

Setting up and Using bkFusion on the bk3000 & 5000 Systems - Transrectal

This document forms part of the bk3000 & 5000 Short User Guide



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General Information

This user guide forms part of the bk3000 & bk5000 user guide. Please refer to the bk3000 & bk5000 user guide for safety information regarding bkFusion.

Before using the equipment, please make yourself familiar with the information in the accompanying user information documents. Some documents are printed. Make sure that you also read the transducer user guide and specifications for each transducer that you use.

bkFusion Hardware Configuration

The following image shows the hardware configuration of bkFusion:

EM Sensor and E14C4t Transducer

The Sensor attaches via the Sensor Clamp to the Transducer. The Transducer transmits ultrasound data to the System. The position of the Sensor is detected by the EM Transmitter.

EM Transmitter (mounted on stand)

The EM Transmitter detects the position of the Sensor electromagnetically, and transmits the data to the EM Control Unit.

bk3000 Ultrasound System with bkFusion Software

The System receives ultrasound data from the Transducer, and Sensor positioning data from the EM Control Unit.

EM Control Unit

The EM Control Unit receives the position of the sensor from the EM Transmitter, and transmits the position of the Sensor to the ultrasound system.

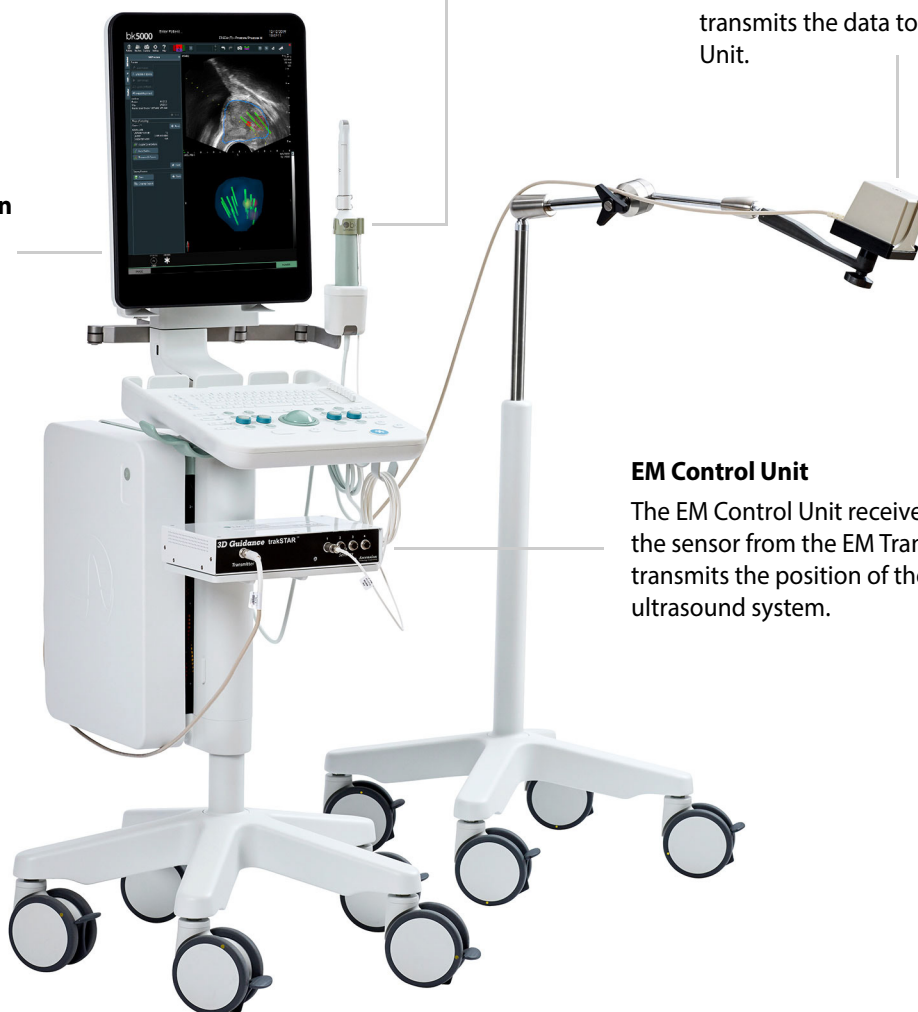


Figure 2-1. bkFusion hardware configuration

Configuring bkFusion Hardware

bkFusion is compatible with the USB foot switch, which can be set as ‘mouse left-click’.
See the bk3000 & bk5000 Advanced User Guide for foot switch configuration information.

1. Connect the EM Control Unit to the bk3000 / bk5000 system using the USB cable (USB ports are located in the rear of the scanning engine). Connect the power cable, then switch the unit **ON**.



2. Connect the EM Transmitter to the EM Control Unit:
Insert the Transmitter cable into the *Transmitter* socket until an audible ‘click’ is heard.



3. Connect the Sensor to the EM Control Unit:
Insert the Sensor cable into socket 1 until an audible ‘click’ is heard.



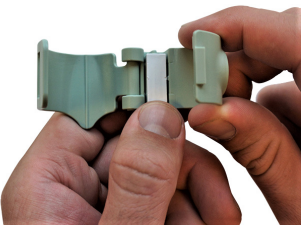
E14C4T (9018)

4. Push the Sensor into the Sensor Clamp channel. The small indentation on the tip of the Sensor must be facing the groove in the Sensor Clamp channel, as indicated.

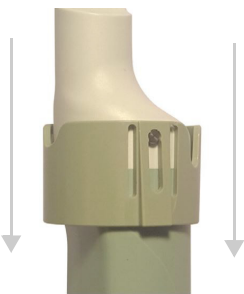


E13C2 (9029)

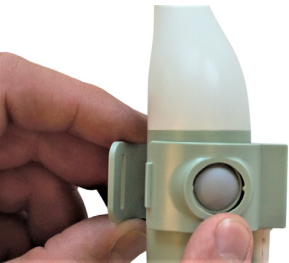
Open the Sensor Clamp and push the Sensor into the channel, as indicated. The small indentation on the tip of the Sensor must be facing the groove in the Sensor Clamp channel.



5. Slide the other Sensor Clamp channel over the steel stud on the side of the transducer until a ‘click’ is heard.



Align the hole in the Sensor Clamp with the transducer button.

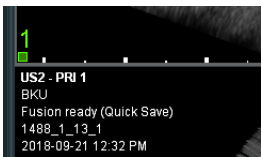


Press the two ends of the Sensor Clamp together until a ‘click’ is heard.



6. The numbered and colored scale under the ultrasound image on the system monitor represents the Sensor’s proximity to the EM transmitter. Green represents the optimal proximity.

To mitigate EM interference, the signal should be either 0 or 1.



Positioning the EM Transmitter

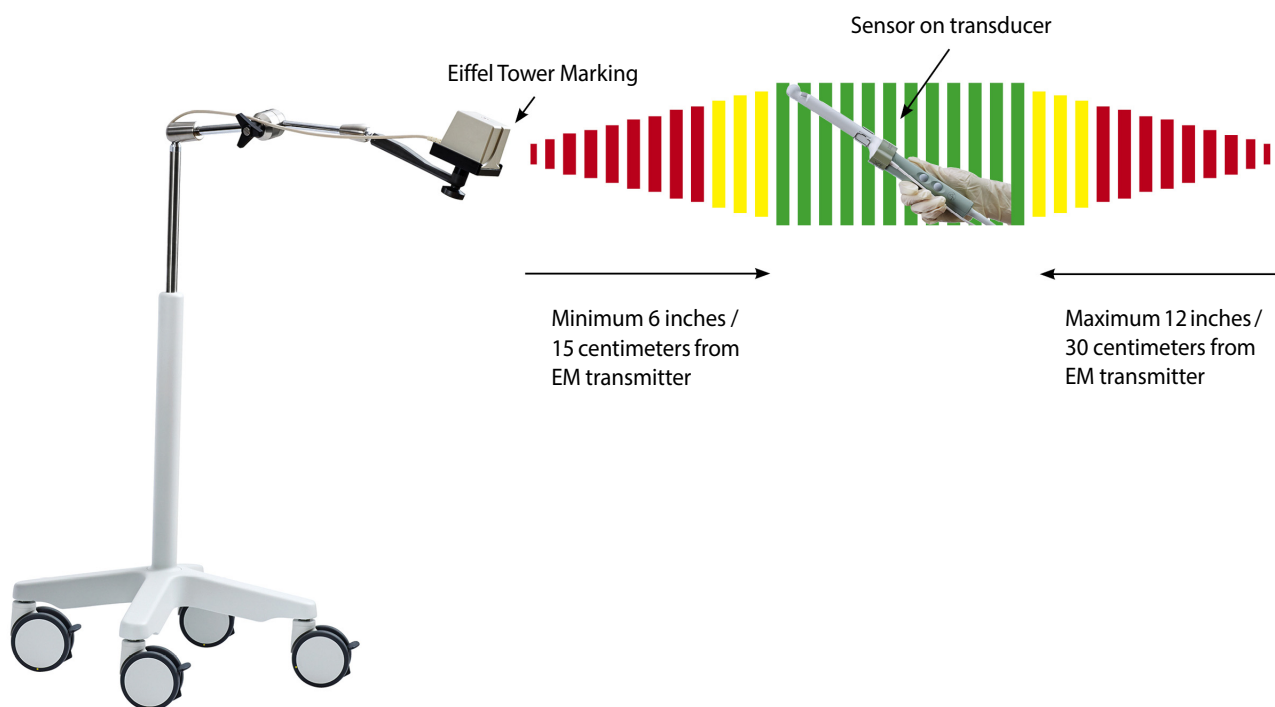


Figure 2-2. The EM transmitter box position

The EM Transmitter box must be positioned at least 6 inches from the **sensor on the transducer**, and no further away than 12 inches / 30 centimeters. The “Eiffel Tower” marking on the EM Transmitter must point directly at the sensor on the transducer. There must be no metal within the 18-inch / 45-centimeter range.

MRI Data Transfer

- For information on importing MRI data from USB/CD, see below.
- For information on importing MRI data from the MIMcloud, see page 10.
- For information on importing MRI data from a Remote Patient List, see page 13.

To Import MRI Data From USB/CD in DICOM Format

- 1 Make sure that a Fusion-compatible transducer is connected to the ultrasound system and the **Prostate** exam type is selected.
- 2 Click the **Fusion** tab that appears at the bottom right-hand corner of the screen.

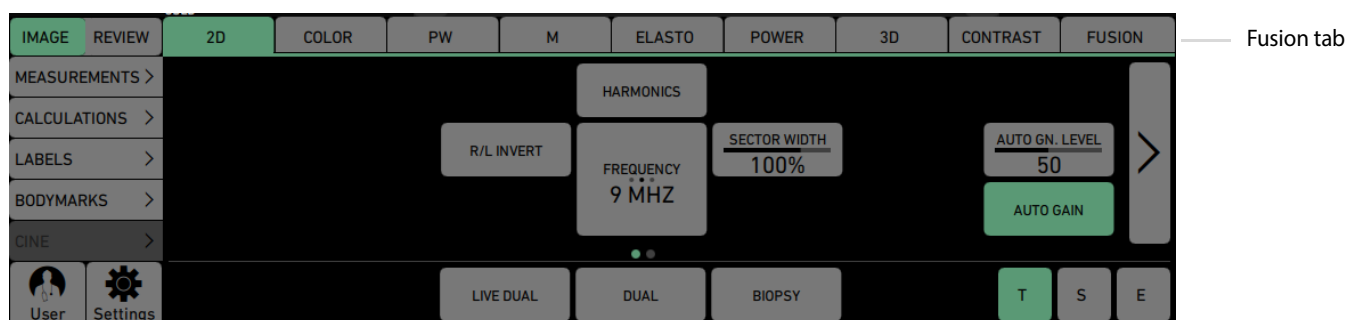


Figure 2-3. Fusion tab

3 Click on the **Advanced View** tab.

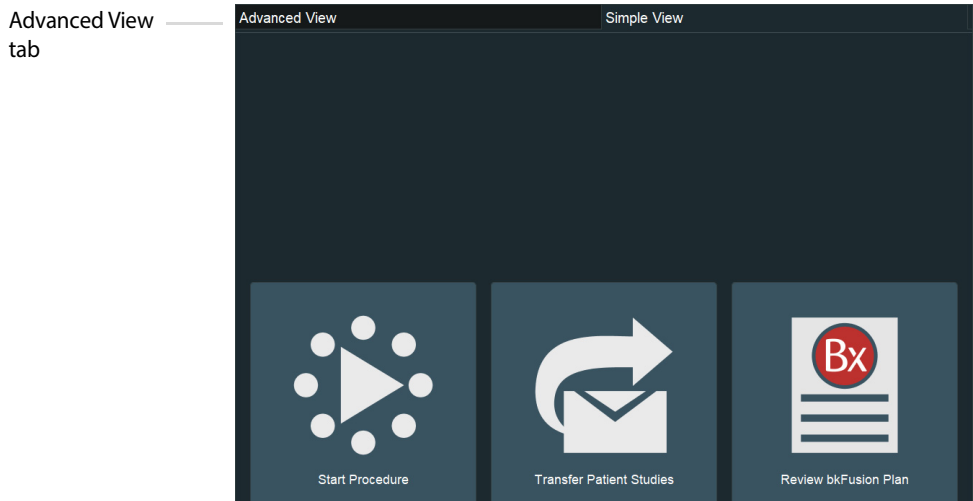


Figure 2-4. Advanced View tab

4 Click the **Import** button at the bottom of the screen.

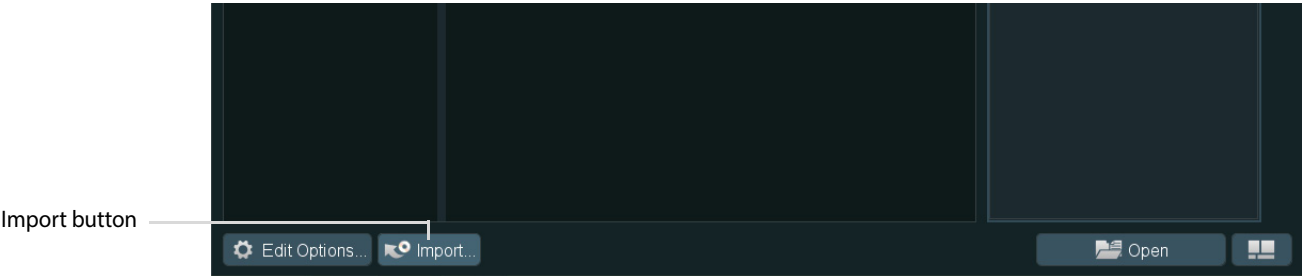


Figure 2-5. Import button

- Click the **Browse** button in the pop-up window.

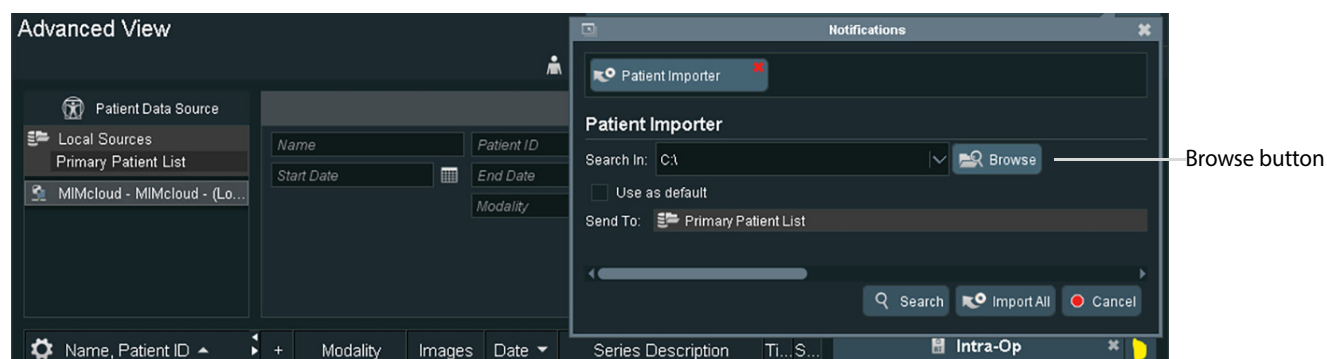


Figure 2-6. Browse button

- Click on the appropriate location, then click **Select Folder**.

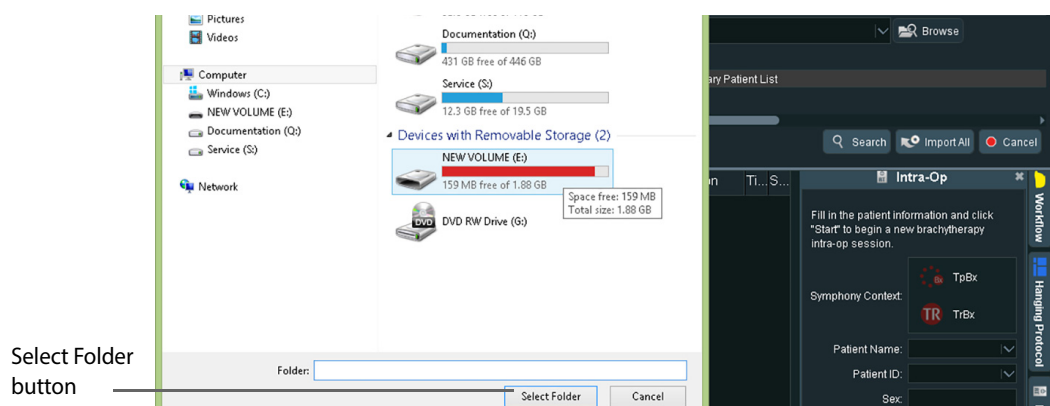


Figure 2-7. Browse screen

- Check that the **Send To:** destination is the **Primary Patient List**. Click **Import All**. Data will take between two and five minutes to download, depending on the size of the data sets.

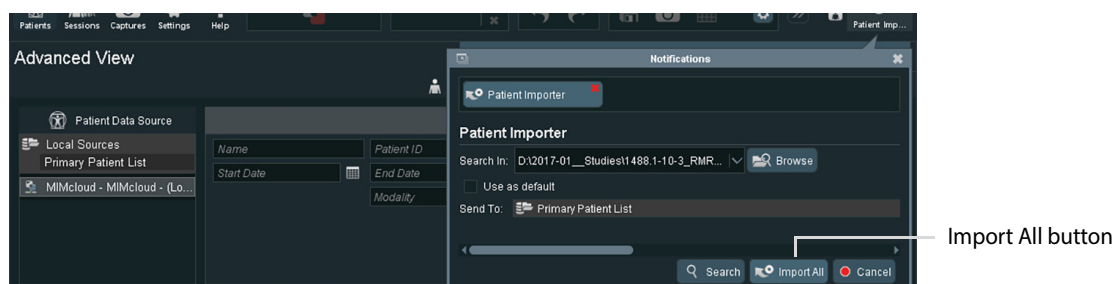


Figure 2-8. Import screen

- To check transfer, double-click on **Primary Patient list**. Click **Newly Received**.

To import MRI data from MIMcloud (US only)

Requirements:

- 1 A MIMcloud group has been configured for your site by MIM Software.
- 2 Users have MIMcloud accounts.
- 3 The BK ultrasound system has Internet access.

To import:

- 1 Make sure that a Fusion-compatible transducer is connected to the ultrasound system and the **Prostate** exam type is selected.
- 2 Click the **Fusion** tab that appears at the bottom right-hand corner of the screen.

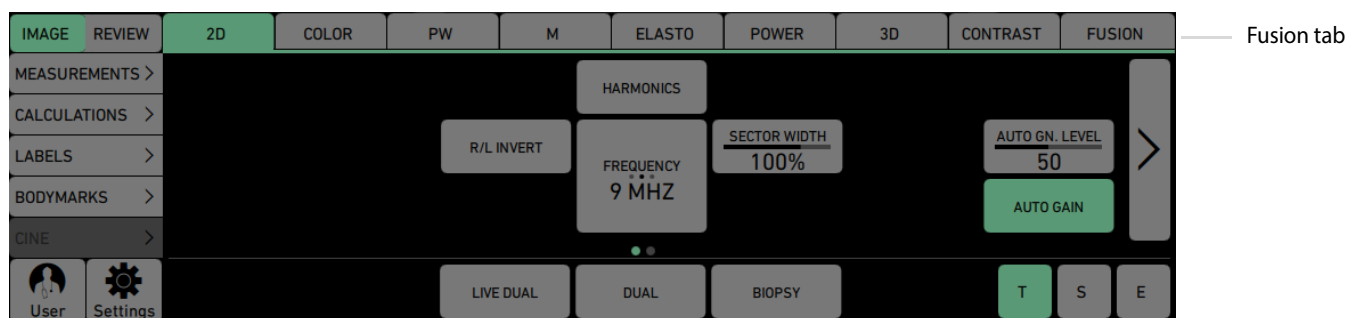


Figure 2-9. Fusion tab

- 3 Click on the **Advanced View** tab.

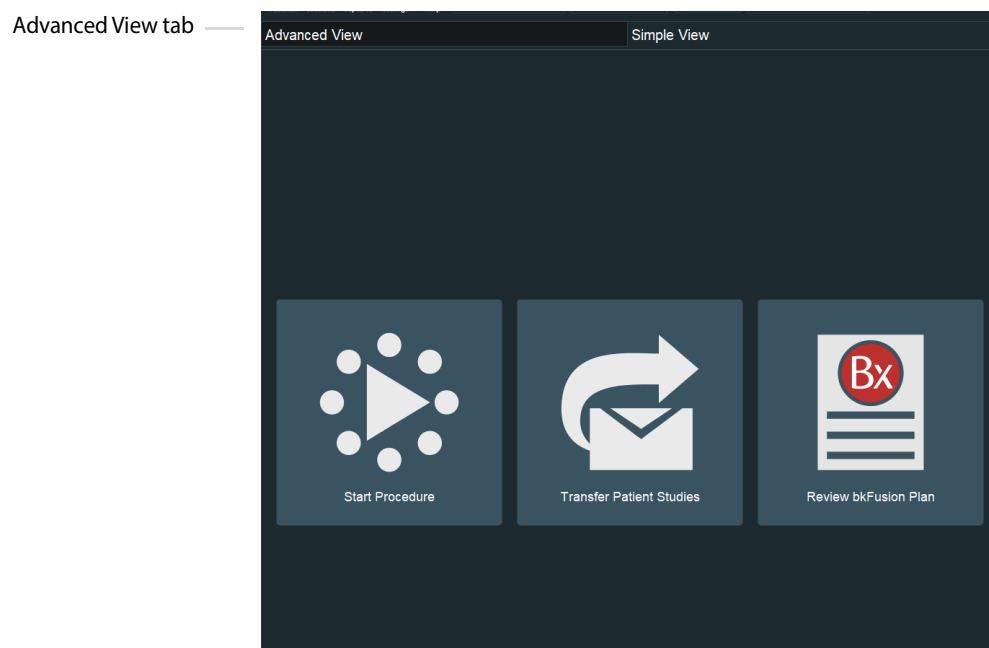


Figure 2-10. Advanced View tab

- 4 Double-click the **MIMcloud** button, then enter your login details in the pop-up window.

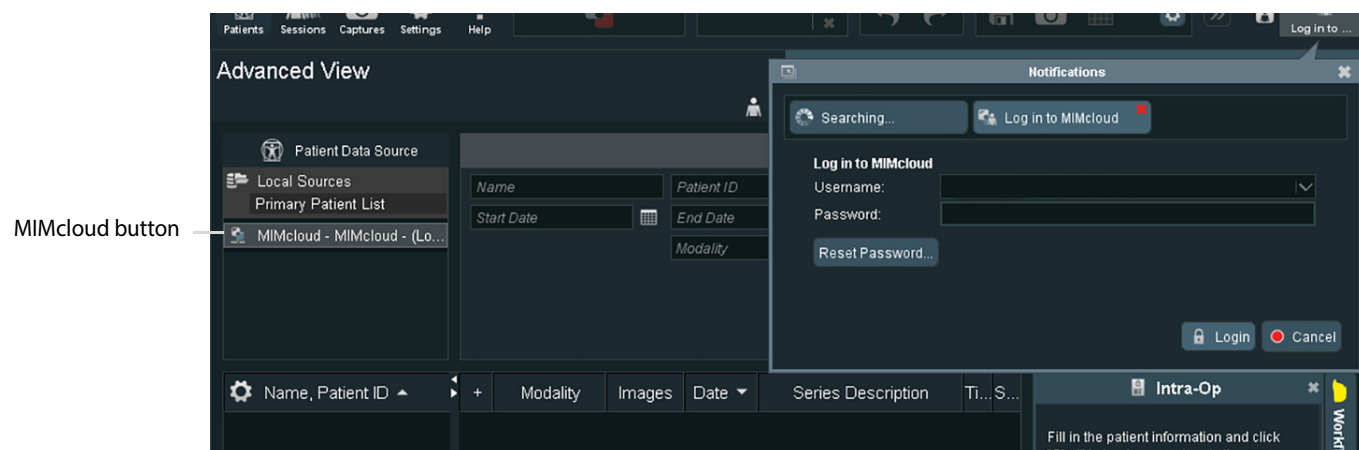


Figure 2-11. Enter login details screen

- 5 Your MIMcloud groups appear on the left-hand side of the screen. Double-click on the appropriate group to view associated patient studies.

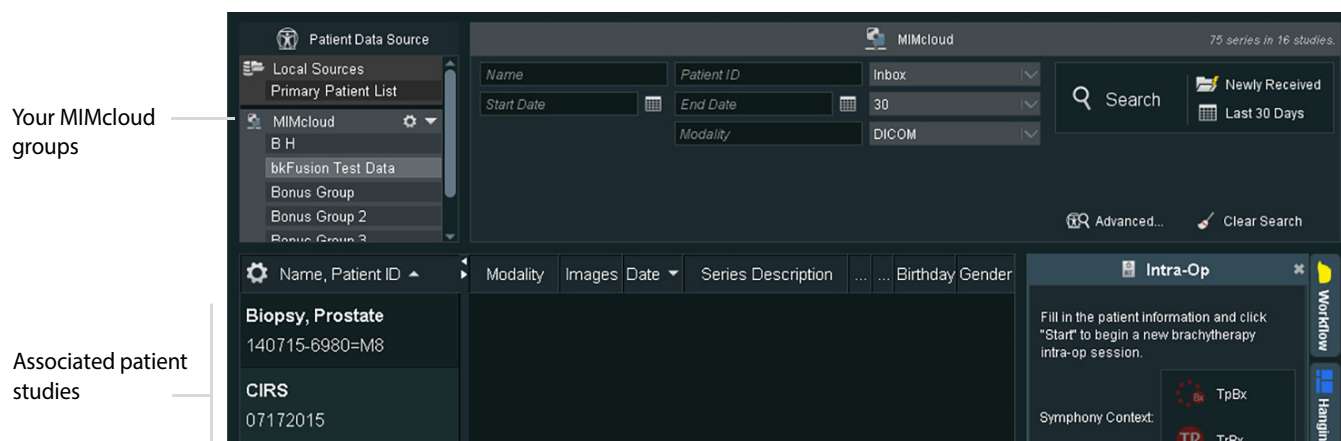


Figure 2-12. Study search screen

- 6 Click on the appropriate patient study to view associated patient results in the center of the screen. To import all results (recommended), click the **Transfer Patient Studies** tab, then double-click **Primary Patient List**. Click **Yes** when prompted by the pop-up window.

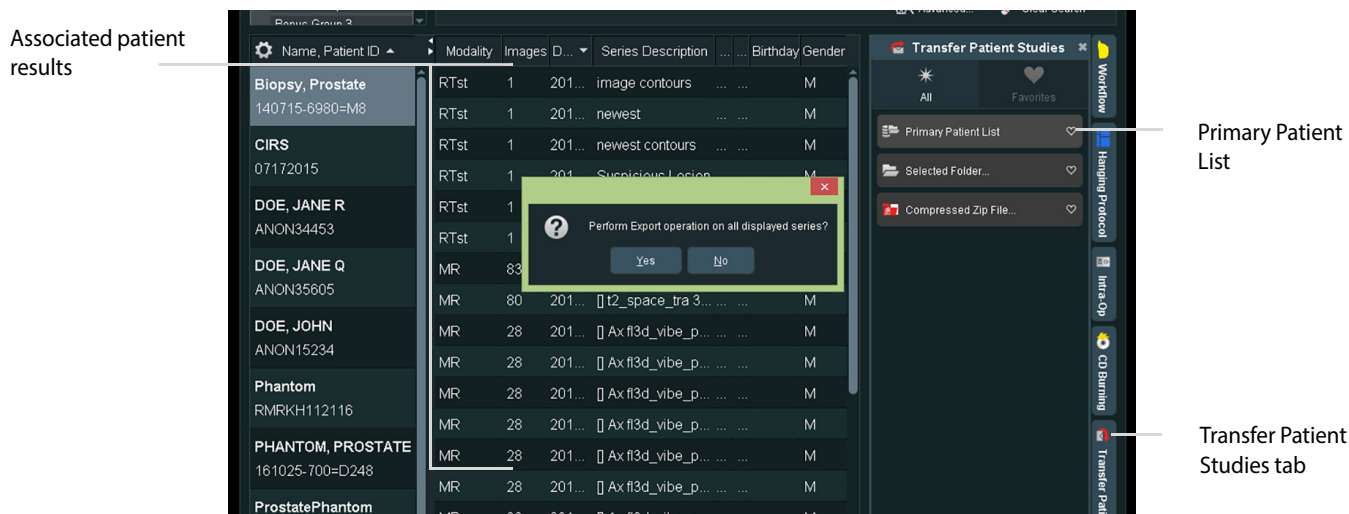


Figure 2-13. Export patient results

- 7 Data will take between two and five minutes to download, depending on the size of the data sets and your Internet connection.

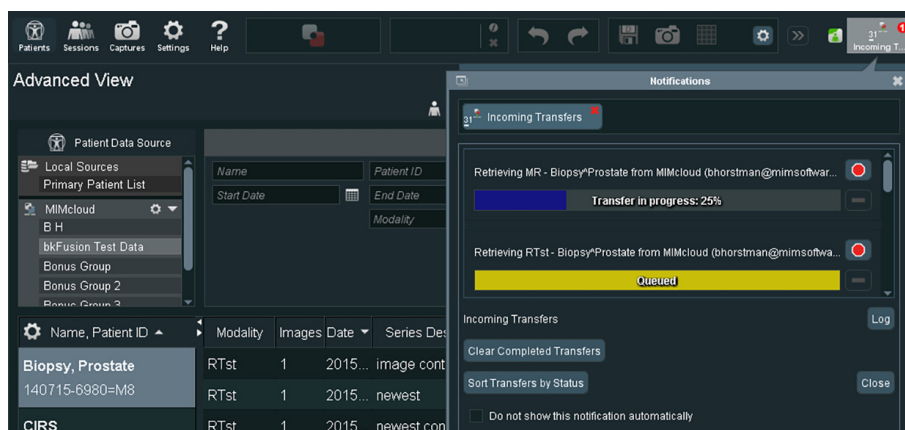


Figure 2-14. Data downloading from MIMcloud

- 8 To check transfer, double-click on **Primary Patient list**. Click **Newly Received**.

To import MRI data via Remote Patient List Transfer/PACS

Requirements:

- The BK ultrasound system has an IP address on the hospital network.

To set up Remote Patient List:

- 1 Make sure that a Fusion-compatible transducer is connected to the ultrasound system and the **Prostate** exam type is selected.
- 2 Click the **Fusion** tab that appears at the bottom right-hand corner of the screen.

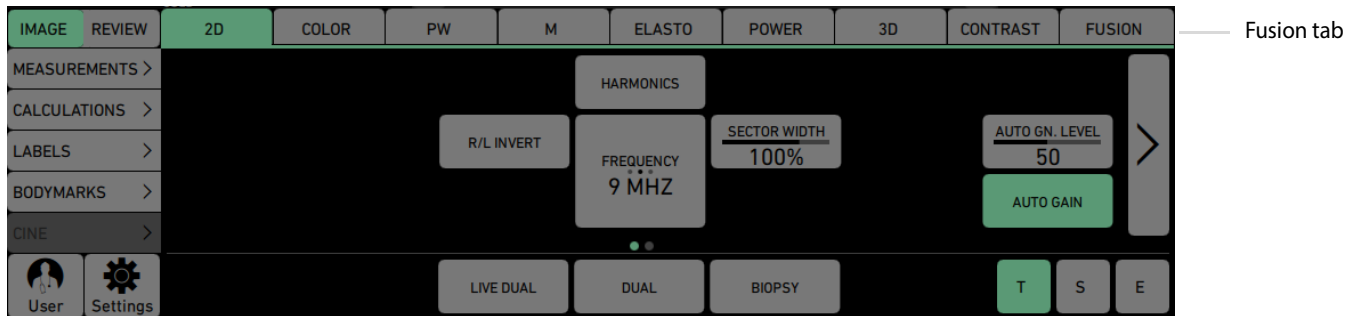


Figure 2-15. Fusion tab

- 3 Click on the **Advanced View** tab.

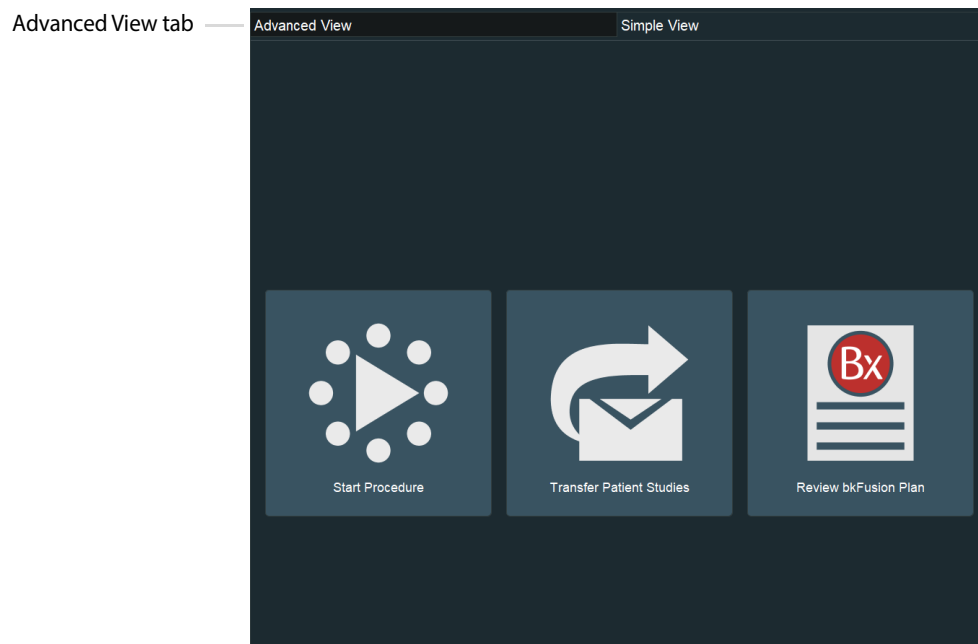


Figure 2-16. Advanced View tab

- 4 Click the **Settings** button.
- 5 Click **General Preferences**.
- 6 Double-click **Remote Patient List Locations**.
- 7 Click the **Add** button.

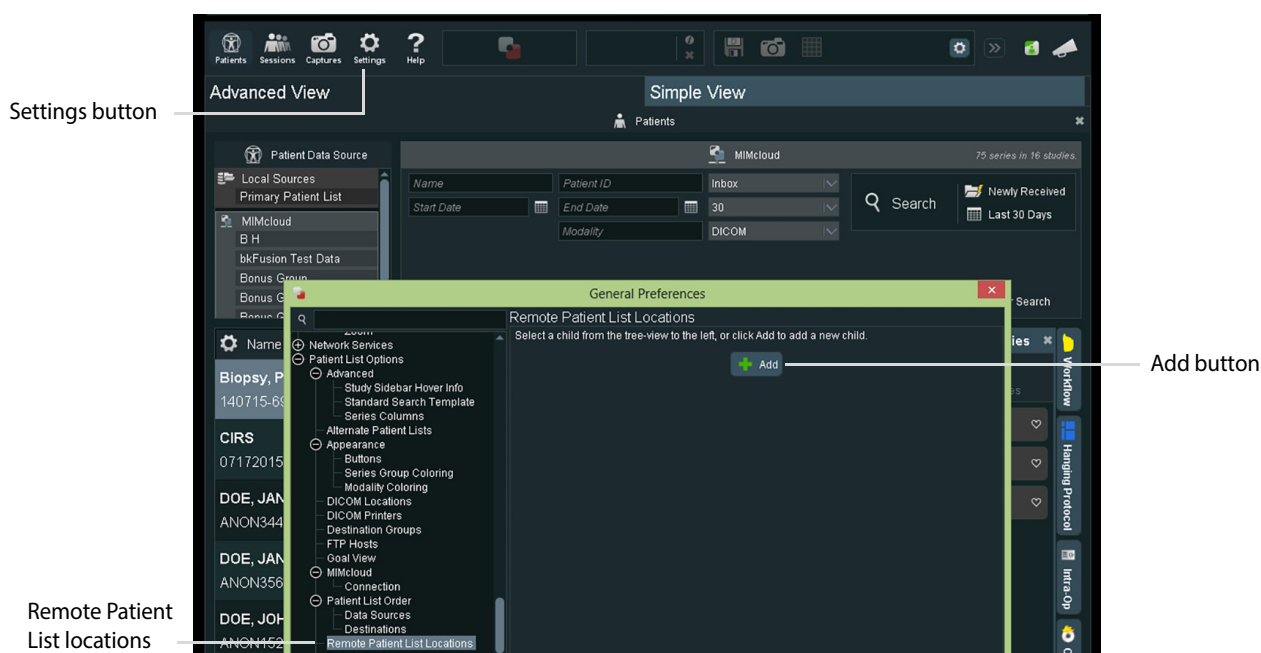


Figure 2-17. Adding a Remote Patient list

- 8 Enter **MIM Radiology** in the description box.
- 9 Enter the appropriate IP Address.
- 10 Click **Test Server Connection**.

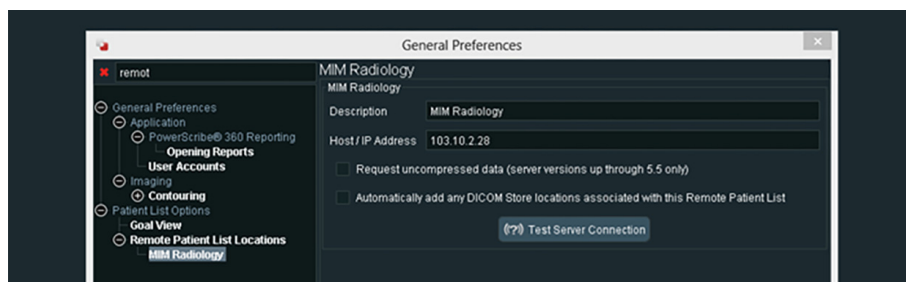


Figure 2-18. Testing server connection

- 11 The four test criteria should read *Successful*, and your MIM software version should appear. Please contact your BK representative if you experience any connectivity issues.



Figure 2-19. Connection test screen

12 Close General Preferences.

To Import:

- 1 Make sure that a Fusion-compatible transducer is connected to the ultrasound system and the **URO Prostate** exam type is selected.
- 2 Click the **Fusion** tab that appears at the bottom right-hand corner of the screen.
- 3 Click the **Advanced View** tab.
- 4 The Remote Patient List will appear in red on the left-hand side of the screen.

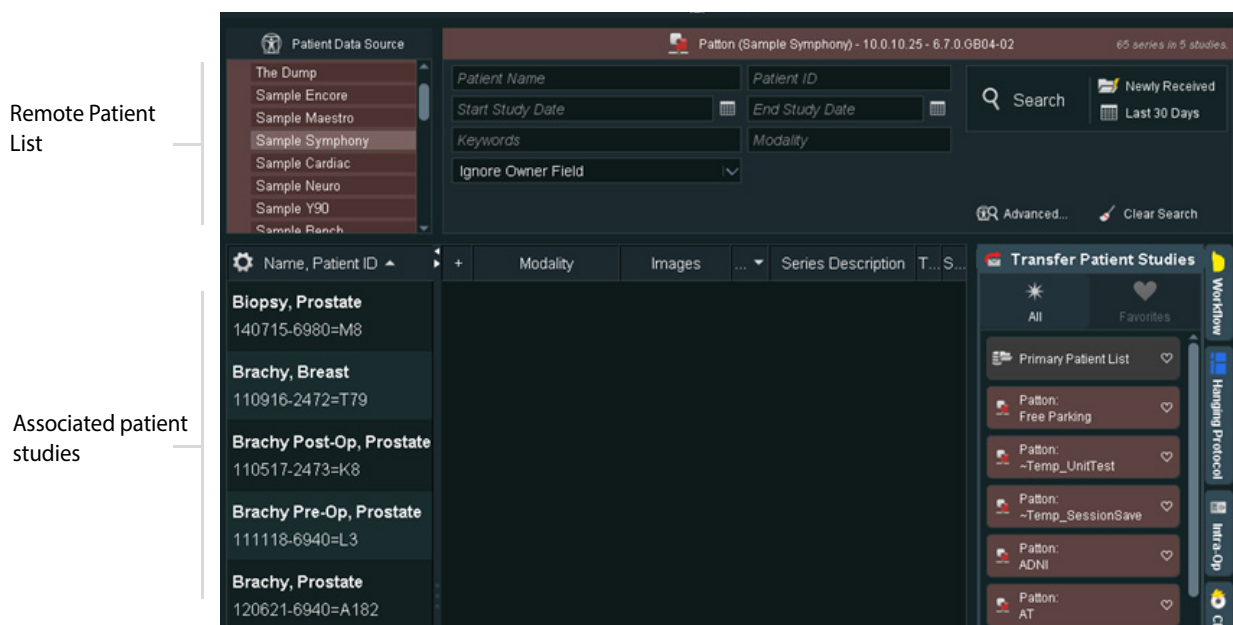


Figure 2-20. Patient Study Screen

- 5 Click on the appropriate patient study to view associated patient results in the center of the screen. To import all results (recommended), click the **Transfer Patient Studies** tab, then double-click **Primary Patient List**. Click **Yes** when prompted by the pop-up window.

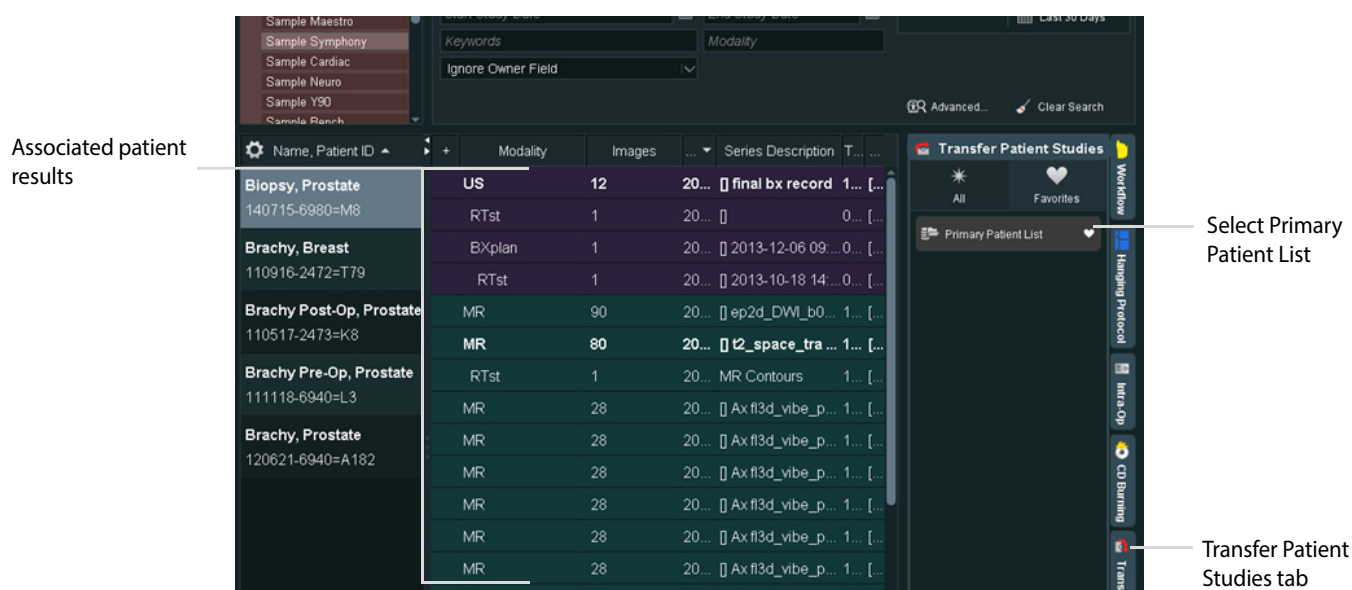


Figure 2-21. Import patient results

- 6 Data will take between one and five minutes to download, depending on the size of the data sets and your Internet connection.

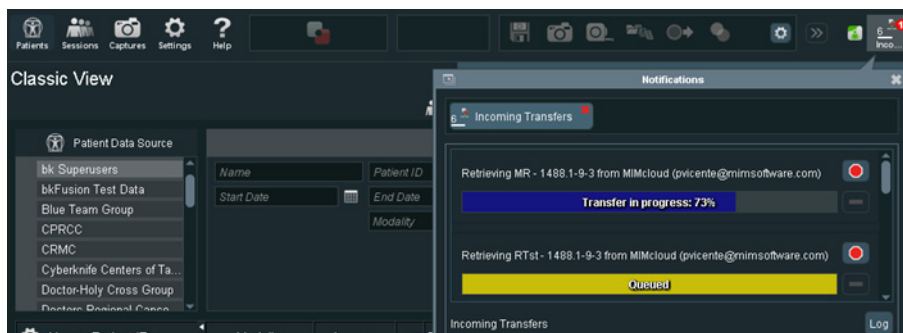


Figure 2-22. Data downloading

- 7 To check transfer, double-click on **Primary Patient list**. Click **Newly Received**.

To Review a BXplan

- 1 Click **Review bkFusion Plan**.

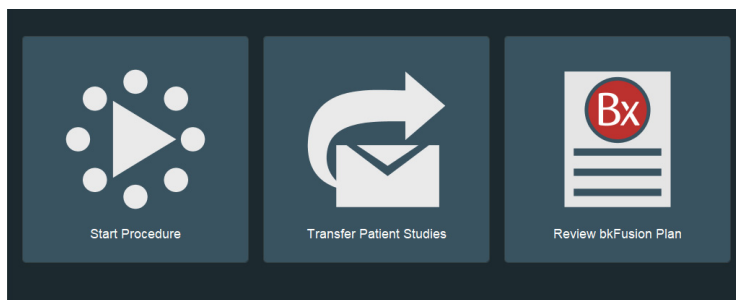


Figure 2-23. Review BXplan

- 2 Select the relevant source, then click **Next**.

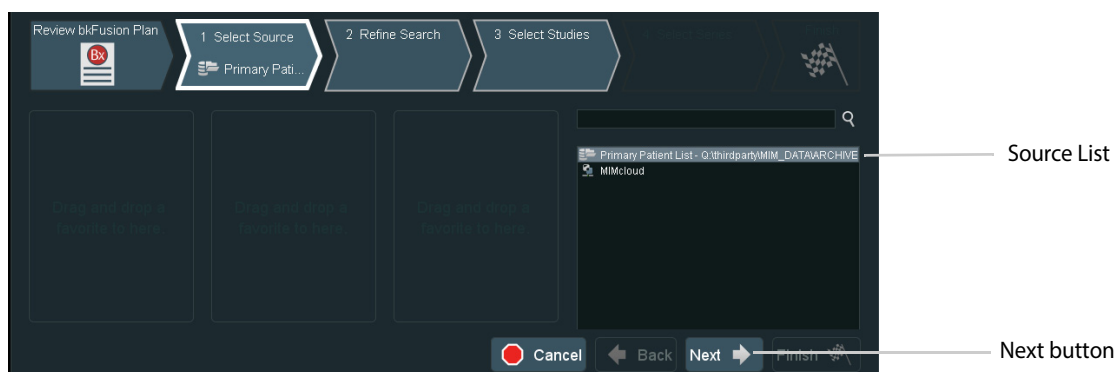


Figure 2-24. Select relevant source

- 3 Click on **Newly Received** to view recent studies.

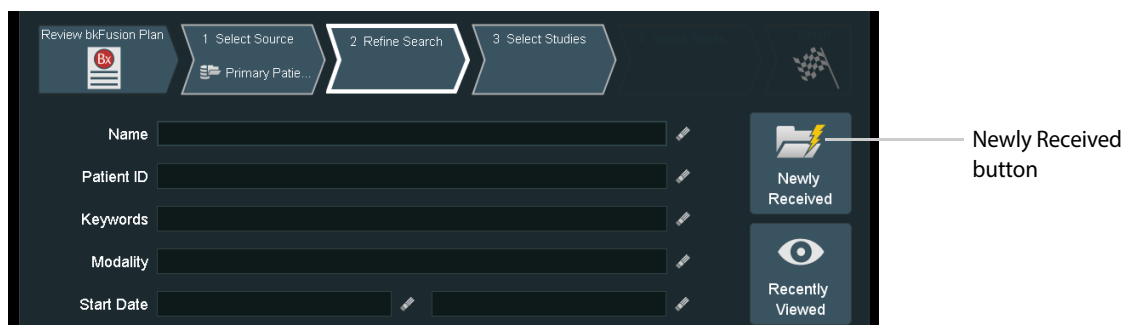


Figure 2-25. Locating a BXplan

4 Select the appropriate plan.

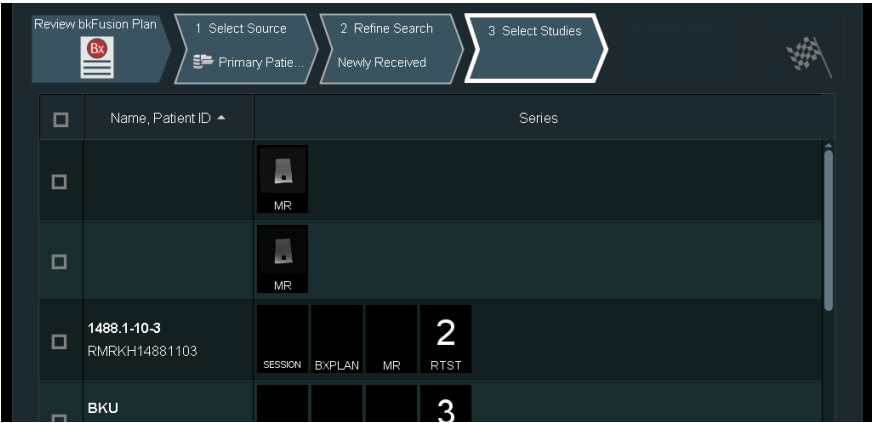


Figure 2-26. Select the appropriate plan

5 Double-click on the study to view the BXplan.

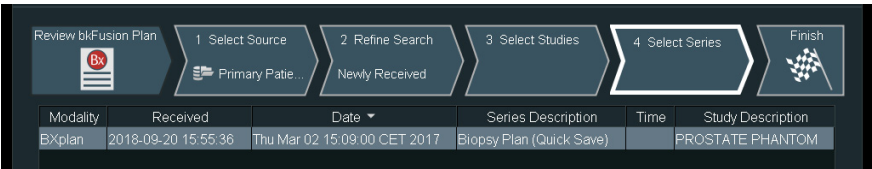


Figure 2-27. View BXplan details

To Contour/Re-contour MRI Slices

It may be necessary to contour or re-contour the MRI prostate/lesions before you continue. If you do not require this step, continue to “Predictive Fusion” on page 23.

- 1 Click the **Advanced View** tab at the top of the screen.

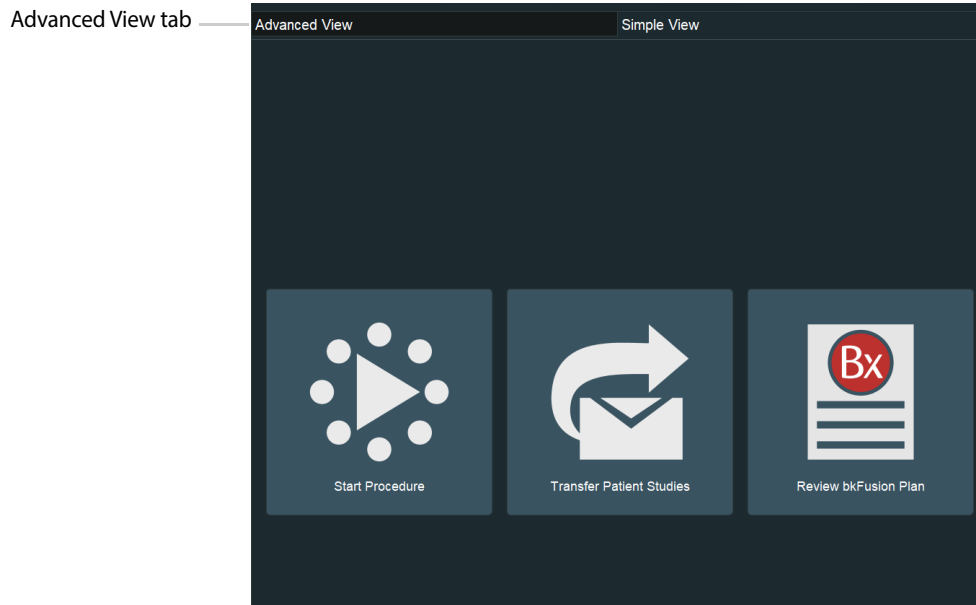


Figure 2-28. Select the Advanced View tab

- 2 Select Patient Data Source, then the appropriate patient. Double-click on the appropriate RTst study from the list.
An RTst study displays the MR image and the original contouring (if existing).

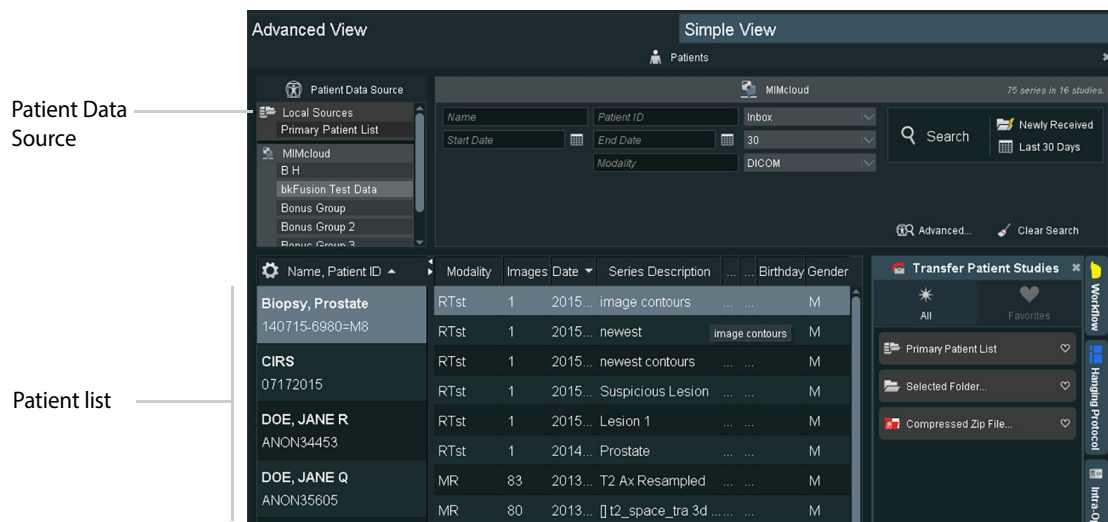




Figure 2-29. Select Patient Data Source tab

- 3 Double-click on the axial image to enlarge it. Press the **3** key to enlarge the image further, or the **2** key to reduce the image. Use the **arrow** keys   to scroll through MR slices.

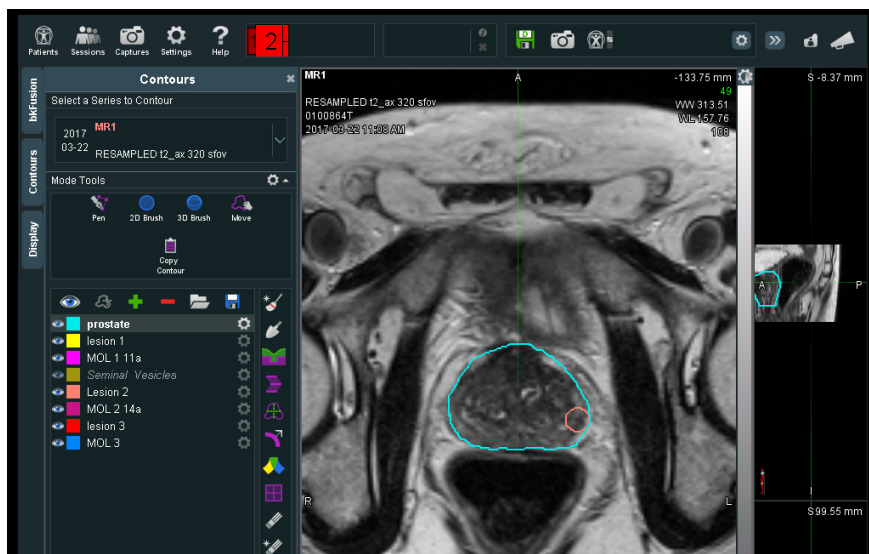





Figure 2-30. Enlarged axial image

To Contour the Prostate and Lesions:

- 4 To contour a prostate or lesion, click the **Contours** tab, select the **2D Brush**  which allows for freehand drawing of contours on a plane-by-plane basis, then click the **New** icon. Your contour will appear in the list on the left-hand side of the screen. Rename and recolor the contour in the **Contour Settings** box at the bottom of the screen.
- 5 Use the   keys in combination with the trackball to enlarge or reduce the size of the 2D Brush, then use the 2D Brush to 'paint' the contour.

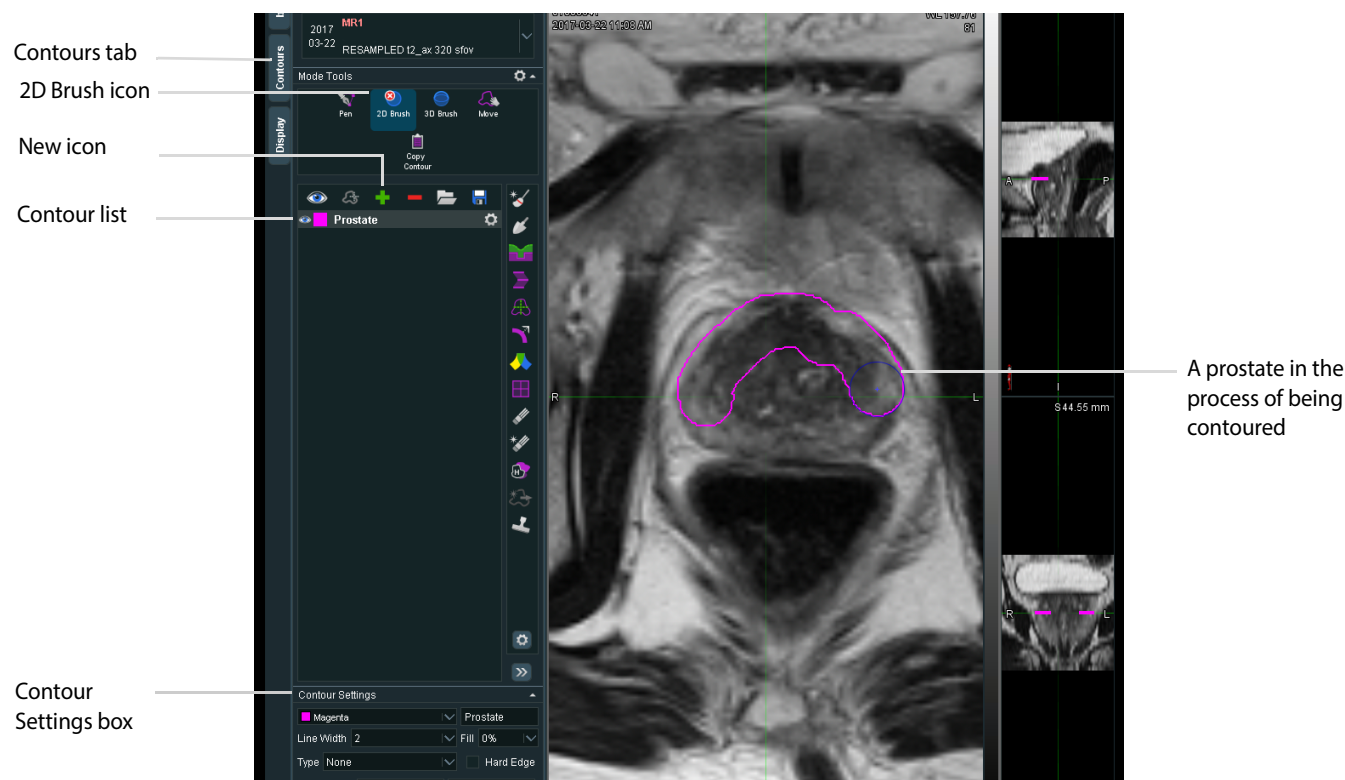


Figure 2-31. Contouring a prostate

- 6 Click on the **Settings** button to erase or delete the contour.

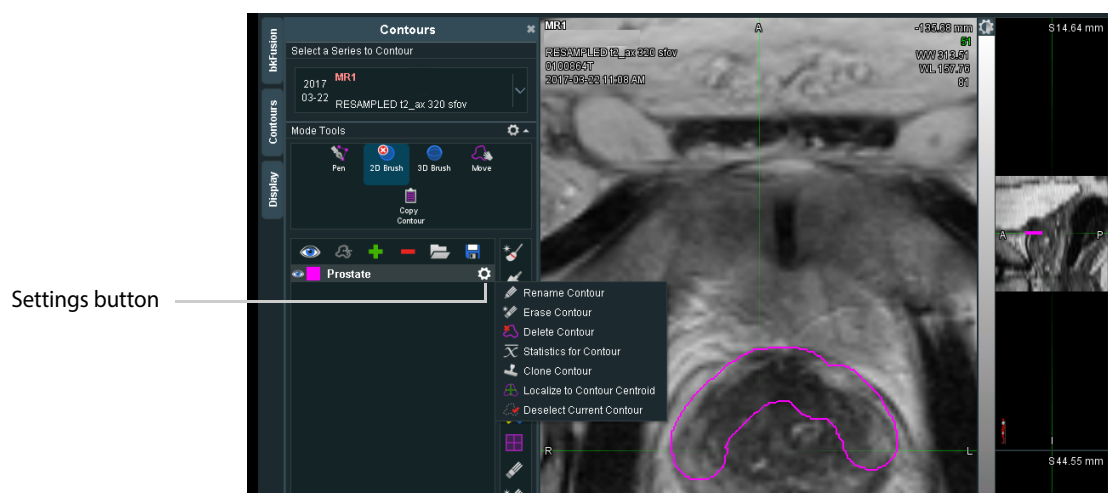



Figure 2-32. Contour settings

- 7 Click the **Interpolate Contour** button  when you are finished contouring slices. The Interpolate Contour function contours across any empty slices.

To Re-contour the Prostate and Lesions:







- 8 To re-contour the prostate, click the **Contours** tab, select the **2D Brush**  which allows for freehand editing of contours on a plane-by-plane basis, then select **prostate** from the Contour list.
- 9 Use the   keys in combination with the trackball to enlarge or reduce the size of the 2D Brush, then use the 2D Brush to adjust or 'paint' the contour. The 2D Brush will appear red when outside the prostate, and blue when inside the prostate.



Figure 2-33. Re-contouring a prostate

- 10 To re-contour a lesion, select the **3D Brush** , which allows freehand creation and editing of 3D contours from any plane, then select the appropriate lesion from the Contour list.
- 11 Use the   keys in combination with the trackball to enlarge or reduce the size of the 3D Brush, then use the 3D brush to adjust or 'paint' the lesion.

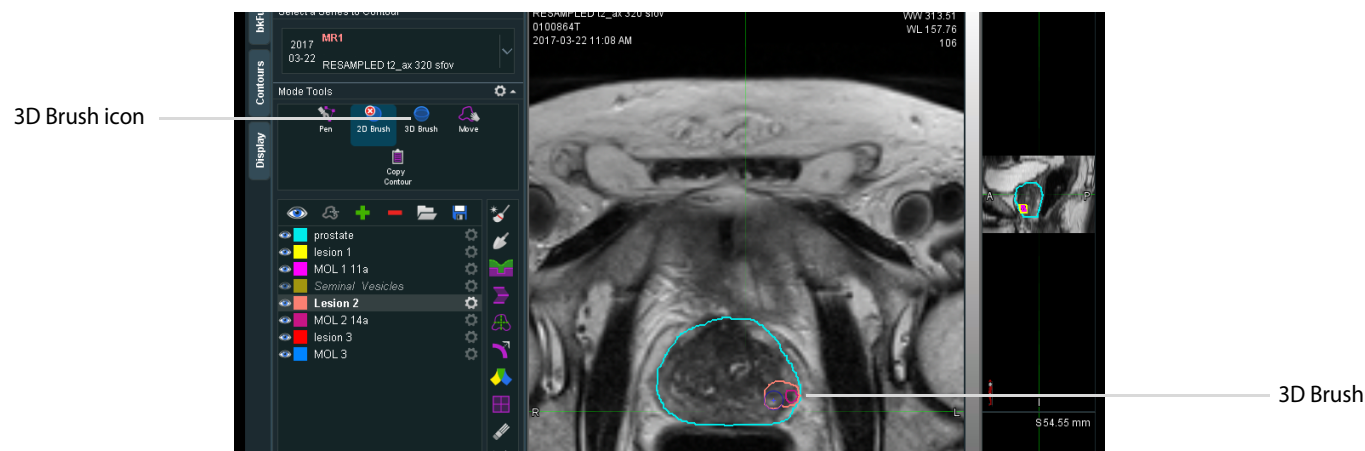



Figure 2-34. Re-contouring a lesion

- 12 Click the **Interpolate Contour** button  when you are finished re-contouring slices. The Interpolate Contour function contours across any empty slices.
- 13 To save the contours, click the **Save** button under the contours tab and save the files as a DICOM RTstructure.

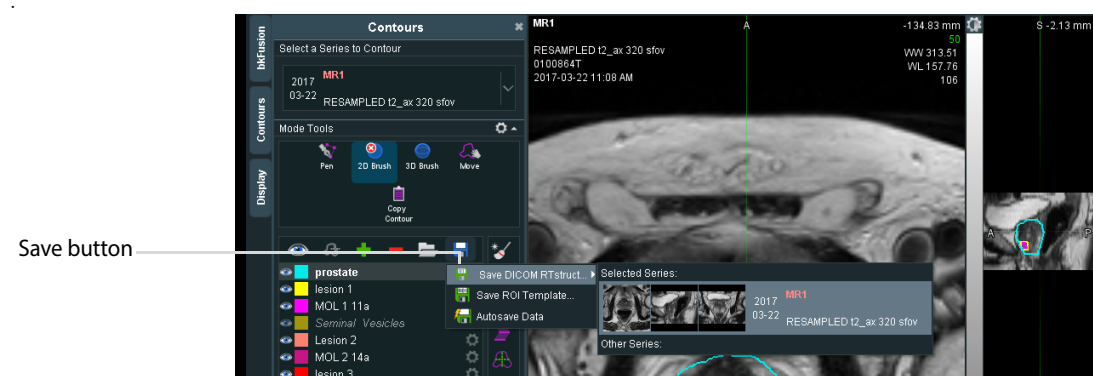


Figure 2-35. Save RTstructure

- 14 To return to Simple View, click **Sessions**, then **Close All Sessions**.

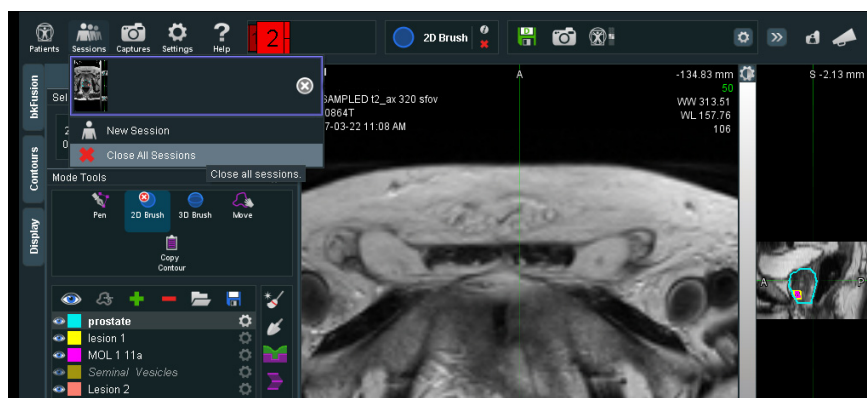


Figure 2-36. Close the session

Predictive Fusion

Predictive Fusion ‘reslices’ and pre-aligns MRI images to correspond to the prostate’s orientation during biopsy. To improve precision and ease of registration, it is highly recommended to use Predictive Fusion.

To use Predictive Fusion:

- 1 From the Contour/Re-contour screen, click the **bkFusion** tab, then the **Begin Planning** button.

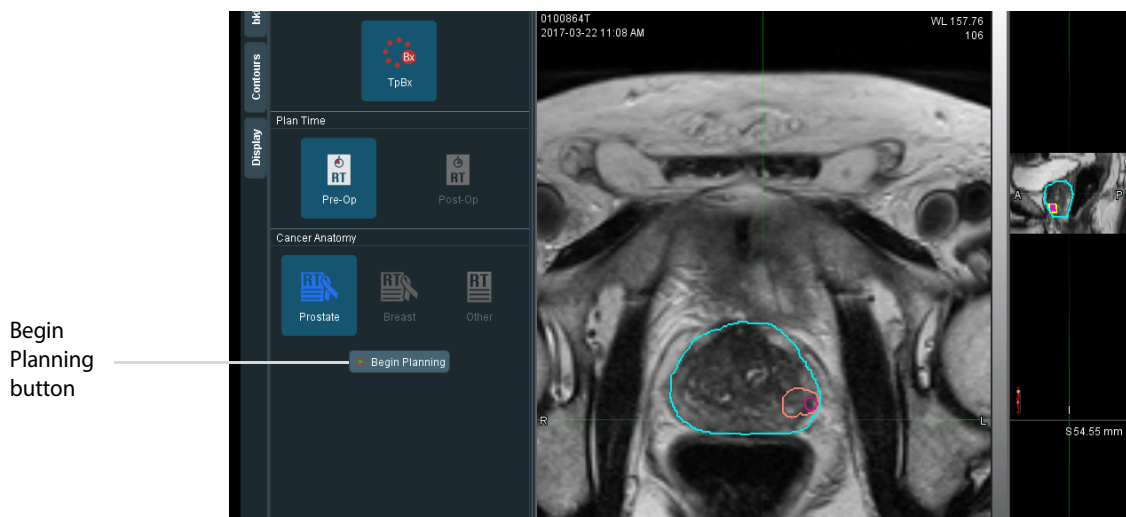


Figure 2-37. Select Patient Data Source tab

- 2 You will see the virtual transducer and grid superimposed on top of the MRI image (see Fig 2-38). Place the virtual transducer in the rectum (approx. 3mm from the posterior wall of the prostate), and adjust the angle accordingly with the trackball and the **Select** key. Move the virtual transducer until the blue base plane is aligned with the base slice of the prostate.
- 3 When the virtual transducer is in the correct location, click **Save As**, enter a description, then click **OK**.

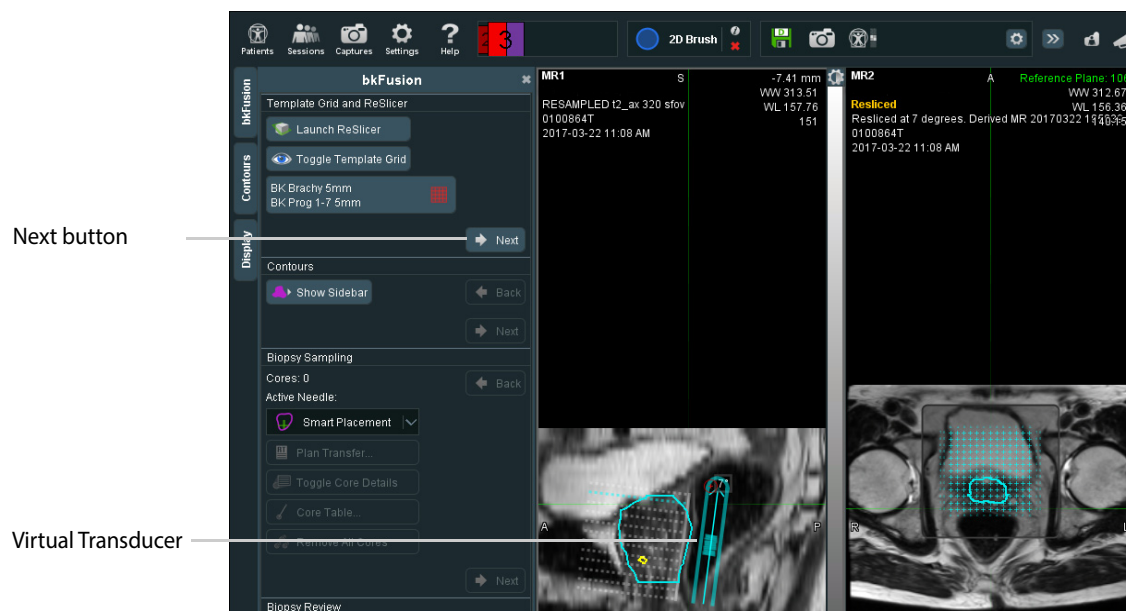




Figure 2-38. Virtual transducer screen

- 4 The prostate can be seen in the transverse plane. Use the arrow keys   to scroll through MR slices and ensure that the Reference Plane is set at the base of the prostate.

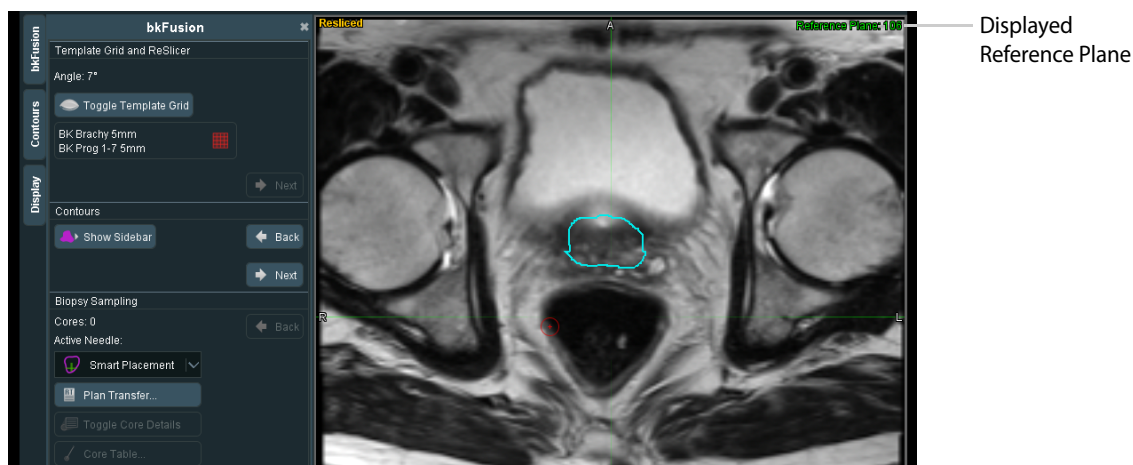


Figure 2-39. Reference Plane screen

- 5 Click the **Save** icon, enter a description, then click **OK**.

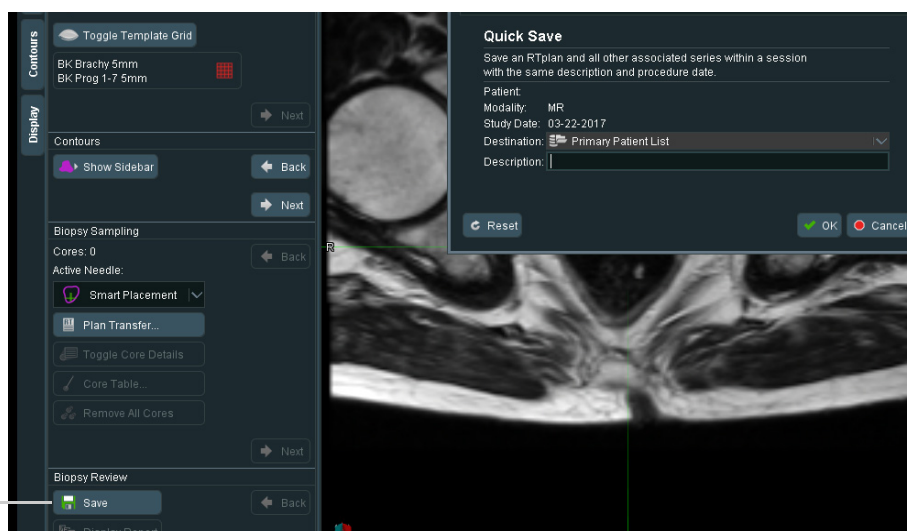


Figure 2-40. Save screen

- 6 Click **Sessions**, then **Close All Sessions**.

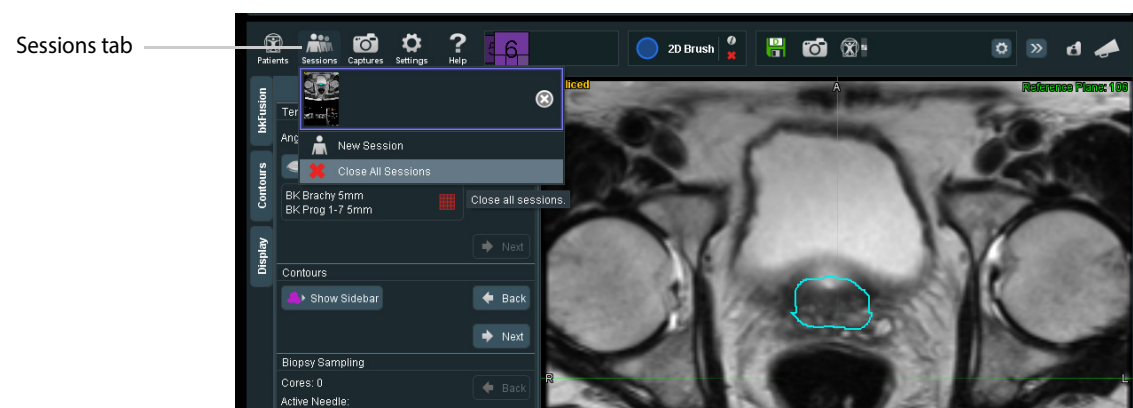


Figure 2-41. Close All Sessions

To Start the Procedure

- 1 Click **Start Procedure**.

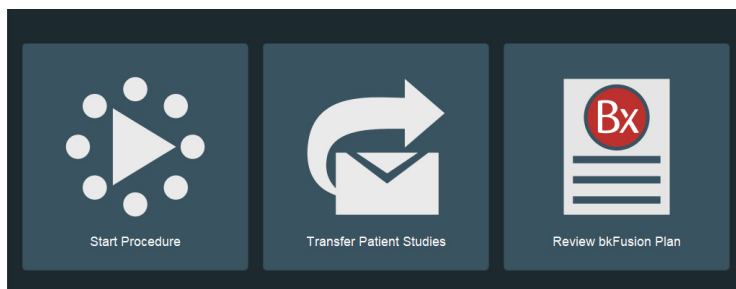


Figure 2-42. Simple View tab

- 2 Click on the **TrBx** (transrectal biopsy) option. Enter the first two letters of the patient's name. A drop-down list under Patient Name will allow you to select the specific patient, and the remaining patient details will auto-populate.

You can also enter a new Patient Name and Patient ID. A dialog box will ask you whether you want to continue with an unrecognized patient name.

- 3 Click **Start Procedure** to begin the fusion exam.







Figure 2-43. Enter Patient Information screen

To Biopsy with bkFusion

NOTE:

1. Avoid contour adjustments while the transducer is out of plane.
2. Always relax the prostate when making adjustments to bkFusion.
3. Always verify anterior prostate registration when targeting the anterior zone, due to inherent deformation.

- 1 After starting the procedure, the most recent study (set by default at the approximate mid-gland contour) is superimposed on top of the ultrasound image in the upper screen. If no contours are displayed, or to see a list of older contours associated with the patient, click the **Load Contours** button.
- 2 To align the contoured prostate with the prostate displayed in the ultrasound image (if necessary), press the top button on the transducer (or press the Change Plane key  on the keyboard) to select the sagittal plane.
- 3 Move the transducer along its axis until the contour matches the outer boundary of the prostate, as in Fig 2-44.
Contours can be realigned using the **Select** key and the  and  buttons on the right side of the screen. When the ultrasound image and the prostate contour are correctly aligned, the **Lock Fusion** button on the left side of the screen will become active. Click the **Lock Fusion** button.
- 4 Press the bottom button on the transducer (or press the Change Plane key  on the keyboard) to select the transverse plane, and repeat the steps above.

NOTE: Click the **Reset Alignment** button to undo all contour alignments and return to the approximate mid-gland contour.

NOTE: For end-fire biopsies, align in sagittal end-fire and adjust in transverse end-fire.

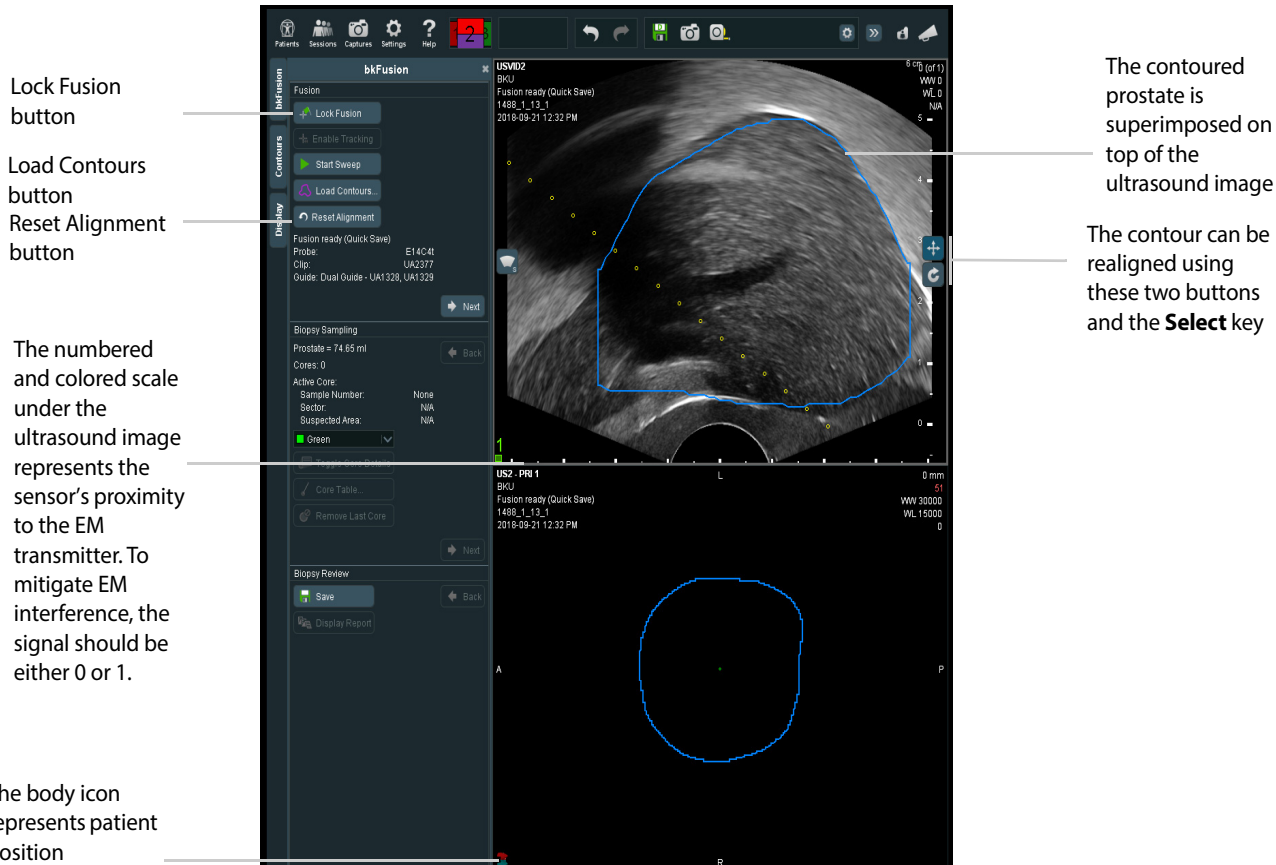



Figure 2-44. Lock Alignment screen

- 5 To capture a 3D volume of the prostate (optional):
 - a. Press the top button on the transducer (or press the Change Plane key  on the keyboard) to select the sagittal plane.
- 6 Rotate the transducer all the way to the right (just outside of the prostate), and click **Start Sweep** on the left side of the screen. Rotate the transducer slowly from right to left until the entire gland is captured, then press **Stop Sweep**. Click **Next** to continue to the biopsy screen and view the 3D prostate volume.

NOTE: *There is a processing delay when reconstructing the prostate.*

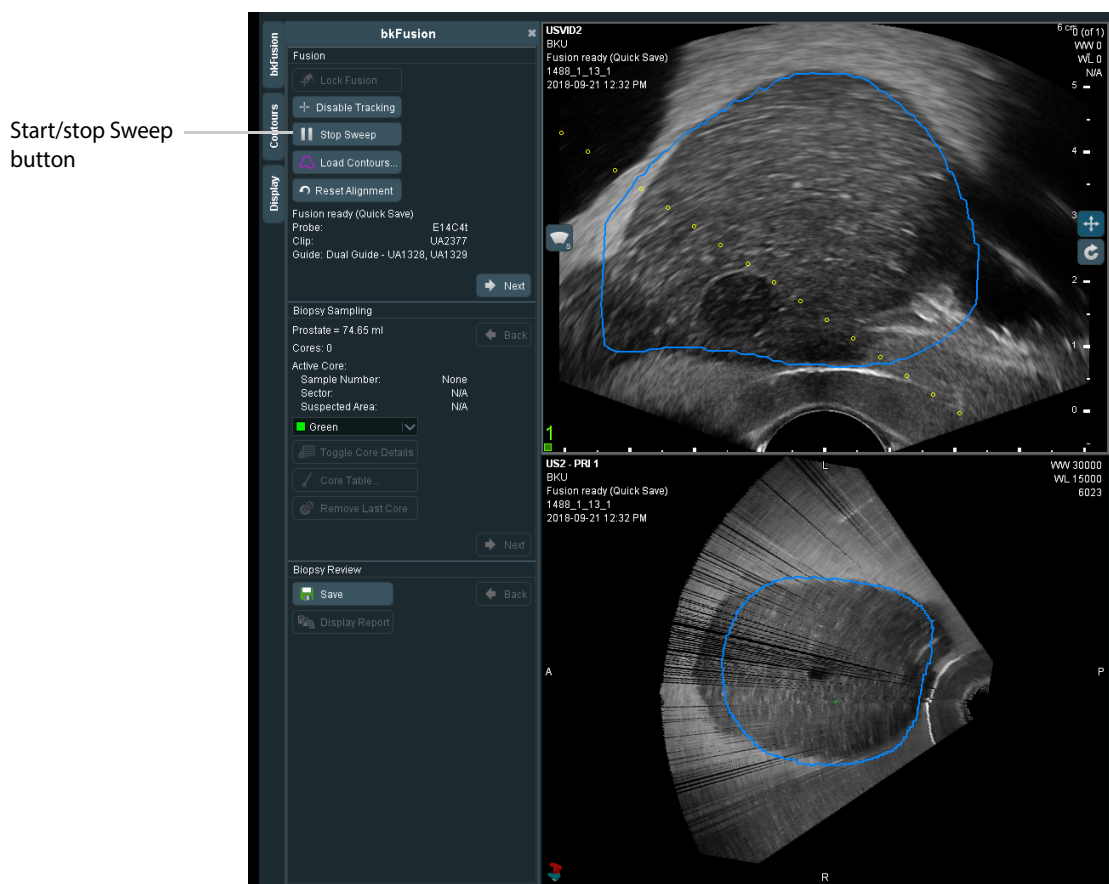






Figure 2-45. Sweep screen

- 7 Press the top button on the transducer (or press the Change Plane key  on the keyboard) to select the sagittal plane, then press the  Biopsy key on the keyboard to enable the biopsy line. You are now ready to biopsy.
- 8 After each biopsy, use the trackball and the **Select** key to place biopsy markers on core locations. For more information on taking a biopsy, please see the Advanced User Guide.
- 9 Click **Toggle Core Details** to enable a box in the bottom left-hand corner of the screen which keeps a count of Sample Numbers, and their location in the prostate.

NOTE: *To remove a core, either:*

- 1 Move the trackball cursor precisely on top of the core, press the  button, and click **Remove Core**.
- 2 Open the Core Table Preview, press the  button on the appropriate core, and click **Remove Core**.
- 3 Click the **Remove Last Core** button.

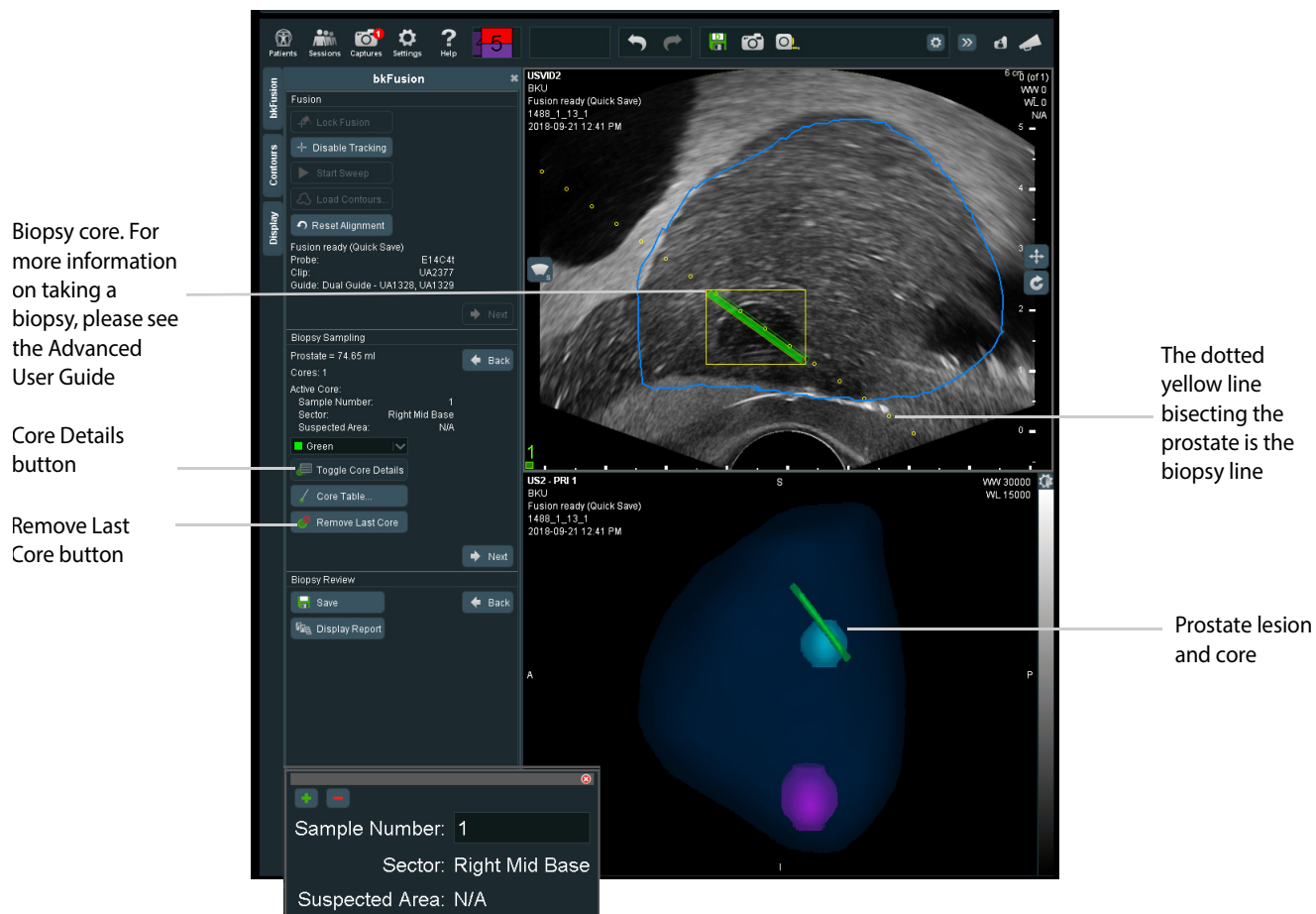


Figure 2-46. Biopsy screen

To Make Measurements

To make measurements, click the **Measure** button and follow the on-screen instructions.

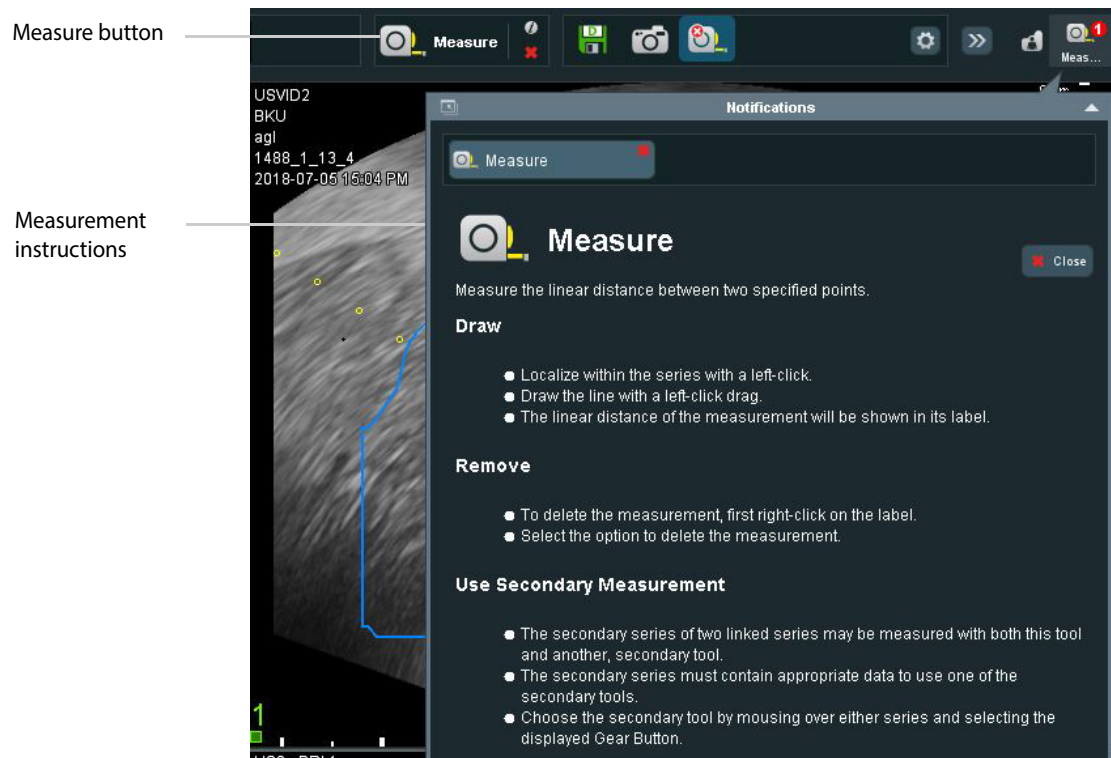


Figure 2-47. Measurement instructions

To Save Biopsy Results and Create a Report

- 1 Once biopsy specimens are acquired, click the **Save** button in the Biopsy Review box to save all data. Select your chosen destination and enter a description for the plan.
- 2 Click **Display Report** in the Biopsy Review box on the left-hand side of the screen.
- 3 Select your Structured Reporting Template from the Notifications popup window.

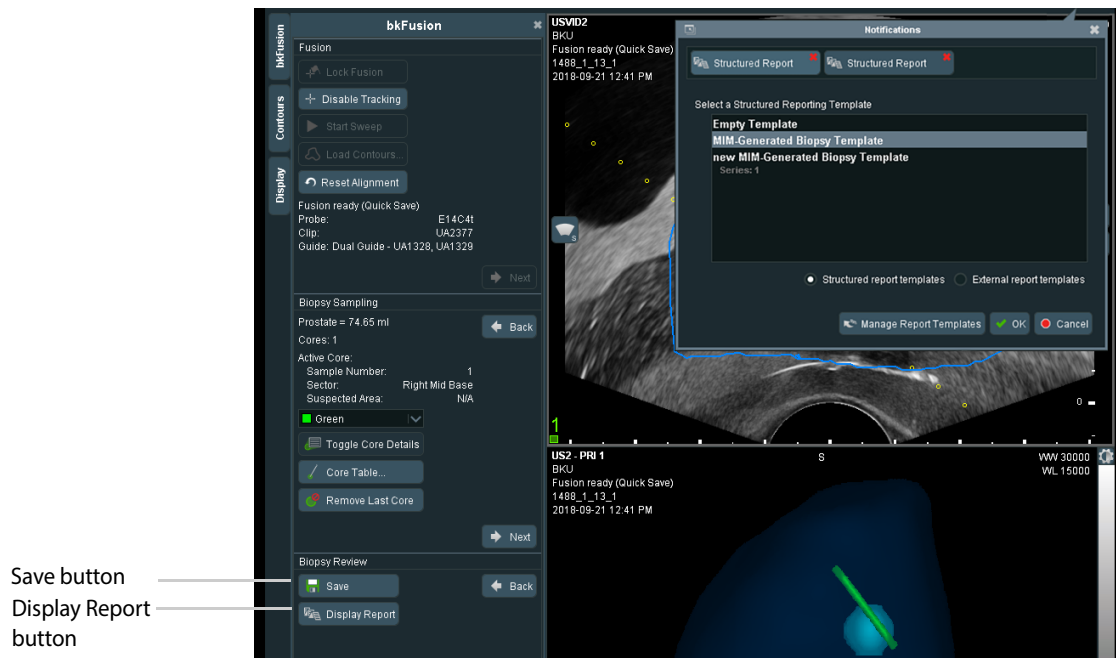


Figure 2-48. Structured Reporting templates

- 4 Click **OK** to view a report similar to that shown below. Reports can be saved in PDF format.

NOTE: To locate a report from a closed session, go to *Advanced View*, double-click **Primary Patient List**, locate proper patient's study, double-click the appropriate **BXplan**, then click **Display Report**.

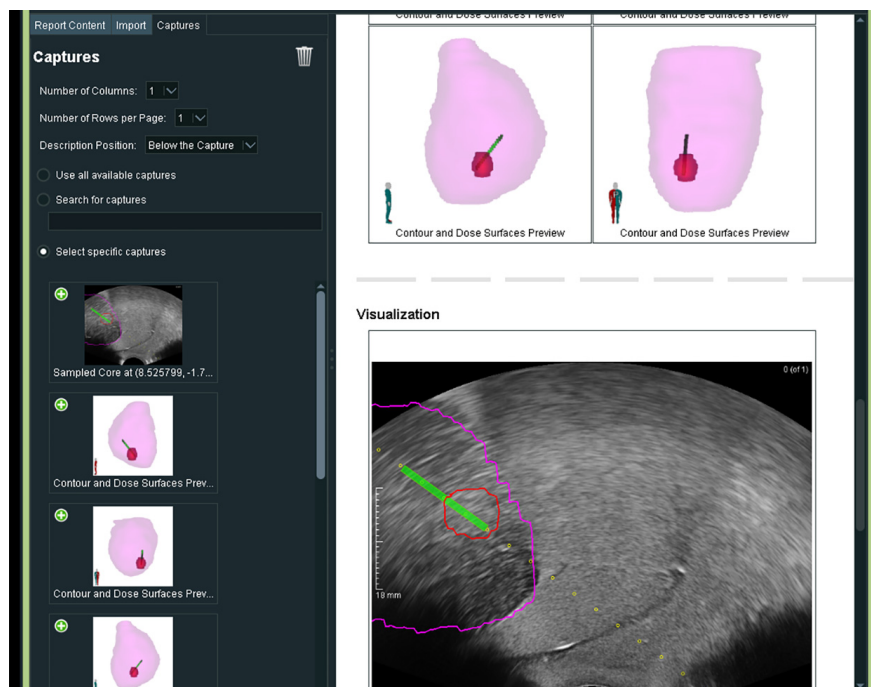


Figure 2-49. Display Report screen

To Save a Report to a USB device

In an open report:

- 1 Click the **Save PDF** icon.
- 2 Select the appropriate USB device from the network list.
- 3 Type the report name, then click **Save**.

To Save Structured Reports

In an open report:

- 1 Click the **Save SR** icon.
- 2 Select Primary Patient List from the Destination menu.
- 3 Enter Series Description, Operator Name, then click **OK**. Your structured report will appear in the Sessions window.

To Save DICOM Images

After you have finished the procedure:

- 1 Click on the **Captures** icon (top left of the screen).
- 2 Select the appropriate images you want to save, then select **Primary Patient List** from the **Send To:** drop-down menu.
- 3 Click the **Save DICOM** button.

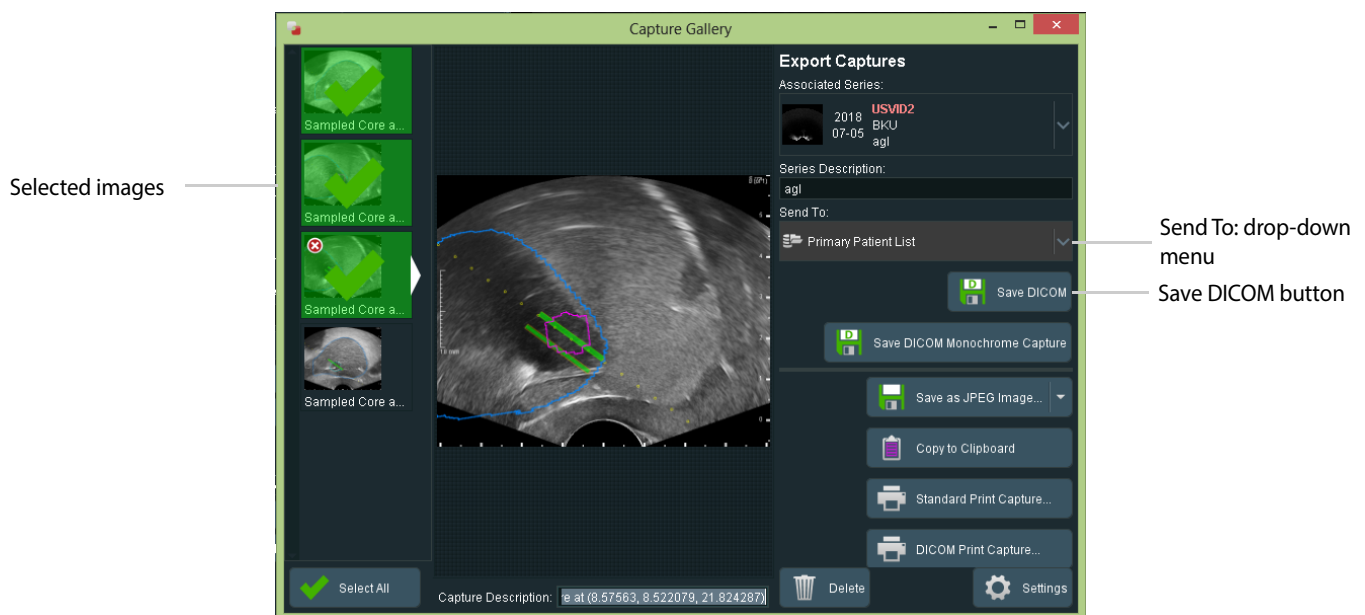


Figure 2-50. DICOM save screen

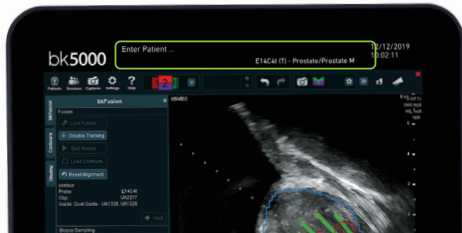
bkFusion TR Steps Quick Guide

Keyboard functions with bkFusion for bk3000/bk5000

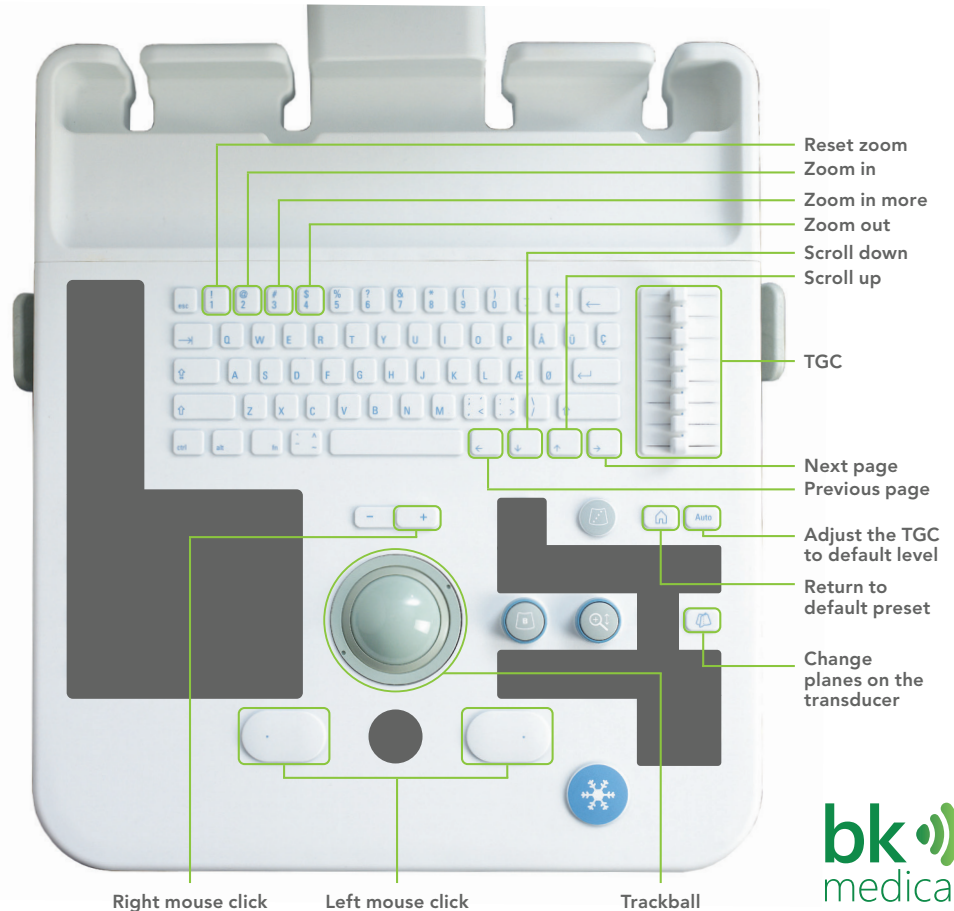
Patient, Transducer, Preset Modifications

The top controls for altering exam information is inactive when using bkFusion. You will not be able to modify the following:

- ❌ Enter Patient ID
- ❌ Change Transducer
- ❌ Change Preset



If you have any issues or problems using bkFusion, please contact your BK Medical representative.



Biopsy Steps for TR bkFusion on bk3000/bk5000





1 Click on the **Fusion** workflow tab
(bottom right corner of the monitor at top of the workspace)

2 Click **Start Procedure**


3 Click **TRBx**, and then enter the first two letters of the patient's name. A drop-down list under Patient Name will allow you to select the specific patient, and the remaining patient details will auto-populate. Click **Start Procedure** to begin the fusion exam.

4 The most recent **BXplan** will load on top of the ultrasound image in the upper screen (mid-gland contour). If contours are not displayed, click the **Load Contours** button

5 Alignment

- Make sure signal strength is between 0 and 1 for optimal alignment. Move the EM transmitter or readjust patient position to acquire the best strength.
- Switch to the transverse plane to start alignment (press the bottom button on the transducer or  on the keyboard. Move the transducer along its axis until the MRI contour matches the outer boundary of the prostate, Use the   buttons on the right side of the screen and hold the **Select** key to realign the contours. When the ultrasound image and the prostate contour are correctly aligned, click the **Lock Fusion** button on the left side of the screen.
- Switch to the sagittal plane (use the top button on the transducer or  on the keyboard) and repeat the steps above.

6 Click **Next** to continue to the biopsy screen

7 You take the biopsies in the sagittal plane. Press  on the keyboard to enable the biopsy line. You are now ready to biopsy

8 After each biopsy, use the trackball and the **Select** key to place a biopsy marker on core locations

NOTE: To remove a biopsy market, move the trackball cursor precisely on top of the core, press  and click **Remove Core**, or click the **Remove Last Core** button.

9 Once all biopsy specimens are acquired, click the Save button in the Biopsy Review box to save all data. Select the chosen destination and enter a description for the series

10 Click **Display Report** in the Biopsy Review box on the left-hand side of the screen. Select your Structured Reporting Template from the Notifications pop-up window

NOTE: You can save the report to USB: Click **Create PDF**, select destination (USB), enter name for the report file, and click OK.

11 Click **Sessions** and **End All Sessions** to end exam

Configuring bkFusion Hardware Quick Guide

bkFusion is compatible with the USB foot switch, which can be set as 'mouse left-click'. See the bk3000 & bk5000 Advanced User Guide for foot switch configuration information.

Connect the EM Control Unit to the bk3000/bk5000 system using the USB cable (USB ports are located in the rear of the scanning engine). Connect the power cable, then switch the unit ON



Connect the EM Transmitter to the EM Control Unit: Insert the Transmitter cable into the Transmitter socket until an audible 'click' is heard



Connect the Sensor to the EM Control Unit: Insert the Sensor cable into socket 1 until an audible 'click' is heard



E14C4t (9018)

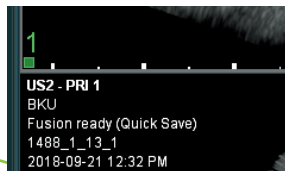
Push the Sensor into the Sensor Clamp channel. The small indentation on the tip of the Sensor must be facing the groove in the Sensor Clamp channel, as indicated



Slide the other Sensor Clamp channel over the steel stud on the side of the transducer until a 'click' is heard

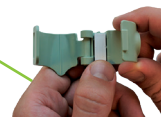


The numbered and colored scale under the ultrasound image on the system monitor represents the Sensor's proximity to the EM transmitter. Green represents the optimal proximity. To mitigate EM interference, the signal should be either 0 or 1

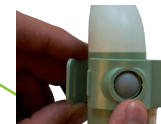


E13C2 (9029)

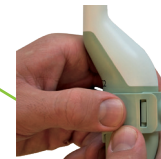
Open the Sensor Clamp and push the Sensor into the channel, as indicated. The small indentation on the tip of the Sensor must be facing the groove in the Sensor Clamp channel



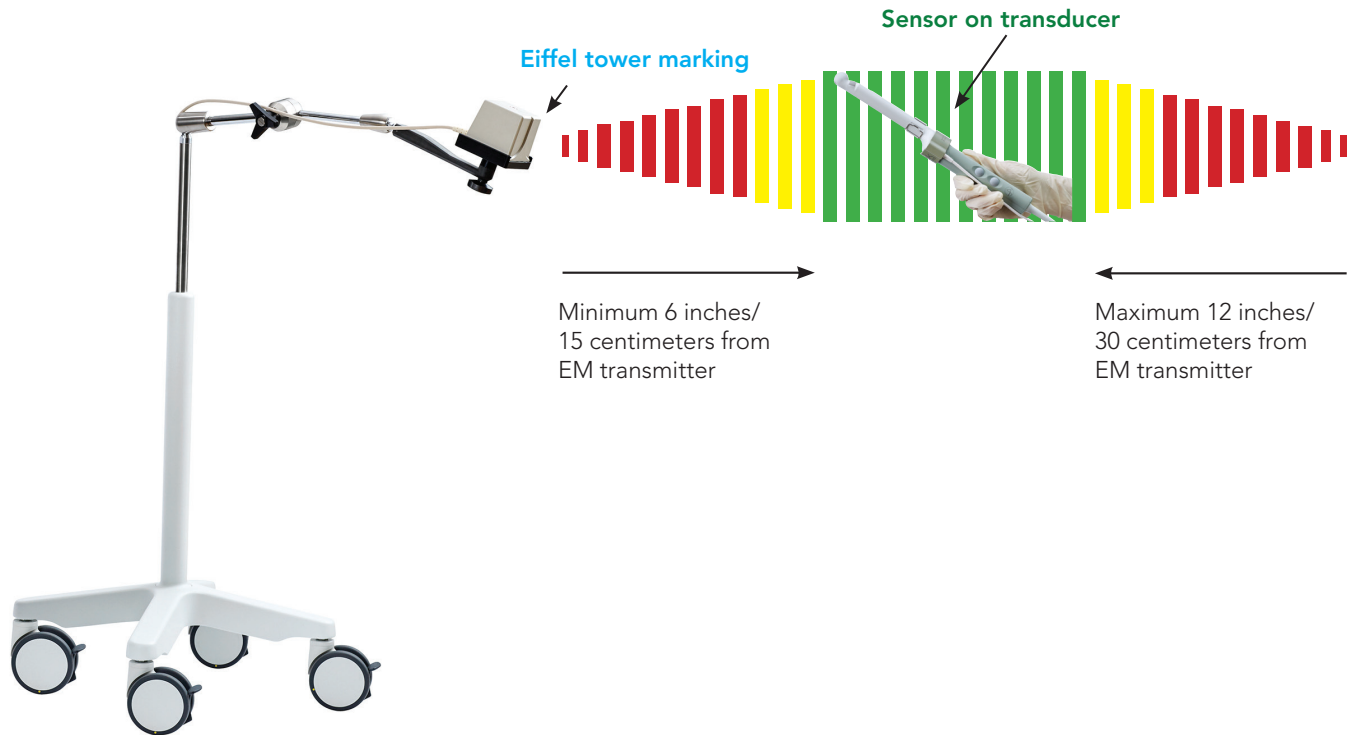
Align the hole in the Sensor Clamp with the transducer button



Press the two ends of the Sensor Clamp together until a 'click' is heard

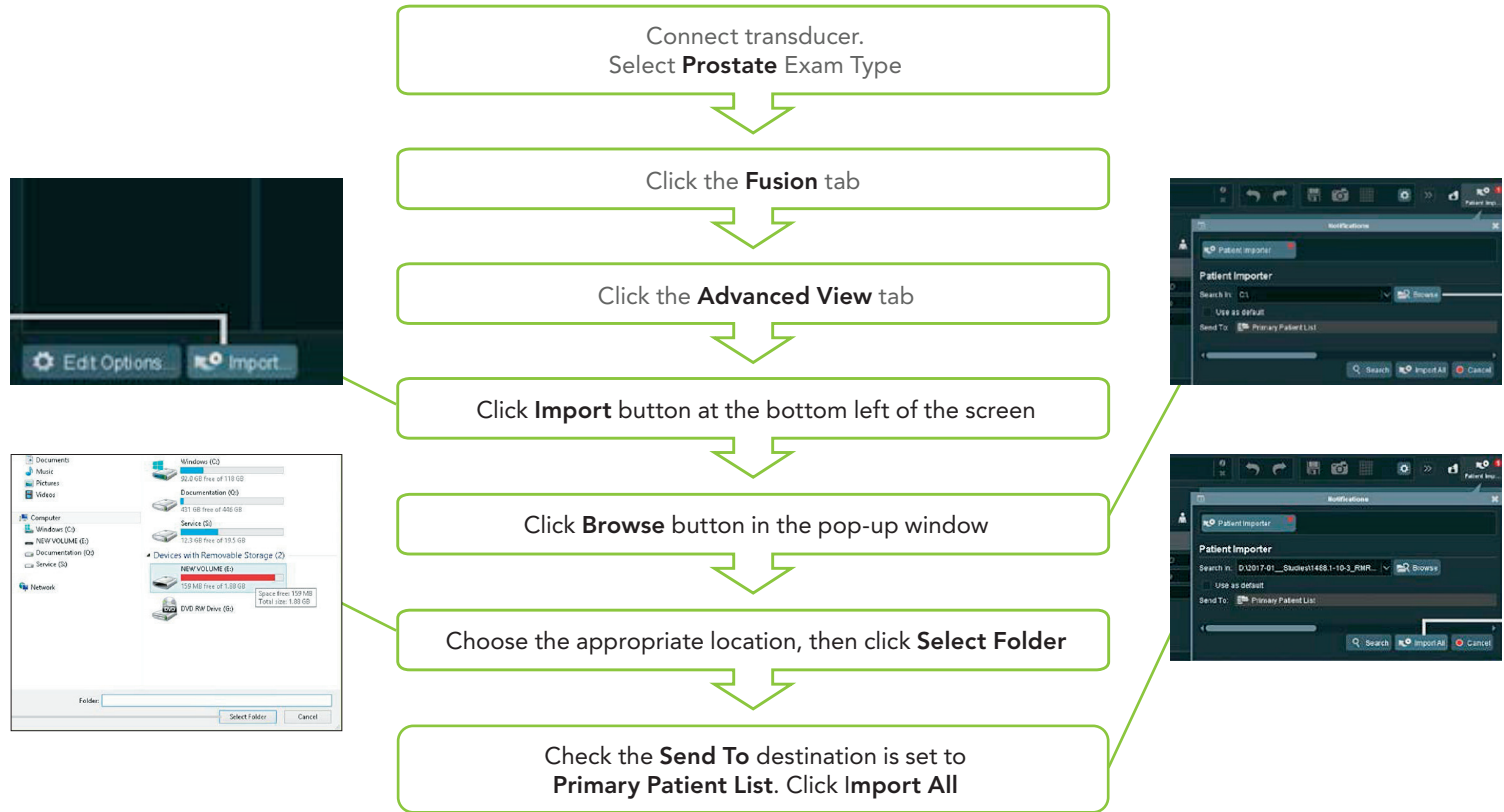


Setting up the EM Transmitter Quick Guide



The EM Transmitter box must be positioned at least 6 inches / 15 centimeters from the **sensor on the transducer**, and no further away than 12 inches / 30 centimeters. The "**Eiffel Tower**" marking on the EM Transmitter must point directly at the **sensor on the transducer**. There must be no metal within the 18-inch / 45-centimeter range.

MRI data import from USB/CD Quick Guide



MRI data import Quick Guide



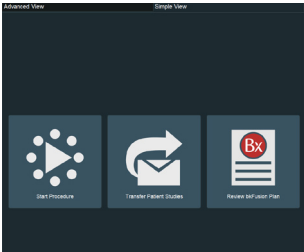
Connect transducer. Select **Prostate** Exam Type

Click the **Fusion** tab

Click the **Advanced View** tab

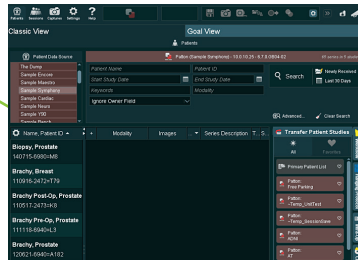
Requirements for MIMcloud

- A MIMcloud group has been configured for your site by MIM Software
- Users have MIMcloud accounts
- The BK Ultrasound system has Internet access

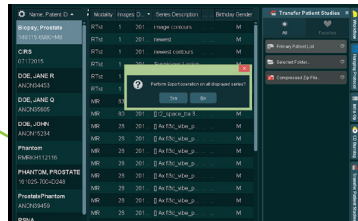


...from Remote Patient List

Click on the appropriate patient from the Remote Patient List.

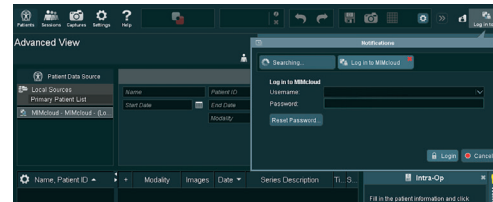


Click the **Transfer Patient Studies** tab, then double-click **Primary Patient List**. Click Yes when prompted by the pop-up window



...from MIM-Cloud (US Only)

Double-click the **MIM Cloud** on the left-hand side of the screen



Enter your login details in the pop-up window

Click on the appropriate patient in the MIM-cloud database

Click the **Transfer Patient Studies** tab, then double-click **Primary Patient List**. Click Yes when prompted by the pop-up window