

Dosimetry Check (DC) Operating Manual

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Math Resolutions, LLC
5975 Gales Lane
Columbia, Maryland 21045
support@MathResolutions.com

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Caution:
Federal (USA)
Law restricts this
device to sale by or
on the order of a
physician.



Dosimetry Check



MediMark® Europe.
11 rue E. Zola
38100 Grenoble. France

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Reference Manuals

Reference manuals are on the www.MathResolutions.com website, also accessible from www.DosimetryCheck.com. There is also a search button at the top of web pages that will search the entire website.

An overview is provided here sufficient for normal operation. Refer to the reference manuals for details. The program is automated throughout but options are provided for manual operation.

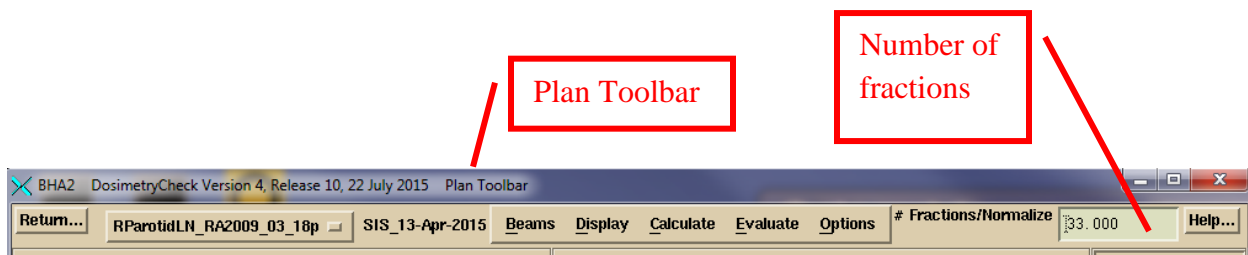
Dosimetry Check is an X/Motif program, native to UNIX/Linux, and will run on Windows with a third party X server.

Import of the Treatment Plan in Dicom RT

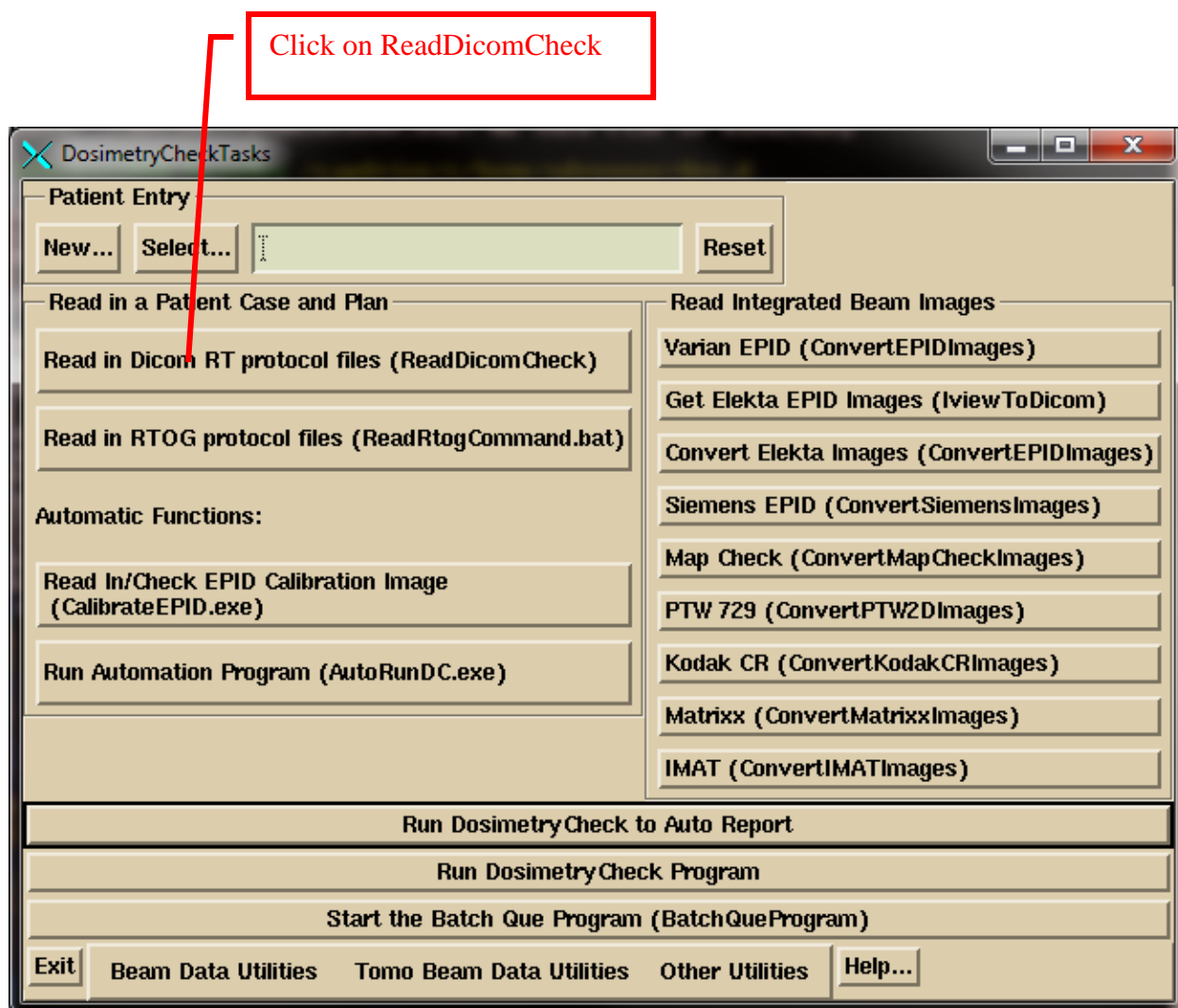
Export the treatment plan to a designated directory (folder). You must export the CT scans, the structures file, the plan file, and the three dimensional dose file.

Number of Fractions

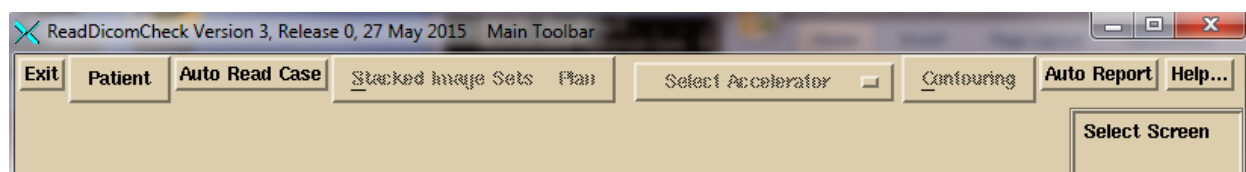
It is your choice in the planning system whether or not to export the dose for one fraction or for many. DC will pick up from the Dicom RT download whether the dose is being shown for one fraction or many. If more than one, DC will multiply the dose it computes by the number of fractions and compare that to the imported dose from the planning system. The number of fractions is shown on the Plan Toolbar and can be changed:



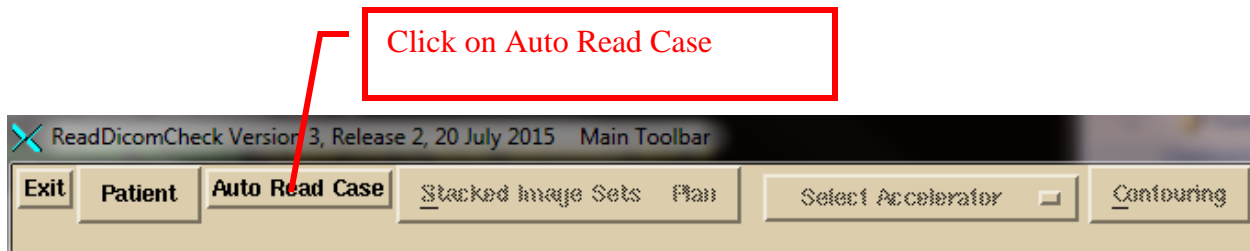
Click on the DosimetryCheckTasks (DCTasks) icon on the desktop and select program ReadDicomCheck or run the same directly.



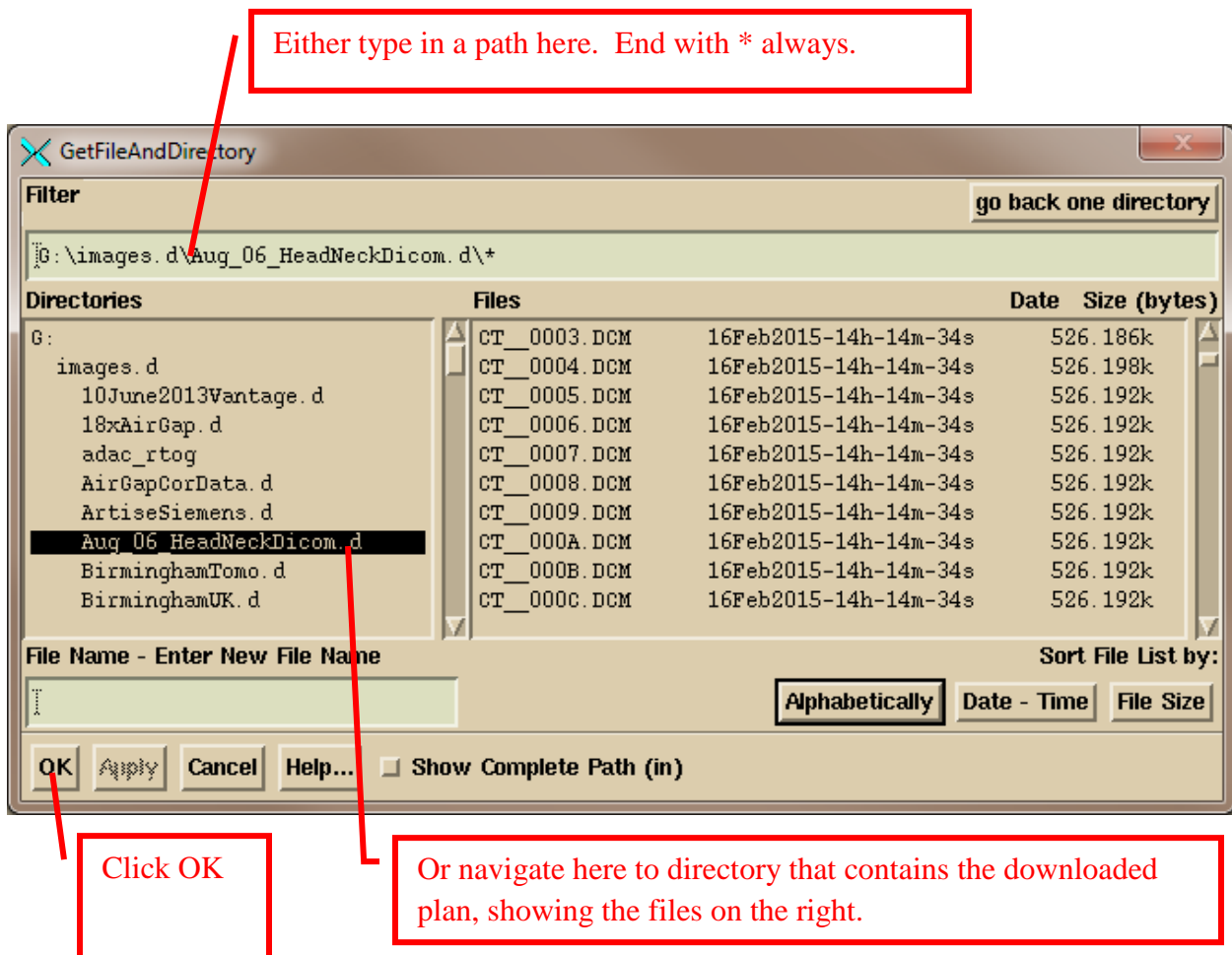
If run from DCTasks, the program writes out to a log file rdcstdout.log. If from a command prompt window you will see the same written to the window. The ReadDicomCheck toolbar is shown below:



For normal operation, hit the “Auto Read Case” button.



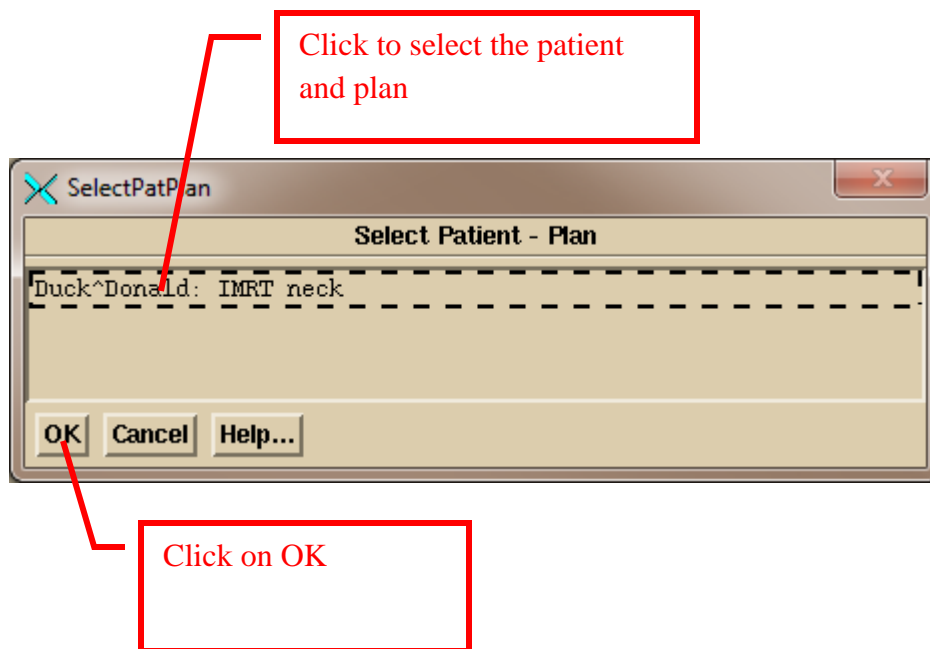
You will get a file selection dialog box for selecting a single directory:



Navigate, either by typing in a path in the Filter box (always end the path with a wild card *. R* would show all files starting with the letter R for example) or use the Directories tree on the left to navigate where the plan down load is where you see the files on the right, and then hit the “OK” button.

The program will create a directory (folder) in its patient's directory with the directory name made from the patient's name in the Dicom RT plan file and with the patient ID appended to the directory name. It is important to generate the name from the plan file as the automatic function will be looking for the same exact name and ID in the EPID Dicom files to associate the EPID files with the patient.

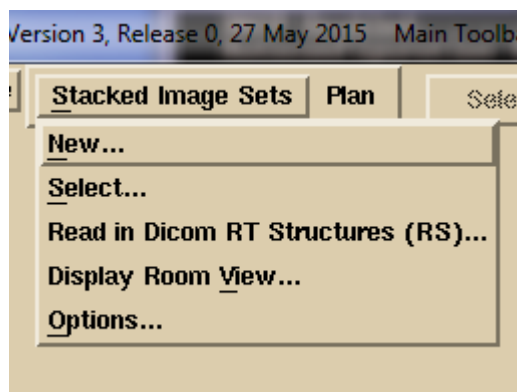
The program will display all patients and plans found in the above selected directory and you will have to pick one (only one shown in the below example) by clicking on the choice and then the OK button.



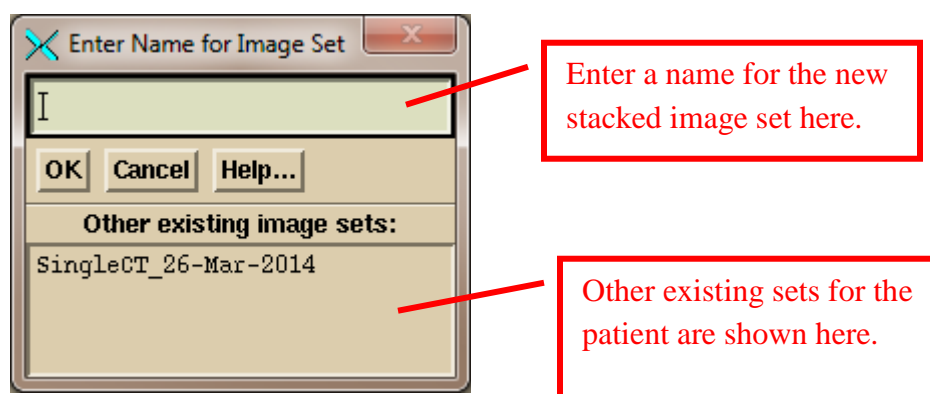
If the accelerator name in the plan is not the same as in Dosimetry Check, you will have to pick the accelerator with the "Select Accelerator" option menu (an option menu is a pull down menu that shows the current choice, like font name and size in Microsoft Word).

Manual Import

If anything goes wrong, you can select files manually. On some rare occasions, for example, the plan might not properly identify the CT scans that belong to the plan. To do manually, select or create the patient under the Patient pull down. The program is designed for all plans to be under the same patient name. Under the "Stacked Image Sets" pull down



either select an existing image set if one was already read in for the plan, or select New to read in a new one. A stacked image set is any set of CT scans (or MRI scans) that together are related geometrically from which a three dimensional model of the patient can be constructed. If reading in a new stacked images set, you will get a popup asking you to type in the name of the stacked image set, while showing any existing image sets:

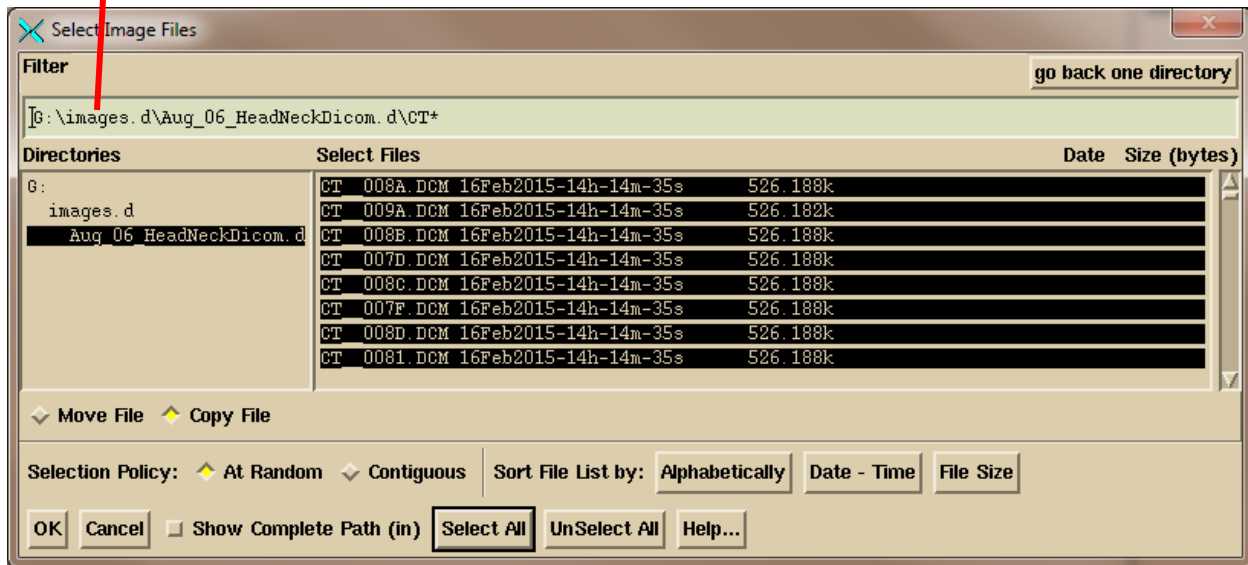


Enter a name for the new stacked image set here.

Other existing sets for the patient are shown here.

You will then get a file selection popup. Navigate to where the CT scans are and select them.

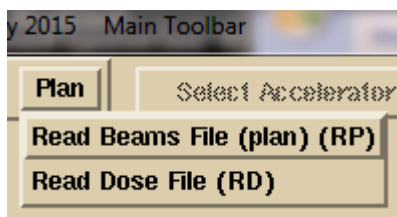
Type in path to where the CT scans are or navigate with directory tree below. Note CT* displays only files starting with CT.



You can use the Filter to display only files starting with the letters CT, then click on “Select All”. Or you can simply click the mouse on each CT scan file. Use “At Random” to select files that might be separated in a list. Use “Contiguous” to select a range by clicking on the first file, then while holding down the shift key click on a file at the other end of the list. Note that you can arrange the files alphabetically, by date and time, and by file size. Click on the “OK” button to continue.

After reading in the CT scans, select to read in the structures file. On the file selection popup, select the structures file (which usually starts with RS).

Then on the Plan pull down:



select to read in the plan file first, then the dose file second. In this manual selection mode, the program will only issue a warning if the CT scans are not related to the plan.

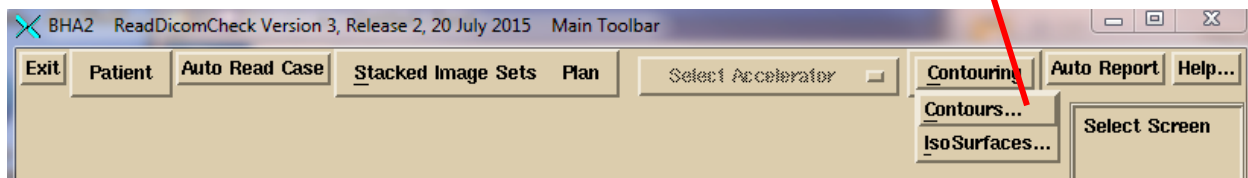
Reloading a Prior Plan

You can reselect a plan already read in. The program will overwrite the plan data and delete any prior computed dose. To reload the plan, select the patient and the stacked images set. Then select the plan. To reload the plan dose you have to read in the plan file first.

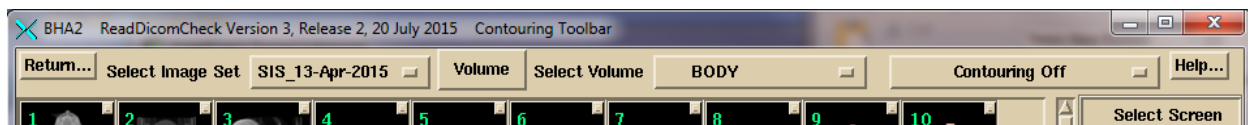
Set Up Patient Model for Dose Computation

It is next necessary for you to be sure that there is a designated ROI (region of interest outline) that represents the external contour of the patient, separating patient from non-patient. Some planning systems such as Pinnacle and TomoTherapy do not require such an external contour. DC does. Most planning system including Pinnacle, Eclipse, XIO, and RayStation will export the external contours and label them as such in the Dicom header so that DC detects which ROI is the external contour and so will pick up that designation automatically. Otherwise use the DC contouring package to create an external contour automatically or manually. See the System2100 reference manual under “Outlining Regions of Interest” section for details on how to use the contouring package.

The contouring package is accessed here.



The Contouring Toolbar:



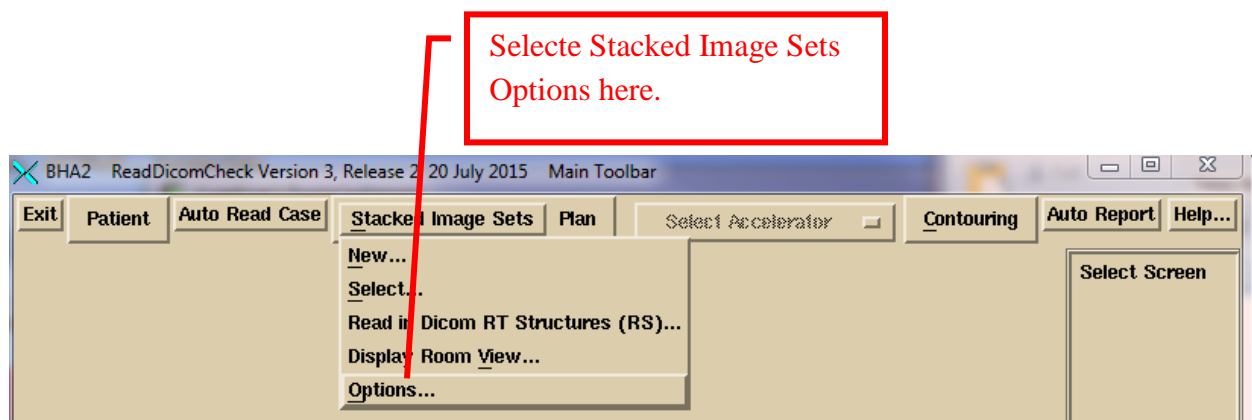
Be aware that the Dicom RT standard only covers how contours are transmitted, not how volumes are made out of those contours. For example:

- By default in DC, inside contours are not holes in the created volume. You have to turn that on for an ROI volume. The exception are ROI volumes of type SUPPORT Dicom RT (3006, A4) for which holes are allowed by default.

- The average density is used for two or more ROI's that intersect at a point. There is not a concept of one ROI inside another.
- By default shape interpolation is turned on in Dosimetry Check (interpolating the shape between coplanar contours that are more than 1 mm apart).
- Contours may be in planes other than the transverse plane.
- The process in DC is to voxel map the volume, then to generate a 3D triangulated surface. The voxel map determines the volume. There may be differences for contour lines running through a voxel as to whether the voxel is in or out of the volume. The surface is used only for display.
- DC has the additional feature of generating three dimensional isosurfaces, but volumes are not generated from isosurfaces. They are used for display only, such as bone.

You must review the couch model from the plan, or create one in DC (you can make and use a template). If a separate ROI was used for inside couch top and outside, you must create a third ROI using the combine volumes tool ("New Volume from Old" on the "Volume" pull down on the Contouring Toolbar) to make a new couch top from the other ROI minus the inner ROI, and delete the formers. See the "Outlining Regions of Interest" section in the System2100 manual and the "Stacked Image Set: skin, density" in the DC reference manual.

All ROI's that are to be assigned densities must be done so (but assignments are imported from the planning system, except for CMS XIO because XIO incorrectly marks all ROI volumes not assigned to have been assigned the density of one). The program will display a pop up showing ROI's that have an assigned density from the planning system when the structures file is read.



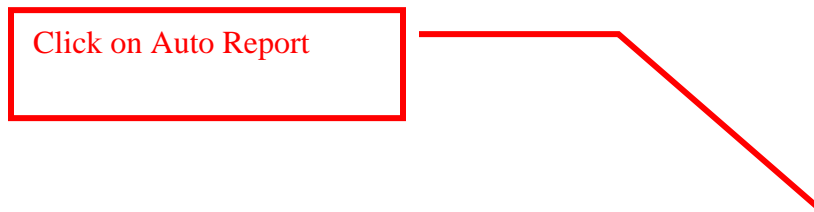
Use the Stacked Image Set Options Toolbar to select skin boundary, select CT number to density curve, and pick specific points for calculation.

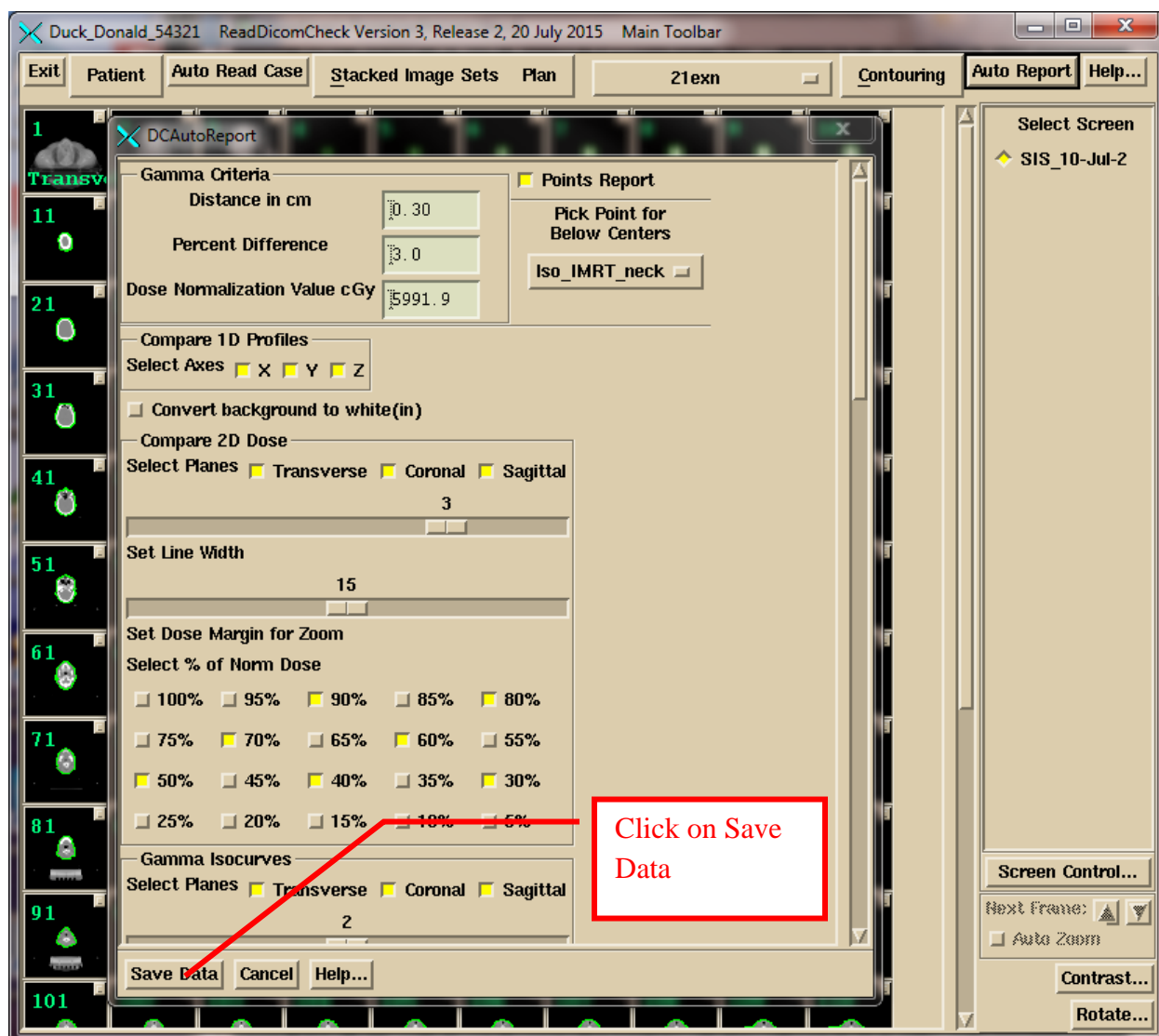


For further details on ReadDicomCheck, see the “Dicom RT Download” section of the Dosimetry Check reference manual.

Set Up for the Auto Report

After the patient model is correct, select “Auto Report” to review selections. After making your selections click the “Save Data” button. This must be done for the automation program to be able to generate a report.





For details see the Plan section of the Dosimetry Check reference manual.

Select the gamma criteria values (distance in cm and percent difference) including the dose to compare to (what the percent is of). The program will default to the plan dose at the average isocenter of all the fields.

Note that if the normalization dose is 100 cGy, then in a low dose region, the difference between 11 cGy and 10 cGy is 1%, not 10%. This is a basic concept for evaluating and comparing plans.

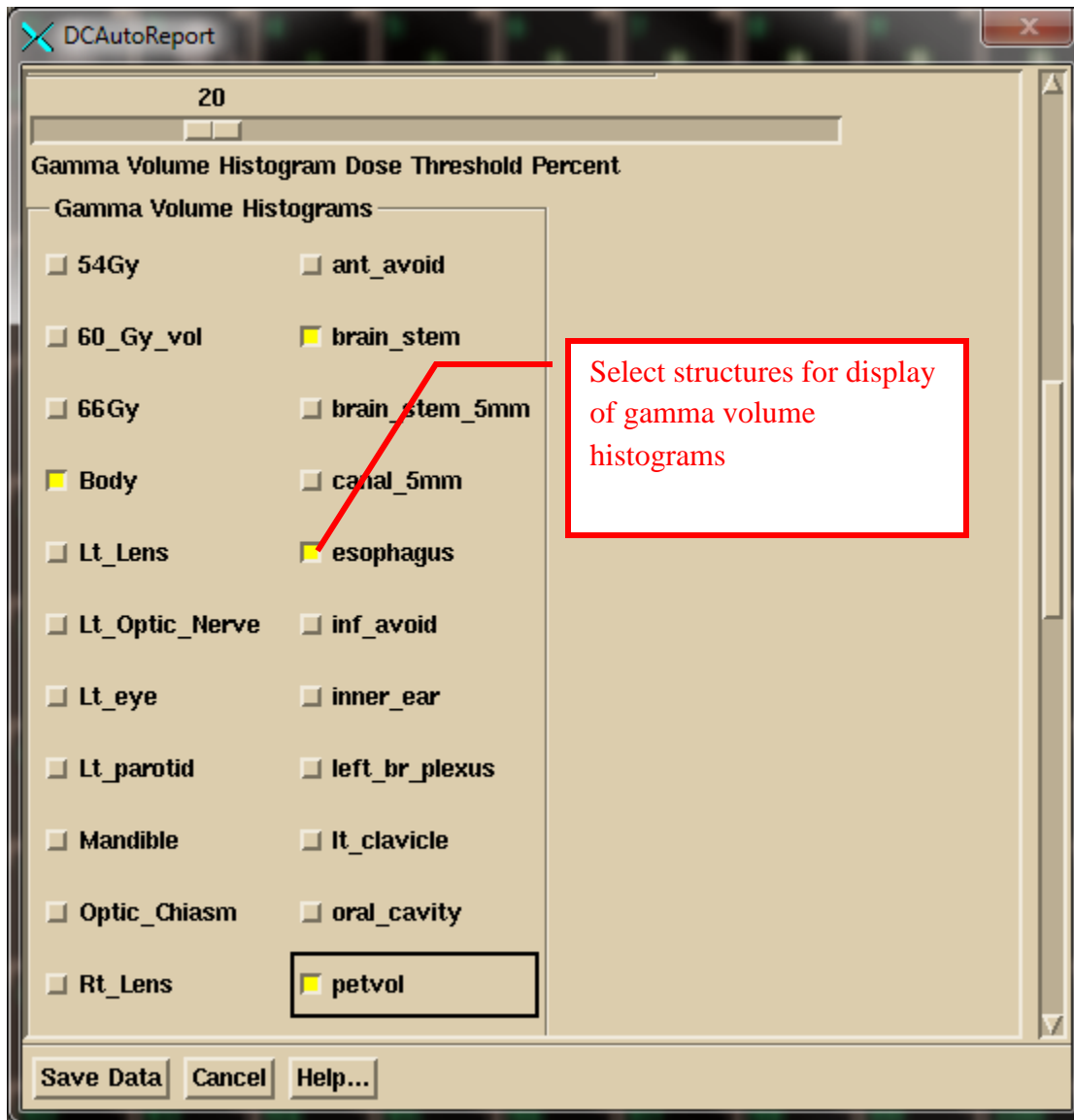
Then select a point (normally isocenter) that all the generated planes and line plots are to go through.

Then select desired dose values (% of the normalized dose) to plot on the dose comparison isodose plots.

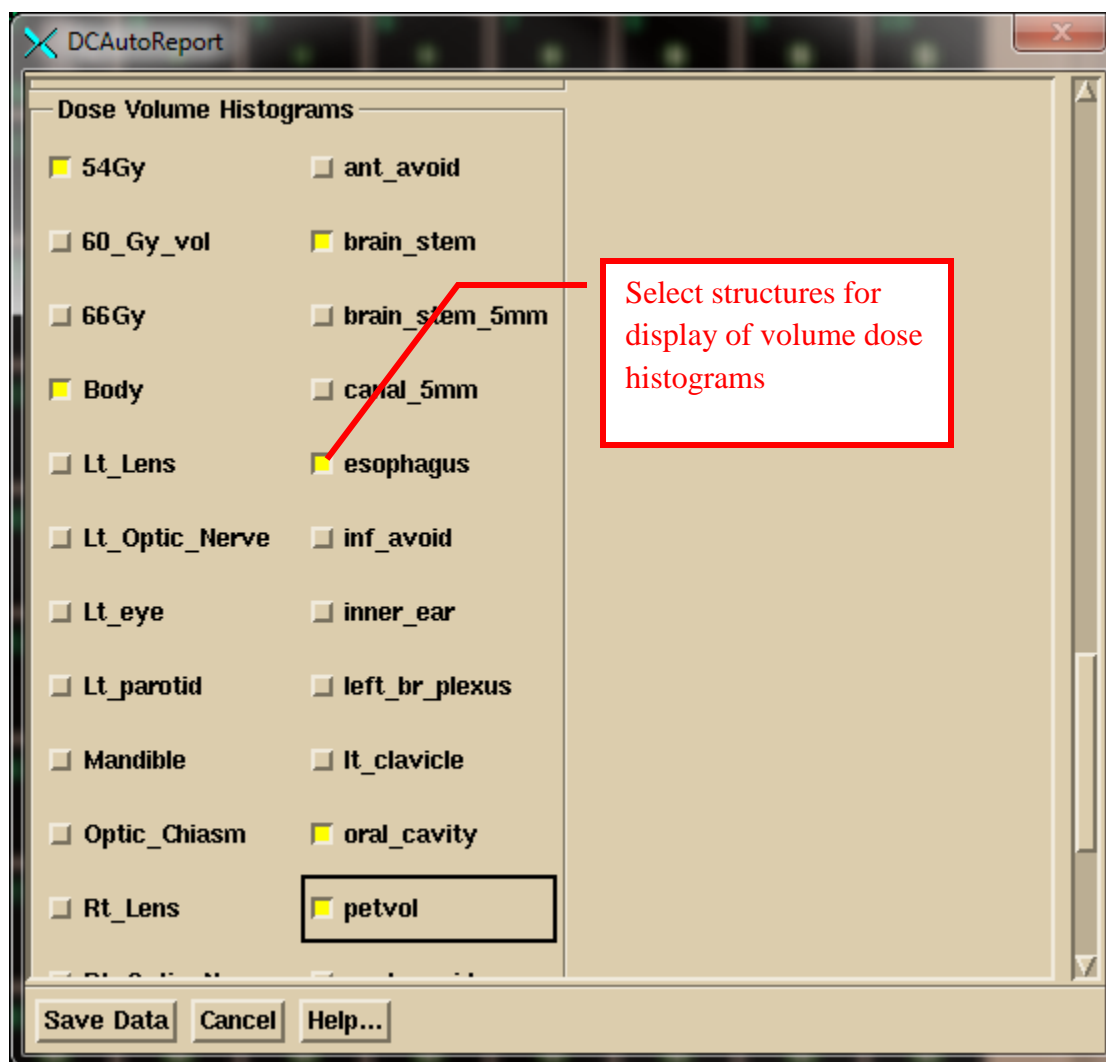
The screenshot shows the DCAutoReport dialog box with the following settings and annotations:

- Gamma Criteria:**
 - Distance in cm: 0.30
 - Percent Difference: 3.0
 - Dose Normalization Value cGy: 5990 (Annotated: "Enter dose normalization value and gamma criteria")
- Points Report:**
 - ☒ Points Report
 - Pick Point for Below Centers: Iso_IMRT_check (Annotated: "Select a point")
- Compare 1D Profiles:**
 - Select Axes: ☒ X ☒ Y ☒ Z
 - ☐ Convert background to white(in)
- Compare 2D Dose:**
 - Select Planes: ☒ Transverse ☒ Coronal ☒ Sagittal
 - 3 (Number of planes)
 - Set Line Width: 15
 - Set Dose Margin for Zoom: 15
 - Select % of Norm Dose:
 - ☐ 100% ☐ 95% ☒ 90% ☐ 85% ☒ 80%
 - ☐ 75% ☒ 70% ☐ 65% ☒ 60% ☐ 55%
 - ☒ 50% ☐ 45% ☒ 40% ☐ 35% ☒ 30%
 - ☐ 25% ☐ 20% ☐ 15% ☐ 10% ☐ 5%
(Annotated: "Select dose % values to plot")
- Buttons:** Save Data, Cancel, Help...

Next select the structures to show gamma values in the gamma volume histogram:



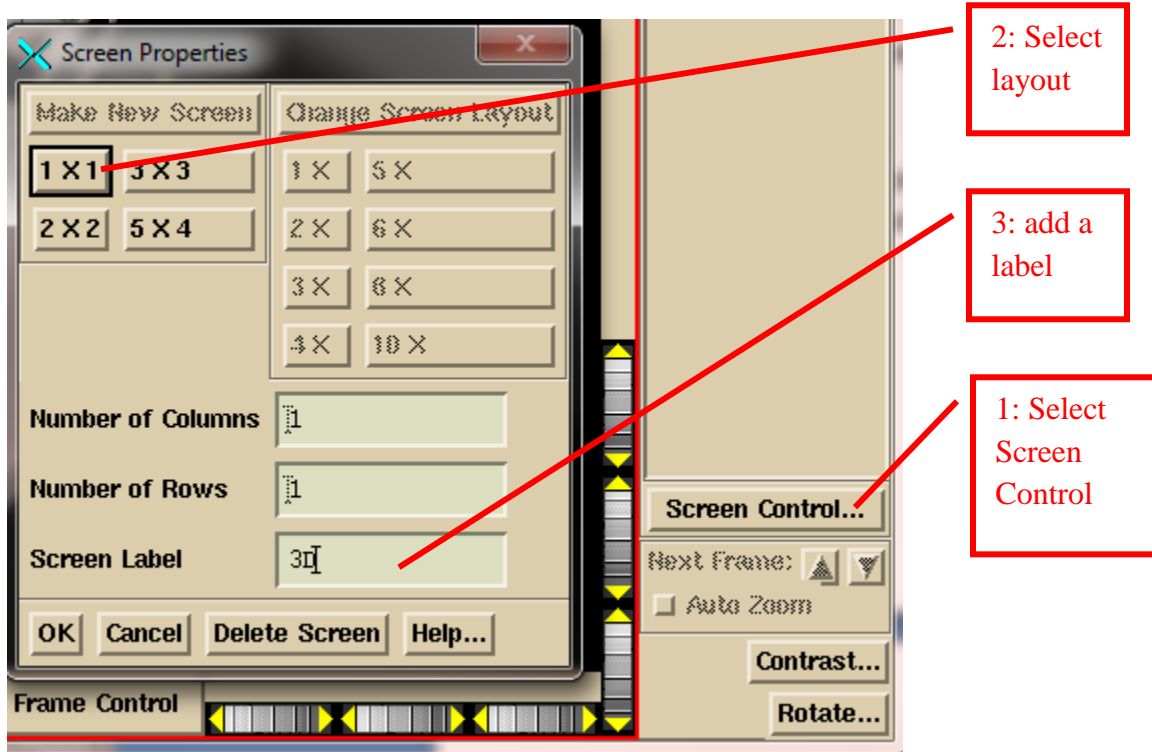
Then select the region of interest (ROI) volumes for the dose volume histograms. An ROI volume is the volume generated from the contours of that volume.



Note that the program will remember your choices. If you consistently name volumes the same way the program will default to those names.

Viewing the Patient in 3D

View the patient and couch model in 3D to verify. For viewing the patient model in 3D see the “3D Views” section of the System2100 manual. Click the mouse on the “Screen Control” button on the bottom left of the main application. You will get the popup shown below. Select “Make New Screen”, then select the layout which specifies how many frames are to be in the screen. Enter a label for the screen you are making and then click on the OK button.



On the new screen, click the mouse on the frame to select that frame for the next image.

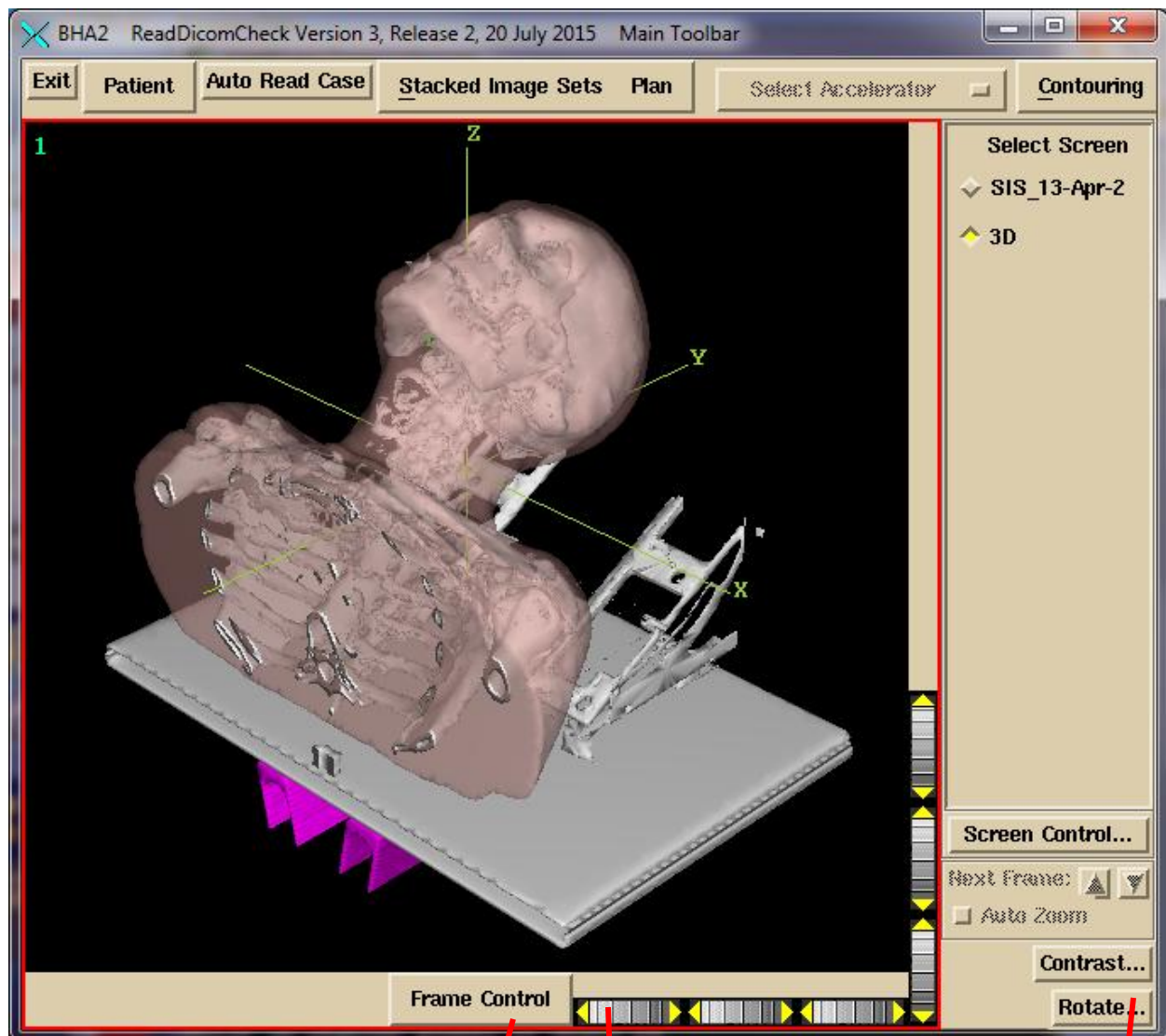
Select to “Display Room View”:





Note that in general, if you have read in more than one stacked image set, you will need to select the stack image set from the option menu. Click on the “Done” button to create the 3D view in the selected frame for the selected stacked image set.

Shown below is an example of 3D view of a patient model, with the external surface shown transparent 64%, a bone isosurface (not from contours, where external hardware was also picked up), a couch top model, and a couch rail model. Rotate the view to be sure the couch top is hollow inside if that is the desired case. Use the wheels around the edge of the frame or drag the mouse. The wheel widget may be dragged beyond the wheel. The yellow triangle is clicked on for single steps.



Frame control for settings of individual ROI's in the display

Wheel widget

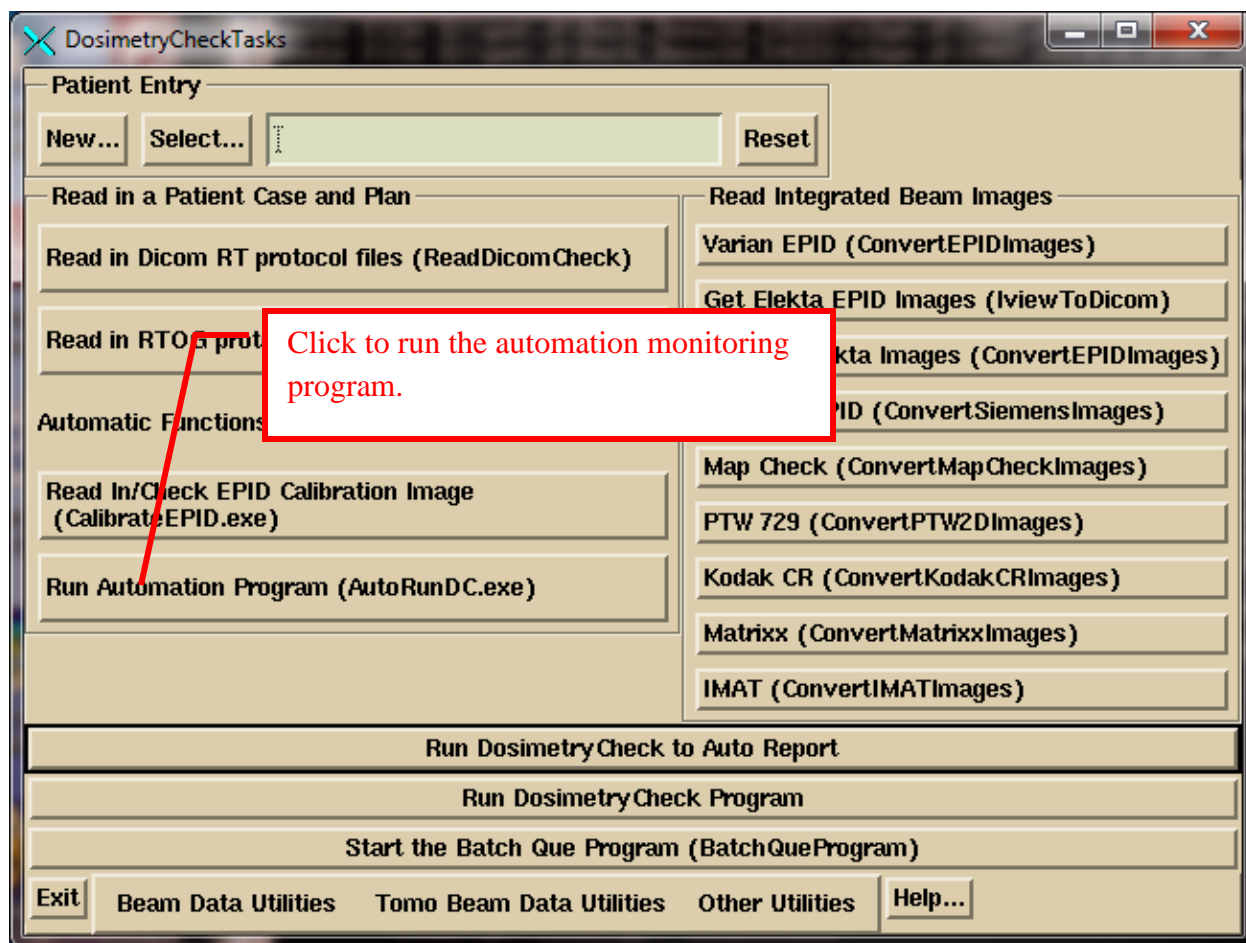
Rotate control for more options

Automatic Processing

Automation is set up by defining three folders for each EPID to be monitored: a calibration folder where the calibration image file is to go (never used for TomoTherapy), a pre-treatment folder where pre-treatment image files are to go, and an exit folder where exit image files are to go. You should always deposit the calibration image file first. The program cycles through the three folders and then waits. Some time lapse between the calibration deposit and the clinical files might be needed to guarantee that the calibration file is processed first.

Export the EPID clinical image files (on in the case of TomoTherapy the Dicom detector file) to the pre-treatment or exit monitored directory (folder). You will get either the completed auto report, or a pop up of the log file as to why the report could not be processed and generated. The program has no way to tell the difference between pre-treatment images or exit images other than the folder those image files are deposited into.

See the “Automatic Processing of EPID Images to Dose Comparison (Auto) Report” manual to set up for automatic processing, and for its limitations. You must start the auto run program or you can add this program (AutoRunDC) to start when the computer is booted:



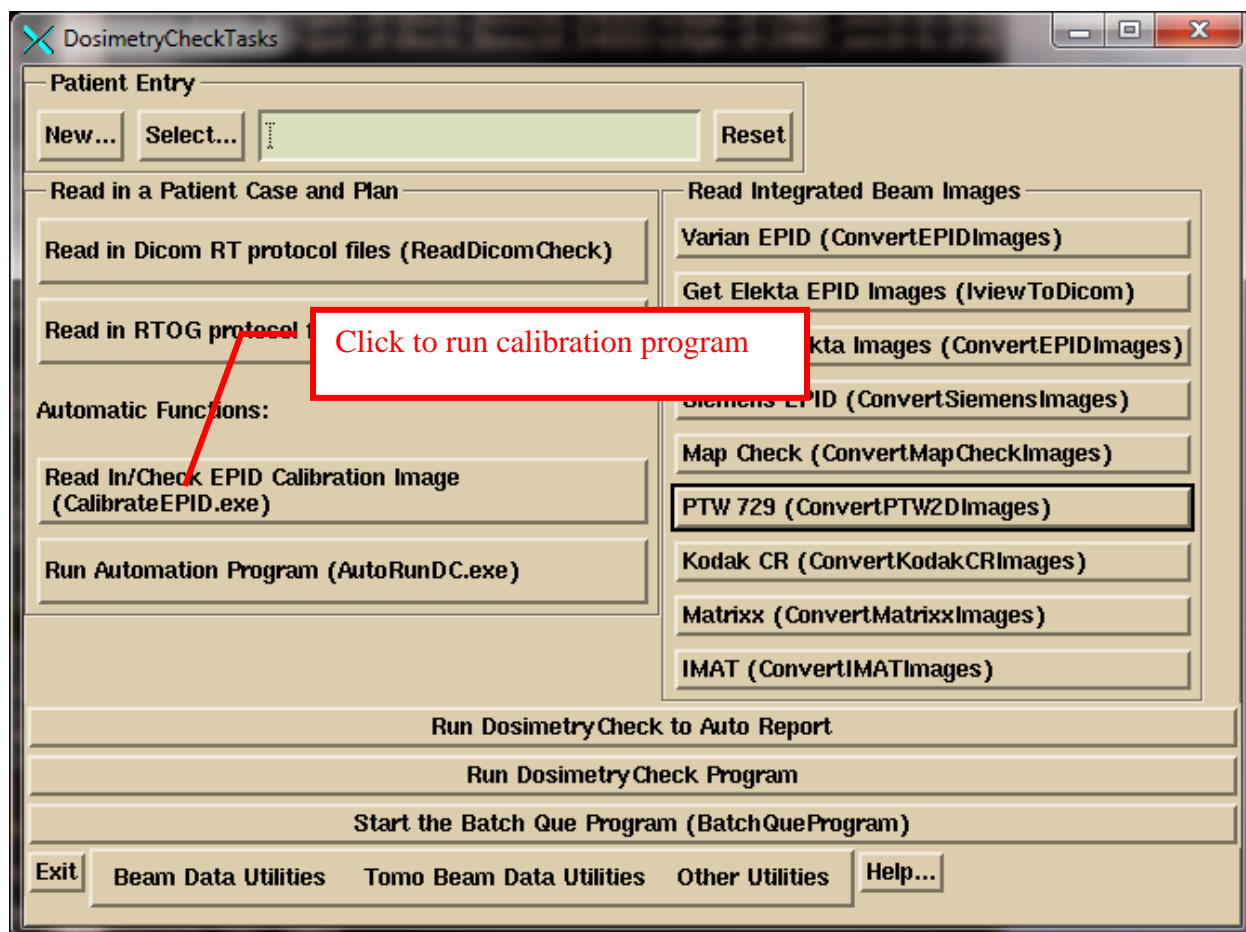
TomoTherapy

For TomoTherapy, only the Dicom export of the detector file can be placed in a monitored directory. The binary file that is not Dicom cannot be processed automatically because it contains no other information such as the patient's name. For the binary files, you must run Dosimetry Check and select to read in the binary only file (under the Beams pull down on the Plan Toolbar, or under Options on the Beam Toolbar).

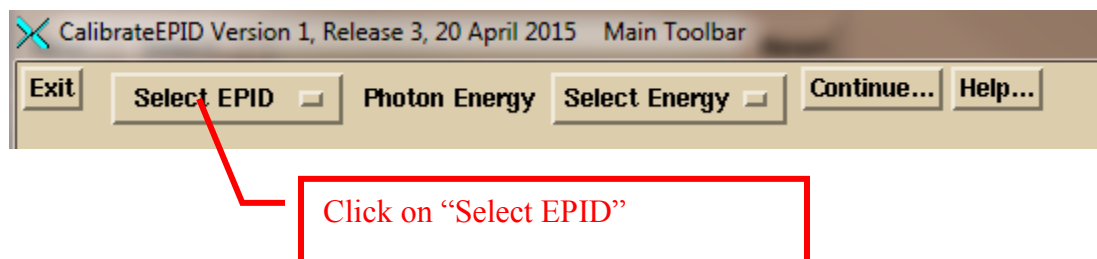
Specifying Calibration for Automation

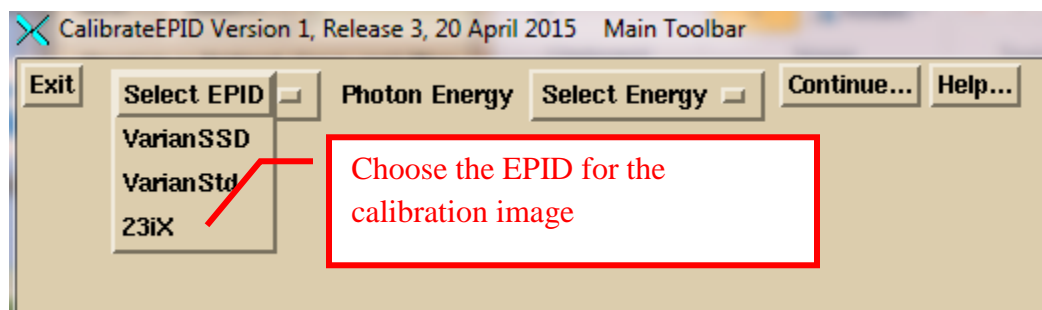
IMRT (Intensity Modulated Radiation Therapy) integrated images and IMAT (Intensity Modulated Arc Therapy) integrated images such as RapidArc (Varian) or VMAT (Volumetric Arc Therapy) are calibrated relative to monitor units by a calibration image for known monitor units. The calibration image is typically a 10x10 cm field size for which the definition of the monitor unit has been stated in terms of a field size, distance to the surface, depth, and dose rate in cGy/mu in the beam data directory in the file "Calibrationnn" where "nn" is the nominal energy such as 06. The calibration image is integrated in air with nothing in the beam.

You must specify the EPID deconvolution kernel to use, and the monitor units that will be used. Then you can put a calibration image into the monitored calibration folder for automatic processing, or also process it below. For IMAT when the calibration image is spread out over more than file, then you must enter those images here as the monitored calibration directory will only use the newest file. Select the EPID calibration program to do this:

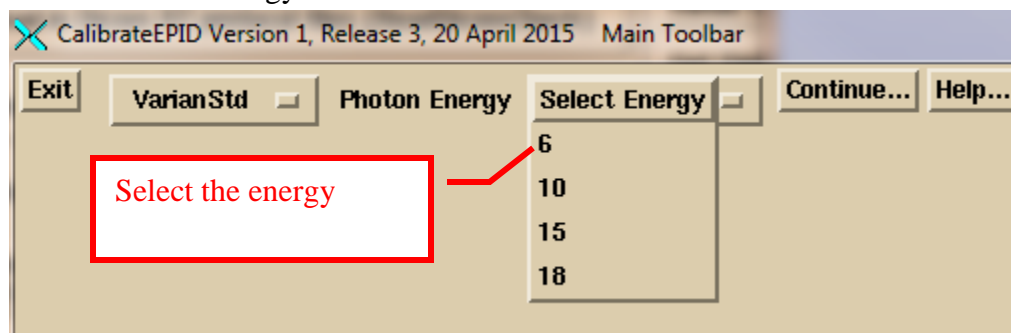


Select the specific EPID:

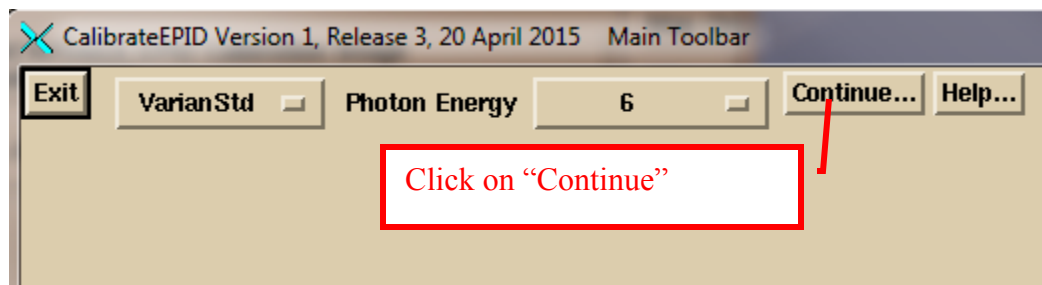




Then select the energy:



then click the mouse on the “Continue” button:

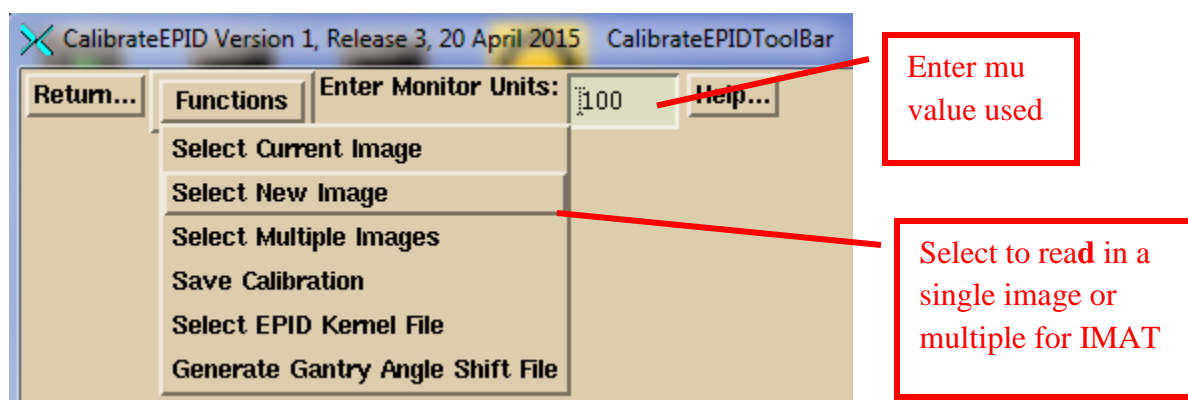


Enter the monitor units you will use for calibration images

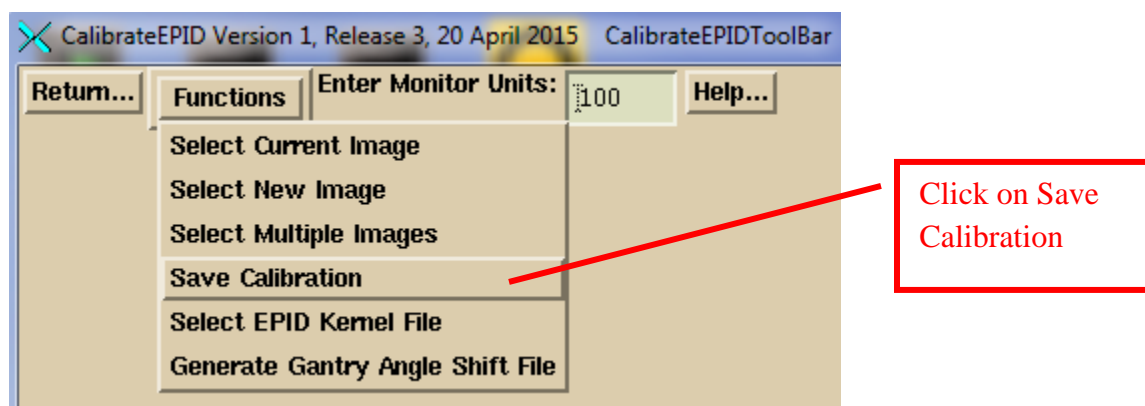
Enter the monitor units you are using for your calibration images in the text box.

Process a calibration image for IMRT or IMAT

To process a calibration image here (you can also just put it in the monitored calibration folder) select “Select New Image”. However, for multiple images of calibration image taken in cine (continuous) mode, you must process those images here as the monitored folder will only use the newest image and ignore the rest. The program will add up the multiple images.

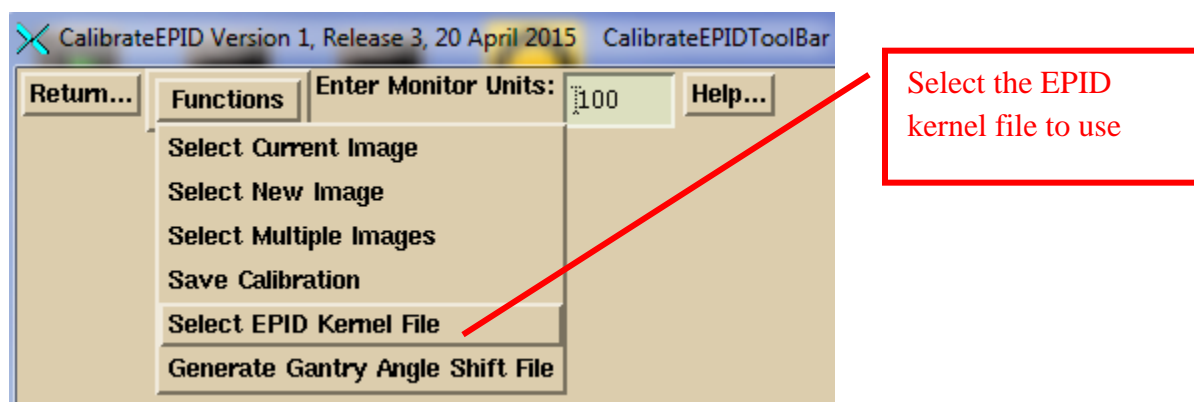


Review the centering and adjust if necessary. See below for ConvertEPIDImages for more on the centering tool. Then save the results by selecting Save on the Functions pull down menu:

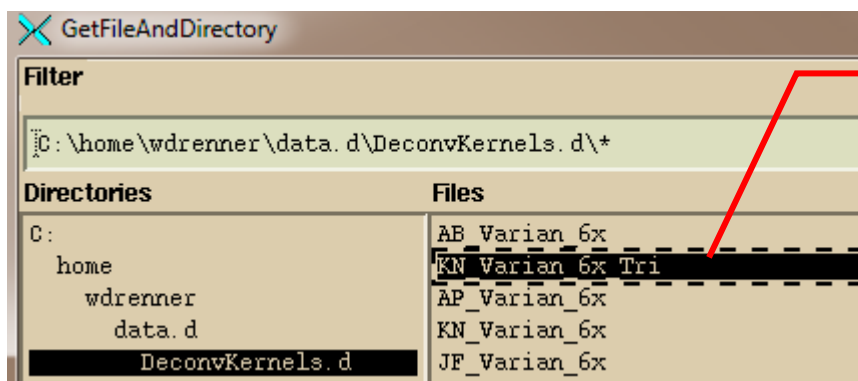


Select the EPID kernel file to use

You must select the EPID kernel file to be used. Select “Select EPID Kernel File” on the Functions pull down.



Select the EPID kernel file from the file selection dialog.



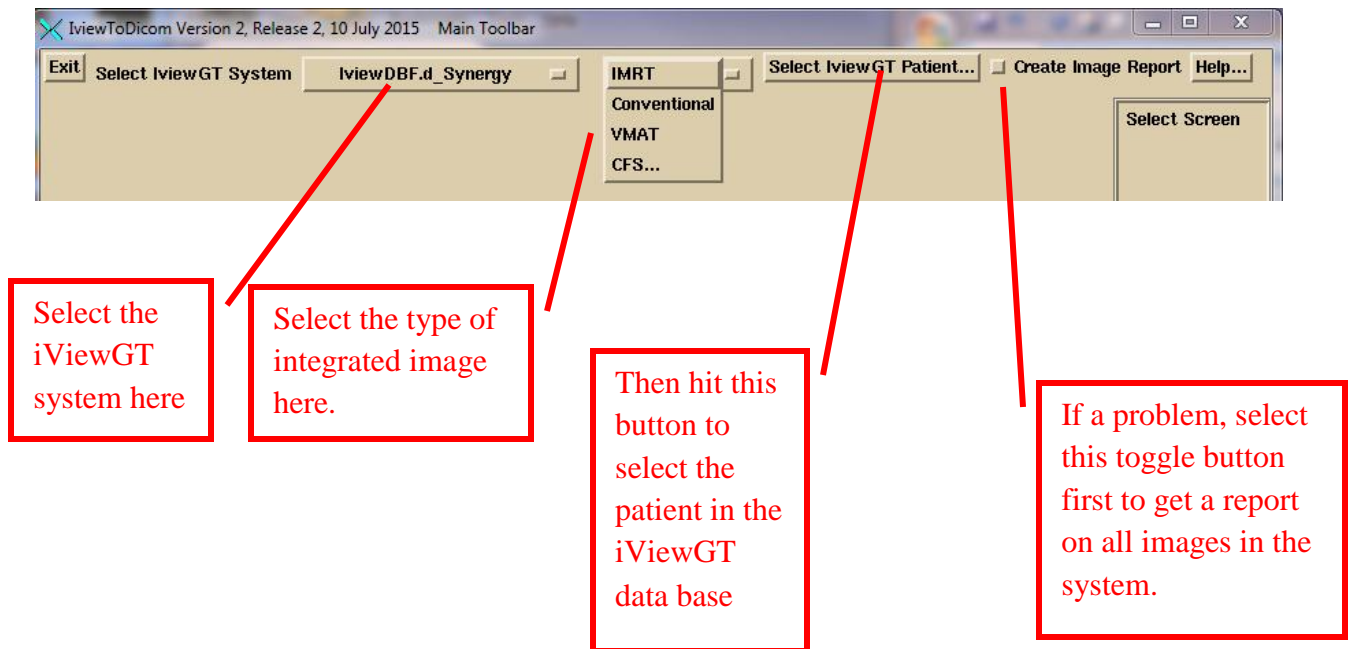
Select the EPID
Deconvolution Kernel

Elekta EPID iViewGT Images

There is no Dicom standard for encoding an integrated image. Varian uses a comment statement or in the case of their portal dosimetry they use CT codes originally meant for Hounsfield units. Siemens uses a private code. And at the present writing, Elekta does not export integrated images in Dicom format. By integrated image, we mean that the pixel values get larger the longer they are exposed, with zero for zero radiation exposure. EPIDs capture images of the order of 5 to 8 frames per second, and the frames are all averaged to display an image. However, if the number of frames is known, one can multiply the image pixel values by the number of frames to get an integrated pixel value (this will be after contrast reversal so that white is more radiation).

Program IviewToDicom

Program IviewToDicom was written to go into the iViewGT data base and pull out information along with the image to then write out a Dicom RT image file. See “Using the Elekta iViewGT Imaging System” manual for details on how to set up and run this program.

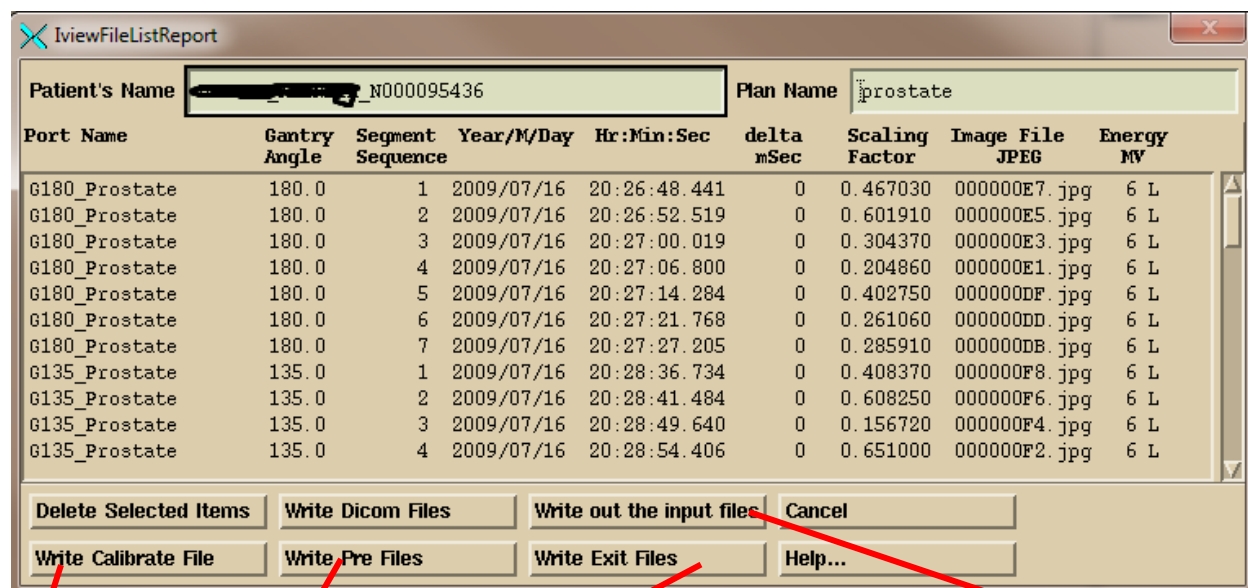


First select the iViewGT system with the first option menu on the left. This list is created by the file IviewGTDirectory.loc in the program resources directory. Then you have to select the type of image on the next option menu. iViewGT will have stored these images differently.

IMRT mode is non-rotating intensity modulated beams. Conventional would be a simple open field such as the 10x10 calibration image. VMAT are images taken in cine mode during beam on while the machine is rotating around the patient. You want to get an image about every 5 degrees. CFS mode is a mode where all fields are treated automatically but the images are under the name of the first field treated. For CFS mode, you will have to select the plan so that the program can figure out which image belongs to which beam.

Then click on the “Select IviewGT Patient” button. The program will display the list of patients found in the iViewGT data base. Lastly, there is a “Create Image Report” toggle button. If you select this first before selecting a patient, you will get a report on all images found in the data base.

After selecting the patient, you will get a pop up showing the latest integrated images for a plan found for that patient. Select to write out the images to the appropriate monitored folders for automatic processing. The program will format the image in a Dicom file and so that the other utility programs in DC can recover the integrated pixel values.



Write out a calibration image to the monitored calibration folder

Write out pre-treatment images to the monitored folder

Write out exit treatment images to the monitored folder

Use this for manual processing later to write to a non-monitored folder

The bottom row of buttons will deposit the Dicom image file in the calibration folder monitored by AutoRunDC, or the pre-treatment monitored folder, or the exit monitored folder. For VMAT, as described below, you will be prompted to select an inclinometer file for each arch, and that file will be added to the folder with the respective Dicom image files for that arc.

The “Write Dicom Files” button will output the images to the folder named by the program resource file NewEPIDImagesDirectory.loc instead of a monitored folder. “Write out the Input

files” will write out copies of the data base files from which information is being extracted from in the iViewGT data base for the purpose of figuring out any problem that might occur.

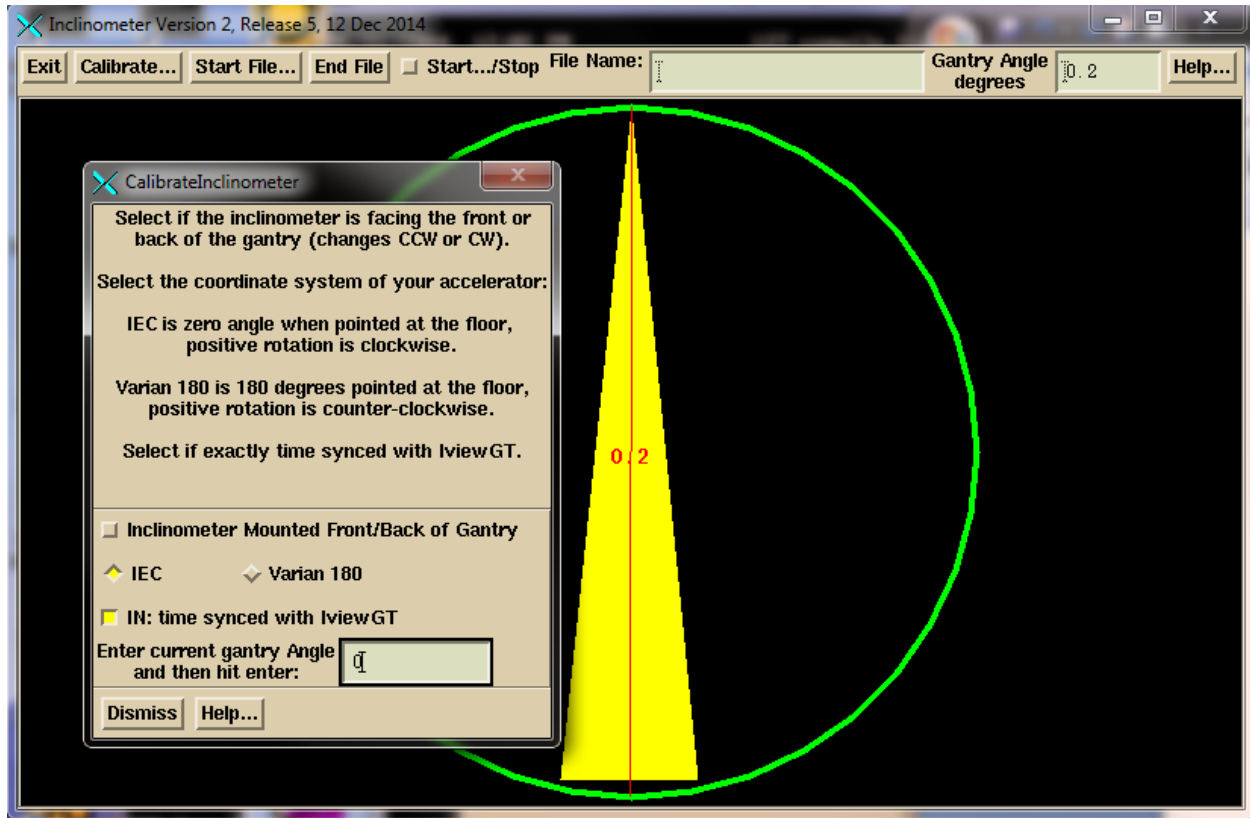
Inclinometer file for Elekta

With Elekta for VMAT, images are integrated while the machine rotates around the patient, but there is only a time stamp for each image. Elekta does not provide the gantry angle in cine mode during VMAT delivery in their data base. To assign a gantry angle to those images an inclinometer must be mounted on the LINAC and a program that we can provide to write out a file of time versus gantry angle. Further, to minimize any impact on the iViewGT computer that program can go on a memory stick. The file produced by the inclinometer program must be included with the processing of the EPID images so that a gantry angle can be determined for each image using the time stamp to look up the gantry angle. The file can be selected along with EPID images or selected manually for processing. The Program IviewToDicom above will prompt you to select the inclinometer file for each beam and will put that file in with the EPID image files. See “Using the Elekta iViewGT Imaging System” manual for details on how to set up and run this program.

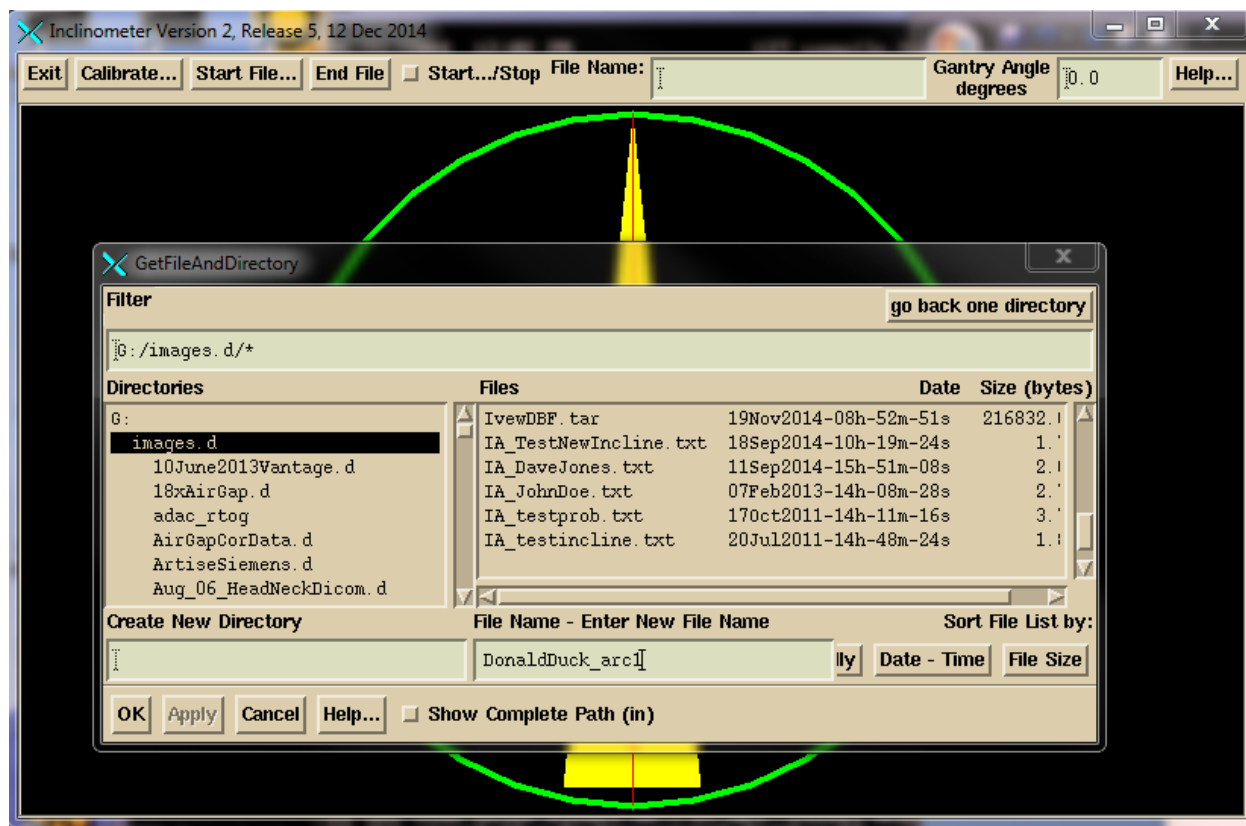
Use of the Inclinometer Program

Hit the Calibrate button to calibrate the inclinometer. Then type in the current gantry angle. Rotate the gantry to be sure that image is rotating in the same direction. If not reverse the mount selection on the calibration popup.

Select “time synced” if the program is running on the iViewGT computer or if the computer is timed synced to the iViewGT computer. With time synced the gantry angle is looked up directly from the time (but first adjusting the time to the middle of the integrated sub-arc). Without time sync, the program will look for the start of gantry movement to establish the time that the beam went on. This information is saved for the next use.



Click the “Start File” button, navigate to where you want the inclinometer file to go, and enter a name to associate with the patient and the arc. The program will add IA to the front of the file name and .txt at the end. You can leave the program running for more than one arc if in time synced mode.



Hit the “Start-Stop” toggle button. Data will be written to the file until you hit “End File” or untoggle the “Start-Stop” toggle button and the file will be closed. A new file must be started for another arc.

Manual Processing of EPID Images

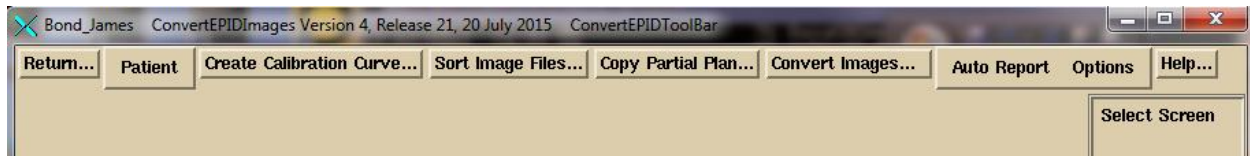
See the separate “Converting EPID Images” and “Converting IMAT Images” reference manuals for more details than shown below.

Processing of IMRT Images

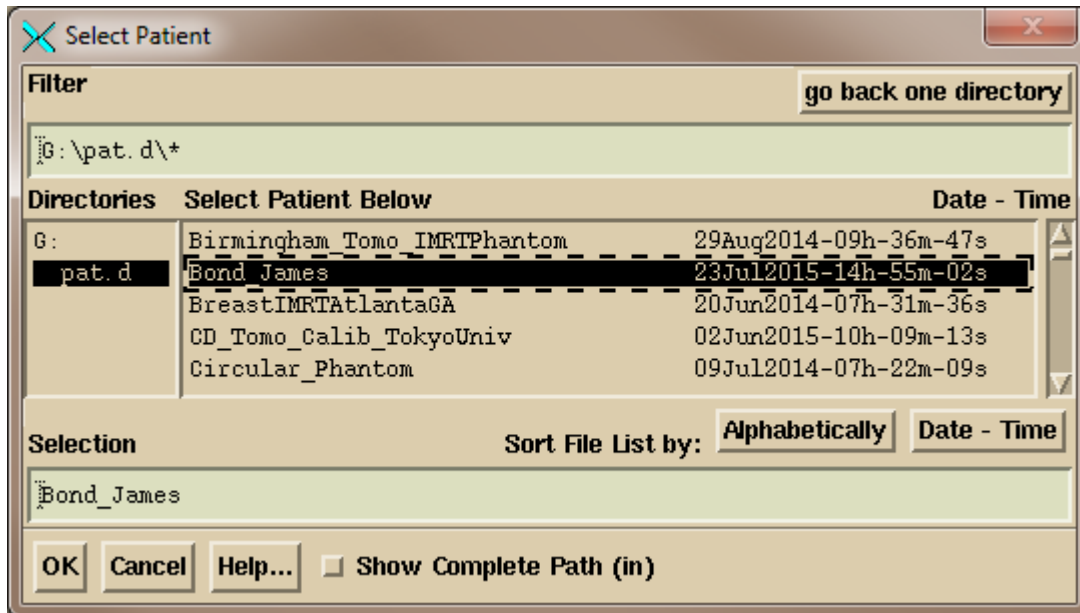
Run program ConvertEPIDImages from DosimetryCheckTasks. On the first toolbar, select the accelerator with the option menu and then the energy. Then hit the continue button:



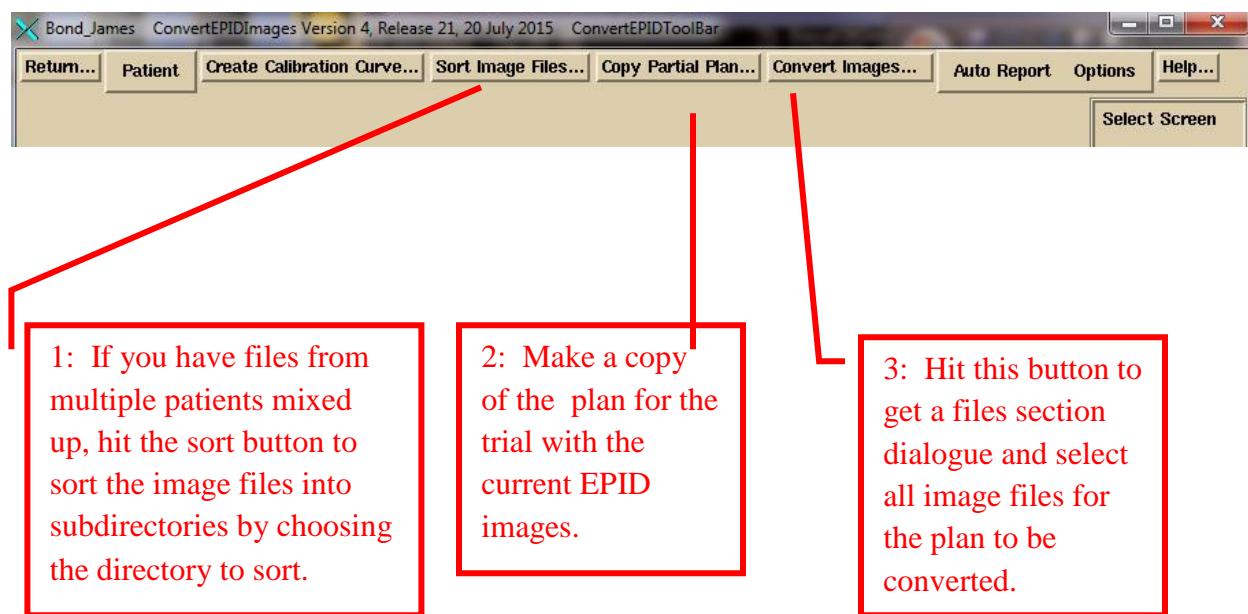
On the Convert EPID ToolBar, hit the “Patient” button to select the patient from the patient selection dialogue. (Note the patient can also be pre-selected from DosimetryCheckTasks).



Select the patient on the right and hit the OK button:

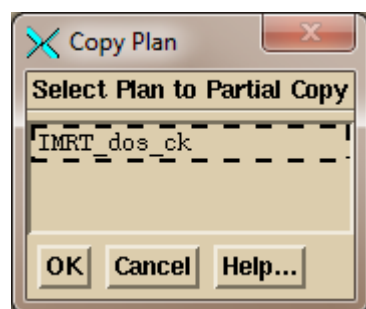


On the ConvertEPIDToolBar you have several options.

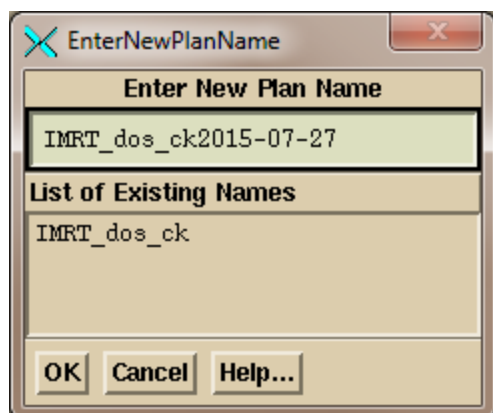


Use the “Sort Image Files” button to select a folder of images to have those images sorted into sub-folders by patient name, energy, and image label.

Next, you may very well want to copy the downloaded plan to make a separate plan entry for this particular trial. A trial being the computed doses for a set of EPID images. The automated functions always does this, appending the EPID date to the plan name. You will be prompted to select the plan to copy:



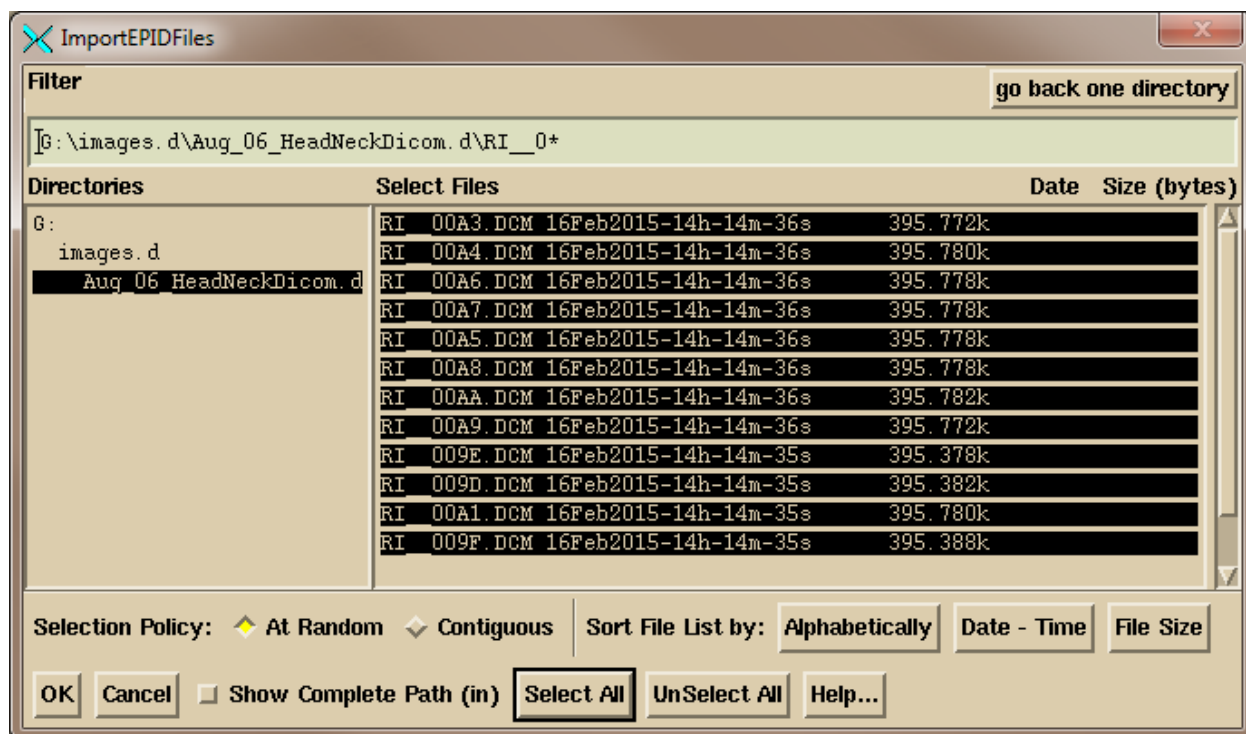
And then to type in a name:



Here the current date will be appended by default, and you can override the name to be used.

Then click on the “Convert Images” button to get a file selection dialogue to select the files to be converted. The files you select must be for the same patient plan.

On the files selection dialogue below, select the files for the plan. But you can only convert one energy at a time. The program will reject image files not of the energy that you selected above. Note that you can set the filter line to only show the image files you want to select. Hit “Select All” or manually select the files. “Contiguous” will let you select the first file and all the ones between that and a second file by holding down the shift key. Then hit the OK button.



The selected files will be read in, and you will then get the convert pop up shown below. The files read in will be listed in a scrolled area in the middle of the pop up. You have to be sure the correct plan is selected and the correct beam is selected for each image. If more than one image is selected for a beam, then they will be added together (such as the case of a multi-leaf carriage shift). You must be sure that the correct EPID kernel is selected. If you untoggle the EPID selection, the images will only be normalized to the calibration image without any further processing. A calibration image must be selected. There can be a single calibration image selected for all the images, or a calibration image to be used with each individual image.

ConvertToRMUPopup

☐ Use Calibration File Select Calibration Curve... Show Calibration Curve...

File Name: []

☒ Use Deconvolution Kernel Select Deconvolution Kernel...

File Name: [VarianTrilogy_6x]

[Trilogy Varian aS500 EPID 5 June 2006 6x]

Get for individual fields: [Center/Calibration] Auto Center All

Select Plan Use plan name: [IMRT_neck] Correct with Flood View

☐ Exit Port Image (in is selected)

File Name	Center cm	Gantry Angle SID	Write To File
	Cen/Cal File	Signal	Monitor Units
[RI_009D.DCM]	[]	[0 deg 104.6cm]	[A1_rpo]
[Select Center/Calibrate]	[]	[]	[A1rpo_0_1_1_.rmu]

Center All/Cal. All File Name: [RI_10x10cal.dcm] Center cm: [0.04 -0.35]

Signal for All Calibration: [747216.812500] Monitor Units: [100]

Frequency Roll Off Term for Exit Images: [0.0]

Frequency Roll Off Term for Pre-treatment Images: [0.1]

Pixel Size cm: []

[Convert To RMU] [Cancel] [Help...]

1: Select the EPID kernel here

Selected plan name shows here, or type in new

Designate exit image here

2: Select the plan

4: Select the calibration image file.

3: For each file be sure the correct beam is selected, selection shown on the right.

Hit this when all choices have been made.

If you select the calibration file with the image files, and the calibration file has the letters “cal” in them, the calibration file will be automatically picked up at that time. Otherwise select it manually.

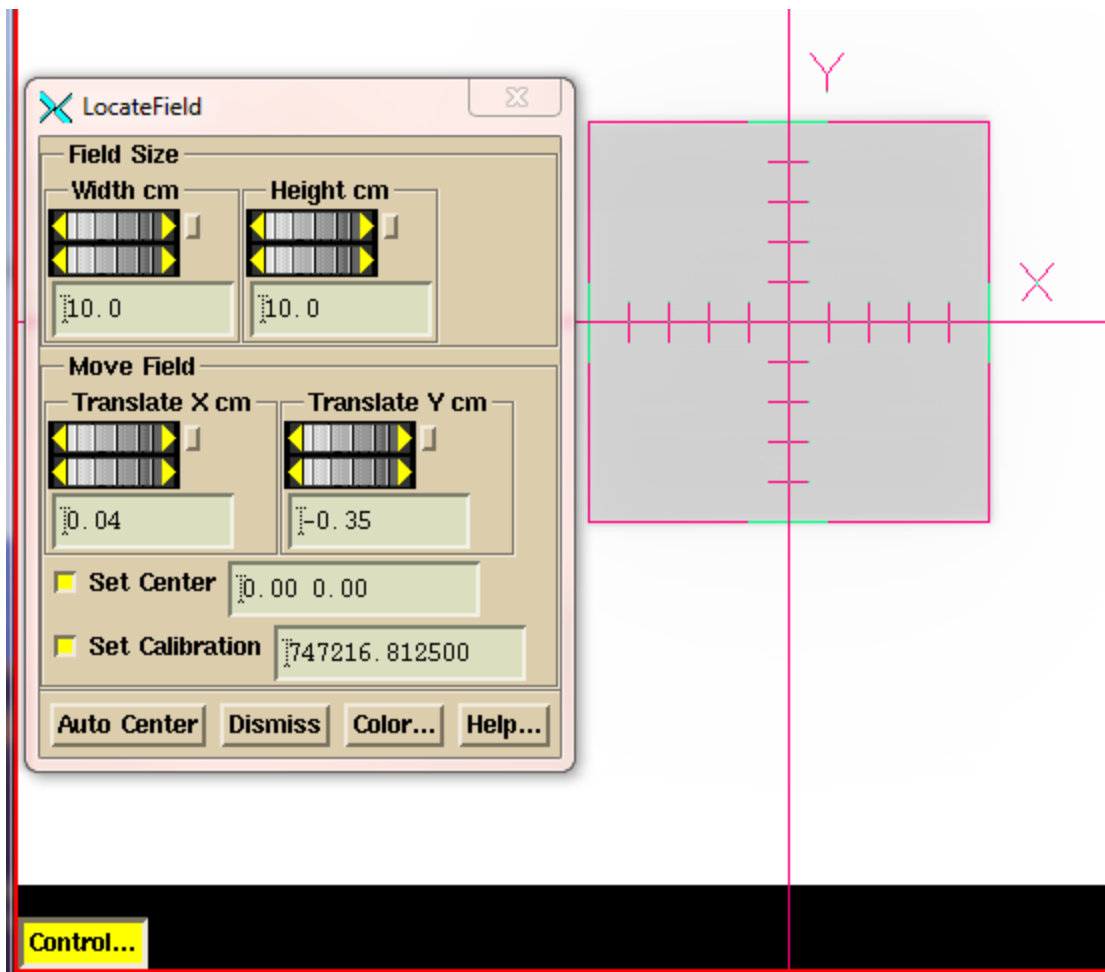
The “Select Plan” pull down acts like an option menu in that the current choice is shown in a text box. You can type in a plan name that you have not downloaded yet but then you will have to type in a name for each beam. If you leave the plan text box blank, the program will not assign the images to any plan. In either case, the processed images are not directly assigned here to the plan. They are put into a folder called FluenceFiles.d in the patient’s folder. Upon running Dosimetry Check, the images will be incorporated automatically if none have been specified yet. If the plan already has images, then you will be asked if you want to incorporate the newly processed images to replace the prior. In contrast, the automated function above will put the image directly into the trial plan that was created.

The exit toggle button is the only place where you designate that the images were taken with the patient in the beam. The patient model must be complete with all assignments of density to region of interest (ROI) volume, a couch model etc. The patient model and EPID deconvolution kernel will be used here to convert an exit image to the in air fluence before the patient and delivered to the Dosimetry Check executable. From that point forward there is no difference between the exit and pre-treatment images. The images will be converted to the units rmu which stands for relative monitor units.

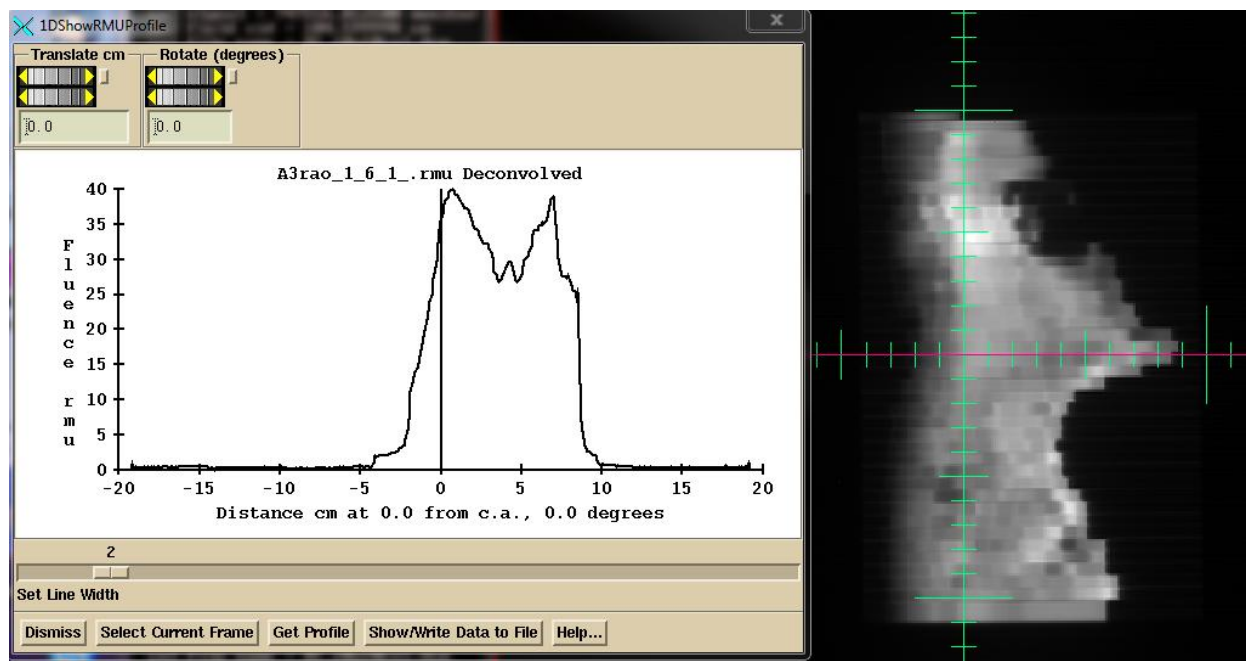
RMU Definition

An rmu is the monitor units that would deliver the same radiation intensity on the central axis of the calibration image (normally designated to be 10x10 cm). For open fields, the rmu would be the monitor units times the collimator scatter factor. In this manner the in air fluence is normalized to monitor units.

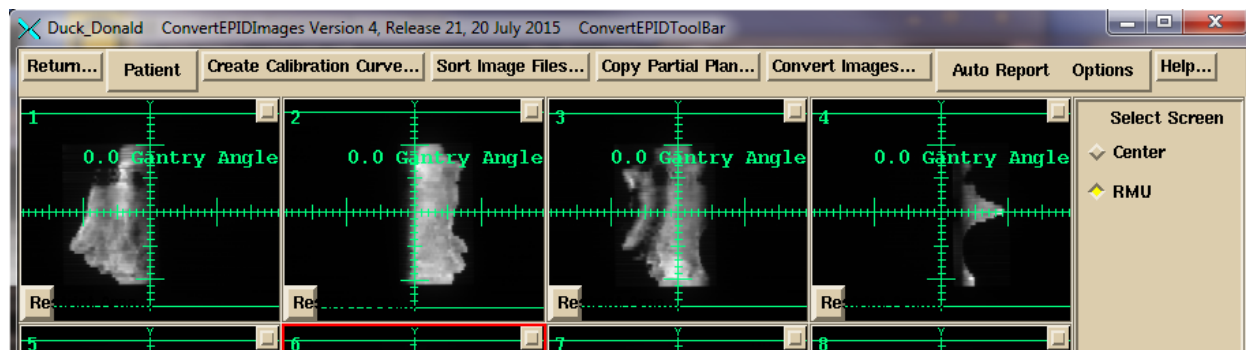
Be sure to review the calibration image for proper centering. Hit the “Control” button to bring up a tool to manually find the image center.



When done with all choices, click the “Convert to RMU” button. After conversion, the converted images will be shown. Then note the tools under the Options pull down on the ConvertEPIDToolBar to look at the rmu value and profile. For testing with known fields, this is a good place to determine if you are getting the correct rmu value. If the rmu value is wrong, the dose will be wrong.

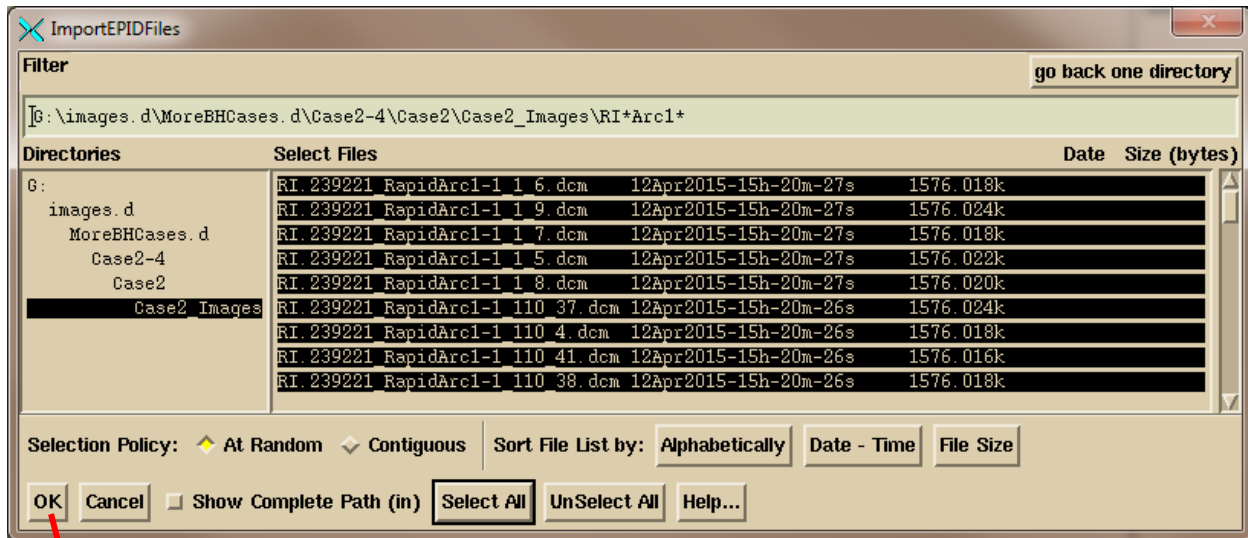


You may then hit the “Auto Report” button shown below to submit the plan for computation and display of the auto report, assuming you had set that up when you ran ReadDicomCheck or some other time for this plan.



Processing IMAT Image (RapidArc, VMAT)

You begin as you do above for IMRT images. The main difference is you process the images for only one arc (beam) at a time. So only select the images for a single arc. Below we have selected all the images for a single arc in the files selection box. Note the use of the Filter box to select to display only the Arc1 files. Otherwise select file one at a time or use the “Contiguous” choice to select a range of inclusive files. Note also files can be displayed in alphabetical order, or by date and time. Be sure to select the correct beam (arc) for the images being processed.



Hit this button when done navigating and selecting image files for an arc.

Click on the OK button when you have navigated to the directory and selected the images for an arc. There are then some differences in the convert popup that you get from the ConvertEPIDImages program:

ConvertToRMUPopup

☐ Use Calibration File Select Calibration Curve... Show Calibration Curve...

File Name

☒ Use Deconvolution Kernel Select Deconvolution Kernel...

File Name AP_Varian_6x

Fitted Kernel. Assumes off axis data is present.

Get for individual fields: Center/Calibration Auto Center All

Select Plan Use plan name: RParotidLN_RA

Select Beam Use beam name: Rapid_Arc1

TrueBeamCorrection

Correct with Flood View

Correct Continuous from Single

Read Inclinometer File

☐ Exit Port Image (in is selected)

File Name	Center cm	Gantry Angle SID	Write To File
	Cen/Cal File	Signal	Monitor Units
RI. 239221_RapidArc1-1		1.5 deg 100.0cm	RapidArc1_1_110001.rm
Select Center/Calibrate			
RI. 239221_RapidArc2-2		6.2 deg 100.0cm	RapidArc2_2_110002.rm
Center All/Cal. All	File Name RI_10x10cal.dcm	Center cm 0.04 -0.35	
Signal for All Calibration	747216.812500	Monitor Units	100
1.5			
Frequency Roll Off Term for Exit Images	0.0		
Frequency Roll Off Term for Pre-treatment Images	0.1		
Pixel Size cm			

Convert To RMU Cancel Help...

Select the plan and then the beam. The selection is shown in the corresponding text box.

Read inclinometer file for Elekta if not already included.

You must select the plan and then the beam that the images are for. As in the IMRT convert popup, you can also type in the plan name and beam name in the corresponding text box that shows your selection if you have not downloaded the plan yet (but the patient entry must exist,

and to process exit images, you must have the plan). The pull down menu coupled to the text box simulates an option menu but with the option to type in something different. If no plan or beam is selected, the images will just go to the FluenceFiles.d folder in the patient's folder under the IMAT sub-folder and you will have to manually select the processed files from Dosimetry Check from the Beam Toolbar under the Options pull down.

If the inclinometer file is needed for Elekta and was not included with the selected images, then you must select to read it in.

For Varian TrueBeam machine with operating version before 2.5, you must hit the TrueBeamCorrection button to correct both the clinical images and the calibration image gantry angle and source image distance (SID). The gantry angle will be off 90 degrees (90 needs to be added to all angles), and the SID will be incorrect.

Other functions are covered in the reference manual.

Dosimetry Check

The Dosimetry Check executable is run for manual non-automated operation. You can generate your own report using the dose comparison tools. Specifics and details are covered in the System 2100 manual and the Dosimetry Check manual. System 2100 provides the underlying image display functions, region of interest outlining, image fusion, and stereotactic functions. Dosimetry Check provides the functions specific for the quality control of treatments with the reconstruction of dose from measured radiation fields and comparison to the planning system dose.

Toolbars and Screens

The program is organized with toolbars, the toolbar being pull down menus, push buttons, and text boxes across the top of the application. Each toolbar has a name that is displayed. A return button on the left will return to the prior toolbar. A map of the tools bars is shown in the Dosimetry Check reference manual.

Below the toolbar is a screen that shows images. The screen is divided into individual frames. Each frame can display a 2D image or a 3D solid model with light model image. If there are more rows than columns of frames, the screen will be scrolled. There is a button in the upper right hand corner of each frame. Hitting that button will display that frame in the entire screen area, or return to showing all the frames. When a single frame of the screen is shown, in the lower right hand corner are arrow buttons that will allow you to step through all the images on the screen one frame at a time. By reformatting a stacked images set in coronal or sagittal frames, one can step through those images. For tools that do not fit on a toolbar, a popup is used

instead. The main application window and all pop ups can be resized. Toolbars and pop ups have help buttons that will display text about the current functions available on the toolbar or pop up.

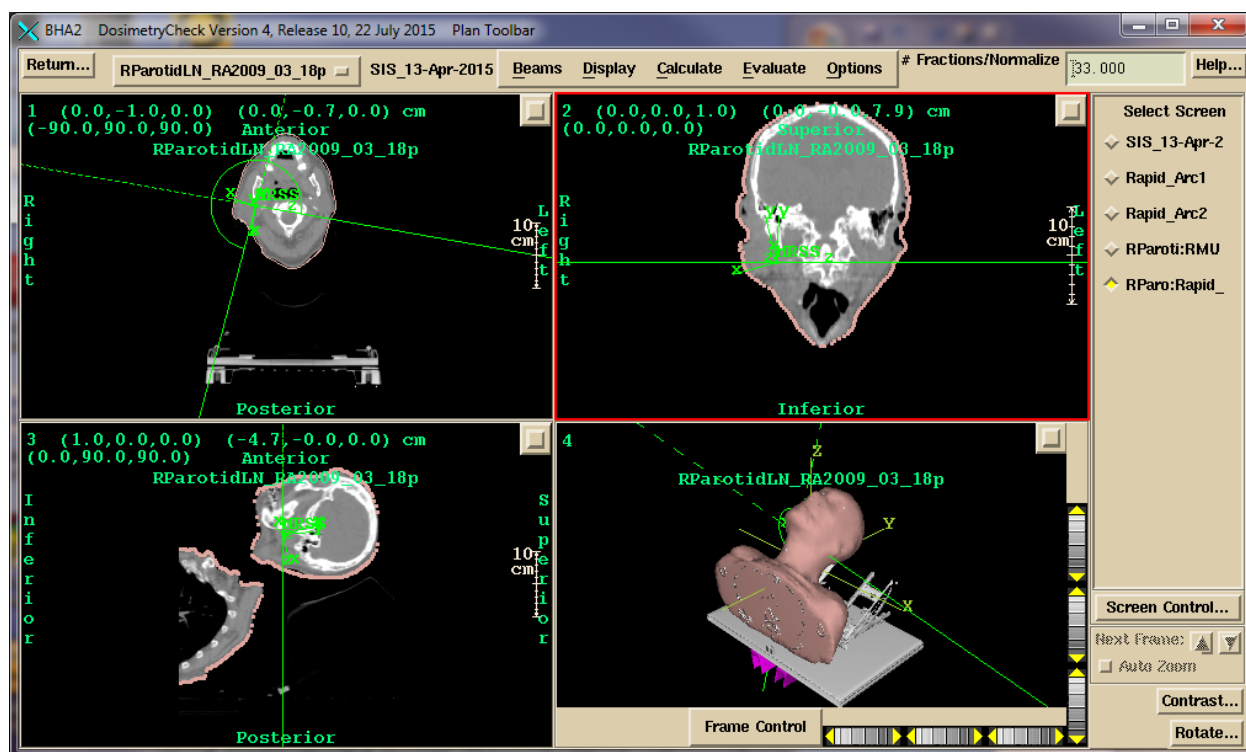
On the right of the main application windows will be a list of all the screens, each of which can be selected to be viewed. Shown below is an example showing the screen that contains a stacked image set of CT scans.



In the above example, screens below the current stacked image set shows the images for arc 1 of a plan, arc 2, an empty screen reserved for IMRT beams of a plan, and a default view of a plan in a transverse, coronal, sagittal, and 3D view.

The “Screen Control” button is for manually creating a screen or changing its arrangement. “Contrast” for adjusting the contrast of 2D images, and “Rotate” for finer controls for 3D images. The current image that these and many controls operate on is the frame outlined in red, the current frame. Clicking the mouse on a frame makes it current. Middle mouse will zoom in (center where you clicked the mouse), right mouse out. For 3D images, wheels will rotate and move the display, or you can drag the mouse.

Below the latter screen is selected to be displayed and the Plan Toolbar has also been selected:



The program has options to create any combination of images within the frame work of screens divided into frames. More than one plan for a patient may be read in and displayed at the same time. One must pick which plan is to be displayed into which image. See the System2100 reference manual for more details on image display.

Printing images

Clicking the mouse in a frame (to key keyboard focus on that window) and then hitting the P key on the keyboard will bring up a pop up with the image and options to add descriptive text and to either print (converting first to a pdf file), or add to a print que to make a multi-page document. See the System2100 manual for details.

Specific Dosimetry Check Functions

Specific functions of Dosimetry Check are covered in detail in the reference manual. The dose and comparison of dose may be done for specific points, dose compared along a profile, dose compared with isodose curves, dose compared with the gamma method, dose volume histograms compared, and gamma volume histograms generated.