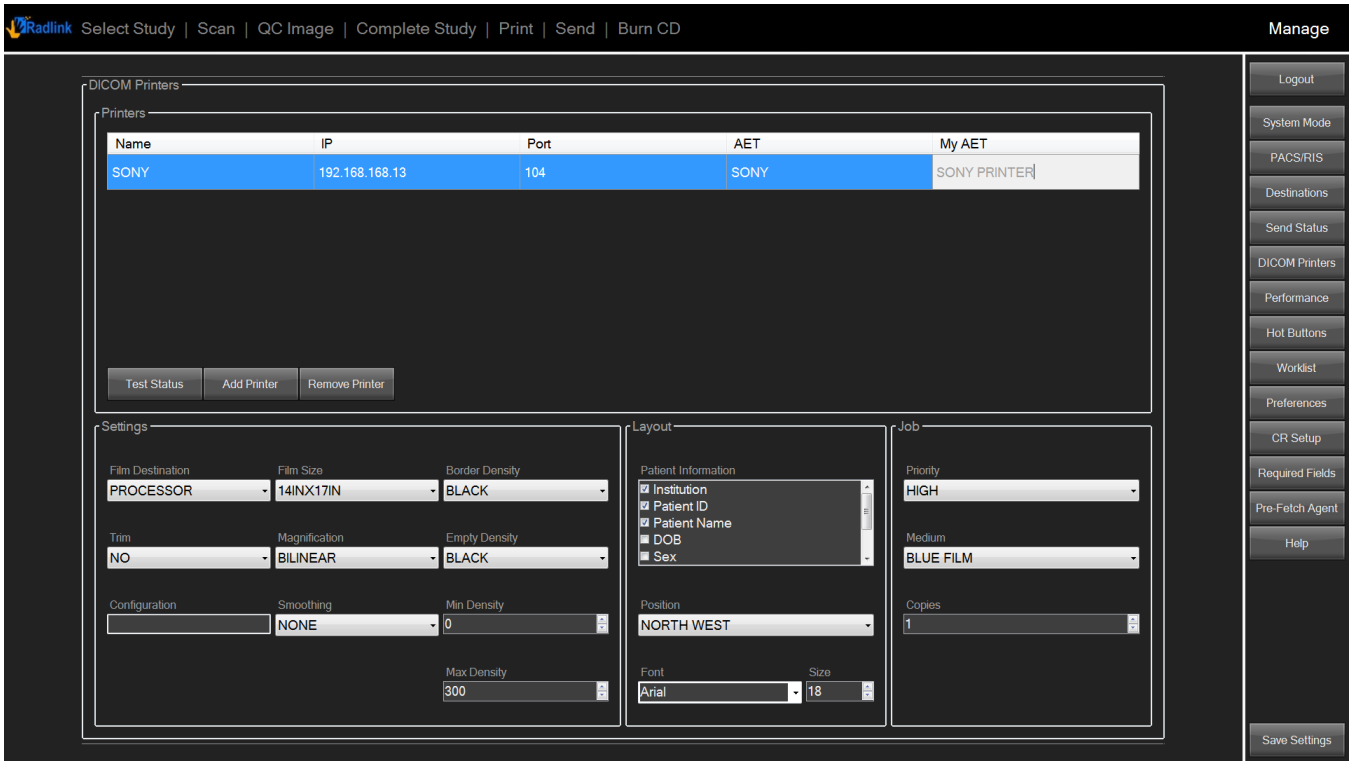


The **DICOM Printers** screen is displayed.

Setting up DICOM Printers (continued)

To add and configure the DICOM printer:

1. Select the **Add Printer** button.
2. Select the blue row under Name and enter the manufacturers name (e.g., Sony)
3. Select the blue row under IP and enter the IP address for the printer.
4. Select the blue row under Port and enter the port number for the printer (e.g., 104)
5. Select the blue row under AET and enter the AET name (e.g., DICOM_PRINTER).
6. Select **Save Settings**.

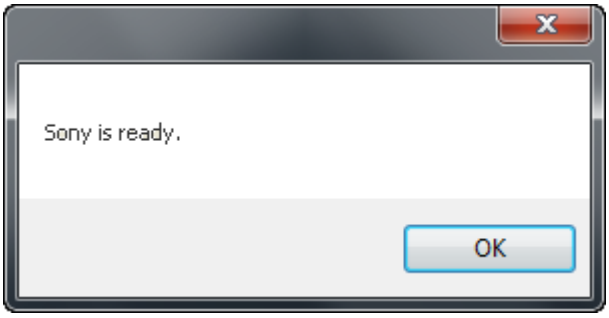


The printer listed above may now be used to print images on media supported by the printer, such as film.

Setting up DICOM Printers (continued)

Before printing an image, it is always best to test the connectivity to the DICOM printer:

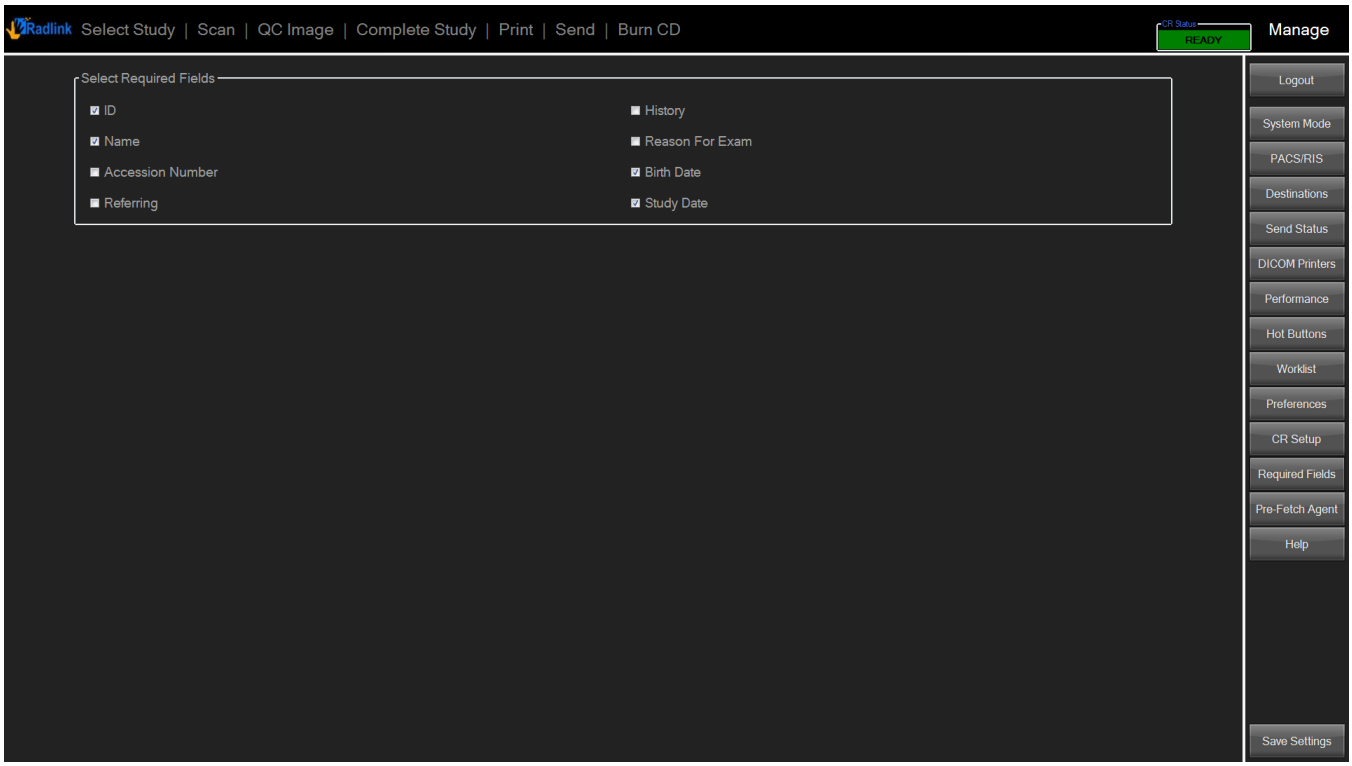
Click the **Test Status** button to ensure that the printer settings are correct. If successful, the following window will be displayed:



Configure printer as desired in **Settings**, **Layout**, and **Job** fields.

Setting up Required Fields

1. Select the **Required Fields** button.

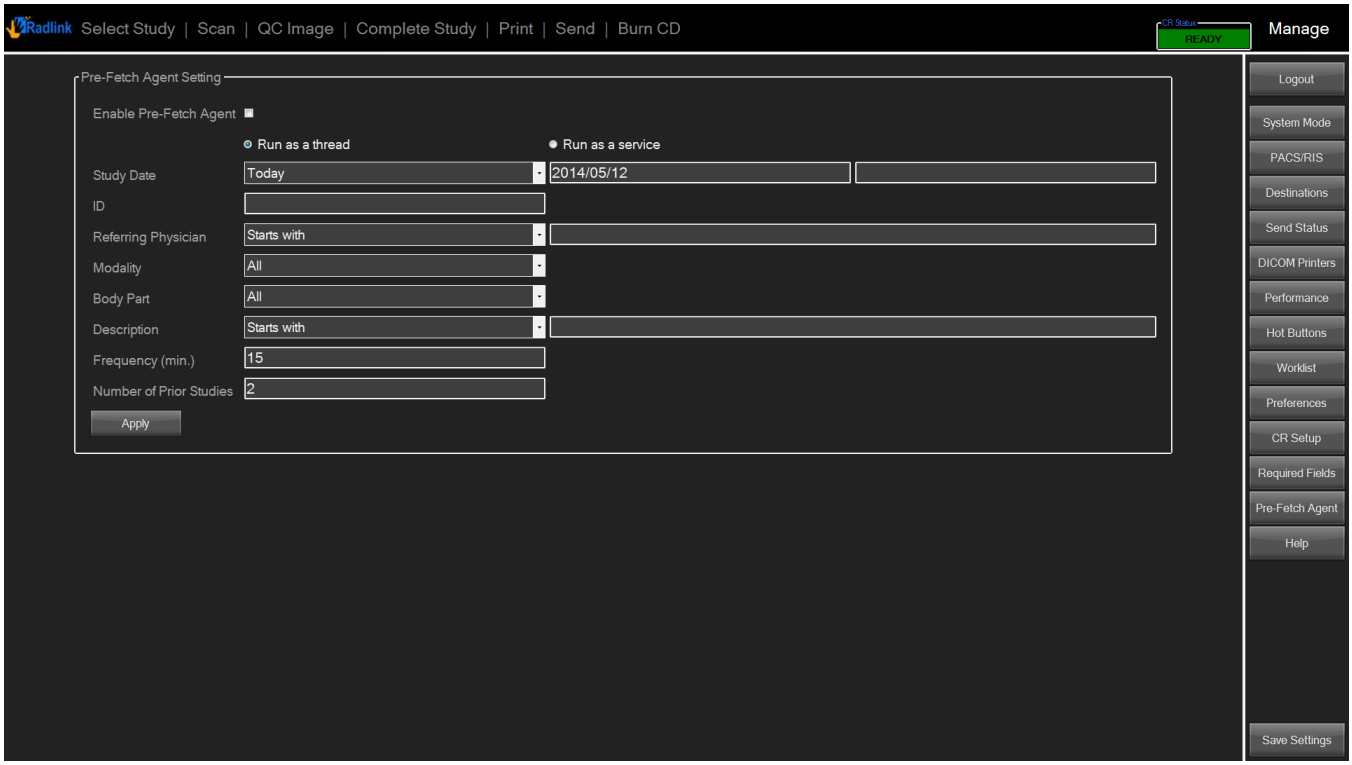


The checkbox **ID** (*Medical Record Number*) is always selected; however you may select other fields as well. When creating a study, the system will check for all fields that are checked to ensure that they have been completed.

Setting up Pre-Fetch Agent

The Pre-Fetch Agent feature allows you to specify which images to automatically download to your local hard drive. This will save the time of downloading the images from a Radlink PACS to your local drive in order to view them.

1. Select the **Pre-Fetch Agent** button.



The Pre-Fetch Agent window is displayed.

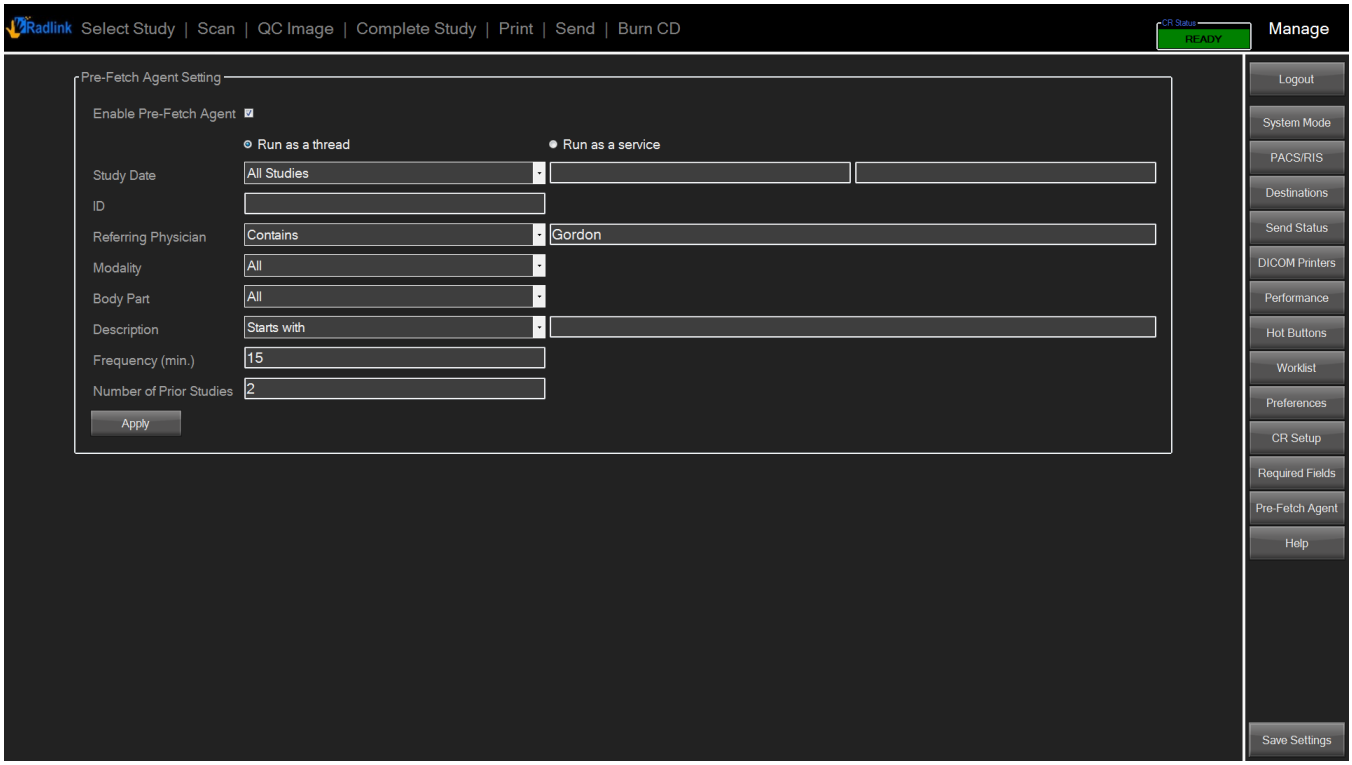
Note that Pre-Fetch may be run in either a **Run as a Thread** (default) or **Run as a Service** mode.

When run in **Run as a Thread** mode, the software must be running in order for Pre-Fetch to function.

When run in **Run as a Service** mode, the software does not need to be running in order for Pre-Fetch to function.

Setting up Pre-Fetch Agent (continued)

1. Set the **Study Date** field to **All Studies**.
2. Enter a physician's name into the **Referring Physician** field.
3. Set the **Referring Physician** pull-down menu to **Contains**.
4. Select the **Enable Pre-Fetch Agent** checkbox.



In this example, all the studies that contain Gordon as the referring physician will be automatically downloaded to the local image folder.

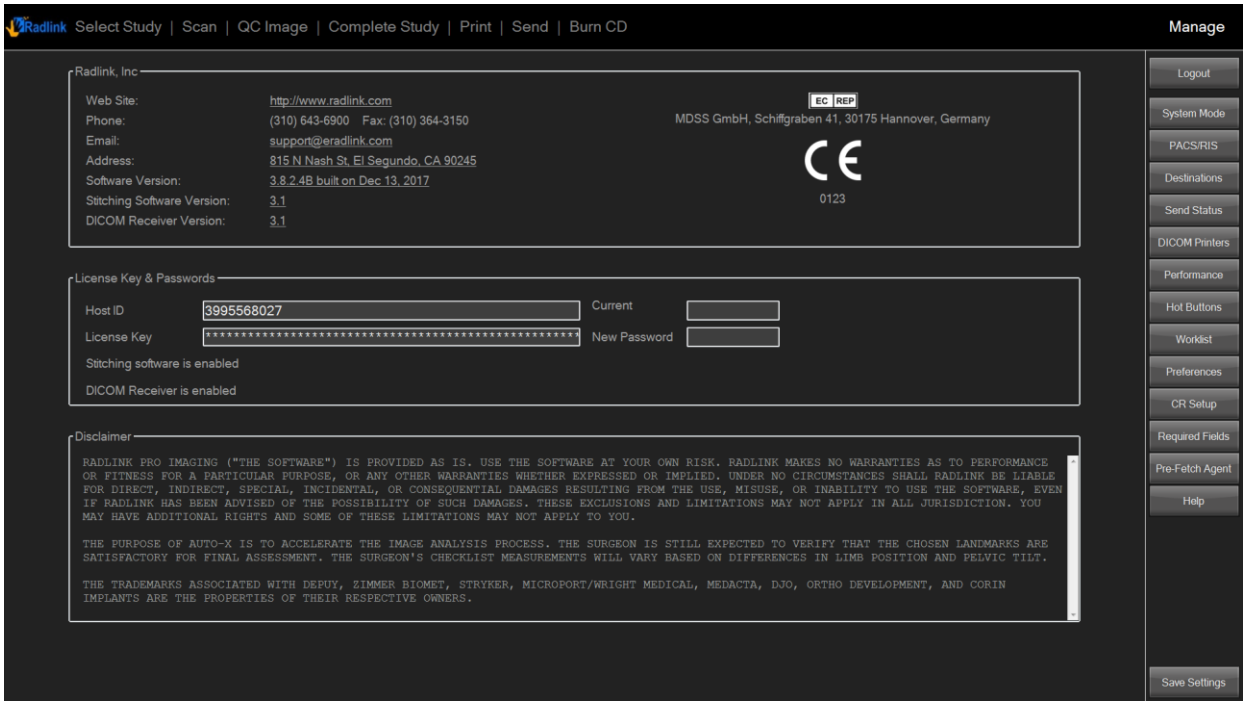
As the day progresses, a query will be automatically performed every 15 minutes so that any new studies containing Gordon will also be downloaded.

Note that if you change any selections after you've enabled the pre-fetch agent, you can either select **Apply** or uncheck and recheck the **Enable Pre-Fetch Agent** checkbox to perform a new fetch.

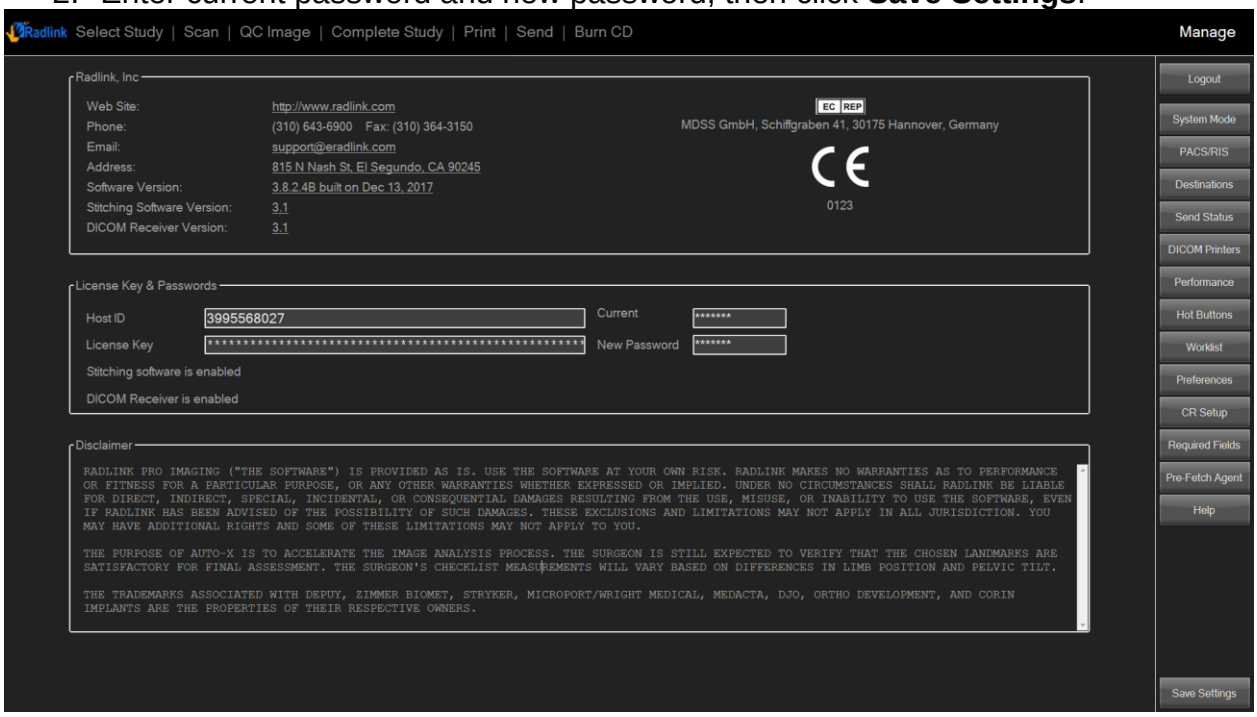
Changing Password for Local Radlink Account

In version 3.8.2.5 or later, software allows user to change default password for local Radlink account.

1. Select the **Help** button.



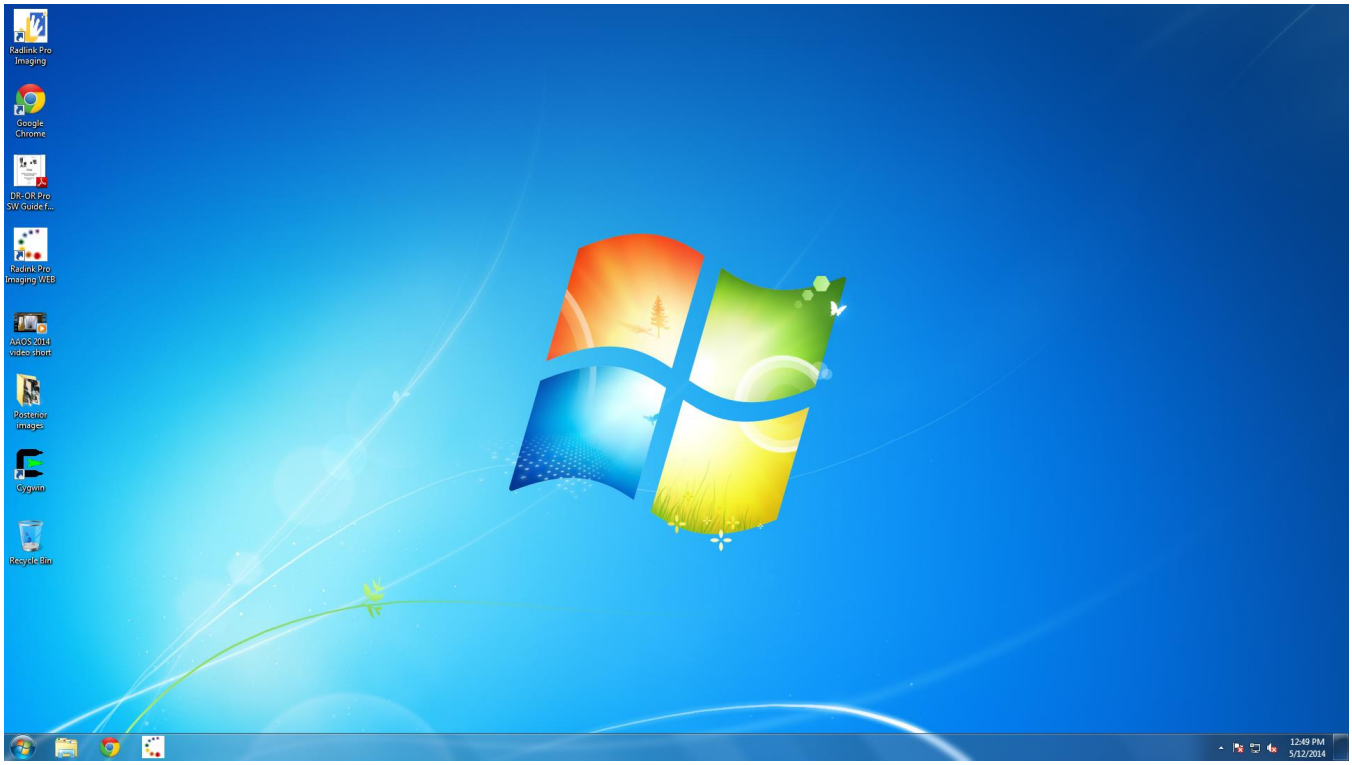
2. Enter current password and new password, then click **Save Settings**.



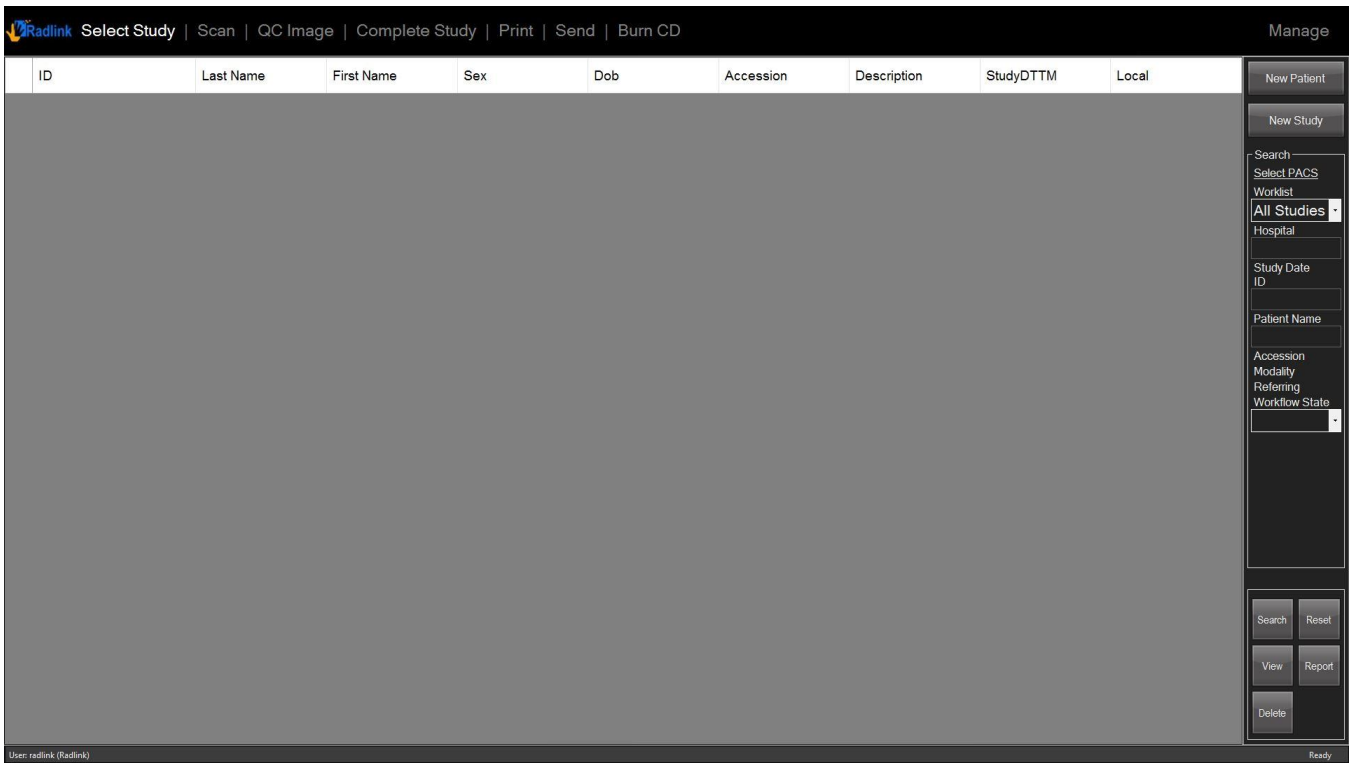
Standard Workflow

Starting Pro Imaging Acquisition Software

To start the imaging software, double-click the desktop shortcut icon **Radlink Pro Imaging** shown below or click **Desktop → Radlink Pro Imaging**



Starting Pro Imaging Acquisition Software (continued)



The **Select Study** screen is displayed with **Worklist** set to **Today** and **Study Date** set to the current date.

Note:
1. The system will automatically perform a query at startup for the **Worklist** setting (in this case **Today**), and will display all studies that match today's date (in this case, none).
2. Logged in user information will display at the bottom of the screen.

IMPORTANT:

- To create a study for a **New Patient**, refer to the next section entitled "Creating a Study and Scanning a New Patient".

- To create a study for an **Existing Patient**, refer to the section entitled "Creating a Study and Scanning an Existing Patient".

Image Retrieving

Download the images from a Radlink PACS to local drive to view:

1. Click **Select Study** Tab, select the desired study and system will automatically take you to QC Image window.

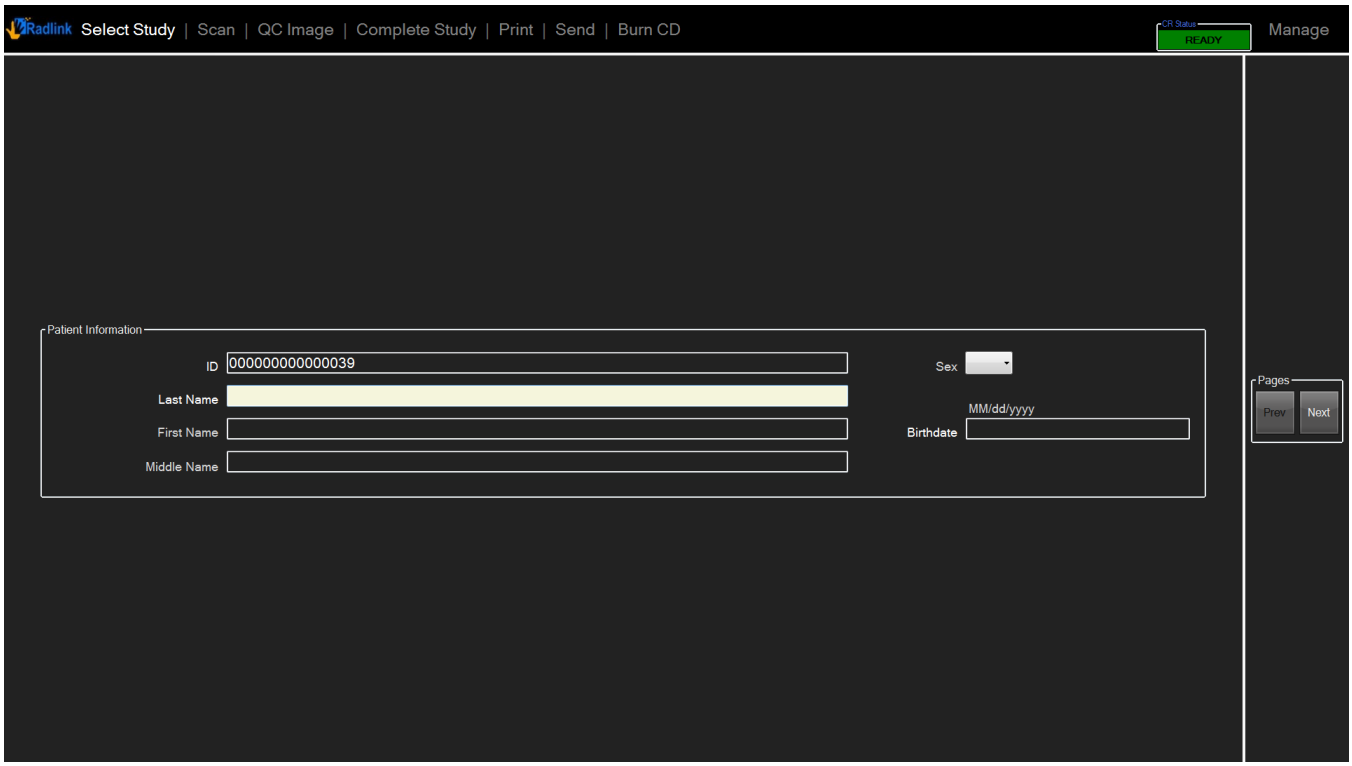
2. Click **Select Study** Tab again, you can see image downloading progress bar under "Local" column

3. After download is finished, a small computer icon appears meaning that the study is successfully downloaded to local.

Creating a Study and Scanning a New Patient

Use the **New Patient** button to create new patient information.

1. Select **New Patient**

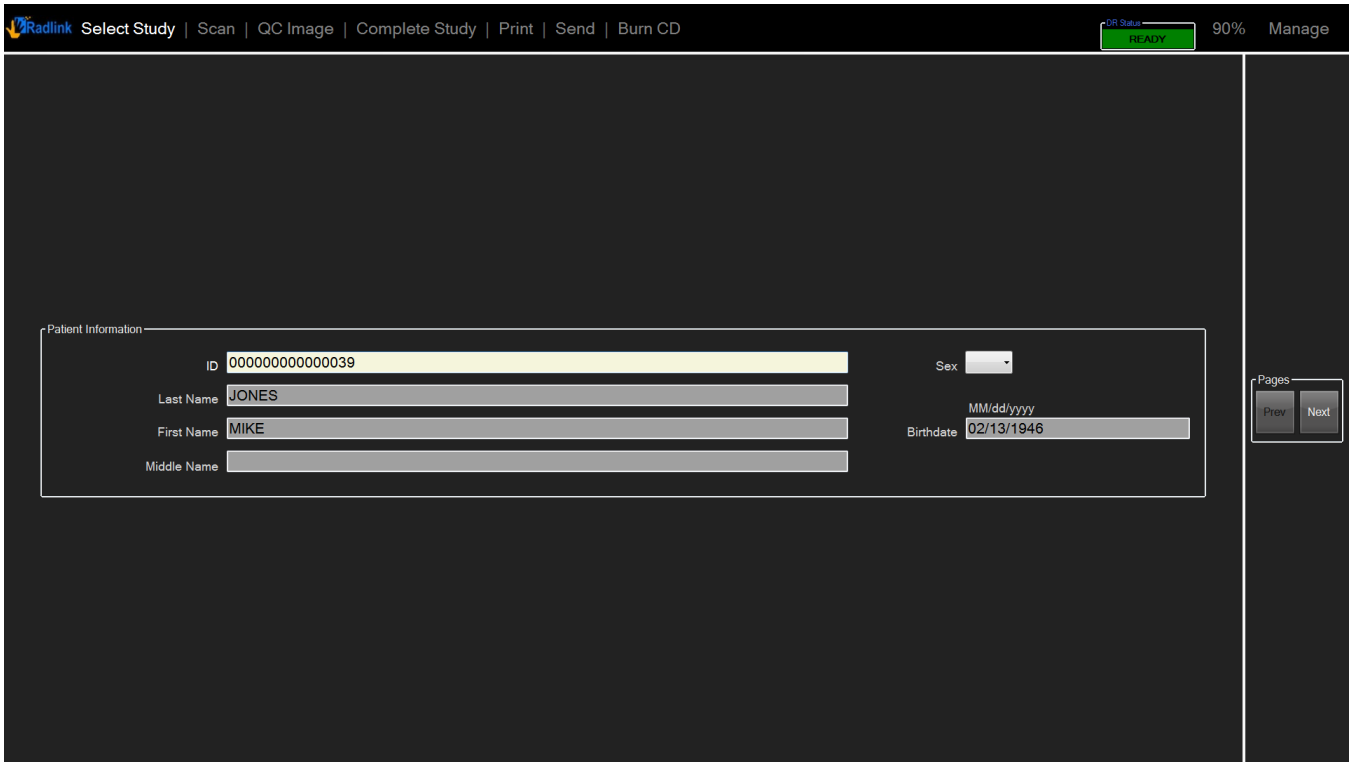


The required fields on the **Patient Information** window can be set by selecting **Manage** and then **Required Fields**. All required fields are denoted using a white font versus a gray font for the non-required fields.

In the above example, **ID** is the only required field.

Creating a Study and Scanning a New Patient (continued)

2. Patient **ID** will be generated automatically. User could also choose to enter **ID** for the patient.



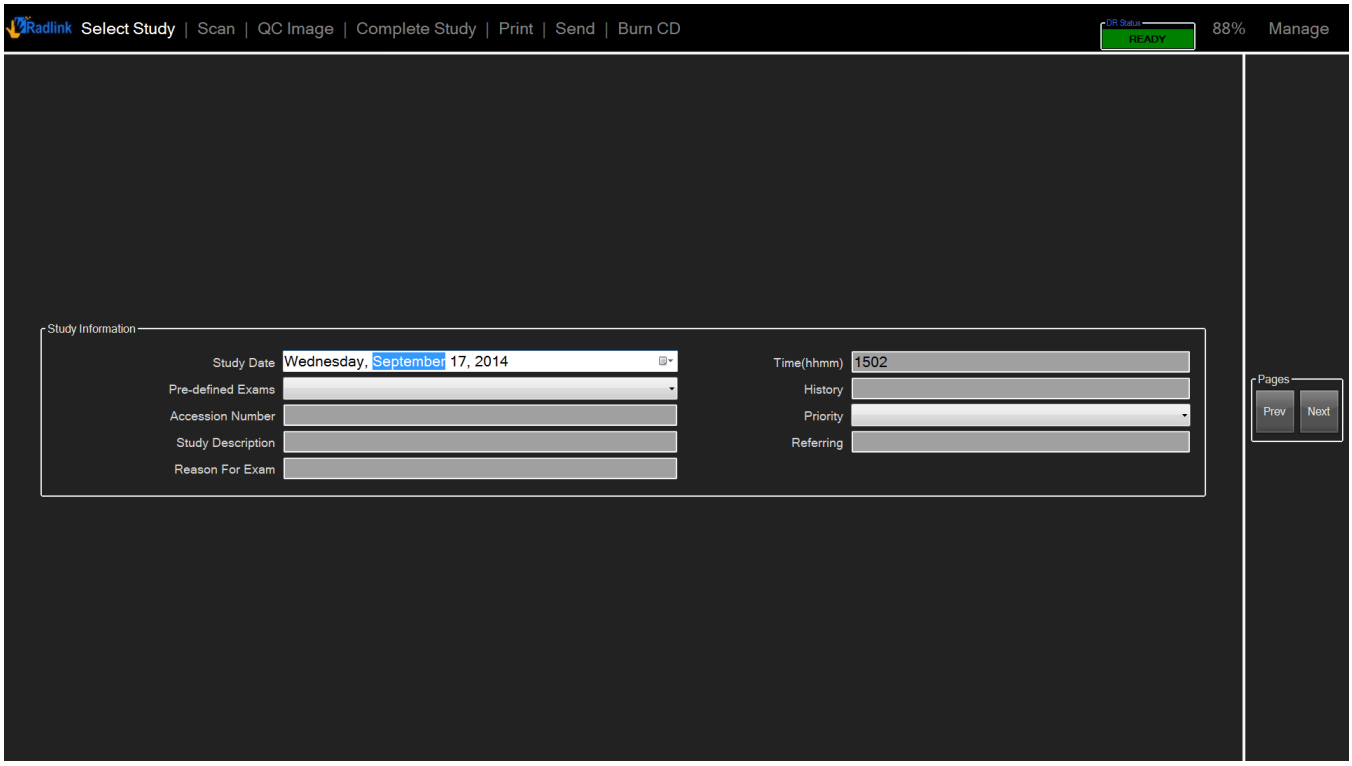
If an **ID** already exists, the patient information is auto-filled.

In the above case, the fields for an example patient “Mike Jones” automatically appeared once his Medical Record Number was entered into the **ID** field by the user.

If a predefined **ID** record doesn’t exist (there will be no auto-fill), simply enter the rest of the patient information in the desired fields.

Creating a Study and Scanning a New Patient (continued)

3. Select **Next**



The **Study Information** window is displayed.

Like in the previous **Patient Information** fields, the required fields for the **Study Information** window can be set by selecting **Manage** and then **Required Fields**.

Enter the study information in the desired fields of the **Study Information** window

Creating a Study and Scanning a New Patient (continued)

4. Select **Next**.

The **Scan** window is displayed.

Creating a Study and Scanning a New Patient (continued)

5. Either select where on the skeleton you would like to take an image of, or select the body part from the pull-down list using the **Body Part** menu in the upper right corner.

The **Body Part** pull-down menu is displayed.

Creating a Study and Scanning a New Patient (continued)

6. Select desired **Body Part** from the pull-down menu.
7. Set the **View** and **Size** fields.

The general recommended technique fields: **kVp**, **mAs**, and **Gain** are automatically populated by default depending on the selected **Body Part**, **View**, and **Size**.

Note: These are reference values only. A trained x-ray technician may choose to adjust these values for their environment (and reset as defaults) as they see fit.

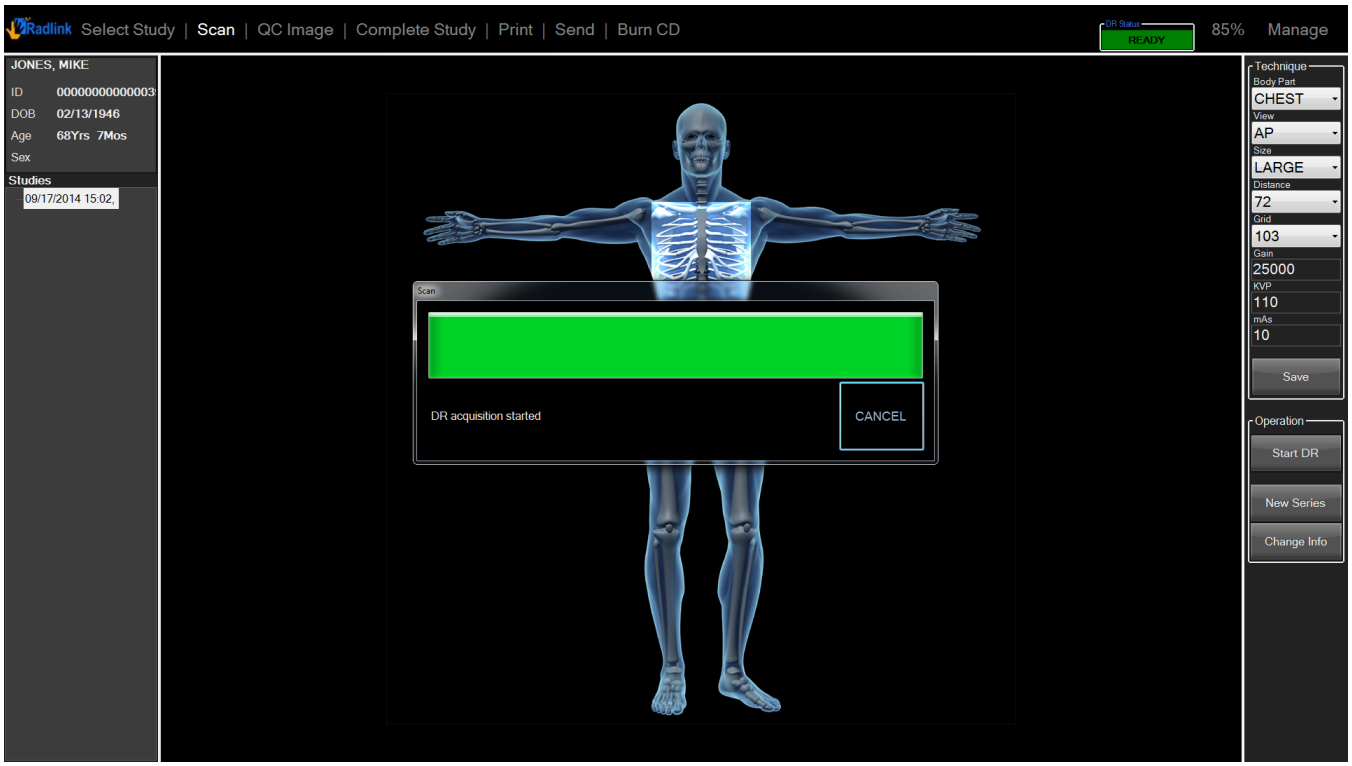
These settings should work well in a clinical setting, but may be changed and customized. Select **Save** to retain any custom settings.

Although the **Gain** setting will affect image processing, the **kVp** and **mAs** settings are informational only (and may be displayed after the image is acquired in the **QC Image** tab by clicking the hot button **INFO**).

Note: You may also view the **EI** (Exposure Index) by pressing the **INFO** hot button.

Creating a Study and Scanning a New Patient (continued)

8. Click on **Start DR**.

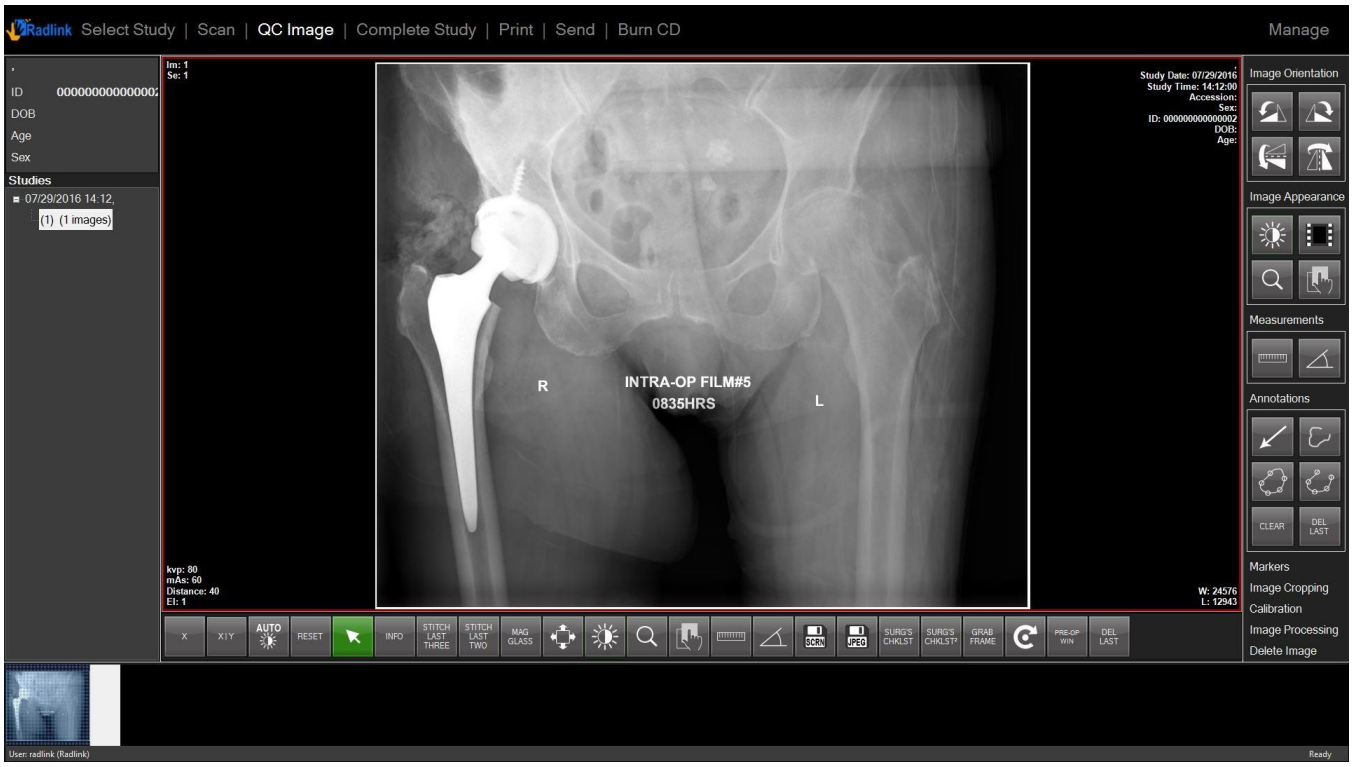


A scan window appears to indicate it is ready for the scan.

Creating a Study and Scanning a New Patient (continued)

After the scan is completed, the image is post-processed (by Radlink's proprietary software to improve image quality) and then is displayed for the user in the **QC Image** tab.

Note: Software will auto scroll to the latest acquired image



If you want to continue scanning additional images to this study, select the **Scan** tab at the top.

The software will return the user to the **QC Image** window/tab following each individual scan

When the user has completed acquiring & viewing images, select the **Complete Study** tab on the top row to push the images to the PACS destination (defined in the **Destinations** window).

After selecting Complete Study, the software will return you to the Select Study tab.

Creating a Study and Scanning an Existing Patient

The **New Study** feature may be used instead of **New Patient** if a patient record already exists. This may save the user time in not having to enter the patient's basic information again.

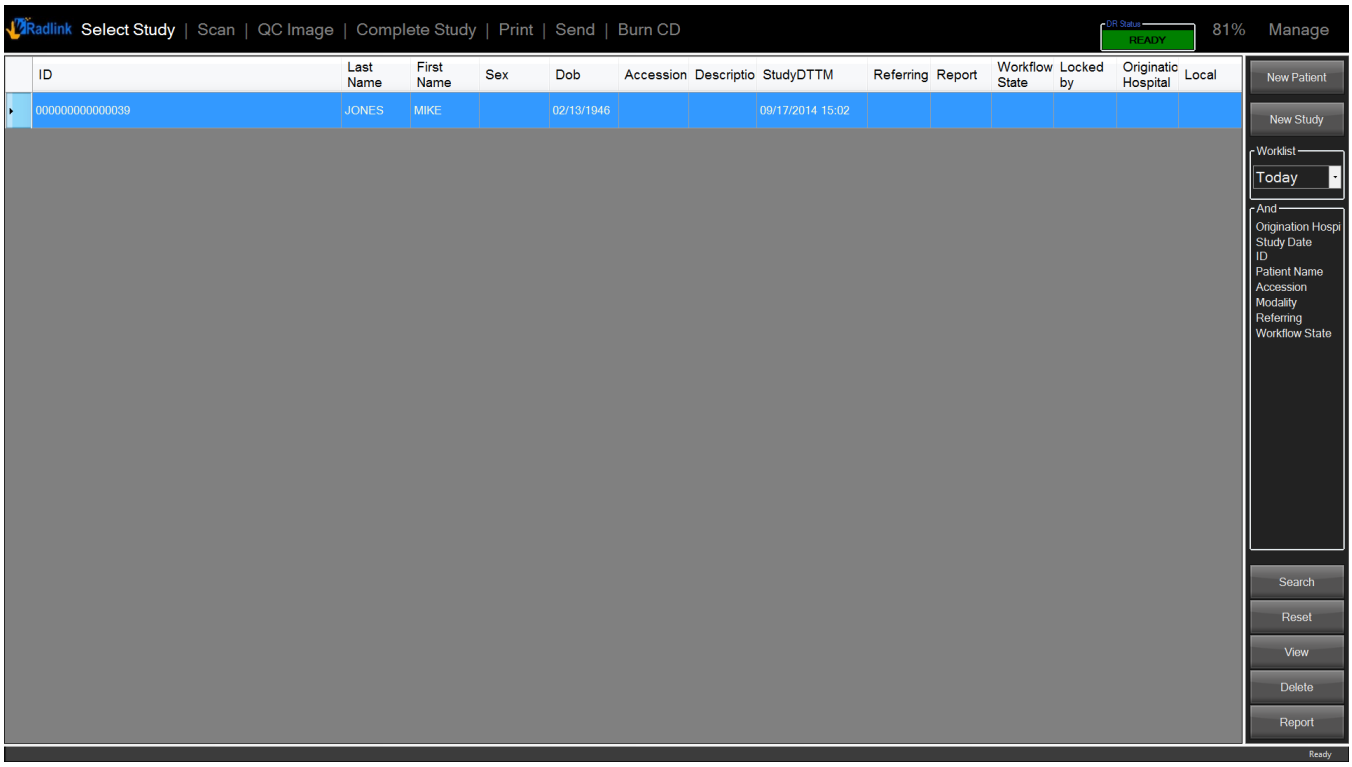
1. Display the existing study in the **Select Study** window: (using the **Worklist** field, *e.g.* ***Today***)

   a. Enter the last name of the patient into the **Patient Name** field and select **All Studies** from **Worklist**

   OR

   b. Enter the ID of the patient into the **ID** field and select **All Studies** from **Worklist**

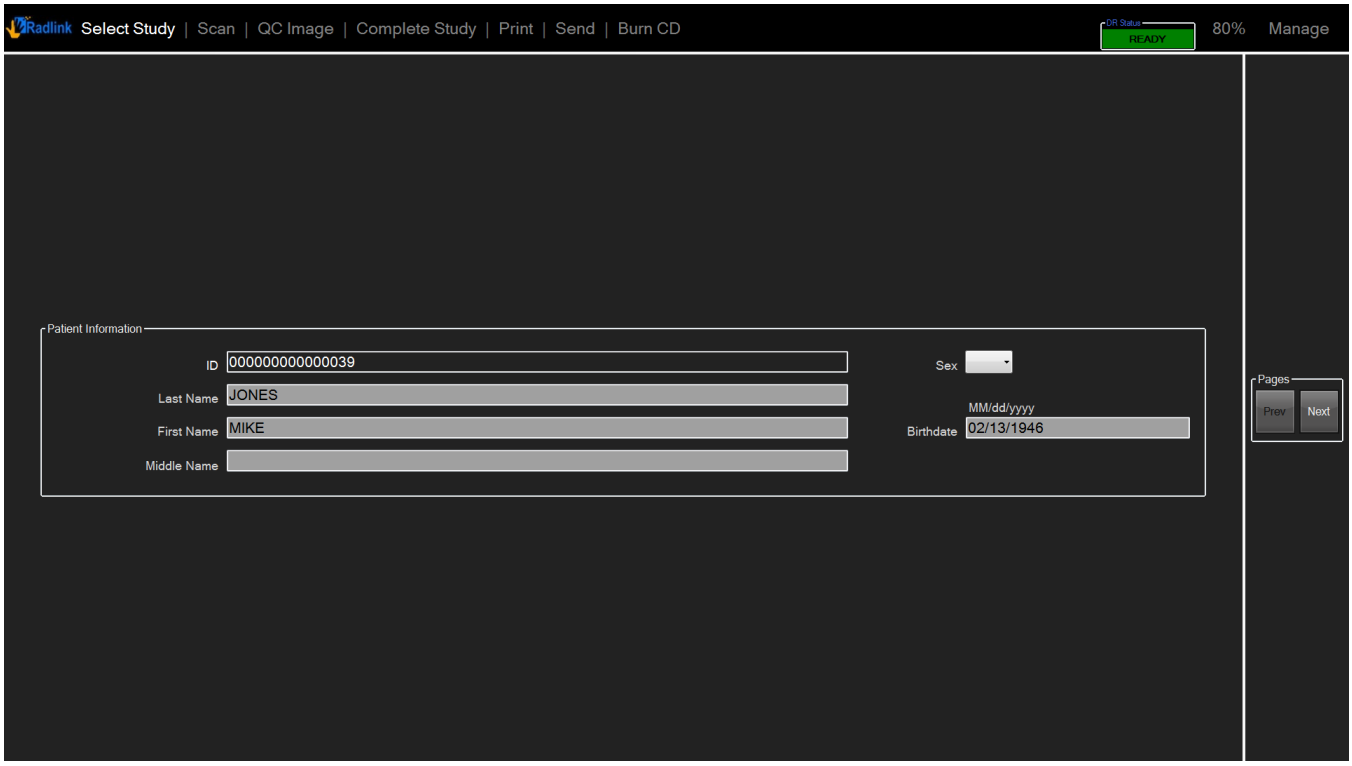
2. Click-on the leftmost column in the desired row (to the left of the **ID** number)



The example patient data for *"Mike Jones"* is displayed above, and is now highlighted.

Creating a Study and Scanning an Existing Patient (continued)

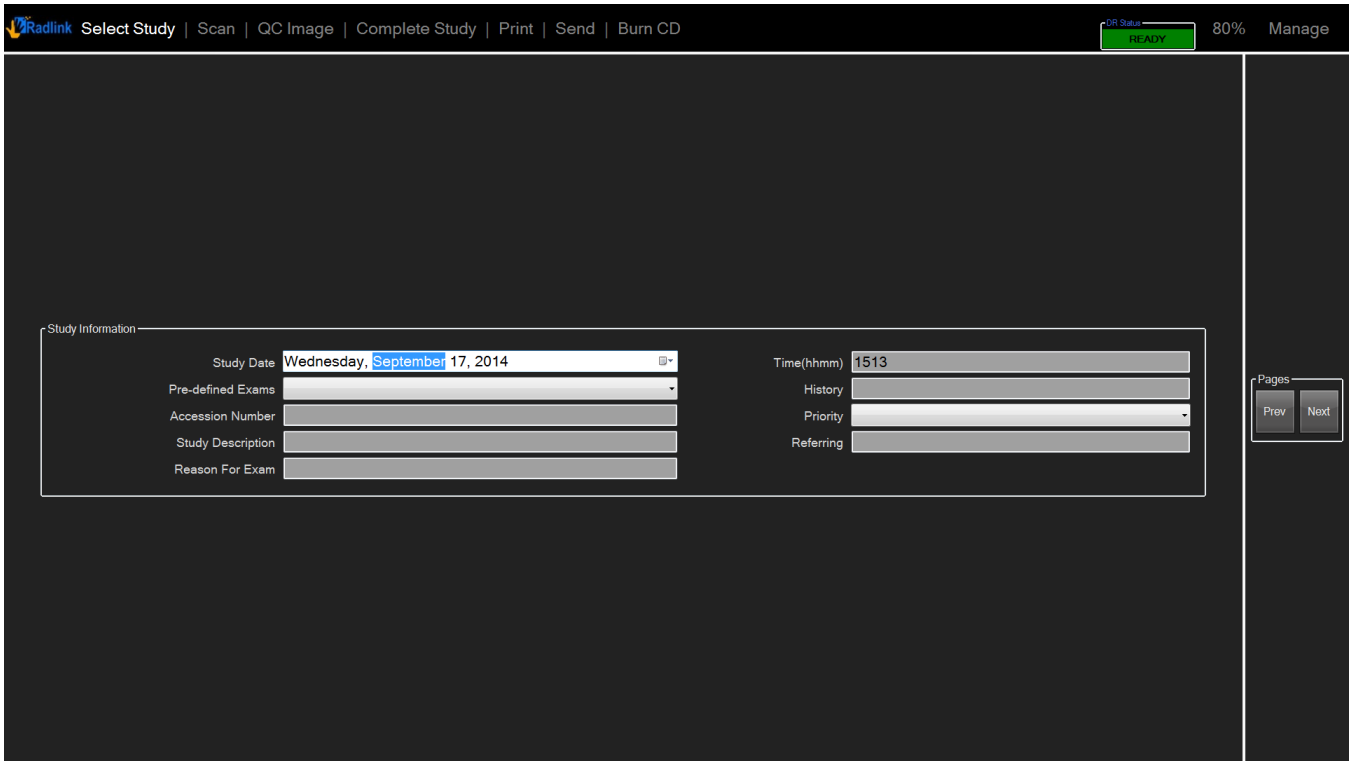
3. With the patient's information now highlighted, select **New Study** on the right menu list



All previously entered information for the patient is automatically transferred to the **Patient Information** window for the new study.

Creating a Study and Scanning an Existing Patient (continued)

4. Select **Next**



None of the previously entered **Study Information** fields will be transferred, but you may manually fill in these fields if desired.

Creating a Study and Scanning an Existing Patient (continued)

5. Select **Next**

The **Scan** window is displayed for the new study.

At this point you can proceed as detailed earlier in the Scan instructions for a New Patient or by entering the **Technique** (information in the upper right corner), and selecting **Start DR**.

When the user has completed acquiring & viewing images, select the **Complete Study** tab on the top row to push the images to the PACS destination (defined in the **Destinations** window).

After selecting **Complete Study**, the software will return you to the **Select Study** tab

Image Scale Calibration
(in millimeters)

Image scale can be calibrated to enable higher accuracy for length measurements.

1. While in **QC Image** window, click the **Calibration** button.

2. Click the **RULER** button for length calibration & **CIRC** button for circular diameter calibration.

3. Click & drag on the image to reference the surface-to-surface length of the calibration object.

4. Enter the known physical length/diameter of the calibration object when **CalibrationDialog** box appears after you are done making your selection

5. Click the **Done** button to save the calibration or **Clear** to undo all calibration settings

Note: The automatic calibration (**25mm Marker**) button is activated now in 3.8 version.

Storing the Study to PACS

Complete Study

When you are satisfied with the quality of the scanned images, you need to store them:

1. Select **Complete Study** from the top row of tabs

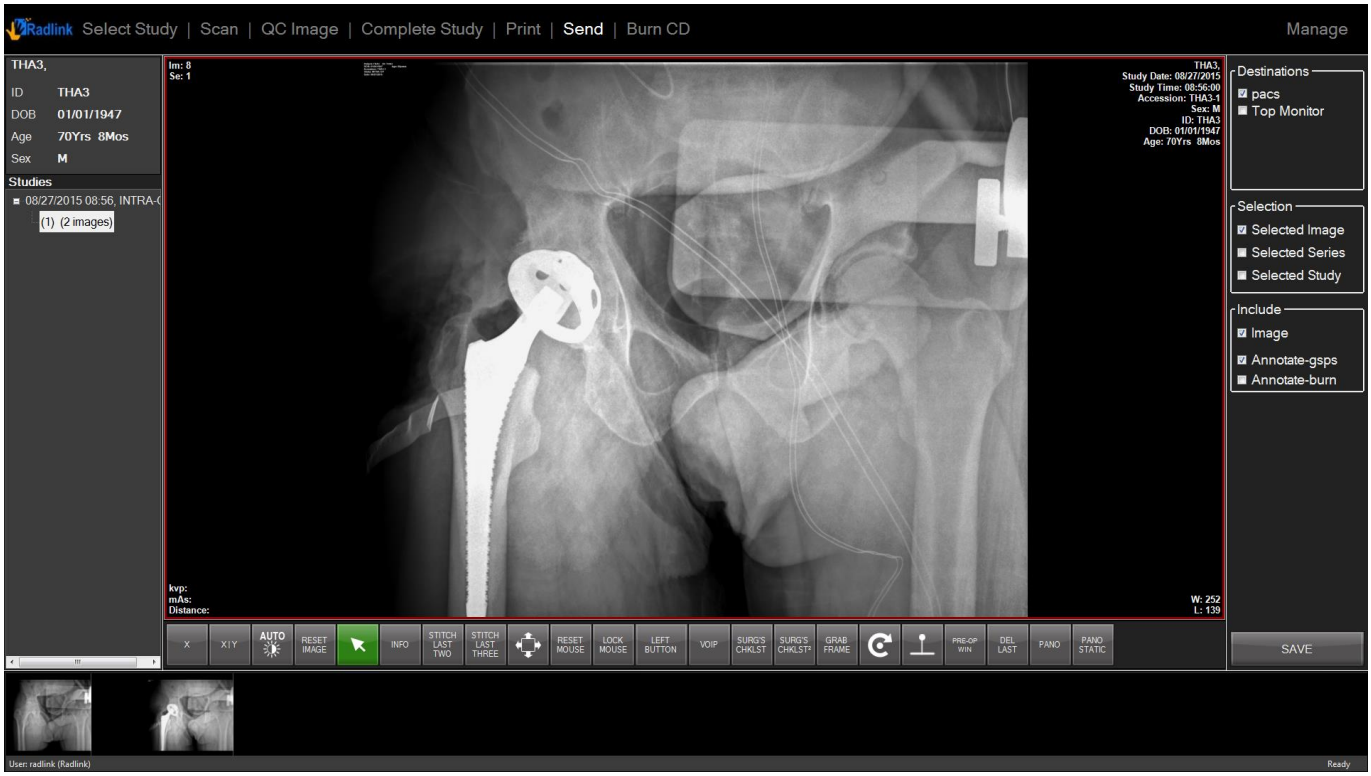
The message above appears and the cursor is shown as an hourglass. At this time no other operations may be performed.

Note: This begins the delivery process to every active destination specified in **Manage** or **Destinations** Settings.

Send

Individual images or the whole study or series can be can also be stored to the PACS, without completing the study, in the Send menu.

1. Select **Send** from the top row of tabs

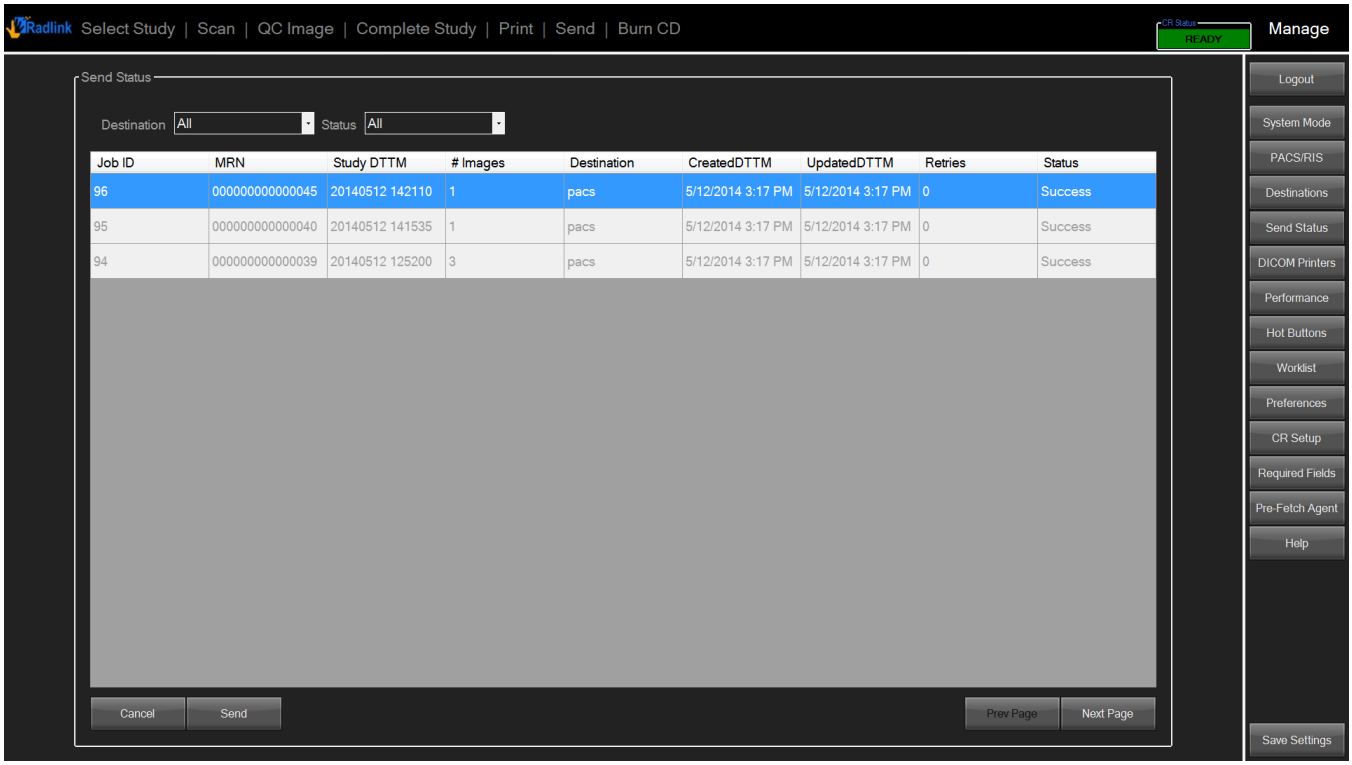


2. Select the destinations the image will be sent to.
3. Select which image, series, or study to send.
4. Select whether to include the annotations on the image.
5. Click **Save** button to send the image.

Verifying Send Status

To verify that the study has been successfully stored after selecting **Complete Study**:

1. Click **Manage** button, then **Send Status** button



The Send Status window is displayed showing the progress of the send operation.

Note: For the 3 example studies in the above picture, under the **Status** column, the current state is automatically updated to indicate the progress (e.g. these are reading **Success**)

A typical progression is **Pending** > **Executing** > **Success**

Once Success appears, the study has reached its destination(s). If the study contains a few images, you may already see **Success** by the time you look at the **Send Status** window.

If there are problems, **Send Status** will attempt to send the study 10 times before giving up and indicating a **Status** of **Error**. The number of attempts will be displayed in the Retries column.

For studies that failed to send, re-select the study and then select **Send** on the bottom to resend the study. See **Troubleshooting** for more information.

Surgeon’s Checklist

Proprietary software designed by surgeons, for surgeons

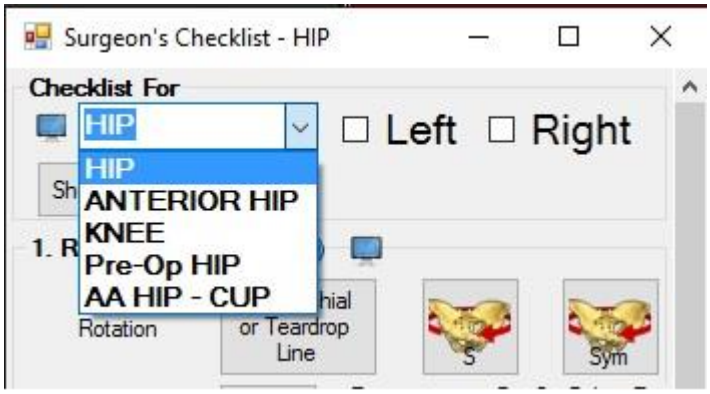
Radlink has worked extensively with orthopedic surgeons who've helped design software that perfectly suits their needs in the OR. Radlink's "Surgeon's Checklist" offers easy to use scale calibration, distance and angle measurements, and easy to follow steps that guides hip surgeon's through the process of ensuring proper implant fit using both pre-operative and intra-operative images.

Introduction

The Surgeon’s Checklist can be activated by clicking one of the hot buttons like this

at QC Image window. The hot button is removable if you go to **Manage,** then **Hot Buttons** to uncheck the selection.

The checklist has 5 options to select from the pull down menu for different purposes. User should also select the Left or Right side of body that needs operation.



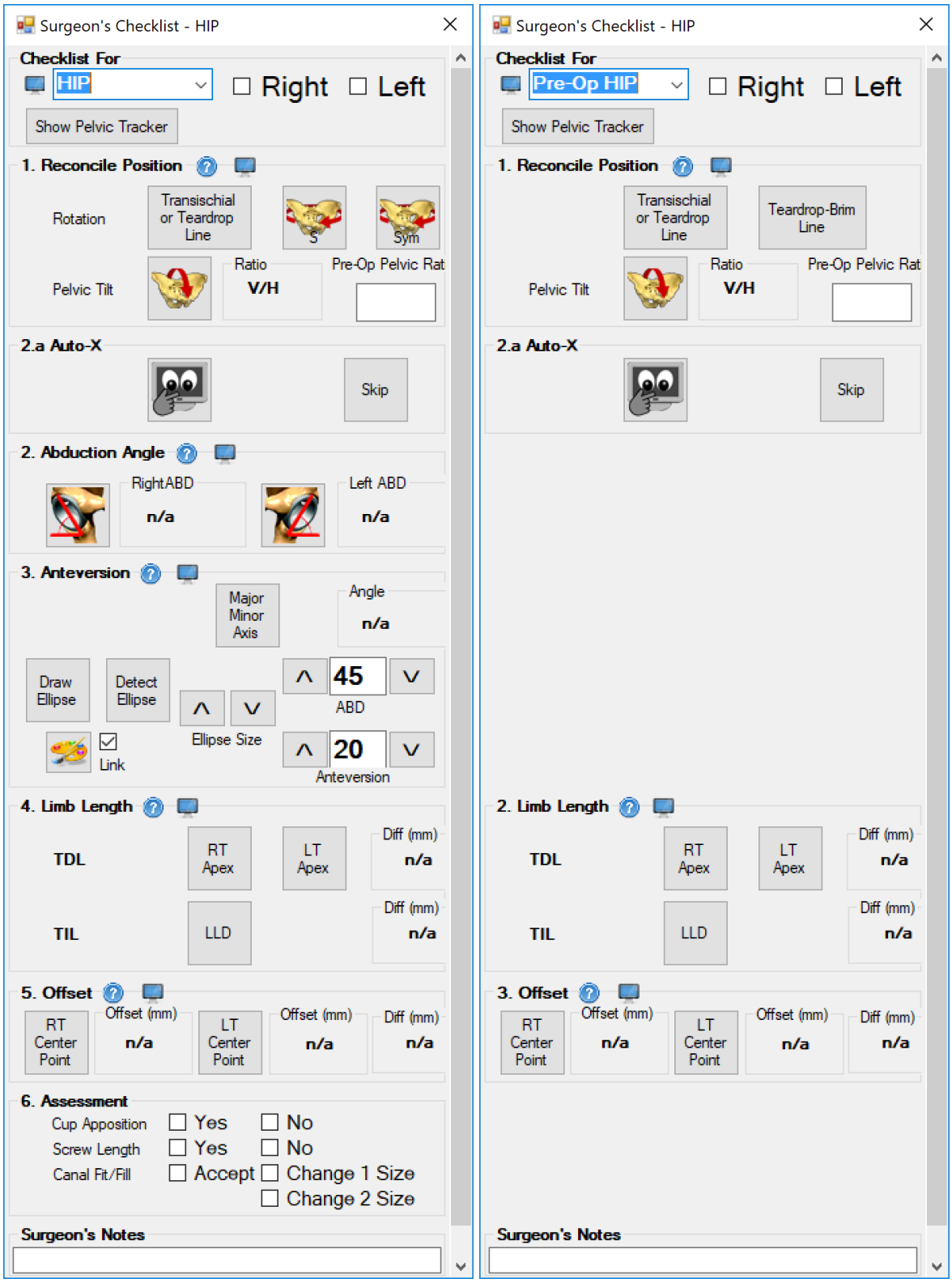
Pre-Op HIP is used for marks and measurements on the X-ray images of the patient before total hip replacement surgery. It has 3 sections which are all covered in **HIP**

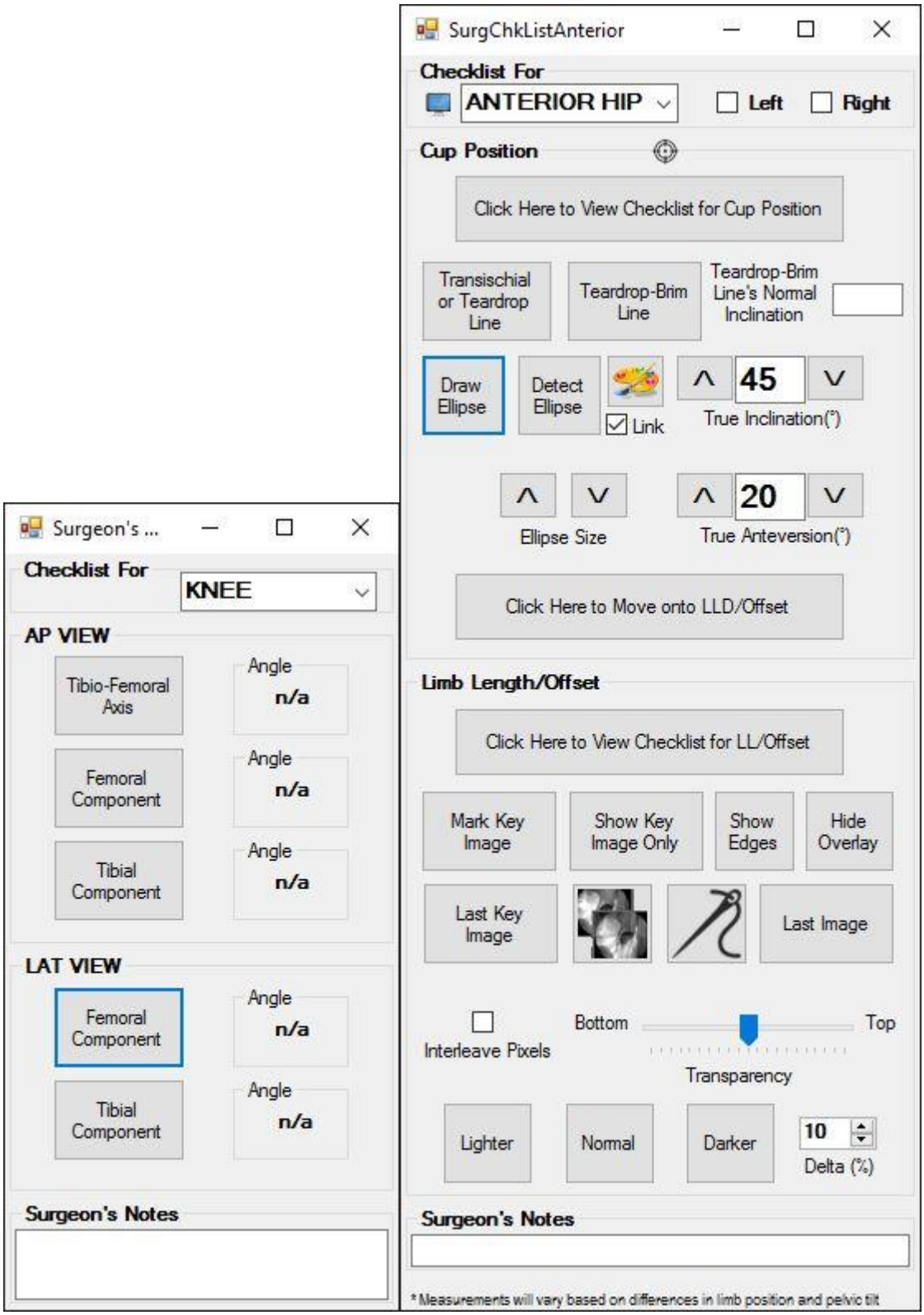
HIP is used for marks and measurements on the X-ray image of the same patient after total hip replacement surgery.

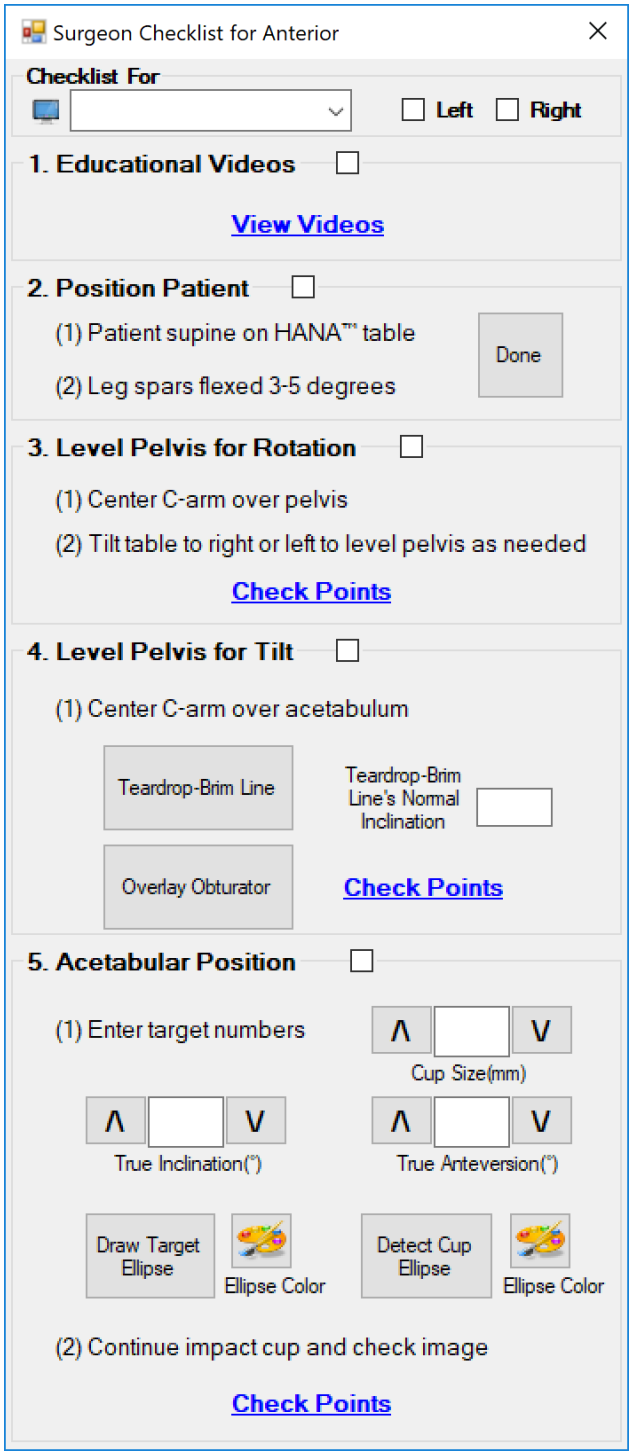
ANTERIOR HIP is used for marks and measurements for doing anterior approach incision.

KNEE is used for marks and measurements on knee X-ray images of the patient

Here are the five Checklists:




SurgChkListAnterior
Checklist For
ANTERIOR HIP
Left
Right
Cup Position
Click Here to View Checklist for Cup Position
Transischial or Teardrop Line
Teardrop-Brim Line
Teardrop-Brim Line's Normal Inclination
Draw Ellipse
Detect Ellipse
Link
45
True Inclination(°)
Ellipse Size
20
True Anteversion(°)
Click Here to Move onto LLD/Offset
Limb Length/Offset
Click Here to View Checklist for LL/Offset
Mark Key Image
Show Key Image Only
Show Edges
Hide Overlay
Last Key Image
Last Image
Interleave Pixels
Bottom
Top
Transparency
Lighter
Normal
Darker
10
Delta (%)
Surgeon's Notes
*Measurements will vary based on differences in limb position and pelvic tilt
Surgeon's ...
Checklist For
KNEE
AP VIEW
Tibio-Femoral Axis
Angle
n/a
Femoral Component
Angle
n/a
Tibial Component
Angle
n/a
LAT VIEW
Femoral Component
Angle
n/a
Tibial Component
Angle
n/a
Surgeon's Notes

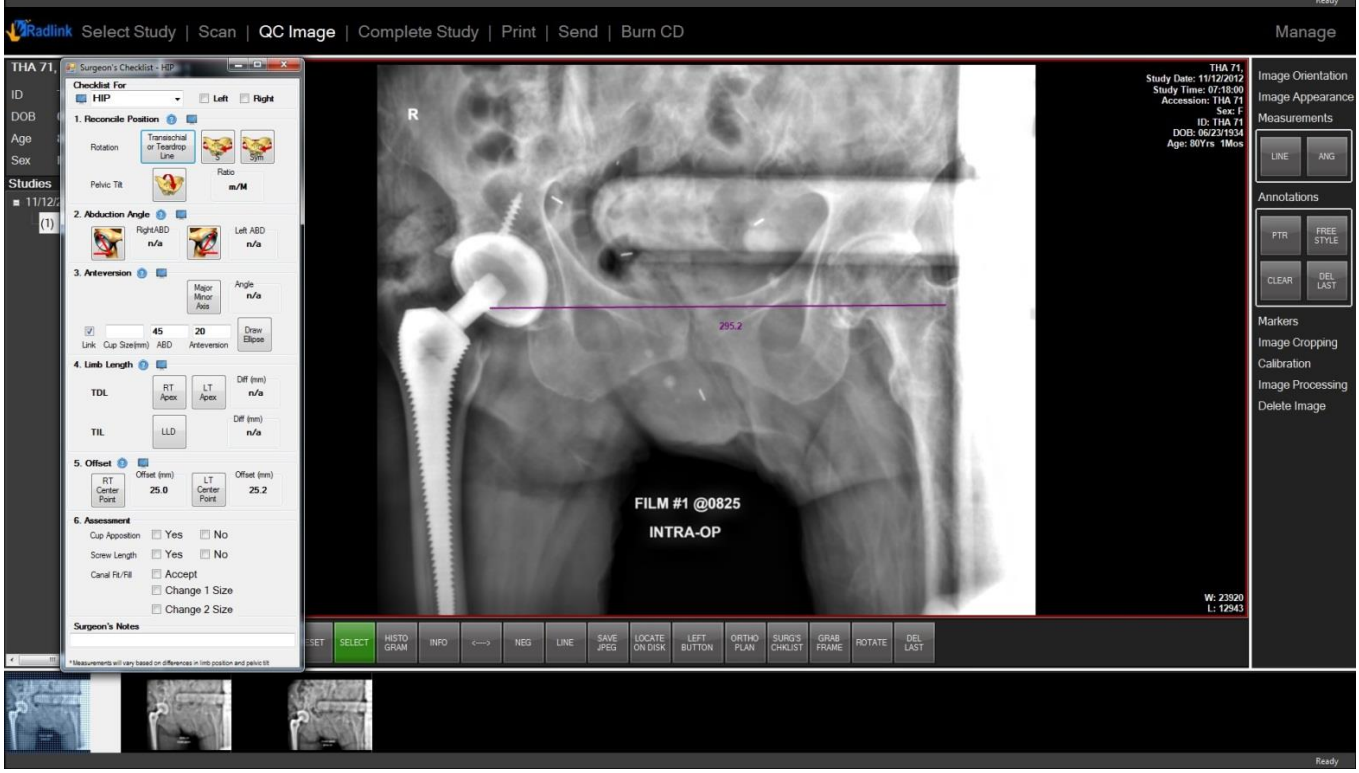


Note: User can write notes in the **Surgeon's Notes** at bottom of the checklist.

Hip

- **Reconcile Position**

1. Click the *Transischial or Teardrop Line* button and draw a line under the ischium or teardrop. Draw Trans-ischial line by drawing a line connecting the two lowest points on the pelvis (Ischial Tuberosity)



Hip

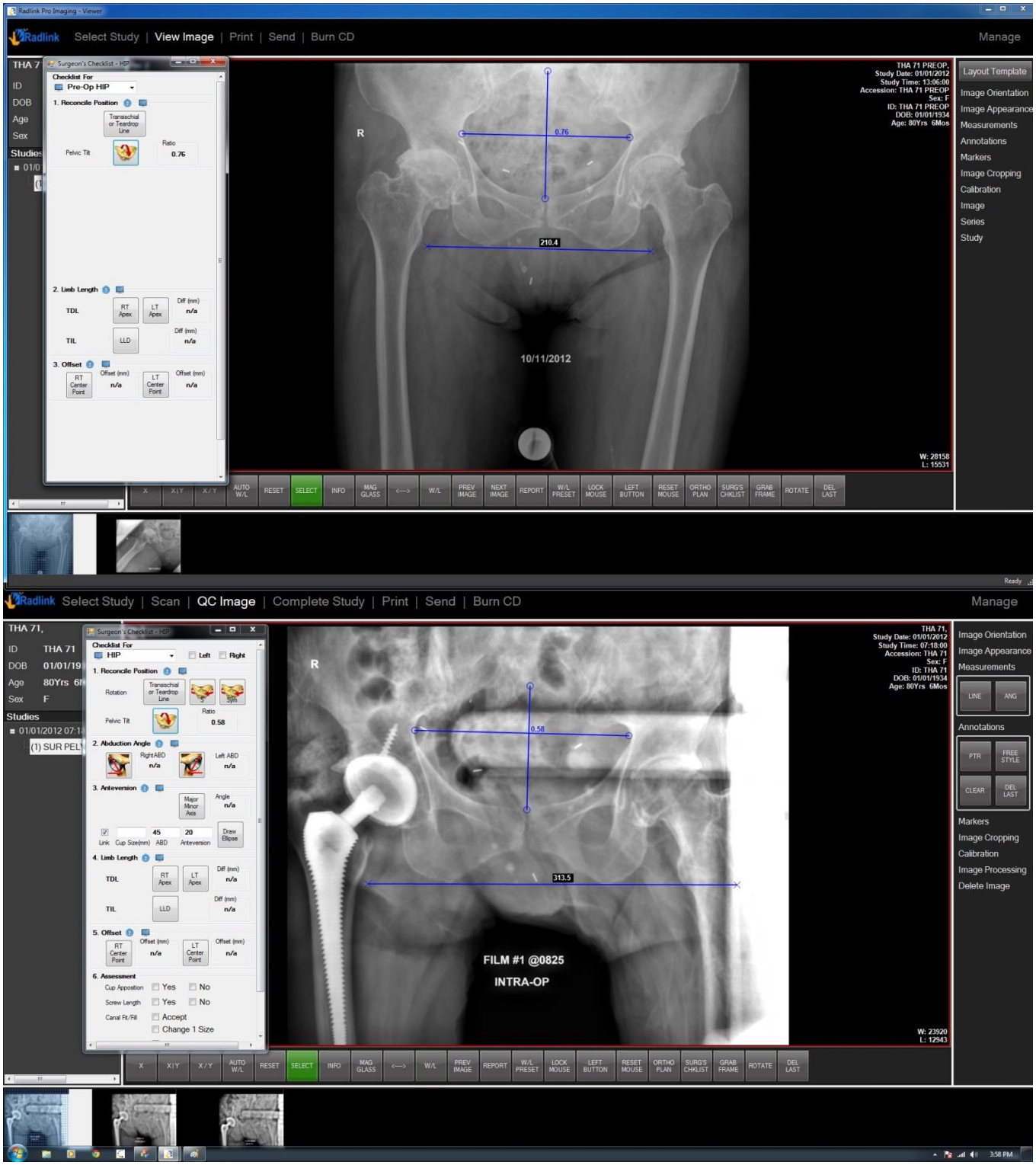
2. Click the *S* button and draw a line in the middle of the spine (mid sacrum).
3. Click the *Sym* button and draw a line between two pubis bones (mid symphysis).

If lines are not close to each other, the checklist will display a suggested rotation degree in red color on the left.
Re-do x-ray if necessary, make sure patient is correctly positioned after rotation.

Note: the lines are automatically set to be perpendicular to the *Transischial or Teardrop Line*

Hip

4. Click the *Pelvic Tilt* button, draw lines from left to right then top to bottom of the pelvis.



The calculated ratio is the length from top to bottom divided by left to right.
An equal ratio will assure the pre-op and intra-op images are having the same position.

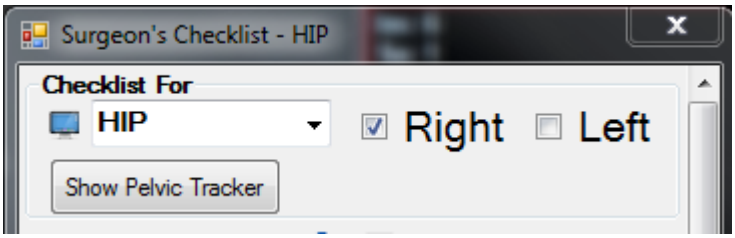
Hip

Auto-X[1]

As introduced in version 3.8.2.0, Auto-X takes advantage of Neural Network to auto detect landmarks of X-ray images. This is done by clicking 5 key points as shown, then all needed measurements are provided by Auto-X algorithm. Feature needs to be enabled by valid license. Button is shown below.

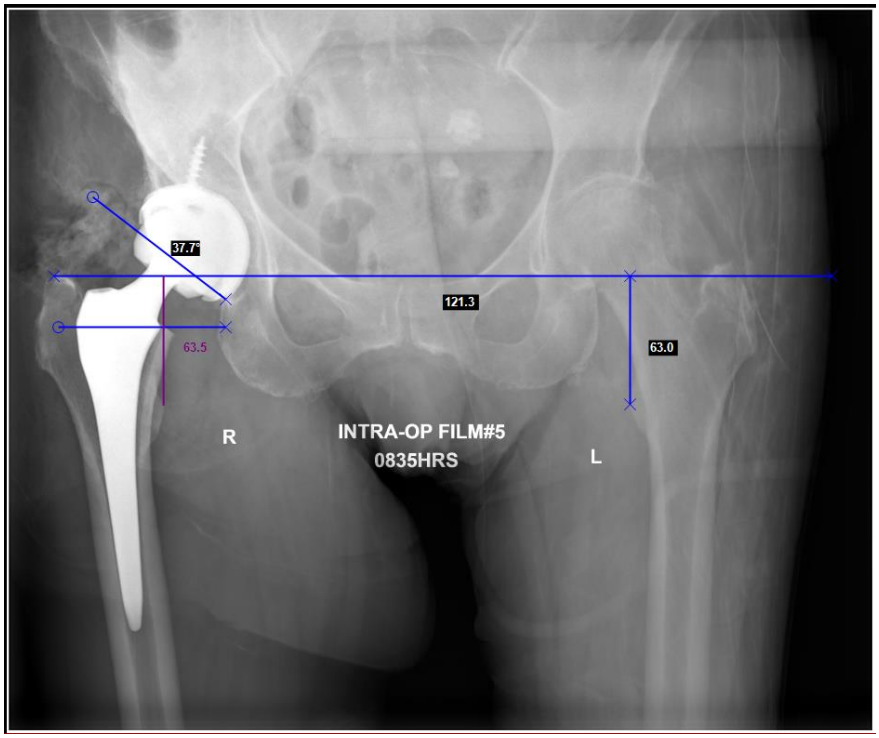
Steps:

1. Choose a side according to the image, and click the *Auto-X*.



2. Click required points as instructed.

3. Measurements are displayed and information is updated thereby.



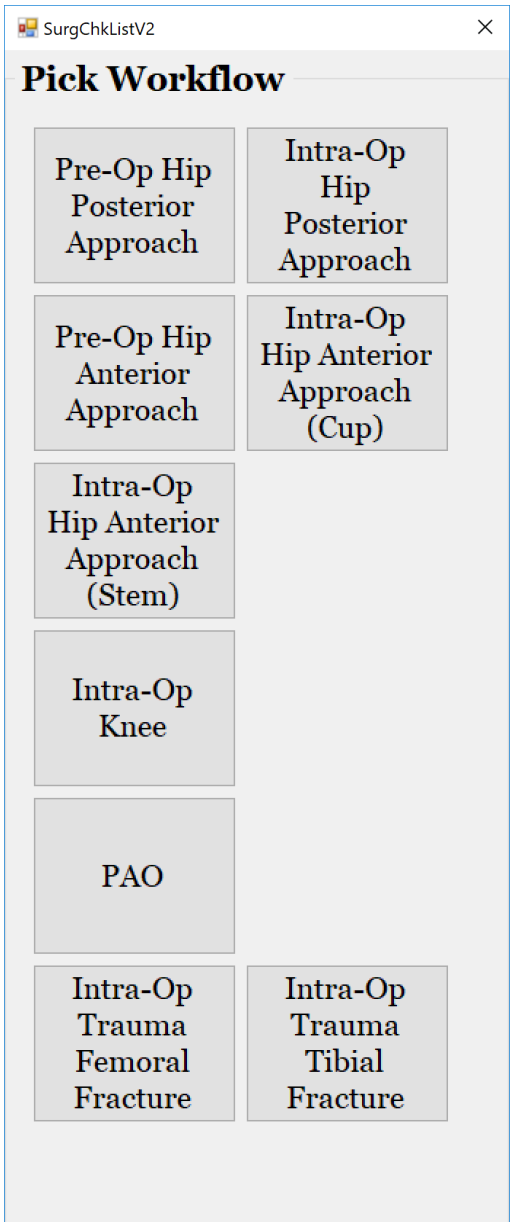
Hip

Auto-X²

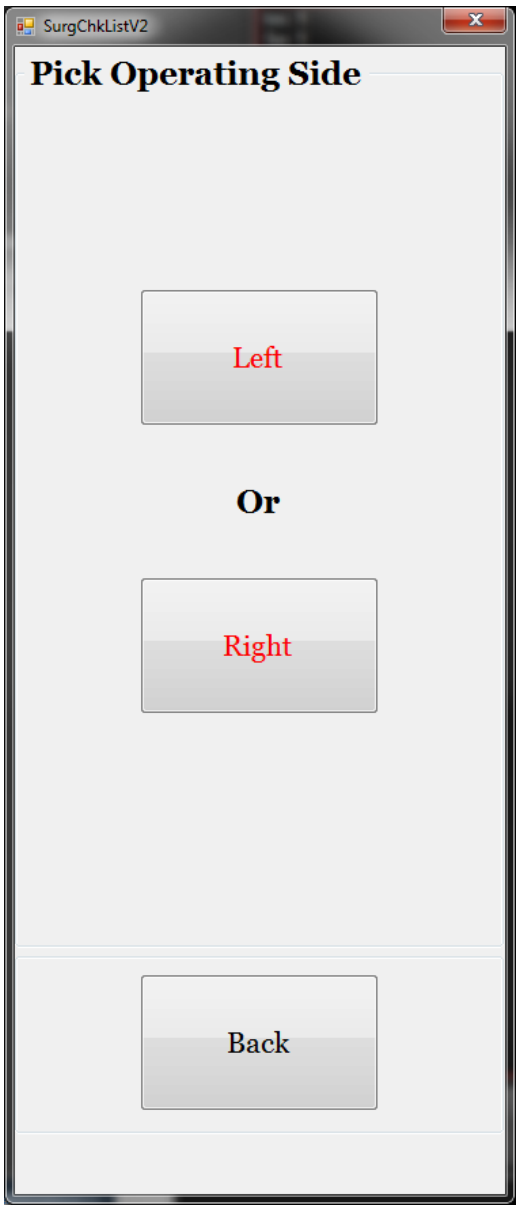
As introduced in version 3.8.2.3, Auto-X is now able to detect more landmarks. This newer version reduces the need for user to click landmark feature point. Feature needs to be enabled by valid license.
Button is showed below.

Steps:

1. Open Surgeon's Checklist², and choose Pre-Op or Intra-Op.

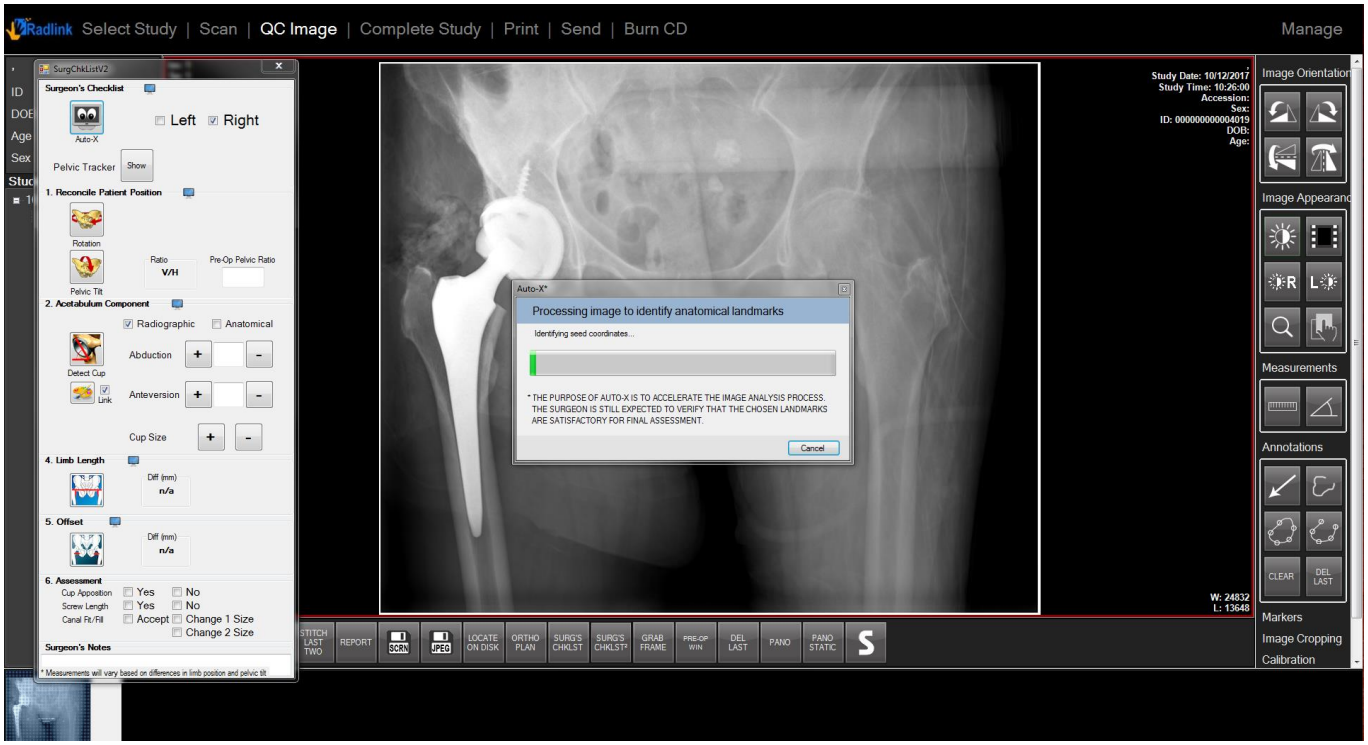


2. Choose a side.

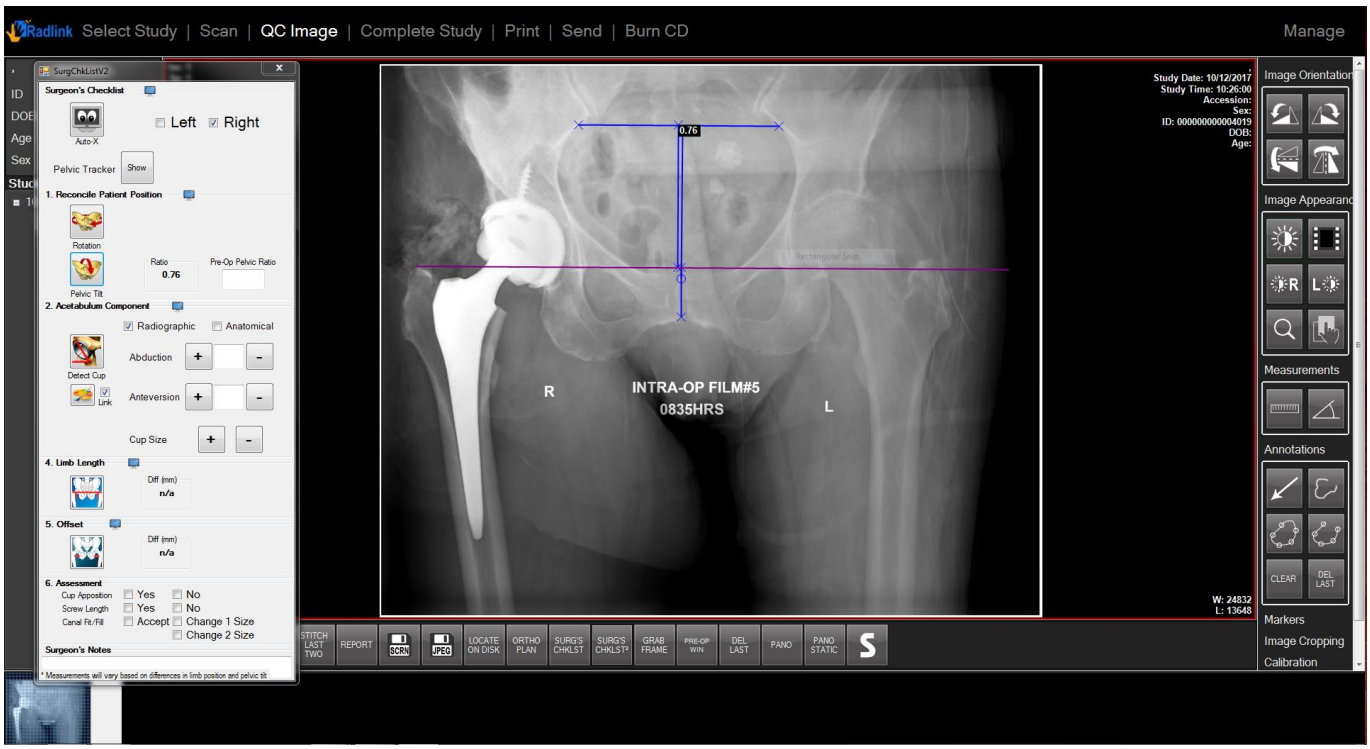


Hip
Auto-X²

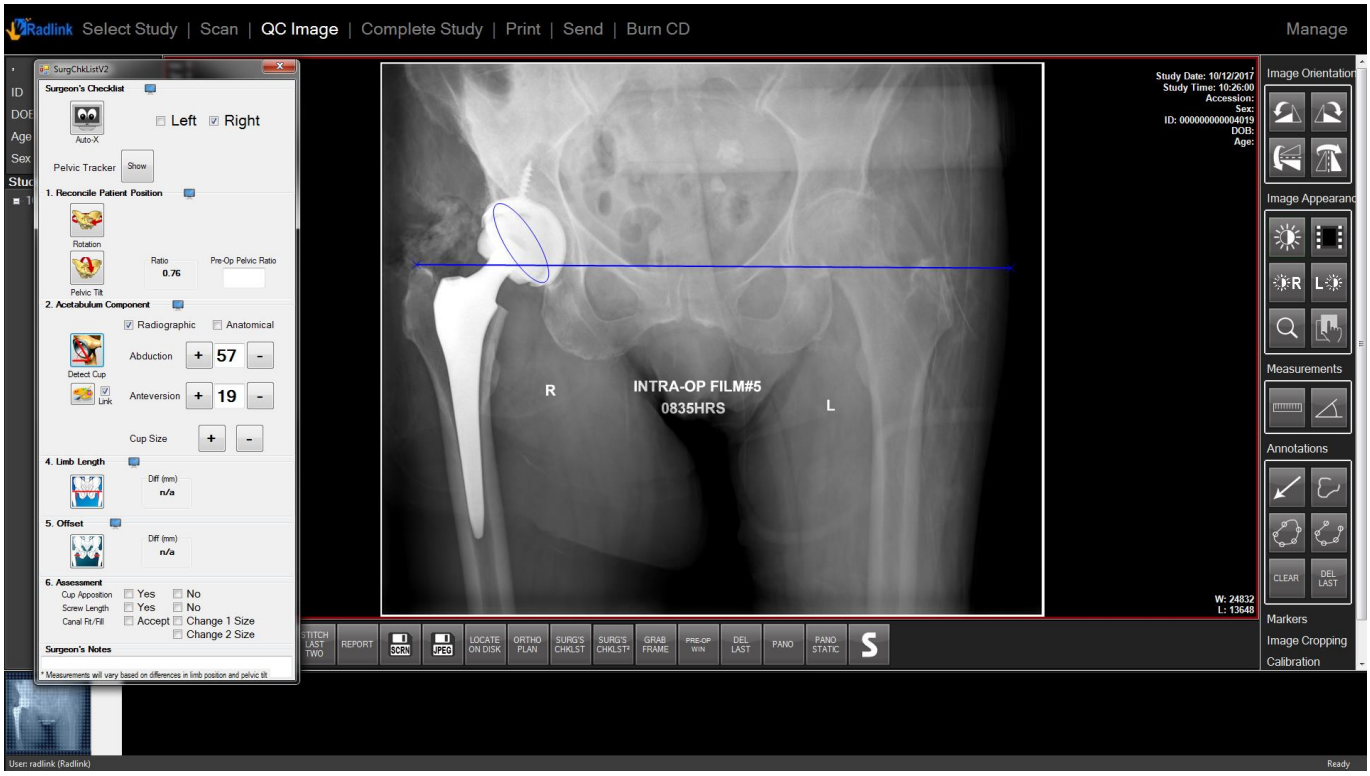
3. Click *Auto-X* button, and wait until the detection process is finished.



4. Click *Rotation* and *Pelvis Tilt* button under Reconcile Patient Position section.

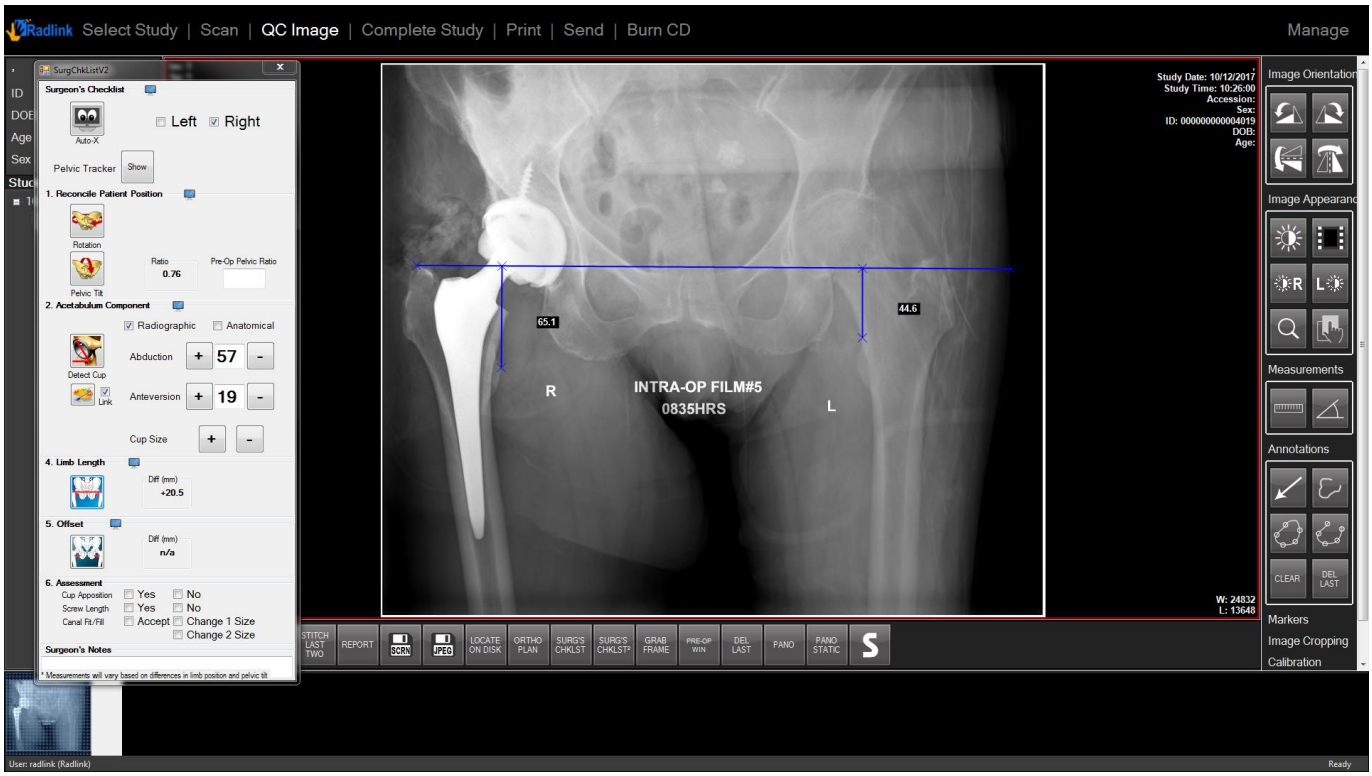


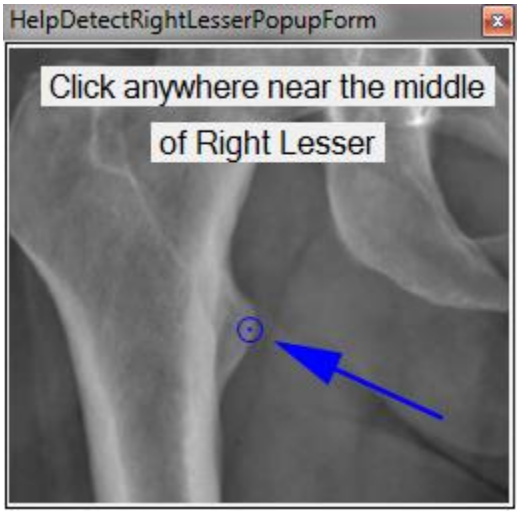
5. Click *Detect Cup* button under Acetabulum Component section.



Hip
Auto-X²

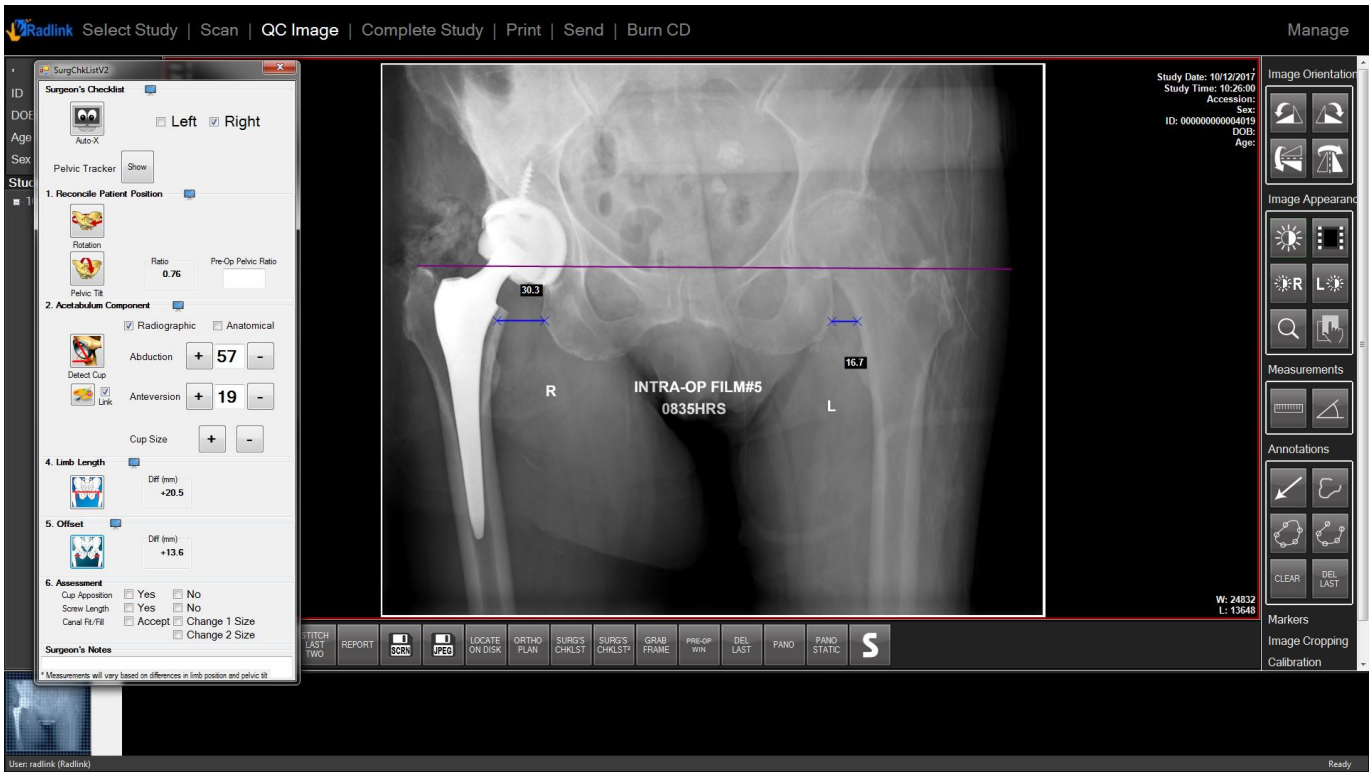
6. Click button under Limb Length section, and click landmark points as instructed.



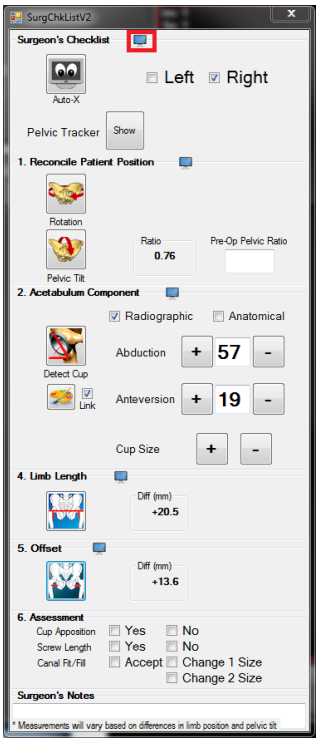


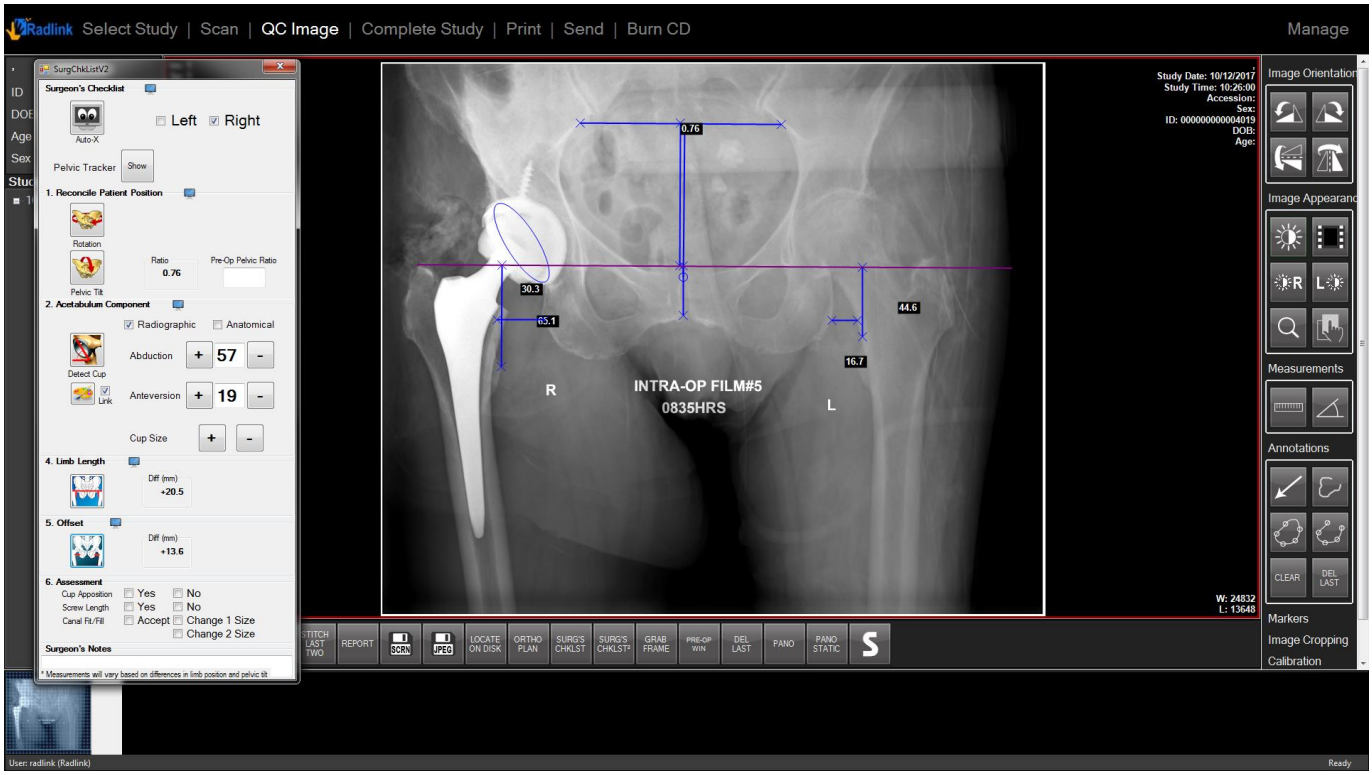
Hip
Auto-X²

7. Click button under Offset section.



8. Click as instructed below to show all detected landmarks.

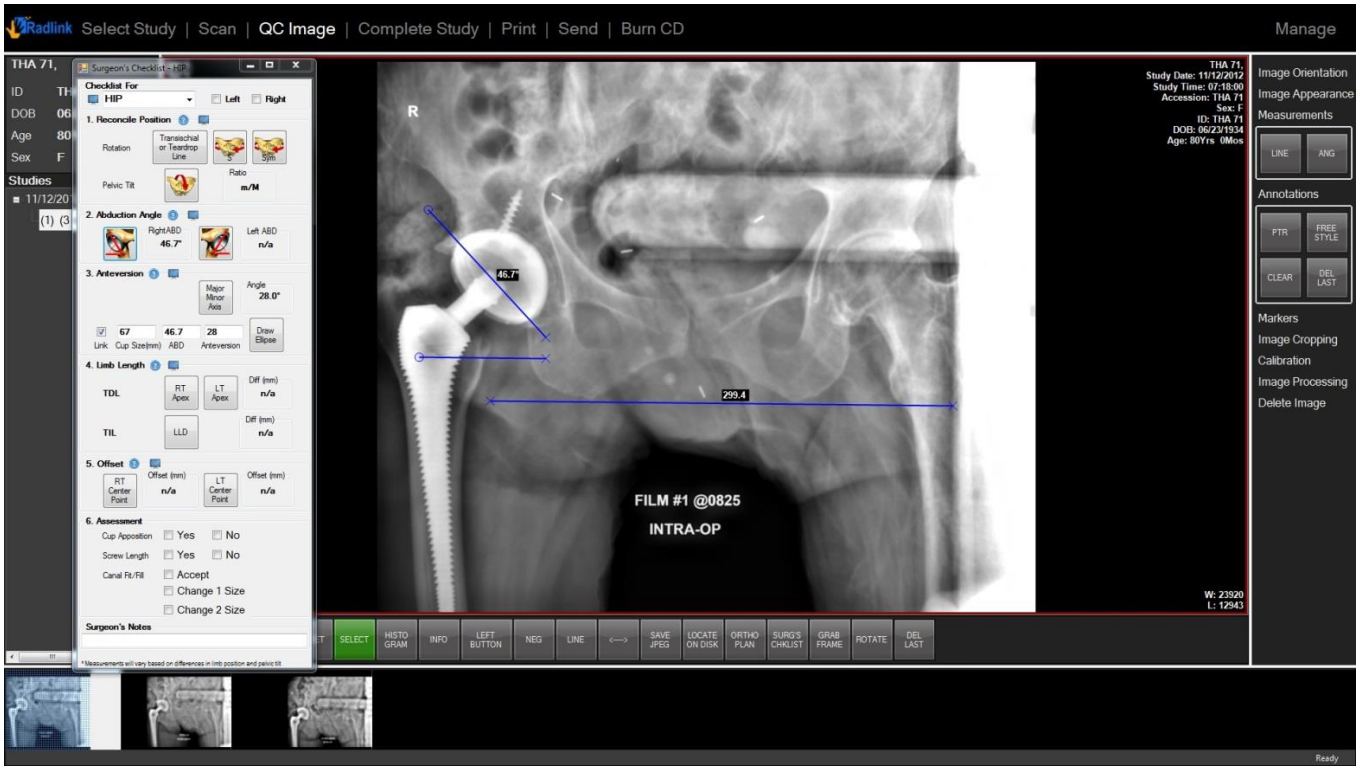




Hip

- **Abduction Angle**

1. Click the *Right or Left ABD* button according to the side of the cup.
2. Adjust the upper side to match the major axis of the cup and measure the angle

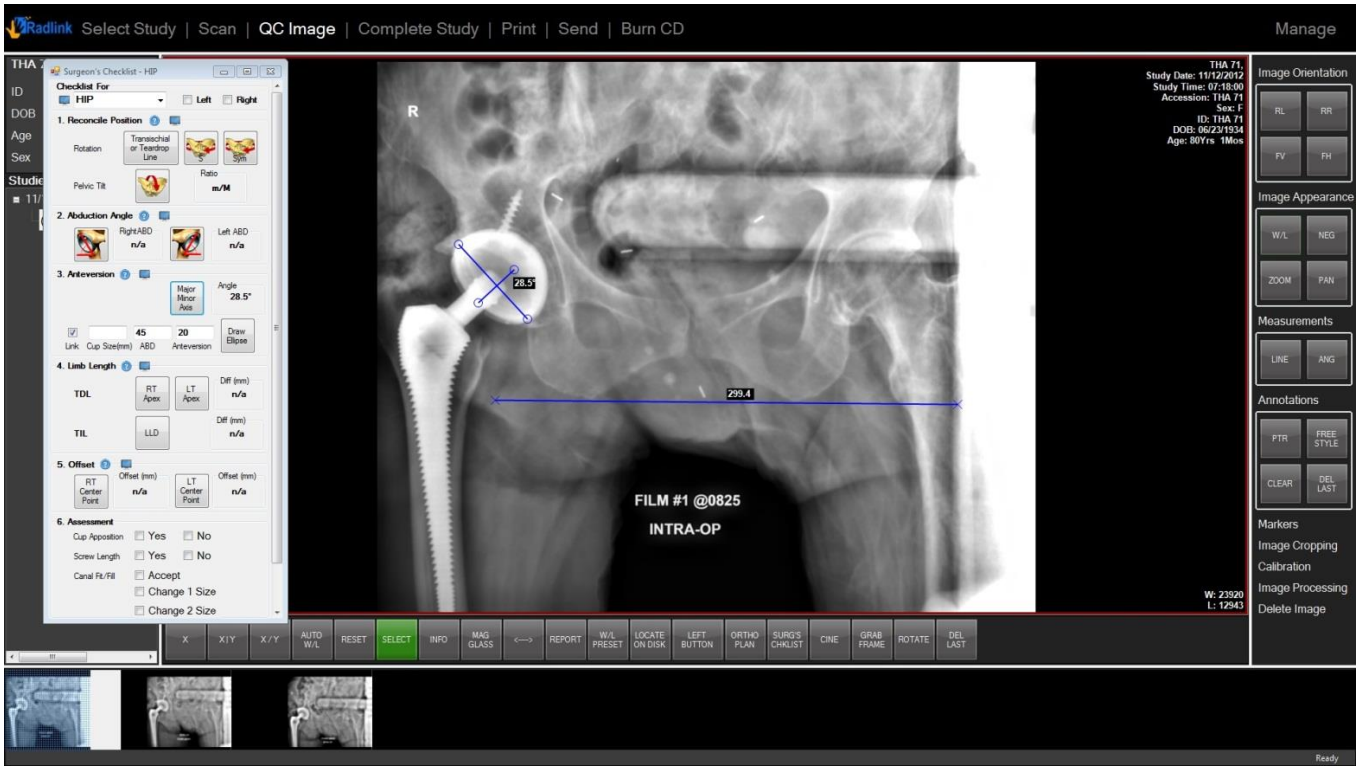


Note: Bottom side is parallel to the *Transischial or Teardrop Line.*

Hip

- **Anteversion**

1. Click *Major Minor Axis* button, draw the approximate major axis and minor axis of the cup.



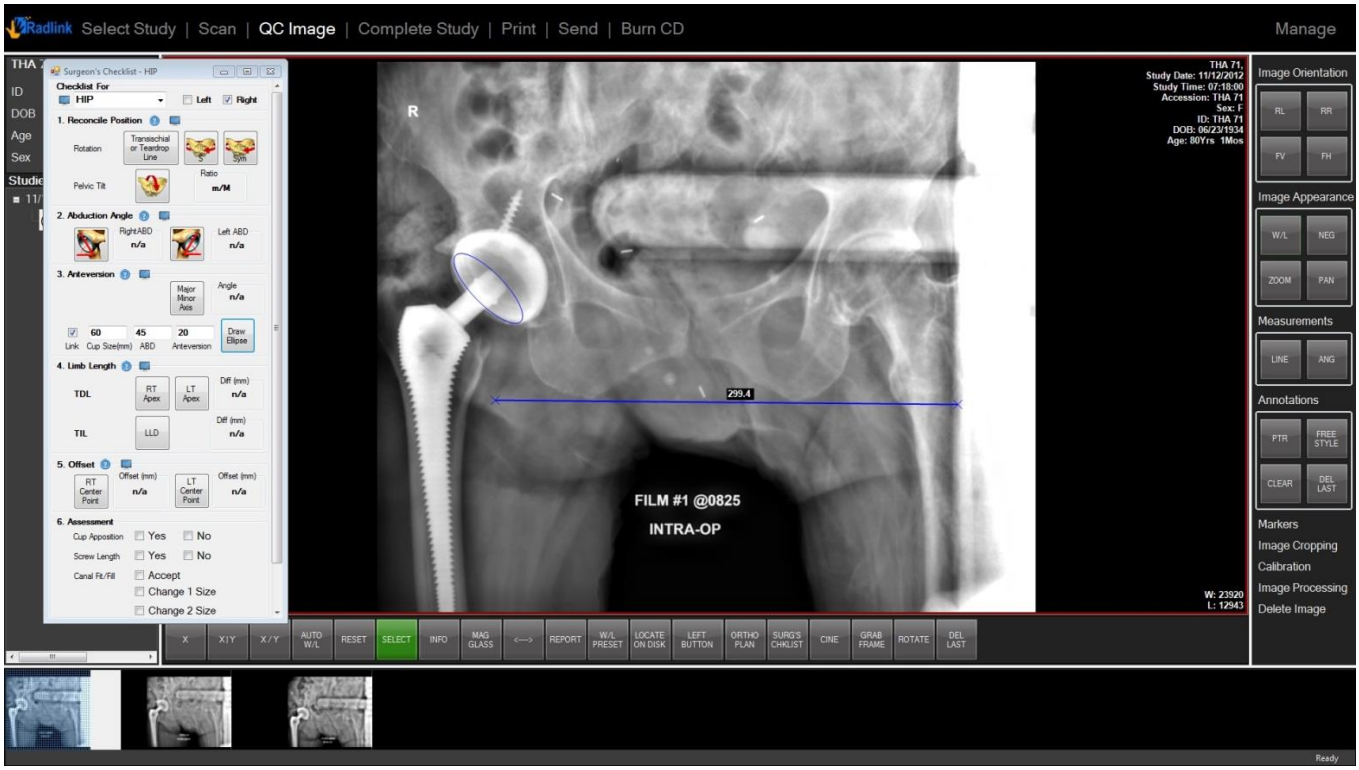
Software will calculate the anteversion angle of the cup.

Hip

- **Anteversion**

2. Enter the desired cup size and angle in *Cup Size(mm), ABD, Anterversion* section.

3. Click *Draw Ellipse* button.



Software will generate an ellipse according to the data that user put in. So that doctors could adjust the cup position to match the ideal ellipse shape.

Note: Only one ellipse can be drawn on the image.

4. There is an option ***Link*** at the left of the section.

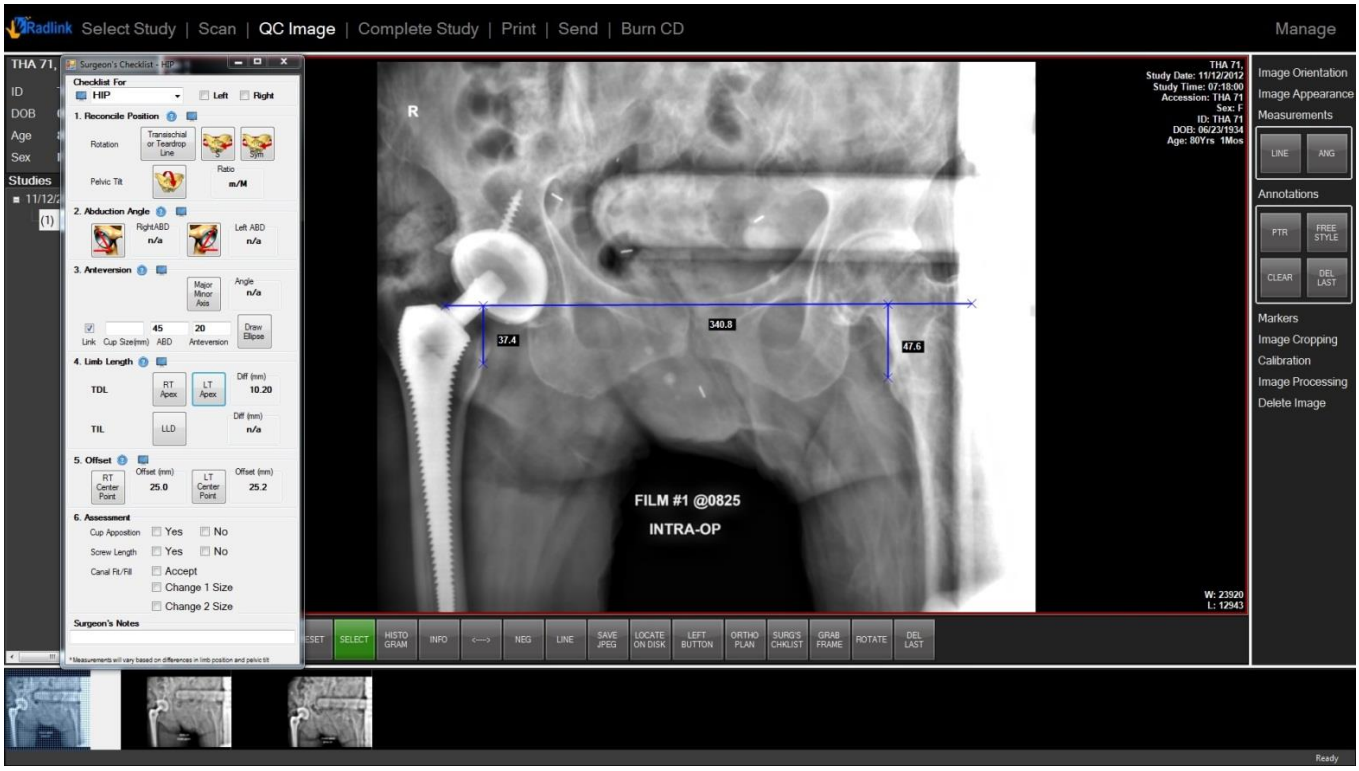
Checking this option will enable the ellipse on the current image to display on every image of the series that has **Link** option checked.

Uncheck the link to detach the current image from the linked group. User can then change the ellipse without affecting other images.

Hip

- **Limb Length TDL**

    1. Click *RT Apex* button, then click the bone apex (lesser trochanter) of the right leg
    2. Click *LT Apex* button, then click the bone apex (lesser trochanter) of the left leg

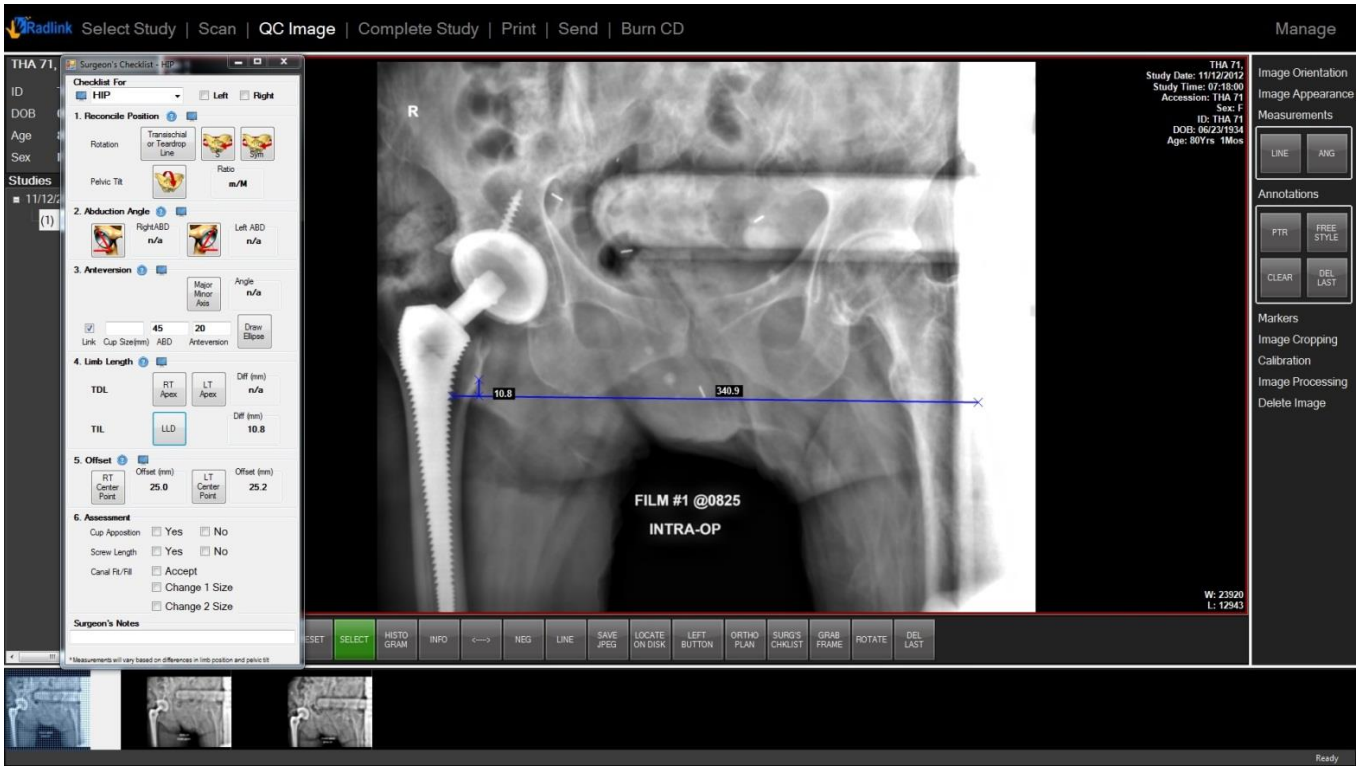


Difference of the leg length will be calculated in millimeter.
Note: the measurement lines are automatically set to be perpendicular to the *Transischial or Teardrop Line*

Hip

- **Limb Length TIL**

1. Click *LLD* button, according to the point that Transischial line touched on one lesser trochanter, click same point on the opposite lesser trochanter.

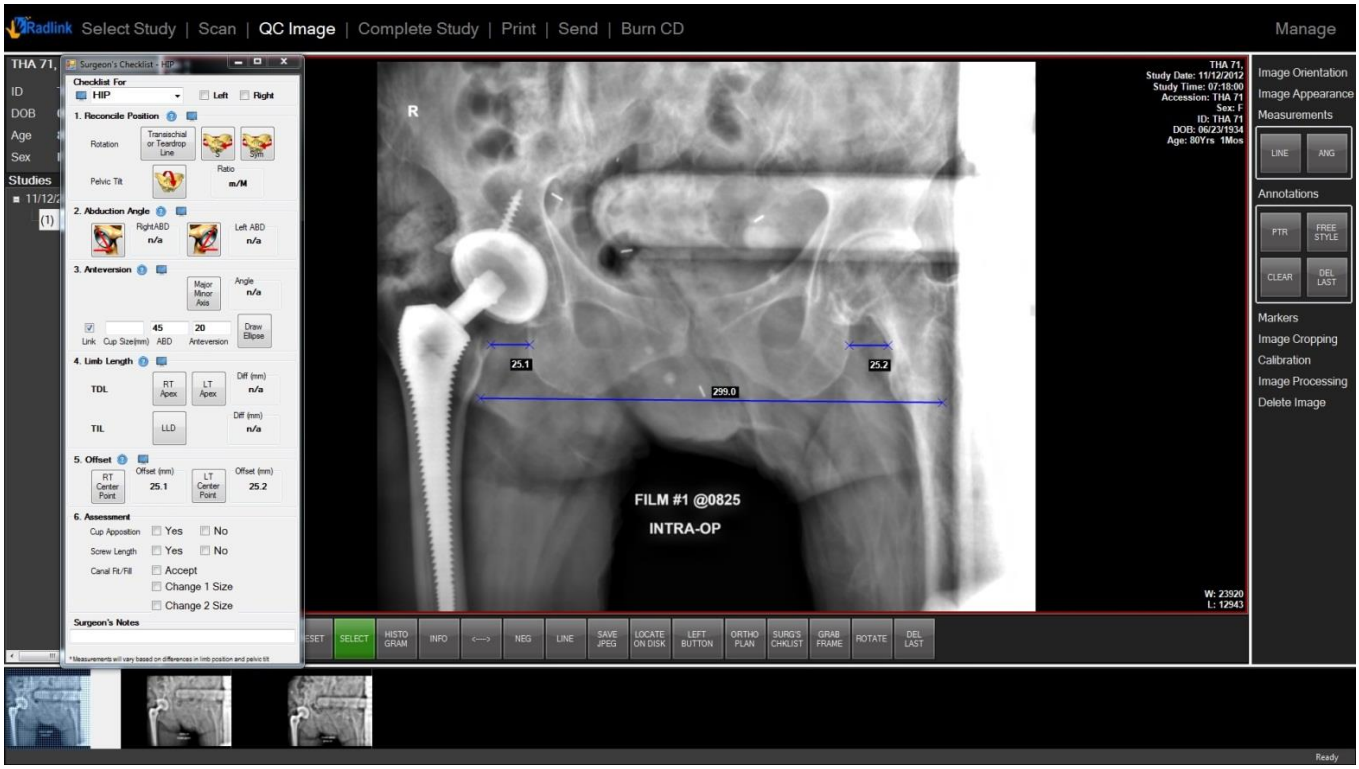


Hip

- **Offset**

1. Click *RT Center Point* button, then click the middle between the bones of leg and pelvis. Adjust the two endpoints of the line to the exact edge of the bones.

2. Click *LT Center Point* button, then draw the line same as step 1 with the same distance away from the Transischial or Teardrop Line

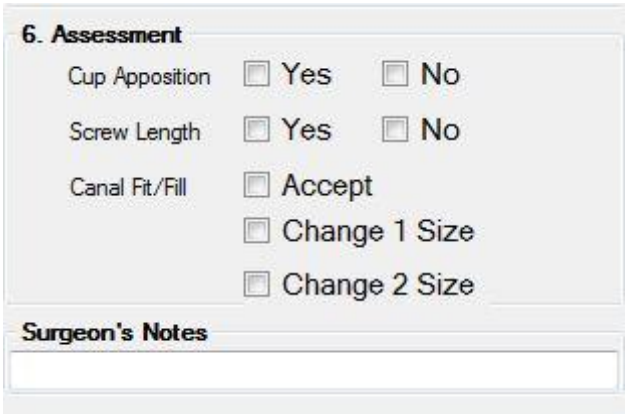


Note: Offset measurements lines are parallel to the *Transischial or Teardrop Line*.

Hip

- **Assessment**

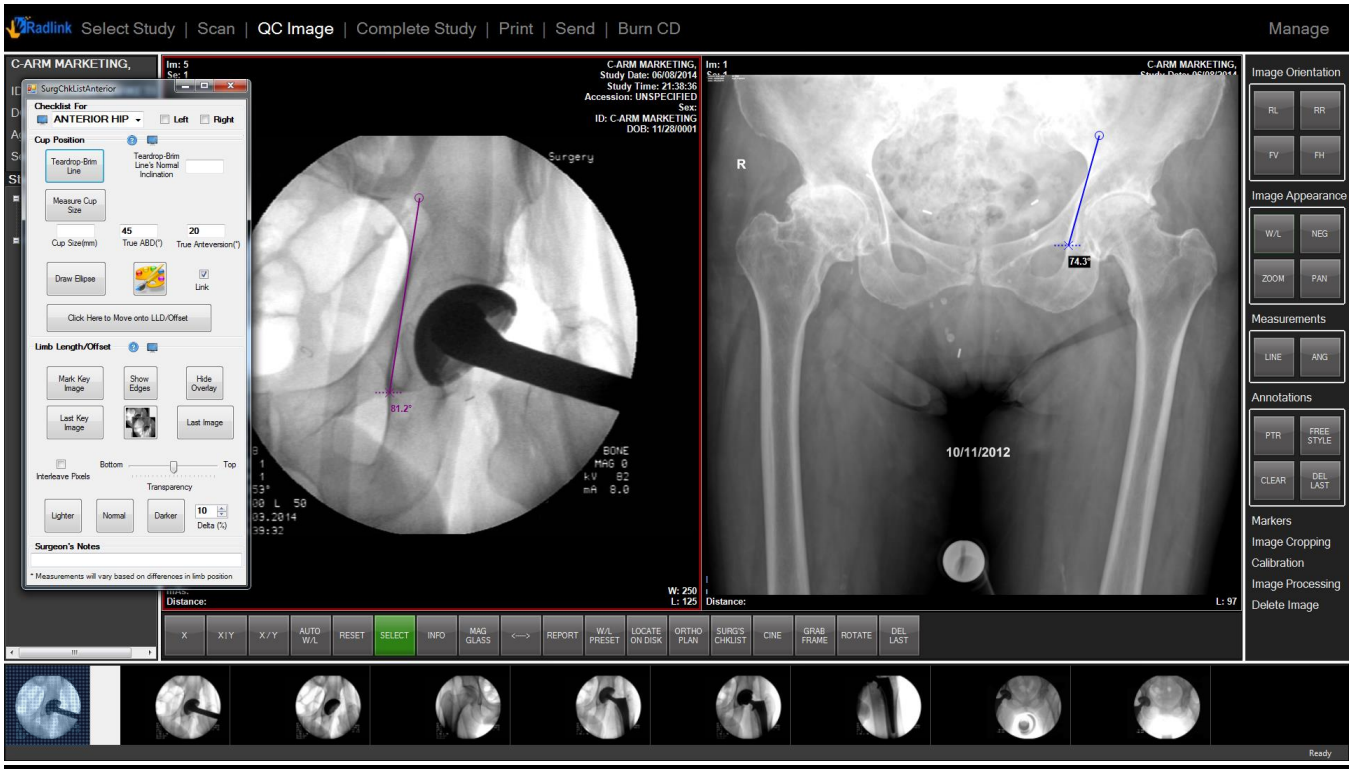
1. Checkmark Cup Apposition once verified by surgeon
2. Checkmark Screw Length once verified by surgeon
3. Checkmark Canal fit/fill once verified by surgeon
4. Type in notes if necessary



Anterior Hip

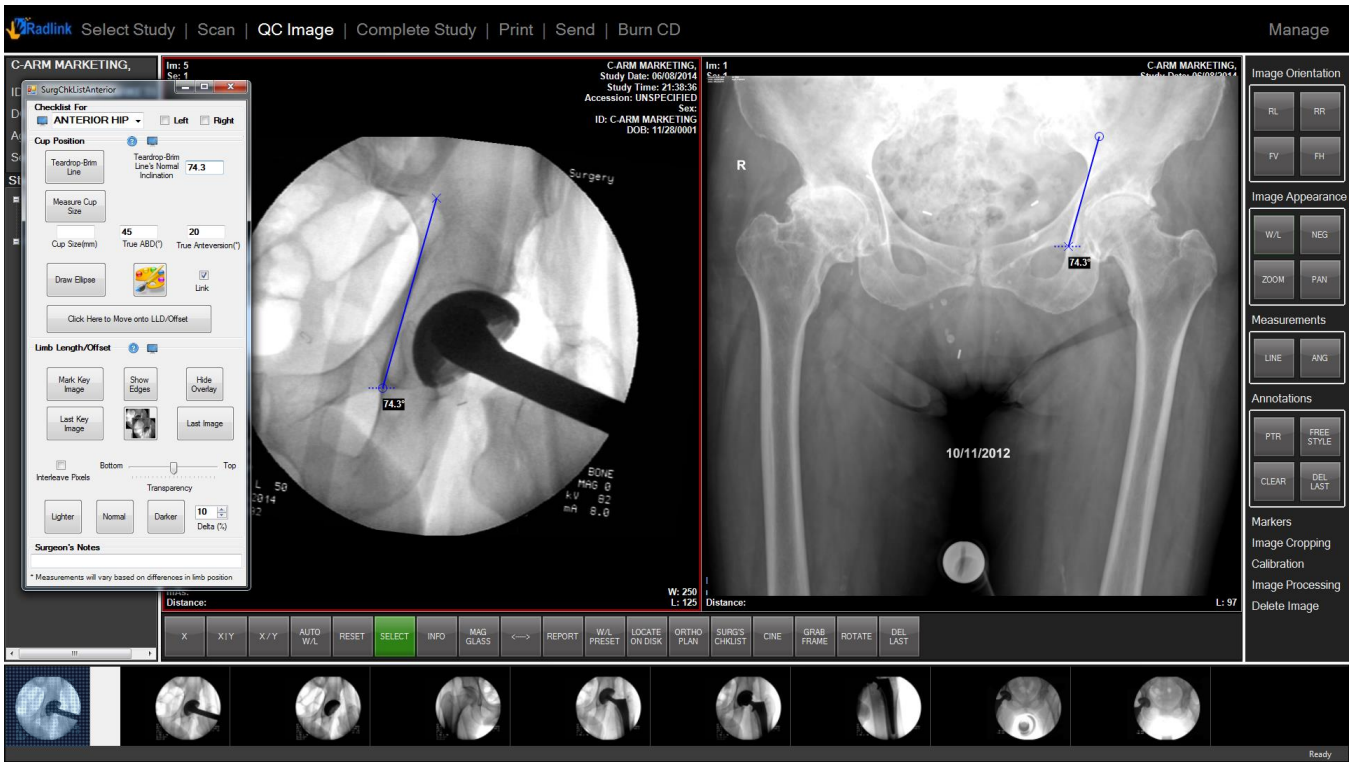
- **Cup Position**

1. Click X|Y button and bring up the pre-op image side to side
2. Click *Teardrop-Brim Line* button and draw ilioischial line on both images



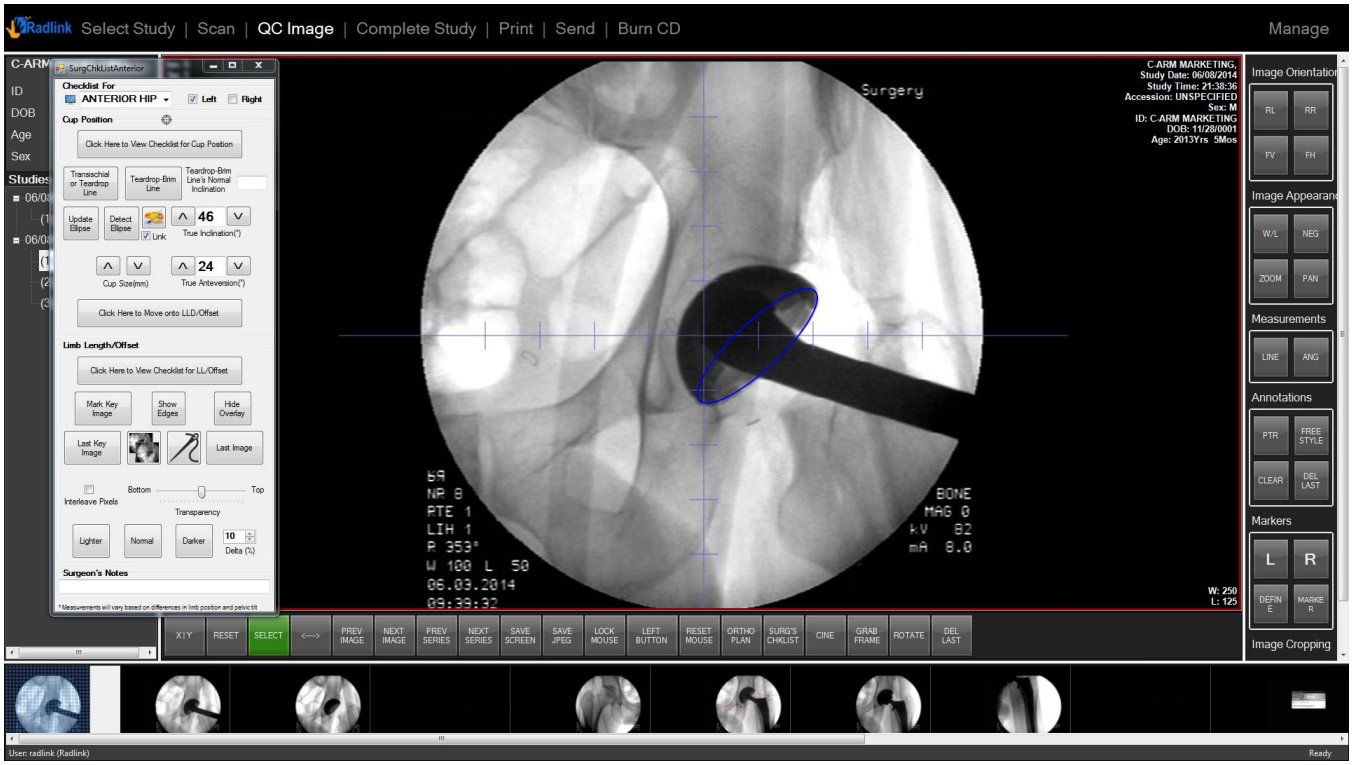
Anterior Hip

3. Enter ilioischial angle from pre-op image in the *Teardrop-Brim line's Normal Inclination*. Image will rotate so that horizontal line is now parallel to inter-tear drop line
4. Check left or right box to match left or right THA case



Anterior Hip

5. Click *Draw Ellipse* button, an ellipse will appear based on the input True Inclination and True Anteversion value.
6. Click *Detect Ellipse* button. Left click on the cup's edge to locate three best points to form an ellipse. Software will automatically create an ellipse based on the three points, True Inclination and True Anteversion angles will be generated as well.
7. Click the *drawing board* to change color of the ellipse.
8. Click *Click Here to Move onto LLD/Offset* to create a new series of study.

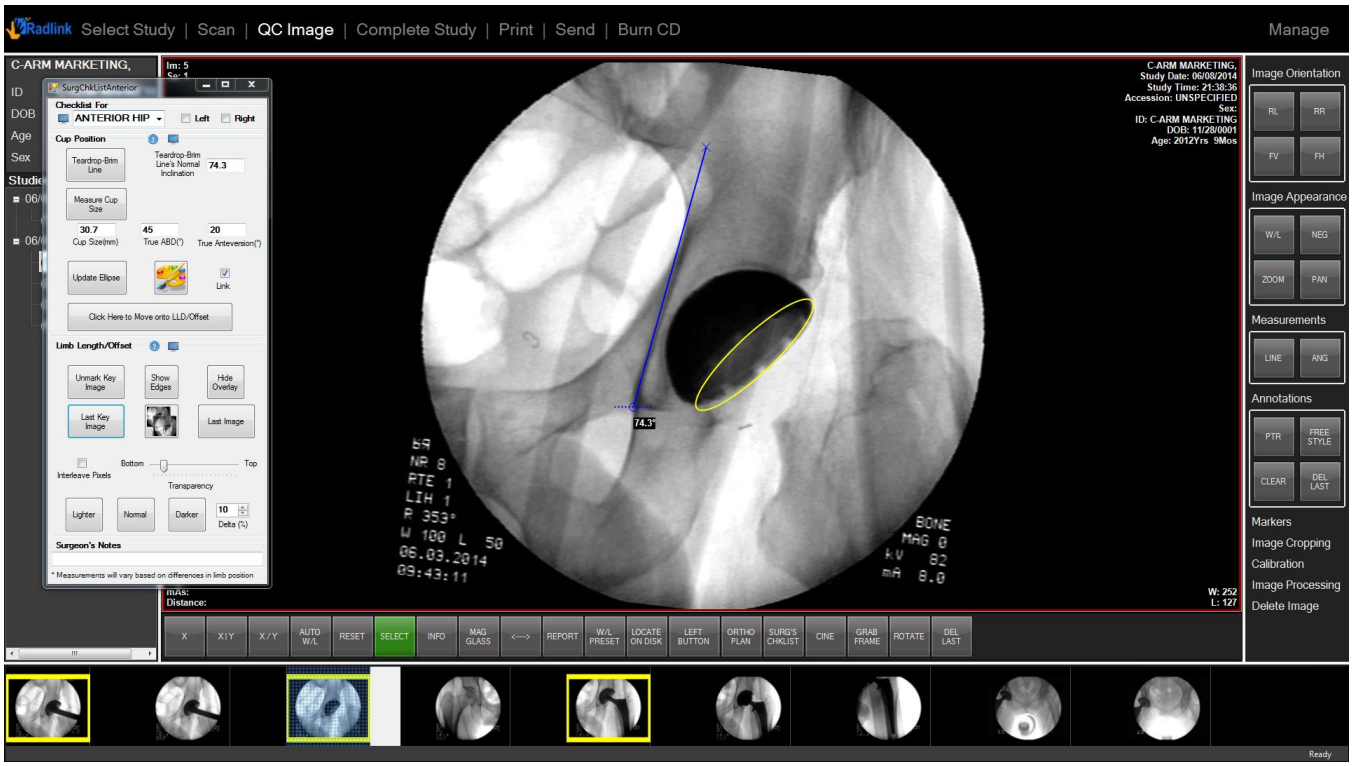


Note: There is a bullseye button at the top. Click it will bring out two axes and some marks for location assistance.

Anterior Hip

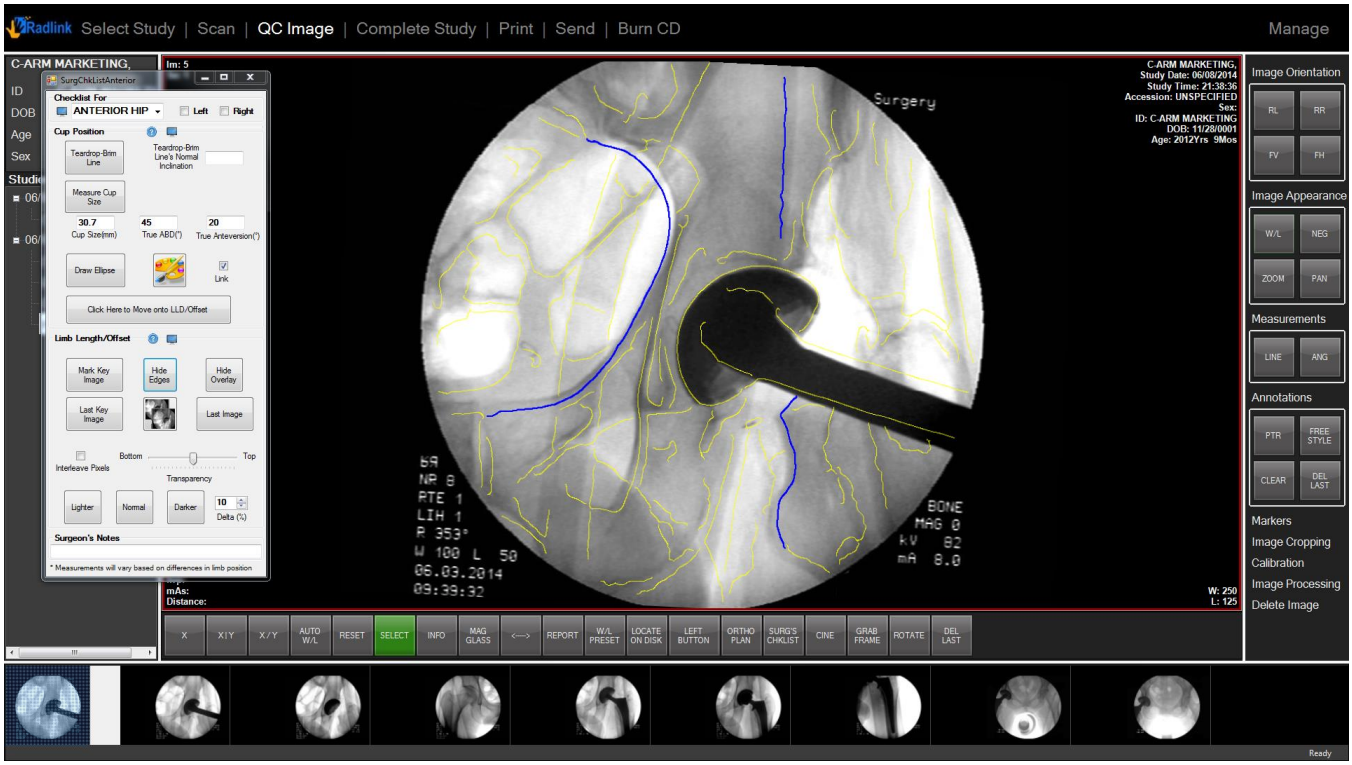
- **Limb Length/Offset**

  1. Click Mark Key Image, current image will be marked as key image. Click again to unmark it.
  2. Click Last Key Image, software will jump to the last key image in this series.
  3. Click Last Image, software will jump to the last image in this series.



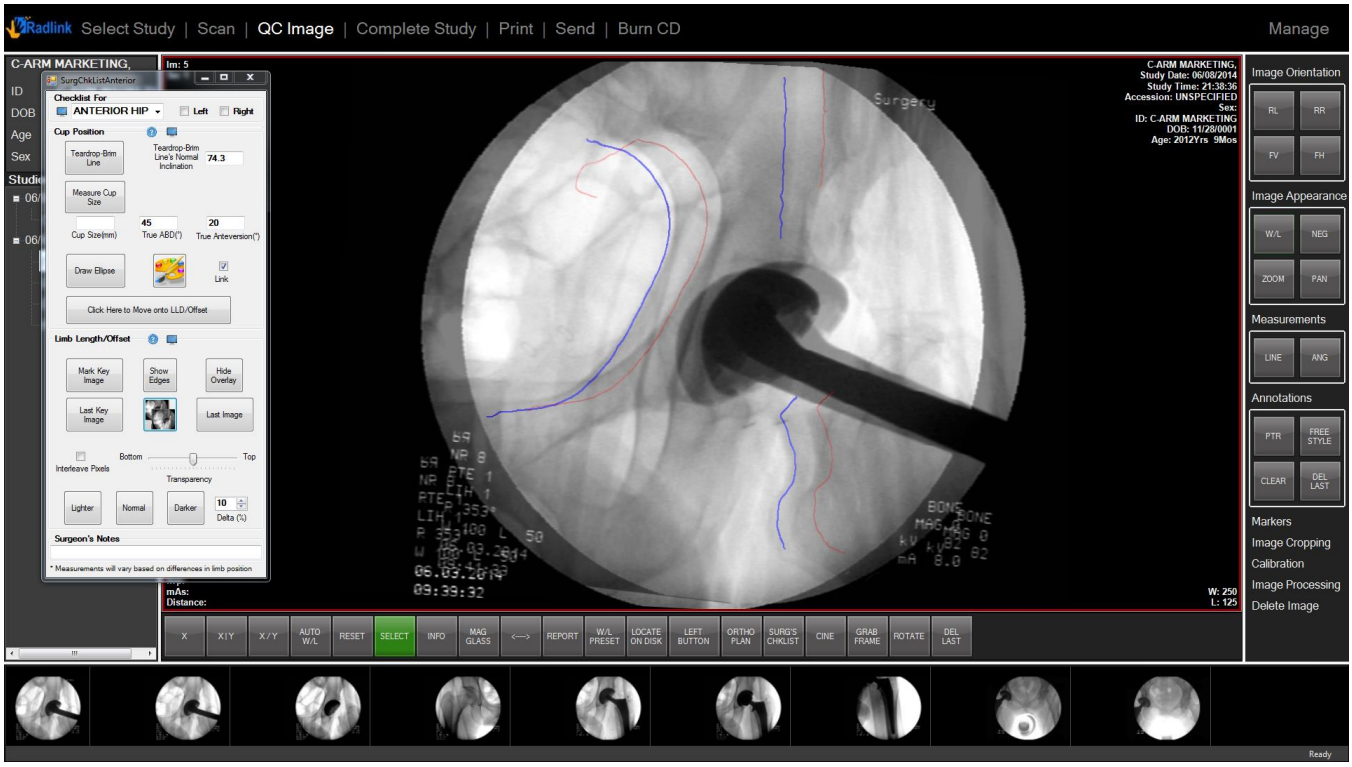
Anterior Hip

4. Click *Show Edges,* software will automatically detect possible edges and mark them with yellow.
5. Click the desired edges and they will turn to blue.
6. Click *Hide Edges,* only the blue edges will be kept.



Anterior Hip

7. Click the button in the middle with two images overlaying. Select desired image.
8. Set operative image on top and move it around to determine LLD and offset. All the marks on that image will be carried over as red color. Use Hot Keys to do micro adjustments.
9. Click *Hide Overlay* to hide the image on top.
10. Level of transparency of overlaid image can be adjusted.

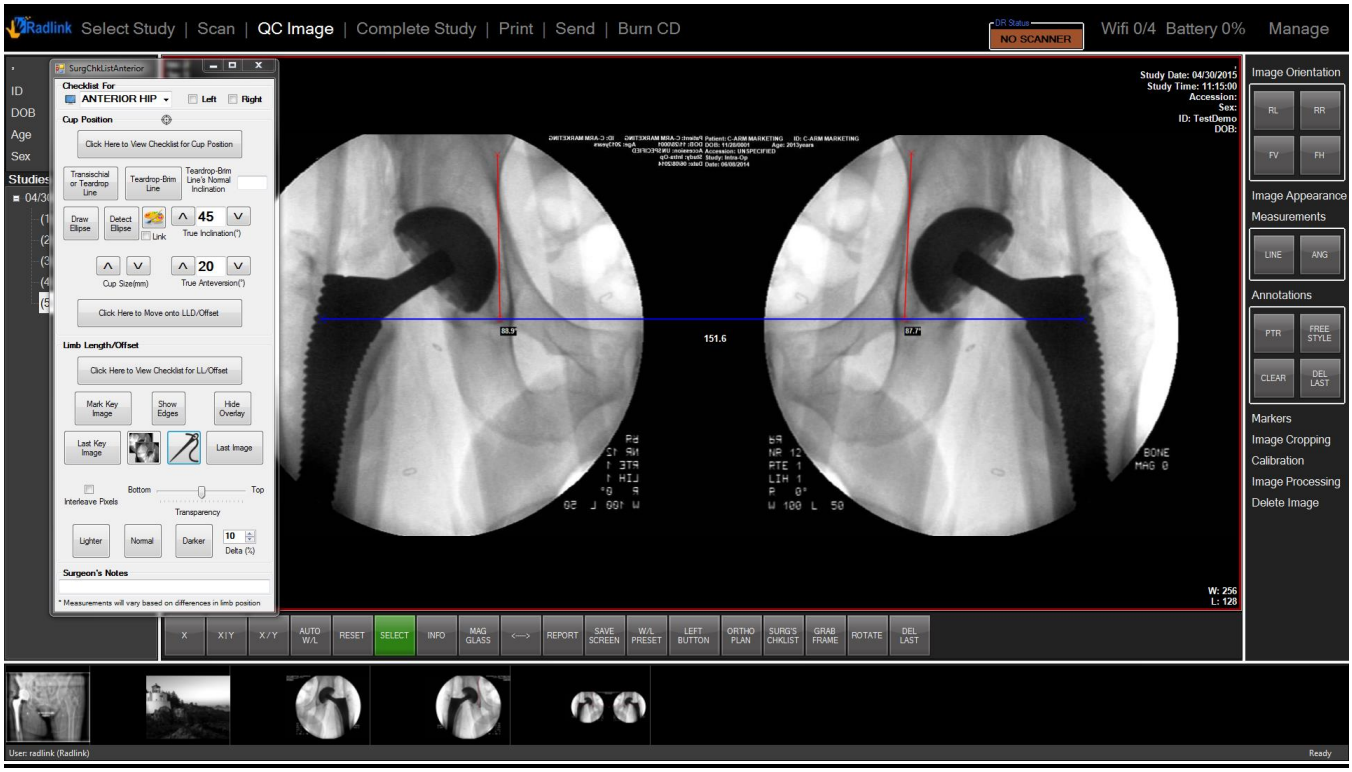


Hot keys:
Page up/ Page down – rotate overlaid image clockwise/counter clockwise
Up/ Down – move overlaid image up or down
Left/ Right – move overlaid image left or right
+/- – change transparency of the top image

Anterior Hip

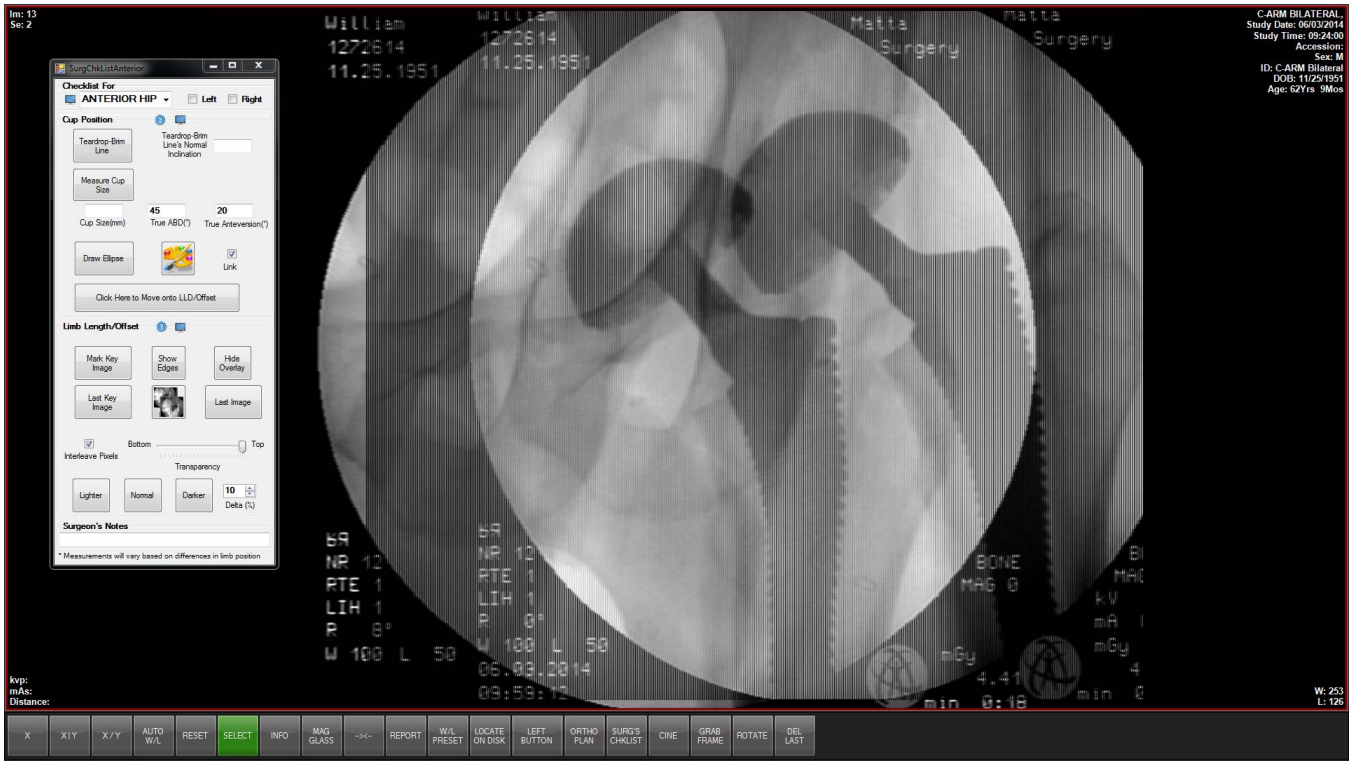
11. Stitching C-arm images.

    1) Draw teardrop-brim lines for both hip on the pre-op image
    2) Draw the corresponding teardrop-brim line on each of the two c-arm image. Make sure the line ends at the end of the teardrop.
    3) Stitch. The software will align the center of the teardrops horizontally.



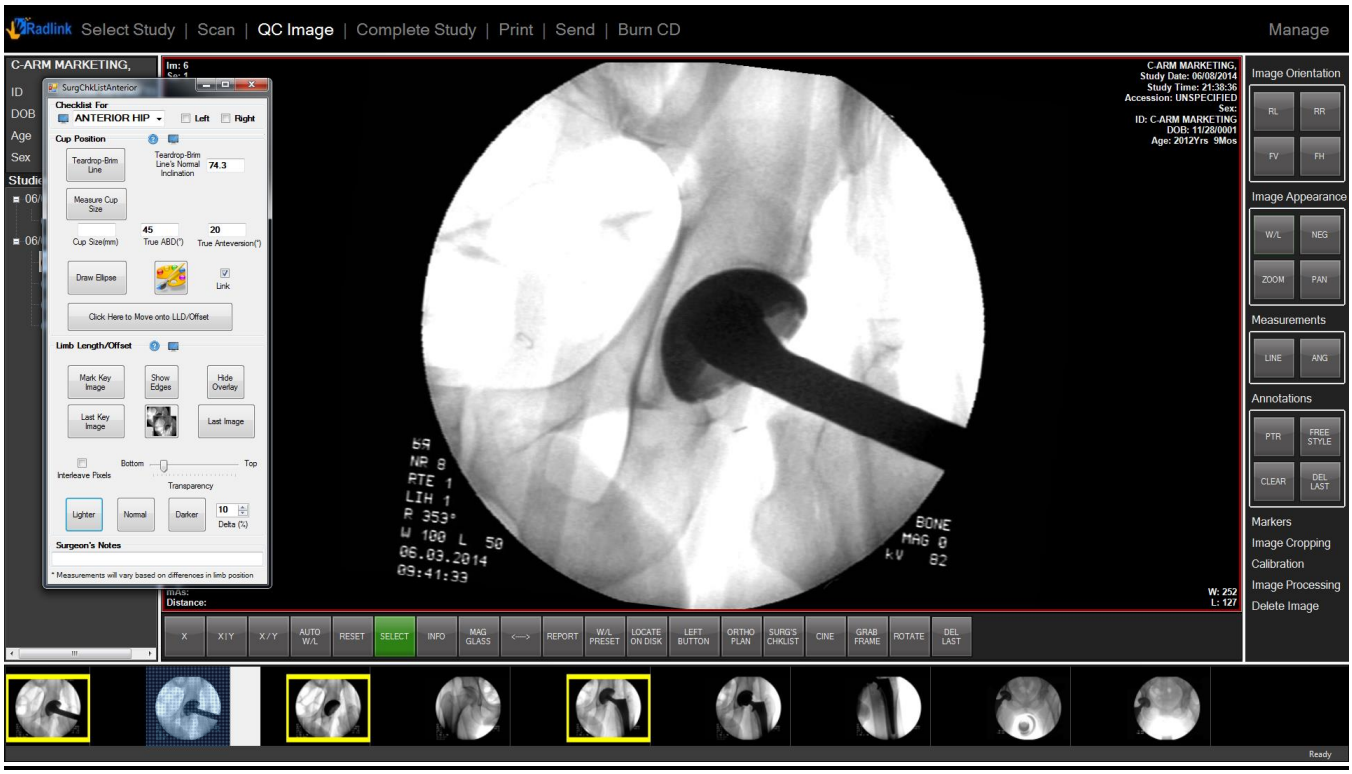
Anterior Hip

12. Check *Interleave Pixels,* the overlaying image at the top will only display pixels at odd columns.
13. Uncheck *Interleave Pixels to* go back to regular image overlay.



Anterior Hip

14. Click Lighter, image will become Delta% lighter
15. Click Normal, image will go back to normal brightness
16. Click Darker, image will become Delta% darker



Delta percentage can be altered to increase or reduce brightness changing rate.

Knee

- **AP VIEW**

1. Click *Tibia-Femoral Axis* button
2. Draw a line along the femur
3. Draw a line along the tibia

Software will tell the angles for the two lines to reach parallel.

Angle is displayed on both image and Checklist.

Knee

- **AP VIEW**

1. Click *Femoral Component* button
2. Draw a line along the femur
3. Draw a line along the intersection of the femoral component artificial joint

Software will tell the angles for the two lines to reach perpendicular.

Knee

- **AP VIEW**

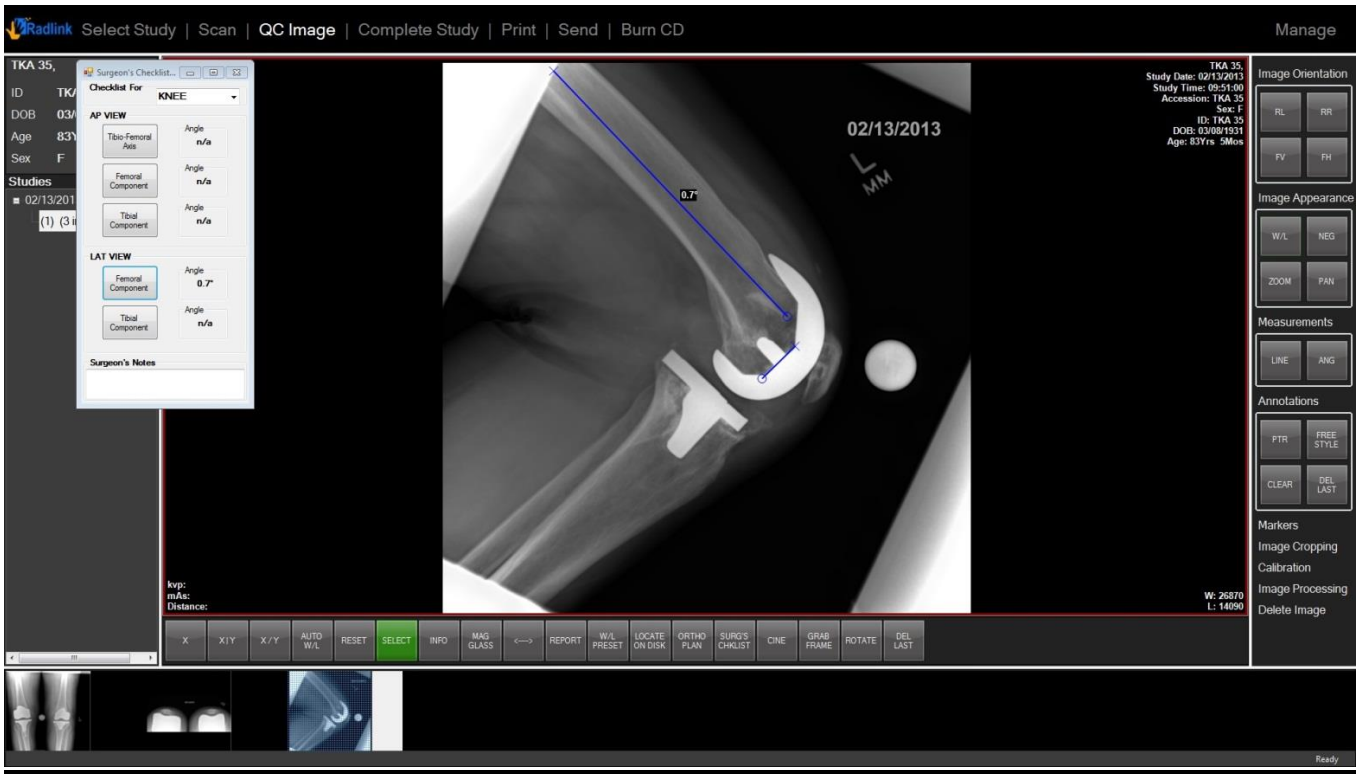
1. Click *Tibial Component* button
2. Draw a line along the tibia
3. Draw a line along the intersection of the tibial component artificial joint

Software will tell the angles for the two lines to reach perpendicular.

Knee

- **LAT VIEW**

1. Click *Femoral Component* button
2. Draw a line along the femur
3. Draw a line along the contact surface of femoral component and femur

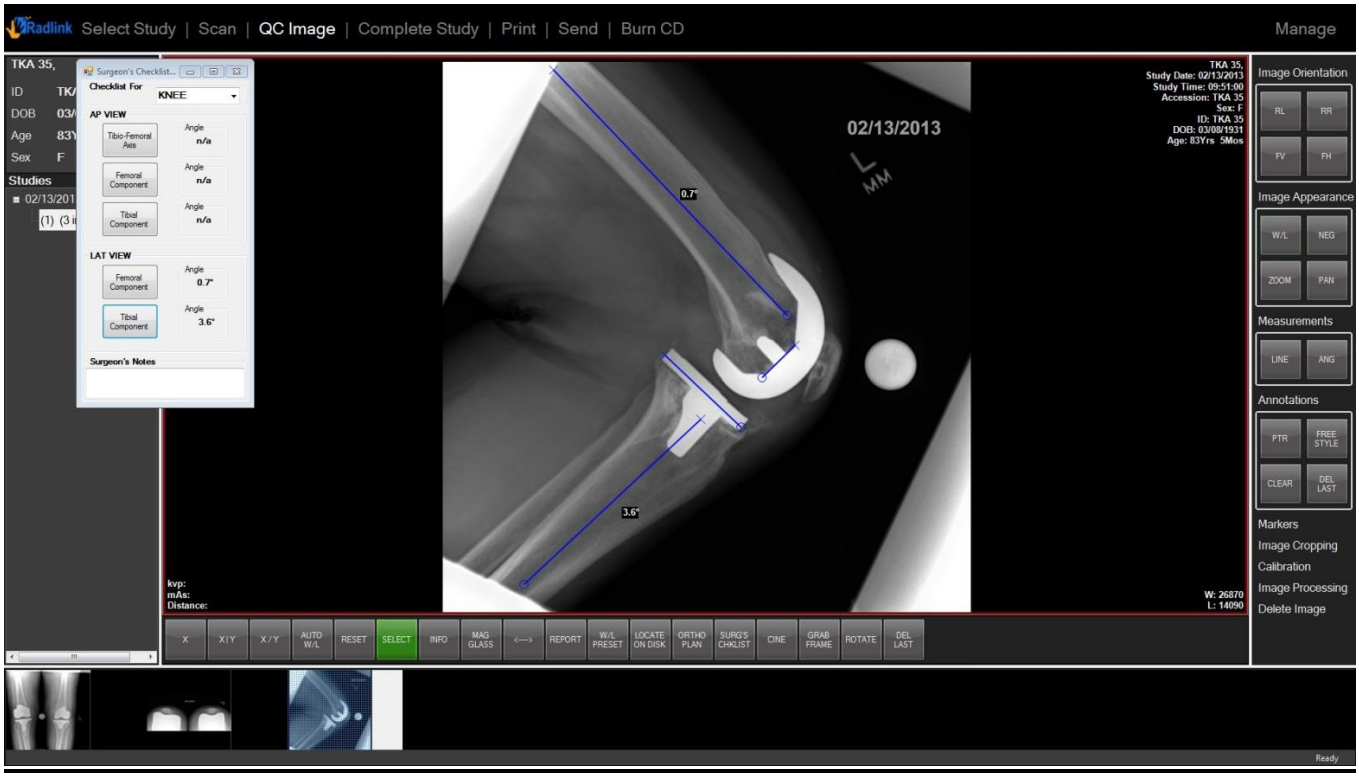


Software will tell the angles for the two lines to reach perpendicular

Knee

- **LAT VIEW**

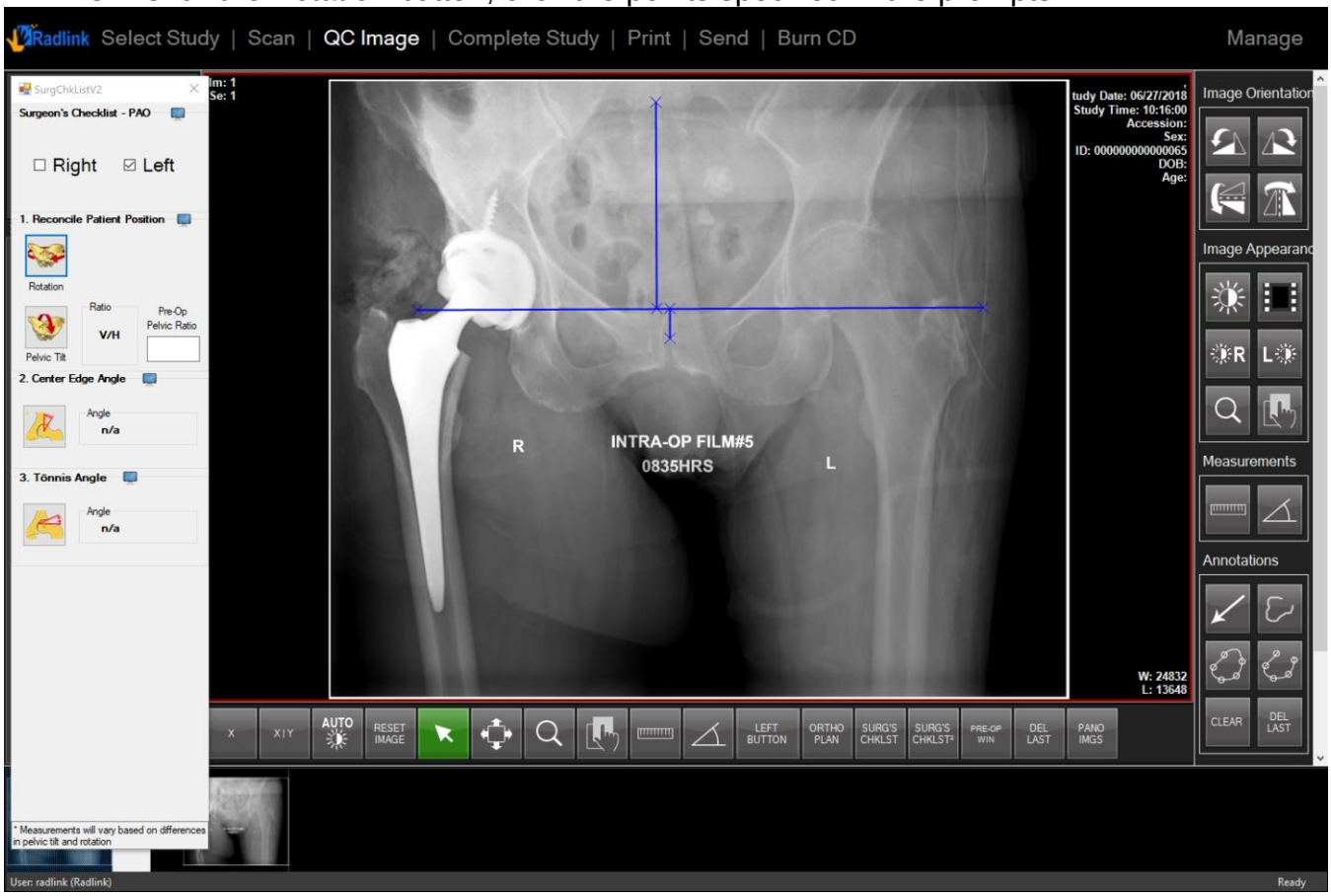
1. Click *Tibial Component* button
2. Draw a line along the tibia
3. Draw a line along the contact surface of tibial component.



Software will tell the angles for the two lines to reach perpendicular

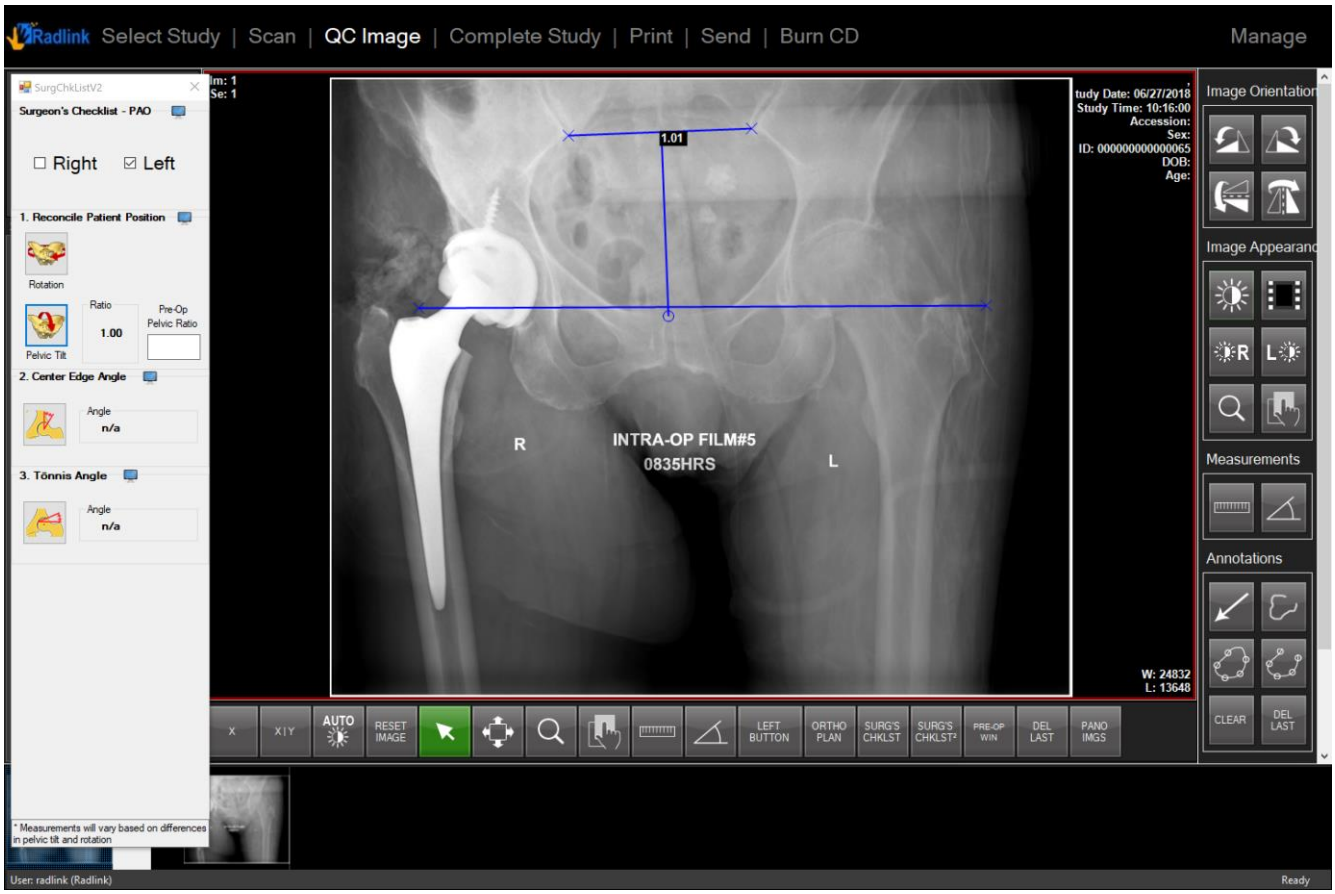
PAO Hip

1. Open Surgeon's Checklist[2] and select PAO.
2. Select the operating side and obtain the image.
3. Click the *Rotation* button, click the points specified in the prompts.



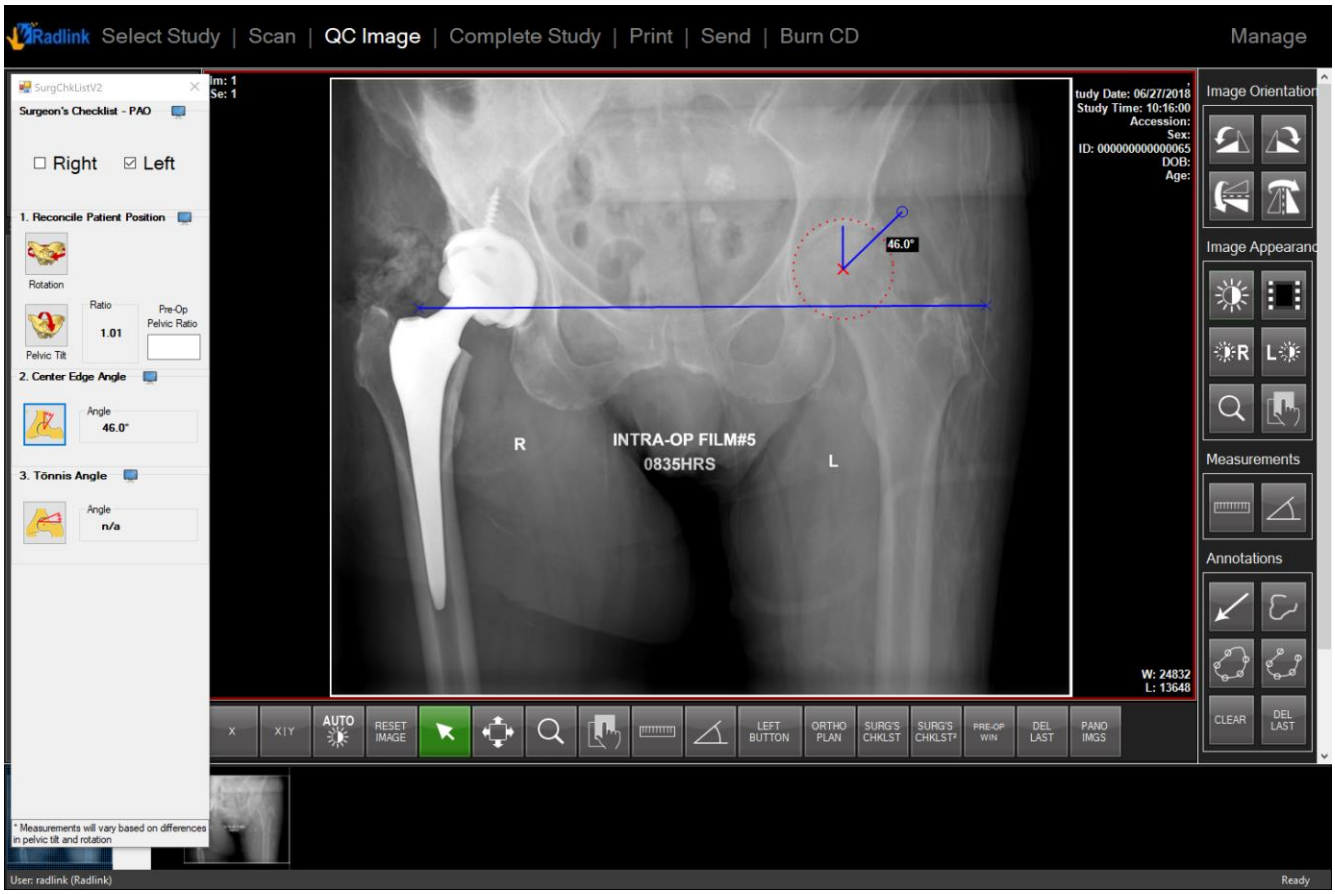
PAO Hip

4. Click the *Pelvic Tilt* button, draw lines from left to right then top to bottom of the pelvis.



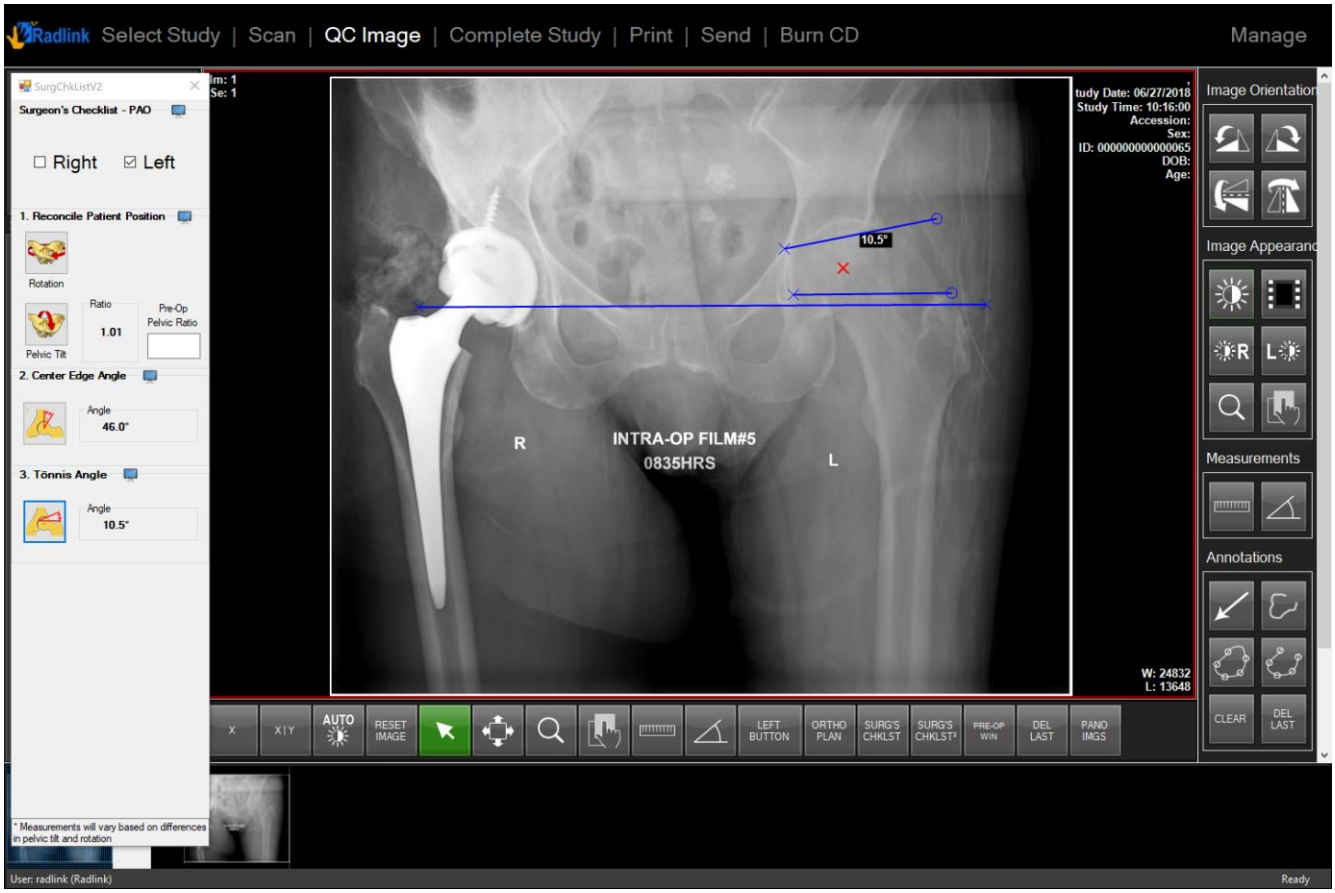
PAO Hip

5. Click the *Center Edge Angle* button, outline the socket with the circle and draw the angle line to connect with the outside sourcil endpoint.



PAO Hip

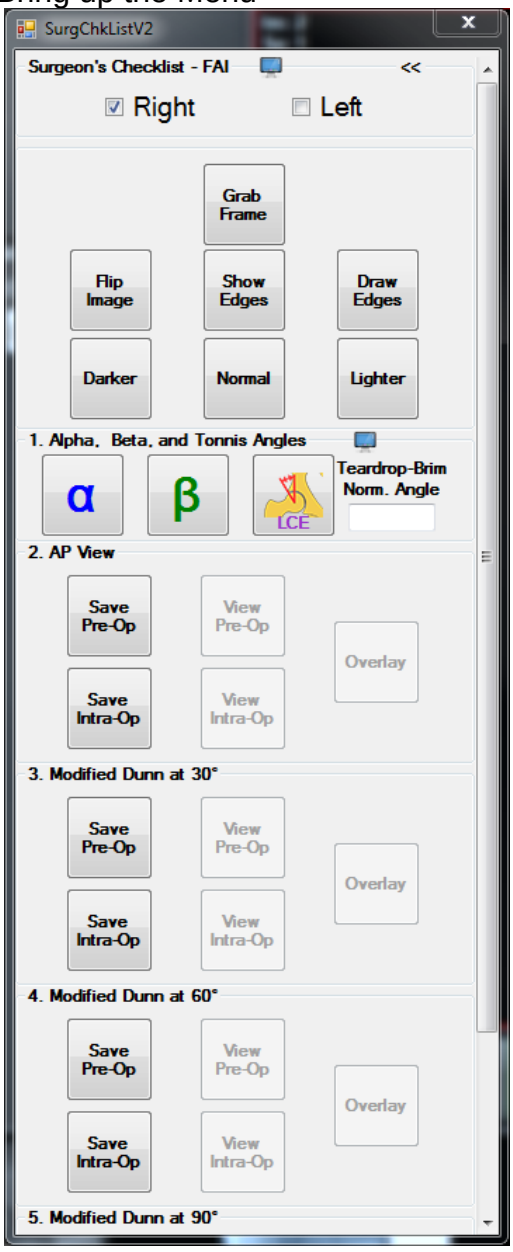
6. Click the *Tonnis Angle* button, draw the angle line to connect the two sourcil endpoints.



FAI HIP

1. Open Surgeon's Checklist[2] and select

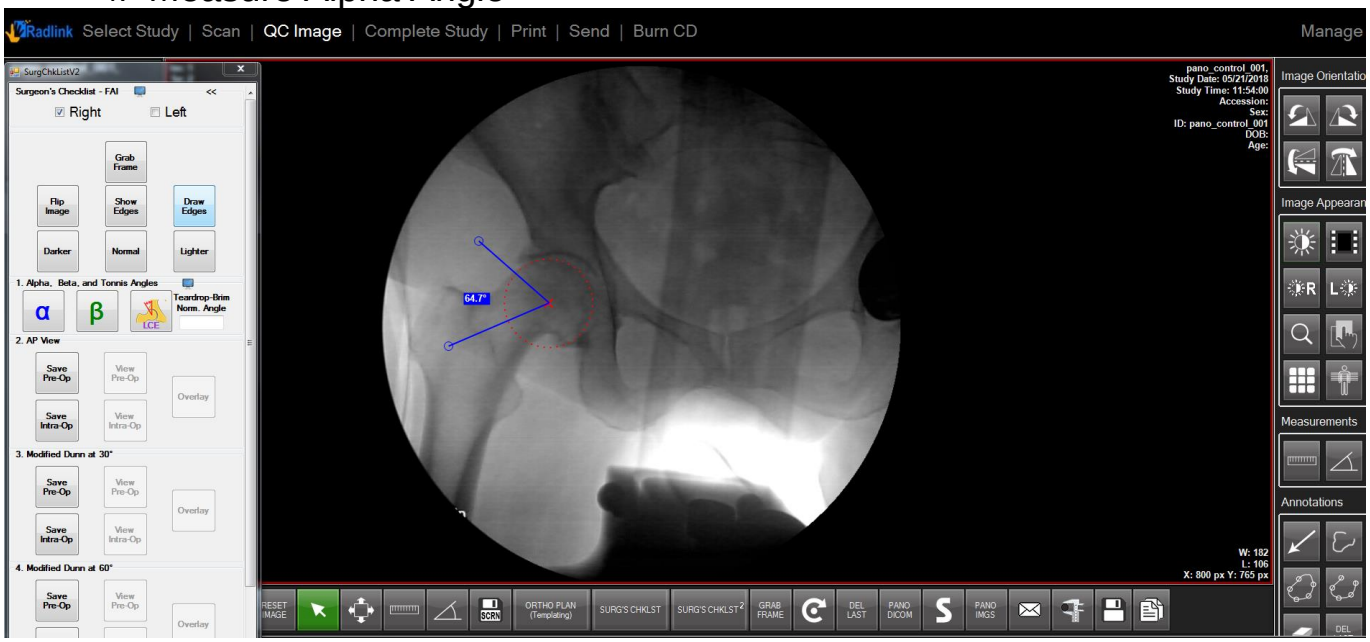
.
2. Select the operating side and obtain the image.
3. Bring up the Menu



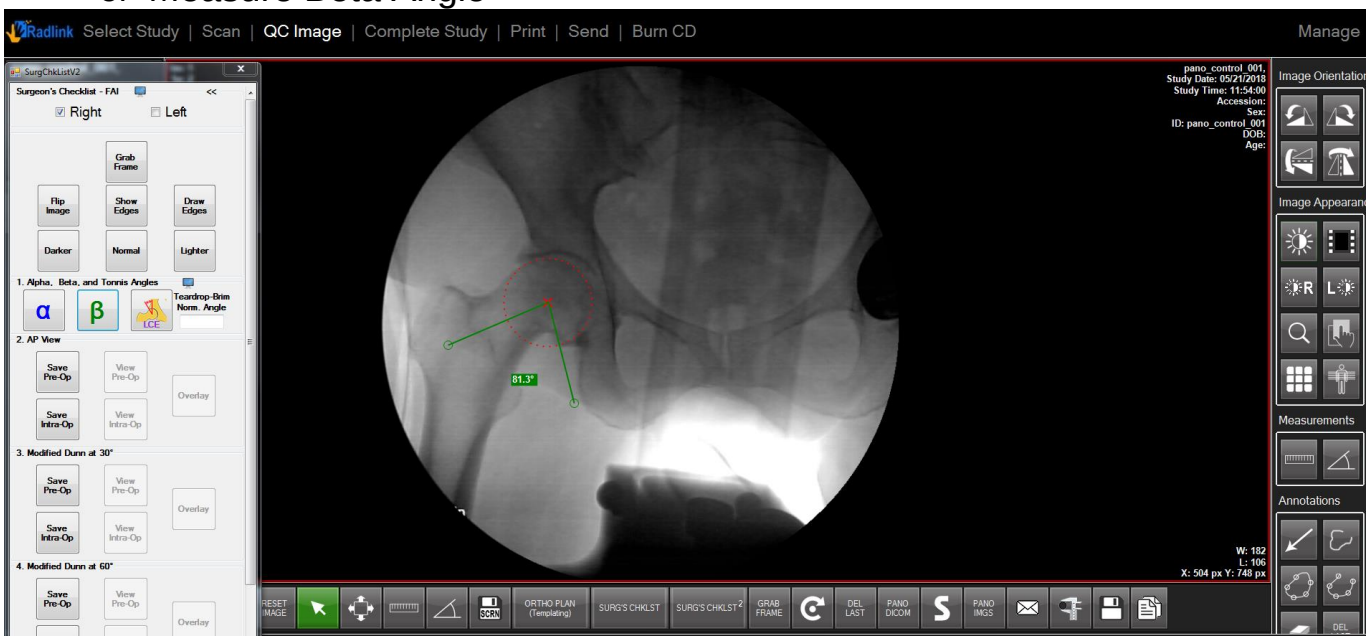
FAI HIP

Grab Frame: grab image from c-arm
Flip Image: flip image left and right
Show Edges: auto detect edges on the grabbed image
Draw Edges: manually draw lines to mark the edge
Darker, Normal, Lighter: adjust image brightness

4. Measure Alpha Angle

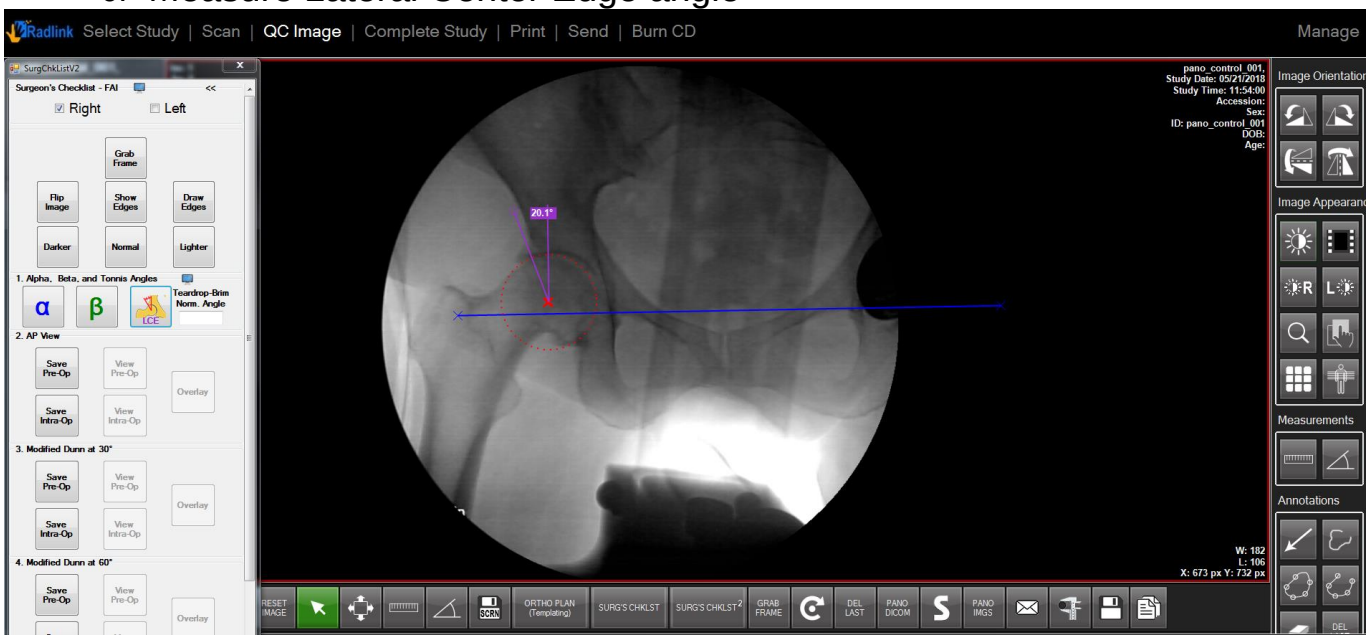


5. Measure Beta Angle



FAI HIP

6. Measure Lateral Center Edge angle



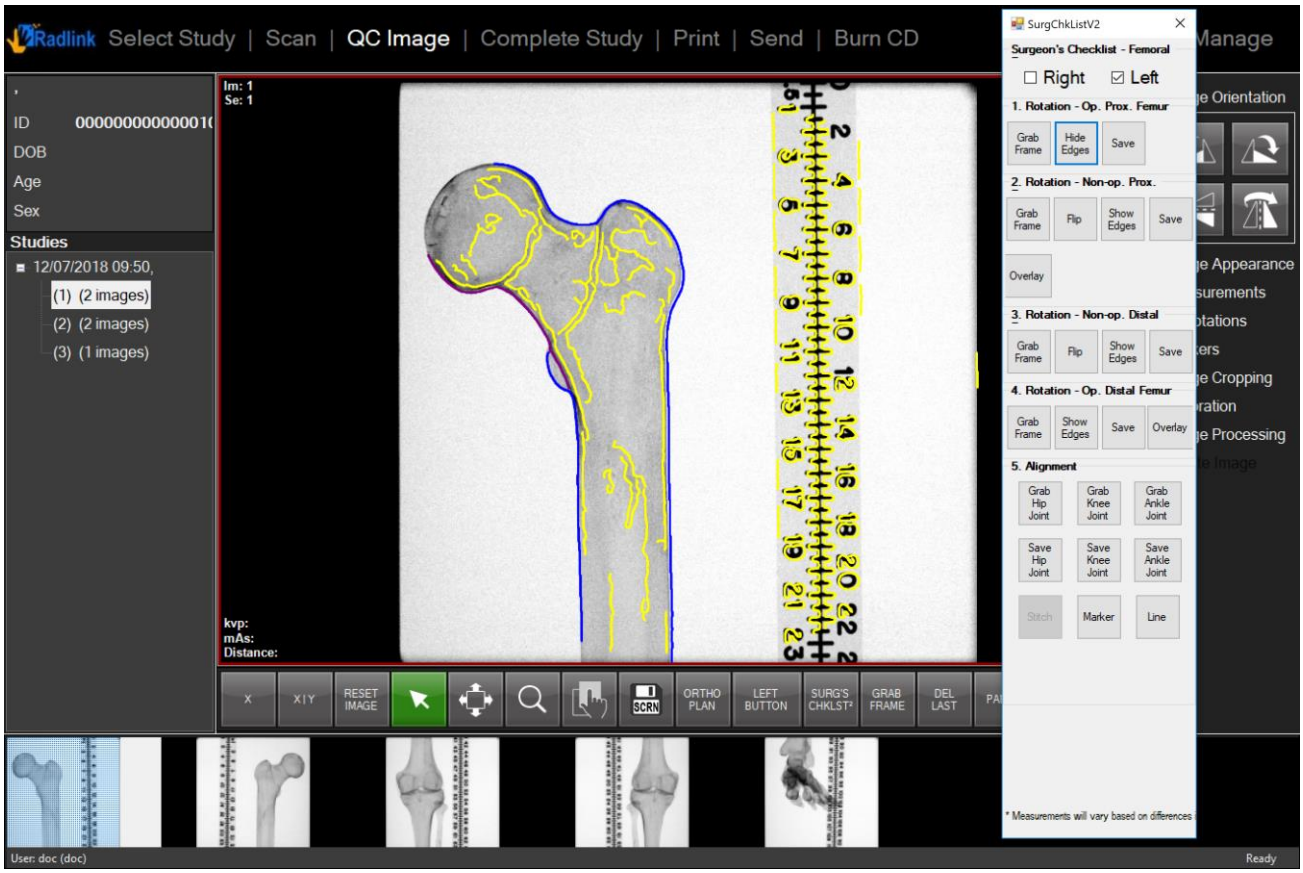
7. If there is ilioischial line drawn, user can input Teardrop-Brim line angle to adjust according to pre-op angle.

For different views: AP View, Modified Dunn at 30-degree, Modified Dunn at 60-degree, Modified Dunn at 90-degree

1. Take Pre-op shot and select image, Click Save Pre-Op
2. Take Intra-Op shot and select image, Click Save Intra-Op,
3. Click View Pre-Op or View Intra-Op to view the saved image
4. Overlay the two images to compare.

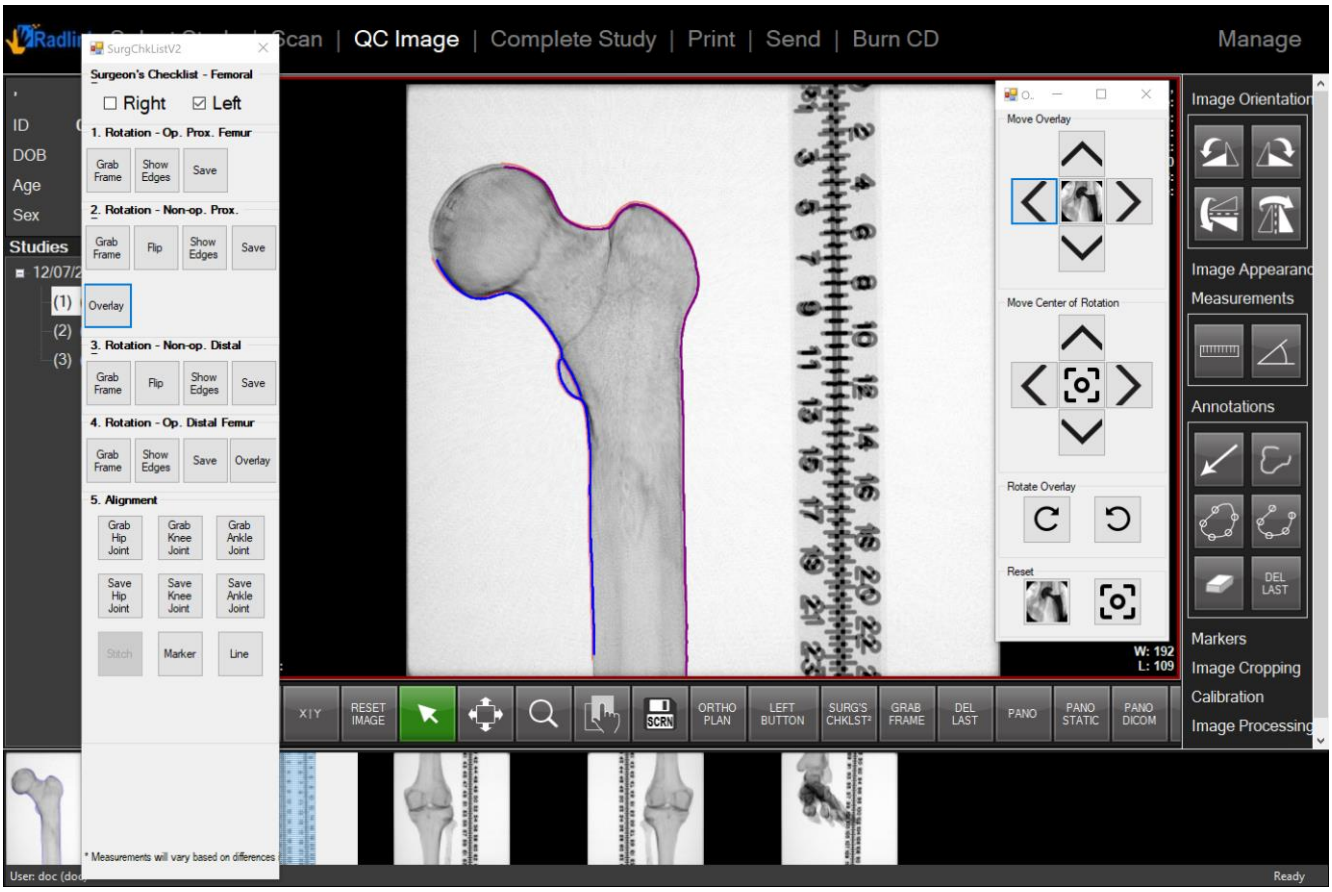
Trauma Femoral/Tibial Fracture

1. Select Intra-Op Trauma Femoral/Tibial Fracture workflow
2. Obtain image of operative proximal femur/tibia.
3. Click Show Edges and select edges for reference around the ROI. Click Save.



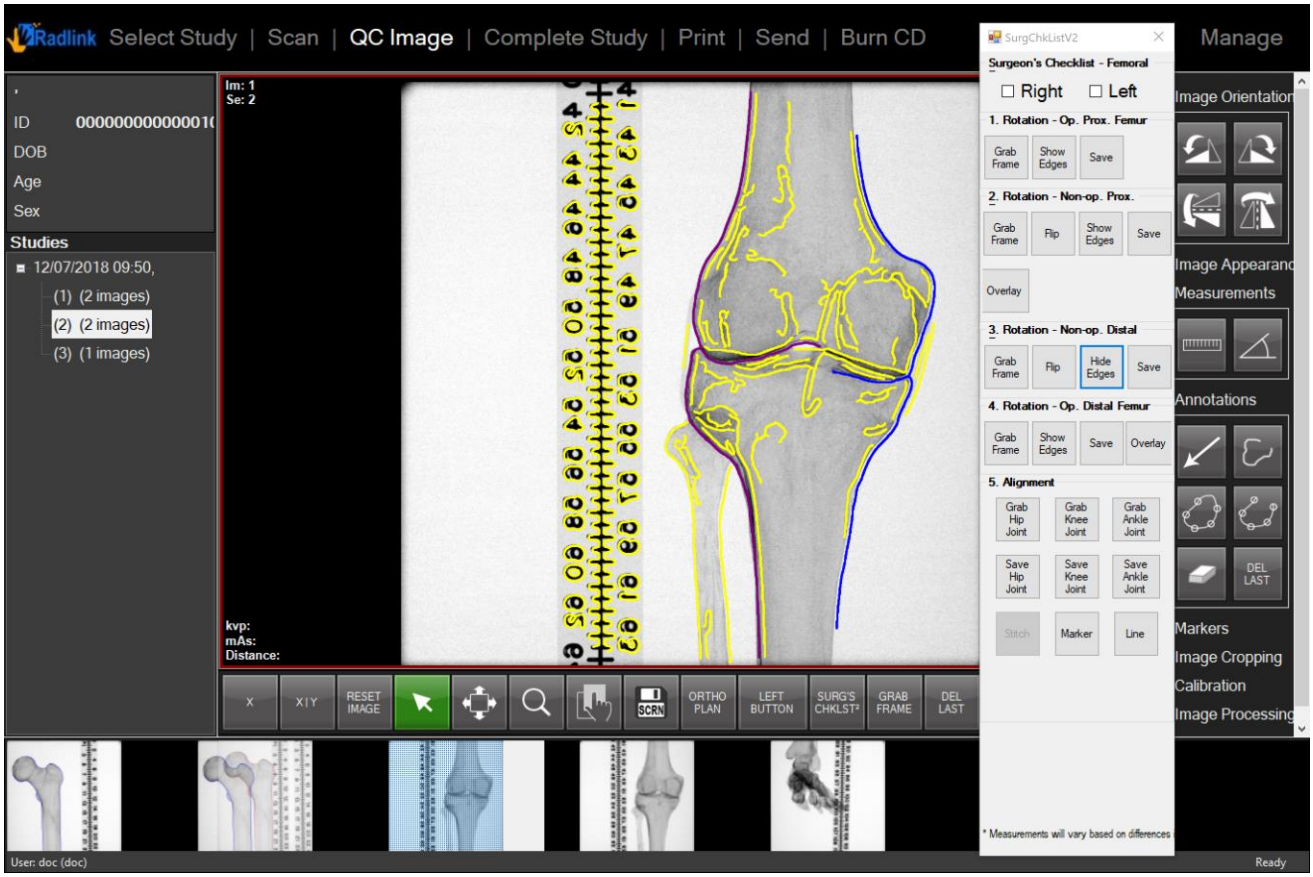
Trauma Femoral/Tibial Fracture

4. Obtain image of non-operative proximal femur/tibia.
5. Flip the image and select the same edges as the operative side. Click Save.
6. Click Overlay.
7. Overlay the two images using the highlighted edges as reference points.



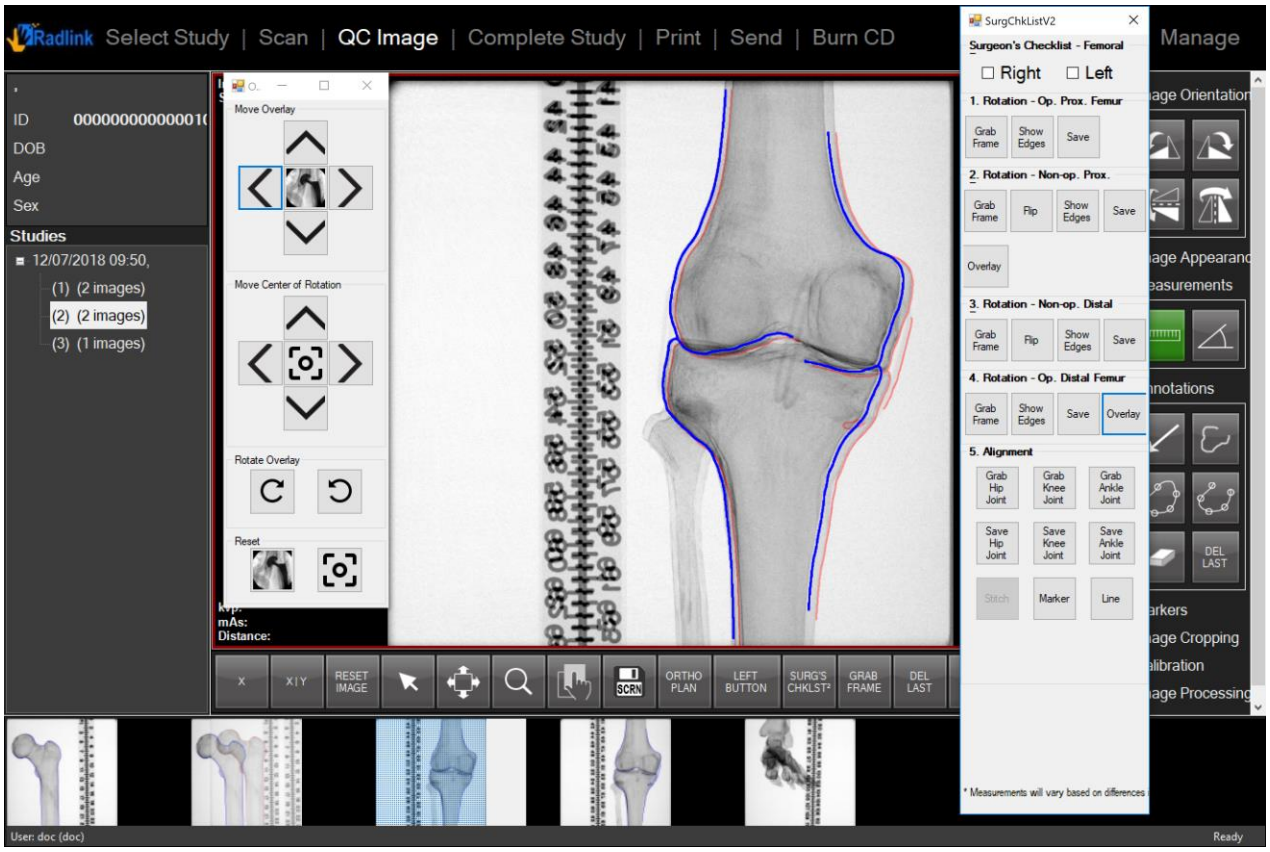
Trauma Femoral/Tibial Fracture

8. Obtain image of non-operative distal femur/tibia.
9. Flip the image and select edges around the ROI. Click Save.



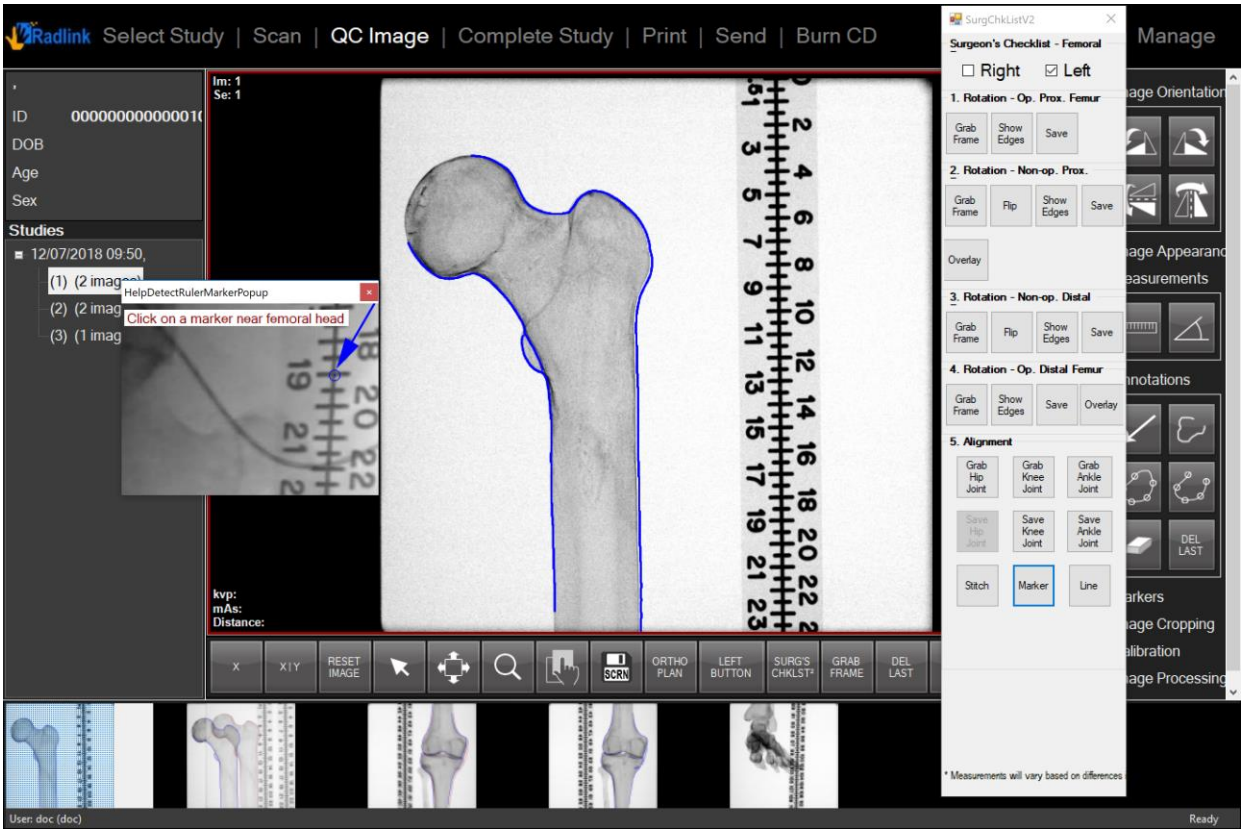
Trauma Femoral/Tibial Fracture

10. Obtain image of operative distal femur/tibia.
11. Select the same edges as the non-operative side. Click Save.
12. Click Overlay.
13. Overlay the two images using the highlighted edges as reference points.



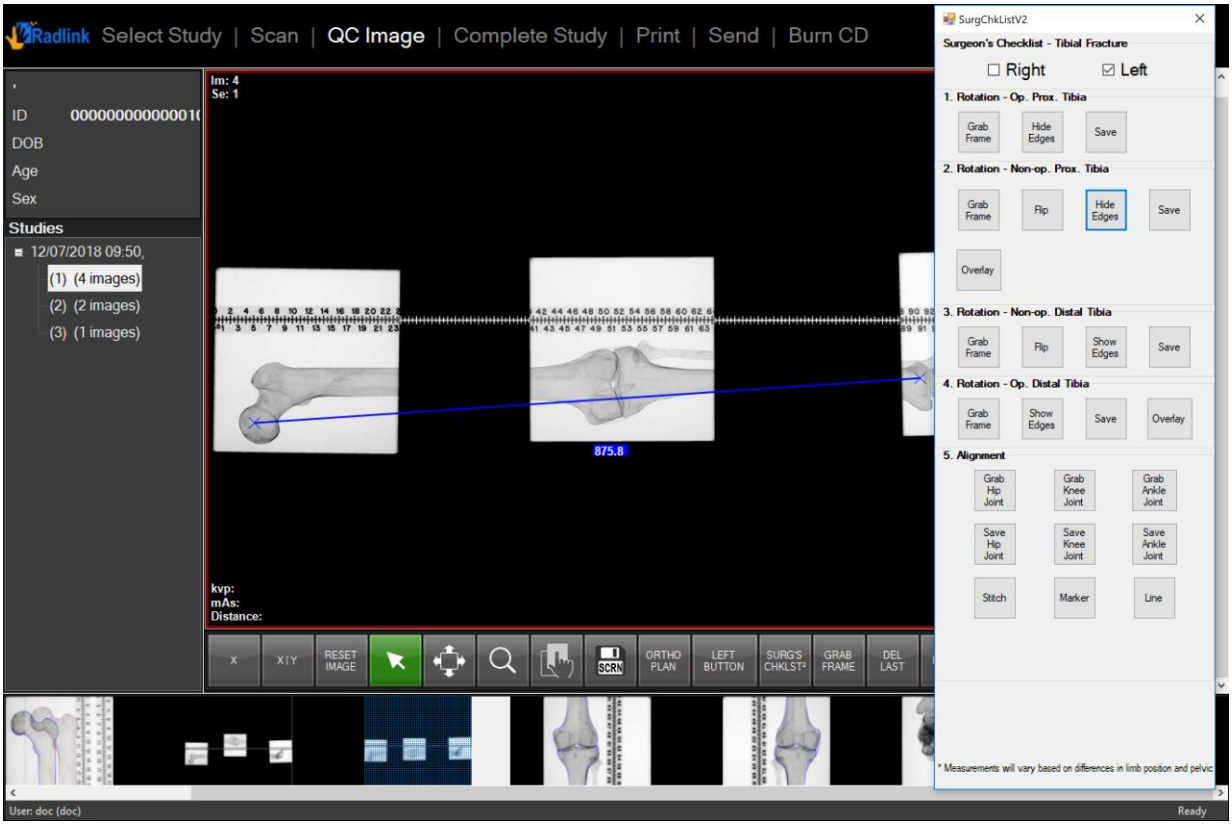
Trauma Femoral/Tibial Fracture

14. Obtain images of operative and non-operative ankle/hip joints.
15. Go to image of operative hip joint and click Marker.
16. Click on a point on the ruler above the ROI and confirm the number on the ruler.
17. Click on a point on the ruler below the ROI and confirm the number on the ruler.
18. Click Save Hip Joint.



Trauma Femoral Fracture

19. Repeat marker steps for operative knee joint and ankle joint.
20. Click Stitch. Go to stitched image and click Line to draw a line from the center of the femur head to the center of the ankle joint.



21. Repeat steps 15-20 for non-operative side.
22. Use line measurements to compare operative and non-operative sides.

Pre-Op Hip

Reconcile Position, Limb Length and Offset are all covered in **HIP**

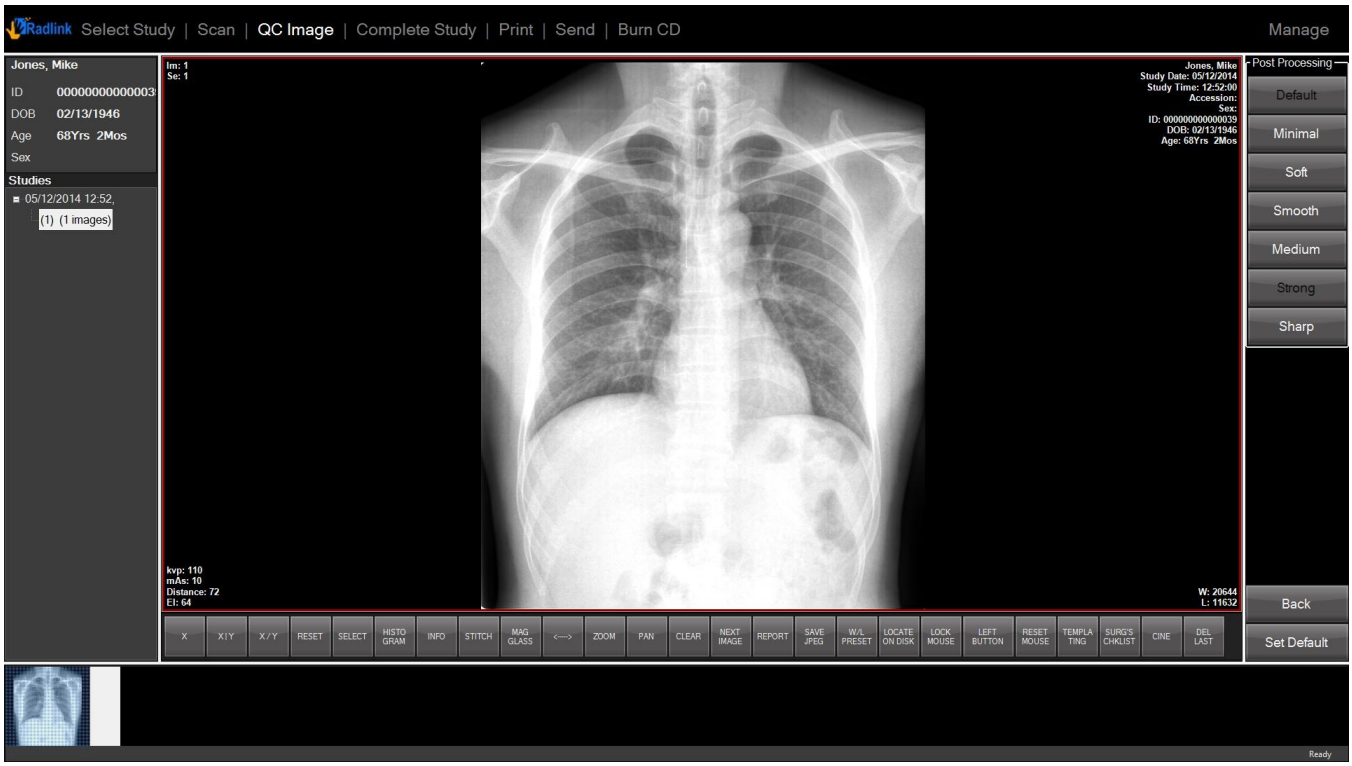
Basic Features

Image Processing

Image Processing reduces noise and artifacts and sharpens image structures, making them easier to view and promote a better image for diagnosis.

Note: The default settings should be acceptable for the majority of images, however may be changed based on preference, technique, x-ray experience, etc.

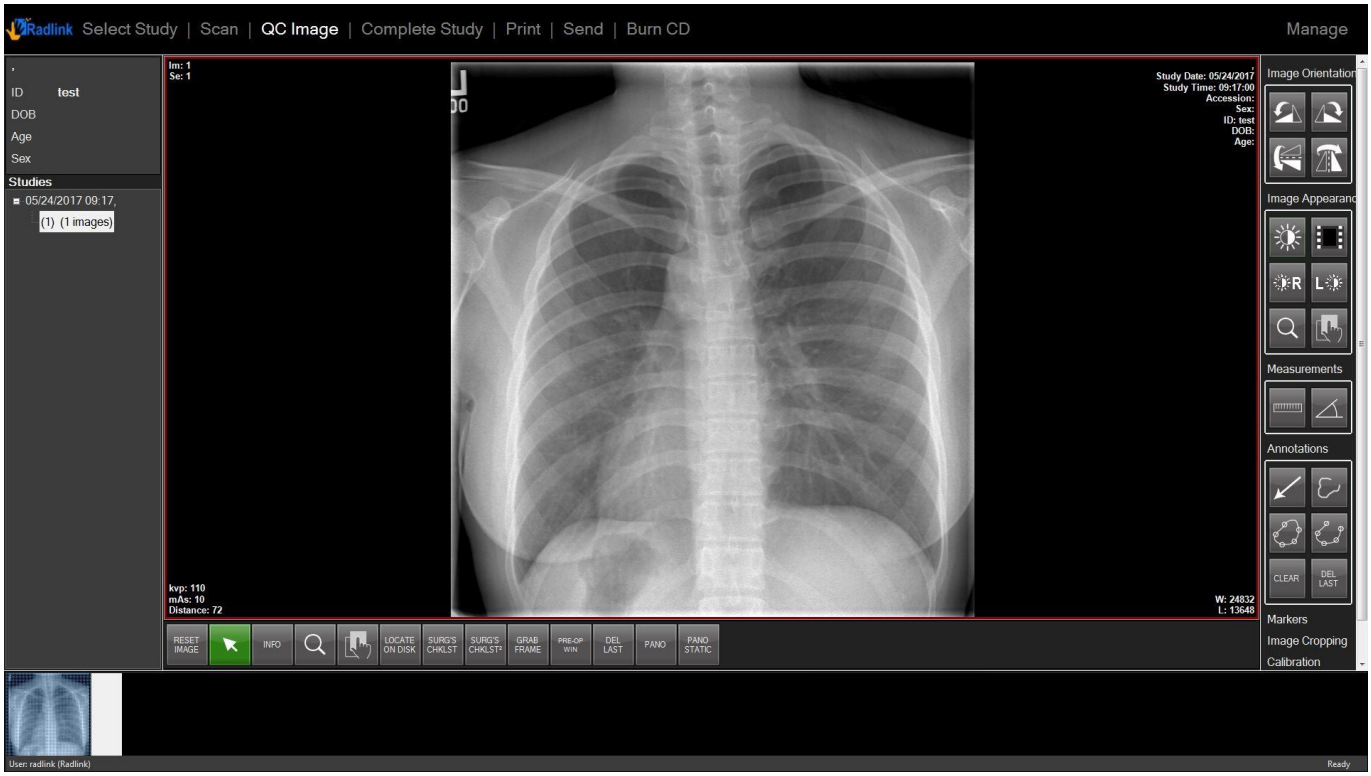
1. Select the **Image Processing** button on the right list while in the **QC Image** window



The **Image Processing** options are displayed.

Window Leveling (W/L)

Normally selecting the best available **Image Processing** algorithm type (e.g. Strong, Medium, etc.) will produce the optimal image, but depending on the user's preference, you may manually change the image-brightness and/or image-contrast by adjusting the **Window Leveling** using the method described below.

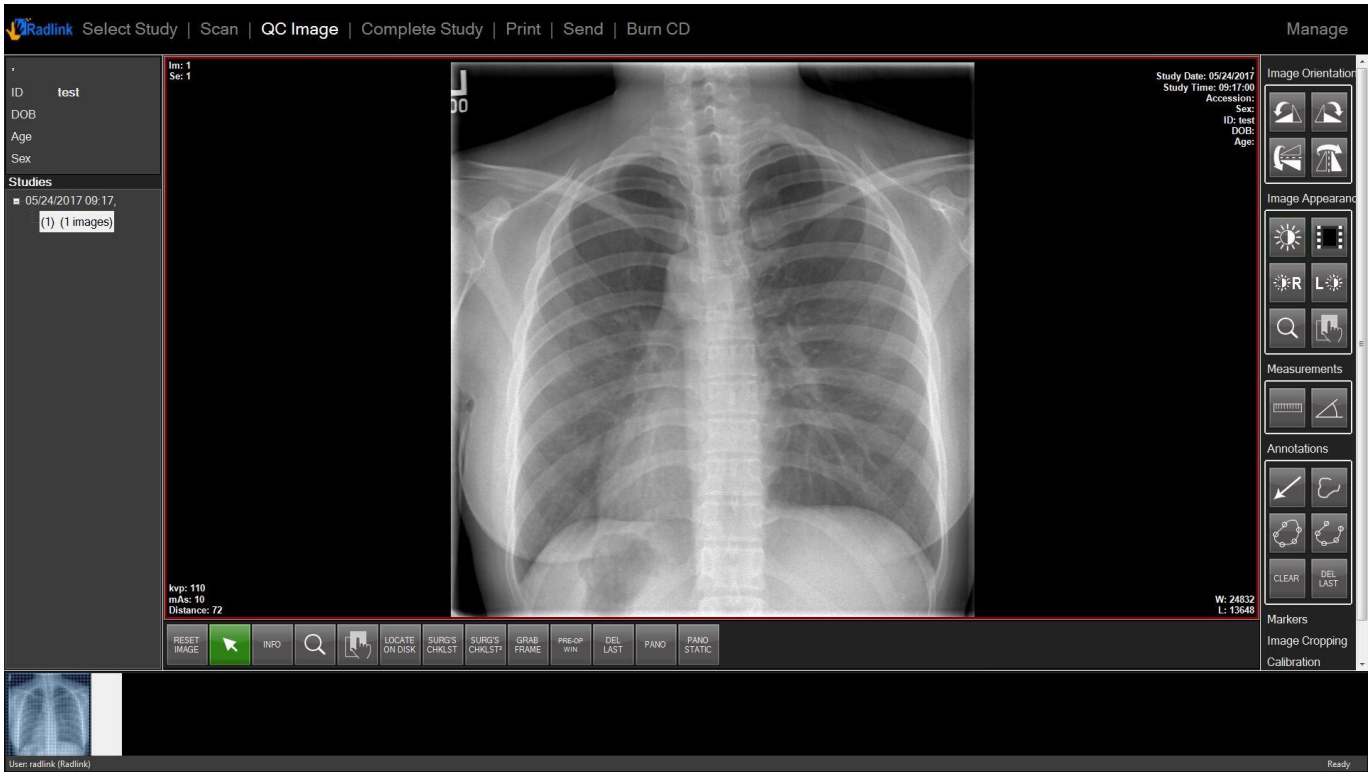


Region of Interest Window Leveling (ROI W/L)

This feature allows the selection of a specific region of the anatomy – with the purpose of **Window Leveling** the brightness/contrast of the image to best represent the area highlighted by the user's selection.

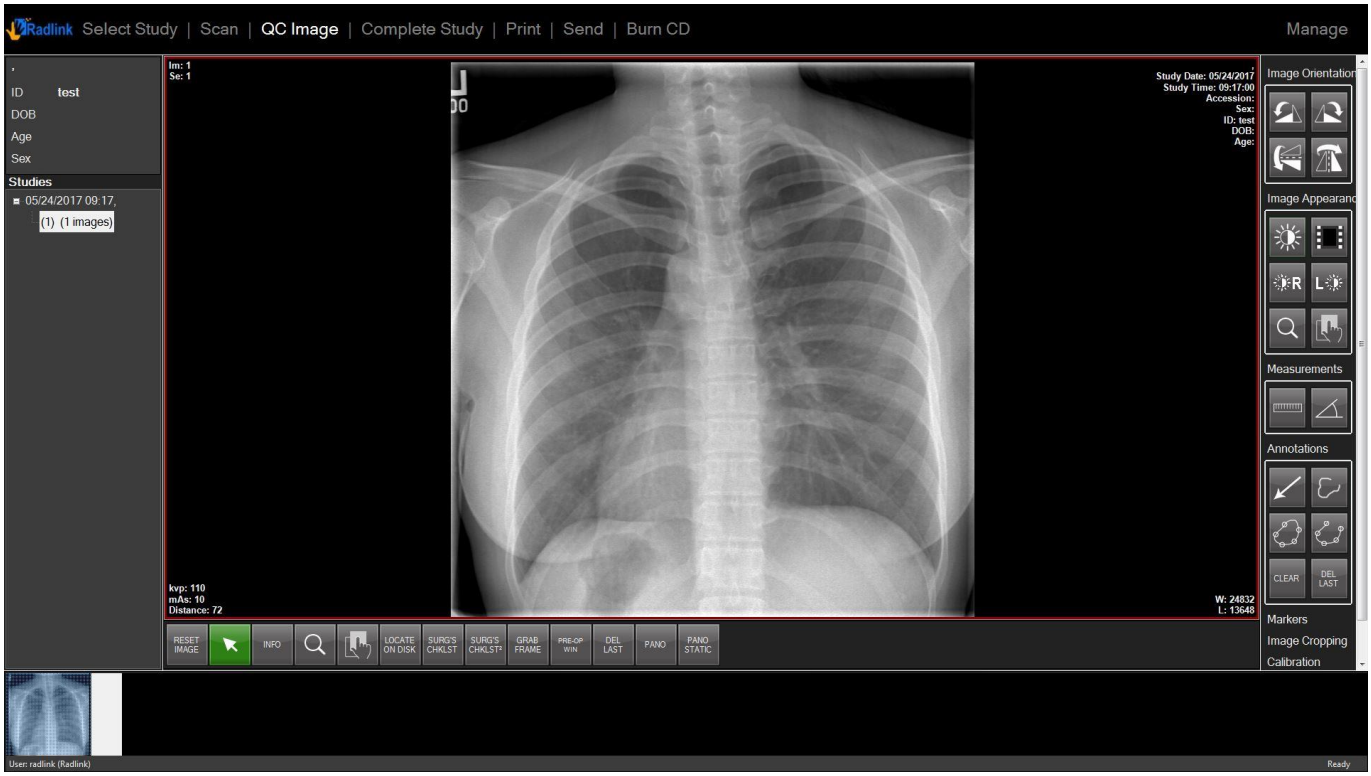
Note: This option optimizes the image quality of the specific region only. The pixels inside the chosen area are used to determine the W/L settings used by the software.

1. Select the image you intend to change and select the **W/L** button twice. The second time you click the button, the description inside the box will change to **ROI W/L**



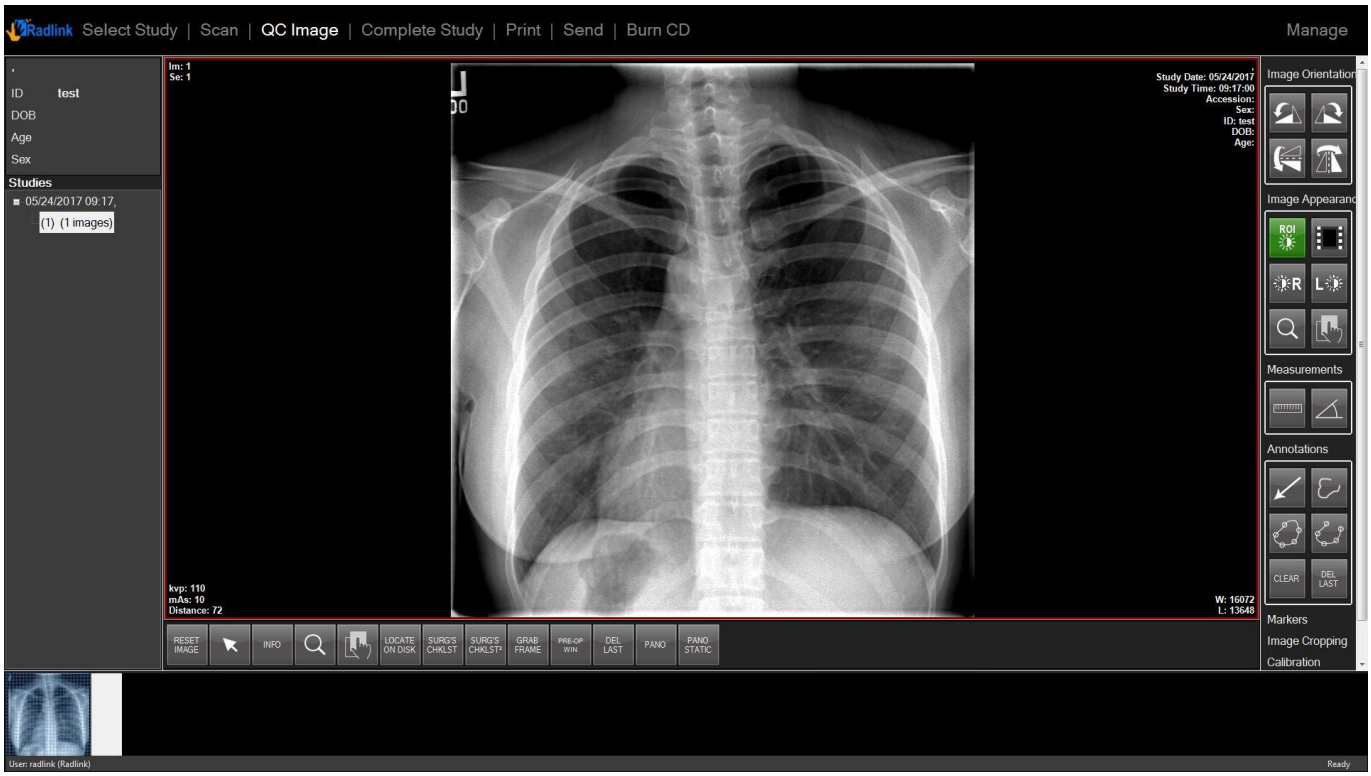
Region of Interest Window Leveling (continued)

2. Choose the region of interest by clicking (while holding the click) and dragging over the selected area of interest, making a rectangle around the region of interest



Region of Interest Window Leveling (continued)

3. Release the click after dragging over the selected area.



Note: The window leveling will change for the whole image, with the emphasis on the selected area having the best image brightness/contrast ratio.

Region-Specific Window Leveling (W/L)

When there are obvious different regions (i.e. left region is much brighter than right) in image, *Region-Specific Window Leveling* could be used to improve image's quality.

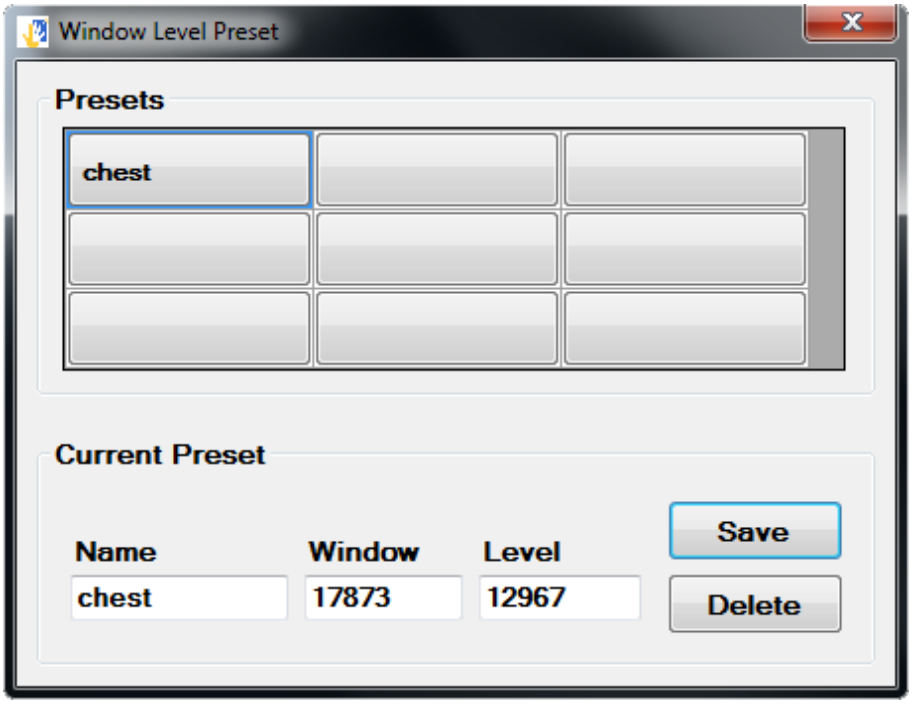
There are two buttons: one for right and the other for left. Buttons are shown below.

Steps:
1. Select current image
2. Change brightness of right/left region by clicking the corresponding button

Window Level Preset

This feature is available when the **W/L PRESET** hot button is checked.

1. Change the **W/L** to a desired appearance
2. Click the **W/L PRESET** hot button
3. Label the appropriate body part in the **Name** field
4. Click **Save**



These **Window Leveling** values can now be recalled for each instance of this body part.

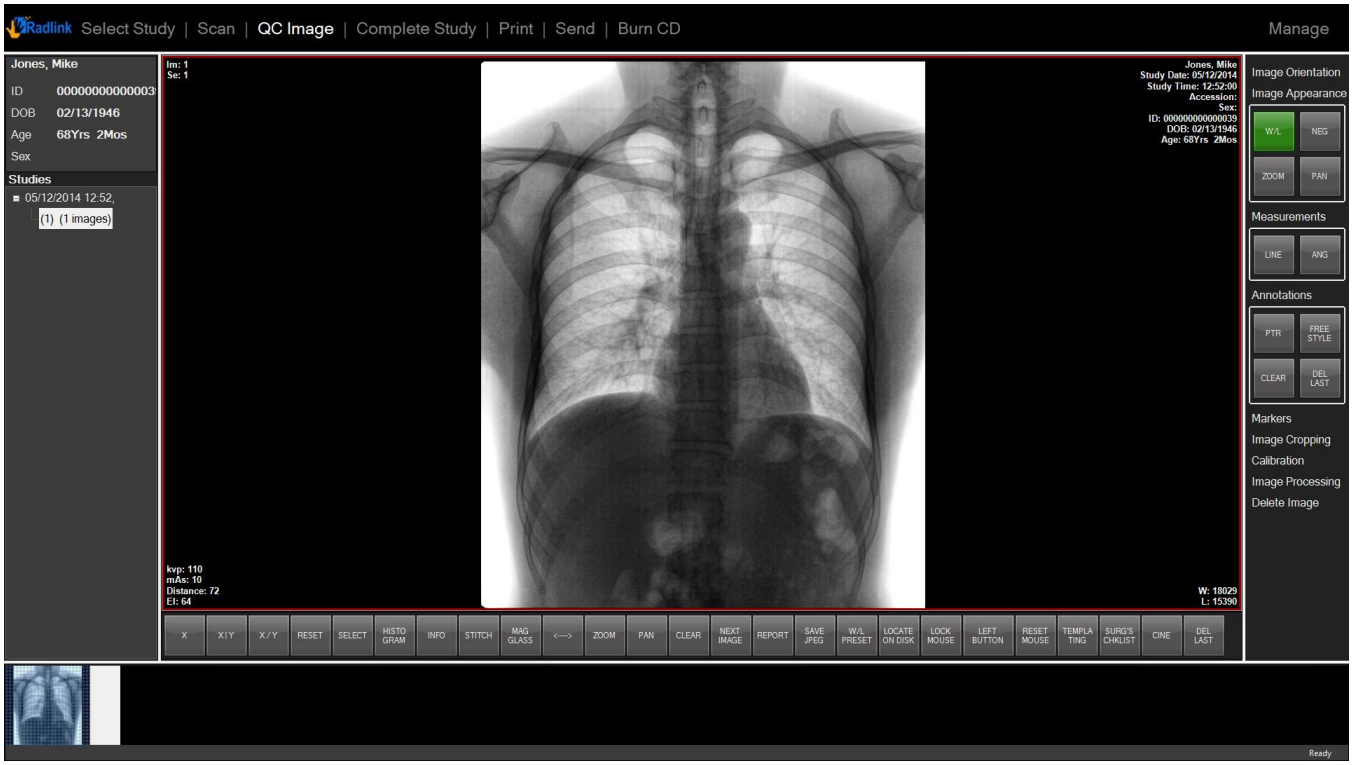
Note: This feature is dependent on the body part selected during the initial acquisition of the image. Saving these values for a “Chest Image” that is scanned with **CHEST** setting in the **Body Part** menu – and then applying these values to a “Chest Image” that has been scanned with **ABDOMINAL** setting will provide less than optimal results, for instance.

Negative Image (NEG)

Displaying a negative image may make it easier to view things such as blood vessels.

To display a negative image:

1. Select the **NEG** button while viewing an image.



A negative image is displayed.

Note: To toggle a negative image back to its original state, select **NEG** again.

Enlarging Images

1. Select an image and press the button that is directly below the image

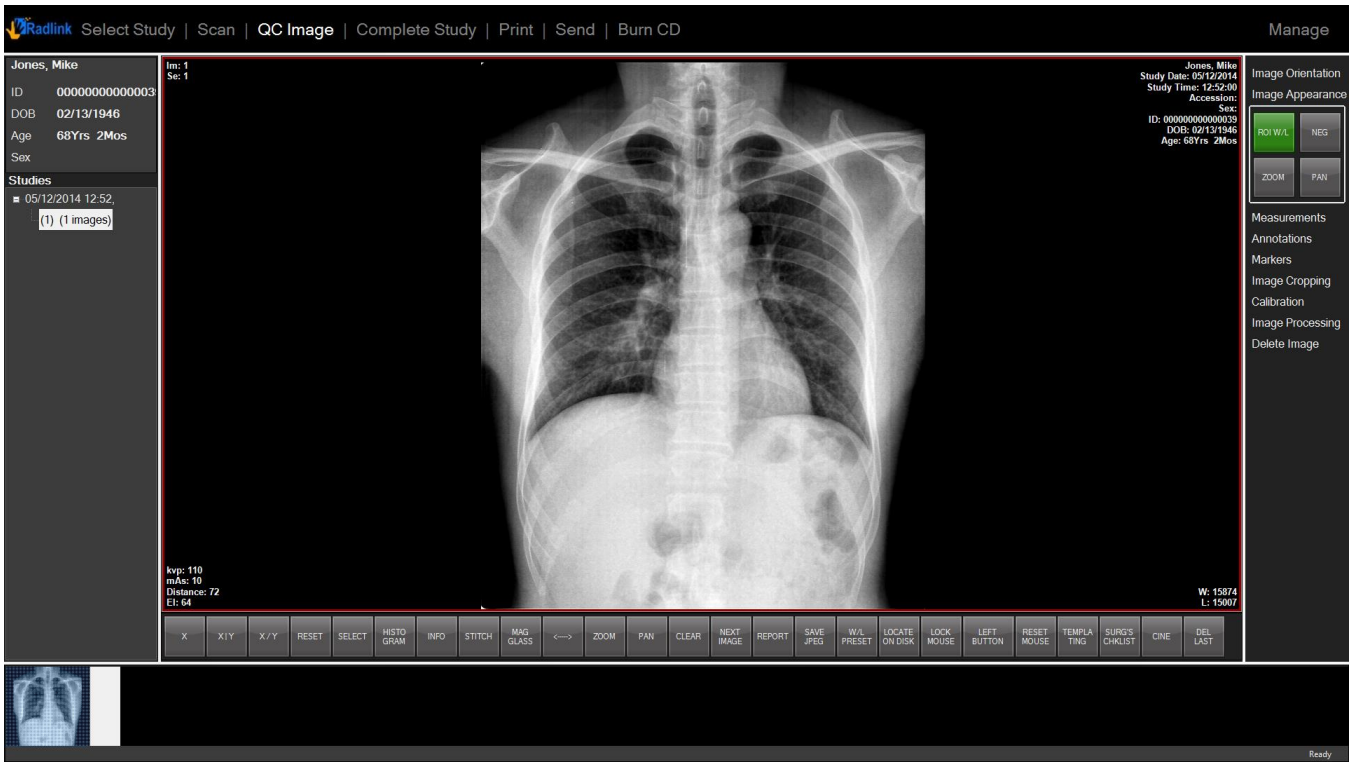
The image is now magnified to full-screen mode.

Note: The buttons that were previously on the right side of the software window and the thumbnails that were previously at the bottom of the software window are now removed.

Note: The hot buttons are still available in full-screen mode

Enlarging Images (continued)

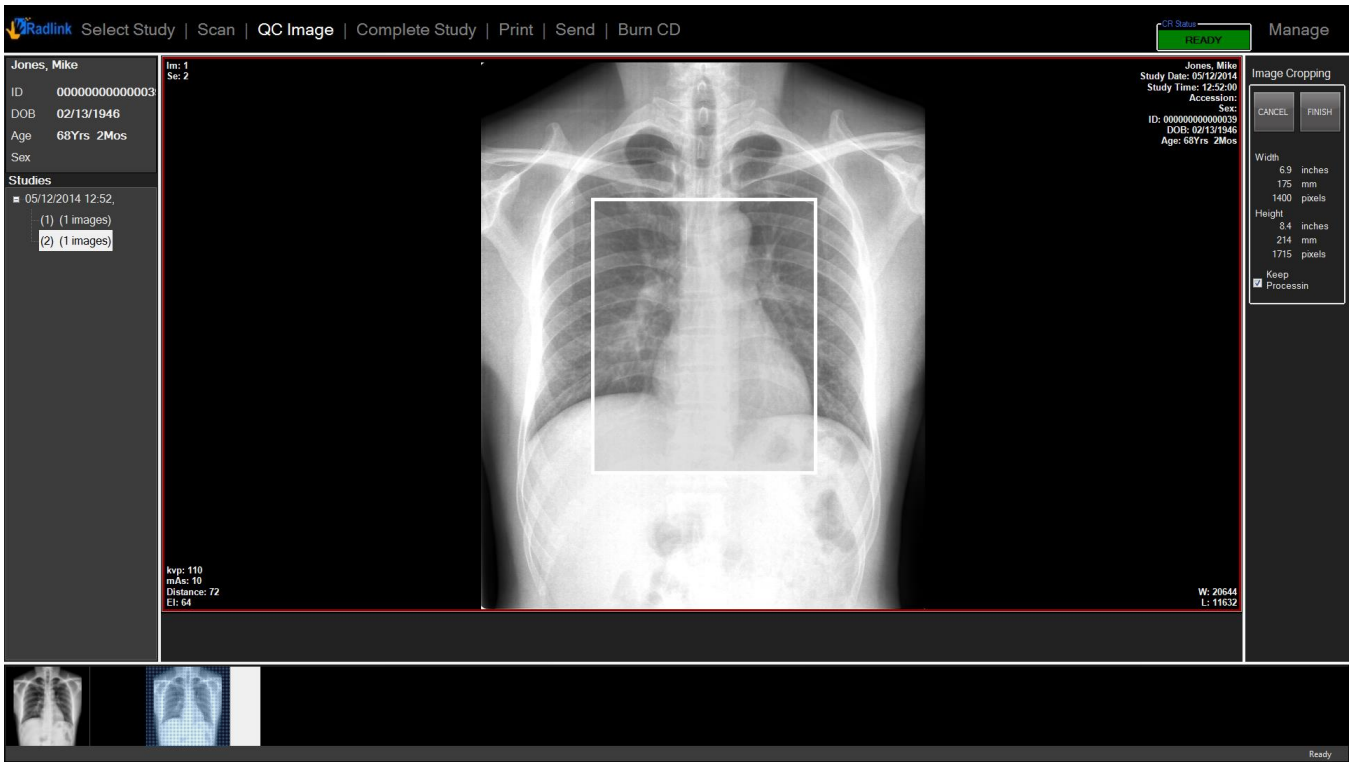
2. To return to the previous view press the button.



Cropping Images

The **Image Cropping** button on the right menu list allows you to select an area of an existing image and create an enlargement.

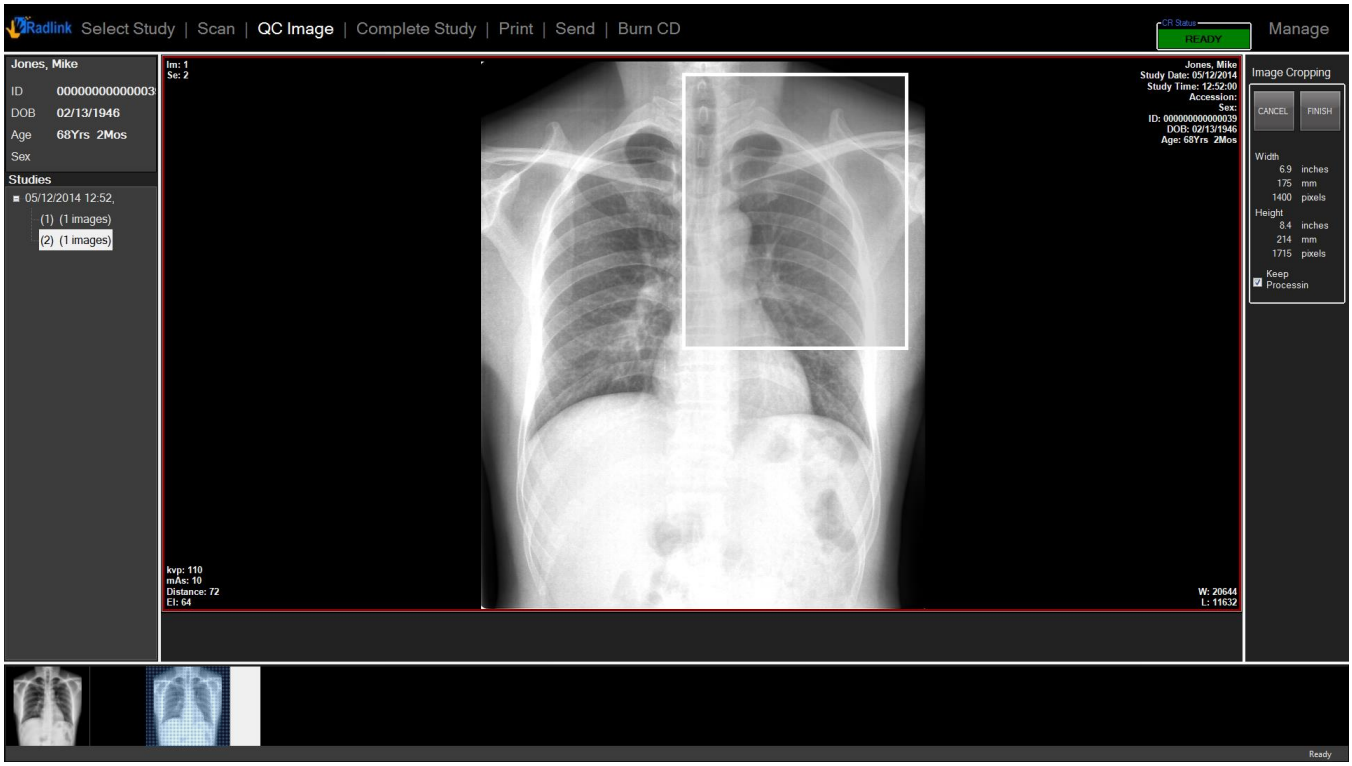
1. While in the **QC Image** window, select **Image Cropping**



The image cropping box will appear as shown above

Cropping Images (continued)

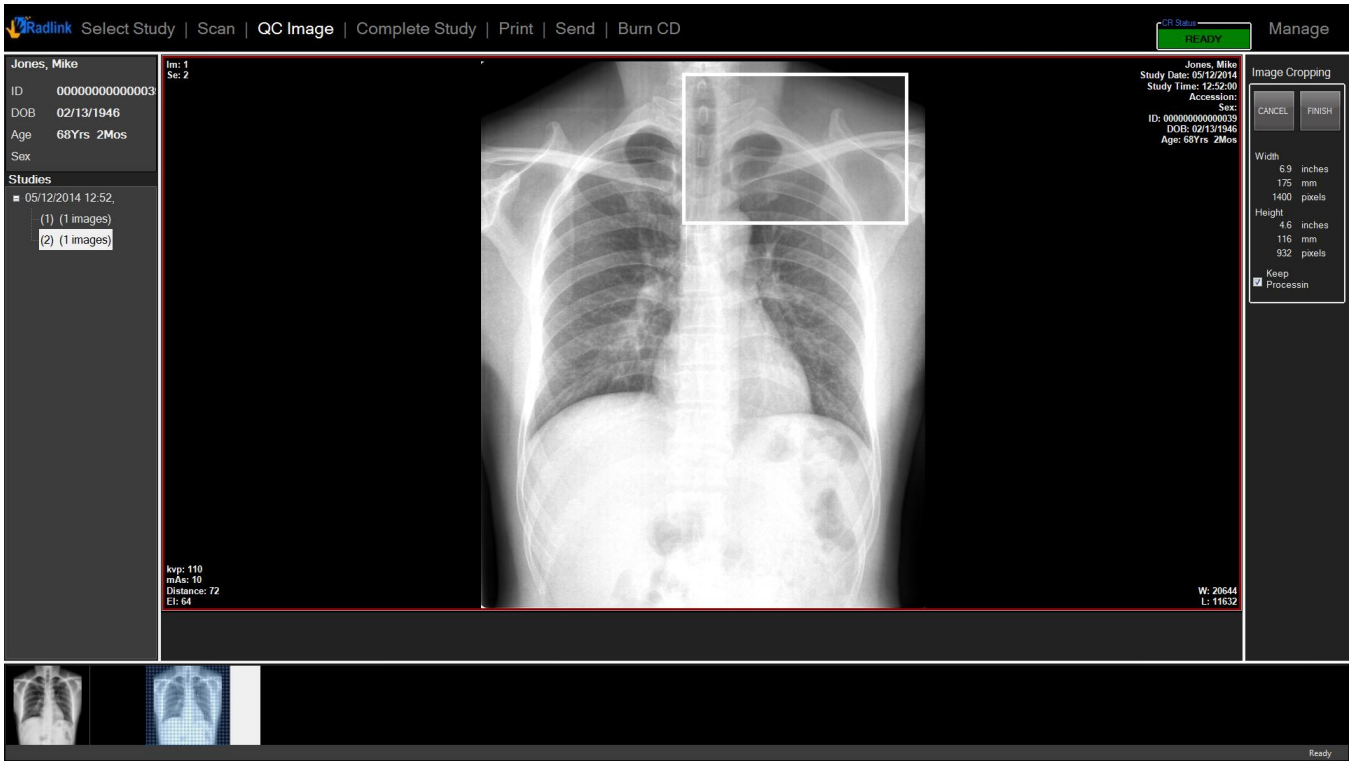
1. Move the box by clicking it in the middle region and dragging it toward the desired image area



In the example above, the image cropping box has been moved to the patient's left collarbone.

Cropping Images (continued)

1. Size the box by selecting an edge or corner and dragging it to the desired size.



In the example image above, the box has been reshaped into a rectangle that more closely follows the shape of the patient's collarbone.

Cropping Images (continued)

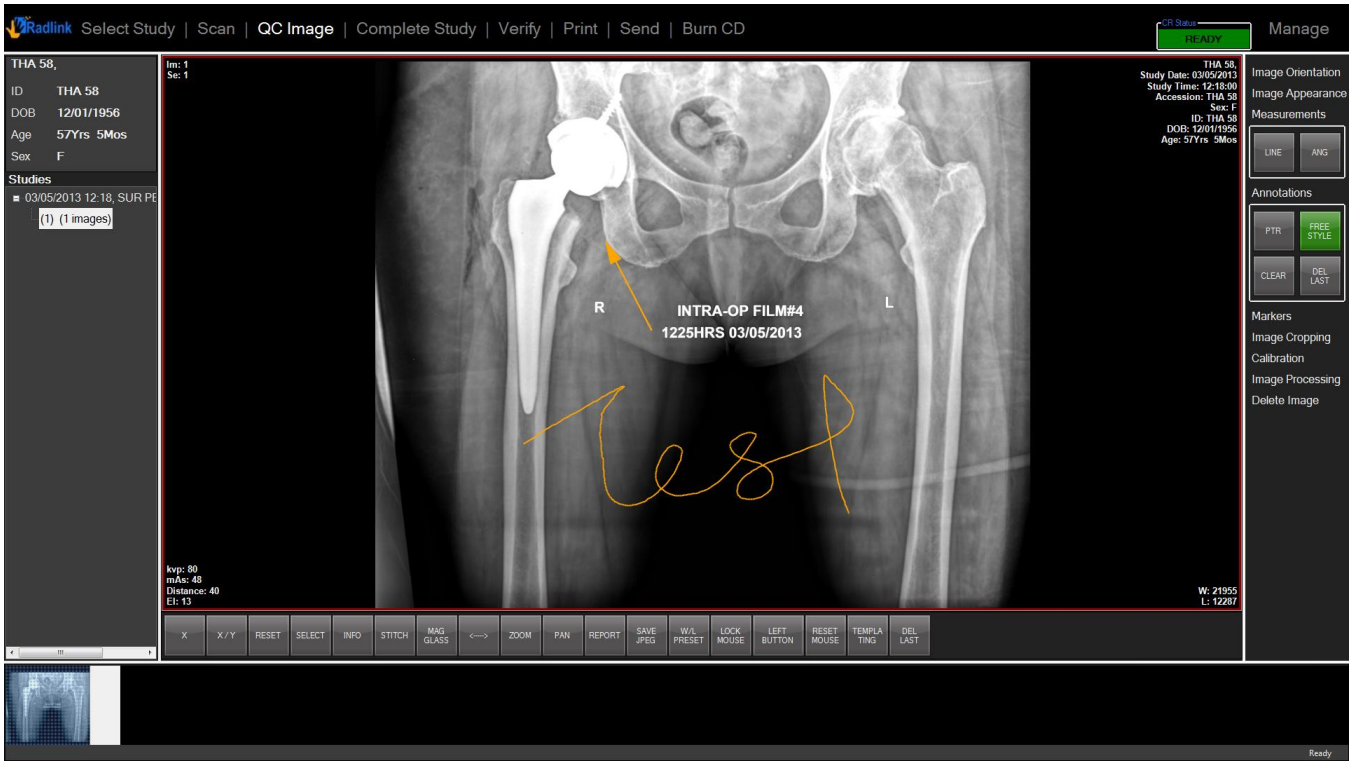
1. When you have adjusted the cropping box to the desired size, select **Finish**.

The cropped area has been captured and generated as an additional image in this series. A thumbnail image has also been created and placed on the bottom bar.

Adding Annotations on Images

Annotations can be added on images and saved to final PACS destinations.

1. While in the **QC Image** window, click the **Annotation** button
2. Click the **PTR** button for pointer and **FREE STYLE** button for free-hand drawing using pointer
3. Select **CLEAR** to undo all annotations and select **DEL LAST** to undo the last added annotation



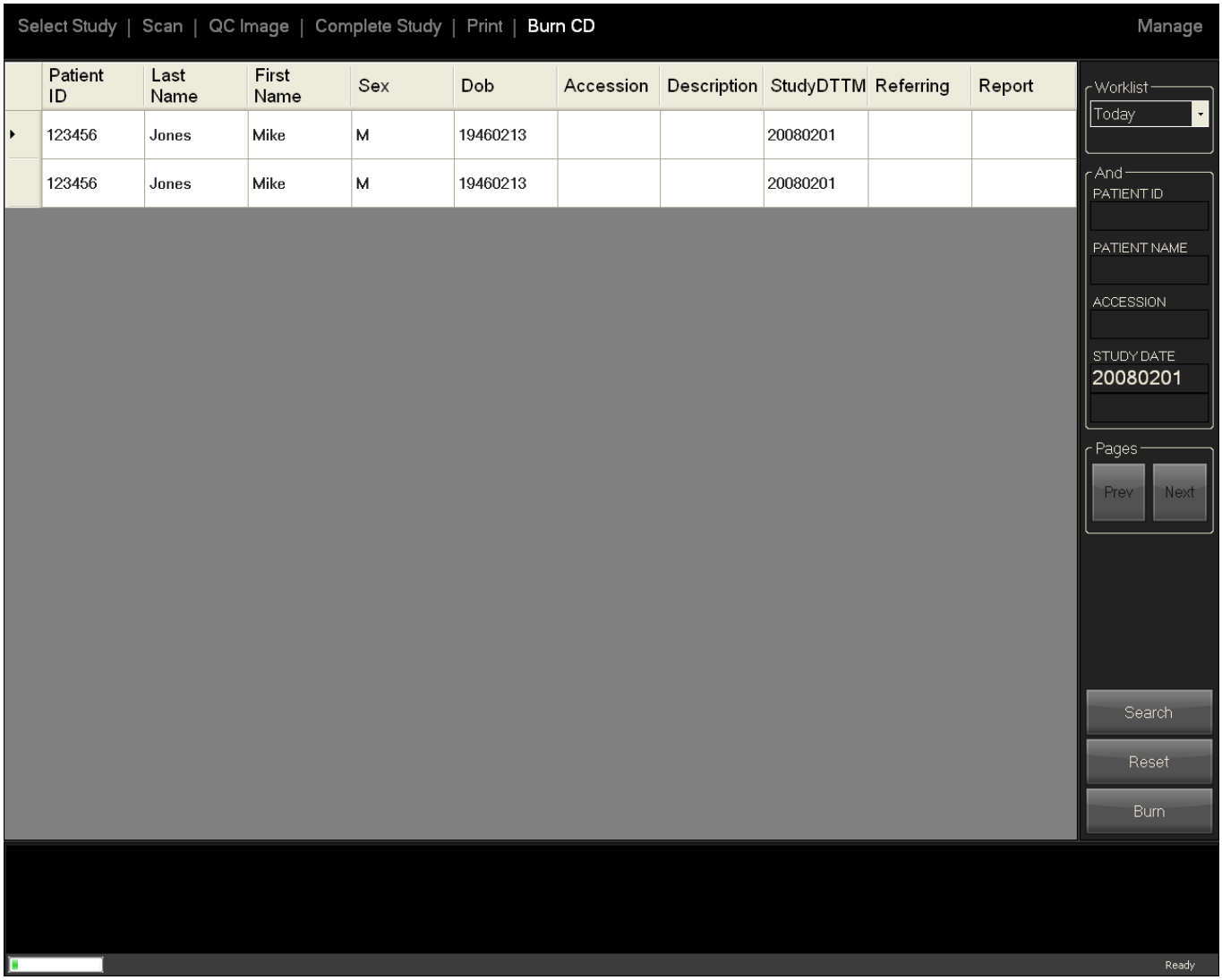
Note: The DEL LAST button will also delete the last angle or length measurement made

Burning a CD/DVD

Exams may be burned to a CD/DVD and inserted into a PC for later viewing.

To burn a CD:

1. Select **Burn CD**
2. Set **Worklist** to **All Studies** to view all studies that are ready to be burned to CD.

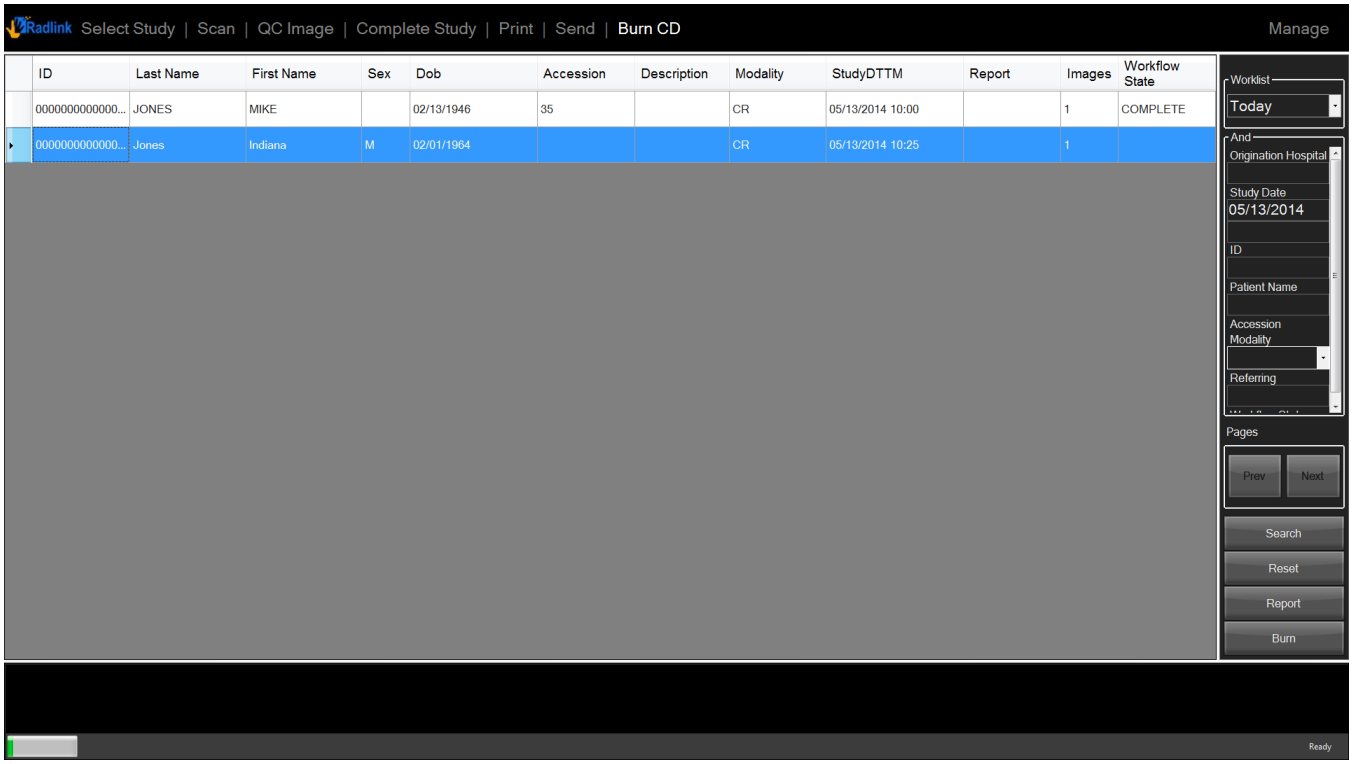


The **Burn CD** window appears.

Note: Only the studies that have been previously viewed are shown. If the study you are attempting to burn to CD is not displayed after selecting **All Studies**, you must first go **Select Study**, find the study, and then view it.

Burning a CD/DVD (continued)

3. Select and highlight the desired studies



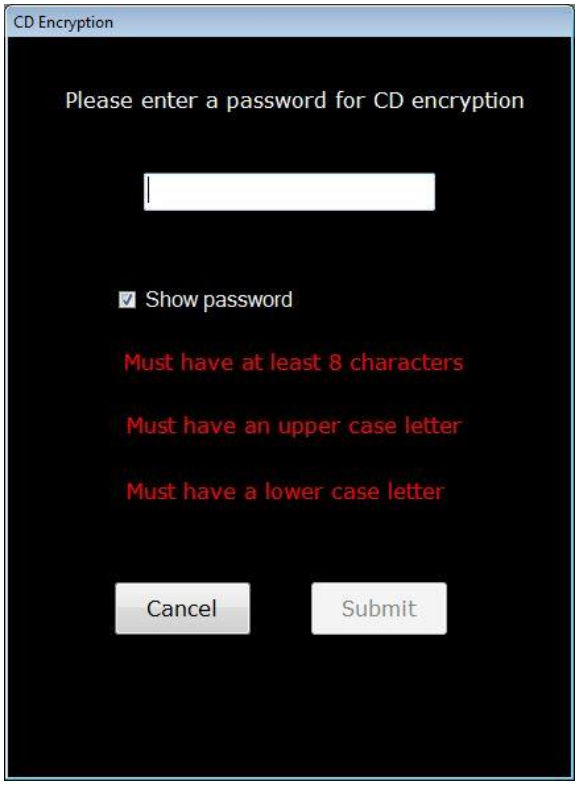
In this example: The bottom study with StudyDTTM of 20140513 is highlighted.

Note: Multiple studies may be burned to CD/DVD by pressing the **CTRL** key, and selecting all the desired studies.

Note: The green bar located in the lower left corner of the software. The green bar(s) will indicate how much space the selected studies will occupy when burned on the CD.

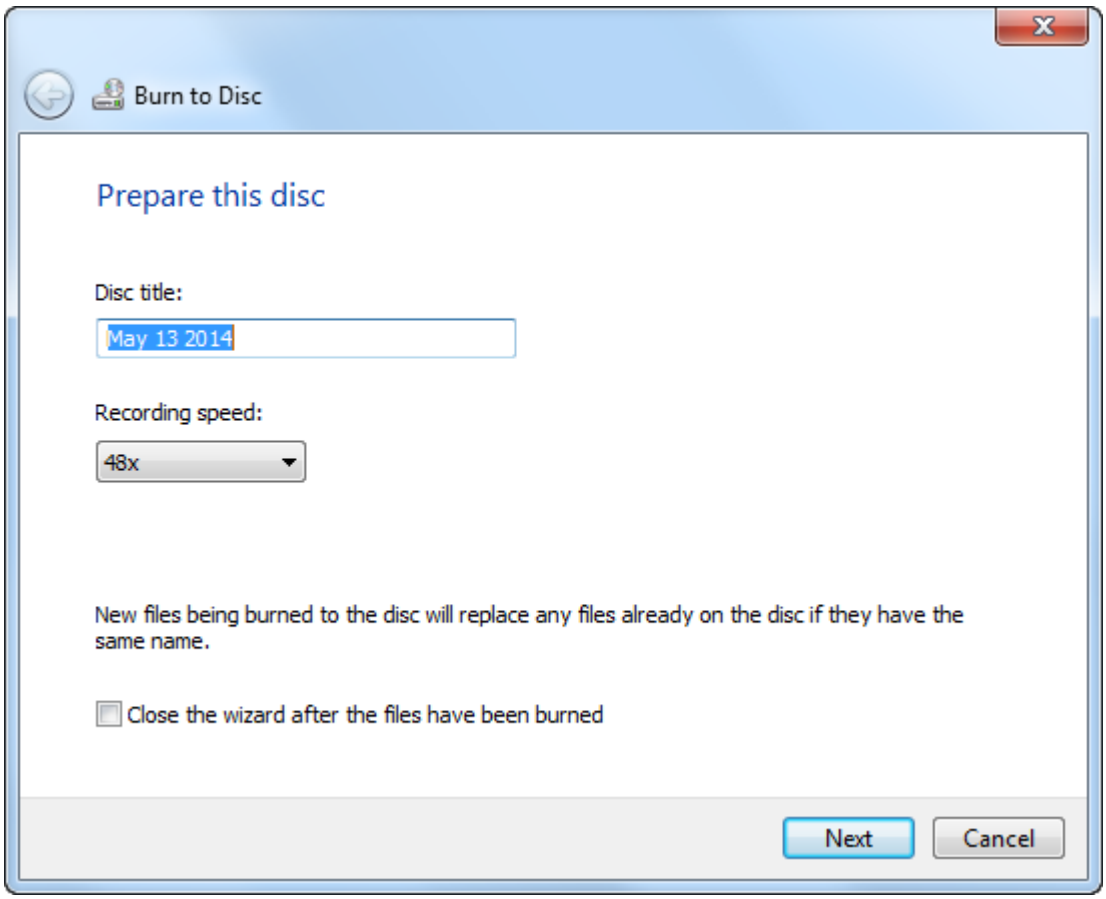
Burning a CD/DVD (continued)

4. Insert a CD/DVD and select **Burn.** Create a password for the CD.



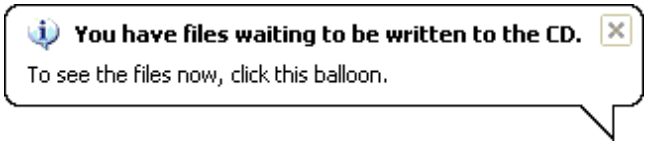
The **CD/DVD Writing Wizard** window appears.

- At this point you can name the CD/DVD, or use the default



5. Select **Next**

Ignore the windows pop-up window below that indicates that files are being written to the CD.

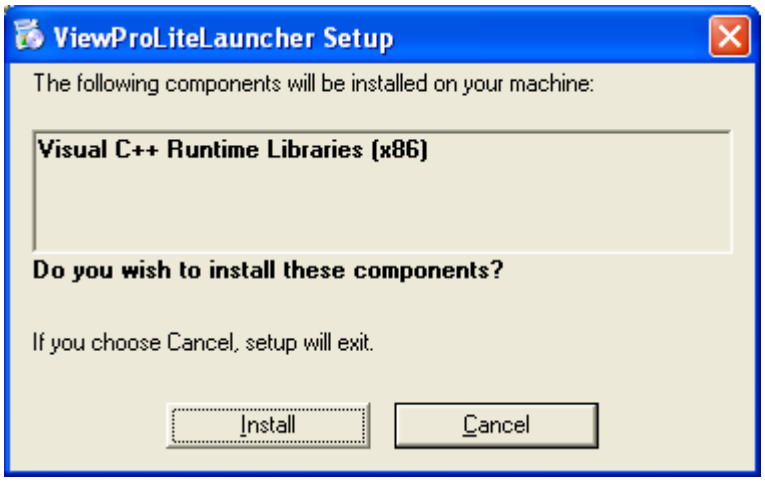


Once the CD/DVD has been burned, the CD/DVD is ejected & is ready to be used

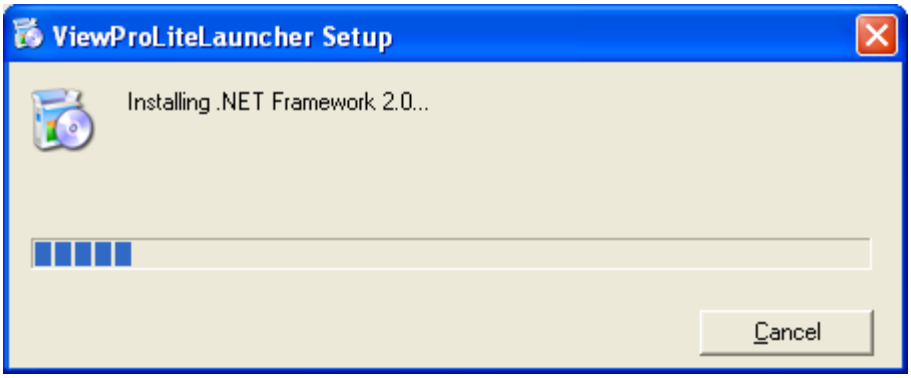
Viewing a Burned CD/DVD

1. To view the study that was burned, insert the CD/DVD into a PC.

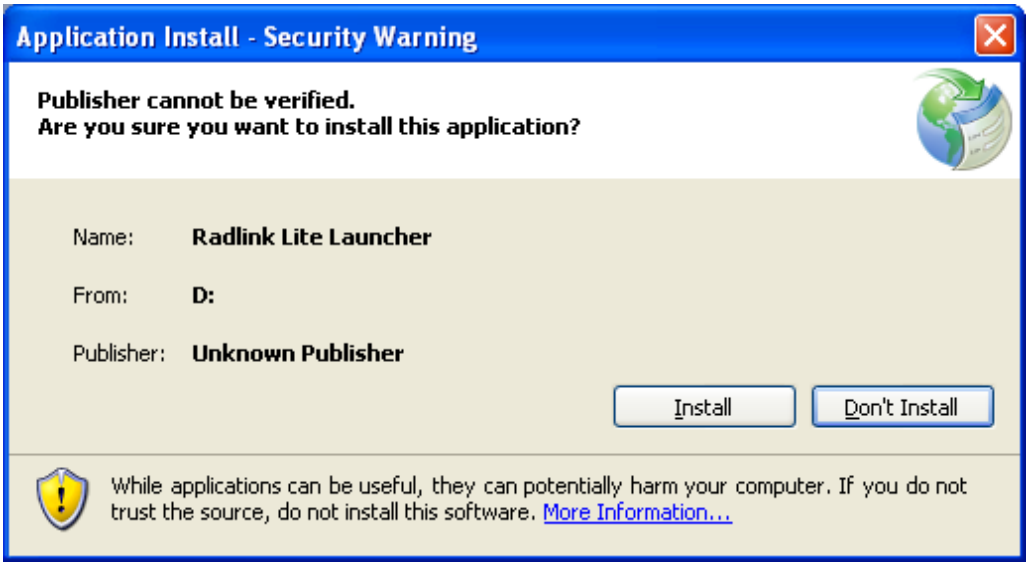
2. When the above window appears, click **Accept**.



When the above window appears, click **Install**.

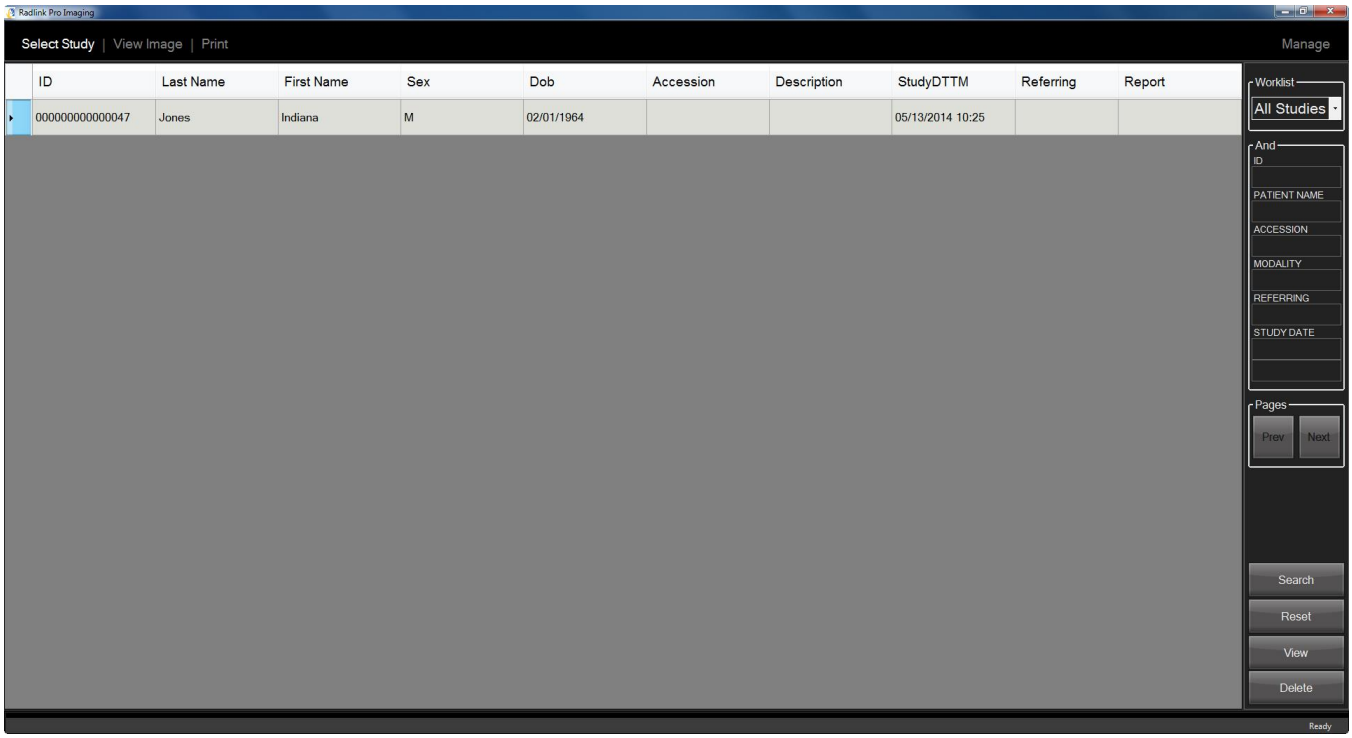


The installation status is displayed.



3. When the above window appears, click **Install**.

Viewing a Burned CD/DVD (continued)



Note: A version of the Radlink Pro Imaging viewing software appears after several minutes.

Note: The default viewer used is **Radlink Lite**. To use the e-Film Lite viewing software instead of the Radlink Lite viewing software, prior to burning, go to **Manage/Preference** and set the **Viewer on CD** field to **eFilm Lite**.

Additional Features

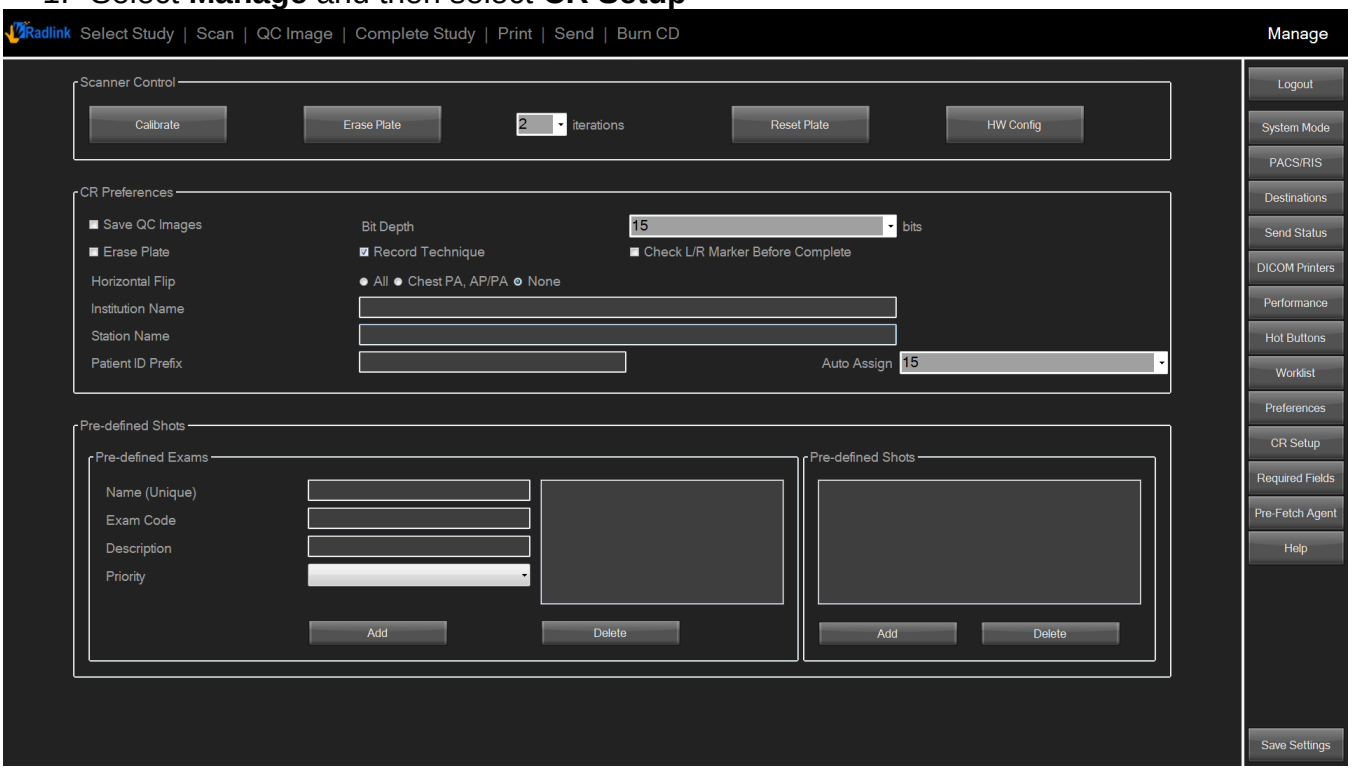
Pre-defined Shots

Setting up Pre-defined shots

The **Pre-defined Shots** feature may be used to either create a **New Patient** or create a **New Study**

Note: You are allowed to set up one or multiple sets of scanning techniques under one study.

1. Select **Manage** and then select **CR Setup**

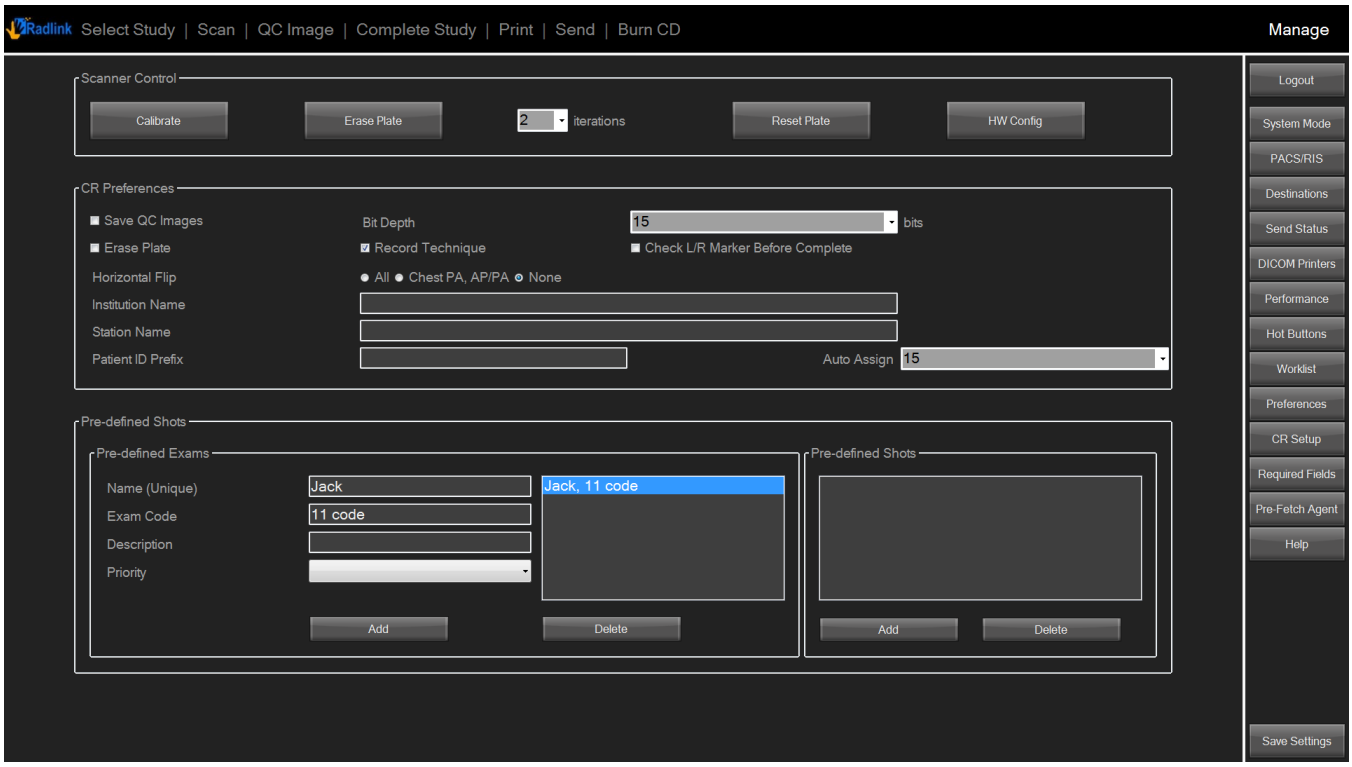


The **Pre-defined Shots Settings** are displayed in the screen.

2. Enter **Name, Exam Code** and select **Priority** under **Pre-defined Exams**

Setting up Pre-defined shots (continued)

3. Click **Add** under **Pre-defined shots**, and then click **Save Settings**



The Pre-defined shots setting is added

Setting up Pre-defined shots (continued)

4. Click “Add” under “Pre-defined Shots”

Scan window is brought up and allows you to add a Scanning technique

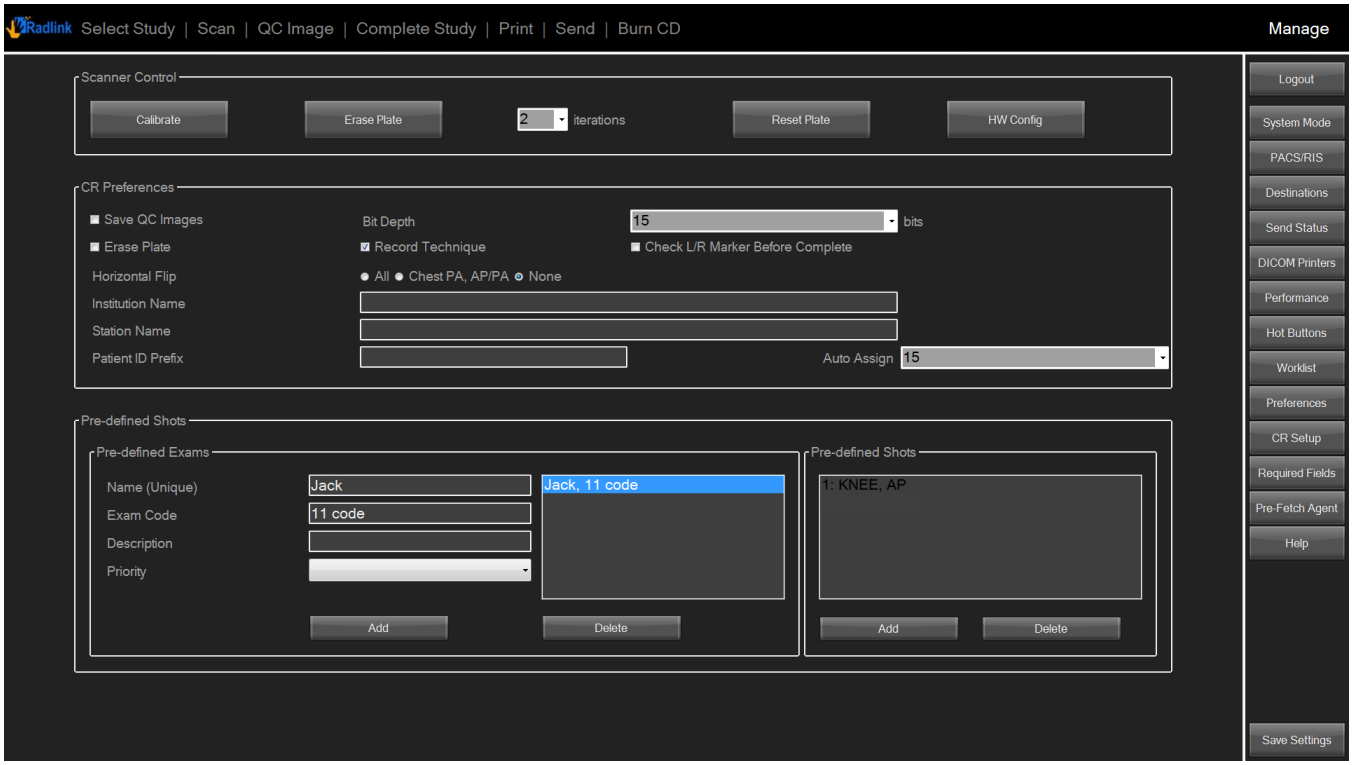
5. Select **Body Part** and set the values for the technique.

6. Click **Save** button.

Setting up Pre-defined shots (continued)

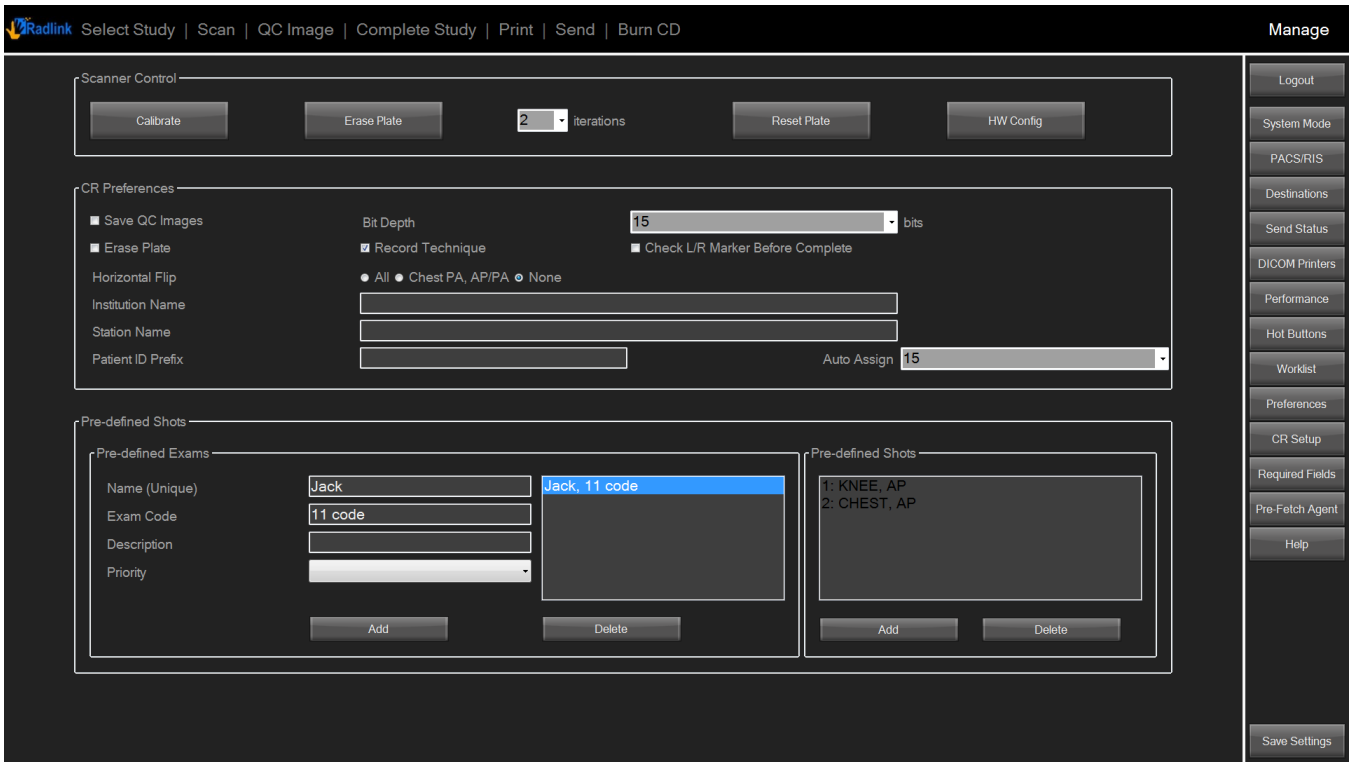
The Scanning technique is added under Pre-defined Shots

7. Click **Save Settings** button



Setting up Pre-defined shots (continued)

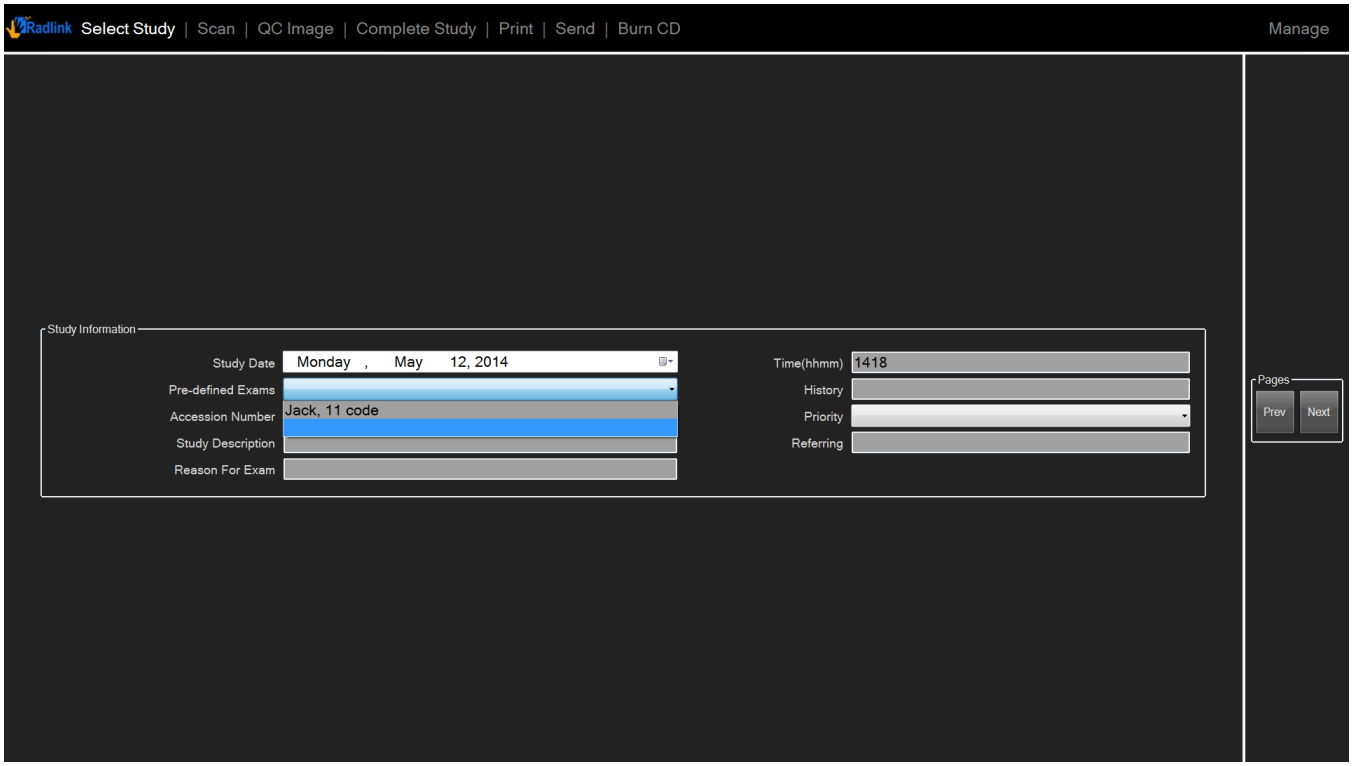
8. Repeat Steps 4-7 to add another technique if desired



Note: You may add multiple Pre-defined Shot(s) techniques to one Pre-defined Exam(s)

Scan using the Pre-defined shots setting

1. Select **New Patient** in **Select Study** window
2. Enter **ID** and select **Next**
3. Select the desired Pre-defined Exams
4. Select **Next**



Scan using the Pre-defined shots setting (continued)

The Pre-defined technique is loaded automatically in the **Scan** Window

Exam Shot follows the order of the techniques of Pre-defined shots

Note: You may manually click **NEXT** or **PREV** in the **Exam Shot** window to change the order

5. Click **Scan**

Scan using the Pre-defined shots setting (continued)

Scanned image will be brought up. You may now go back to **Scan** window and the second technique of the Pre-defined Shots is ready.

6. Click **Scan**

In the above example, a total of two pre-defined images showed up under this study because we configured the Pre-defined Shots window with two techniques.

Note: For additional images, continue to proceed back to the **Scan** window after acquiring an image

Creating a New Series

Creating a new series is useful for segmenting scans by modality or body part into a separate folder.

To create a new series:

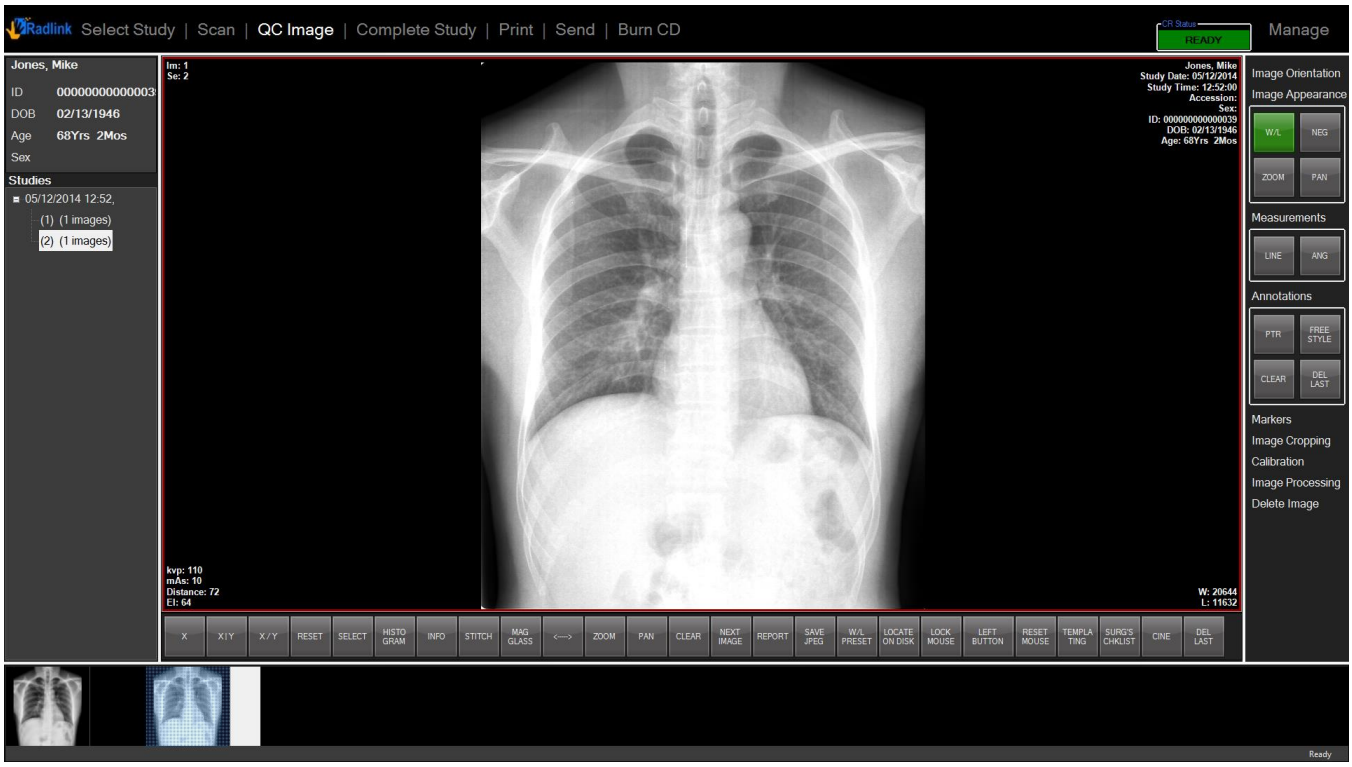
1. Go to **Scan** window and select **New Series**

A new series is now created under the same patient **ID** record and study

Note: The new series that was just created begins with zero images in it

Creating a New Series (continued)

2. Select **Start DR**



Note: The newly scanned image is placed into the second series, denoted as **(2) (1 images)**

Auto Crop Stitched/Frame Grabbed Images

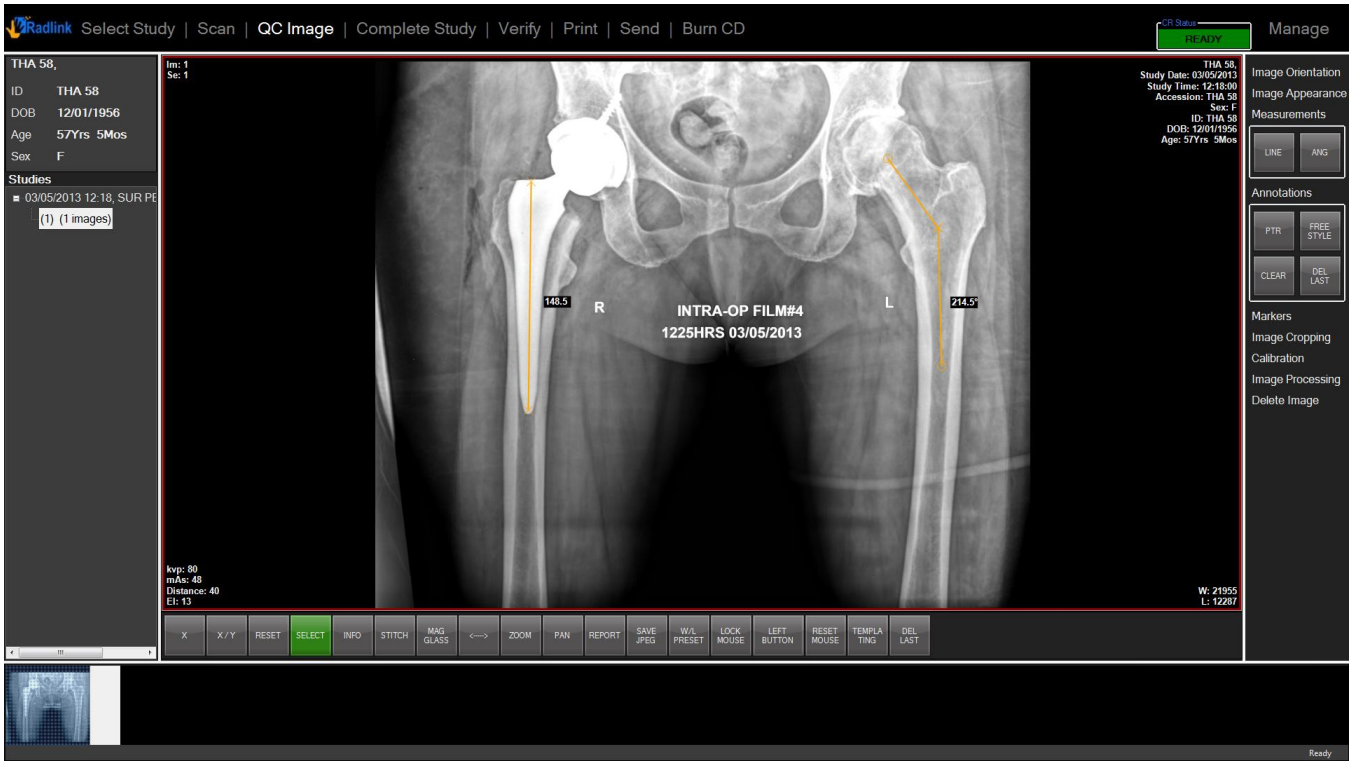
1. Auto-crop the images grabbed from the frame grabber, to have the circular-shaped image only. This will crop away the non-essential content from grabbed image.

Note: This is an optional function. Go to Manage, Preferences. Check Auto Crop Stitched/Frame Grabbed Images to activate it.

Geometry Measurements

Length and angle-geometry measurements of the image can also be obtained for reference.

1. While in **QC Image** window, click the **Measurements** button.

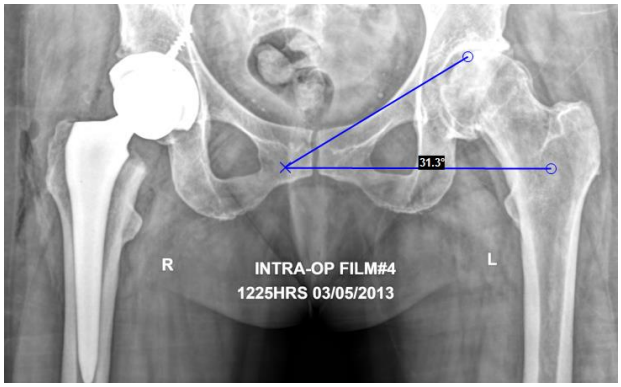


3. Click **LINE** button for length measurements
    - Click and drag from one reference point to another to measure relative distances

Note: Accuracy of measurements can be greatly improved using the **Calibration** tool to convert all relative measurements to measurements in millimeters using an object of known size

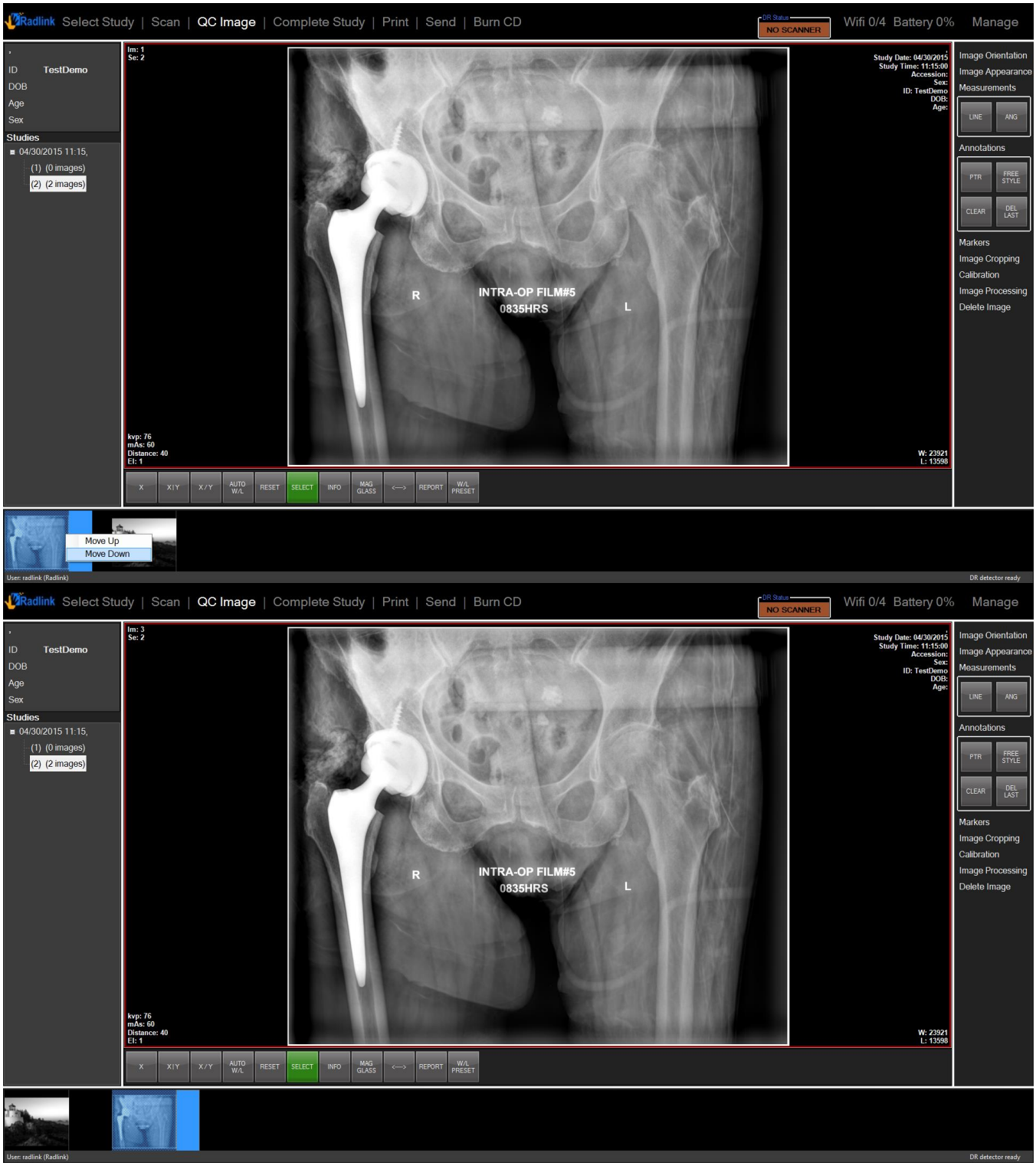
4. Click **ANG** button for angle measurement.

5. As shown below, angles are measured by aligning the two **X**'s (from each line) on top of each other and measuring the relative angles between the **O**'s on the opposite side of the lines



Rearrange Images

1. Right click thumbnails in QC Image window, move up or move down images to change order. Can go through different series.

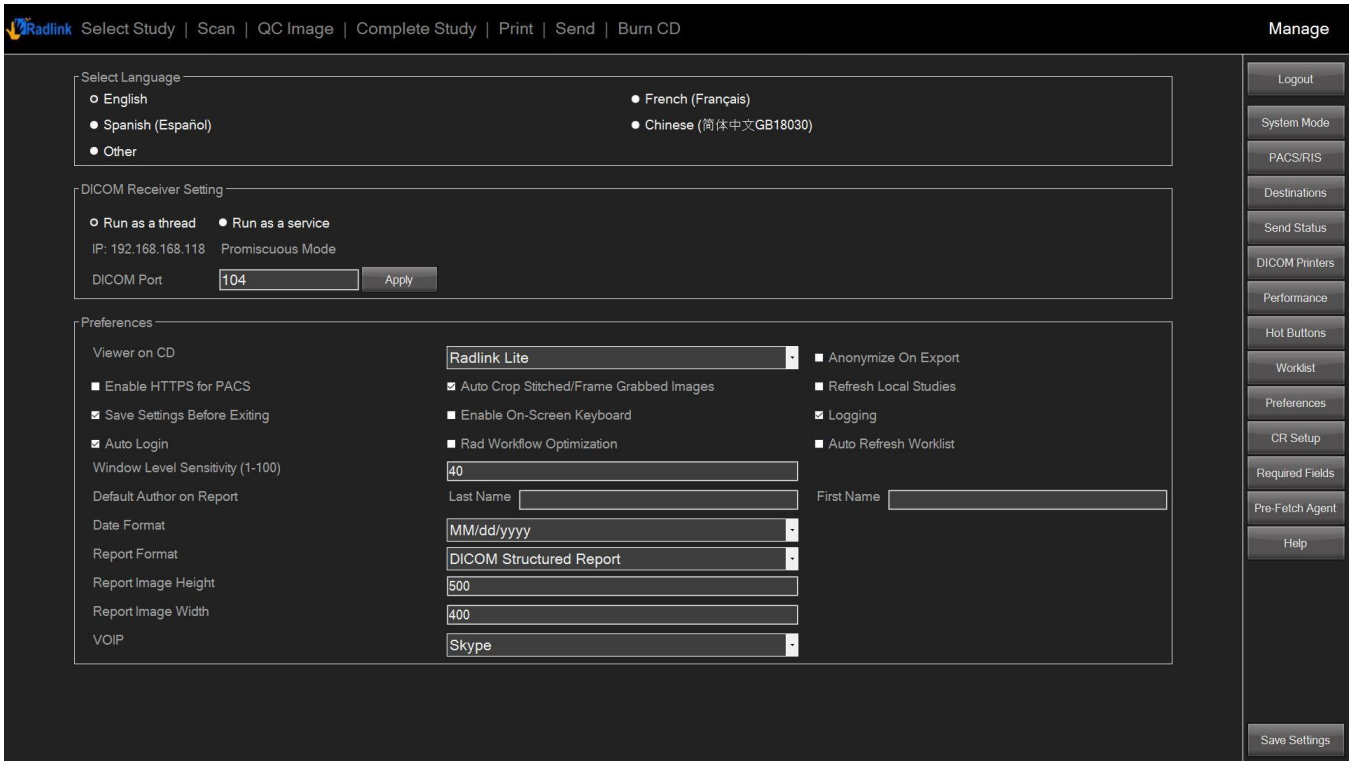


Reports

You may also attach notes to studies and save them with the images to the PACS.

To set the default doctor name so that you don't have to re-enter it for each report:

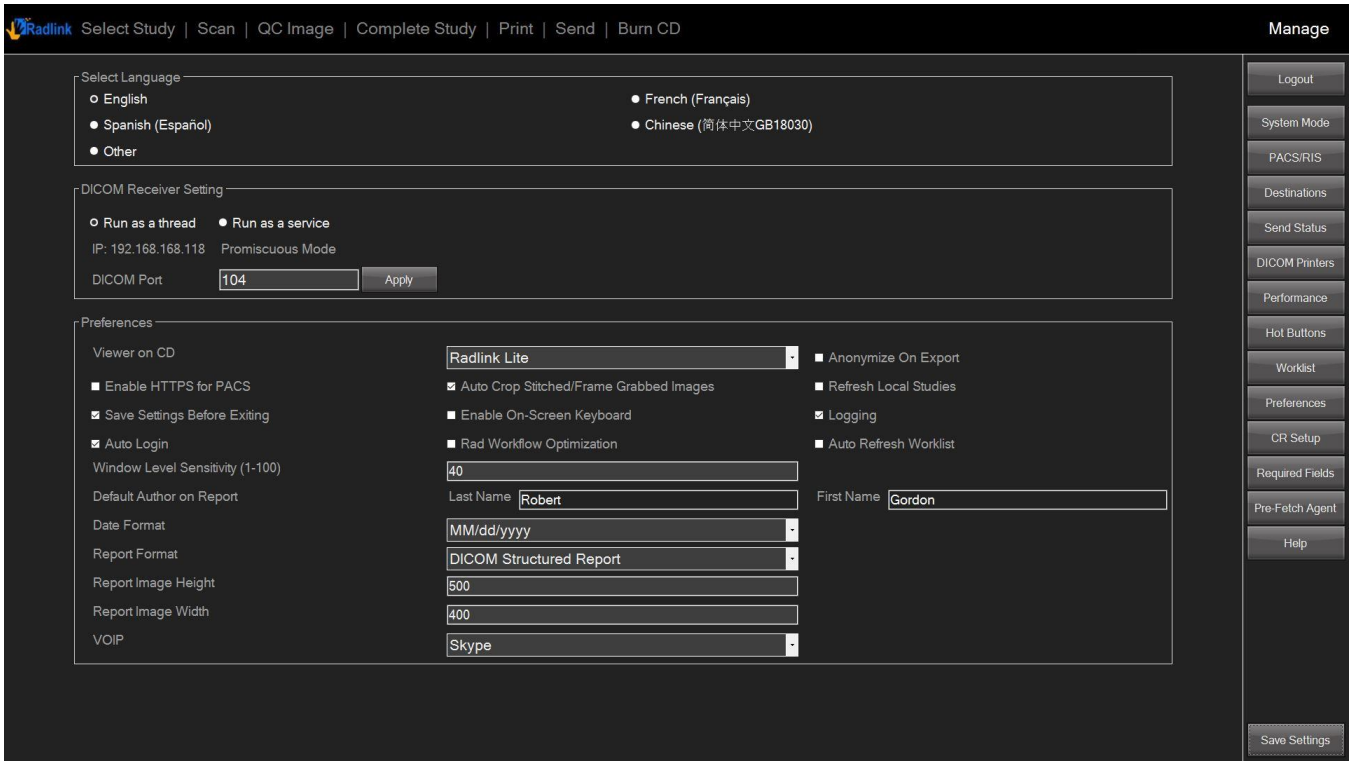
1. Click **Manage** button then **Preferences** button



The **Default Author on Report** is displayed in the **Preferences** section.

Reports (continued)

2. Enter the author's name in the **First Name** and **Last Name** fields.

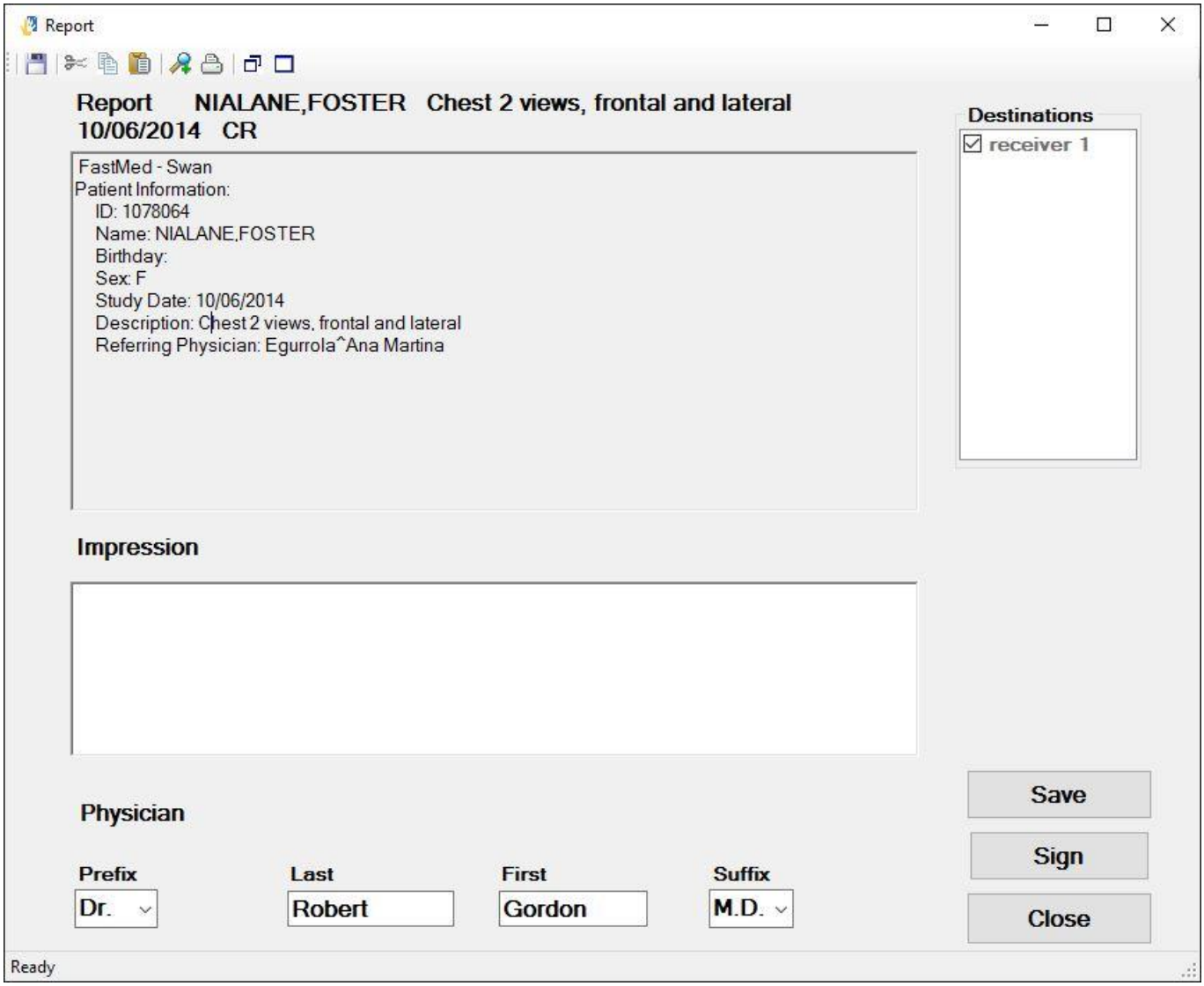


Note: In this example above, the report author *"Robert Gordon"* has been entered

Reports (continued)

To enter notes on a specific patient:

1. Select the desired study and view it in the **QC Image** window
2. Click **Report**



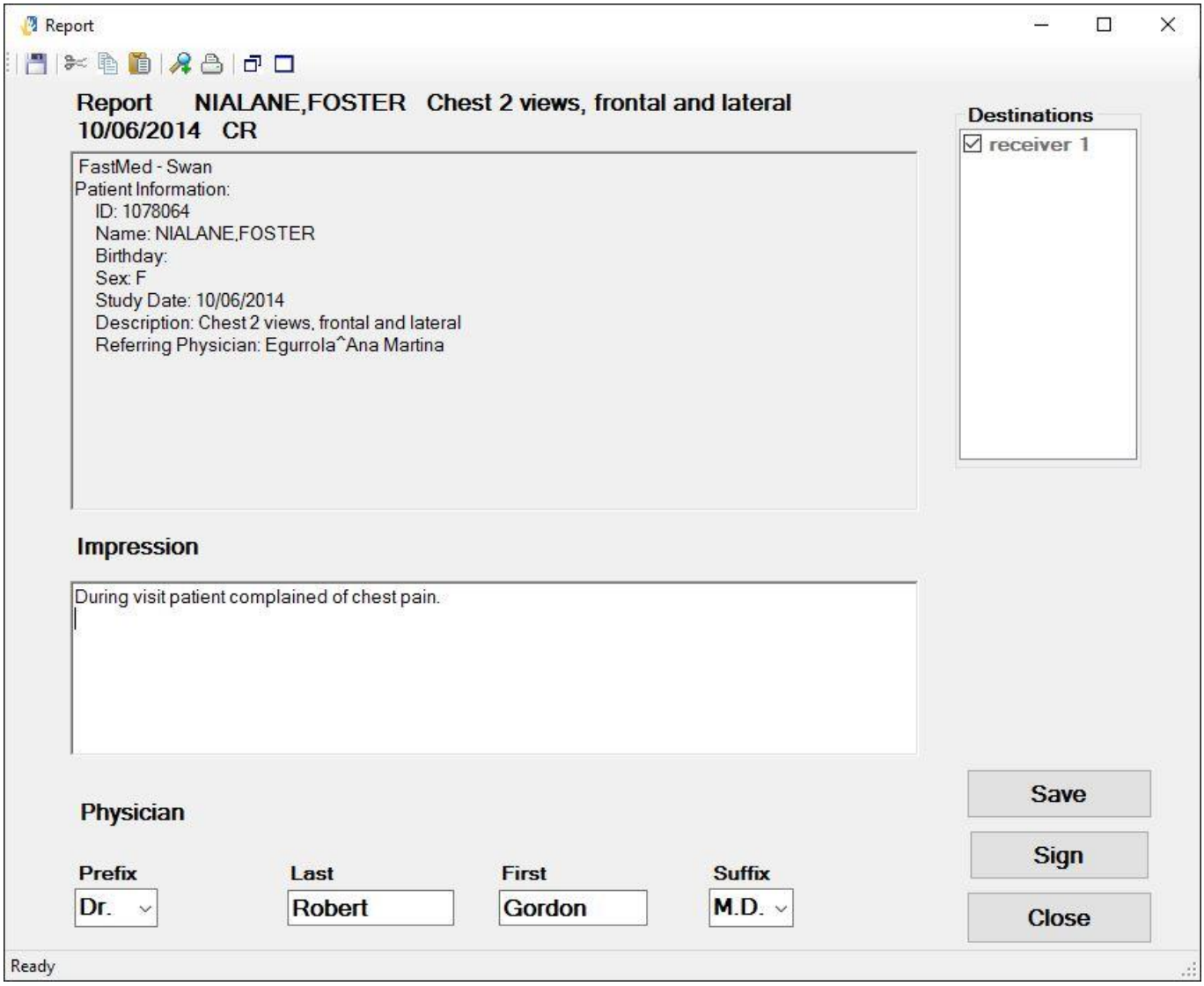
The above (structured) **Report** window is displayed

Note: The destinations are shown in the upper right hand corner

Only after entering a report, select **Save** or **Sign** to send the report to all active destinations.

Reports (continued)

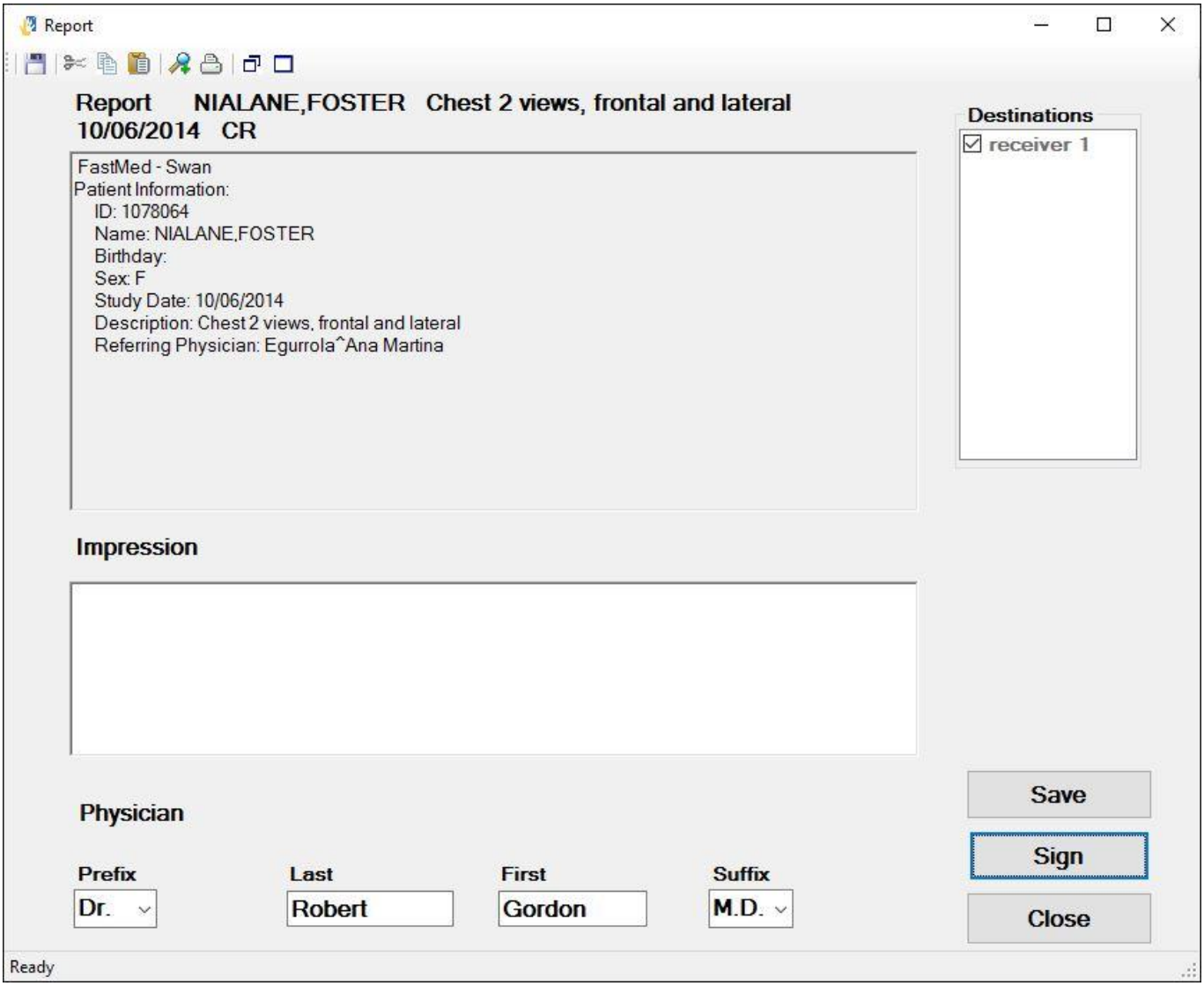
3. Select the **Impression** area and type a report.



Note: While **Save** sends the report to the specified destination, you may still modify it.

Reports (continued)

4. When you are finished with a report, select **Sign**



After clicking **Sign**, the report is displayed in a read only window, and also stored to the active destination(s).

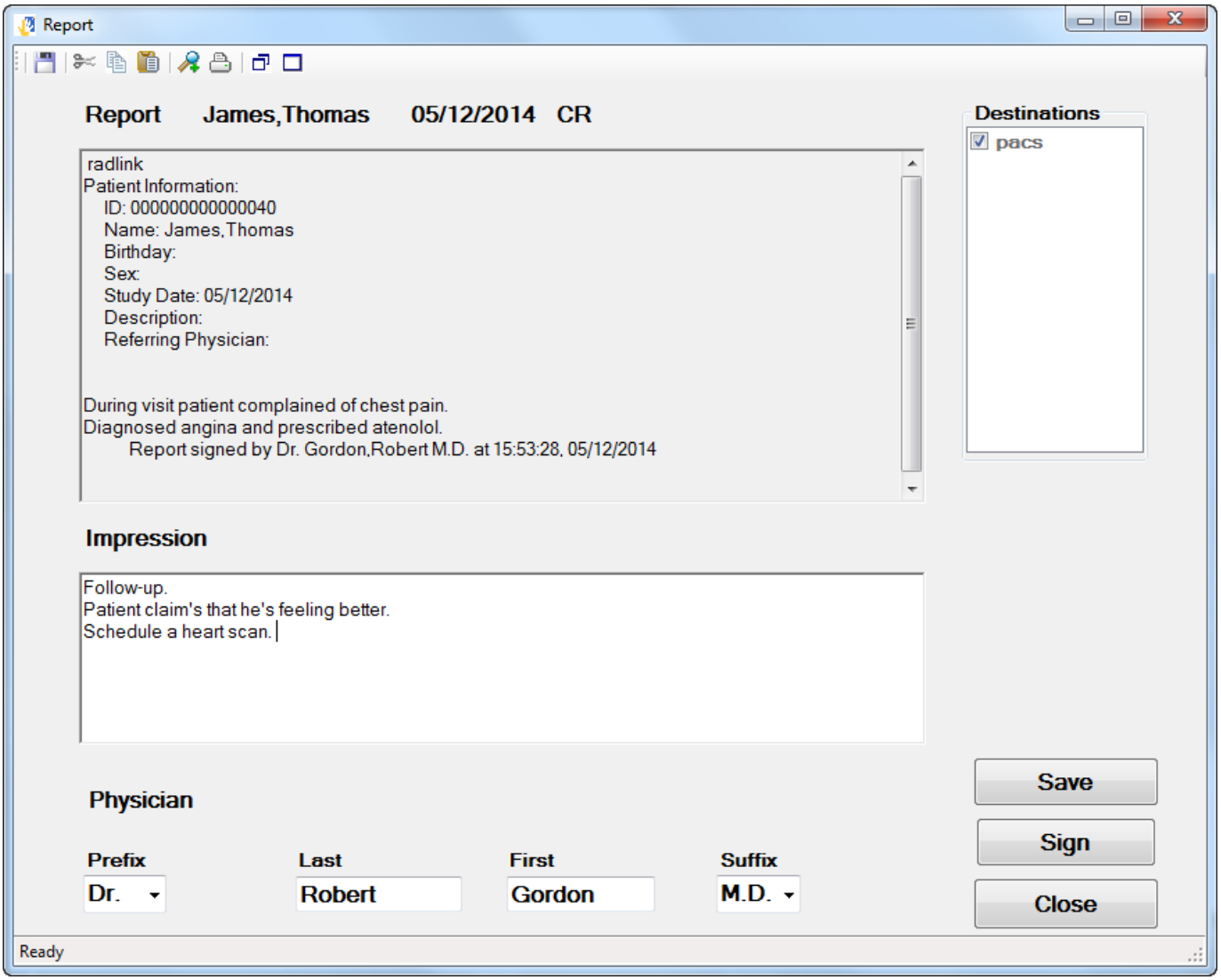
Note: A signed report can no longer be modified.

Note: To view the **Impression** field and the currently displayed image simultaneously, press the “Minimize” icon at the top of the **Report** window.

Reports (continued)

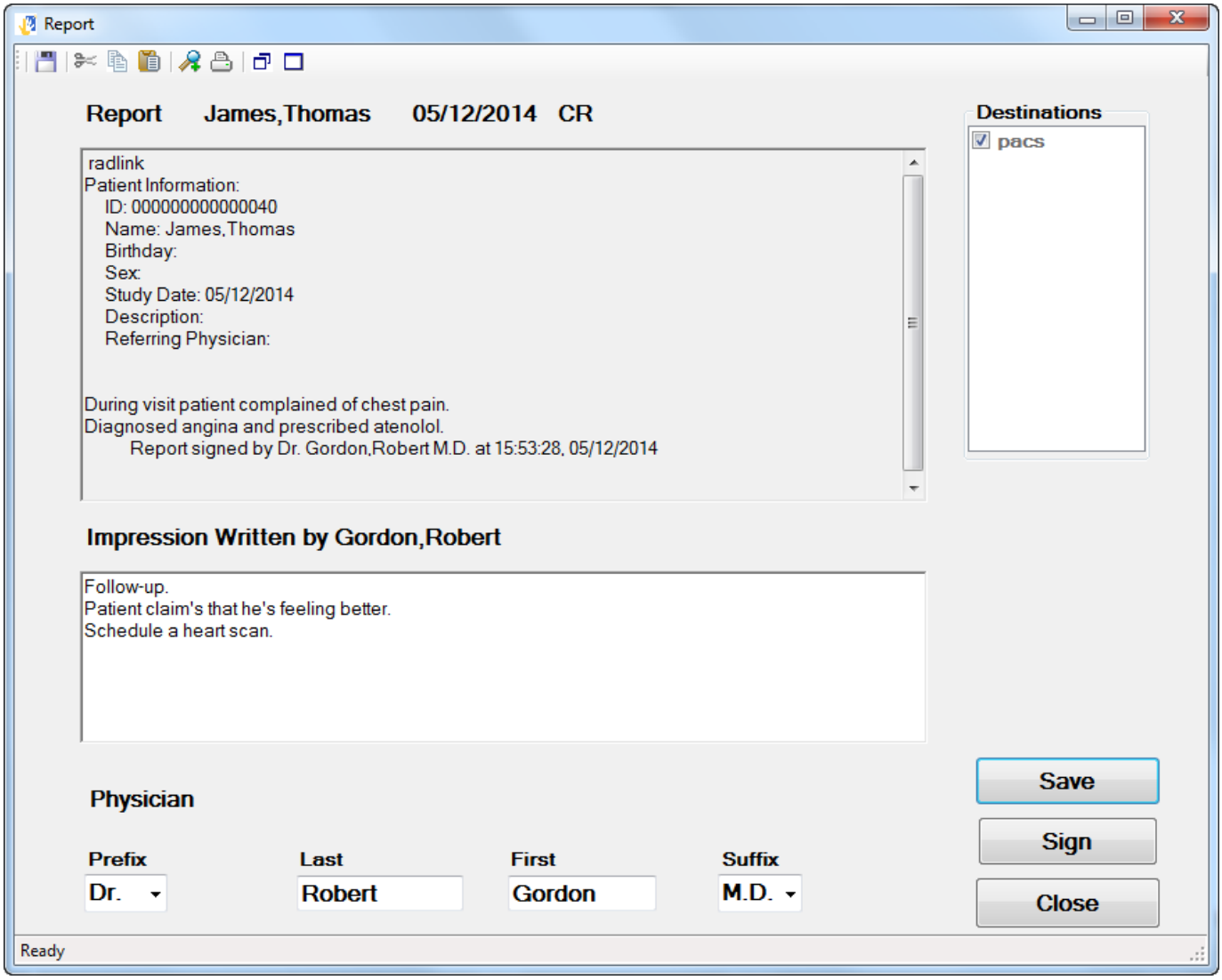
To enter a second report:

1. Select the **Impression** area and type a report.



Reports (continued)

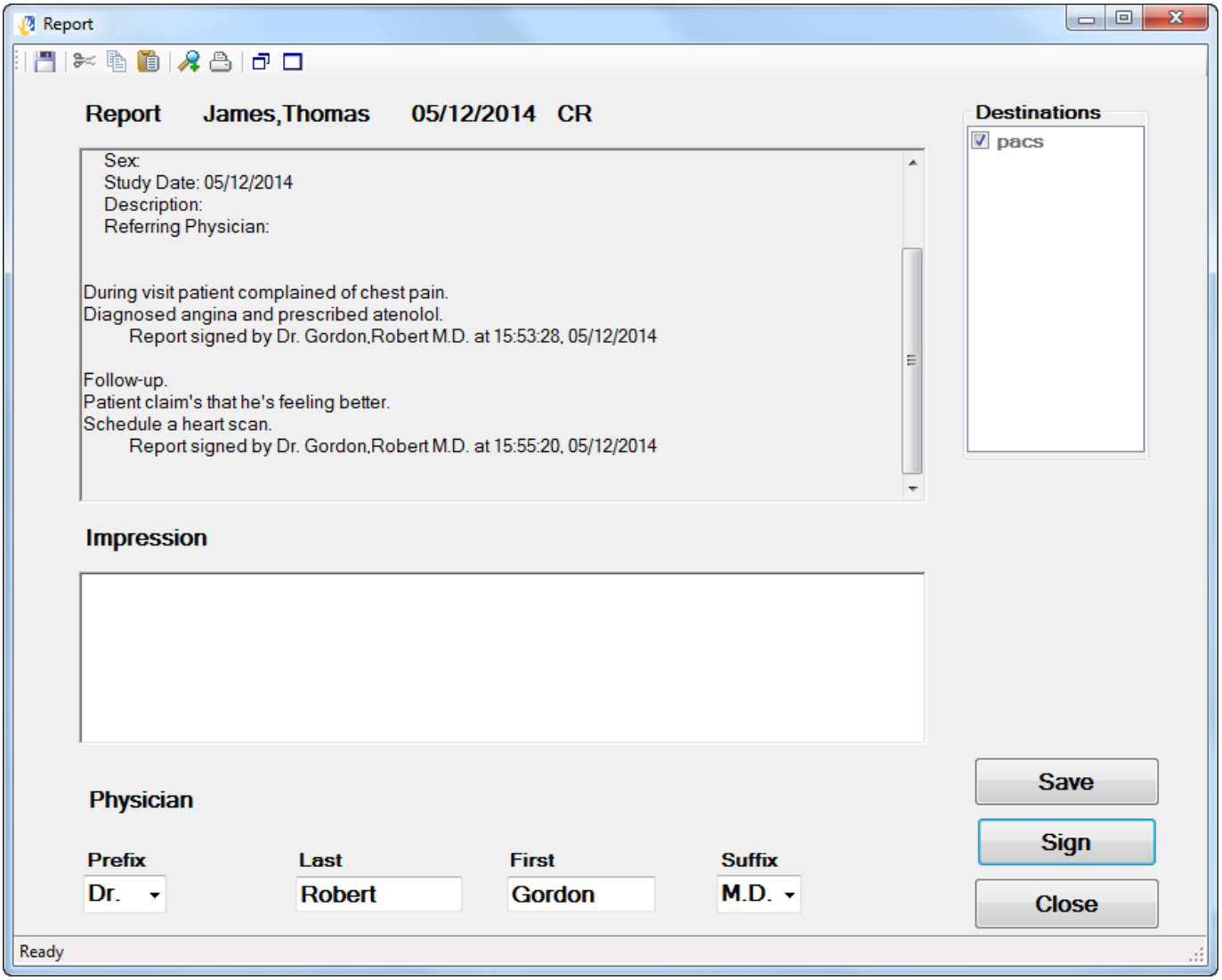
1. When you are finished with the second report, click **Sign** or **Save** button.



Note: While **Save** sends the report to the specified destination, you may still modify it.

Reports (continued)

When you have finished with the report and don't wish to make any more changes, click **Sign** button to finalize it.

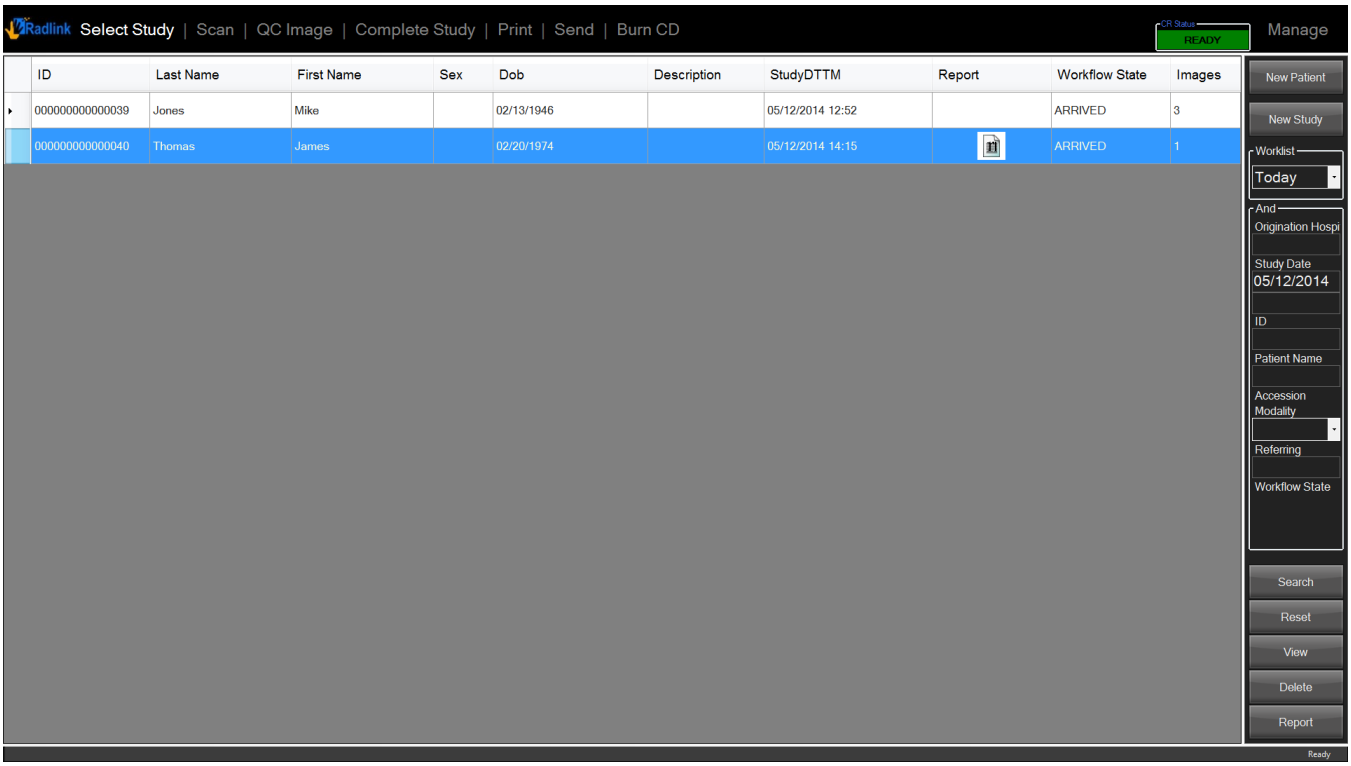


Note: The second report was pushed into the "read-only area" of the window, and was stored to the active destination(s).

Reports (continued)

To determine whether a study has a report:

1. Click the **Select Study** button and set Worklist to **All Studies**



Any study that has a report will contain an icon displayed in the **Report** column.

Note: In the above example, only the bottom study contains a report.

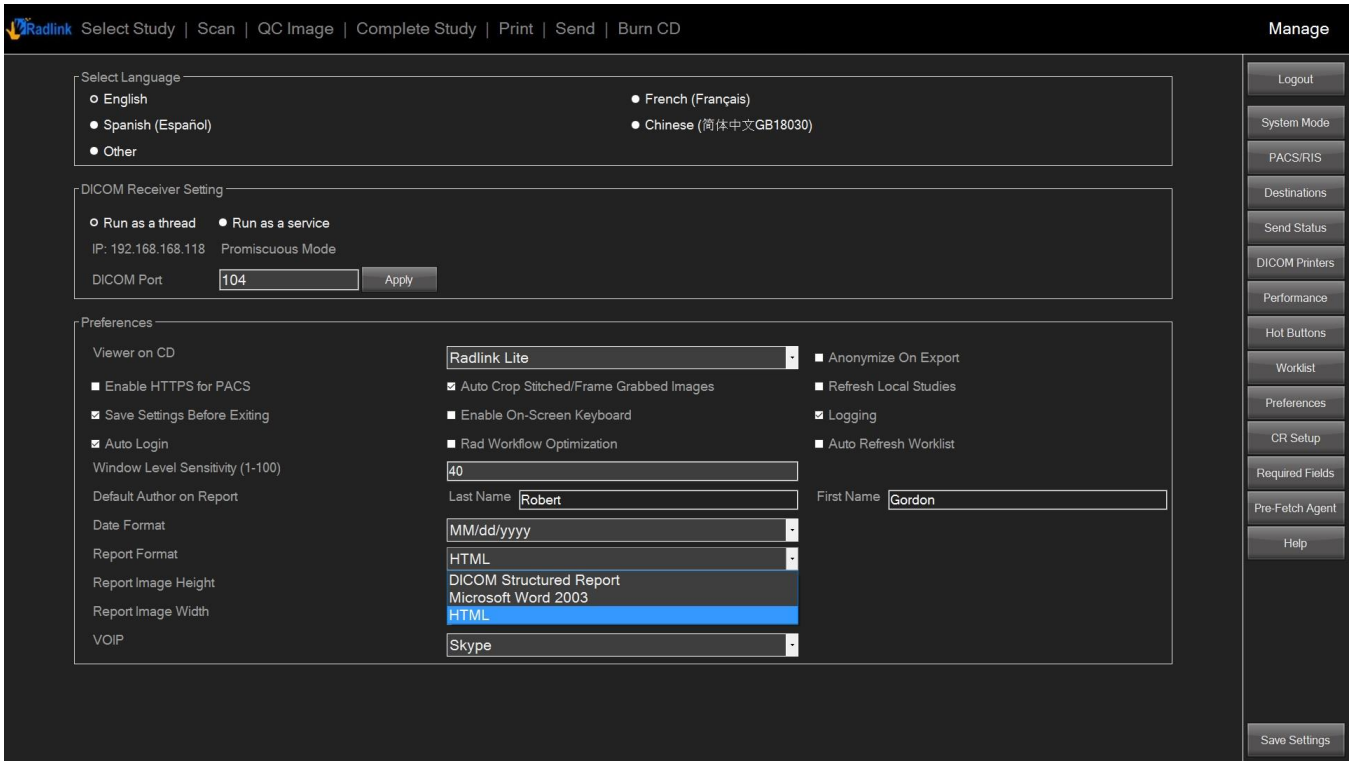
To read a report, select any study that has this icon, and then select the **Report** button in the bottom right corner of the software window screen.

Report editing using IE browser

You may edit and save reports using IE browser

To set the **Report Format** to HTML format:

1. Select **Manage,** and then select **Preferences**
2. Select **HTML** for **Report Format**
3. Select **Save Settings** in the bottom right corner

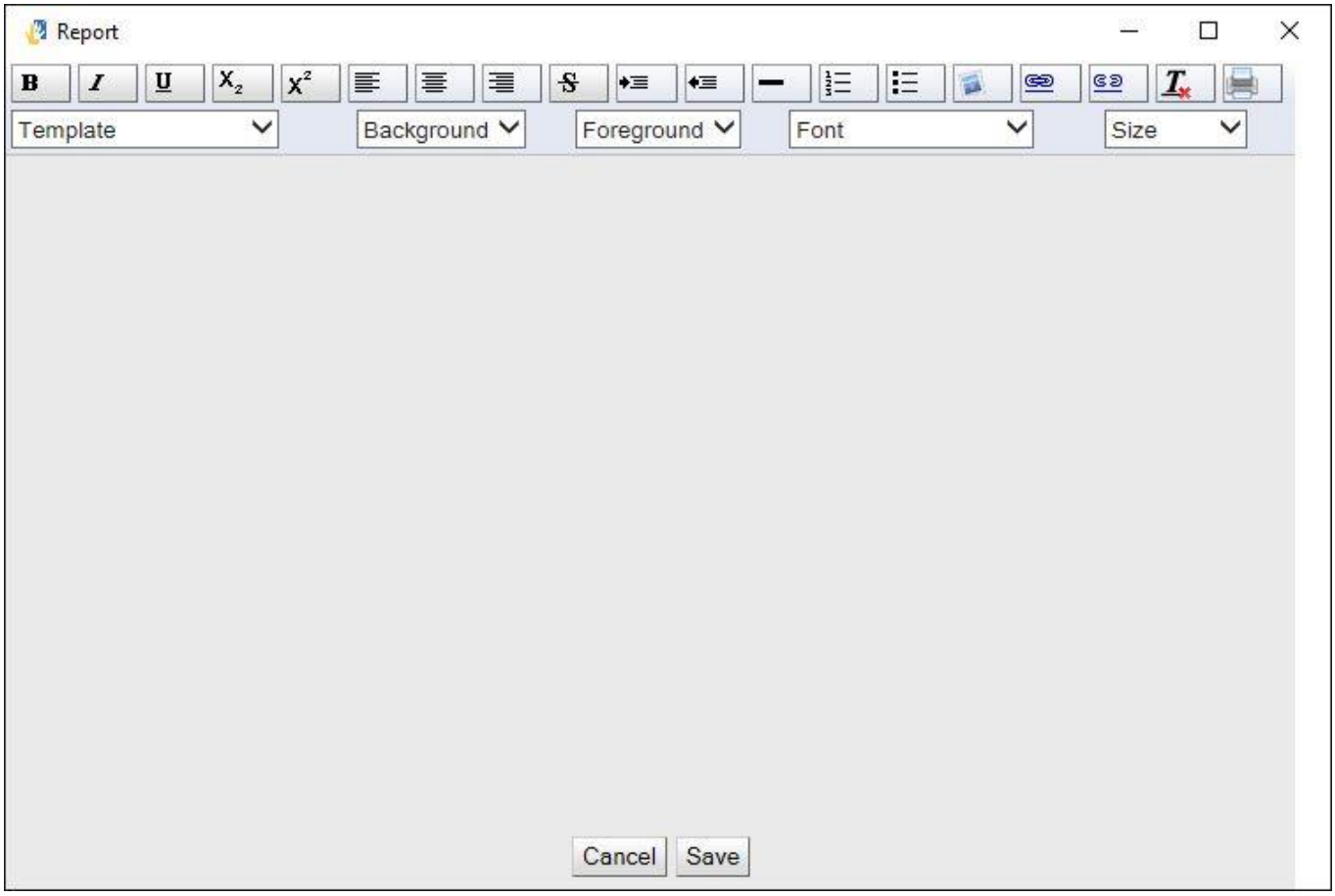


Report editing using IE browser (continued)

To enter notes on a specific patient:

1. Select the desired study and open it in the **QC Image** window

2. Click **Report**



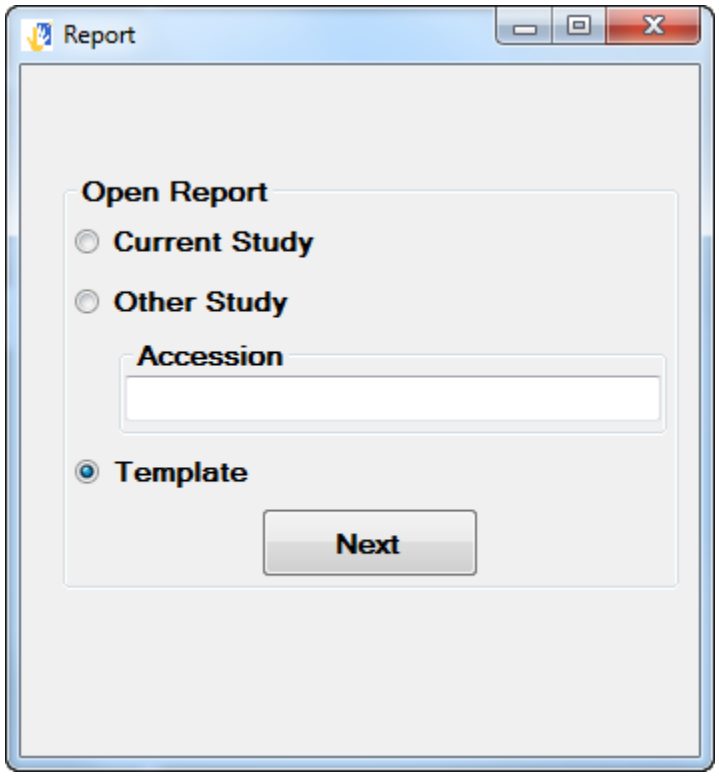
The HTML format **Report** window is displayed.

Note: After entering a report, when **Save** is selected the report will be stored to all active destinations

Report Template

The Radlink Pro Imaging software allows users to define the layout of a report (a template) in Microsoft Word format, where it can also be saved to PACS.

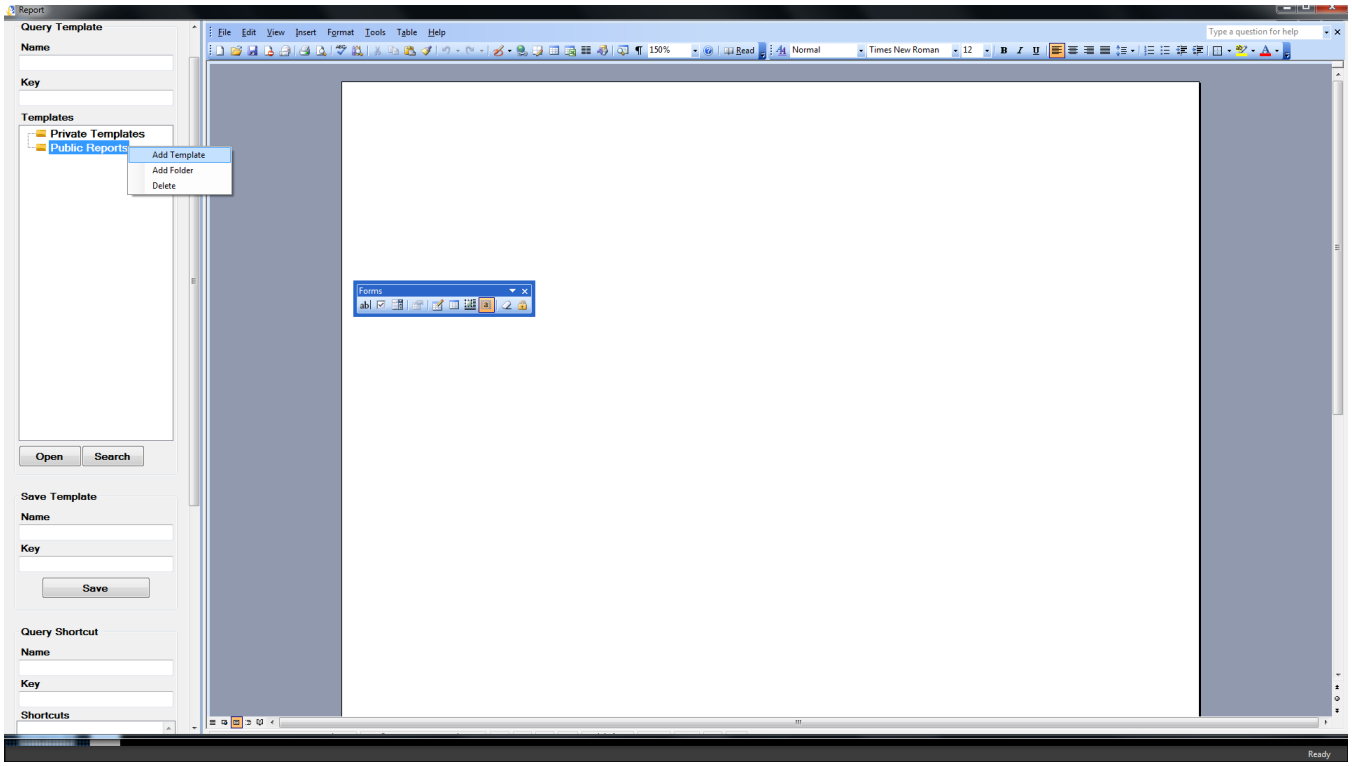
1. Select the desired study and view it in the **QC Image** window
2. Click **Report** from hot button list to bring up the report window in Microsoft Word format
3. Select **Template** to modify templates.



Report Template (continued)

4. Click the **Next** button

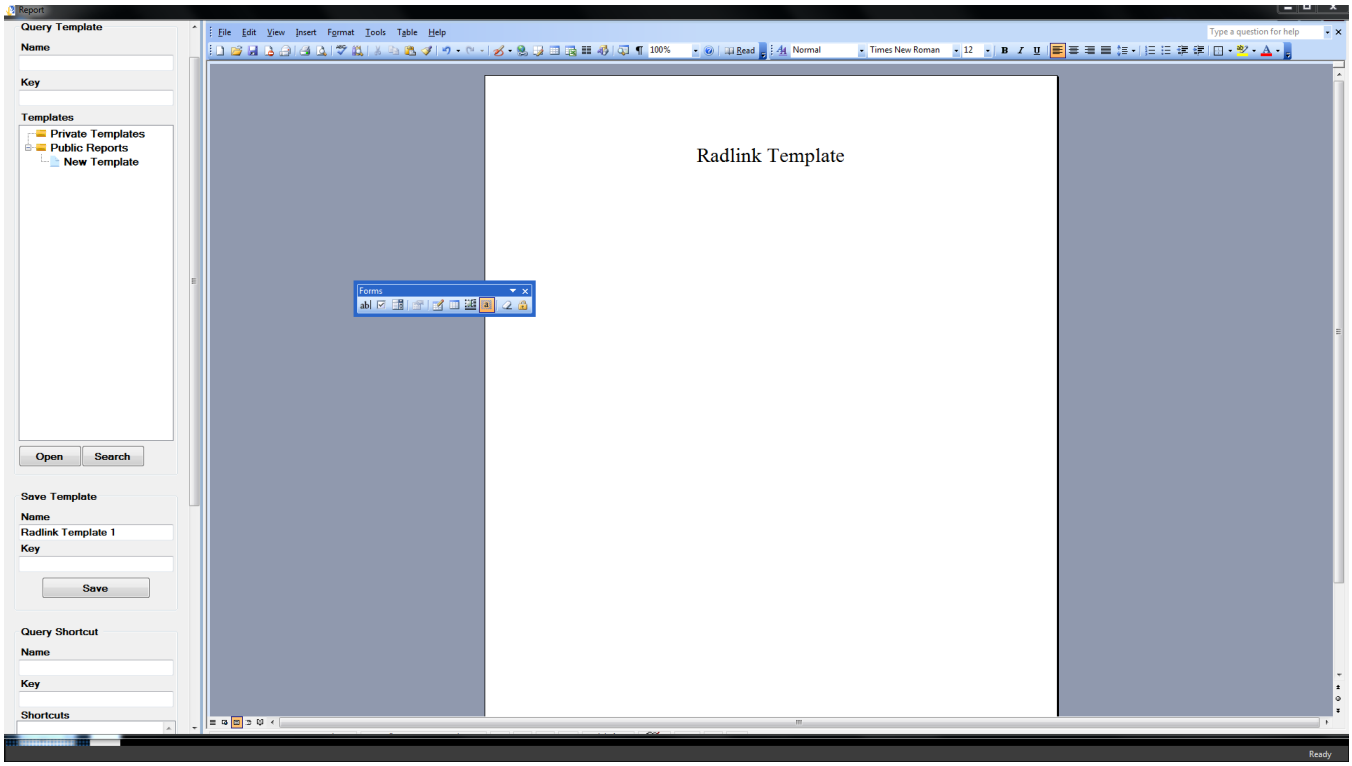
5. On the opened template editor, click **New** to open a blank report without the template or click **Open** to load new templates in Microsoft Word format from your PC.



Report Template (continued)

6. Edit template content

7. Click the **Save** button to save the report to PACS (which can be used in Workflow)

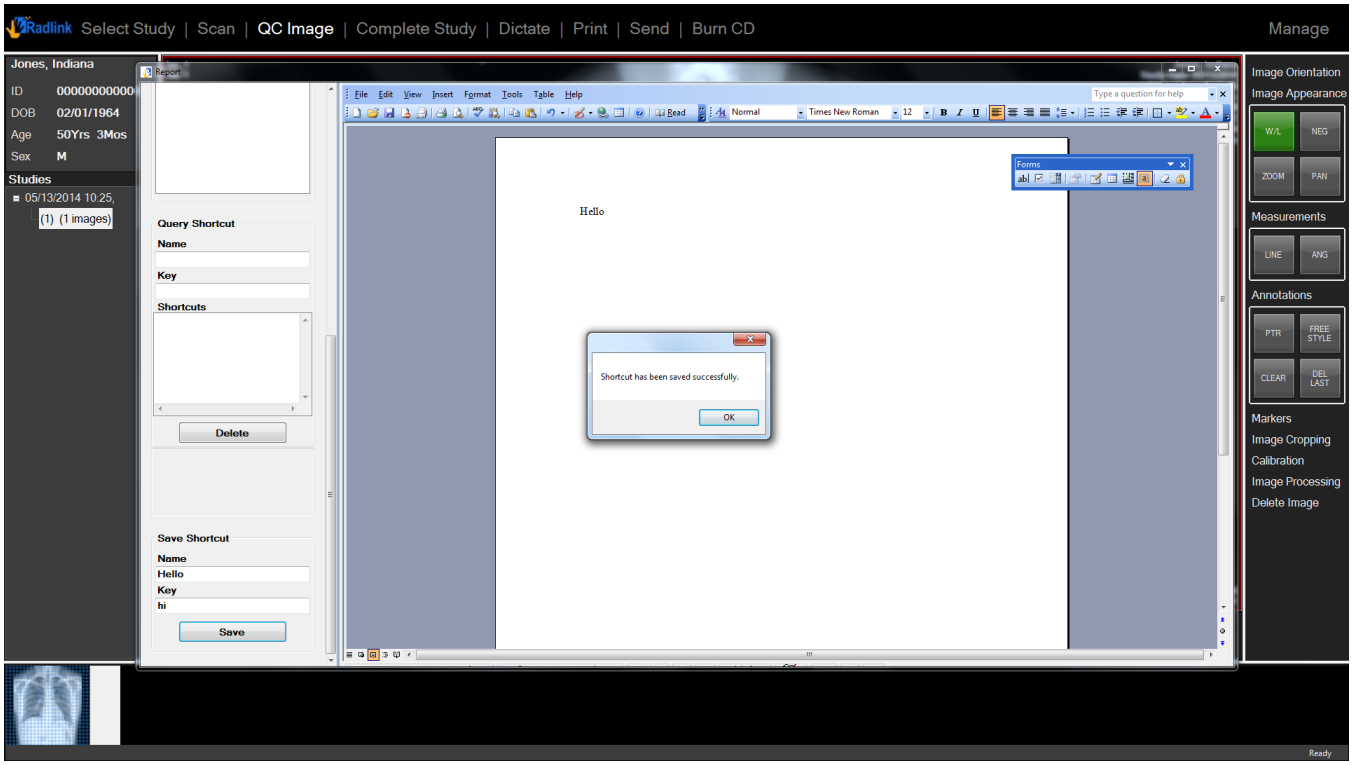


Lexicon/Shortcut

Radlink Pro Imaging software allows users to define/retrieve Lexicon/shortcuts

To create a new shortcut:

1. Enter the **Name** and **Key** under **Save Shortcut** column
2. Select desired text in Microsoft Word window
3. Click **Save**

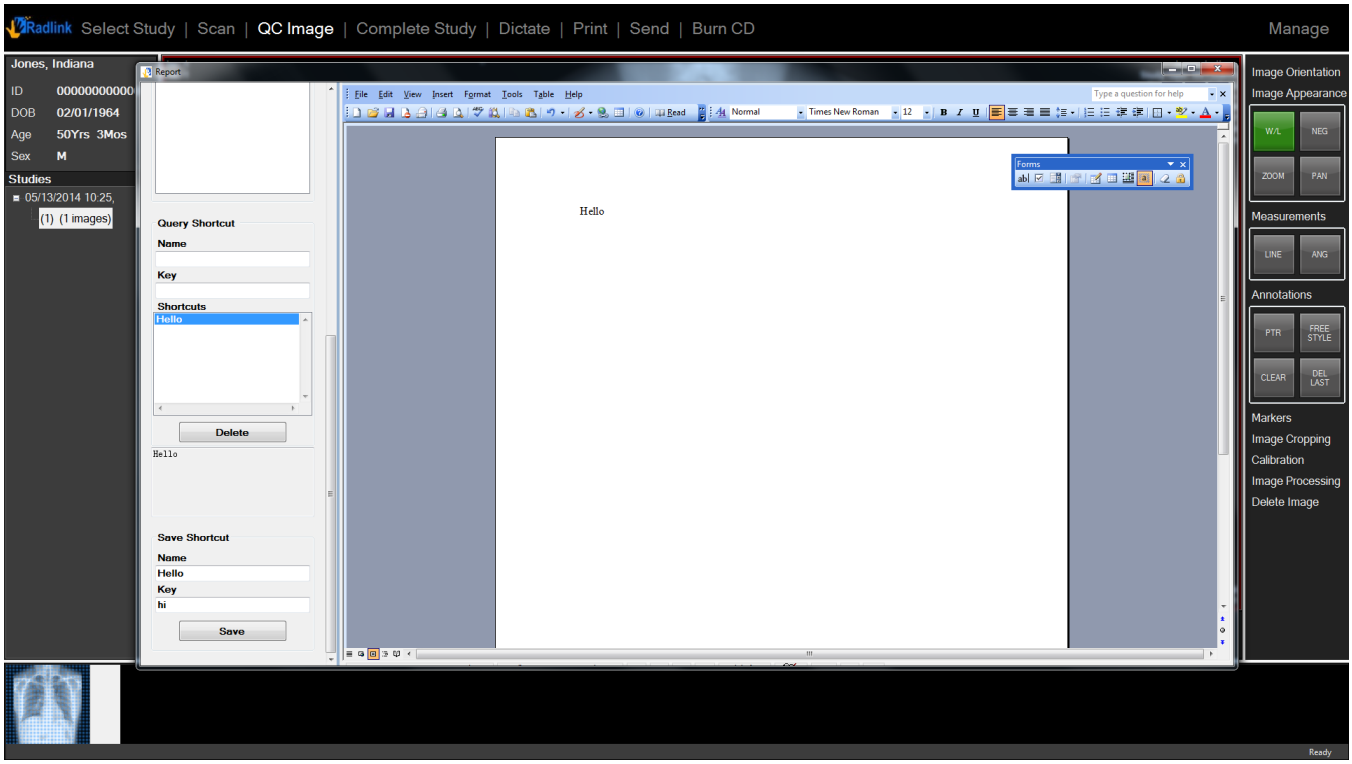


Lexicon/Shortcut (continued)

To query the shortcut:

1. Place the mouse in the Microsoft Word window at the point that you want to add the text of the shortcut.

2. Double-click the desired **Shortcut Name** under the **Query Shortcut** column.



The text of the shortcut will be added to your report.

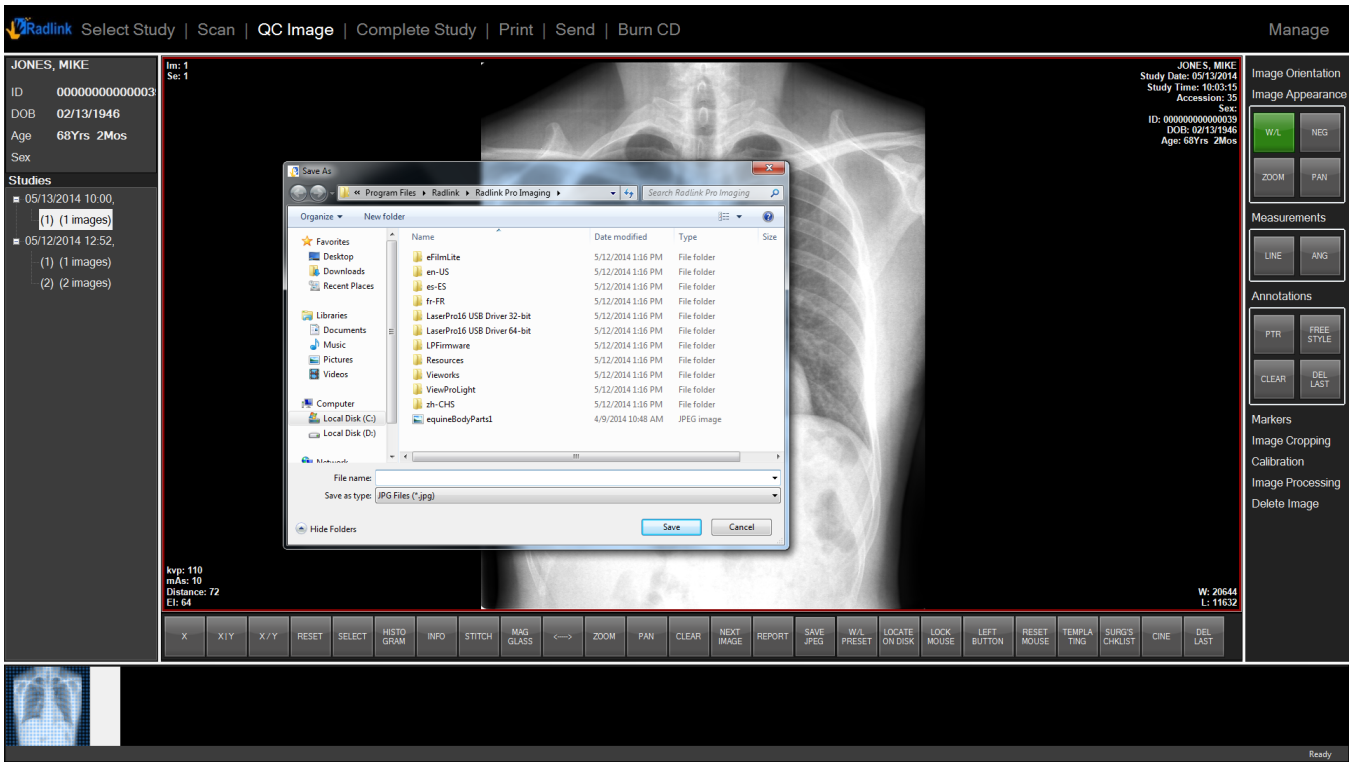
JPEG

Converting viewed images to JPEG files

To convert and save an image as a compressed JPEG file:

1. Select **Manage** then click **Hot Buttons** and check the **SAVE JPEG** box, click **Save Settings**

2. View the desired image back in the **QC Image** window



3. Select the hot button **SAVE JPEG**

4. In the **Save As** window, specify the desired location and select **Save**

Note: If more than one image is displayed when **SAVE JPEG** is selected, only the active window will be saved.

- The active window is shown in the center main-viewing screen, highlighted by the red box

Add JPEG Image/ Import Images

1. Copy and paste jpeg images to “C:\Users\GPS User\ViewPro\incoming” folder, they automatically convert to DICOM images into current study, but will create a new series for each input image.

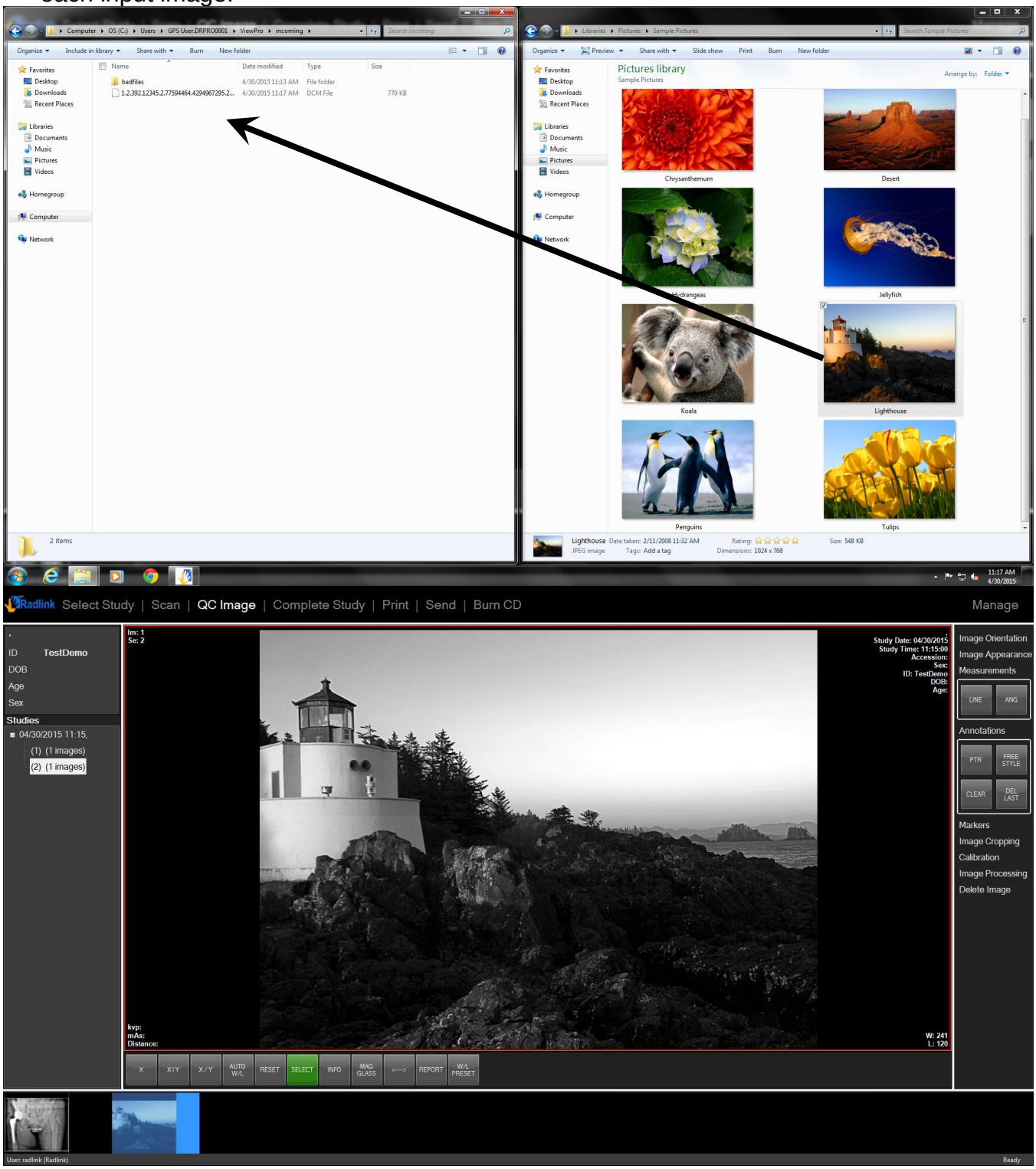
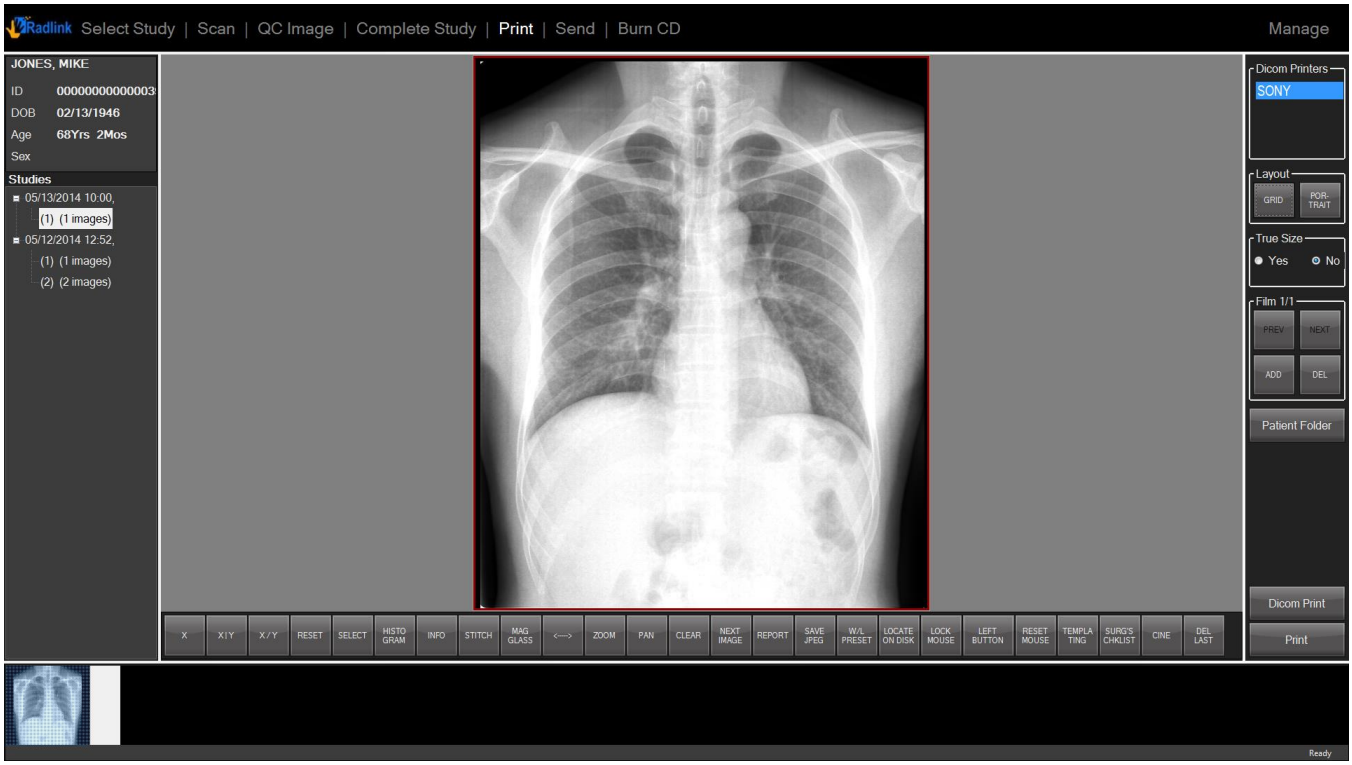


Image “Lighthouse” is imported to software with study series number (2).

Printing

Images may be printed to any of the printers that were previously setup in **Setting Up DICOM Printers** and/or to the printer defined as the Windows default printer

1. Press the **Print** tab located at the top of the display.
2. View the image window you intend to print
3. Click the checkbox of the printer(s) you wish to print in the **Printers** section.
4. Press the **Print** button.



For a non-DICOM printer (such as the Windows default printer), only one image may be printed at a time even though multiple images can be displayed.

<u>The following options apply to DICOM Printing Only:</u>

True Size when checked will print the actual size of the image to film.

True Size when unchecked will print the image as it is currently viewed on the display.

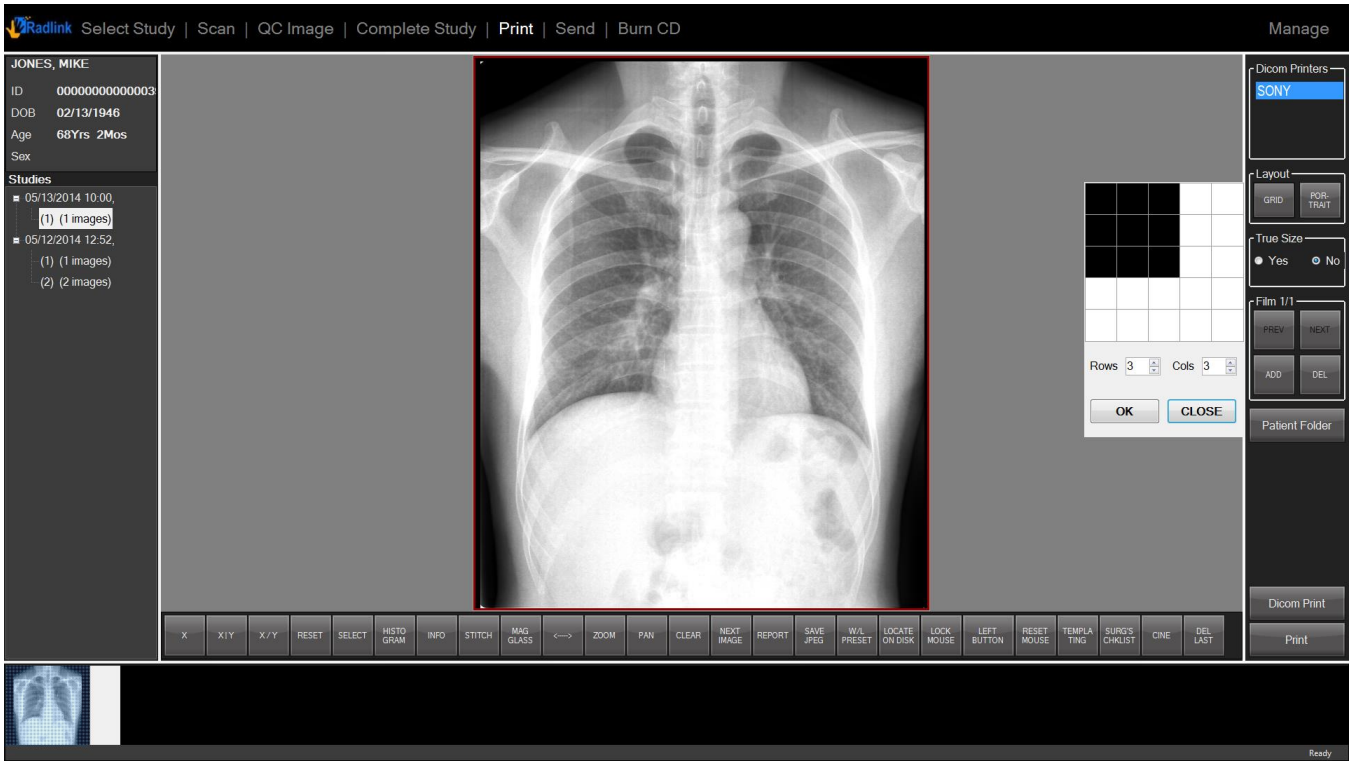
Select the image(s) you wish to print using the | X | | X \| Y | | X / Y | or Layout buttons,

Click the checkbox of the printer(s) you wish to print, and press the **Print** button.

Printing images from different patients

Images from different patients are allowed to be printed in the same print session.

1. Press the **Print** tab located at the top of the display
2. View the image window you intend to print
3. Click **GRID** button



Note: Grid windows will pop-up and allow you to set up the layout of the film

Printing images from different patients (continued)

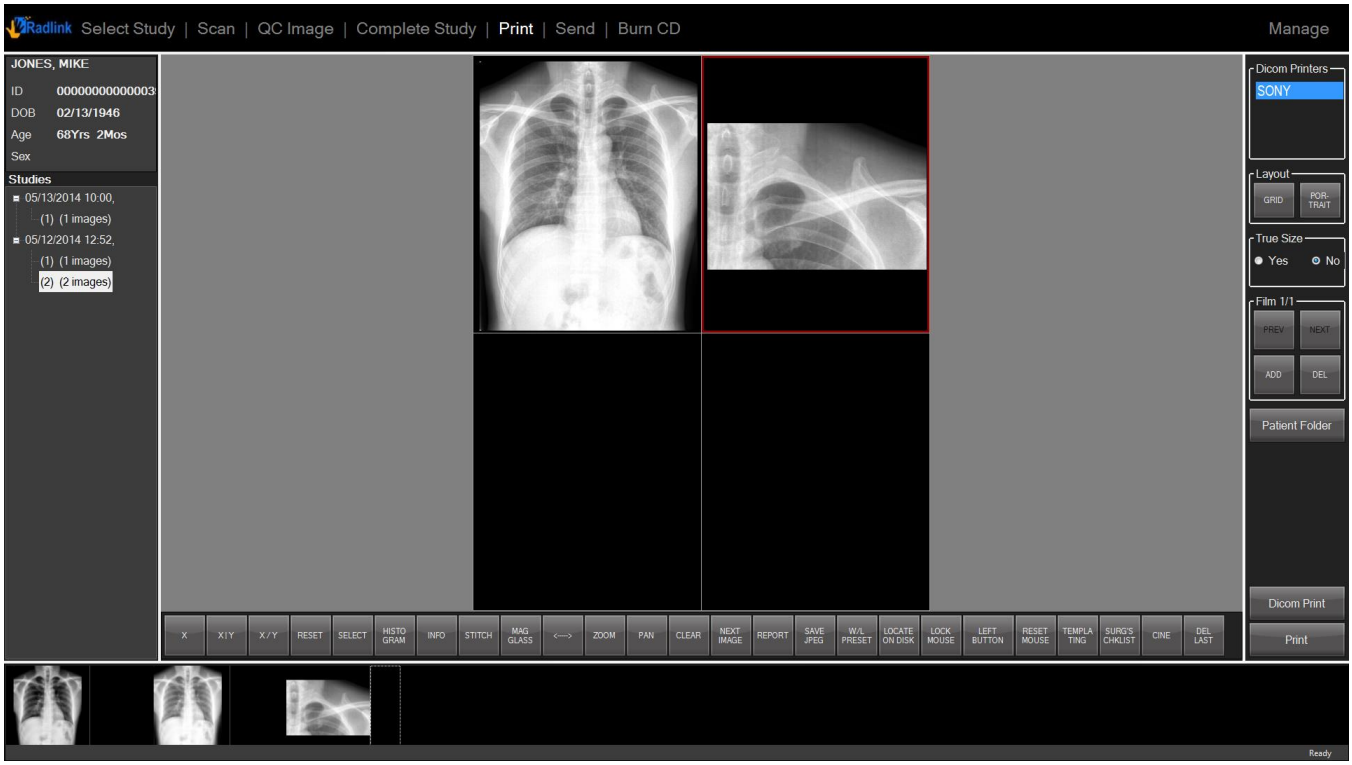
4. Select the desired layout and click **OK** button.
5. Left click in the grid where you want to place the next image
6. Click the **Patient Folder** button
7. Search the desired patient

The Search Patients window should pop up and allow you to add images from different patients in the same print session.

Note: You can search by patient name, patient ID, accession # or referring. You can also narrow down by modality.

Printing images from different patients (continued)

8. Select the patient, click **Load** button and close the **Search Patients** window



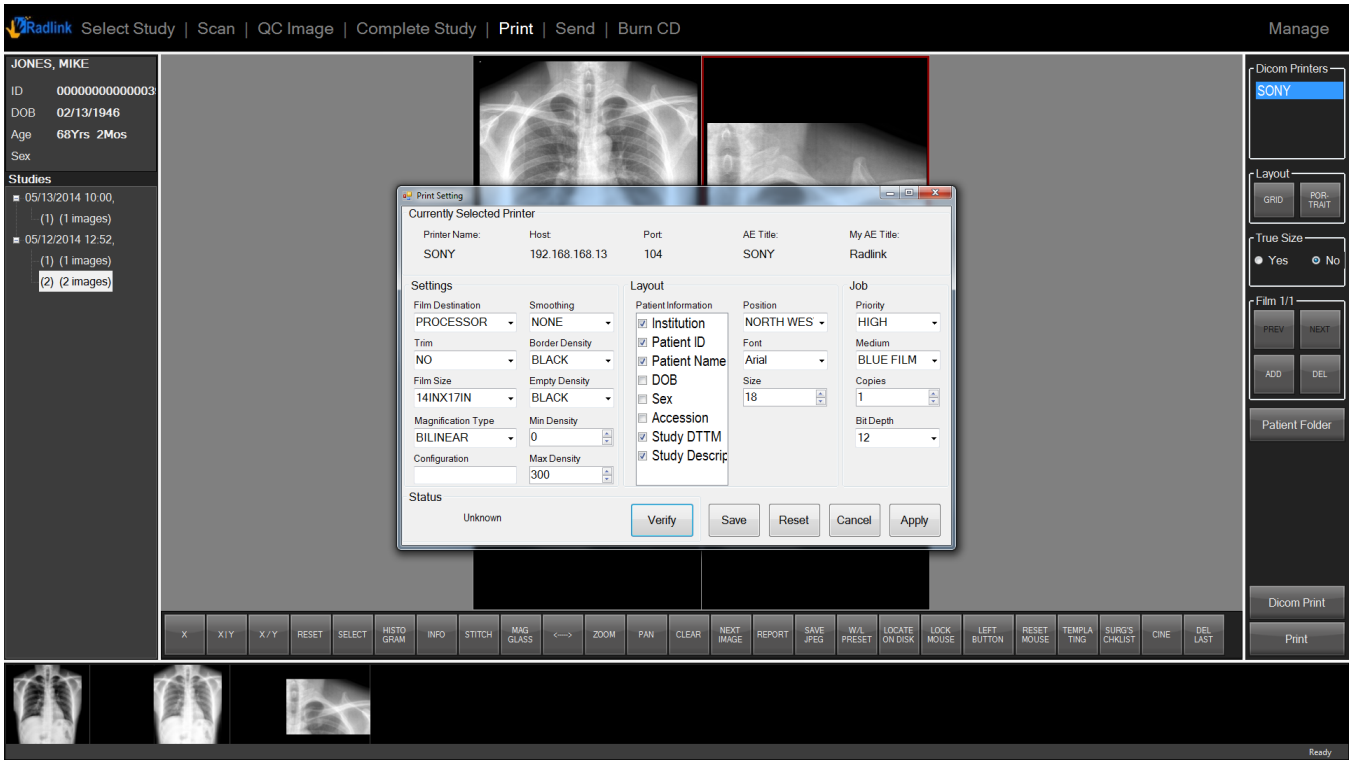
Note: All the images of that patient will be loaded as thumbnails at the bottom.

9. Select the desired image to fill in the grid.

10. Repeat 5-8 to add images from other patients if needed.

Printing images from different patients (continued)

11. Double click the printer you wish to print with, while inside the **Printers** section



The **Print Setting** window will pop up and allow you to modify the setting of the printer:

12. Select the **Save** button.

13. Select the **Print** button.

Printing images for multiple sheets

1. Press the **Print** tab located at the top of the display.
2. View the image window you intend to print
3. Select the layout of the film and add images
4. Click **NEXT** button under **Film** box

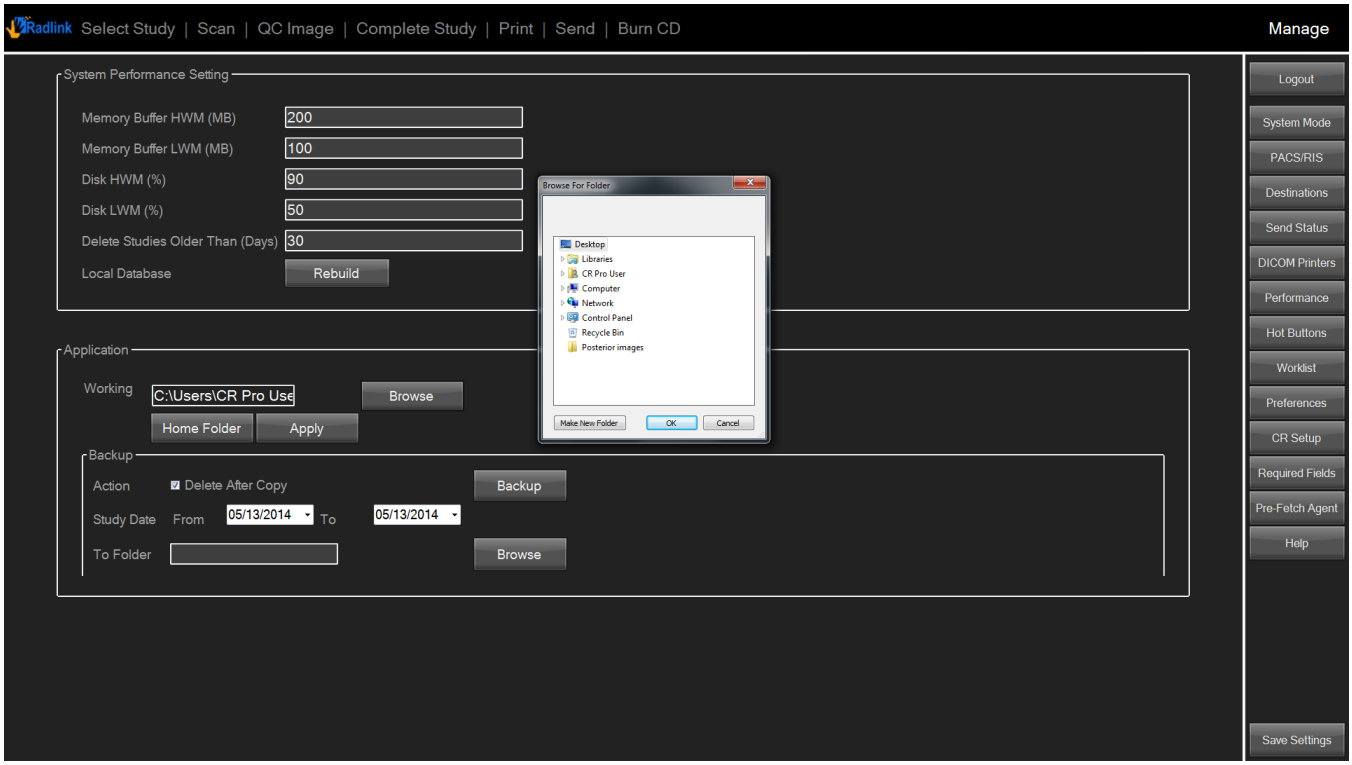
New sheet will be loaded and allows you to set up the layout and add images for the next film.

You may Click **ADD** or **DEL** buttons to add or delete the sheets.

Backup/Restore ViewPro Folder

You are allowed to set up a backup folder in order to backup all the data in ViewPro folder.

1. Go to **Manage**, and then click **Performance**
2. Click **Browse** under **Application** to setup a backup folder.
3. Click **Backup** to copy the files from the **Home Folder** to **Backup Folder**



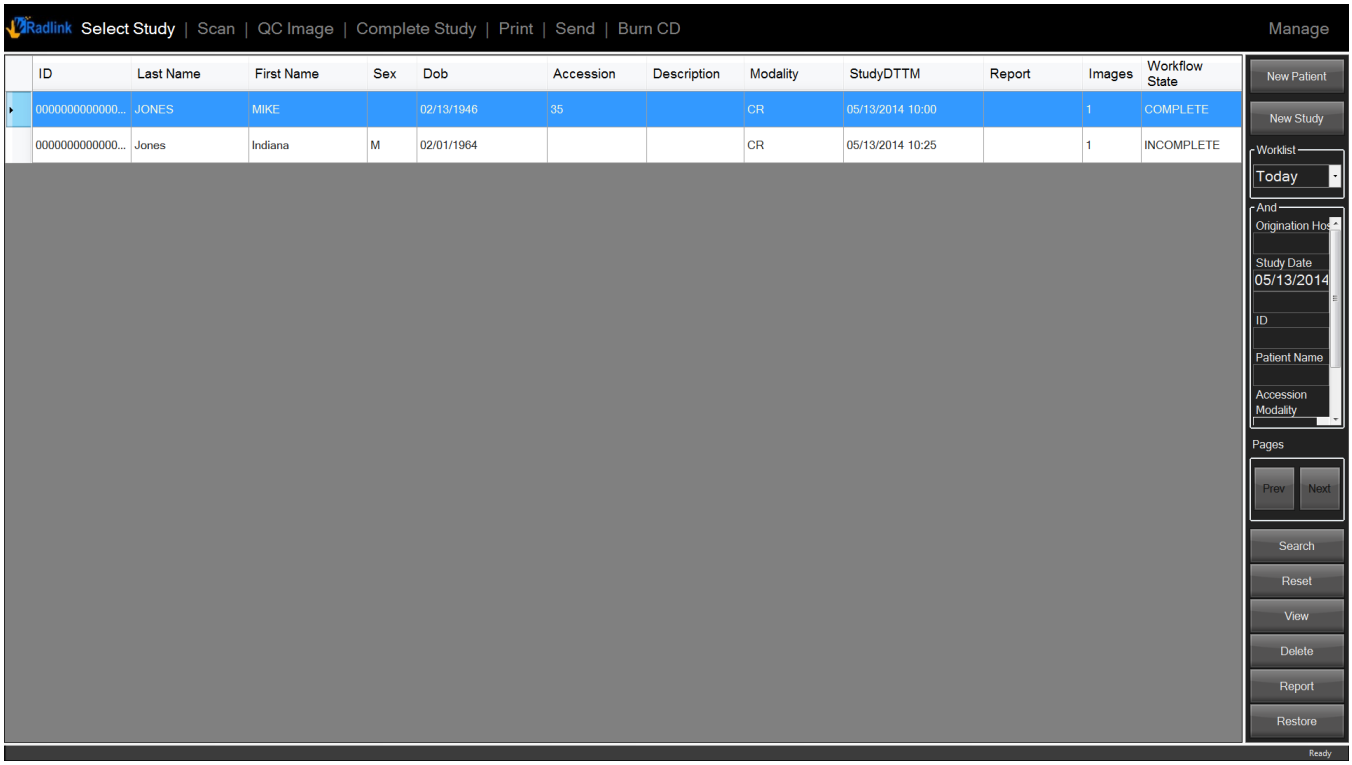
You may check the **Delete After Copy** box, and ViewPro will delete files in the **Home Folder** after importing them into the **Backup Folder**

Note: You may set the study date to narrow down the files you need/choose to backup.

Backup/Restore ViewPro Folder (continued)

To restore the files from **Backup folder** back to **Home folder** after the backup:

1. Go to **Manage**, and then click **Performance**
2. Click Browse under Application to set the **Backup Folder** path as **Home Folder**.
3. Click **Apply** button.
4. Go to **Select Study** window

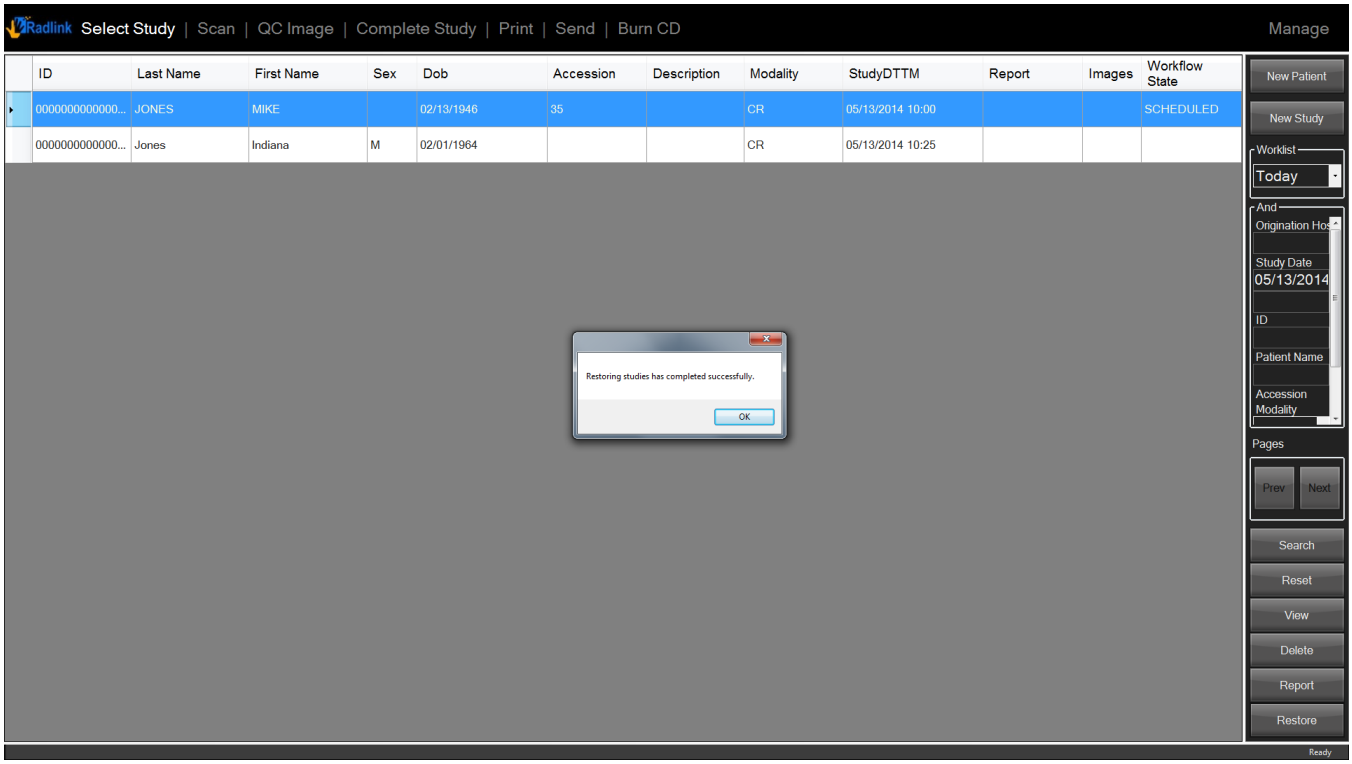


The **Restore** button shows up at the right bottom.

5. Select the studies that you want to restore by highlighting all the desired studies

Backup/Restore ViewPro Folder (continued)

6. Click **Restore** button

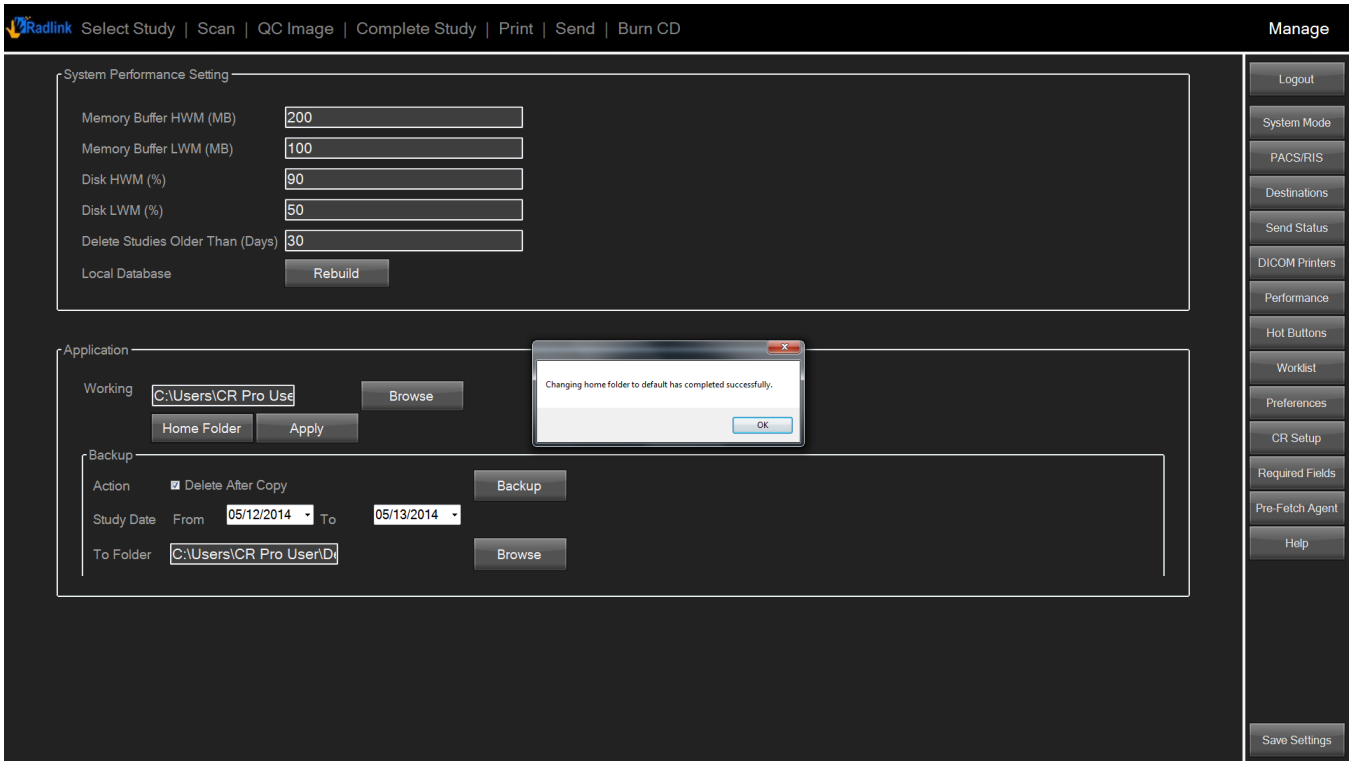


A message will pop up indicating that restoration of the files has completed successfully.

7. Click **OK**

Backup/Restore ViewPro Folder (continued)

8. Go to **Manage**, and then click **Performance**
9. Click **Default** button for the **Home Folder** path setting.



10. Click the **Apply** button

Workflow States

Note: The Workflow States are a configurable portion of the Radlink Pro Imaging software. All fields may be customized to display information that the end user will define for the software.

It is required that Microsoft Word be used to take reports in this functionality. Microsoft Word is sold separately.

In this example:

The Radlink embedded ThinPACS is configured with a list of workflow states that best suits the needs of the site. The complete list of workflow states is:

Workflow State	Description
ARRIVED	When a study first arrives at the PACS, its state is ARRIVED.
VERIFIED	The completeness and accuracy of the study has been verified.
DICTATED	A report has been dictated for the study.
FINALIZED	The report has been approved and finalized.

A site can be configured with a subset of the states "**ARRIVED, VERIFIED, DICTATED, FINALIZED**".

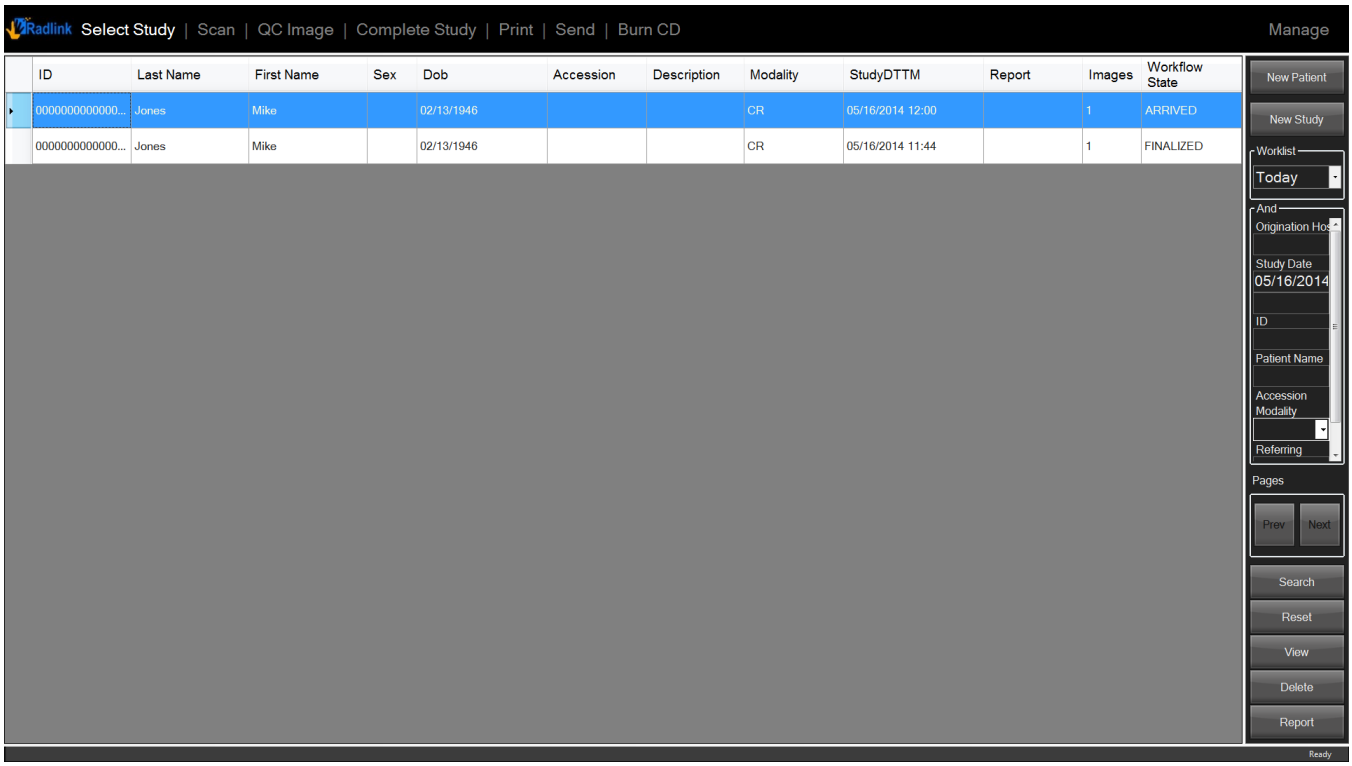
If a site is not configured with Workflow States, the following buttons will not be present.

If the site is configured with Workflow States, the software will take the following sequence.

Workflow States (continued)

If a site is configured with the full set of workflow states, the status of the **Workflow State** column would be as follows:

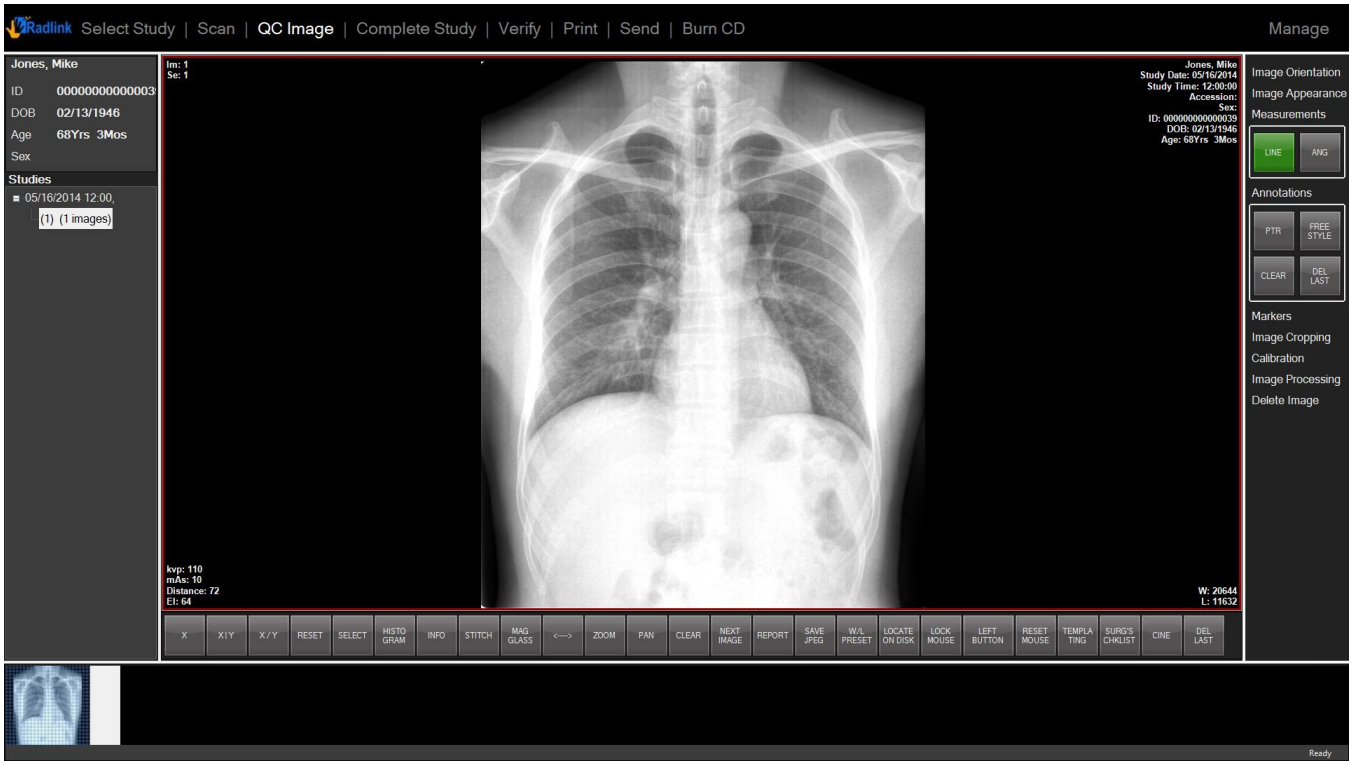
1. Go to **Select Study**
2. Select the desired study that you want to view



In the example case above, the highlighted study has a Workflow State of "**ARRIVED**", meaning the study has arrived to the PACS destination.

Workflow States (continued)

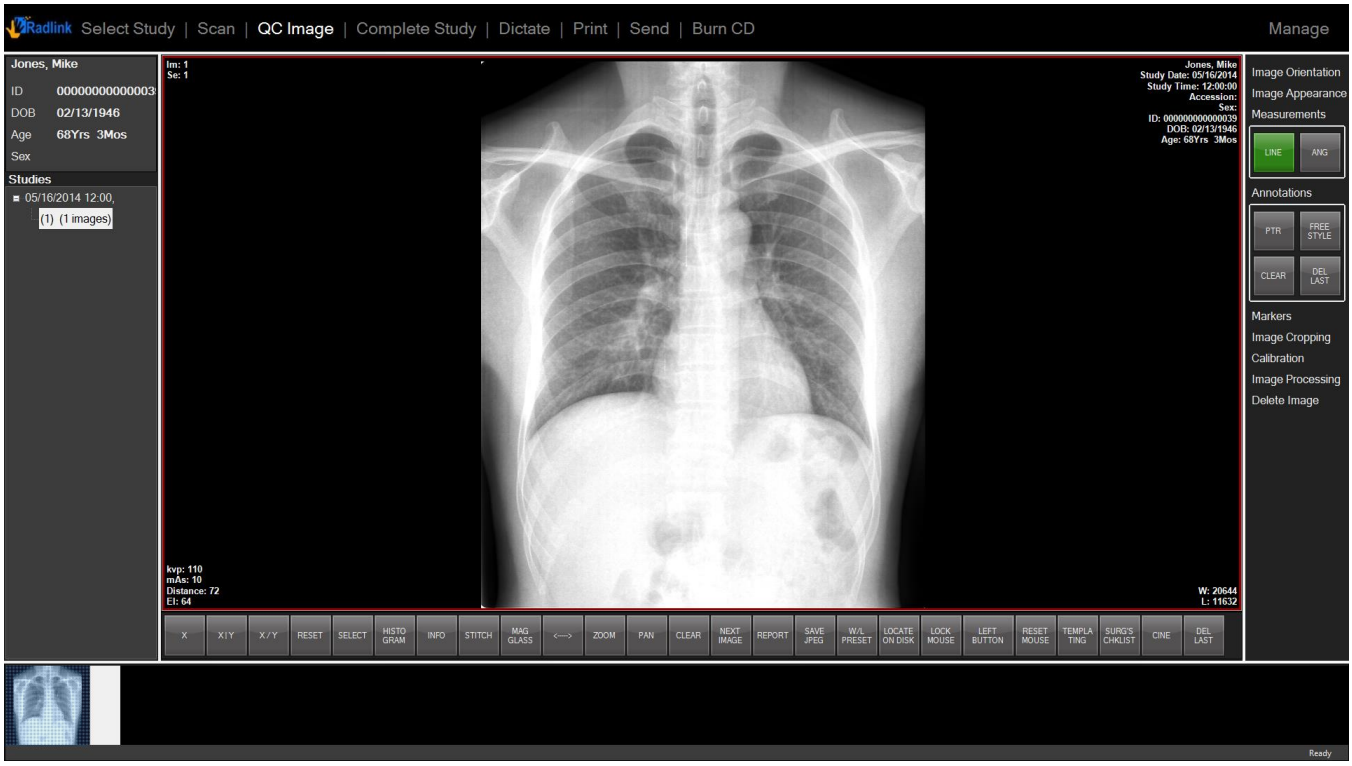
3. Click the **Verify** button.



Note: In this example, the button which has been custom defined is the **Verify** button at the top of the software. The action that has been defined when this button is pressed is that the software will verify that all of the images that were supposed to be sent with the study have properly arrived.

Workflow States (continued)

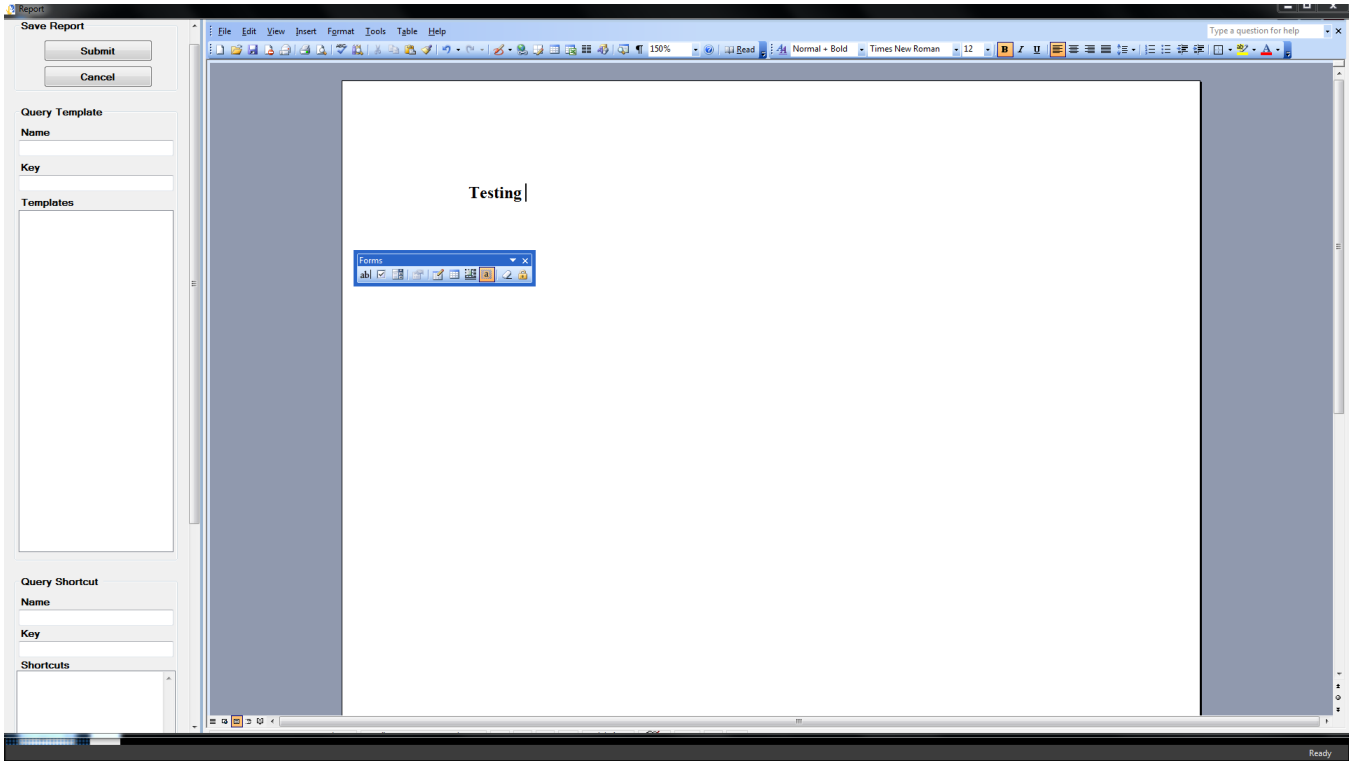
4. Click the **Dictate** button.



Note: In this example, the software was able to properly verify that all of the images that should have arrived have successfully been transferred. The button at the top will now read the next custom setting, **DICTATE**, and the **Workflow State** of the study changed to **VERIFIED**.

Workflow States (continued)

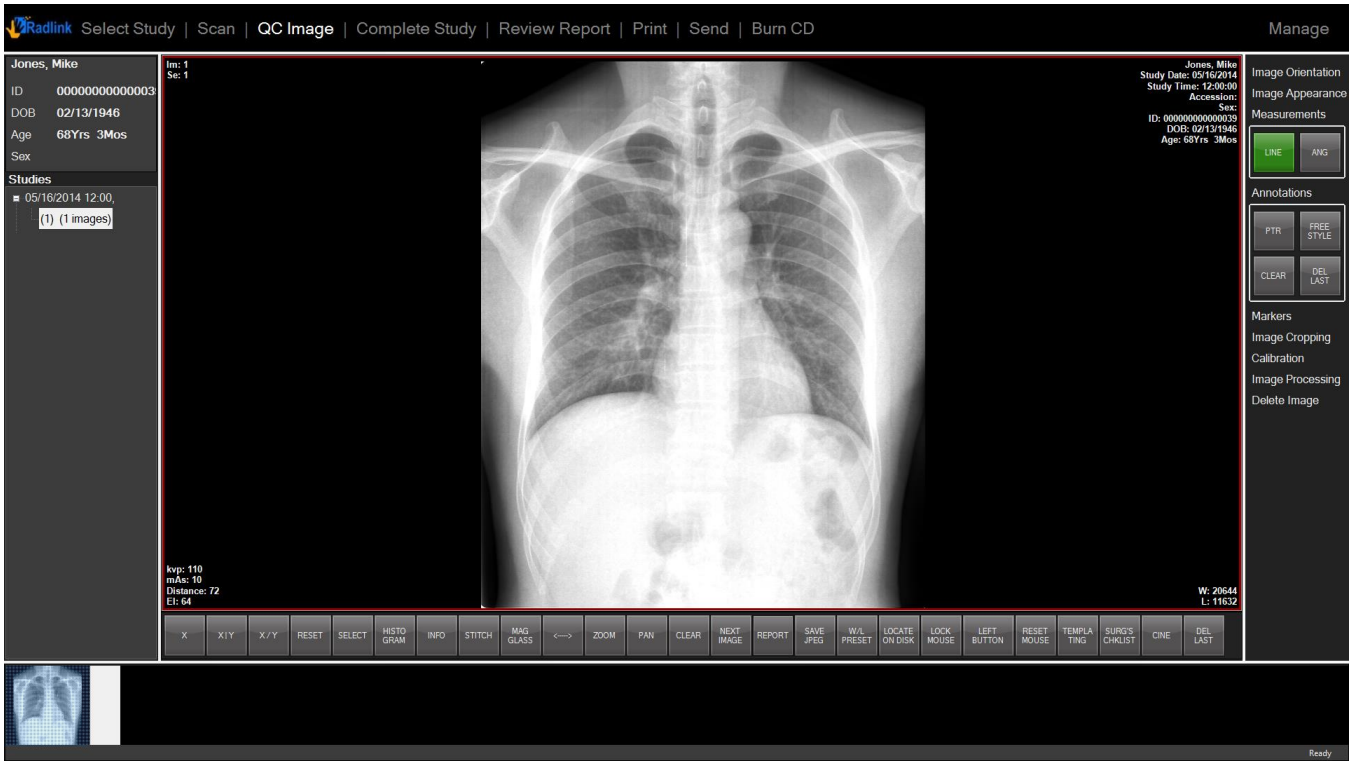
5. Click **SUBMIT** to submit the report



Note: A report window for the current study will be brought up for the user to make notes to. There is a **SUBMIT** button on the left side for when the user has completed all of the notes for this study.

Workflow States (continued)

6. Click the **Review Report** button.

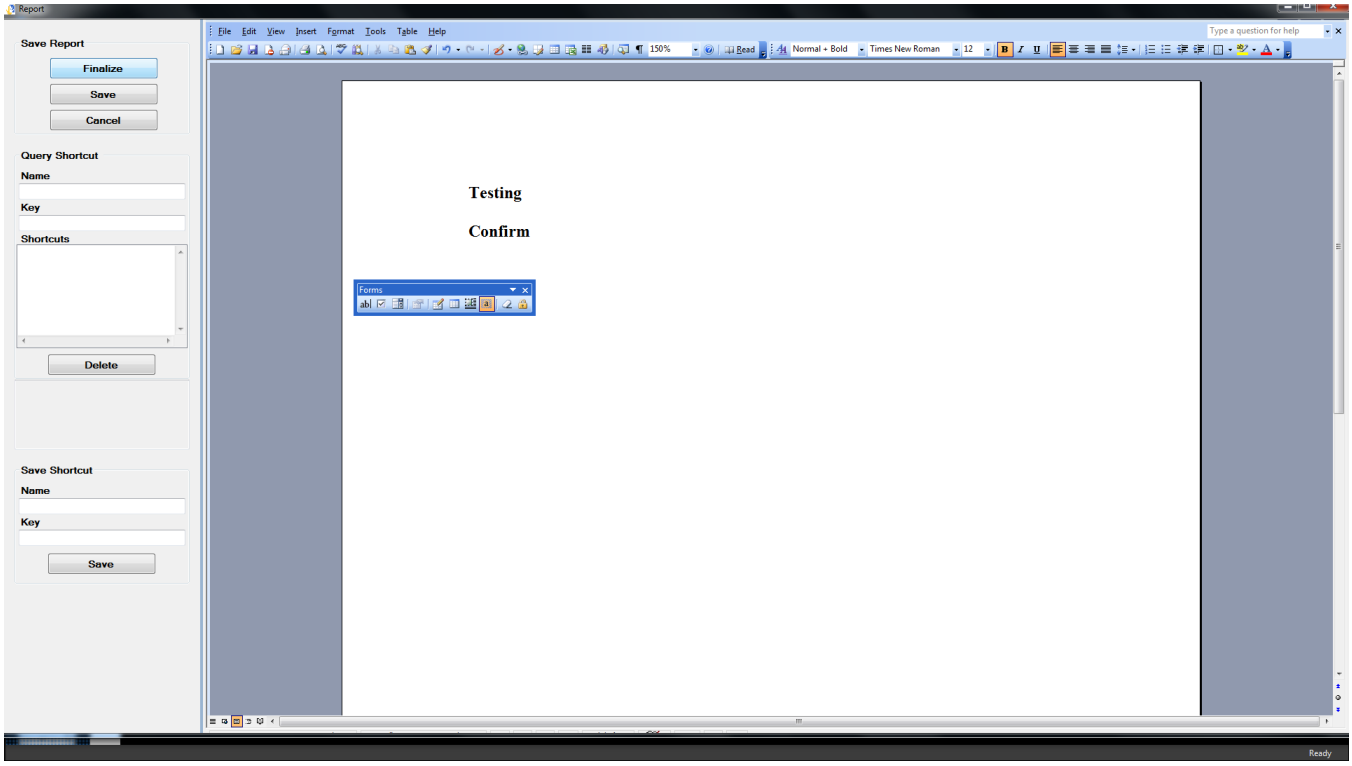


Note: The **Dictate** button will now show **Review Report** and the state of the study will be changed to **Dictated**

Note: When the report is at the **Dictated** state, multiple edits can be made before finalizing of the report

Workflow States (continued)

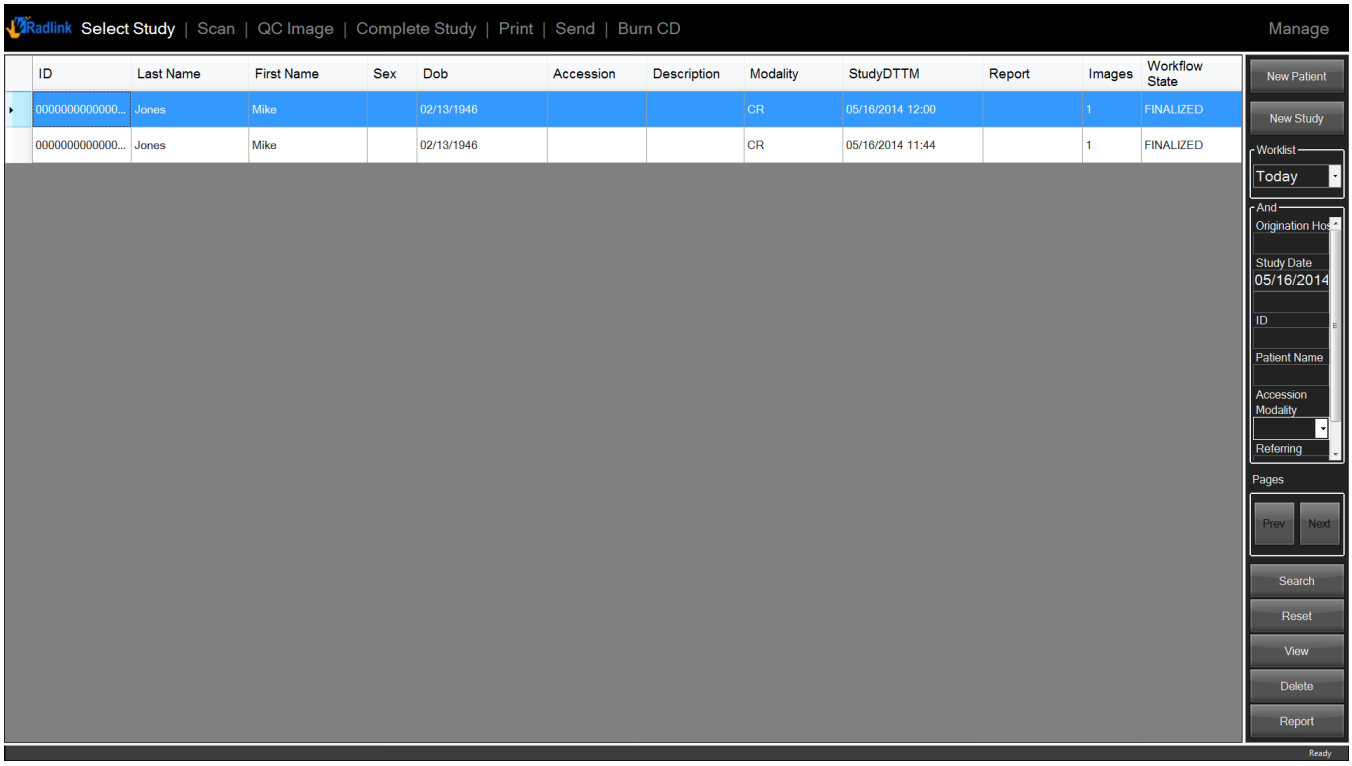
7. Click the **Finalize** button



Note: A report window for the current study will be brought up again for editing with both **Save** & **Finalize** buttons available.

- By Clicking the **Save** button, the report window will be closed and the workflow state will continue to read as the **Dictated** state. The user may continue to add notes at this point.

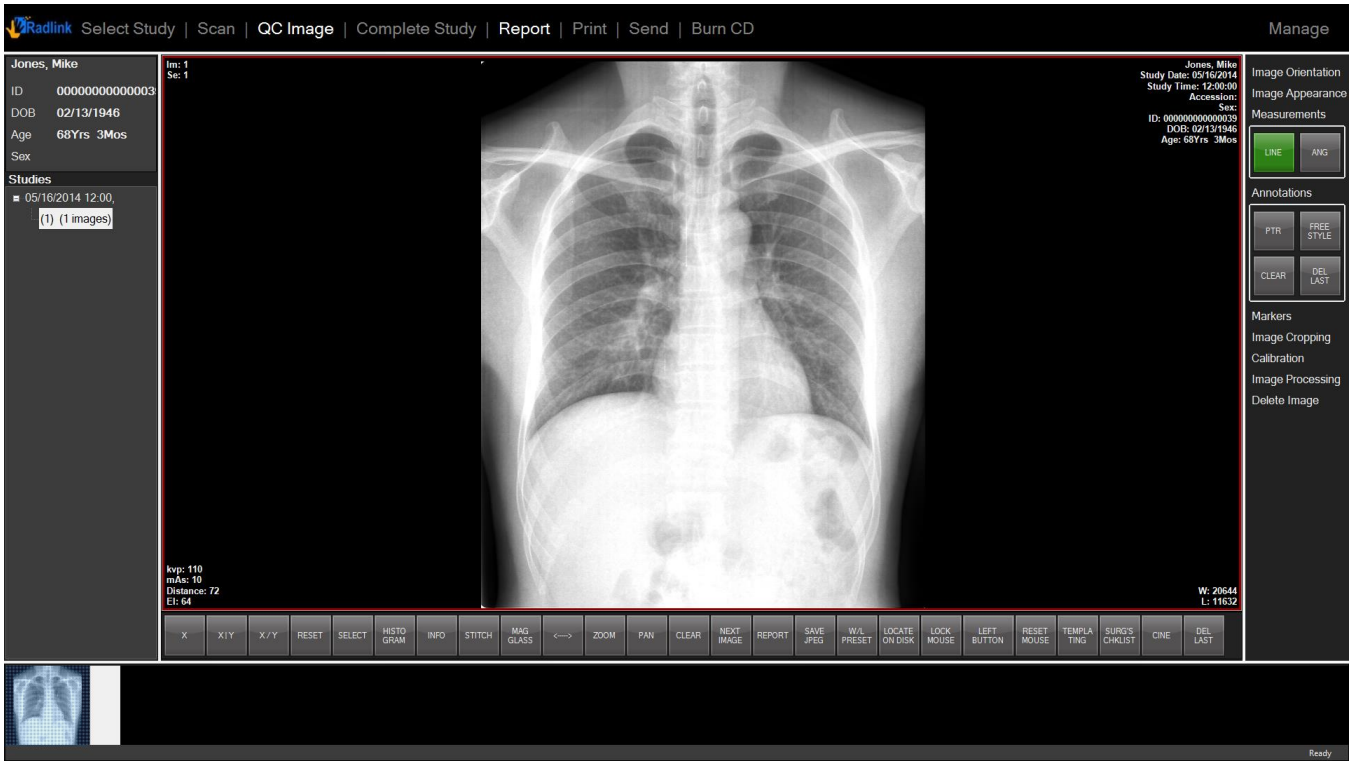
Workflow States (continued)



Note: The **Review Report** button will now read as a **Report** button, and the state of the study will be changed to **FINALIZED**

Workflow States (continued)

8. Click the **Report** button.



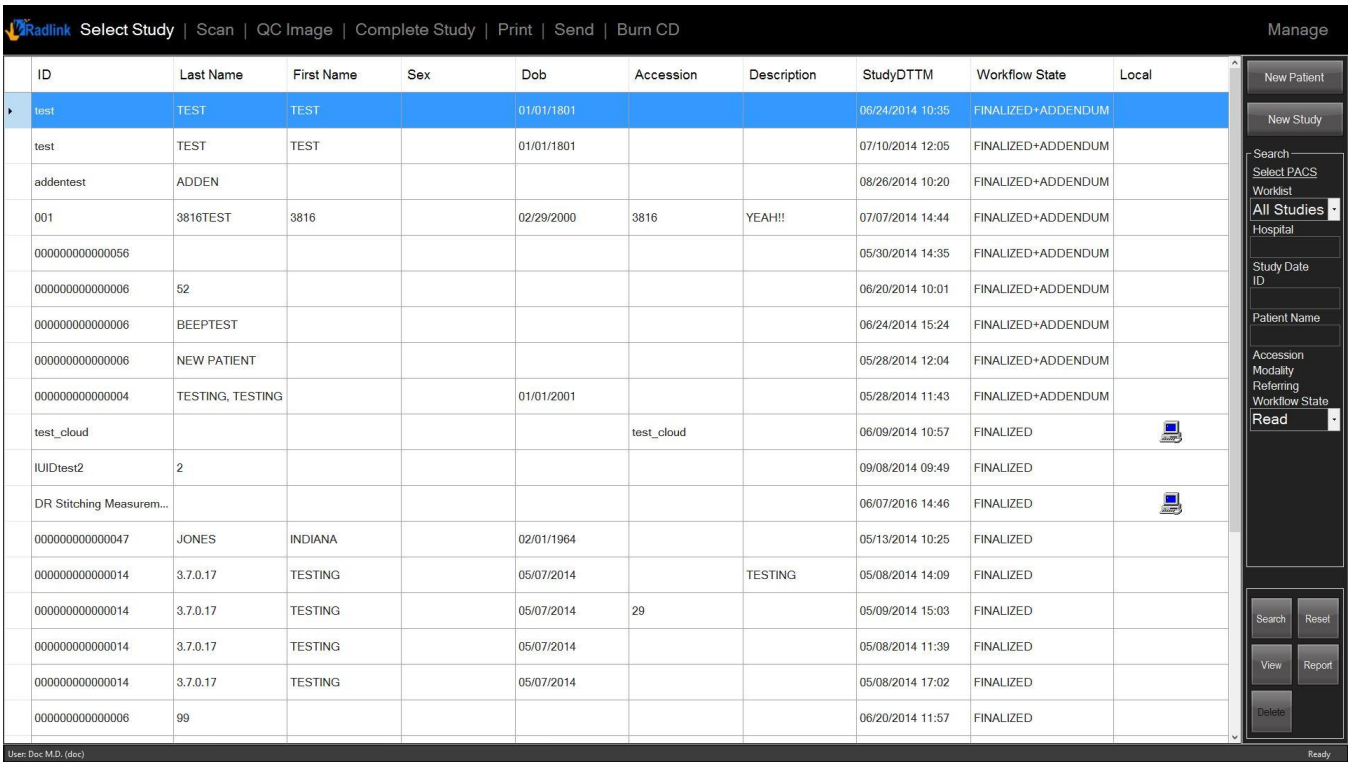
The finalized report will be opened in adobe PDF format for viewing and distribution.

Query by Multiple Workflow States

1. Log on PACS.
2. Select “Select Study”. In “Workflow State”, choose the state that you want to query. “Read” and “Unread” are defined as below.

Workflow State	Description
READ	Consist of REVIEWED, FINALIZED, FINALIZED + ADDENDUM states.
UNREAD	Consist of ARRIVED, PRELIMILARY states.

3. Click “Search” button.



All studies with “Read” state are returned after the search.

Acquire a test image

Before the GPS system is used in a case, it is recommended that the user follows the instructions described in the next section to verify the WiFi communication between the FPD and computer is functioning properly.

Vieworks Flat Panel Detector

1. When communication is established with Vieworks panel. Click Windows **Start** button, type “Chameleonsetup” in the bottom search section. Select **ChameleonSetup.exe** from the search results.

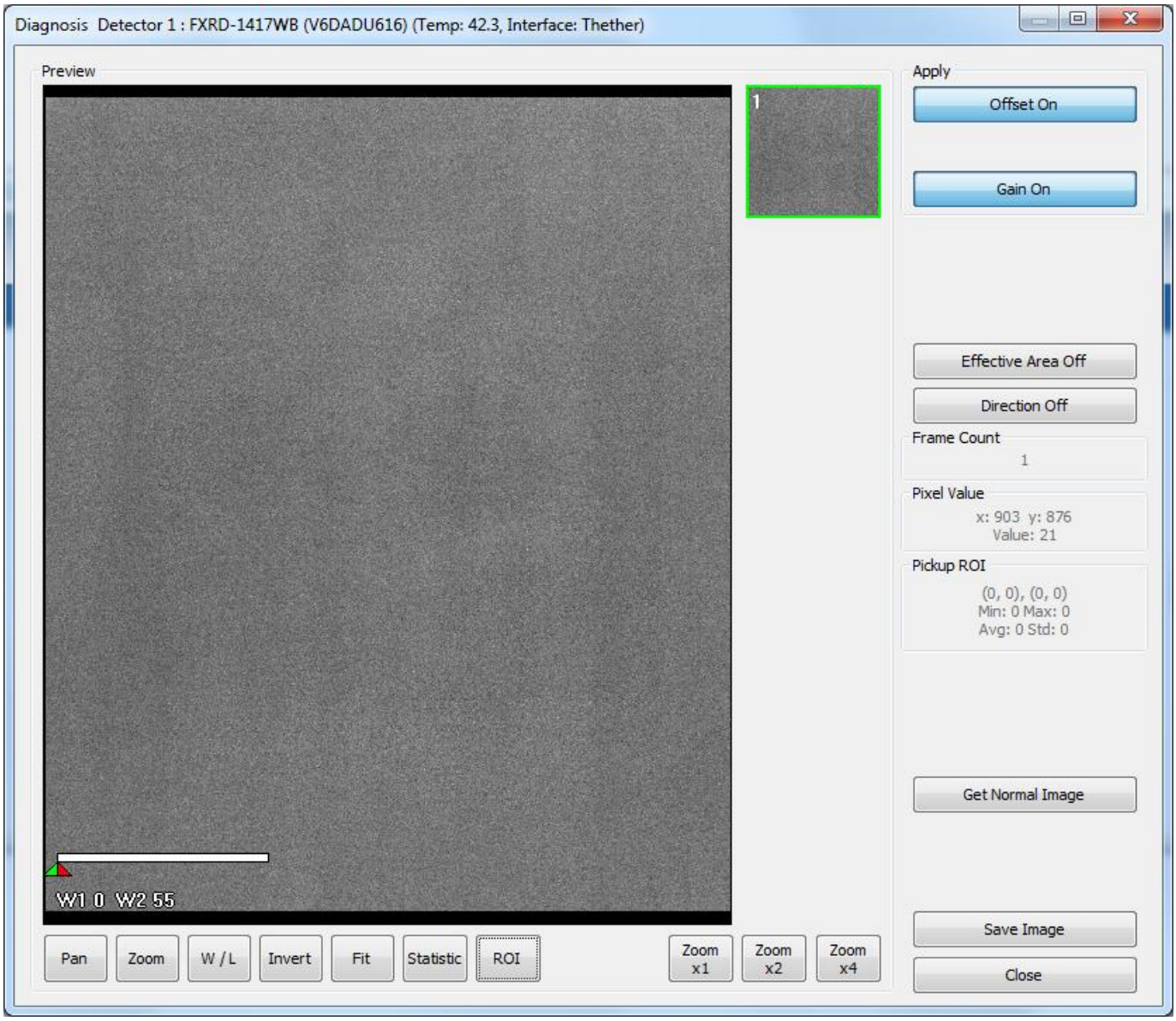
2. User should see both “SCU” and “Detectors” section have a connected device highlighted with green status. (If no device is showing up, click **Refresh device list** at bottom right side and check if one of the three lights near power button showing solid blue. Restart panel if no light showing solid blue. Once the device shows up, double click to highlight)

3. Click **Next.** Click **Diagnosis** in the middle.

4. Click **Get Normal Image** at bottom right.

5. Click **ROI** at bottom. Hold left click and drag a rectangle on the image.

If you see a test image similar to this, it means the panel successfully sent an image to the computer, so the connection is good.

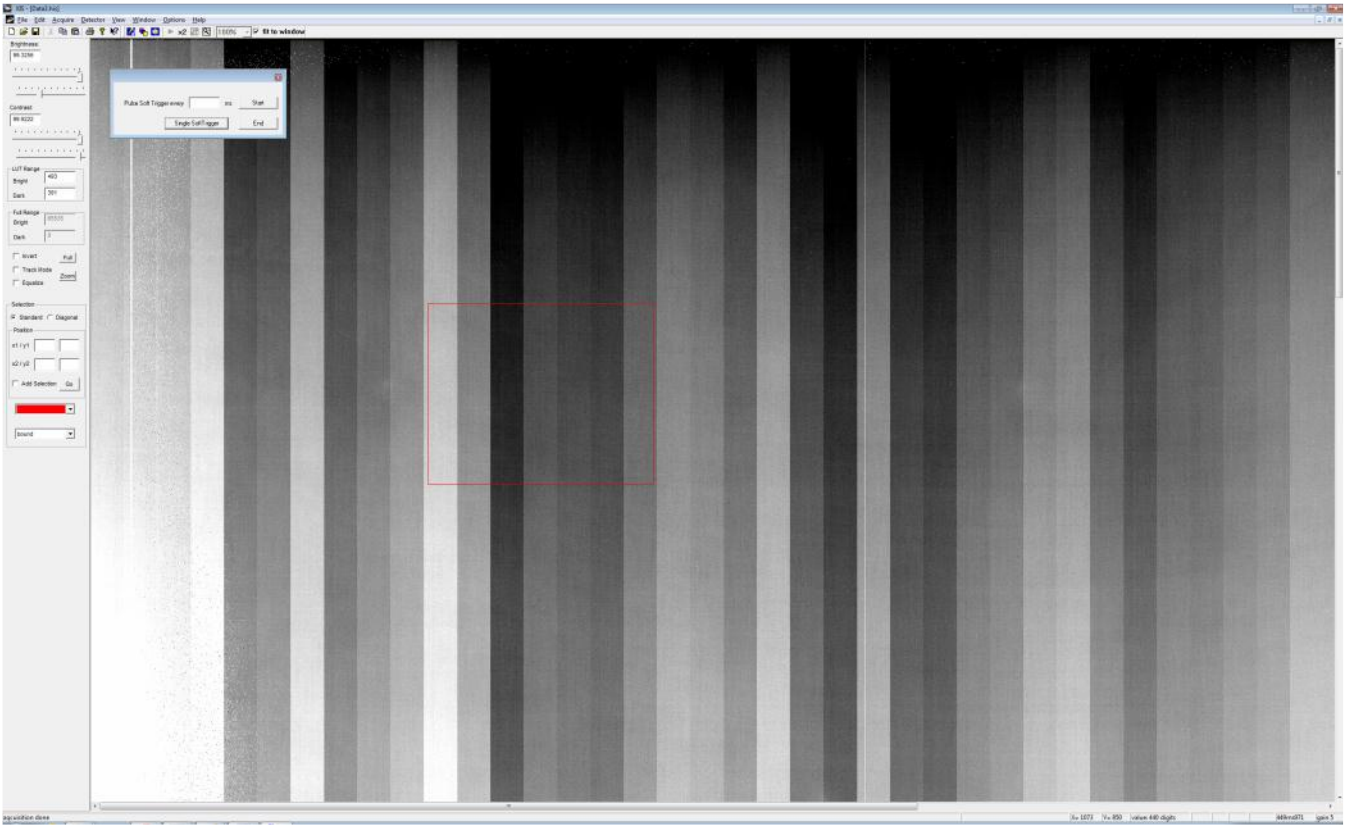


6. Click **Close** to exit.

Perkin Elmer Flat Panel Detector

1. When communication is established with the XRpad, click Windows **Start** button, type “xis” in the bottom search section. Select **xis** program from the search results.
2. Press **Enum / Setup GbIF Detector**.
3. Press **Init** to initialize the XRpad for imaging.
4. The XRpad is now initialized in XIS and ready to image.
5. To configure a trigger mode, select **Options -> Detector Options**.
6. In the Detector Options window, select **Soft Triggering**.
7. To prepare to acquire a single shot, click **Acquire -> Single Shot**.
8. XIS is now waiting for a soft trigger to trigger the image acquisition.
9. Click **Acquire -> Set Soft Trigger** to bring up the software trigger window.
10. Click **Single Soft Trigger** to trigger the acquisition.
11. The image may appear black at first before it is windowed properly.
12. To window the image, left click with the mouse and continue to hold it down while dragging a rectangle around a region of interest. Release the left mouse button and click the right mouse button once. The image will be automatically windowed to the region selected in the red rectangle.

If you see a test image similar to this, it means the panel successfully sent an image to the computer, so the connection is good.



13. Close the window to exit.

Thales Flat Panel Detector

1. When communication is established with Thales panel. Click Windows **Start** button, type “pixrad” in the bottom search section. Select **Pixrad Viewer** program from the search results.

2. Click **Select** at top left

3. Choose **config_3543EZ** folder, click **OK**. Wait for initializing.

4. Pick **MODE1** under Application mode at bottom left.

5. Click **Start**

at bottom.

6. If you see the software show a test image with massive straight lines, it means the panel successfully sent an image to computer, so the connection is good.

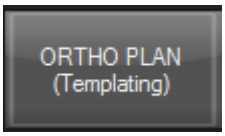
7. Close the window to exit.

Purchased Features

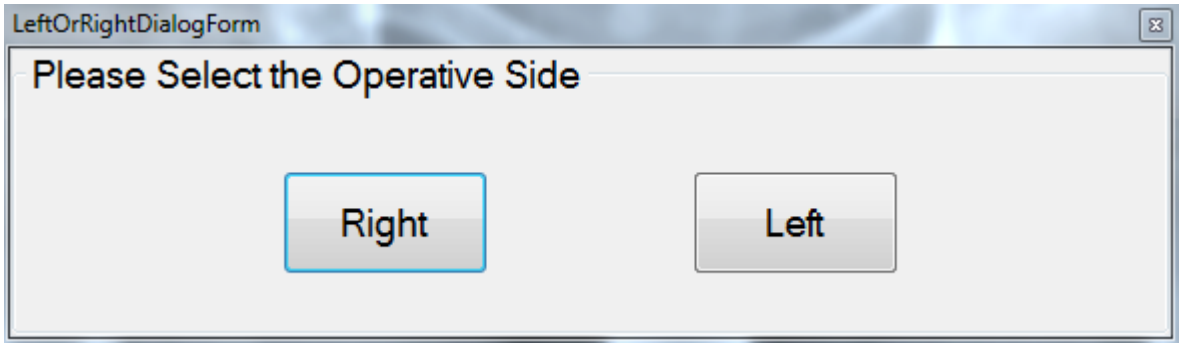
Template

Create different sizes of simulated Acetabular Cup and Femoral Component to help find good fit for hip replacement.

Introduction

The template can be activated by clicking the Ortho Plan hot button like this 

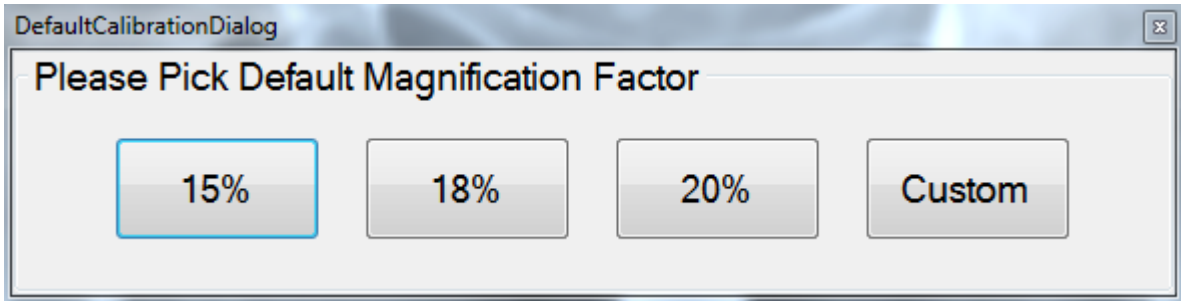
under QC Image.
A small window will appear in the middle. User should select the Left or Right side of body that needs operation.



Hip

- **Calibration**

1. User will select options from the window below



2. Select Magnification Factor 15%, 18% or 20%.
3. Or select Custom to go to calibration page
4. Click *25mm Marker* button on the right side.

5. Find the metal ball on the image and click its center, edge will be automatically detected.
6. Type in 25 for the physical length then click *OK*.
7. Or select other options such as Ruler, Circle, Cup or 0% magnification for measurement.

Magnification Factor will be calculated as: default length/25 - 1

Since the actual size of the metal ball is 25 millimeters, the calibration assures all the planning and measurements are running under actual size.

Hip

- **Pre-Processing**

The *Ortho Plan* now supports auto detection technology to simplify the workflow. The *Auto read* function will pre-process the image and recognize features of interest.

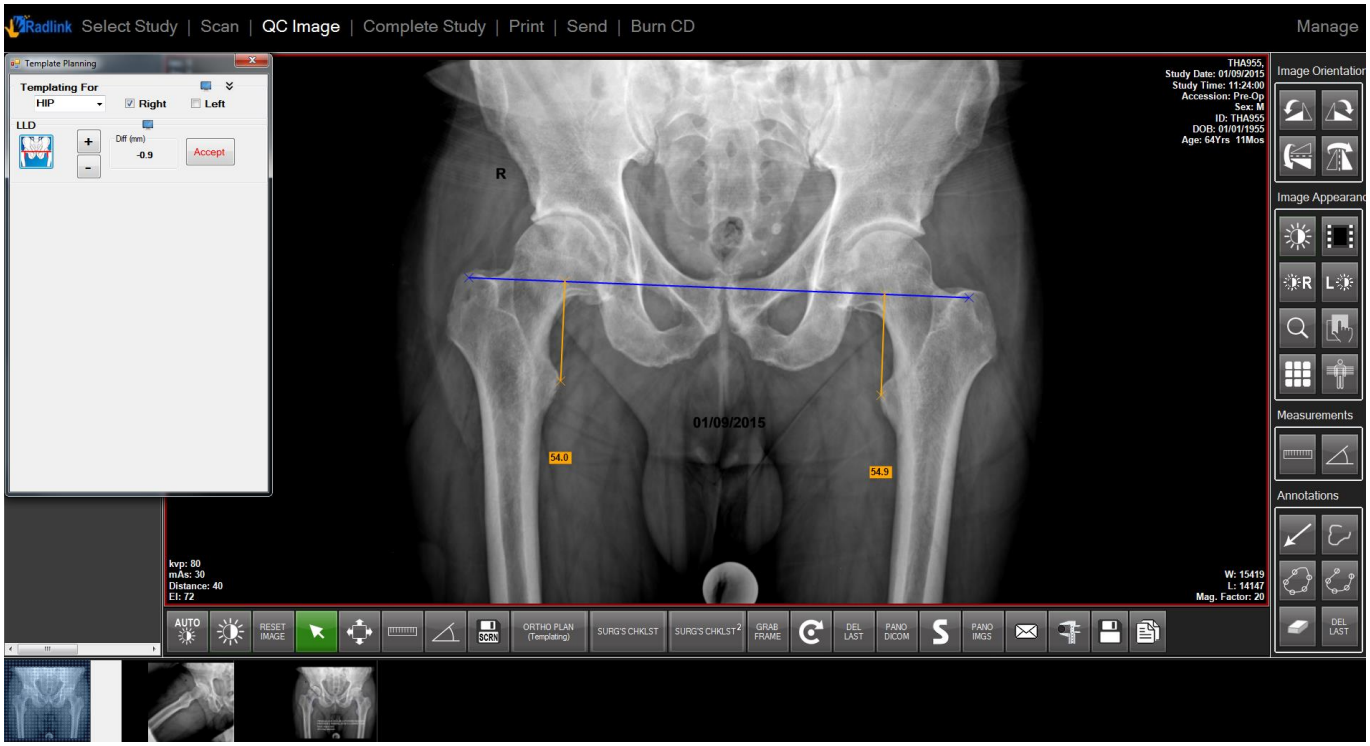
1. After calibration software will run AutoRead immediately.

2. Wait until the *Auto Read* function ends. Now the program recognizes all regions of interest.

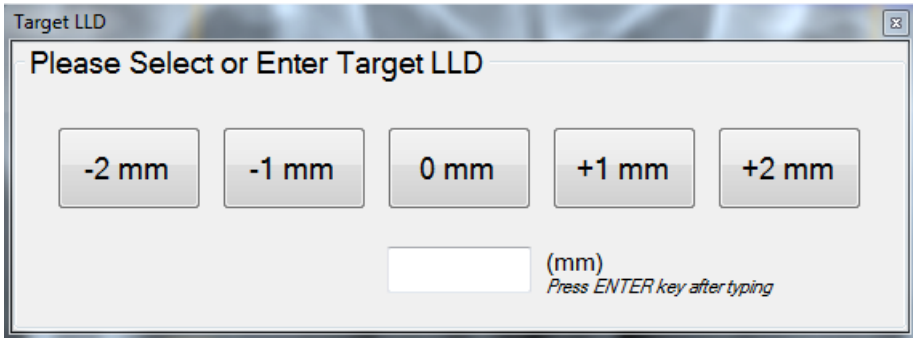
Hip

- **LLD**

1. Next, click the button under LLD section,
2. The detected LLD will show up on screen. In case when it's not the best fit, drag and drop the bottom point to adjust leg length. Difference of the leg length will be calculated in millimeter.
3. When the end points are acceptable, click



4. User will be asked to select target LLD, select 0mm if both sides are targeted to be balanced.



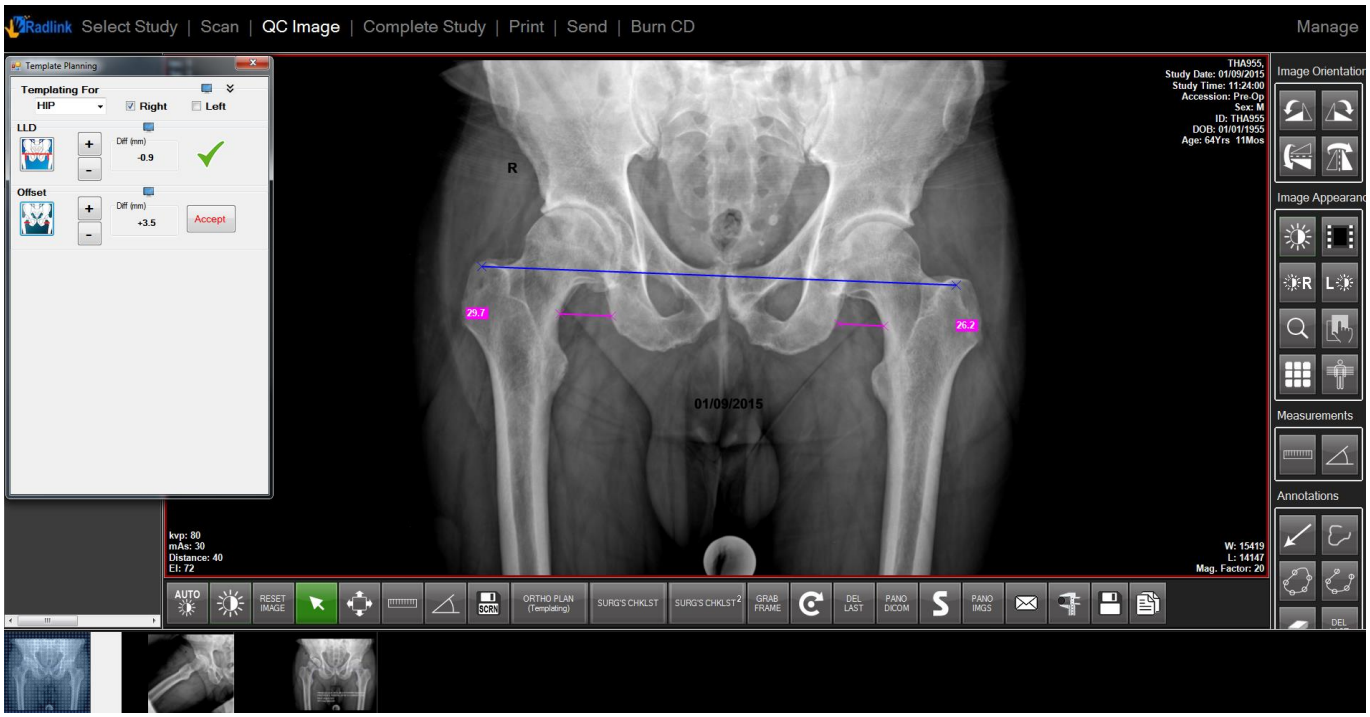
Note: the measurement lines are automatically set to be perpendicular to the *Transischial or Teardrop Line*

Hip

- **Offset**

1. Click button under Offset, the detected Offset will show up on screen. As instructed above, change the offset length by dragging and dropping the endpoint. Offset length will be calculated in millimeter.

2. When the end points are acceptable, click



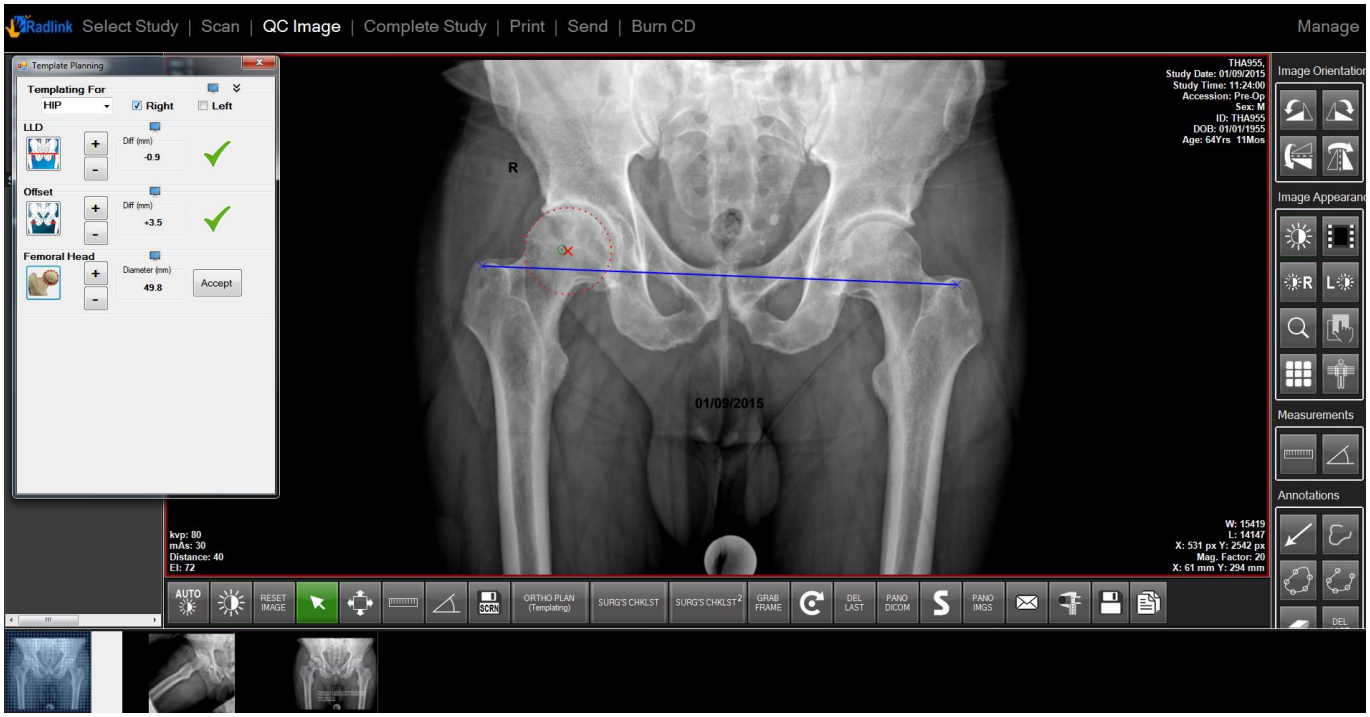
3. Same as LLD, User will be asked to select target offset, select 0mm if both sides are targeted to be balanced.

Note: the measurement lines are automatically set to be parallel to the *Transischial or Teardrop Line*

Hip

- **Femoral Head**

1. Click button
2. Software's auto read function will find a circle along the femoral head, software will generate the diameter of the circle.
3. When the edge of the circle is acceptable, click

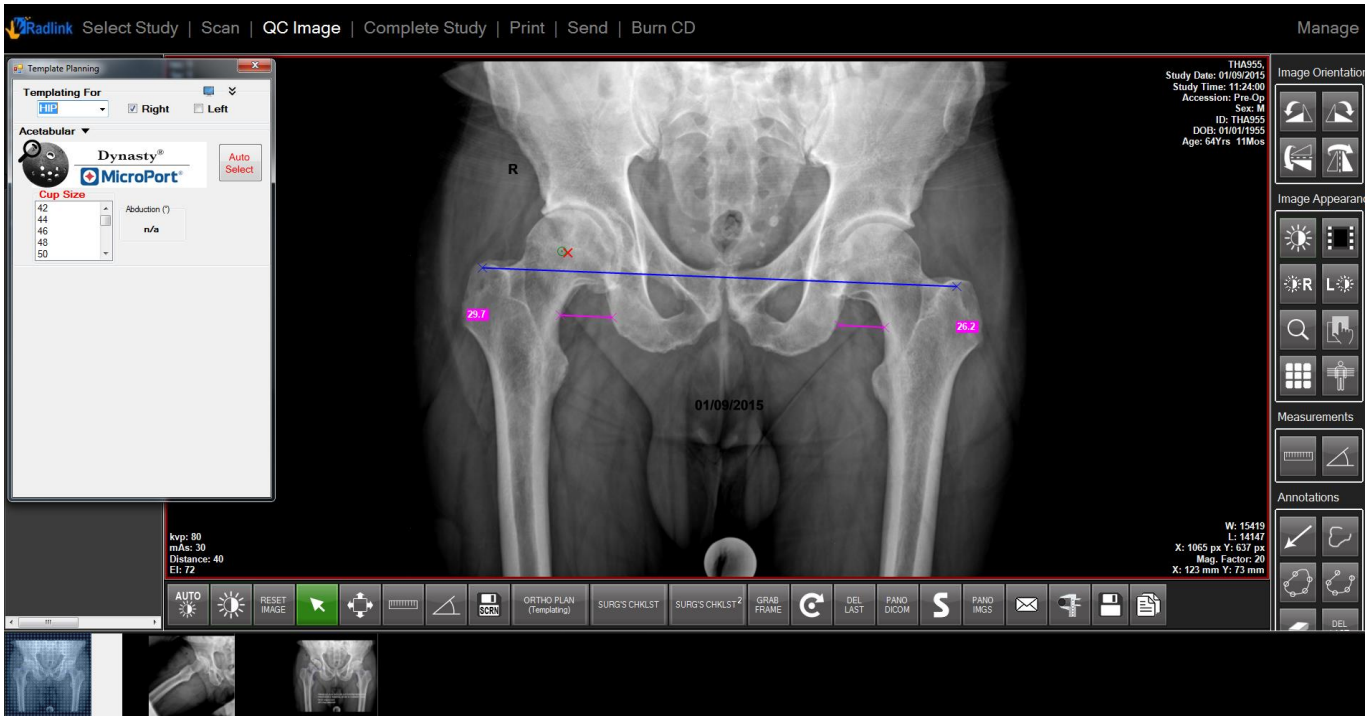


Hip

- **Acetabular**

1. Click

button



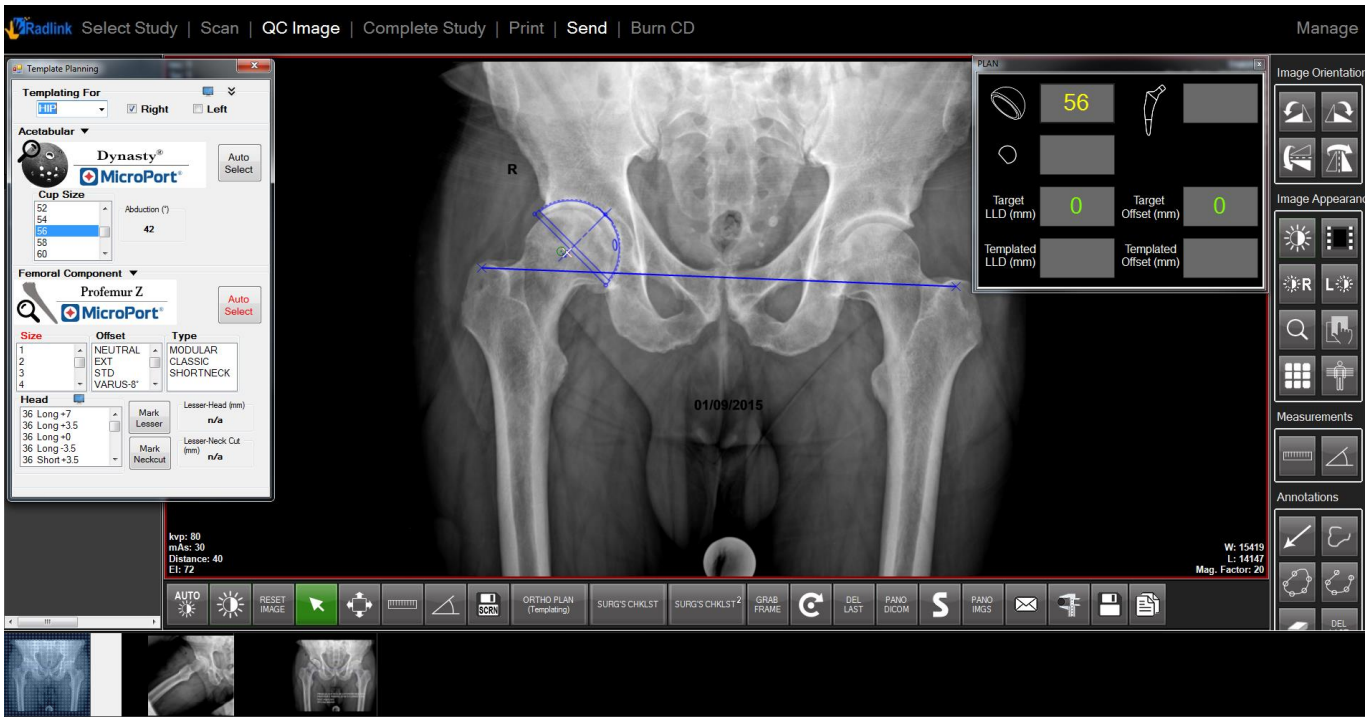
2. Software will automatically generate a cup. If not ideal, adjust Cup size and position accordingly.

Hip

- **Femoral Component**

1. Click

button.



2. Software will automatically generate a stem based on Auto read. If not ideal, adjust Size, Offset, Type and Head sections.

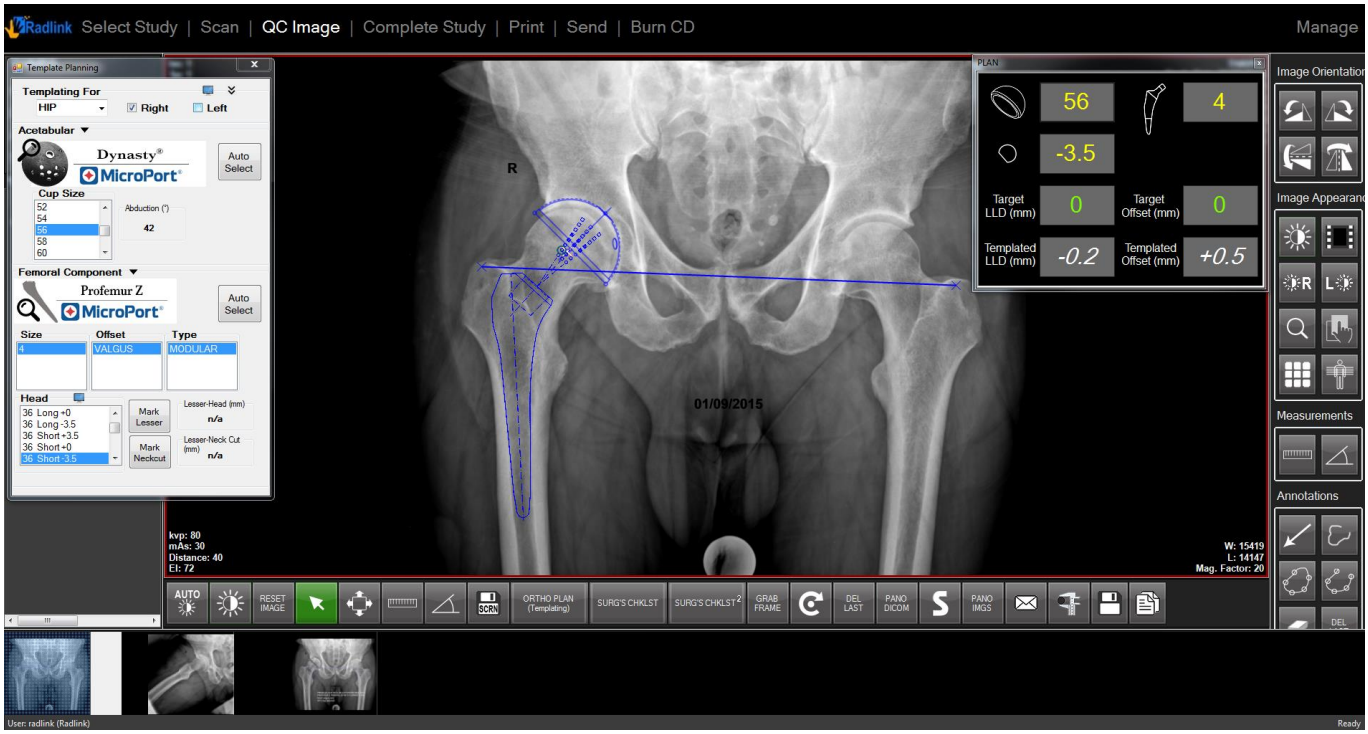
Hip

- **Femoral Component (continued)**

3. A small window called “PLAN” shows up on the top right corner, it displays the current information of cup size, stem size, neck length. The bottom two rows showing Target LLD, Target offset and actual Templated LLD and Templated Offset.

4. There will be a green circle near the femoral head center, the distance from center of the green circle and femoral head center is based on the measurements from LLD and Offset from previous steps.

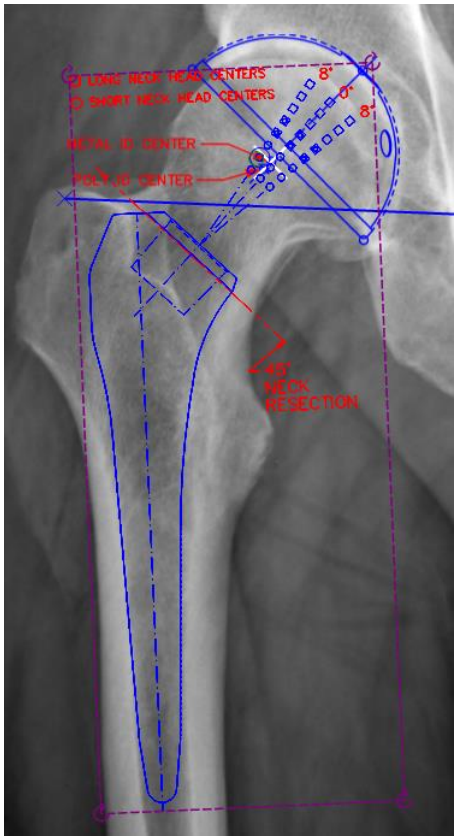
5. Adjust stem template with different fit options, matching the green circle and the blue circle on stem, user can achieve templated LLD/Offset matching the targeted LLD/Offset.



Hip

- **Femoral Component (continued)**

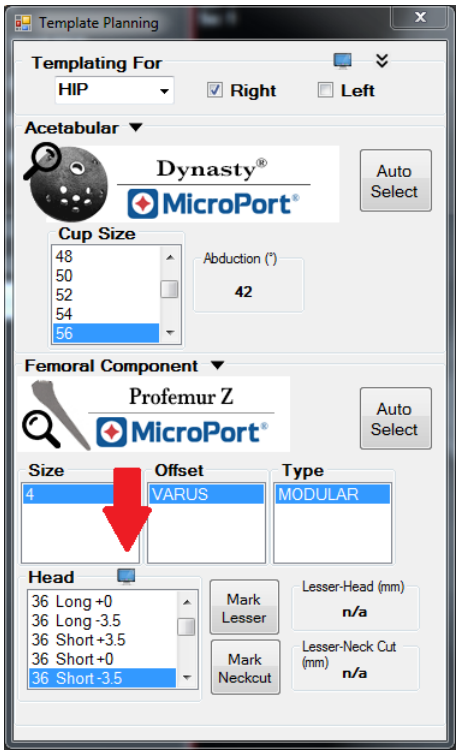
6. Double click the cup or stem will bring out detailed information about the template. Double click again, the information will hide back.

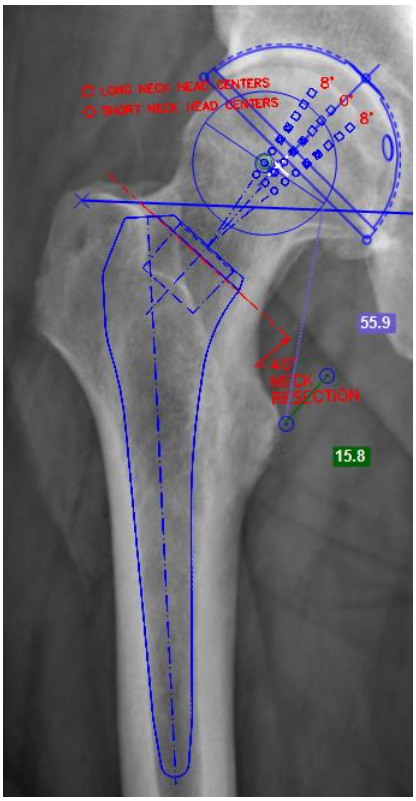


Hip

- **Femoral Component (continued)**

7. Click the little window button pointed out below on the lower side of templating menu, user will see a popped up circle with 36mm diameter(user can select different sizes in Head section) centered at the selected neck length.





8. Go to

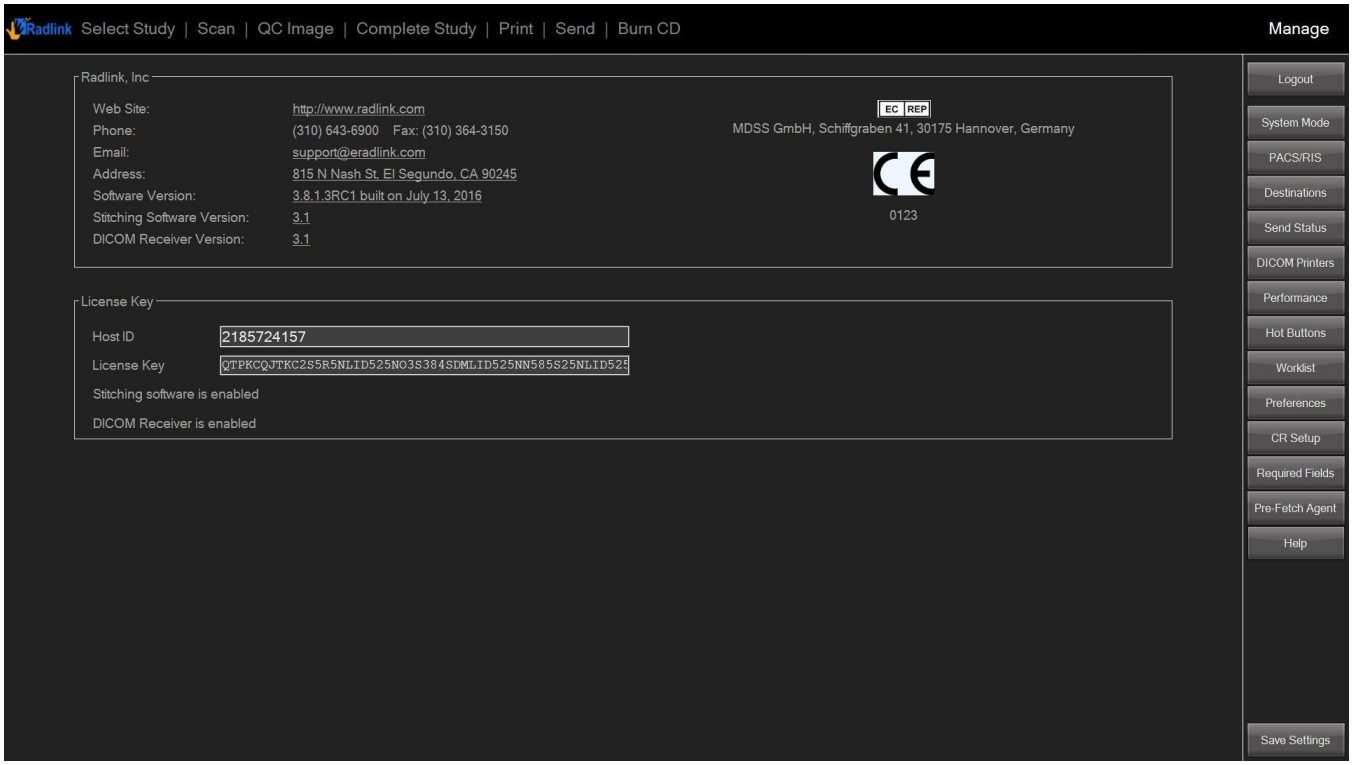
Click **Mark Lesser** button, click lesser trochanter on patient image, software will measure the distance between the edge of the ball and lesser trochanter
Click **Mark Neckcut**, click on the extension of Neck Resection line and make sure the connected line is perpendicular to Neck Resection line, so that software can measure the distance.

Stitching Images
(Optional – purchased separately)

The current release supports functions to stitch multiple X-ray images. Stitching function requires images taken with markers to increase accuracy.

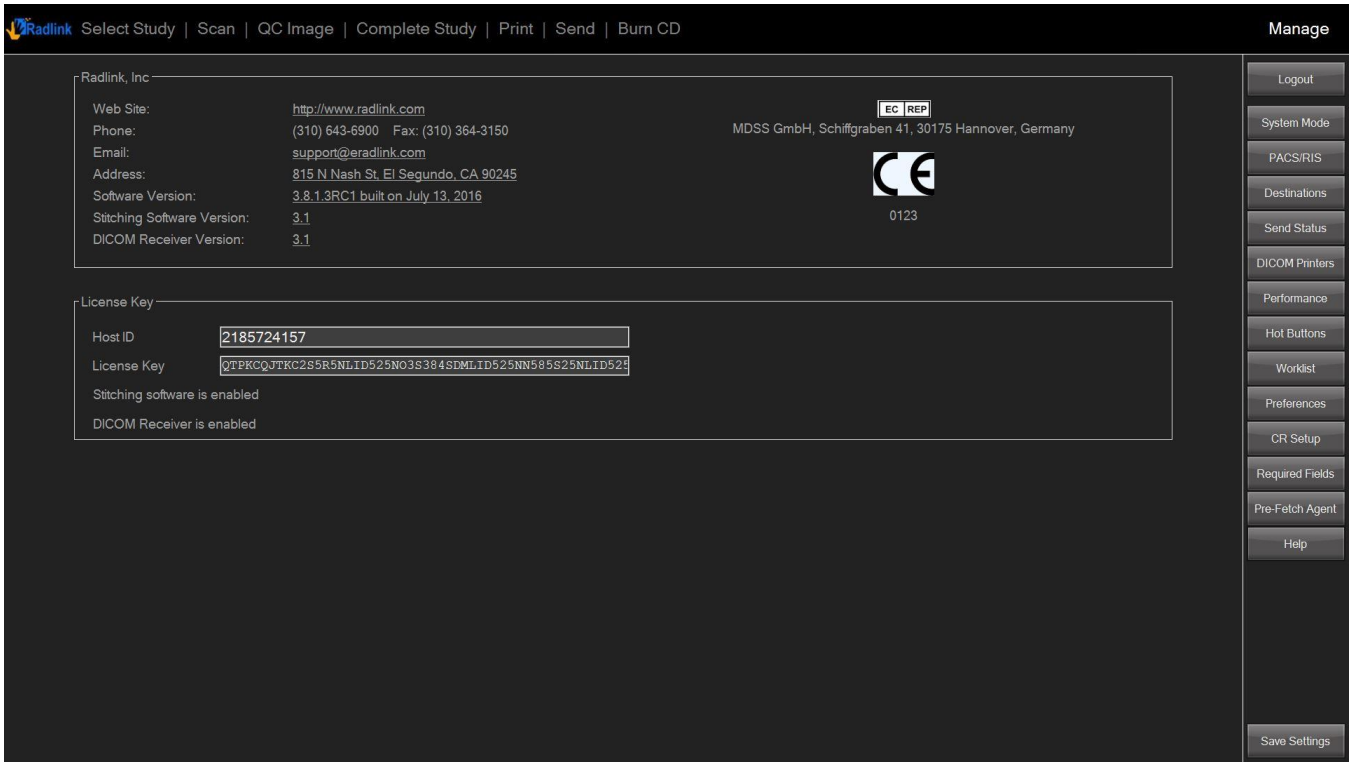
To enter the password for stitching:

1. Select **Manage**
2. Select **Help**



Stitching Images (continued)

3. Enter the password into the **License Key** field and select Save Settings.

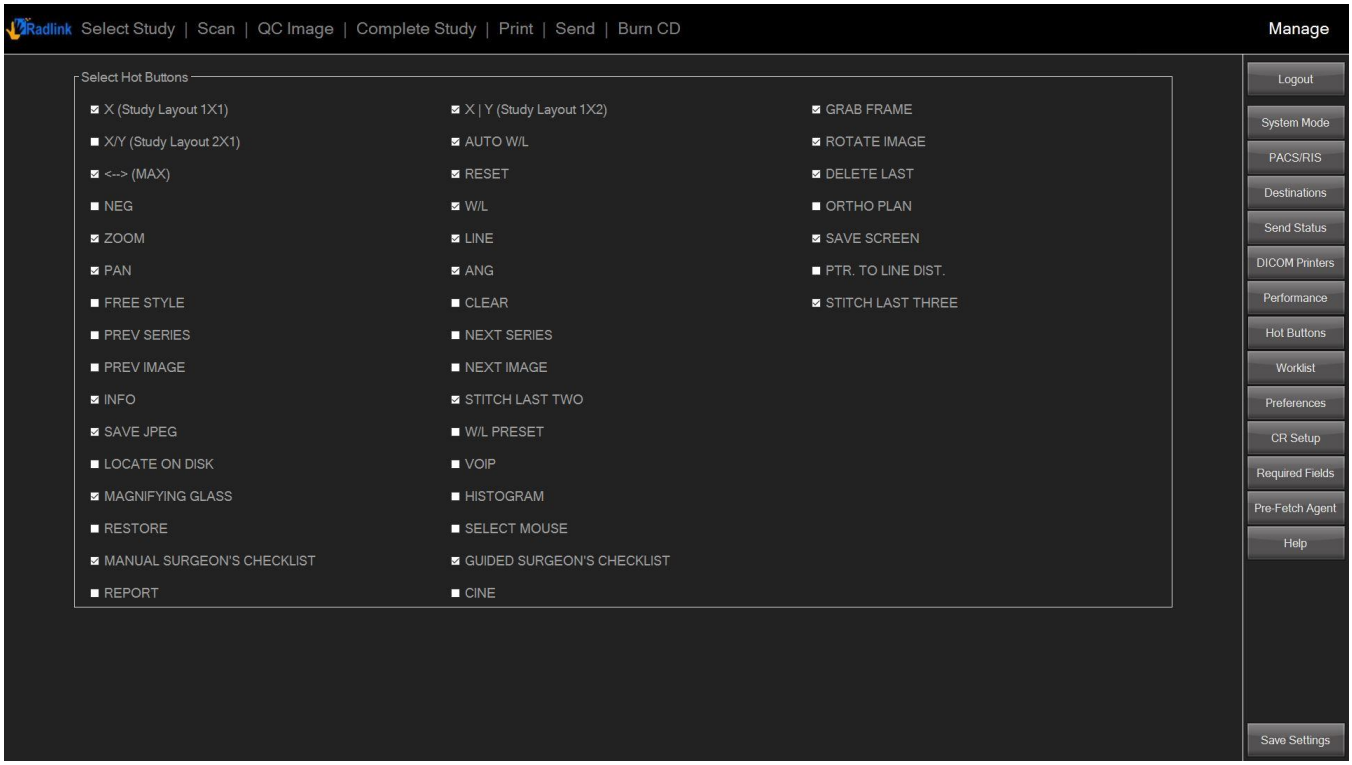


The message **‘Stitching software is enabled’** is displayed.

Stitching Images (continued)

To stitch multiple images together:

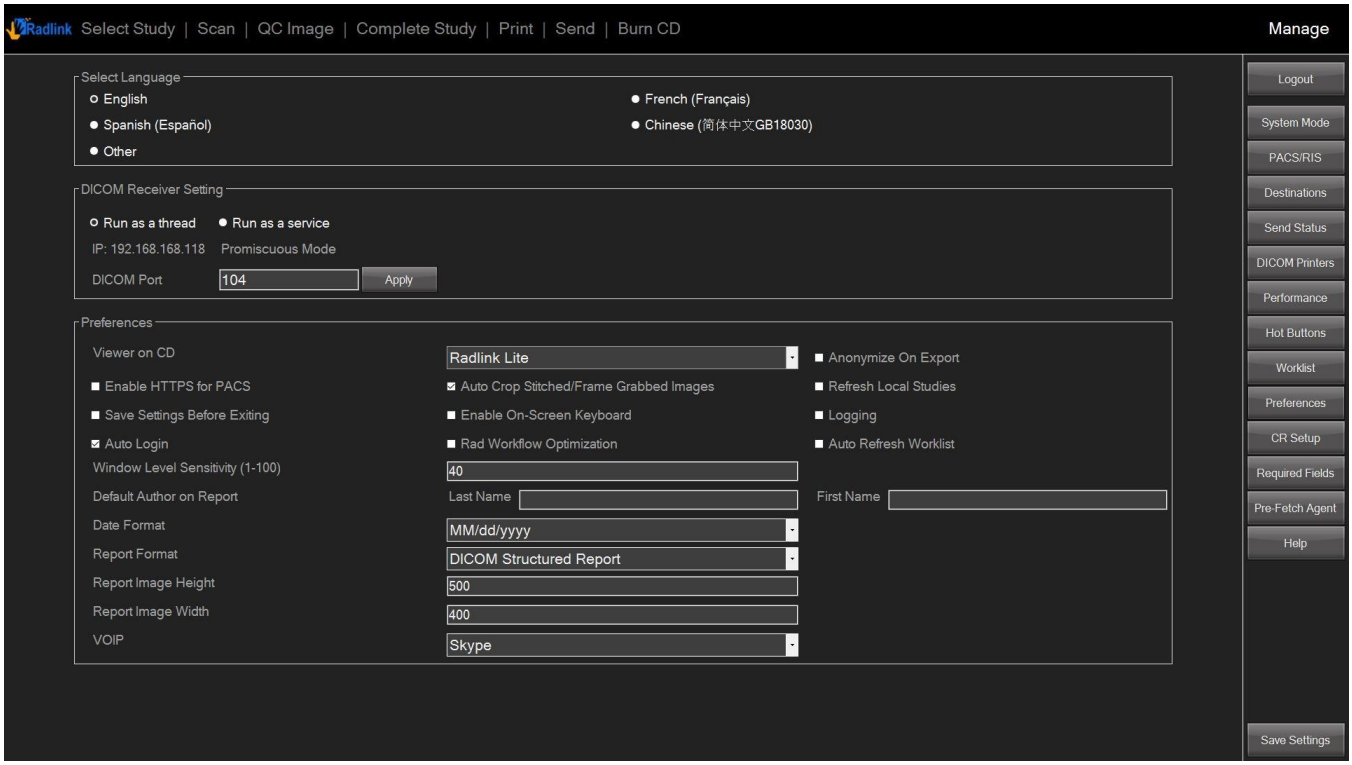
1. Go to **Manage**, then click on **Hot Buttons** and check the box **STITCH LAST TWO** and **STITCH LAST THREE.**



The stitching feature is now enabled.

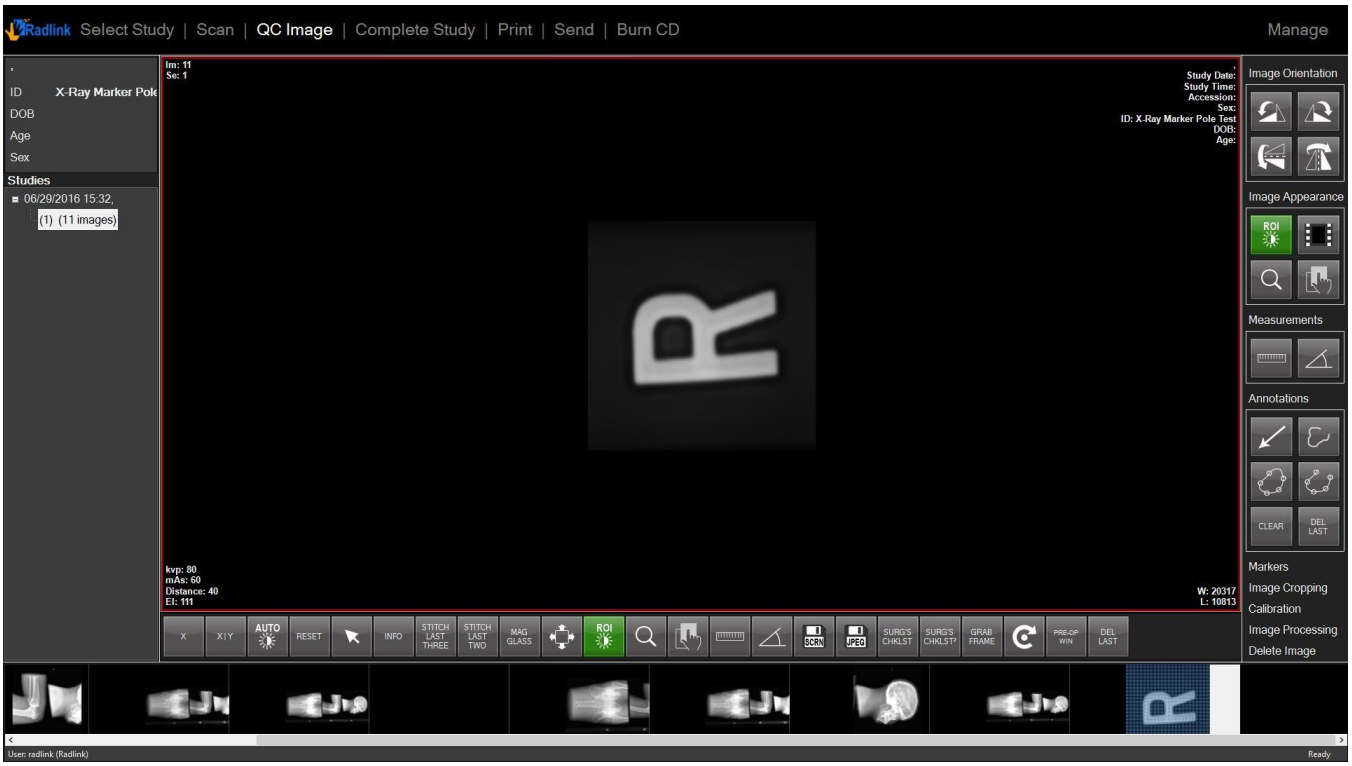
Stitching Images (continued)

2. Go to **Manage,** then **Preferences** and check the box **Auto Crop Stitched Images** This option removes a portion of the image surrounding the stitched area and makes the resulting image appear more seamless.



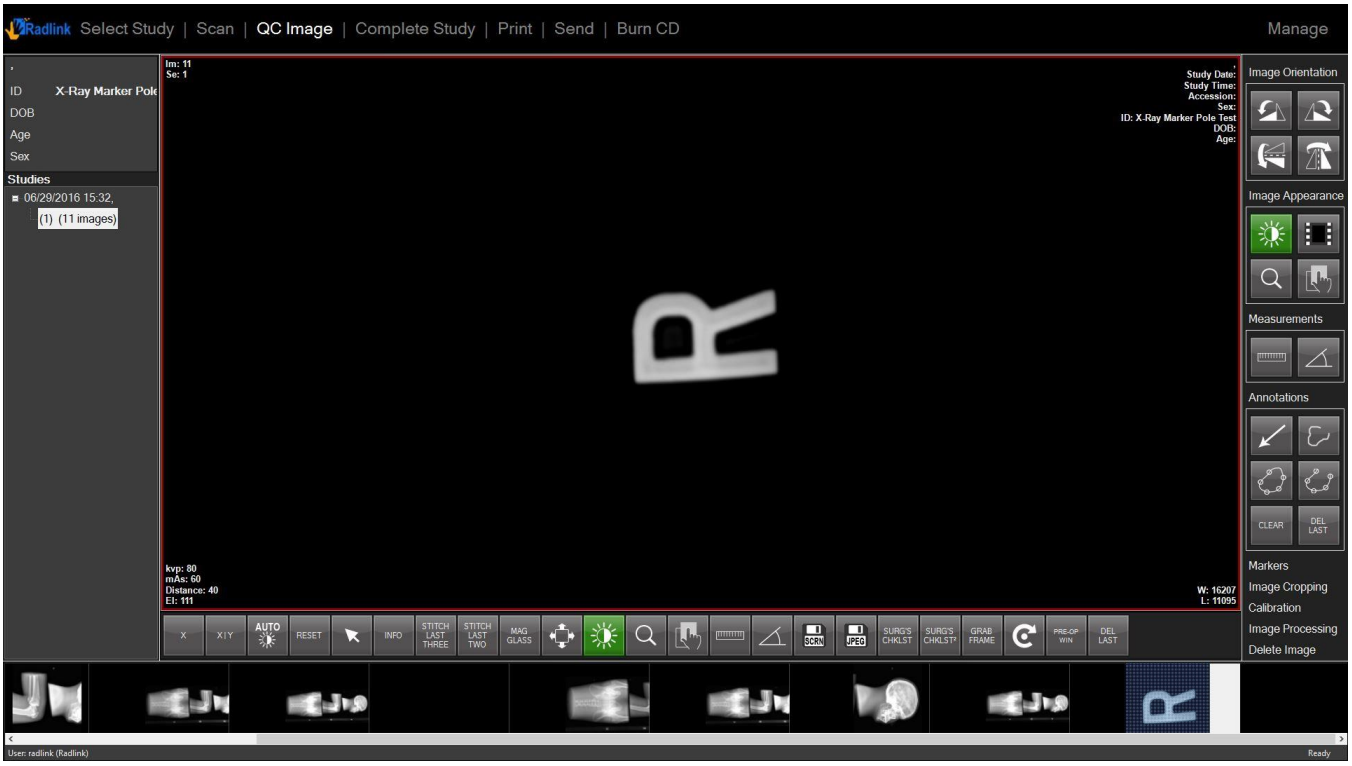
Stitching Images (continued)

3. After shooting X-Ray images, set up marker template. Use “Image Cropping” function to crop out marker from image.



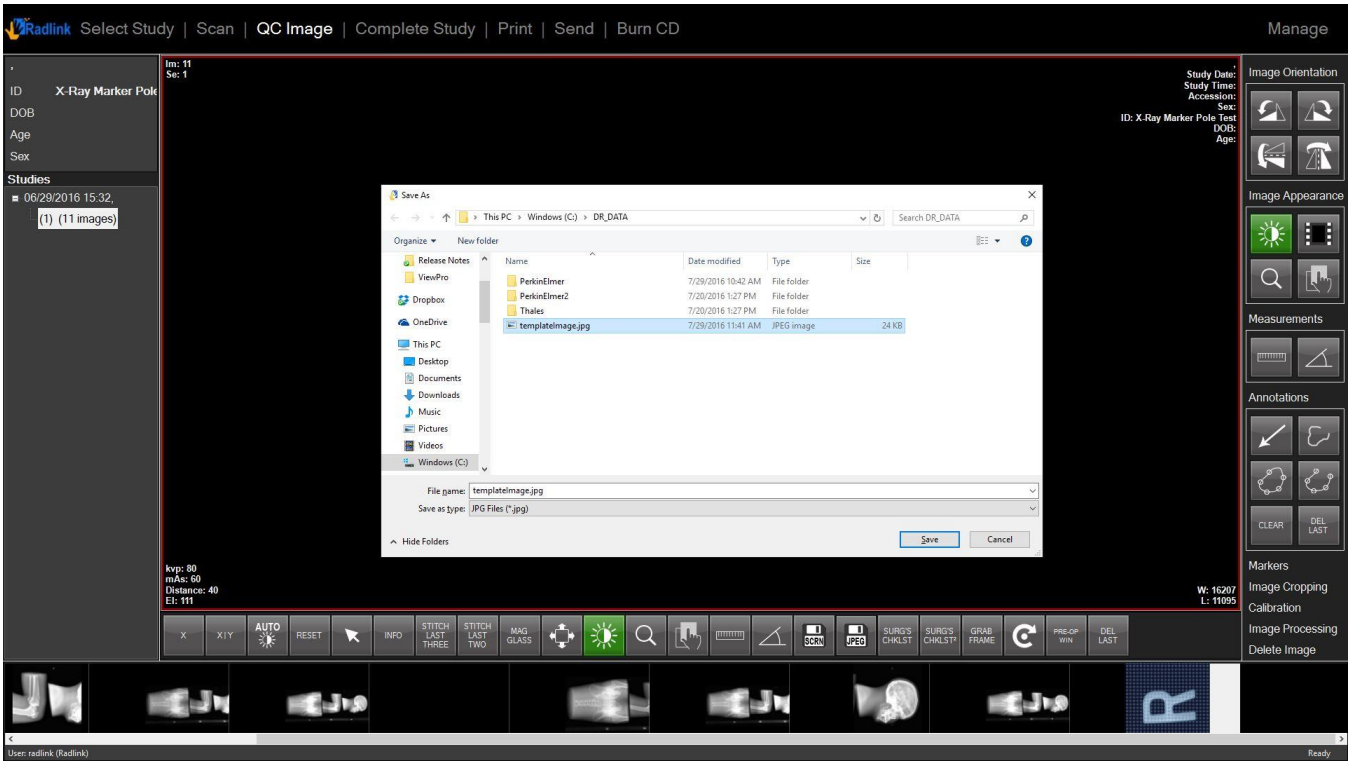
Stitching Images (continued)

4. To get better quality, use W/L or ROI to make marker look clear.



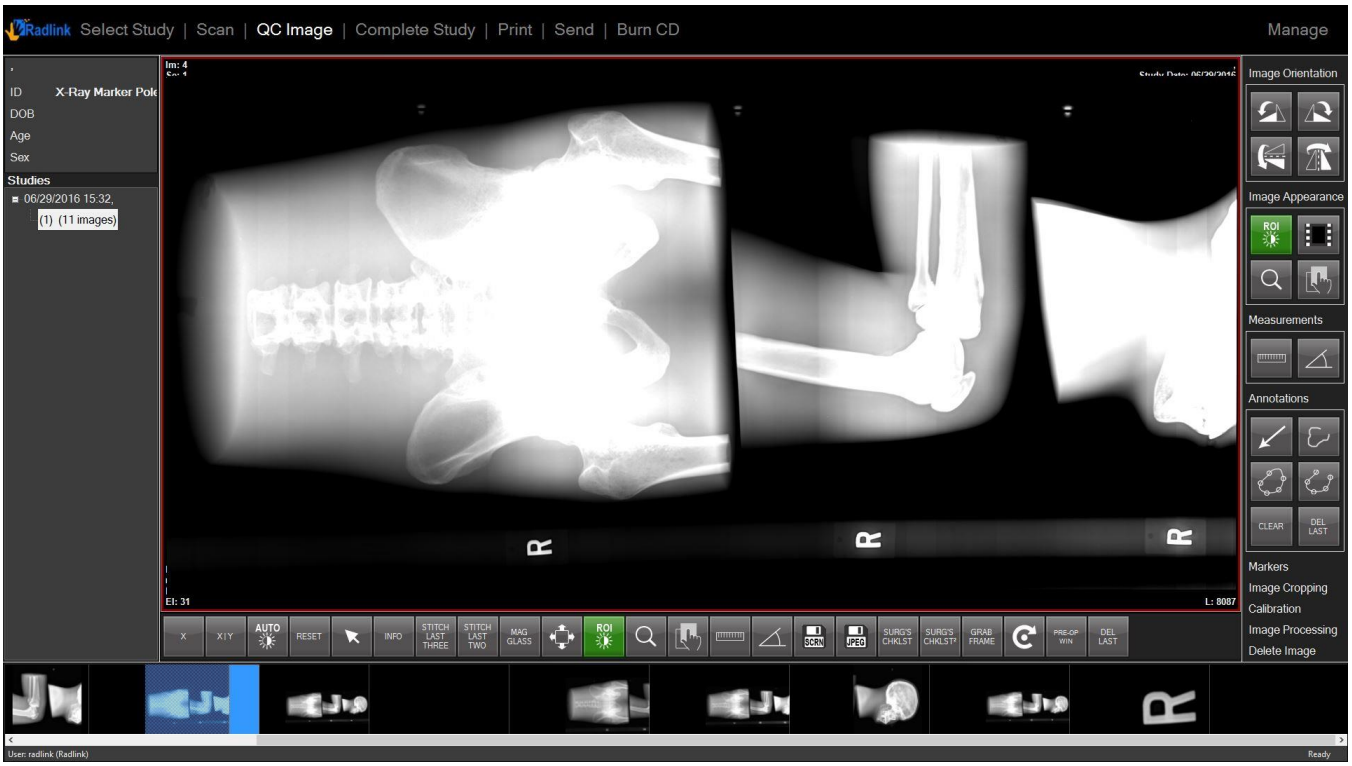
Stitching Images (continued)

5. Use “Save to JPEG” button to save the image as “C:\DR_DATA\templateImage.jpg”.



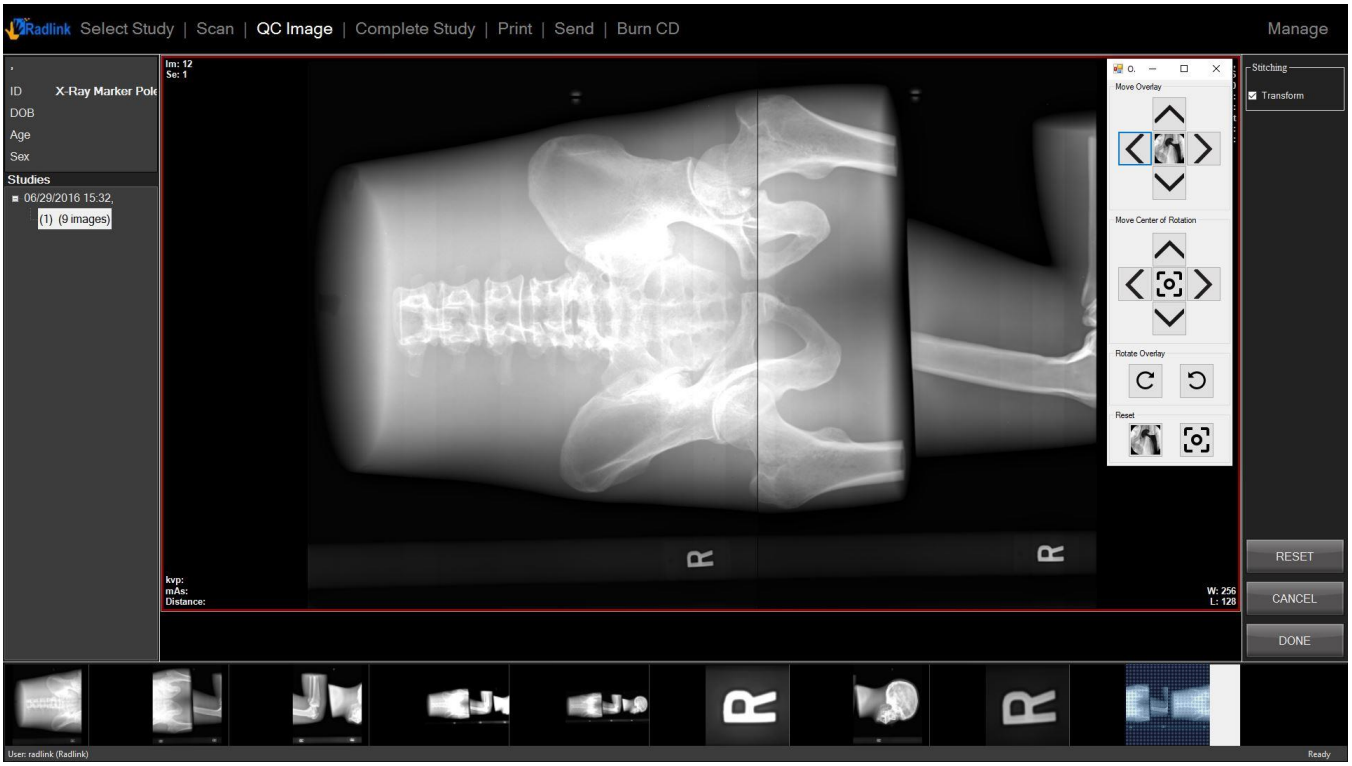
Stitching Images (continued)

6. Use W/L or ROI to adjust the images that you want to stitch, make the marker clear and similar to the template.



Stitching Images (continued)

7. Select an image, and click “Stitch last two” or “Stitch last three”.



Stitching Images (continued)

8. When the stitched image shows up, use the tool at the right to change stitched image if needed. Then click “Done”.

The final stitched X-ray image is displayed. To stitch three images, you can use “Stitch last three” button. For more than 3 images, you can stitch them one by one.

Panoramic view

Panoramic view is a new feature introduced in version 3.8.1.4. To have this function enabled, contact Radlink to acquire the license with Pano function.

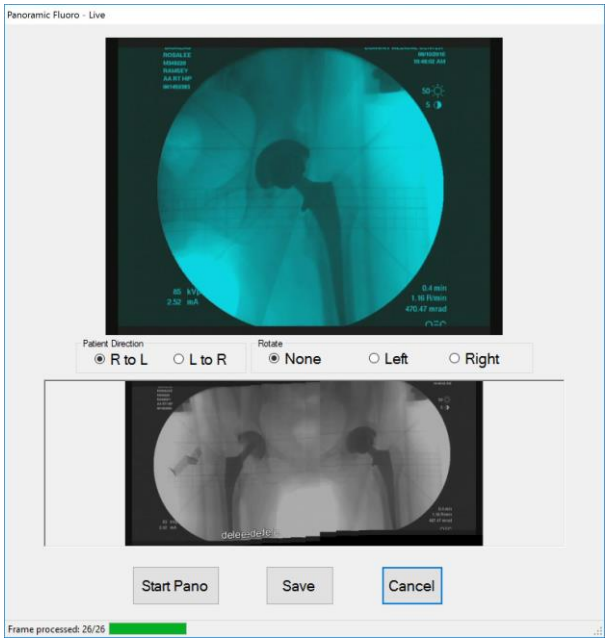
The Pano function can automatically construct a panoramic view based on a live image stream. The “Pano” button is shown below.

To get a panoramic image, follow the following steps. **Note: Patient direction should be either right to left or left to right.**

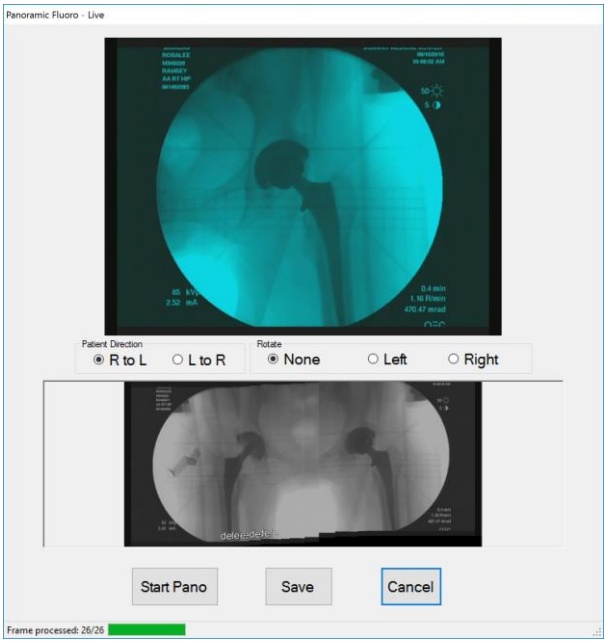
1. Click on “Pano” button to open Pano Window.

Panoramic view (continued)

2. When the fluoro is ready, click “Start Pano” button on the Pano Window. During scanning, the panoramic image at the lower part of the window will keep updating itself as each new frame is coming in.

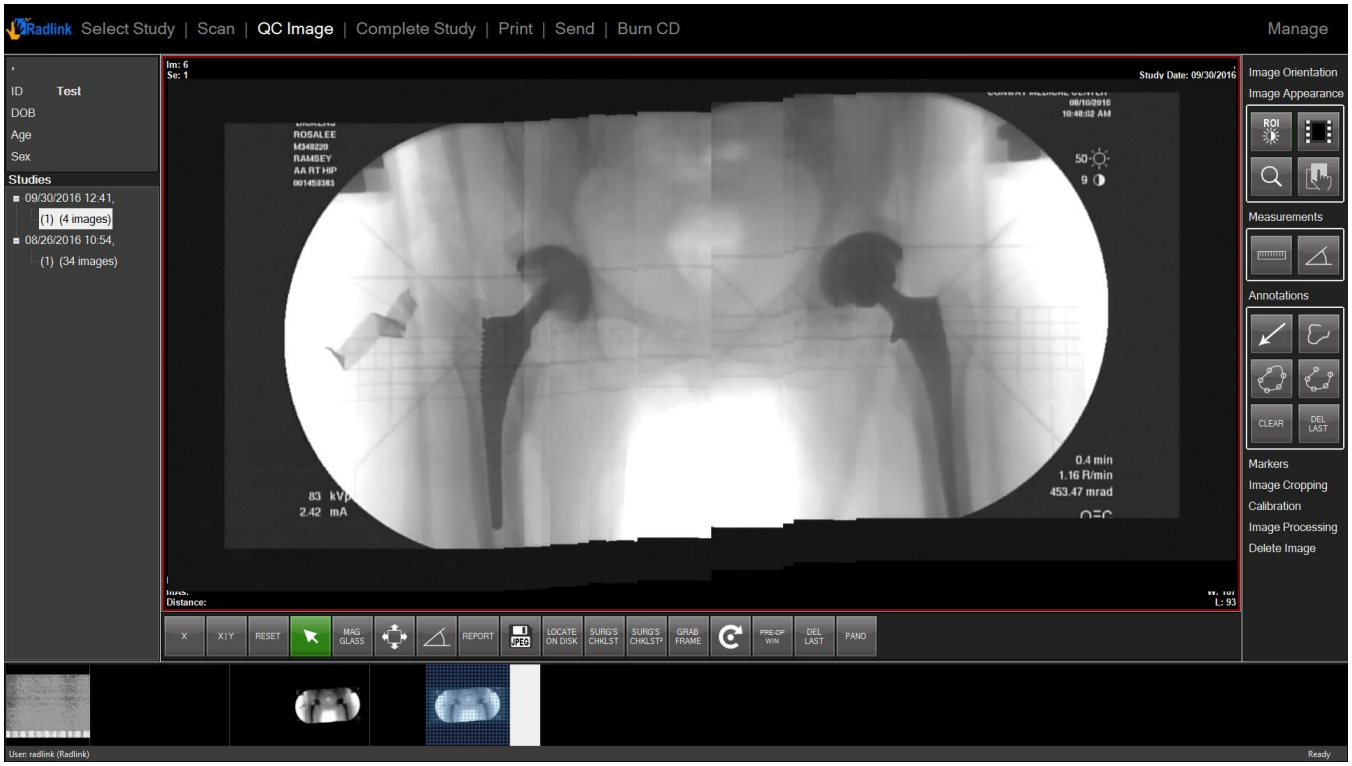


3. When the rightmost/leftmost position has been imaged, click the “Stop Pano” button. To save result, click the “Save” button.



Panoramic view (continued)

4. The panoramic image will be added to the last image of the current study.



Static Panoramic view

Static Panoramic view is a new feature introduced in version 3.8.1.5. To have this function enabled, contact Radlink to acquire the license with Pano function.

The Static Pano function can automatically construct a panoramic view based on static grabbed images. This function stitches all grabbed images together to generate a panoramic view in real time. The “Pano Static” button is shown below.

To get a static panoramic image, follow the following steps. **Note: Patient direction should be either right to left or left to right.**

Preparations:

1. Make sure GPS Tower or Tablet has the Pro Imaging software of version 3.8.1.5 or higher.
2. Verify that the C-arm can be moved on a sliding rail or motorized rail. For the PANO function to work properly, the C-arm must be able to do smooth translational movements (movement along a single axis). No rotation should be introduced to the movement of the C-arm during PANO operation.
3. After C-arm kit or GPS towers BNC cable is connected to C-arm, check the connectivity and verify the acquired image from the C-arm matches the original image on the C-arm monitor in shape. When needed, adjust the ratio of the C-arm images by pressing the RES button on the C-arm kit or GPS Tower, or change the resolution in the software. The recommended resolution for most C-arms is 1024X768.

Operate Panoramic Fluoro

1. Position the C-arm image intensifier at one side of the patient and above the hip.
2. Launch **PANO Static** function in Radlink Pro Imaging software.
3. Gradually move the C-arm to the other side of the patient with translational movement only. Break down the movement into several intervals based on the size of the patient. At each interval, take a C-arm shot and grab the image by pressing the **Grab Frame** button in Radlink software. Make sure any two adjacent images have an overlap of no less than 50%. We suggest the following two approaches as recommended operating guidelines.

    A. Bony landmark based approach. Please see Figure 1 for illustrations.

    (Assuming we are moving the c-arm from patient right to left)

    1) Position the C-arm such that the right lesser is in the middle of the screen, take shot #1

Static Panoramic view (continued)

2) Move the C-arm until the right femoral head is in the middle of the screen, take shot #2

3) Move the C-arm until the symphysis is in the middle of screen, take shot #3

4) Move the C-arm until the left femoral head is in the middle of the screen, take shot #4

5) Move the C-arm until the left lesser is in the middle of the screen, take shot #5

B. Physical distance based approach. Please see Figure 3 for illustrations.

1) Move the C-arm from one side of the patient to the other, make a note of the total distance that the C-arm has traveled, by looking at the markings on the C-arm bar.

2) Divide that distance by 5 to separate into 5 shots. (For patient with overly large pelvis, increase the number of shots as needed).

3) When taking pano, move the C-arm by 1/5 of the total distance.

4. After all desired shots are acquired, wait until the **Save** button is activated, then press **Save** button to complete the pano operation.

Static Panoramic view (continued)

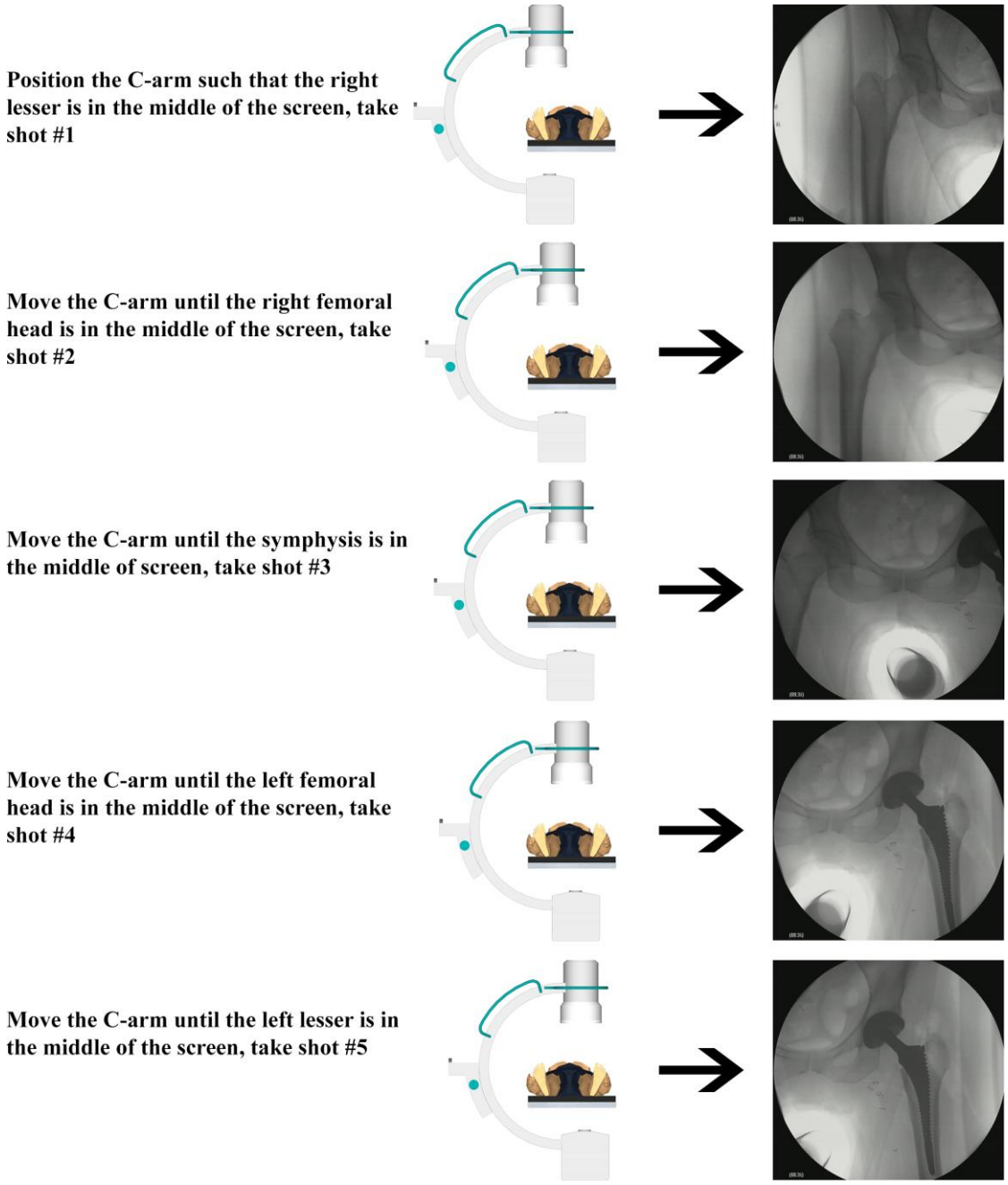


Figure 1. Bony landmark based approach.

Static Panoramic view (continued)

Figure 2. Pano image based on the 5 shot from Figure 1.

1. Move the C-arm from one side of the patient to the other, make a note of the total distance that the C-arm has traveled as **D** by looking at the markings on the C-arm bar.

2. Divide that distance by 5 to separate into 5 shots. (If the pelvis is large, the distance can be divided to 5 or more to separate into 5 or more shot.)

d = D/5

3. When taking pano, move the C-arm by **d** during each interval of shot.

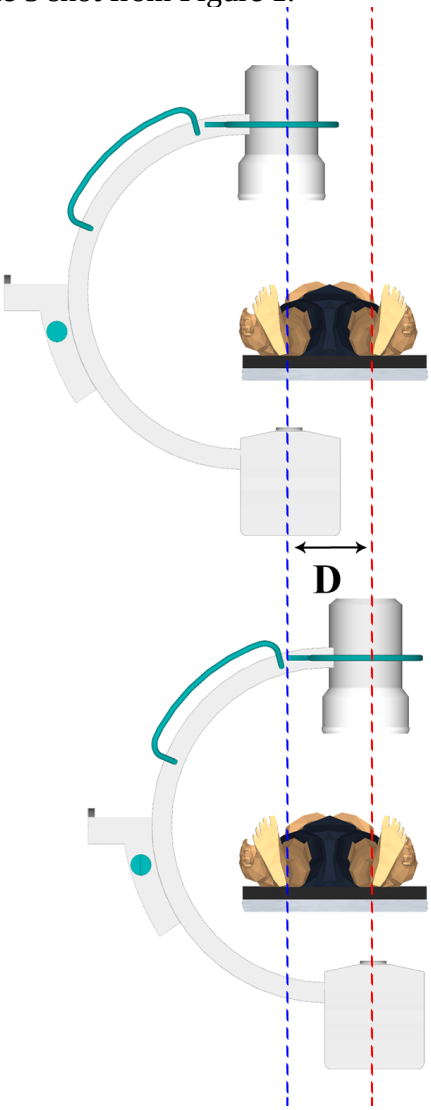


Figure 3. Physical distance based approach.

Static Panoramic view (continued)

Tips:

1. Make sure that during PANO Static operation, the movement of the C-arm is translational. Do not rotate the image intensifier.

2. Make sure the image acquired by Radlink software is proportional to the original image displayed on C-arm monitor.

3. During PANO Static, regardless which guideline is followed, there should be enough (at least 50%) overlaps between any two adjacent images.

Principle of Operations

C-arm images are mostly distorted due to the imaging technology, which results in inaccuracy when measuring ROI that is beyond the center region of the image. This phenomenon is shown by image A in figure 4 – 6, where a straight metal rod is placed across the pelvis and the rod appears bent asymmetrically when captured by the C-arm. In addition, the further away from the center of the image, the more severe the distortion.

Radlink's Pano function addresses this distortion issue by generating a panoramic image based on a sequence of overlapping C-arm images. During the generation of a panoramic image of the pelvis, Radlink software employs intensity based image registration technique to accurately register the images, and crop out the center region of each image and stitch them together based on the registration. Image B in figure 4-6 shows the resulted pano image, where the distortions of the metal rod are corrected in all cases.

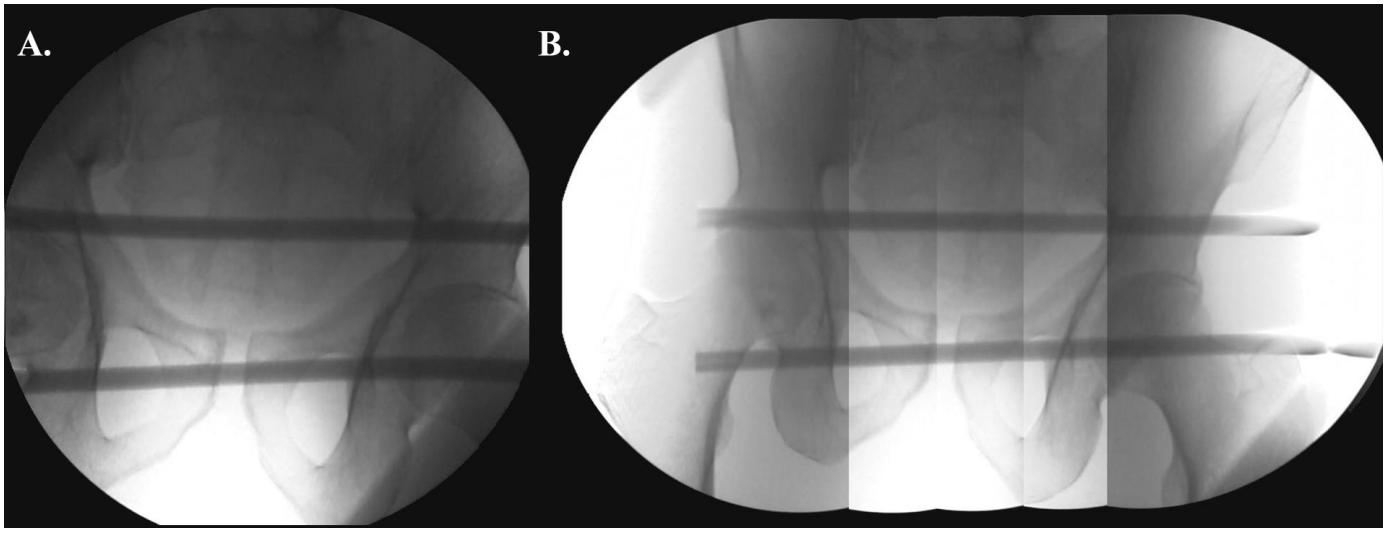


Figure 4. A. Original C-arm image with straight metal bar across pelvis distortion. B. Distortion-free panoramic image generated by Radlink Pano Static function.

Static Panoramic view (continued)

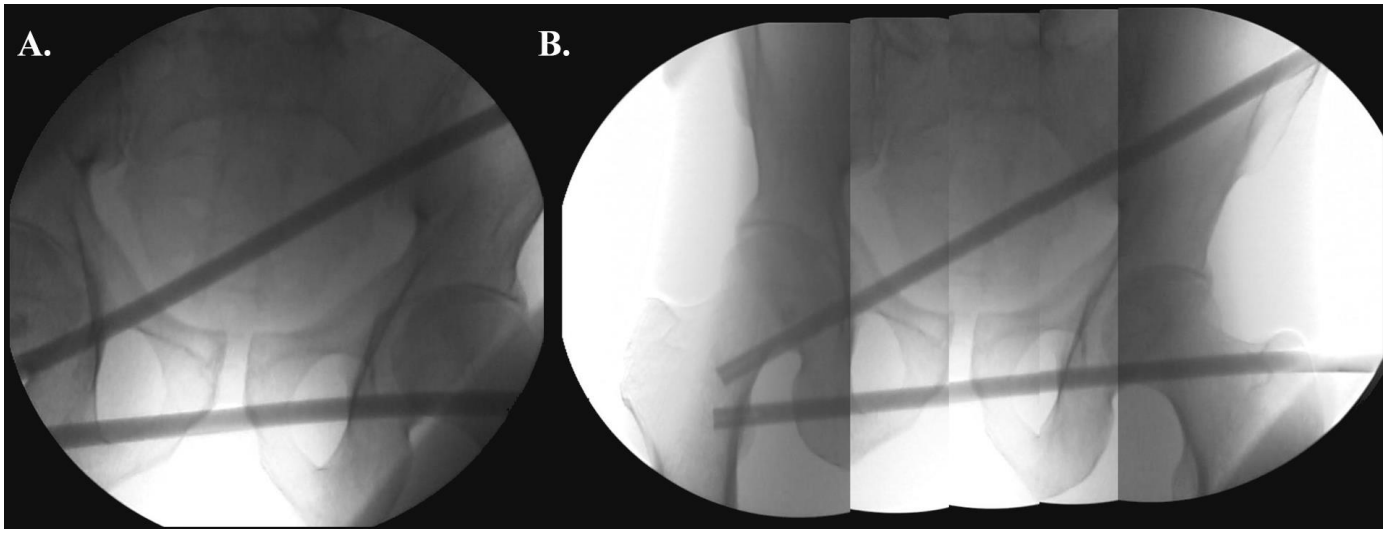


Figure 5. A. Original C-arm image with straight metal bar across pelvis distortion. B. Distortion-free panoramic image generated by Radlink Pano Static function.

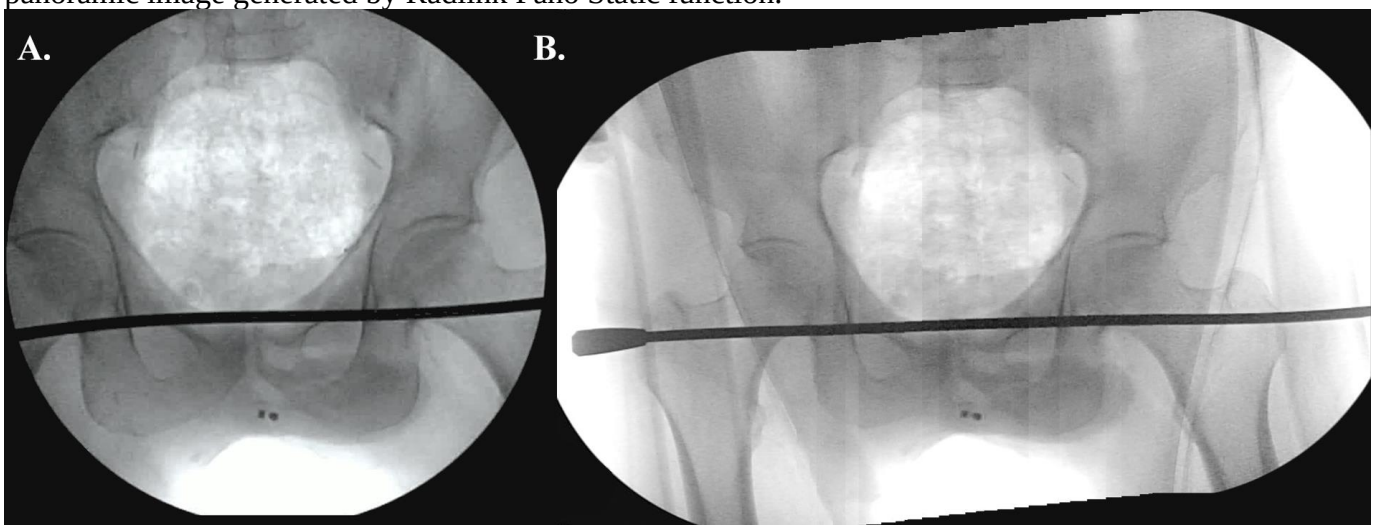
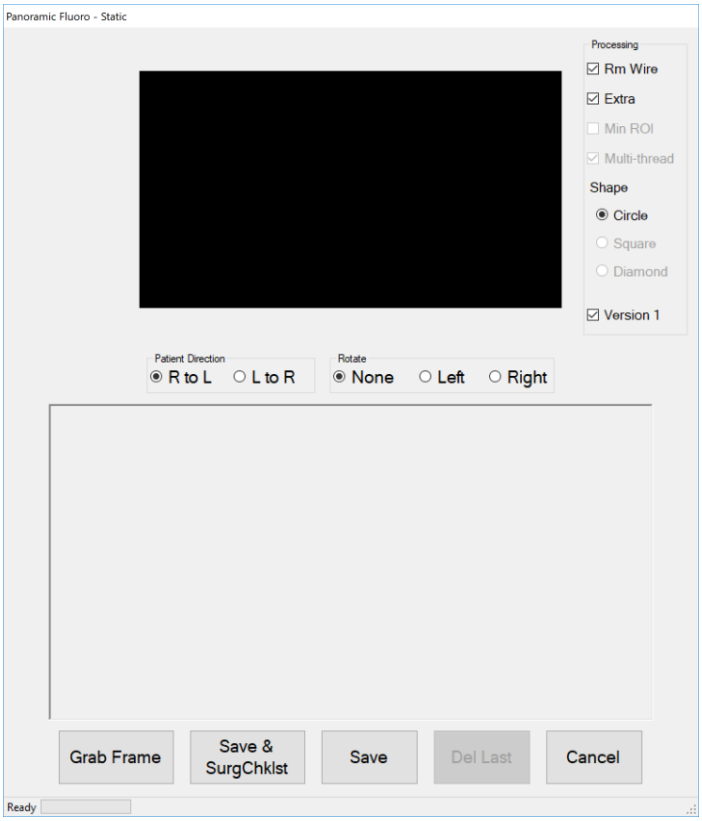


Figure 6. A. Original C-arm image with straight metal bar across pelvis distortion. B. Distortion-free panoramic image generated by Radlink Pano function.

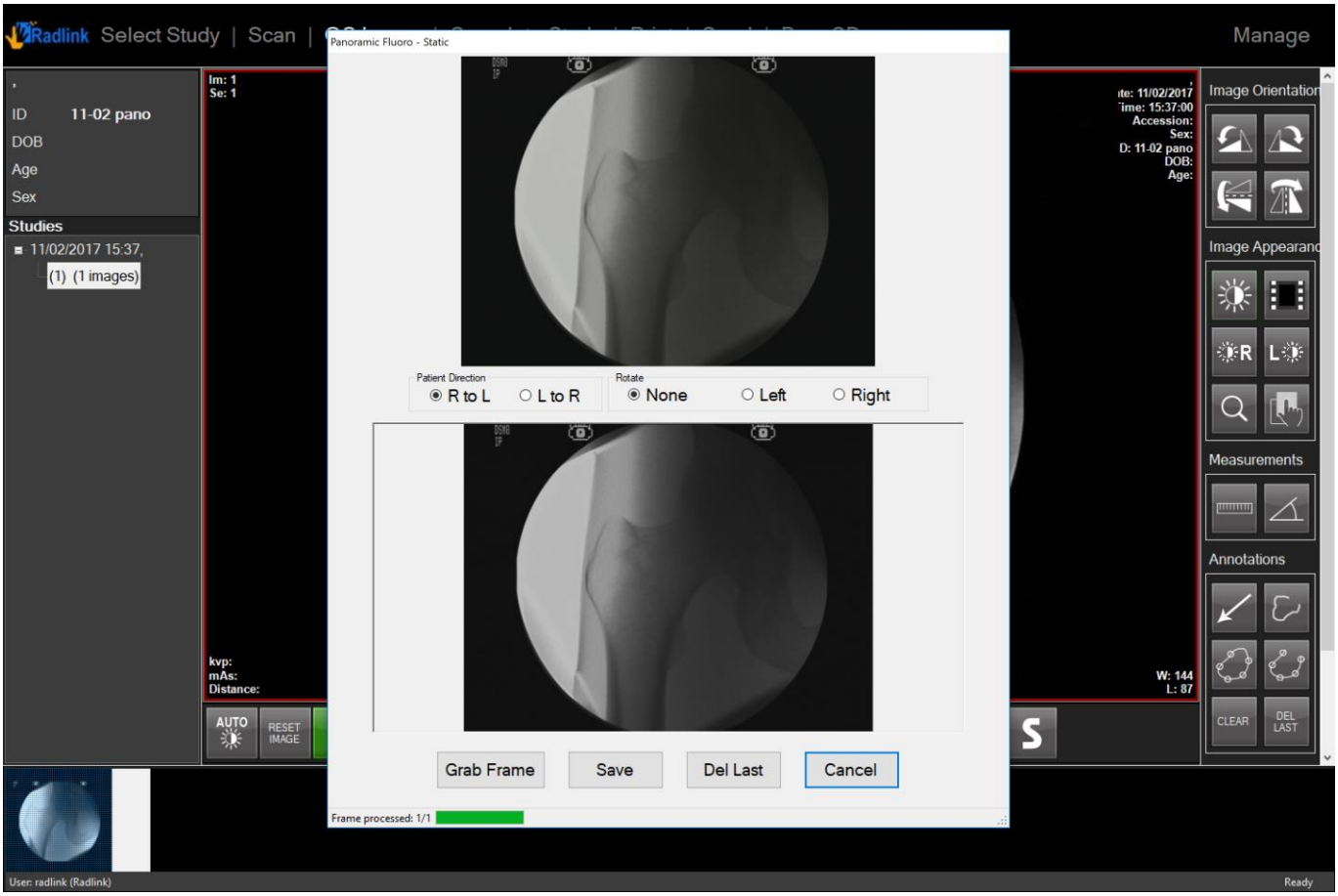
Static Panoramic view (continued)

1. Click on “Pano Static” button to open Pano Window.



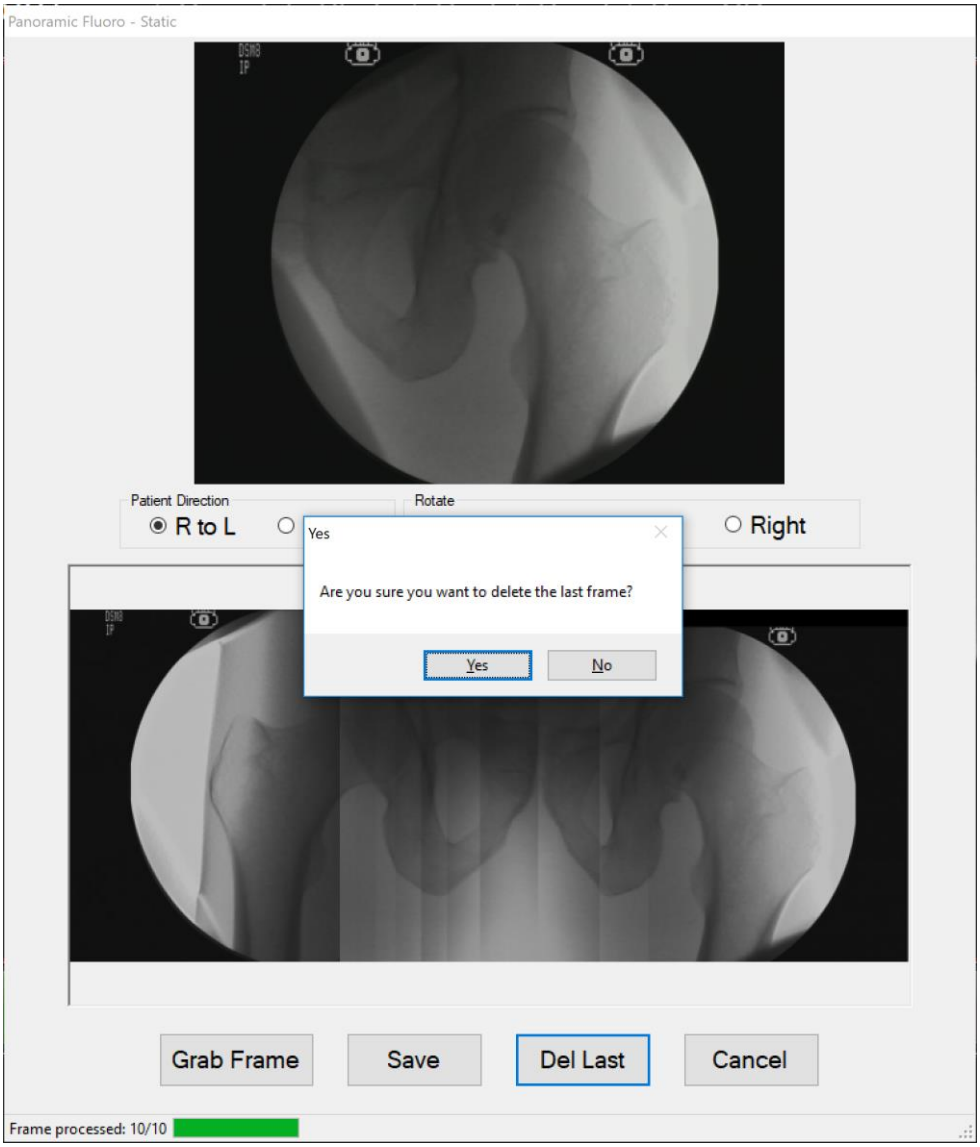
Static Panoramic view (continued)

2. When the fluoro is ready, click “Grab Frame” button on the Static Pano Window when there is appropriate motion between two frames. During scanning, the panoramic image at the lower part of the window will keep updating itself as each new frame is coming in.



Static Panoramic view (continued)

3. When the current frame is not in the best position, click “Del Last” button to undo the most recent stitched frame.

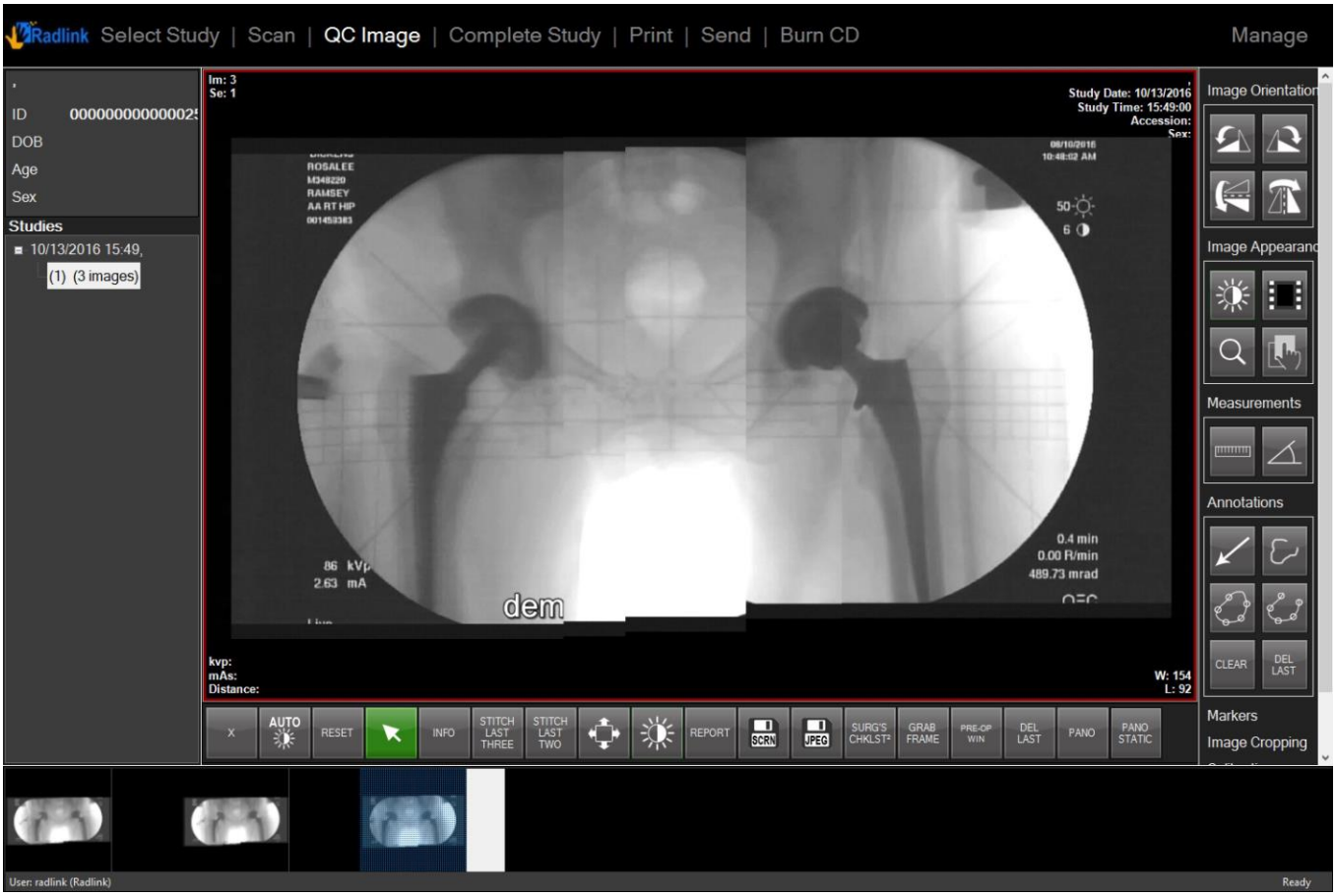


Static Panoramic view (continued)

4. When the rightmost/leftmost position has been imaged, click the “Save” button to save the shown result.

Static Panoramic view (continued)

5. The static panoramic image will be added to the last image of the current study.



DICOM Panoramic view

DICOM Panoramic view is a new feature introduced in version 3.8.2.5. To have this function enabled, contact Radlink to acquire the license with Pano function.

The DICOM Pano function can automatically construct a panoramic view based on DICOM images received by the Pro Imaging software. DICOM images must be dropped into the incoming folder of the software one at a time and this function stitches all of the images together to generate a panoramic view. The “Pano DICOM” button is shown below.

To get a panoramic image, follow the following steps.

1. Click on “Pano DICOM” button to open Pano Window.

2. Copy the DICOM images into the “incoming” folder one at a time. The software will begin processing and stitching the images.

3. After all of the images have been processed, click the “Save” button to save the image. The panoramic image will be added to the last image of the current study.

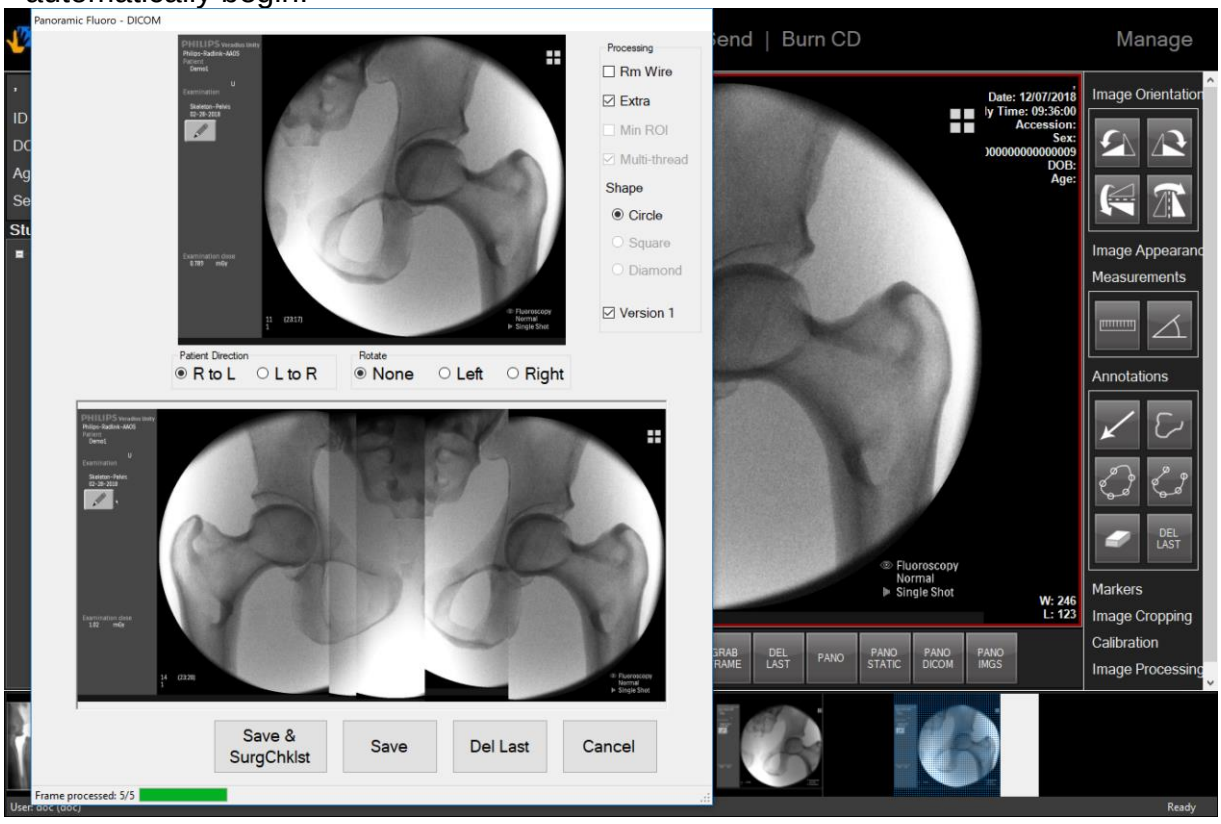
Selected Images Panoramic view

Selected Images Panoramic view is a new feature introduced in version 3.8.2.5. To have this function enabled, contact Radlink to acquire the license with Pano function.

The Selected Images Pano function can automatically construct a panoramic view based on images that have been selected in the Pro Imaging software. The “Pano IMGS” button is shown below.

To get a panoramic image, follow the following steps.

1. Select the images to be stitched. Multiple images can be selected by holding “Shift” or “Ctrl” while clicking the desired images.
2. Click on “Pano IMGS” button to open Pano Window. Processing and stitching will automatically begin.



3. After all of the images have been processed, click the “Save” button to save the image. The panoramic image will be added to the last image of the current study.

Pelvic Tracker

1. Turn on the Pelvic Tracker. A blue light will turn on indicating the device is on. Position the patient in the Lateral-position prior to starting your THA, with the pelvis of the patient perpendicular to the ground (vertical). Using proper sterile technique, insert the Radlink Sensor into the isolation bag, probe cover, or a similar sterile bag enclosure. Carefully cut off the excess of the bag and seal the Sensor using a Tegaderm, IOban or another similar adhesive-based sterile wrapping material.

2. Once the Sensor is sealed and sterile-wrapped, place the Sensor on the patients' Iliac Crest just above the incision, and secure the Sensor to the patient using IOban or a similar sterile adhesive tape.

3. Click the *Show Pelvic Tracker* button and wait for the model image to appear on the screen. The Pelvic Tracker can also be shown alongside the X-ray image by clicking the X|Y hot button and opening the Pelvic Tracker through Surgeon's Checklist in the second window.

4. Press "Reset Alignment" to Zero the Sensor to the initial position prior to beginning the THA procedure.

5. The rotation and tilt can be tracked by the numbers underneath the Pelvic Tracker model during the procedure. Prior to capturing your next x-ray, restore the "Rotation" output in the Pelvic Tracker measurements to ~0° (+/- 2-3°) depending on the physician's tolerance for imperfect pelvis position in the x-ray image.

6. If you find that the initial position was not exactly as desired, you can adjust the target position of the Sensor measurements by making a slight correction to patient position and then clicking the *Reset Alignment* button once the setup is complete.

- **e.g.** If your first image of the pelvis is rotated ~10° too far forward, rotate the patient back ~10° and press the *Reset Alignment* button. The model will reset to the animated position and the Rotation and Tilt numbers will be reset back to 0. This will be the position and orientation that will be used to reposition the patient in any subsequential X-ray images captured.

7. Click the *Hide Pelvic Tracker* button to go back to the X-ray image.

Software Upgrades

For instructions on how to reinstall the GPS software or upgrade to a later version, see:

http://radlink.com/usermanuals.html

To download the latest version of software, see:

http://radlink.com/downloads.php

If you are experiencing trouble with viewing instructions or downloading software, please contact your Radlink service provider.

Troubleshooting

This section addresses how to resolve some of the common problems using the imaging software.

Radlink Support can also be contacted for assistance:

Phone: (310) 643-6900 Option 2
Email: support@radlink.com

Image Problems

The information in this section is provided for general informational purposes only.
Please refer to your x-ray manufacturer for techniques as well as hints on taking better images.
Contact your authorized Radlink service provider for any problems you cannot resolve.

Vertical Lines

Cause/Solution:

When random vertical lines are present throughout an image it usually means that calibration needs to be performed. See the section on calibration.

Image Problems (continued)

Dark Image

Cause/Solution:
Overexposure is a possible result of using too much mAs.

To correct existing image, use window leveling (W/L). Decrease the mAs in future exposures

Image Problems (continued)

Grainy Image (Quantum Mottle/Noise)

Cause/Solution:

If an image is grainy, it may be underexposed.

The user may need to increase the KVP and/or mAs.

Image Problems (continued)

Too white (underpenetrated)

Cause/Solution:

If an image is too white it may be underexposed because of low mAs or KVP settings.

To resolve, use window leveling (W/L). The user may need to increase the KVP and/or mAs.

Image Problems (continued)

Unprocessed Image

Causes/Solutions :

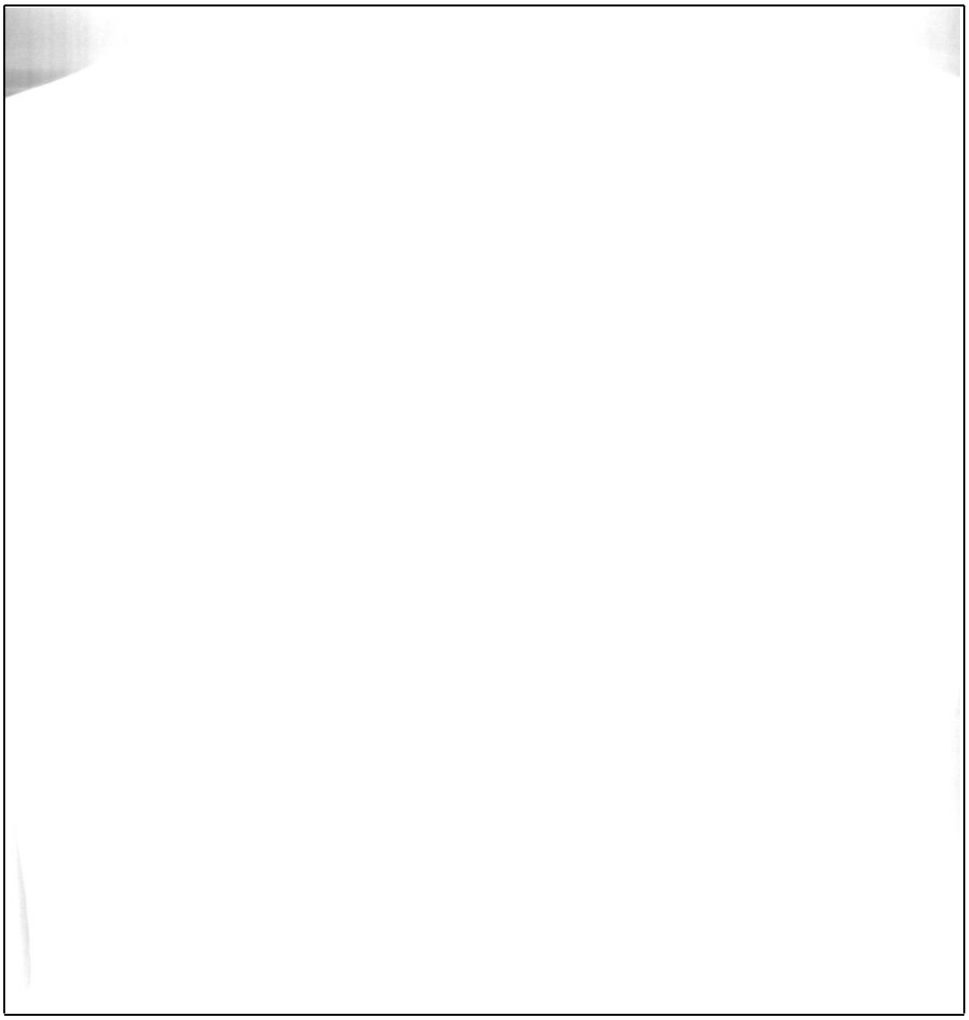
1. The imaging algorithms are not compatible with the software. To resolve, view the image and select the **Image Processing** button and then select the **Default** button or another that yields the best image.

If a pop-up message appears that the processing of the body part is unsupported, call your Radlink service provider.

2. A raw (unprocessed) image was placed in the incoming folder. To resolve, follow the steps in step 1.

Image Problems (continued)

Mostly all white image when viewed from a burned CD



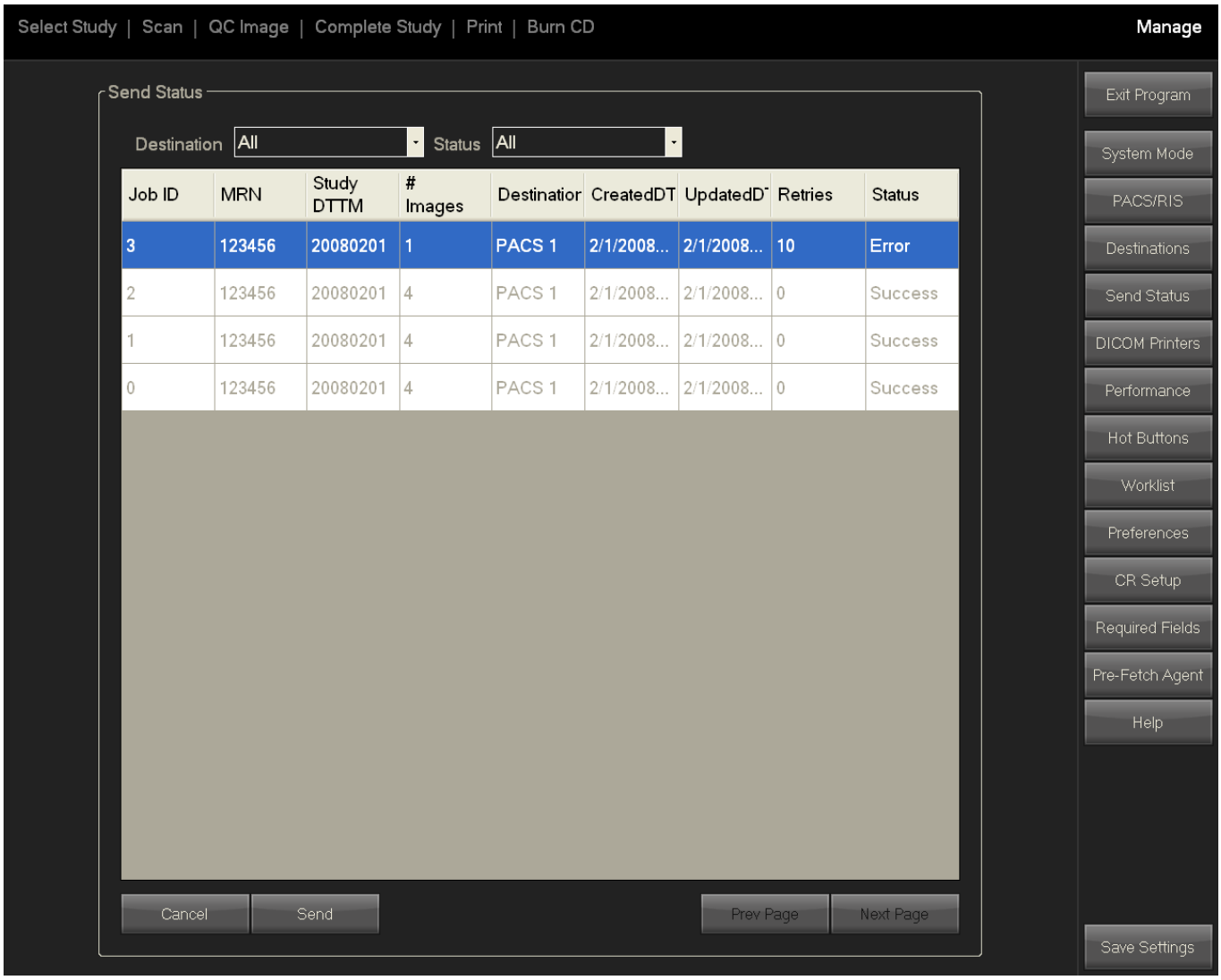
Cause/Solution:

If the **Complete Study** button was not selected on the GPS before burning a CD, the image will appear nearly-all-white when viewed.

To correct, select the study, click **Complete Study**, and burn a CD again.

Send Status Indicates Error

One of the things that could lead to an error is if the network went down that connects the GPS to a remote PACS (not the embedded Radlink PACS). In this case, the software will wait 15 minutes to re-establish connection before indicating an **Error** state.



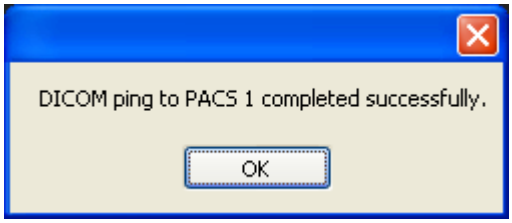
To resend a study that is displayed with a status of **Error**, highlight it and select **Send**.

The system will try again 10 times to send the study to the destination.

Send Status indicates Error (continued)

If the error still exists:

1. Select **Manage**
2. Select **Destinations**
3. If there is more than one host, highlight the host listed in the Send Status' **Destination** column that contains an **Error**.
4. Click the **Ping** button to ensure that the Destination settings are correct. If successful, the below window will be displayed.
5. If the **Ping** is unsuccessful for the destination in question, you will need to contact your Radlink service provider for further assistance.



Can't read a Burned CD

Most likely the problem is the .NET framework 2.0 is not installed on the PC in which the CD is inserted.

Here are instructions for installing the batch file that will install the required files:

1. Start > **Run**
2. Enter your CD drive letter and path. For example: **D:\ViewProLightSetup.bat**
3. Select **Ok**
4. Follow on-screen instructions
5. After installation has completed, eject, and then re-insert the CD

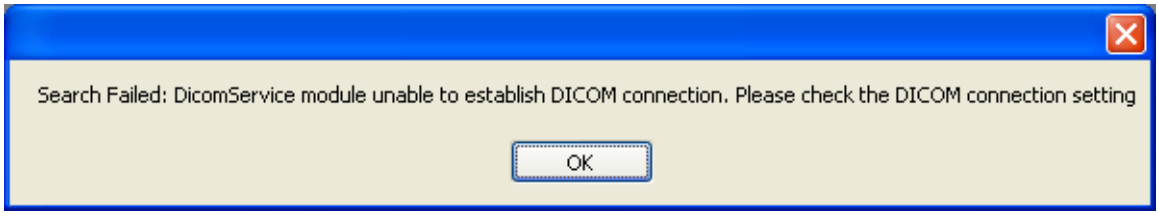
The optional e-Film Lite viewer may be used instead of the default Radlink Lite viewer. See the **Burning a CD** section.

A Burned CD doesn't contain markers

This can be caused by not selecting **Complete Study** before burning the CD.

No connection with PACS server

If the following pop-up window appears, the connection to the PACS server is not established. Please refer to Configuring the PACS Server Settings.



The following applies to a Radlink GPS unit

If a user clicks **Log Off** in the window below instead of **Switch User**, the PACS service may shut down.

One method to fix this problem is to simply restart the GPS:

Start > **Turn Off Computer** > **Restart**

Appendix

This section describes the set of features according to menu.

Select Study

New Patient
Used to create new patient and study information before a scan is performed.

New Study
Used to carryover existing patient information before a new scan is performed. To use, highlight desired study by clicking in the left most column in Select Study window and press New Study.

Worklist
A pull-down menu of available pre-defined dates is displayed

Selecting a Worklist value will do the following:

Today – display all studies with the current day's date
Past 2 Days – display all studies with the current day's date and yesterday's date
Past 7 Days – display all studies within the last week
Past 30 Days – display all studies within the last 30 days
All Studies – display all studies regardless of date

And
Used in conjunction with Worklist and Search.
Consists of 4 fields:

PATIENT ID (aka **M**edical **R**ecord **N**umber or MRN)
PATIENT NAME (must be last name)
ACCESSION
DATE RANGE

After specifying one or more **And** field(s), the Search button or Enter key must be selected.

Pages
Next – displays the next group of studies
Prev – displays the previous group of studies

Search
When Search is selected, the studies that match the Worklist and the fields in the **And** section are displayed.

Reset
Resets the Worklist to Today and inserts the current day's date into the DATE RANGE field.

View
Downloads selected studies to your local hard drive so that they may be displayed faster the next time they're selected. To use, highlight one or more studies by placing the cursor in the leftmost column next to the study and click. The row will appear highlighted. Then press the View button. To highlight multiple studies, hold down the CTRL key while making selections and then press the View button.

Delete
Deletes the GPS's local images for each highlighted study. Note that any studies that were previously stored to a PACS are not deleted.

Column Headings
Studies may be sorted in forward or reverse order by selecting the desired heading. A second selection will toggle the sort order.

Scan

Once a study has been created or viewed, the Scan tab may be selected. The scan window is used to select the exam techniques and initiate the scan.

Body part
A pull-down menu of the available body parts. These may also be selected by selecting the corresponding area on the anatomical man. Depending on the body part that is selected, the values for KVP, mAs, and Gain will automatically default to preset values that can be manually changed.

View
Depending on the body part chosen, selection of any of the available views may automatically change the KVP, mAs, and Gain values.

Size
The approximate size of the patient. Depending on the body part chosen, selection of any of the available sizes can automatically change the KVP, mAs, and Gain values.

KVP
The peak voltage applied to an x-ray tube, expressed in kilovolts.

mAs
The electric charge in milliamps that flow through the x-ray tube per second. The KVP value times mAs equals power in Watts, or Joules per second.

Gain
The light absorbed by the phosphor plate in the cassette is amplified based on the gain setting.

Save
Saves any custom settings for fields KVP, mAs, and Gain.

Start DR
Activates the GPS digital panel to receive X-rays and form images. When finished, the image is post-processed and displayed in the QC Image window.

Demo Scan
Set by selecting CR Demo or DR Demo button in Manage/System Mode/Image Acquisition, it simulates a scan. A sample chest in CR Demo or a sample hip or knee in DR Demo x-ray image is post-processed and displayed.

New Series
Create a new series for segmenting scans by modality or body part into a separate folder.

Change Info
Change the Patient Information and Study Information fields for the current exam.

QC Image

Image Orientation
RL – Rotate Left. Rotates selected image 90 degrees to the left side.
RR – Rotate Right. Rotates selected image 90 degrees to the right side.
FV – Flip Vertically. Flips the selected image 180 degrees up/down.
FH – Flip Horizontally. Flips the selected image 180 degrees left/right.

Image Appearance
W/L – Window Leveling. Allows the adjustment of the contrast of the selected image. Select the image and move left or down to lighten and right or up to darken
ROI W/L – Region of Interest Window Leveling. Allows the adjustment of the contrast and brightness within a defined area of selected image.
NEG – displays a negative of the selected image.
ZOOM – enlarges selected image.
PAN – moves selected image.

Image Cropping
Create a magnified image of a selected area.

Add Markers
Allows the placement of **L**eft, **R**ight designators, and customizable text strings using **Define**. Once placed, they may be removed by selecting and dragging off the image.

Image Processing
The selectable algorithm buttons which are based on the selected body part, reduce noise and artifacts and sharpen image structures, making them easier to view and promote a better diagnosis.

Delete Image
Removes a scanned image from the active image window.

Studies (left margin)
In Image Acquisition mode, all studies under the same ID number will be displayed at a time on the left side of the main view (note that Viewing Workstation mode shows all studies).
Below Studies are Series, and Image information. The number for each is indicated. You may select these to display the desired images.

Pano
In the pano window, a panoramic image can be created using a live image stream.

For example:

Studies
20060920, L/S <- Study 1 (StudyDTTM/Modality)
(1) (1 images) <- Series 1, 1 image
(2) (3 images) <- Series 2, 3 images
(3) (5 images) <- Series 3, 5 images

Hot Buttons

Settable in **Manage** > **Hot Buttons**

Default buttons:

X – displays a 1x1 grid
X | Y – displays a 2x1 grid
X / Y – displays a 1x2 grid
AUTO W/L – restores window leveling to original setting
W/L – allows user to window level by adjusting brightness & contrast
RESET – restores all Image Orientation, Image Appearance, Measurements, and Annotations customizations to their original values.
INFO – overlays patient information on image.
← → expands the window to full screen size
→ ← restores the window to default screen size
REPORT – Brings up the Structured Report window which allows the entry of clinical notes.
Pano – Brings up the pano window which allows a panoramic image to be created

Measurements:
LINE – allows the placement of a line between two points on an image and determines the resulting length in millimeters.
ANG – allows the placement of two lines on an image and determines the resulting angle in degrees.
Once placed, lines or angles may be individually removed by selecting their midpoints and dragging them off the image.

Annotations:
FREE STYLE – allows the placement of freehand drawing to an image.
CLEAR – removes all freehand drawing from selected image.

Series
NEXT – displays the next series of images in selected study
PREV – displays the previous series of images in selected study

Image
NEXT – displays the next group of images in selected series
PREV – displays the previous group of images in selected series

Optional Buttons (Can be found in **Manage** > **Hot Buttons**)
ZOOM – enlarges an image (drag cursor from top left to bottom right of screen)
PAN – moves the viewing window to a different region of the image you a looking at
SAVE JPEG – saves a JPEG version of the current image on the active window
LOCATE ON DISK – locates the current image on the local drive (acquisition folder)
MAGNIFYING GLASS – tool for magnifying specified area of image
NEG – displays a negative version of the image (black/white are switched)
W/L PRESET – opens menu for saving and calling saved window-leveling values
HISTOGRAM – graph showing data distribution of current image
CINE – play a series of images cinematically

ROTATE – rotate image to any angle around its center point
GRAB FRAME – grab frames from the targeted device
SURGEON'S CHECKLIST – offers easy to use scale calibration, distance and angle measurements for orthopedic surgeons
ORTHO PLAN – create virtual components to estimate the best fit for orthopedic surgery
DELETE LAST – delete the latest annotation user made on the image
SAVE SCREEN – capture the current screen and save it under the current study
PTR TO LINE DIST – measure distance from a point to a line
STITCH LAST THREE – stitches the last three images together
INFO – toggles display of patient information
STITCH LAST TWO – stitches the last two images together
SELECT MOUSE – assigns a hot button to a mouse button
PANO DICOM – opens DICOM panoramic image reconstruction window
PANO IMGS – opens panoramic image reconstruction window for selected images
EMAIL – email images from software

Thumbnail Images
Small .jpg images called thumbnails are located at the bottom and may be selected for display in the main window(s). Note that for the MR modality images, only one thumbnail will be displayed.

Key Image – in order to identify important images, thumbnails can be marked as key images by pressing "k" on the keyboard, a yellow frame will appear around the selected thumbnail. Press "k" again to unmark the thumbnail.

Complete Study

This button stores the currently viewed study and all its images, markers, lines, angles and freestyle annotations, to the active destinations specified in the Manage/Destinations window.

Print

In the **Printers** section, a checkbox will appear for each printer that was previously added including the Windows default printer. For information on adding or removing DICOM printers, see **Manage** > **DICOM Printers**

Print – prints the displayed image to the printer(s) checked under Printers heading.
Preview – applies only to the Windows default printer. Displays how the image will appear when printed.
True Size – when checked will print the actual size of the image (DICOM printing only)
True Size when unchecked will fit the image to the film size (DICOM printing only)
Layout – Allows multiple images to be printed on one film (DICOM printing only)
Print Series – Prints every image in the selected Series.
Print Study – Prints every image in all Series.

Send

Destinations – Select the PACS the image is to be sent to. Multiple PACS can be selected.

Selection – An individual image or the whole series or study can be sent to the destinations.
Include – The image can be sent with the annotations.

Burn CD

Studies may be burned to a CD and inserted into a different GPS or a PC for viewing. A de-featured version of either the Radlink (default) or e-Film viewer is stored on the CD along with the study information.

To select the viewer, go to Manage/Preference and set the **Viewer on CD** field.

Manage

Battery Percentage
Radlink Pro Imaging software will have panel battery percentage displaying at the top right corner under DR Perkin Elmer system mode.

Logout
This button closes the Radlink Pro Imaging software window.

System Mode – allows the selection of Image Acquisition or Viewing Workstation.
Image Acquisition - contains most of the features of Viewing Workstation plus the ability to create studies, receive images from the GPS systems, and perform additional image enhancements not available in the Viewing Workstation mode.
DR Perkin Elmer – PerkinElmer flat panel X-Ray detector that performs real-time digital x-ray imaging, mode to operate Radlink DR Pro & GPS.
DR Vieworks – Vieworks flat panel digital radiography system, mode to operate Radlink DR Pro & GPS.
CR Pro – Mode to operate Radlink CR Pro unit.
Laser Pro – Mode to operate Radlink Laser Pro unit.
Frame Grabber 1.0 – Mode to grab images from targeted device by using epiphan DVI2USB Frame Grabber.
Frame Grabber 2.0 – Mode to grab images from targeted device by using epiphan AV.io frame grabber
DR Thales – Thales flat panel detector, mode to operate Radlink DR Pro & GPS.
DR Demo – Simulate DR scans, a sample hip or knee post processed x-ray image will be displayed for demonstration.
CR Demo – Simulate CR scans, a sample chest post processed x-ray image will be displayed for demonstration.
Frame Grabber Demo – Simulate c-arm image, a sample cup implant image will be displayed from Grab Frame
Wireless Frame Grabber – Mode to connect with Wireless C-Arm Kit
Save Settings – saves the System Mode setting.

PACS/RIS (**P**icture **A**rchiving **C**ommunication **S**ystems/**R**adiology **I**nformation **S**ystems)
The server repository for images (PACS) or patient tracking and scheduling (RIS) is selectable in Worklist.

The following fields are displayed under the PACS Server Setting window:
Name – name of the PACS server
IP - the physical network node address of the PACS server.
DICOM Port - the logical port of the PACS server.
Source AET - **A**pplication **E**ntity **T**itle of the Radlink device
PACS AET – AET of the PACS server
WEB Port -default outbound Web request port
Save Settings – saves the PACS information.

Destinations
These settings allow you to specify the destination(s) that will receive the images you've scanned when you select Complete Study.
Save Settings – saves the Destinations settings.

Send Status
Send Status is used to verify that a study has been successfully stored to the active destinations listed in the **Destinations** tab within Manage in the Radlink Pro Imaging software.

Cancel – after sending a study to a destination, if it is listed in the 'Executing' state, the transmission can be cancelled by highlighting the study and selecting Cancel. If a study is in any other state such as Pending, it cannot be cancelled.
Send – if a study is displayed in either Cancelled, Error or Unknown states, highlighting the study and selecting Send will attempt to re-send the study to the destinations.

DICOM Printers
Specifies the printer parameters and allows printers to be added and removed.
Test Status – provides feedback on the availability of the specified printer.
Add printer – allows addition of a DICOM printer
Remove printer – removes the highlighted printer.
Film Size – allows the selection of the following film sizes: 14INX17IN, 14INX14IN, 11INX14IN, 10INX14IN, 10INX12IN, 8INX10IN.
Save Settings – saves the DICOM printer information.

Performance

The defaults under the heading System Performance Setting are:
Memory Buffer HWM (MB) = 500
Memory Buffer LWM (MB) = 250
Disk HWM (%) = 90
Disk LWM (%) = 50
Delete Studies Older Than (Days) = *user defined*
Application Disk Drive = C

HWM stands for high watermark
LWM stands for low watermark

When studies are viewed for the first time they are copied to the local disk drive along with their thumbnails so that subsequent views will be more efficient in terms of the display time. The above parameters apply to these local files.

For example, if the memory allocation exceeds 500MB, the system will automatically try to release local memory to reach the lower watermark setting of 250MB.
The same applies to the Disk watermarks. Files are removed if they occupy 90% of the disk, which is defaulted to the C drive, until they occupy 50% of the disk capacity.

Studies can also be automatically cleared from the local hard drive after a specified number of days by populating the **Delete Studies Older Than** field.

Local Database Rebuild – the studies.xml file (local database) can be rebuilt automatically by clicking this button. This file may need to be rebuilt in the case of if being deleted or corrupted.

Worklist Fields

The Select Worklist Fields section specifies the column headings that will appear in the Select Study window.
Beep option under this section will let user hear a beeping sound as the new study arrives in the study list.
The Select Server section determines whether the PACS or Modality Worklist settings (see Manage > PACS/RIS) will be used in the Select Study window.

Preferences

Select Language – select English, French, or Chinese (simplified), or Spanish user interface.
DICOM Receiver Setting (optional- purchased separately) – The IP and DICOM Port values can be used to allow the reception of DICOM images from any networked DICOM storage device such as another Viewing workstation or GPS.
Viewer on CD - Specifies the default viewer that will be used when Burn CD is performed.
Enable Study List Scrollbars – useful when there are many studies for a patient that overflow the window list.
Enable On-Screen Keyboard – used for touch screen displays. Whenever a text field is selected, a keyboard is displayed. Uncheck for non-touch screen displays.
Auto Crop Stitched Images - removes a portion of the image surrounding the stitched area and makes the resulting image appear more seamless.
Refresh Local Studies – displays images from the PACS (if present) rather than from local drive.
Save settings before exiting – automatically performs Save Settings when the software is exited.
Default Author on Report – used to set the default doctor name in a report so that you don't have to manually re-enter it each time.
Date Format – allows the selection of date formats MM/dd/yyyy (month, day, year), yyyy/MM/dd (year, month, day), and dd/MM/yyyy (day, month, year). The date format selection will appear on the display for Select Study, QC Image, and Print menus.

CR Setup

Calibrate – see Calibration section
Erase Plate (button) – erases a cassette based on the number of iterations.
Iterations – the number of times a cassette will be erased when Erase Plate is selected.
Reset Plate – if stuck, retracts the plate back into cassette.
Save QC Images – saves the pre-processed or raw images to local hard drive.

Erase Plate (checkbox) – if unchecked, will not erase plate after a scan. Useful for demonstration purposes.
Bit Depth – used when connecting CR Pro to high-definition monitor.
Flip Chest AP/PA Images – when checked, will automatically flip an image horizontally if body part is chest and view is AP/PA. Useful when x-ray is taken with patient's back to plate.

Required Fields
When checked, these patient and study information fields must be completed when creating a New Patient.

Setting up Pre-Fetch Agent
The Pre-Fetch Agent feature allows you to specify which images to automatically download to your local hard drive. This will save the time of downloading the images from a Radlink PACS to your local drive in order to view them.

Help
The Help section contains selectable hypertext links to Radlink's website, email, address, and software updates. Also contains functionality to change default password for local Radlink account.

Save Settings
After making any changes to the Manage menus, be sure to click the **Save Settings** button. This will record and implement your settings if the system is restarted.

This completes the Radlink GPS Software Guide for Human Imaging – Version 3.8

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