Austin Radiological Association

CT Post Processing Protocols

Questions? Email ARA_*3D PostProcessing

Last Update: 9/15/2023 7:21 AM

PROTOCOLS

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Bony Pelvis/Hip

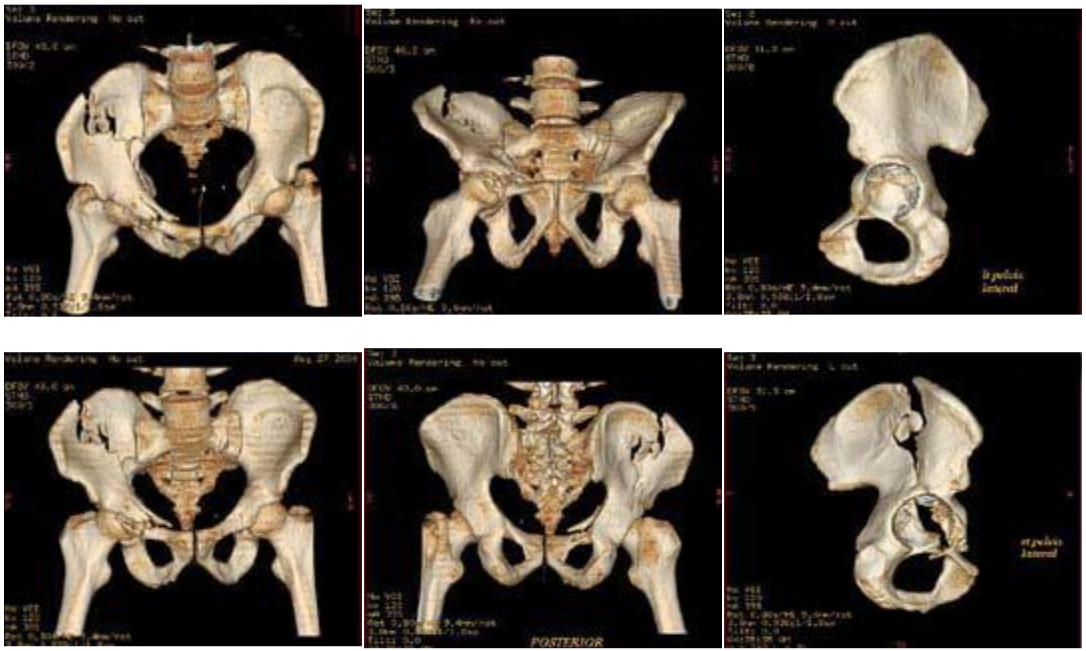
These are used for bony fractures in the pelvis and post operative assessment of any hardware or bony growth. **Use the standard reconstructions (not bone) for 3D. If not available, call the scanner and ask the tech to retro recon the series in standard.**

Volume Rendered Views:

Capture AP, PA, AP 35 ° cephalad and AP 35° caudad views. Do a 360° movie of the entire pelvis. Save all images in color and a very transparent opacity curve. Apply a different color to the metal to differentiate it from the bone. Create views to demonstrate any bony growth in the pelvis. (32 Images total)

Segmented Views:

Disarticulate femurs and remove sacrum. Trim away half of the pelvis, using cut planes, and do an exterior and interior lateral view of the remaining portion of the pelvis. Repeat for other half of pelvis. (4 images total)



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Bony Lower Extremity

Femur, Knee, Lower Leg, Ankle, Foot

Use the standard reconstructions (not bone) for 3D. If not available, call the scanner and ask the tech to retro recon the series in standard.

Volume Rendered Views:

In addition to these standard projections, you may need to create additional views to best demonstrate the pathology. Save all images in color

Femur:

AP, PA, both laterals.

Disarticulate femur and repeat the views.

Knee:

AP, PA, and both laterals

Disarticulate the tib-fib and capture the best views to demonstrate the tibial plateau.

Lower Leg:

AP, PA, both laterals, and obliques to open space between tibia and fibula.

If patient has tibial plateau fracture, disarticulate the tib-fib and capture the best views to demonstrate the tibial plateau

Ankle:

AP, PA, both laterals, and obliques.

Foot:

AP, PA, both laterals.

Disarticulate affected bone if needed and get views to demonstrate pathology.

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ARA DIAGNOSTIC IMAGING

Bony Upper Extremity

Shoulder, Humerus, Elbow, Forearm, Wrist, Hand

Use the standard reconstructions (not bone) for 3D. If not available, call the scanner and ask the tech to retro recon the series in standard.

Volume Rendered Views:

*In addition to these standard projections, you may need to create additional views to best demonstrate the pathology. Save all images in color

Shoulder:

AP, PA, Superior-inferior, lateral of affected side

Disarticulate shoulder bones from chest and repeat the views.

Then disarticulate the humerus and get a lateral-medial view of the glenoid fossa.

*If an individual bone is of interest, segment it out and get AP, PA, superior, inferior and both lateral views of the bone.

Humerus:

AP, PA, and lateral-medial views of humerus

Disarticulate the humerus get a medial-lateral view of the glenoid fossa.

Create a 360 degree batch rotation of the disarticulated humerus.

Forearm and Elbow:

AP, PA, both laterals, and obliques to open space between radius and ulna

Wrist and Hand:

AP, PA, both laterals.

Disarticulate navicular if needed and get views to demonstrate pathology.

Disarticulate radius and ulna and get views of distal ends of these bones if a fracture is suspected.

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Craniofacial

Series sent to PACS:

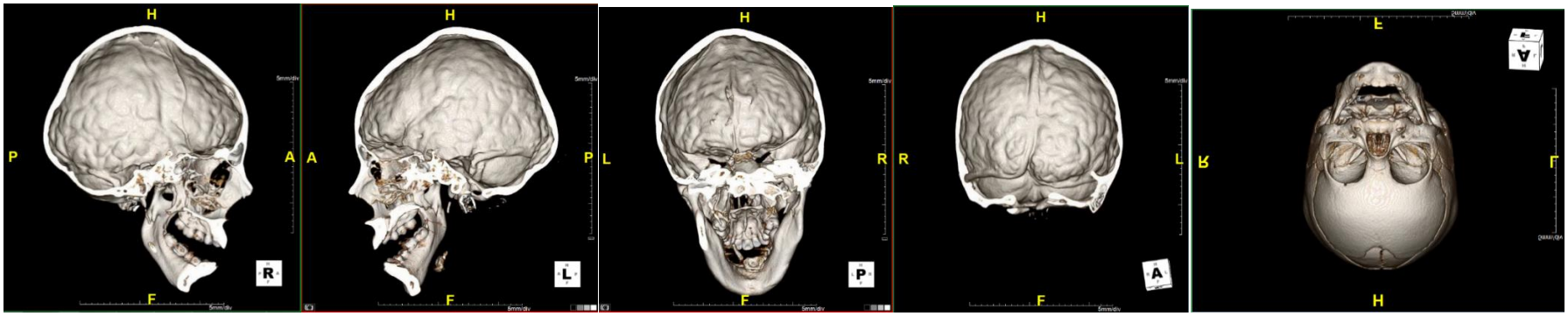
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

VRT Tumble: 24 Images 360° Starting in AP and rotating downward

Captures of the skull showing suture lines (4 Images)

Instructions for Cutting:

- Load reformat set from the patient list
- Using the free ROI tool remove cervical spine and any unneccesary anatomy (pacifier/bottle, fingers etc.)
- Right click and select Batch Wizard to create rotation and tumble
- Create Captures by using the FOV on the 4 on 1 screen. Capture the Left and Right lateral skull and the Posterior and Anterior skull



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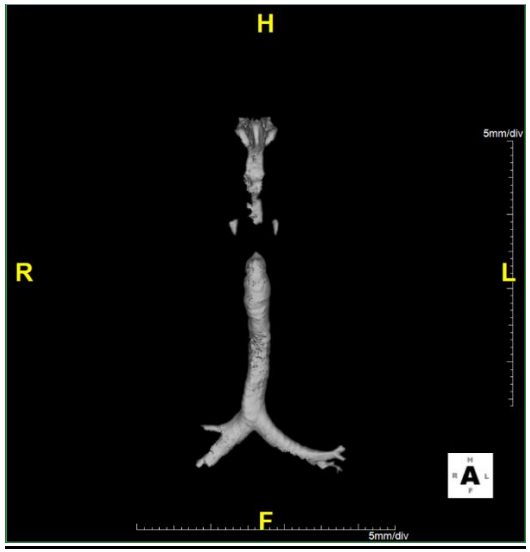
Airway

Series sent to PACS:

VRT Rotation Inspiration: 24 Images 360° starting in AP and rotating from Left to Right

VRT Rotation Expiration: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load inspiration reformat set from the patient list
- Select the low att workflow from the dropdown menu on the workflow tab
- Change the Image to an MPR
- Using the region grow tool on the 4 on 1 screen, grow the trachea and upper airway
- Click the select button on the right side of the screen
- Select the trachea window on the right side of the screen
- Change the background color to black
- Right click and select Batch Wizard to create rotation
- Load the Expiration reformat set and follow the same steps outlined above
- 

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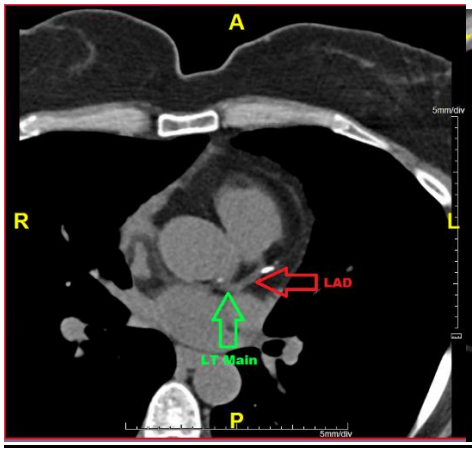
Calcium Sore

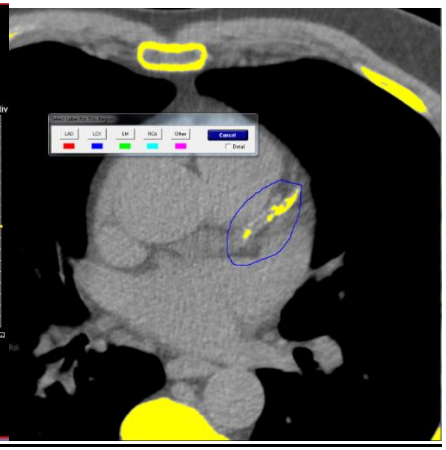
Instructions for Cutting:

- Load calcium score series from the patient list
- Select no when asked to run automatic bone removal
- Select the calcium score tool on the right side of the screen
- Hit ok on the series that needs to be scored
- Scroll through images and score calcium within the coronary arteries. This is done either by left clicking on a lesion or by holidng the shift + left mouse button and circling the lesion
- Once a lesion is selected, the option to identify which coronary artery it is in will pop up and an artery will need to be selected.
- Once scoring is complete, click validate
- Click on the report button on the right side of the screen and select calcium report. If this button says output instead of report, click the dropdown menu just to the right and select report
- When the document loads, select the location that the study was performed
- Check the document for any innacuracies in the patient's information, add your initials and then close the document by clicking the "x" in the top right side of the page
- Select "save word document and images as DICOM series"
- Go back to the patient list and click the update study list button
- Send the calcium report to PACS **it is the series that has 3 images**
- Open the study in PACS and add a note with the text "post processing completed". The study can not be seen by a radiologist until this note has been entered.
-

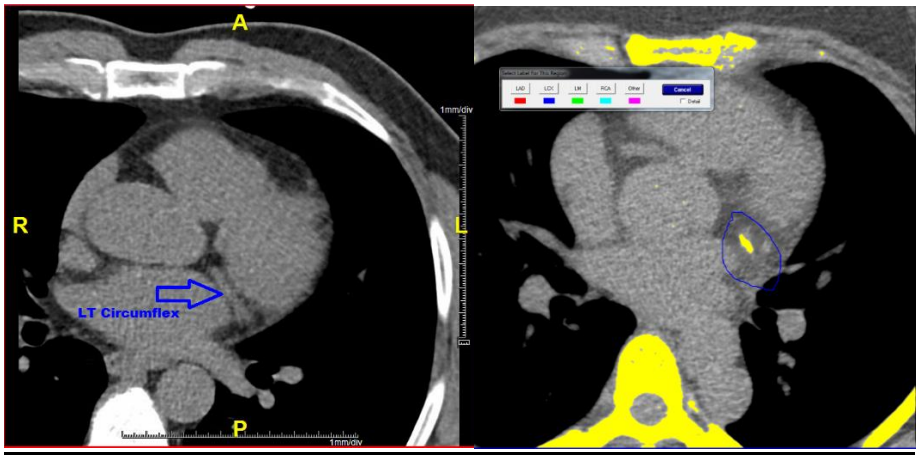
Left Main and LAD



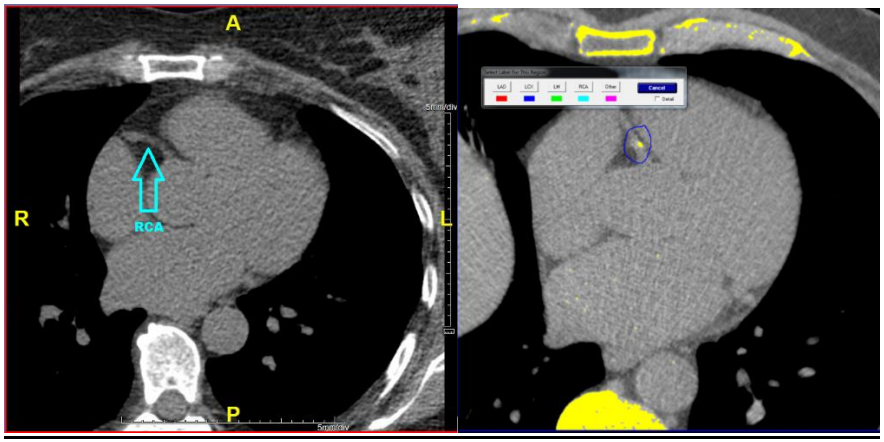
LAD with Calcium



Left Circumflex **Left Circumflex with Calcium**



RCA RCA with Calcium



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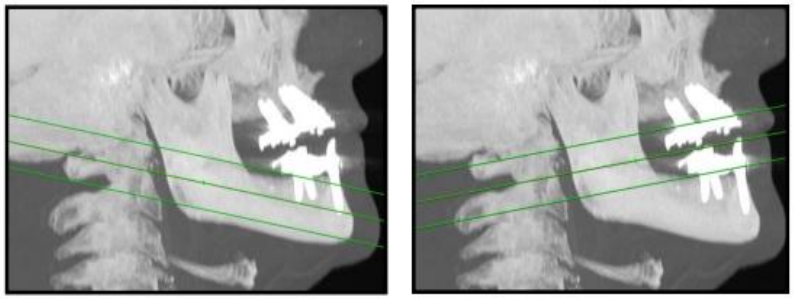
ARA DIAGNOSTIC IMAGING

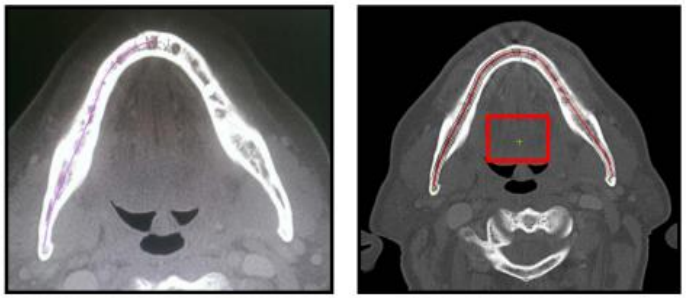
Dental via Syngo.Via

syngo.CT Dental allows for the creation of panoramic range series and paraxial range series of the jaw – the mandible and maxilla – as an aid in the planning of dental implant surgery, mandibular cosmetic surgery, or facial trauma reconstruction.

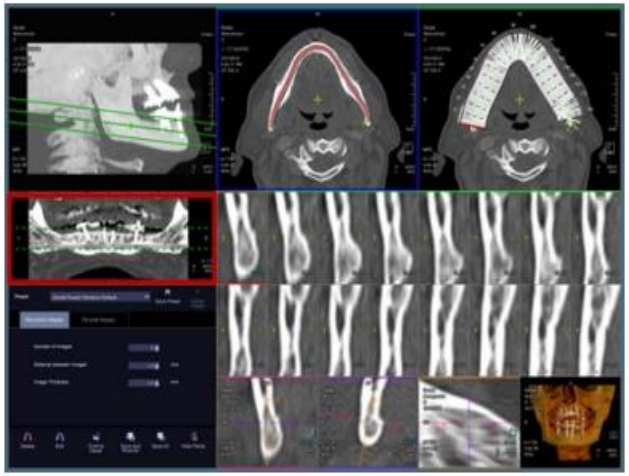
1. From the **Patient Worklist**, load an appropriate data set into the CT Dental Workflow:
   - If the examination has been correctly mapped, double click to load
   - If manual mapping is required, right-click the examination and select Open With > CT Dental
2. Adjust the dental range and the orientation of the reference plane. Angle the green reference lines parallel to the mandible or the maxilla, and extend the range (outermost lines) to include anatomy of interest.



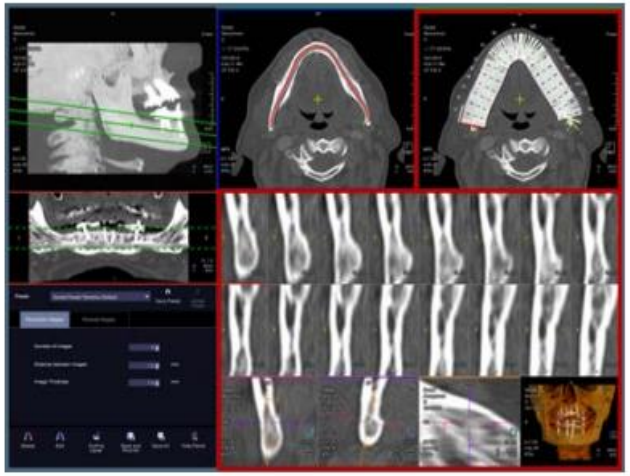
3. In the panoramic reference segment, define the center line, which will be used as a base to define ranges of panoramic and paraxial result images. Click to set the start point. You can scroll using the mouse wheel and click consecutive points in multiple images to define the centerline. Double-click to finish. Note also the lingual marker, which is represented by a yellow + and indicates the lingual (tongue) side of the centerline. Drag it to reposition if necessary.



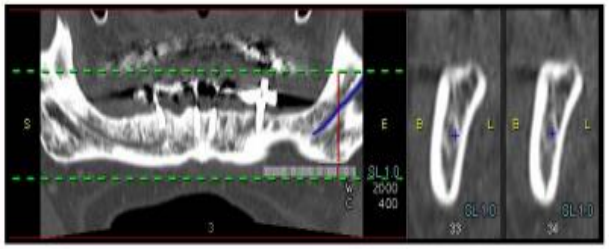
4. After defining the center line, **panoramic result images** are calculated according to the current parameters in the range parameter panel. White **panoramic** lines on the panoramic reference image define the results images, which are displayed in the results segment. Number of images, distance between images, and image thickness can be customized in the parameter panel.

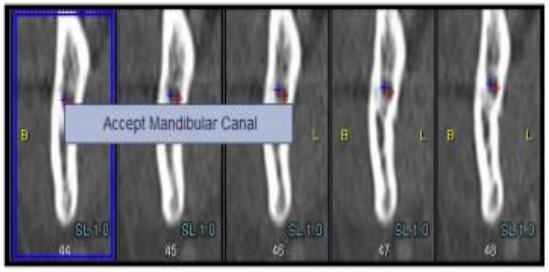


5. After defining the center line, **paraxial result images** are calculated according to the current parameters in the range parameter panel. White **paraxial** lines on the panoramic reference image define the results images, which are displayed in the results segment and by default are distributed equidistantly. The start and end points of the paraxial range and other parameters can be customized in the paraxial images tab.

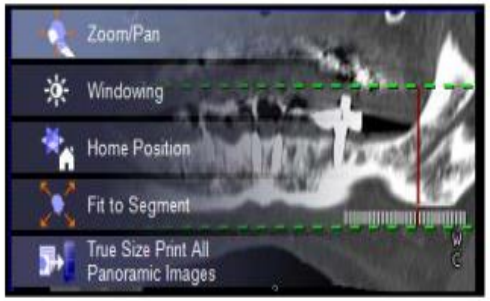


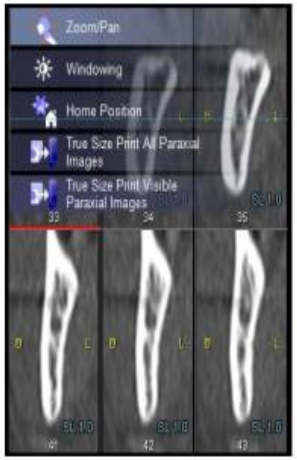
6. For presurgical dental implant planning, you can mark the mandibular canal using both the panoramic and paraxial result images. Note that only markers that have been defined and accepted on the paraxial result images (right-click on red marker) will be saved.





7. Panoramic and paraxial ranges and result images can be saved separately or together and can be printed in true size to a connected printer.





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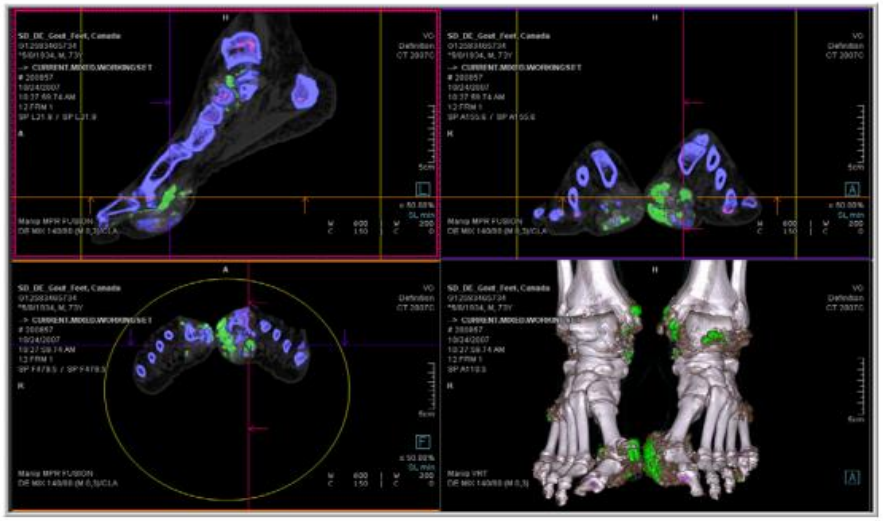
DIAGNOSTIC IMAGING

Dual Energy Gout via Syngo.Via

The ***syngo.via* Dual Energy Gout** application class is especially designed to help visualize the status of gout and help distinguish between urate, bone, bone marrow, and contrast agents.

1. From the **Patient Worklist**, load an appropriate data set into the **Dual Energy Workflow:**
    - If the examination has been correctly mapped, double click to load
    - If manual mapping is required, right-click the examination and select (Re-) Assign Workflow Template > CT Dual Energy
2. From the Workflow Steps, click on the Gout Application Class.

3. *syngo.via* will apply a colored overlay map to the MPR images in Segments 1, 2, and 3, and will also generate a colored VRT in Segment 4 (depending on selected layout). By default, potential urate is displayed in green.



4. This resulting Gout data set may be saved as a new axial, coronal or sagittal series using the Parallel Ranges tool in an upper left MPR segment, or as a radial range in the upper left VRT segment.

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ARA DIAGNOSTIC IMAGING

Dual Energy Monoenergetic via Syngo.Via

The ***syngo.via*** **Dual Energy Monoenergetic** application class simulates images scanned with a single photon energy beam, depending on the energy (keV) value. By changing the energy value (keV), the contrast between different materials can be enhanced. This may sometimes be helpful in improving the image quality of anatomy in the presence of metal.

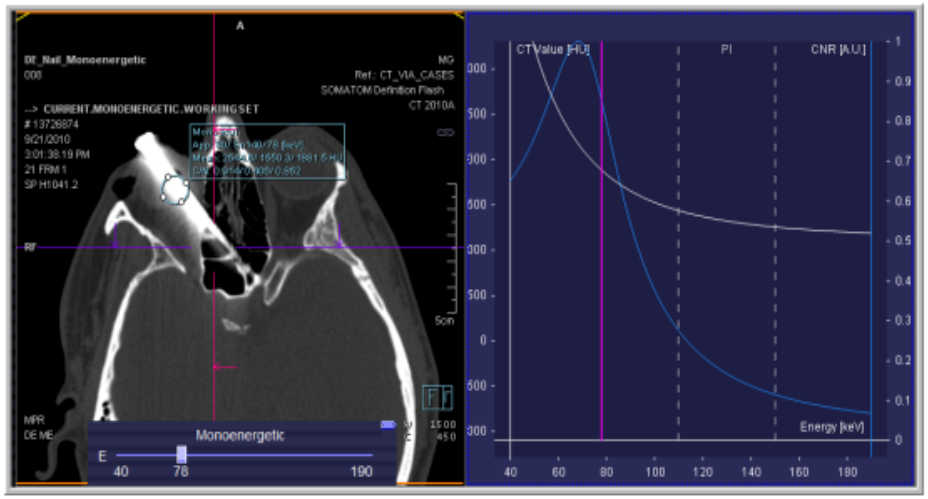
1. From the **Patient Worklist**, load an appropriate data set into the **Dual Energy Workflow:**

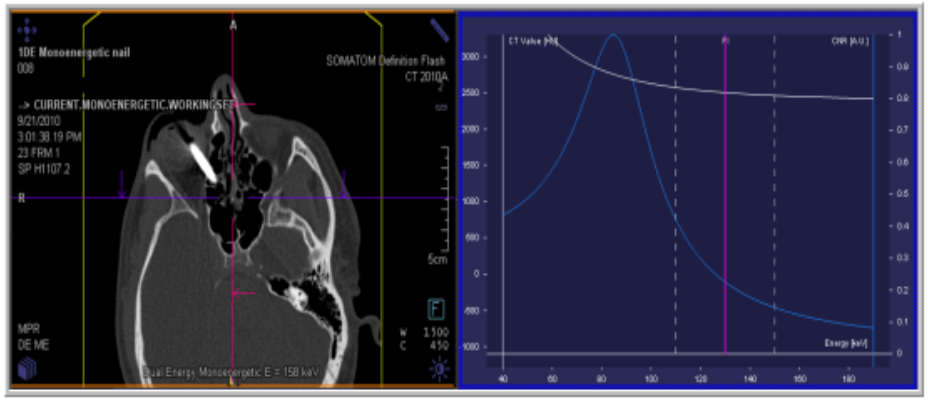
   - If the examination has been correctly mapped, double click to load
   - If manual mapping is required, right-click the examination and select (Re-) Assign Workflow Template > CT Dual Energy

2. On the Dual Energy Workflow Step, click the drop-down arrow adjacent to the Optimum Contrast icon to expose both the Optimum Contrast and Monoenergetic icons. Click on the Monoenergetic icon.

3. From the upper right segment tools in any segment, click the drop-down arrow adjacent to the Dual Energy ROI Circle and select the ROI Monoenergetic option.

4. Using the left mouse button, draw an ROI on the metal in that segment. *syngo.via* will graphically display the CT value (HU) and the contrast to noise ratio (CNR) curves for the tissue of interest. The white dotted vertical lines indicate the energy range of optimal metal artifact reduction (110 – 150 keV). Move the magenta line into this area using the mouse or the Monoenergetic slide bar at the bottom of the DE image until the desired image quality is obtained.





5. This resulting Monoenergetic dataset may be saved as a new axial, coronal, or sagittal series using the Parallel Ranges tool in the upper left segment.

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Enterography

Series sent to PACS:

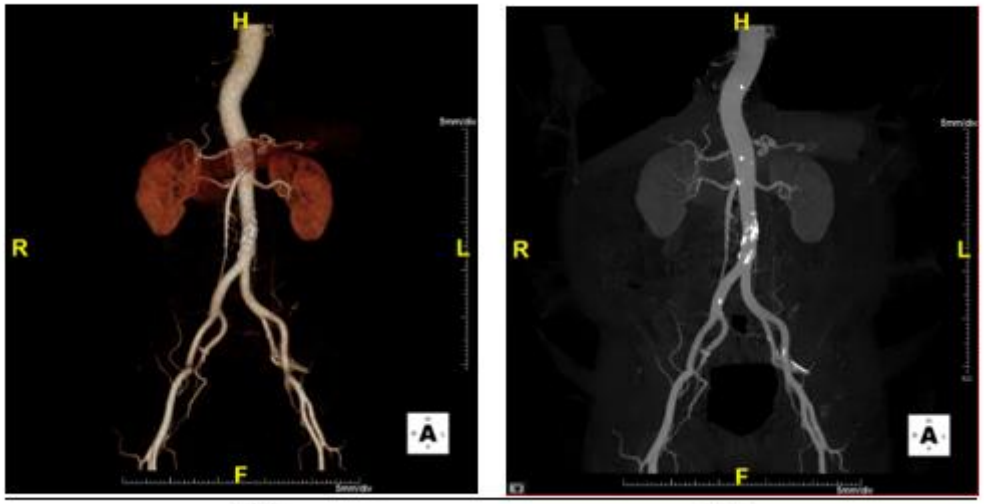
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT MIP

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CTA Abd/Pel with Lower Extremity Runoff

Series sent to PACS:

VRT Rotation ABD/PEL: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation ABD/PEL: 24 Images 360° starting in AP and rotating from Left to Right

VRT Rotation Upper Legs: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation Upper Legs: 24 Images 360° starting in AP and rotating from Left to Right

VRT Rotation Lower Legs: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation Lower Legs: 24 Images 360° starting in AP and rotating from Left to Right

Left Anterior Tibial Artery Slab MIP: 12 Images 1x1 MIP Sagittal View

Left Posterior Tibial Artery Slab MIP: 12 Images 1x1 MIP Sagittal View

Right Anterior Tibial Artery Slab MIP: 12 Images 1x1 MIP Sagittal View

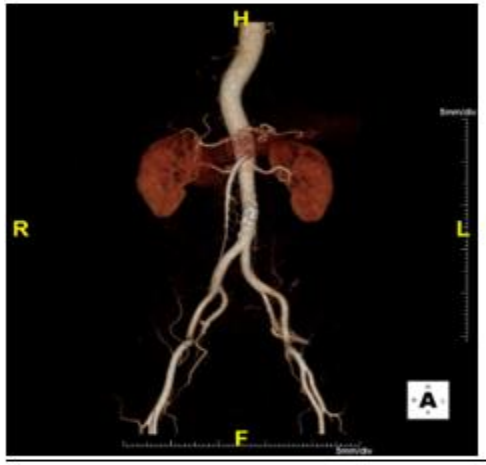
Right Posterior Tibial Artery Slab MIP: 12 Images 1x1 MIP Sagittal View

Instructions for Cutting:

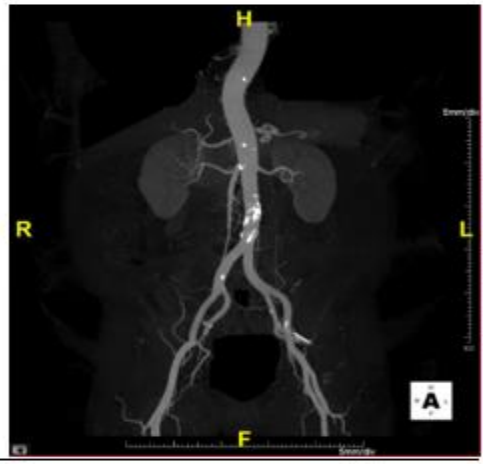
- Load reformat set of the ABD/PEL from the patient list. If there is only one reformat set you may use the “Show Series Information” tool on the patient list. This will allow you to load images of each section separately using the “start” and “end” buttons within that tool
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation
- Return to Patient List

- Load reformat set of the upper legs (Just below bifurcation thru knees) using the CTA ABD/PEL workflow on the patient list. If there is only one reformat set you may use the “Show Series Information” tool on the patient list. This will allow you to load images of each section separately using the “start” and “end” buttons within that tool
- Click the bone removal tool
- Click the fragment clean up tool
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation
- Return to Patient List
- Load reformat set of the lower legs (knees thru toes) using the CTA ABD/PEL workflow on the patient list. If there is only one reformat set you may use the “Show Series Information” tool on the patient list. This will allow you to load images of each section separately using the “start” and “end” buttons within that tool
- Right click to Change Image to MPR
- Turn on CPR tool
- Shift click on each blood vessel separately: LT Anterior Tibial, LT Posterior Tibial, Right Anterior Tibial and RT Posterior Tibial
- Using the CPR tools, trace each vessel to below the ankle joint if possible
- Save a scene of all CPR lines
- Select the “extract” button on the right side of the screen while using the CPR tool
- Click on each vessel separately; Right click and select Batch Wizard to create MIPs of each Vessel
- Right click to Change your image to VRT
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



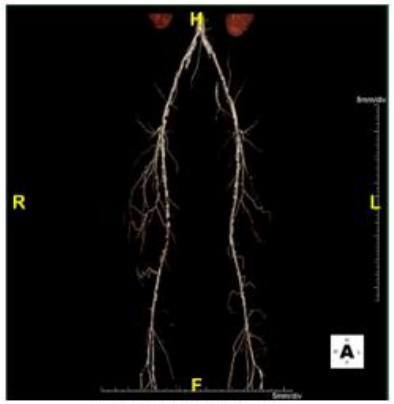
VRT ABD/PEL



MIP ABD/PEL

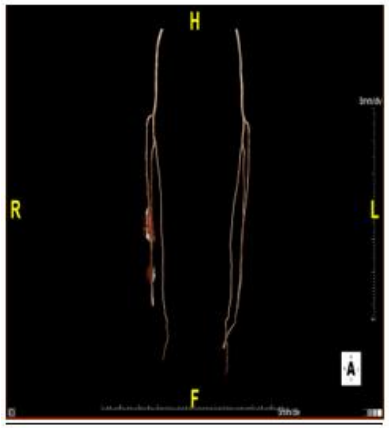
Anterior Tibial Artery Slab MIP

Posterior Tibial Artery Slab MIP

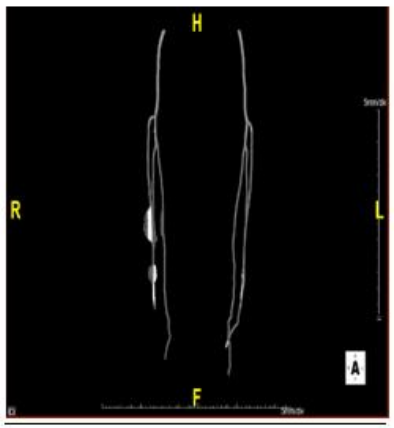


VRT PEL and Upper Legs

MIP PEL and Upper Legs



VRT Lower Legs



MIP Lower Legs

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CTA Abdomen Pelvis

Series sent to PACS:

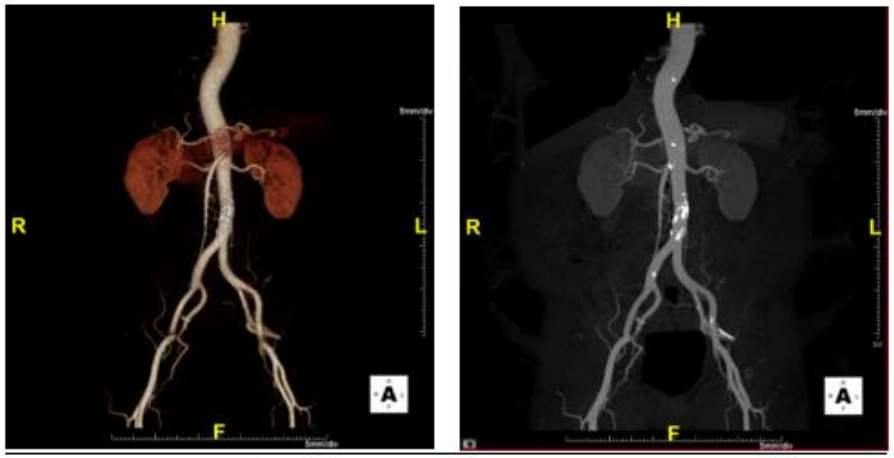
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT MIP

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CTA Abdomen Pelvis Perforator

Series sent to PACS:

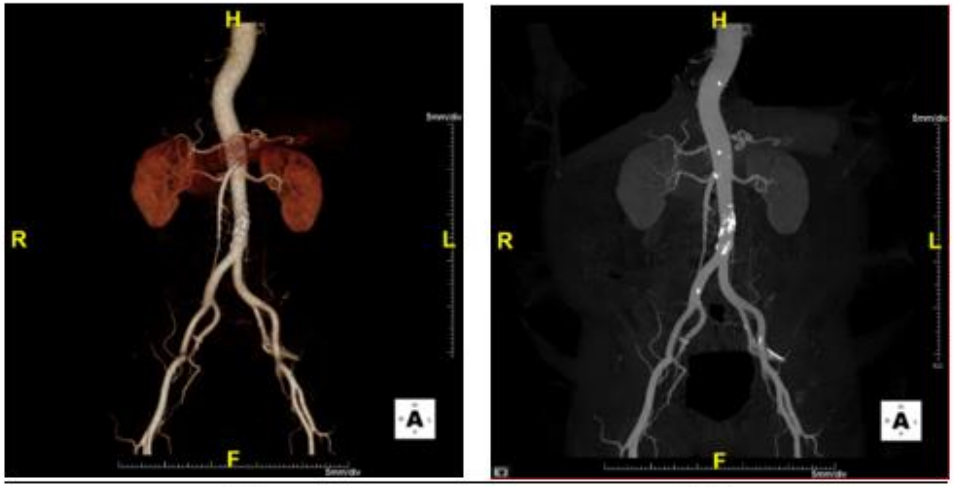
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT MIP

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CTA Abdomen

Series sent to PACS:

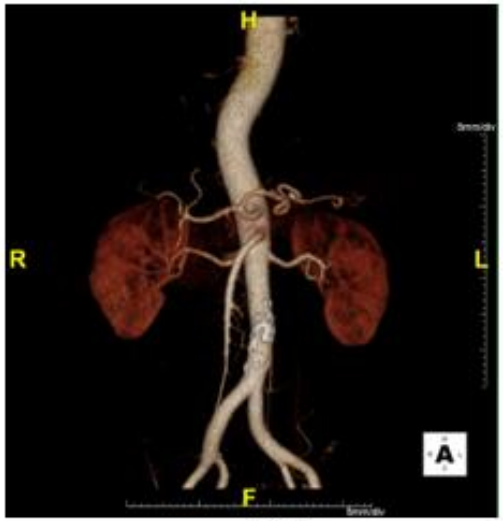
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

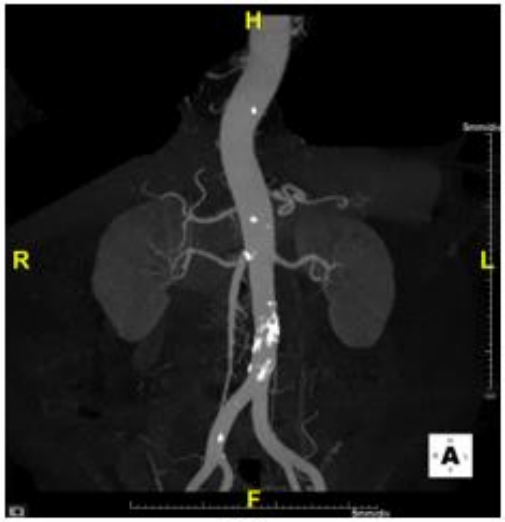
Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT



MIP

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CTA Brain

Series sent to PACS:

Captured images of the following:

- Anterior Communicating Artery
- LT Middle Cerebral Artery
- RT Middle Cerebral Artery
- Posterior Circulation
- Sagittal VRT
- Axial Oblique MIP

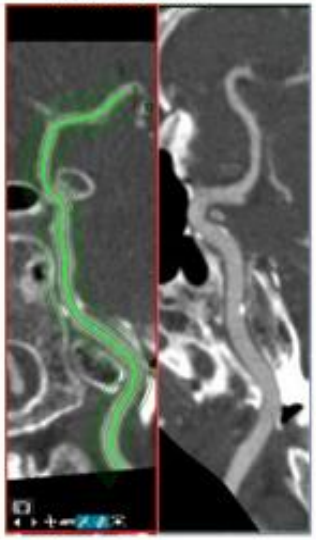
LT Internal Carotid Artery Slab MIP: 12 Images 1x1, AP View

RT Internal Carotid Artery Slab MIP: 12 Images 1x1, AP View

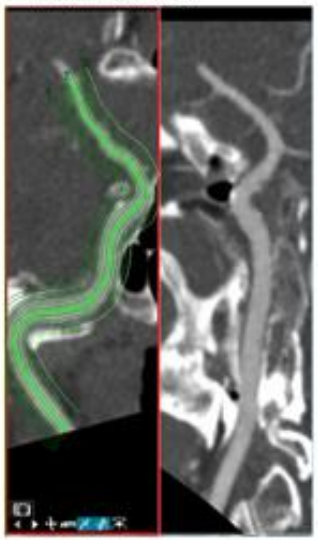
Instructions for Cutting:

- Load reformat set using the COW workflow on the patient list
- Select the dropdown menu on the workflow tab and select the COW workflow
- Use that workflow to capture the appropriate images
- Change exam FOV to include entire head
- Right click and change image to MPR
- Turn on CPR tool
- Shift click both the LT and RT internal carotid arteries. If they are already done by the computer, verify that the vessel anatomy has been accurately mapped by the CPR tool
- Screen save CPR lines
- Select each vessel, Right click and select Batch Wizard to create Slab MIPs
- Dose report and/or Patient Protocol Page

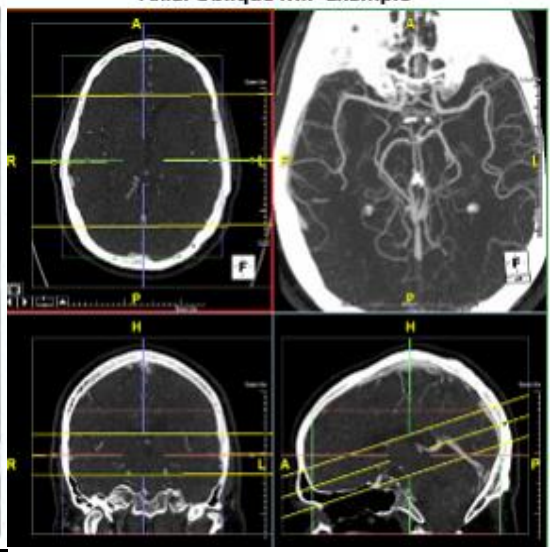
LT Internal Carotid Slab



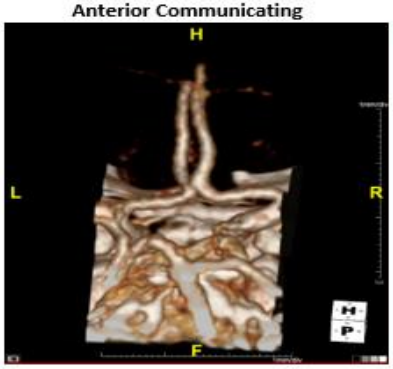
RT Internal Carotid Slab



Axial Oblique MIP Example

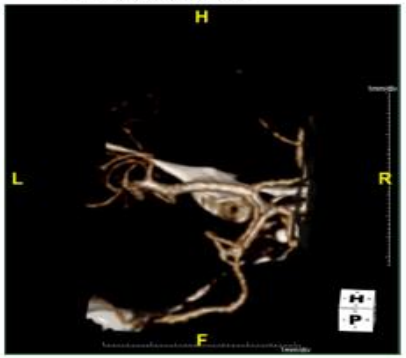


Anterior Communicating

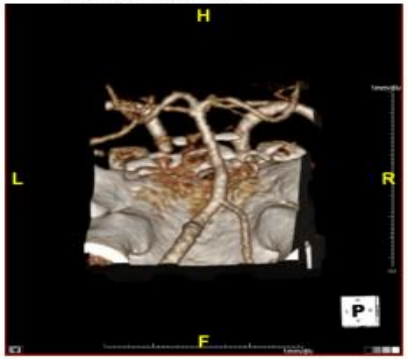


RT Middle Cerebral

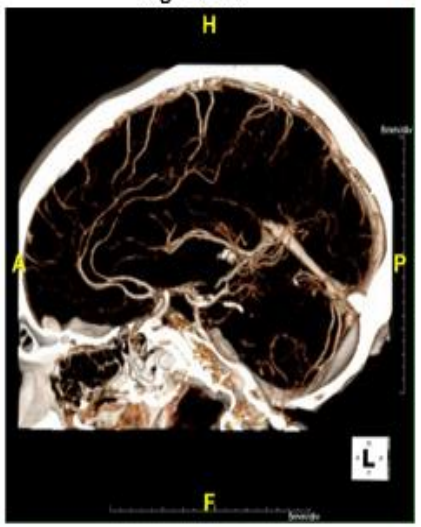
LT Middle Cerebral



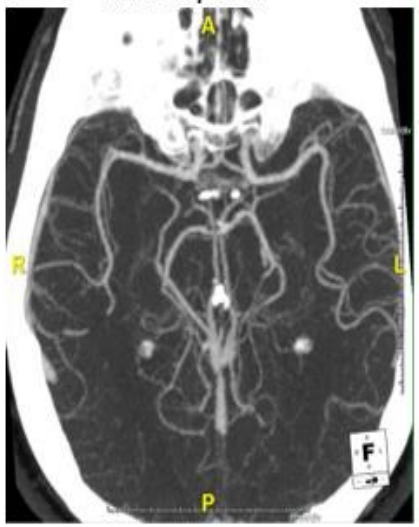
Posterior Circulation



Sagittal VRT



Axial Oblique MIP



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CTA Carotid

Series sent to PACS:

LT Carotid Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

RT Carotid Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

LT Vertebral Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

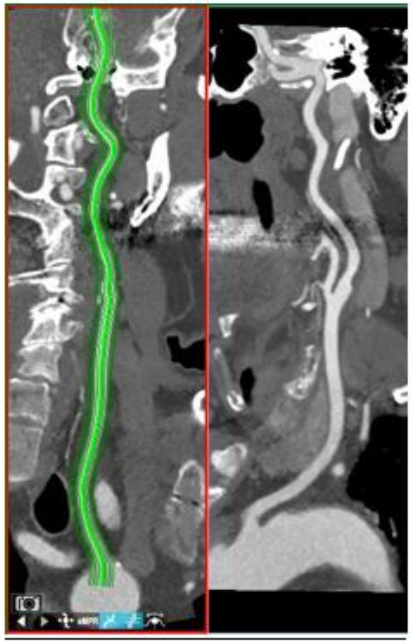
RT Vertebral Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

VRT Rotation of Carotids with overlay: 24 Images 360˚ starting in AP and rotating from Left to Right

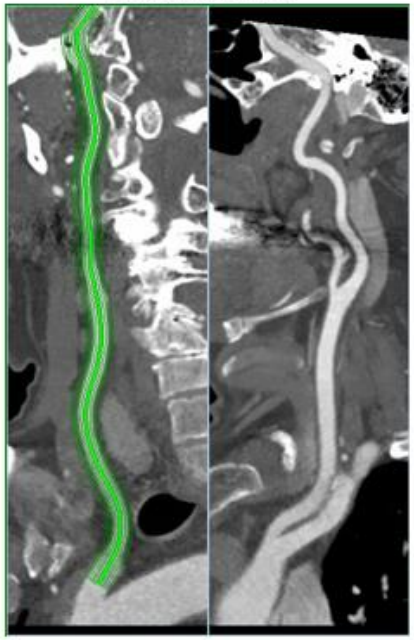
Instructions for Cutting:

- Load reformat set from the patient list
- Select no to bone removal
- Right click and change image to MPR
- Turn on CPR tool
- Shift click RT and LT carotids and RT and LT Vertebrals. If the computer has done this for you, take care to verify that the vessel anatomy has been accurately mapped by the CPR tool
- Each vessel should include the origin of the vessel thru the base of the skull
- Screen save CPR lines
- Select each vessel, Right click and select Batch Wizard to create Slab MIPs
- Select the Exclude button on the right of the screen while using the CPR tool
- Right click the image and change it to VRT
- Using the Free ROI tool and the region grow tool, bring back any missing anatomy: exam should include aorta, bilateral carotids, vertebrals and subclavians and include the carotid bifurcation
- Select the “show/hide mask” button on the right lower side of the screen
- Right click and select Batch Wizard to create rotation with overlay

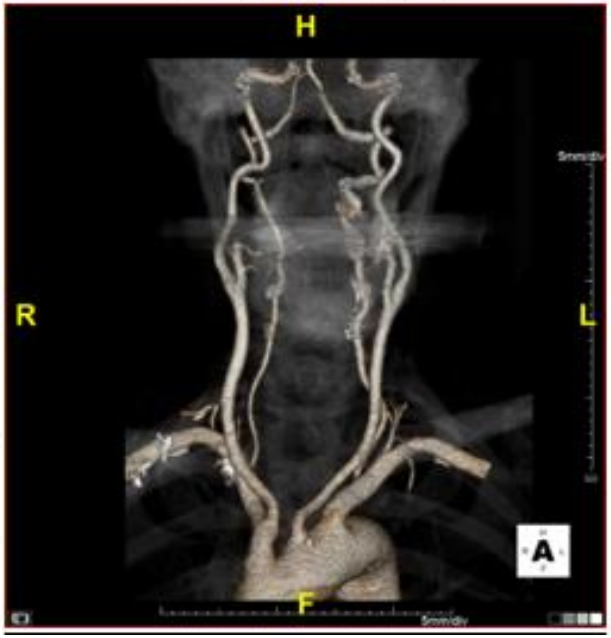
LT Carotid Slab MIP



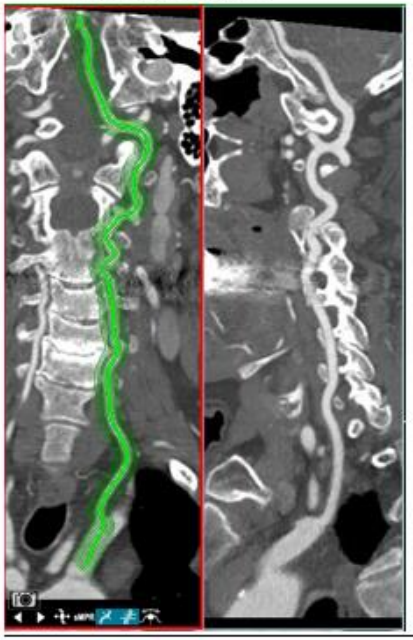
RT Carotid Slab MIP



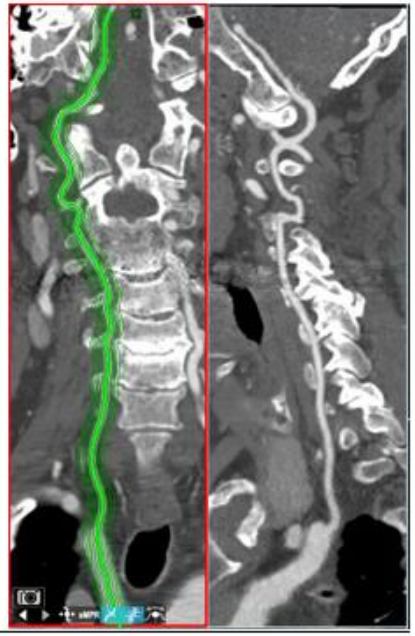
VRT Carotid with Overlay



LT Vertebral Slab MIP



RT Vertebral Slab MIP



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CTA Carotid and Brain

Series sent to PACS:

Captured images of the following:

- Anterior Communicating Artery
- LT Middle Cerebral Artery
- RT Middle Cerebral Artery
- Posterior Circulation
- Sagittal VRT
- Axial Oblique MIP

LT Internal Carotid Artery Slab MIP: 12 Images 1x1, AP View

RT Internal Carotid Artery Slab MIP: 12 Images 1x1, AP View

LT Carotid Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

RT Carotid Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

LT Vertebral Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

RT Vertebral Artery Slab MIP: 12 Images 1x1, Lateral View. Include origin through skull base

VRT Rotation of Carotids with overlay: 24 Images 360˚ starting in AP and rotating from Left to Right

Instructions for Cutting:

- See protocols for CTA Brain and CTA Carotid

Sample Images:

- See protocols for CTA Brain and CTA Carotid

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CTA Chest Abdomen Pelvis

Series sent to PACS:

VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:

VRT MIP

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CTA Chest

Series sent to PACS:

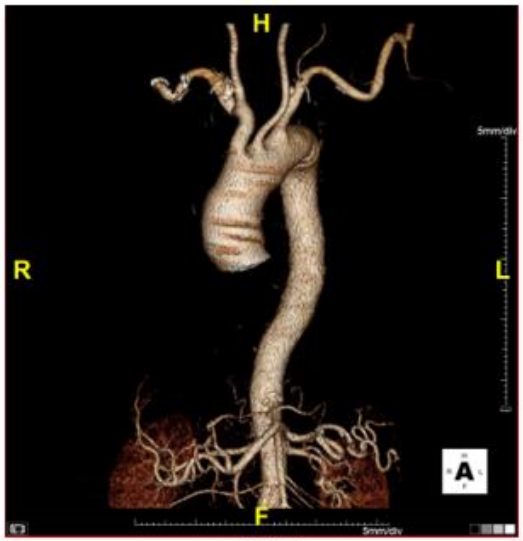
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

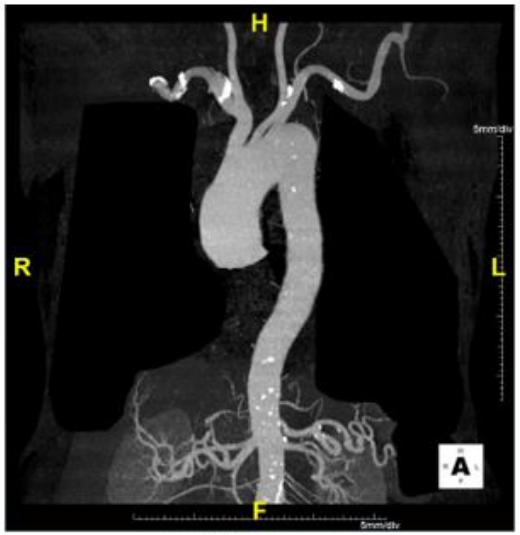
Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT



MIP

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CTA Prostate Artery

Series sent to PACS:

VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

10 x 2 RAO MIP (40 degrees RAO, 10 degrees caudal)

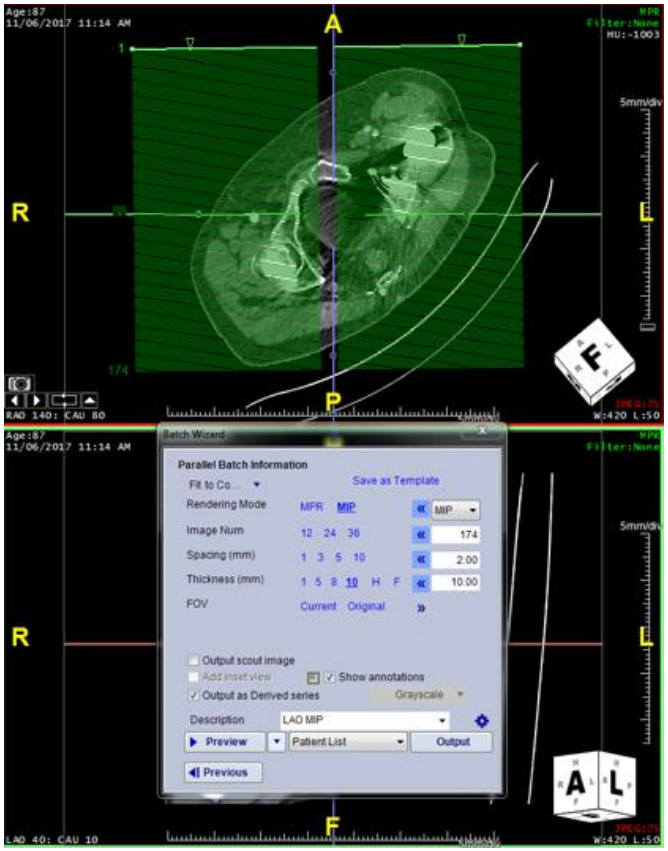
10 x 2 LAO MIP (40 degrees LAO, 10 degrees caudal)

Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Instructions for Creating 10 x 2 Oblique MIPS:

- Load reformat set from patient list
- Change the top right Image to MIP
- Using the 4 on 1 image display, right click on the bottom left image and select “link to 3D” from the dropdown menu
- At the bottom left corner of the top right screen you will see in green the letters LAO and CRA, left click on that, type in the correct increments (40 LAO, 10 CAU) then hit “ok”
- Right click on the top left image and select “Batch Wizard”
- Select Parallel, then left click and drag the mouse across the top left image from top to bottom
- Change the Rendering Mode to MIP, change the spacing to 2mm and the thickness to 10mm.
- After batching the LAO images, click on the green “LAO” at the bottom left corner of the top right image, select RAO from the box that pops up and hit ok
- Follow the same steps above to batch another set of MIP images in the RAO orientation



Sample Images:

VRT MIP

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CTA Pelvis

Series sent to PACS:

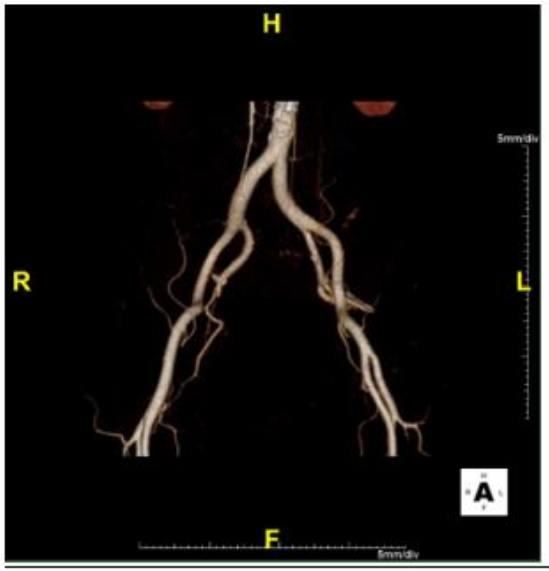
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

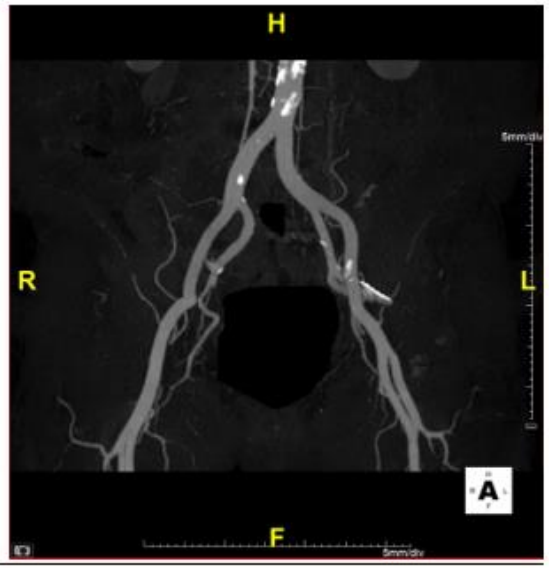
Instructions for Cutting:

- Load reformat set from the patient list
- Click the bone removal tool
- Click the fragment clean up tool
- Window level until kidneys are slightly translucent
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones
- Confirm that no vessel anatomy has been cut off, if so, use the the free ROI tool on the axial images with overlay or the region grow tool to bring back any vessel anatomy needed
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT



MIP

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CTA Upper Extremity

Series sent to PACS:

Upper Extremity Slab MIP: 12 Images 1x1, AP View. Include Aorta through wrist

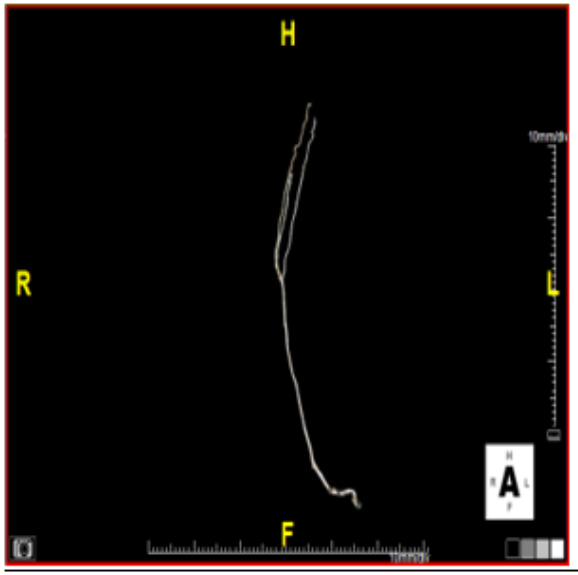
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

MIP Rotation: 24 Images 360° starting in AP and rotating from Left to Right

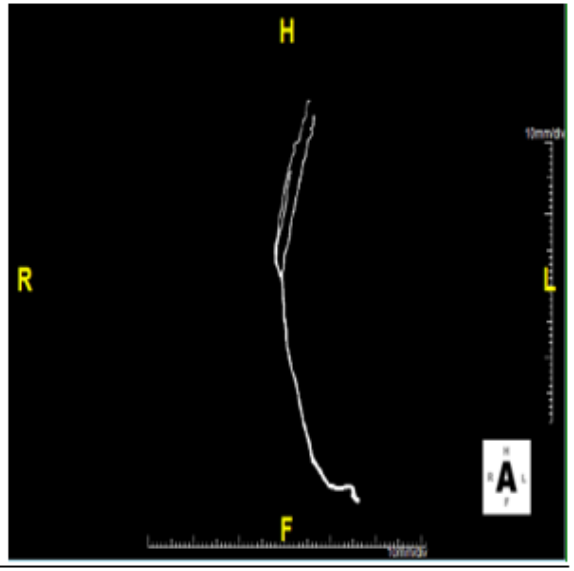
Instructions for Cutting:

- Load reformat set from the patient list
- Change image to MPR
- Turn on CPR tool
- Shift click on Brachial artery
- Usint the CPR tools, trace the entire Brachial artery from Aorta through bifurcation into Radial and Ulnar Arteries
- Include Radial and Ulnar arteries through the wrist if possible
- Save a scene of all CPR lines
- Select the “extract” button on the right side of the screen while using the CPR tool
- Click on the Brachial Artery, right click and select Batch Wizard to create a MIP of the Brachial Artery/Radial or Ulnar Artery through the wrist
- Right click to Change your image to VRT
- Using the Free ROI tool or the Region Grow tool cut out any remaining bones and window level image to show vessel anatomy
- Right click and select Batch Wizard to create rotation
- Right click and select MIP, change MIP to full and window/level image do display vessel anatomy and calcium within vessels
- Right click and select Batch Wizard to create rotation

Sample Images:



VRT



MIP

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GECK Spine

Series sent to PACS:

Curved Coronal (2x2 Curved range through entire spine)

Curved Sagittal (2x2 Curved Range through entire spine)

VRT Rotation Spine: 24 Images 360° starting in AP and rotating from Left to Right

VRT Rotation Hardware: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list using the “Geck Spine” workflow
- Hold “Shift” and click down the entire spinal canal to create CPR, hit the “finish” button on the left side of the screen
- Adjust your green line on both the coronal and sagittal planes so that it runs directly down the center of the spinal canal
- Select the “Curved Coronal” tab in the workflow window and click on your CPR line to start the batch function
- Batch Curved Coronal images through the entire spine
- Select the “Curved Sagittal” tab in the workflow window and click on your CPR line to start the batch function
- Batch Curved Sagittal images through the entire spine
- Select the “VRT Rotation” tab in the workflow window
- Make appropriate adjustments to window/level and zoom of VRT, then batch VRT Spine
- Select the “Metal Rotation” tab in the workflow window
- Make appropriate adjustments to the window/level and Zoom of harware VRT, then batch the Hardware Rotation

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Spine with Hardware

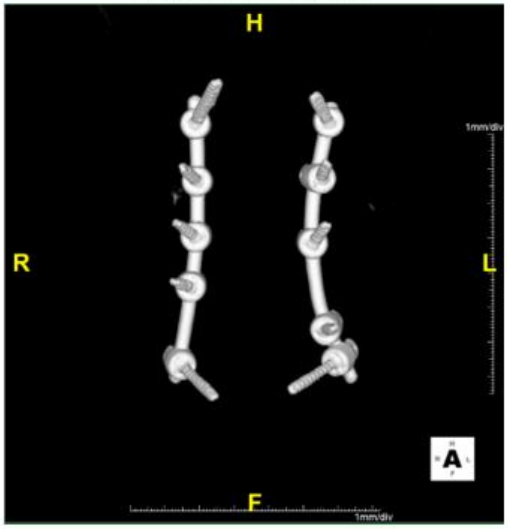
Series sent to PACS:

VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

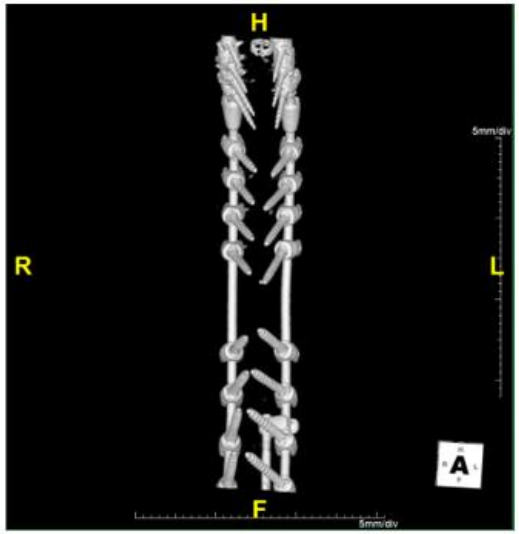
Instructions for Cutting:

- Load reformat set from the patient list
- Click the Template tab, scroll down to the Hardware template and select that
- Window level until hardware only is visable
- Right click and select Batch Wizard to create rotation
-

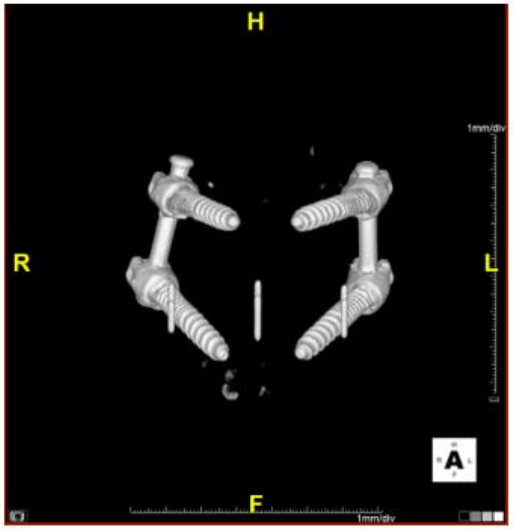
Cervical Hardware VRT



Thoracic Hardware VRT



Lumbar Hardware VRT



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Stryker Spine

Series sent to PACS:

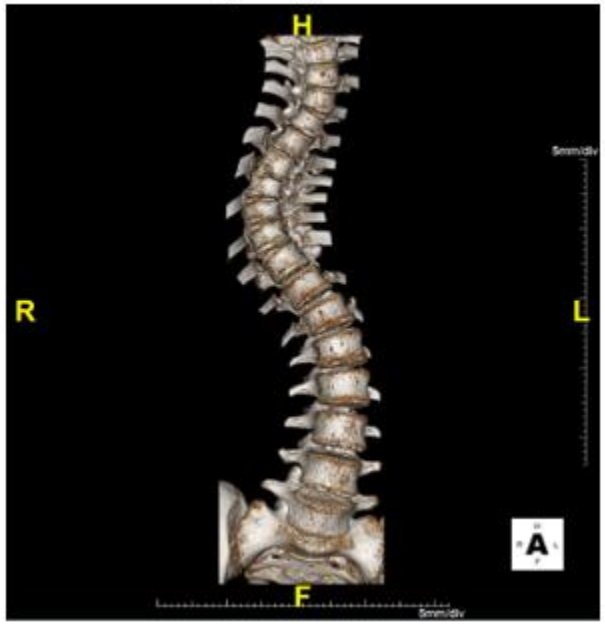
VRT Rotation: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Using the free ROI tool remove most of the ribs and clavicle anatomy
- Right click and select Batch Wizard to create rotation

Sample Images:

Stryker Spine VRT



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Shoulder

Series sent to PACS:

VRT Rotation Shoulder: 24 Images 360° starting in AP and rotating from Left to Right

VRT Rotation Glenoid/Scapula: 24 Images 360° starting in AP and rotating from Left to Right

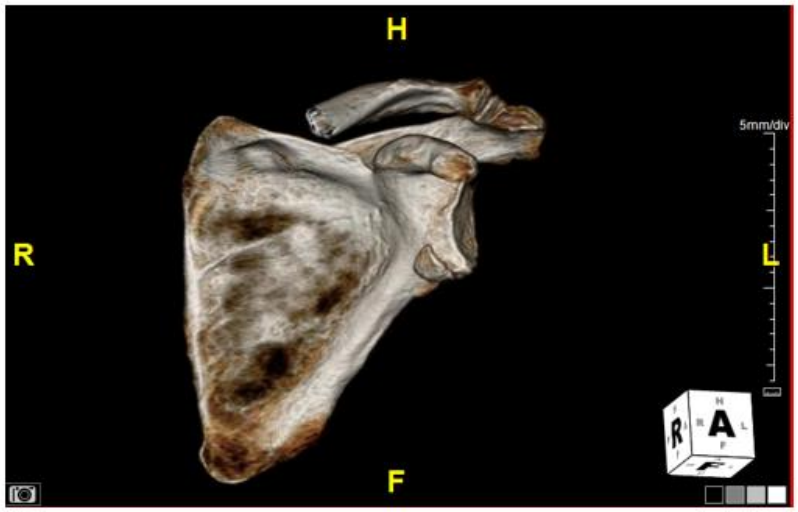
VRT Tumble Glenoid/Scapula: 24 Images 360° starting in AP and rotating from Downward

VRT Rotation Humerus: 24 Images 360° starting in AP and rotating from Left to Right

Instructions for Cutting:

- Load reformat set from the patient list
- Cut out Ribs and CT Table leaving shoulder
- Right click and select Batch Wizard to create rotation
- Cut out Humerus to show only Scapula
- Right click and select Batch Wizard to create rotation
- Using the Free ROI tool select “reverse” to display the Humerus, remove ribs and CT table once again
- Right click and select Batch Wizard to create rotation

Glenoid/Scapula VRT



Sample Images:

Shoulder VRT

Humerus VRT

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Renal Volume

Series sent to PACS:

LT Renal Volume

LT Renal Volume Captures with Overlay

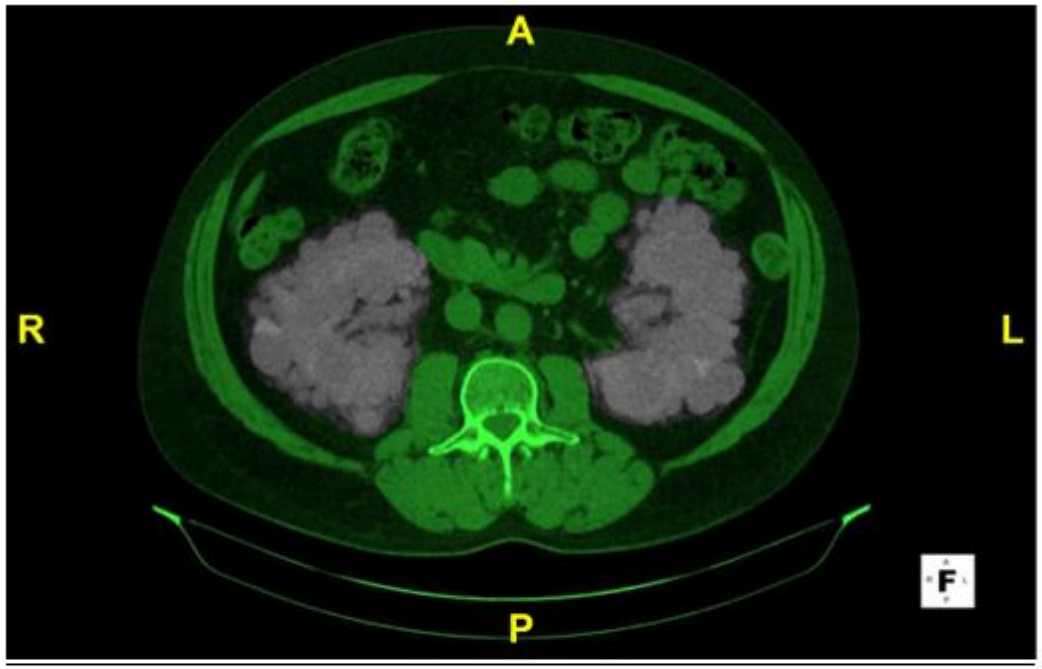
RT Renal Volume

RT Renal Volume Captures with Overlay

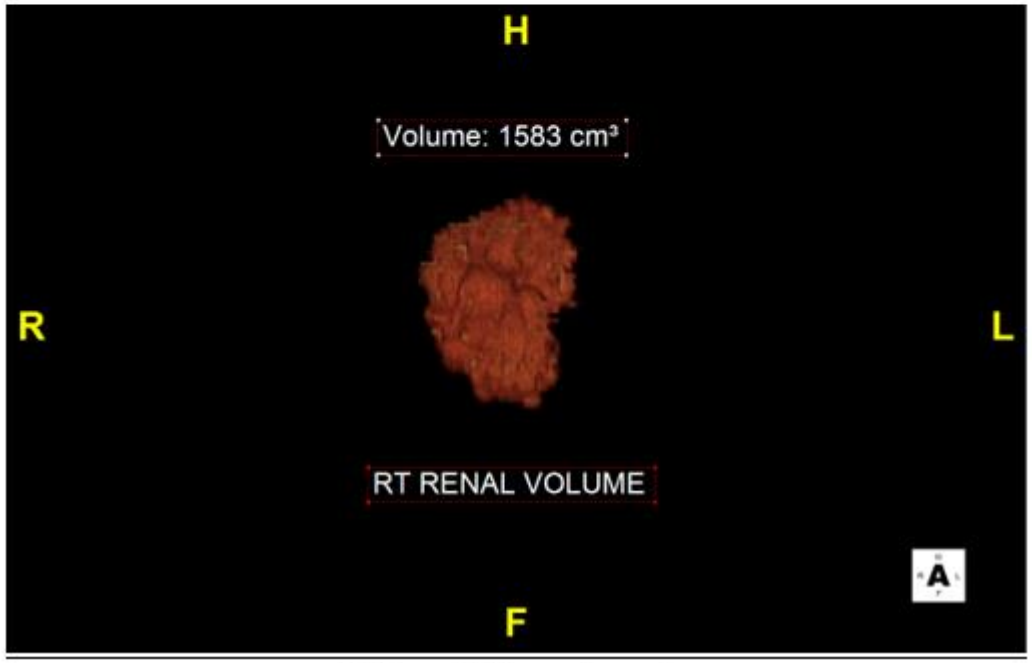
Instructions for Cutting:

- Load reformat set from the patient list
- select the reverse button on the right side of the screen under the free ROI tool
- From the 4 on 1 view, double click on the axial dataset
- Using the free ROI tool scroll through and circle the Left Kidney on each image separately, taking care to not include any outside tisse or to not cut any renal tissue. This should include any and all masses and renal cysts present.
- It may help to put the images in a liver window which is 180 @80. Window level the images to these settings to better visualize renal tissue and vessel anatomy
- Once you have completely circled all anatomy, select the include button on the right side of the screen under the free ROI tool
- Double click to go back to the 4 on 1 screen
- Window the kidney so that it is fully visible in the VRT screen
- Save a scene with the name left kidney
- Right click on the Kidney and select “measurement”, then select “volume” and hit “ok” **this can also be done by holding down ALT and V
- Right click and select Arrow/Text, click on image where you want to add text and type Left Renal Volume
- Capture the image of the Kidney with the Volume and Label clearly displayed
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series Left Renal Volume and the series number should be 100
- Delete the image from the output panel
- Go back to the Axial images, using the free ROI tool scroll through and circle the Right Kidney on each image separately, taking care to not include any outside tisse or to not cut any renal tissue. This should include any and all masses and renal cysts present.
- Once you have completely circled all anatomy, select the include button on the right side of the screen under the free ROI tool

- Double click to go back to the 4 on 1 screen
- Window the kidneys so that they are fully visible in the VRT screen
- Save a scene with the name total renal
- Right click on the Kidney and select “measurement”, then select “volume” and hit “ok” **this can also be done by holding down ALT and V
- Right click and select Arrow/Text, click on image where you want to add text and type Total Renal Volume
- Capture the image of the Kidneys with the Volume and Lebel clearly displayed
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series Total Renal Volume and the series number should be 101
- Delete the image from the output panel
- Go back to the Axial images and with overlay turned on capture each image of the kidneys separately
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series Total Renal Volume Captures and the series number should be 102
- Delete the images from the output panel
- Go back to the Axial Images, with overlay turned on begin cutting off the left kidney. Once you have completely circled all of the left kidney anatomy, select the exclude button on the right side of the screen under the free ROI tool
- Double click to go back to the 4 on 1 screen
- Window the Right kidney so that it is fully visible in the VRT screen
- Save a scene with the name right kidney
- Right click on the kidney and select “measurement”, then select “volume” and hit “ok” **this can also be done by holding down ALT and V
- Right click and select Arrow/Text, click on image where you want to add text and type Right Renal Volume
- Capture the image of the RT Kidney with the Volume and Lebel clearly displayed
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series RT Renal Volume and the series number should be 103
- Delete the image from the output panel
- Send Series 100, 101, 102 and 103 to PACS, Verify images are in PACS and add a note into PACS that the post processing has been completed
- Change the study to complete stautus if needed prior to removing from Pending 3D reservations folder



Axial Image with Overly example



RT Renal Volume Example

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Liver Volume

Series sent to PACS:

Total Liver Volume

Total liver Volume Captures with Overlay

RT Lobe Liver Volume

RT Lobe Liver Volume Captures with Overlay

Tumor Volume (if needed)

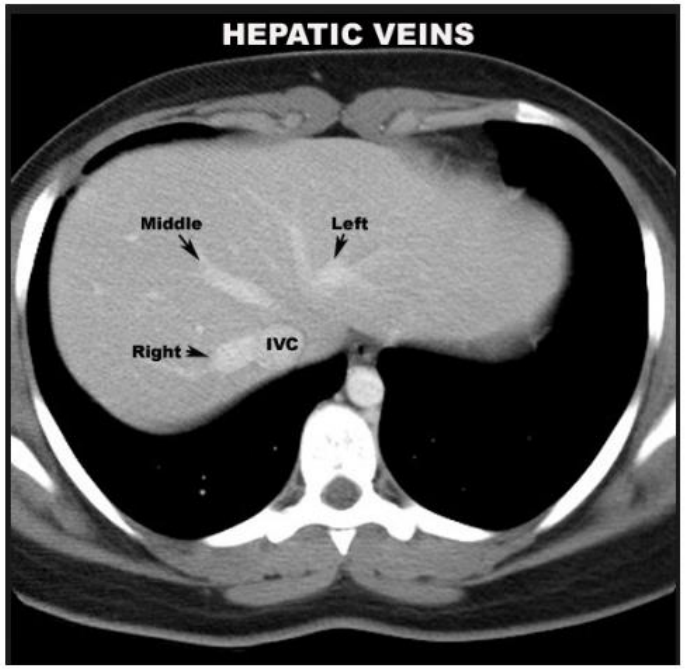
Tumor Volume Captures with Overlay (if needed)

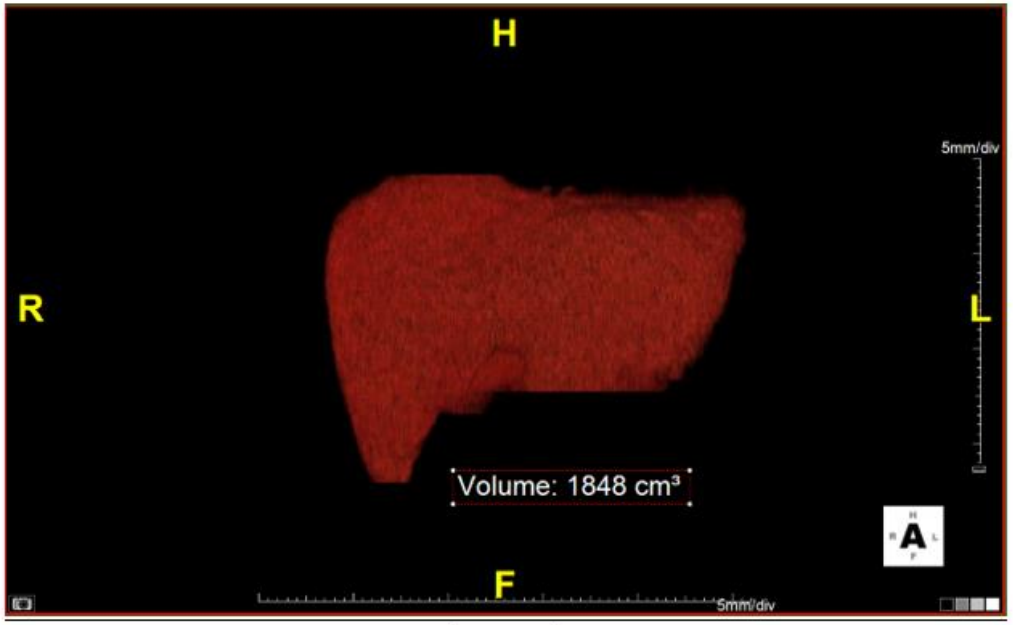
Instructions for Cutting:

- Load reformat set from the patient list
- From the 4 on 1 view, double click on the axial dataset
- Using the free ROI tool scroll through and circle the liver on each image separately, taking care to not include any outside tisse or to not cut any liver tissue. Do not include Gall bladder or large vessels like portal vein or IVC
- It may help to put the images in a liver window which is 180 @80. Window level the images to these settings to better visualize liver tissue and vessel anatomy
- Once you have completely circled all liver anatomy, select the exclude button on the right side of the screen under the free ROI tool
- Select Reverse
- Double click to go back to the 4 on 1 screen
- Window the liver so that it is fully visible in the VRT screen
- Save a scene with the total liver volume
- Right click on the liver and select “measurement”, then select “volume” and hit “ok”
- Capture the image of the total liver with the Volume
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series Total liver Volume and the series number should be 100
- Delete the image from the output panel
- Go back to the Axial images and with overlay turned on capture each image of the liver separately
- Select the Output tab on the top right of the screen

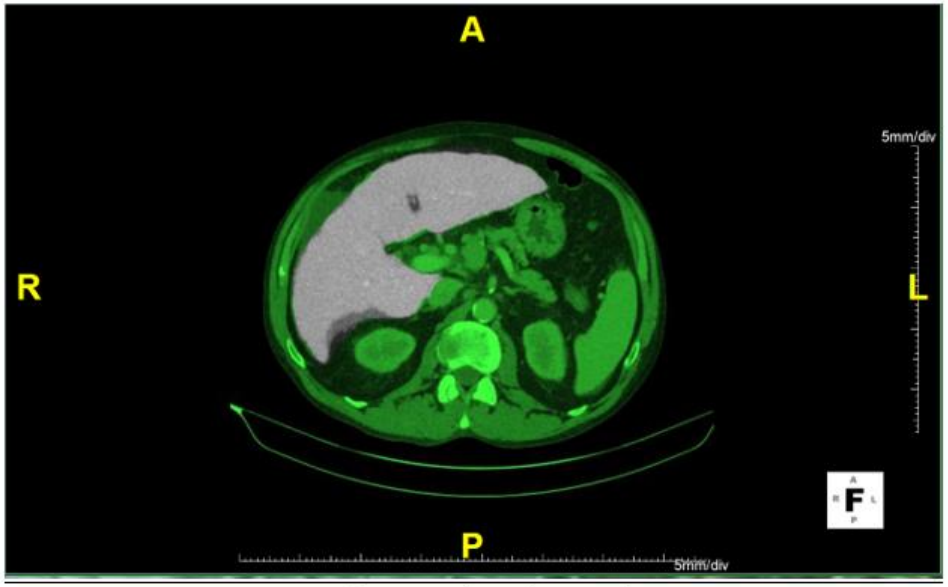
- Select the Send tab
- Select local server
- Label the series Total liver Volume Captures and the series number should be 101
- Delete the images from the output panel
- Go back to the Axial Images, with overlay turned on begin cutting off the left lobe of the liver. The LT lobe of the liver is separated by the middle hepatic vein and gall bladder fossa
- Once you have completely circled all of the left lobe liver anatomy, select the exclude button on the right side of the screen under the free ROI tool
- Double click to go back to the 4 on 1 screen
- Window the liver so that it is fully visible in the VRT screen
- Save a scene of the right lobe of the liver
- Right click on the liver and select “measurement”, then select “volume” and hit “ok”
- Capture the image of the RT lobe of the liver with the Volume
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series RT liver Volume and the series number should be 102
- Delete the image from the output panel
- Go back to the Axial images and with overlay turned on capture each image of the liver separately
- Select the Output tab on the top right of the screen
- Select the Send tab
- Select local server
- Label the series RT liver Volume Captures and the series number should be 103
- Delete the images from the output panel
- If there is a large singular tumor or a tumor volume has been specifically requested, this same process will need to be repeated for any/all liver tumors.

Sample Images:





Total Liver Volume



Axial Image with Overly example

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Coronary Arteries

Series sent to PACS:

Calcium report

Coronary Captures: Approx. 6-8 captured images of coronary artery anatomy

LAD Slab MIP: 12 images 1x1

LAD Slab Rotation: 12 Images 360° rotating from left to right

LCX Slab MIP: 12 images 1x1

LCX Slab Rotation: 12 Images 360° rotating from left to right

RCA Slab MIP: 12 images 1x1

RCA Slab Rotation: 12 Images 360° rotating from left to right

Ejection Fraction

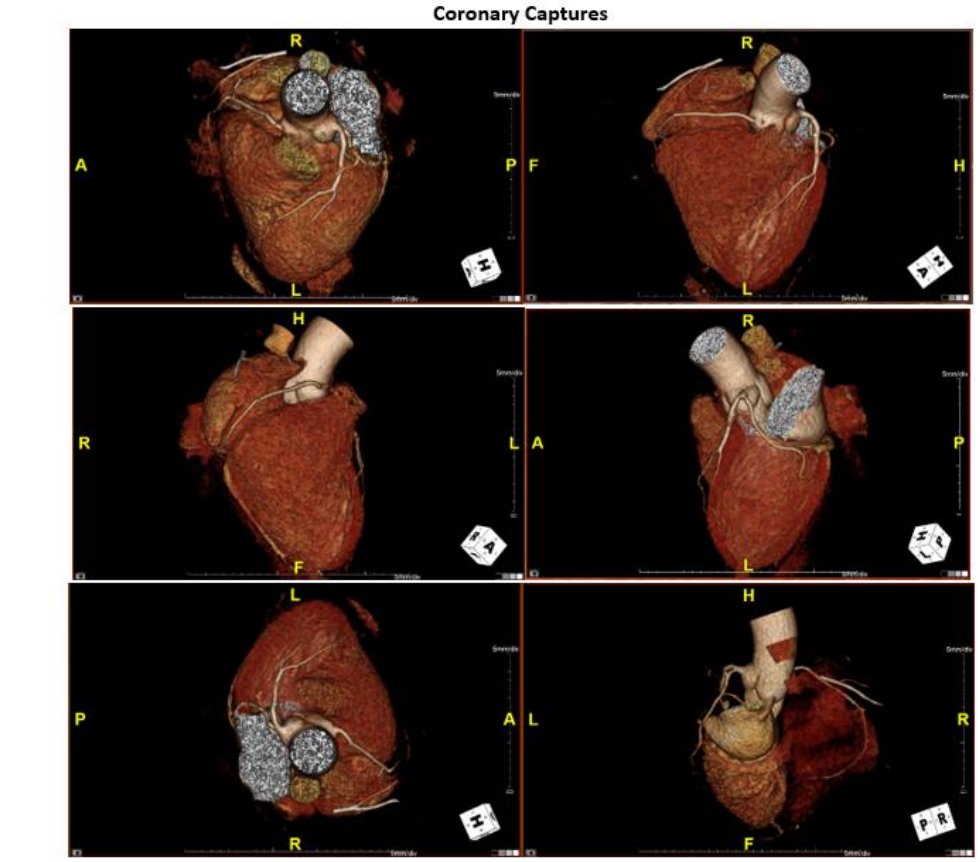
Instructions for Cutting:

- Create Calcium score **for instructions see calcium score protocol
- Load reformat set using the Cardiac workflow on the patient list
- Select yes when asked to run bone removal
- Using the free ROI and region grow tools remove any cardiac anatomy that is obscuring the view of the coronary arteries taking care to not cut out any coronary artery anatomy
- Window/level the image do display anatomy without obstruction
- Capture images of the heart in views that display the origins of the arteries as well as the course of the arteries around the heart. These will be labeled Coronary captures
- Right click and change the image to MPR
- Turn on the CPR tool
- Shift click on each coronary artery. If the computer has already done this for you, verify that the vessel anatomy has been accurately mapped by the CPR tool. Each vessel should include the origin and as much of the vessel as possible
- Save a scene of the CPR lines
- Click on each coronary artery, right click and select Batch Wizard to create slab MIPs and Slab Rotatations
- Go back to the patient list and load the multiphase set using the cardiac workflow on the patient list

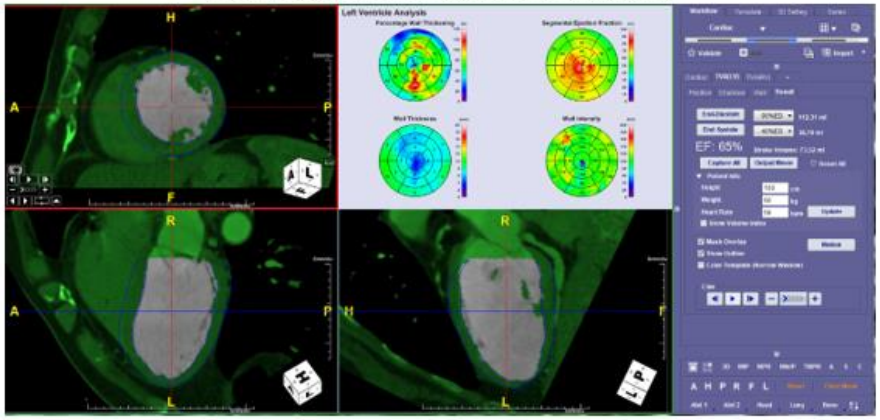
- Select no when asked to run automatic bone removal
- select the “LV EF” workflow from the workflow tab
- Click ok once the calculation is finished
- Click the result tab on the right side of the screen and enter the patients height, weight and scan heart rate
- Click on the update button
- Confirm that the calculation is correct and there are no errors in the mapping of the cardiac wall.
- Select the Wall tab and capture the image in the top right corner of the 4 on 1 screen. This will be labeled Ejection fraction

When a patient presents with history of a Bypass Graft, you will also need to process 3D images and a Slab MIP/Rotation of the graft for the radiologist to visualize it better

Sample Images:

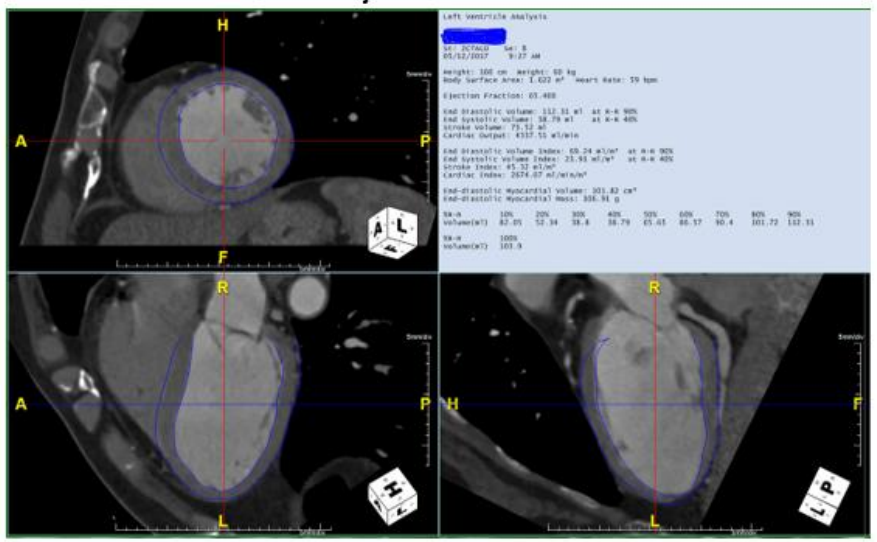


Result Page, Green overlay to Verify accuracy



RCA Slab MIP

Ejection Fraction



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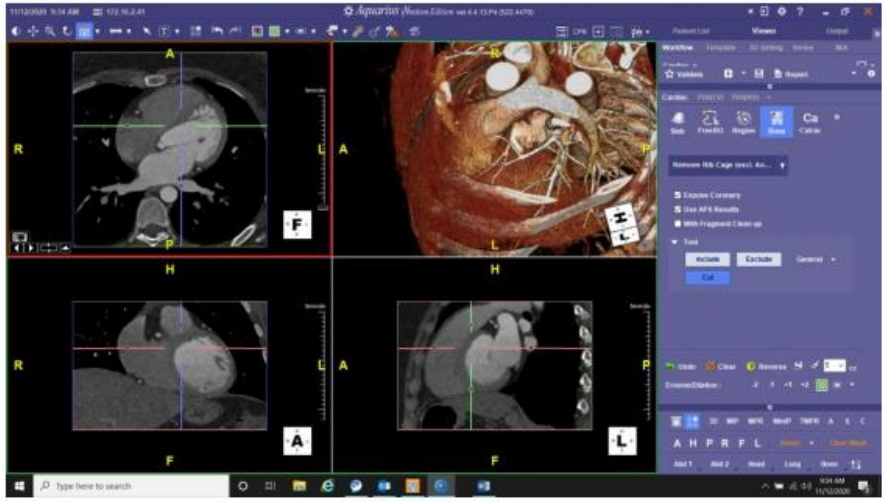
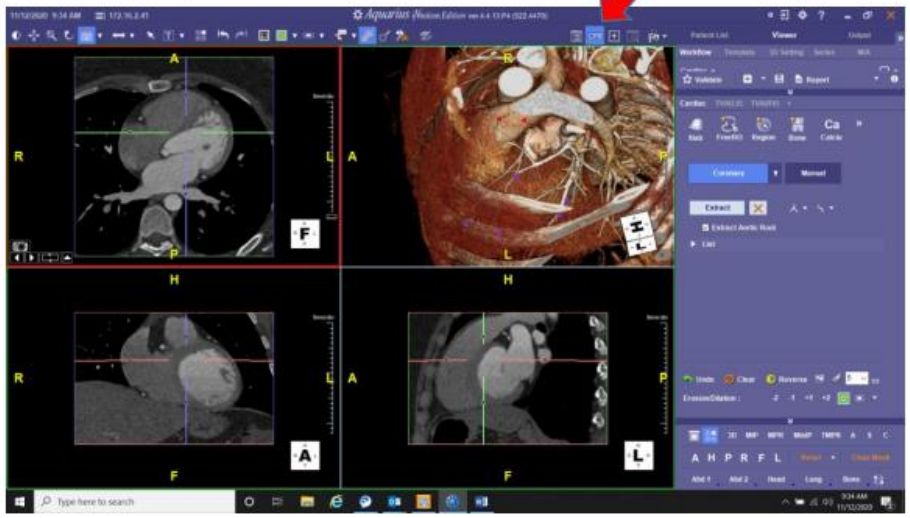
ARA DIAGNOSTIC IMAGING

Coronary Artery Fly Through

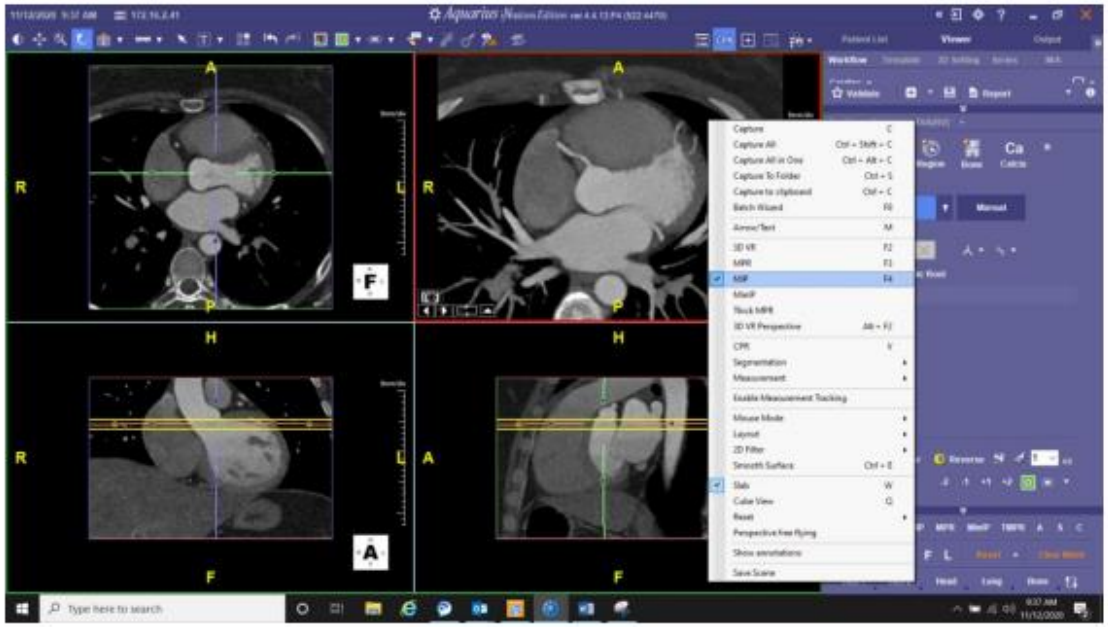
Load series that is going to be used for vessel analysis



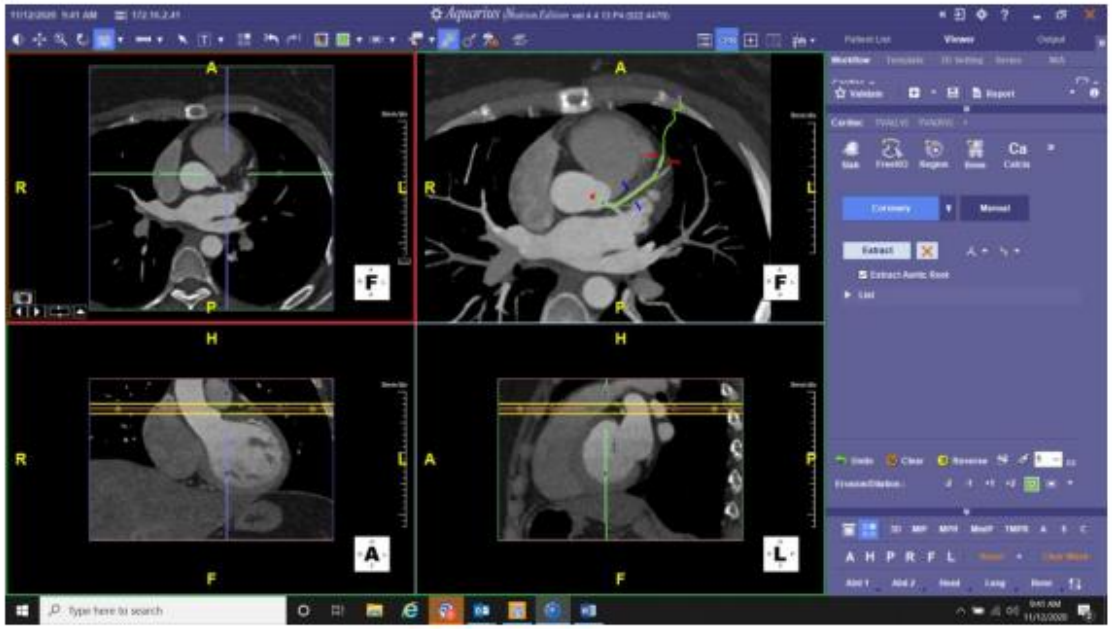
Select CPR (this activates the curved planar reformation tool that will be used to select the vessel



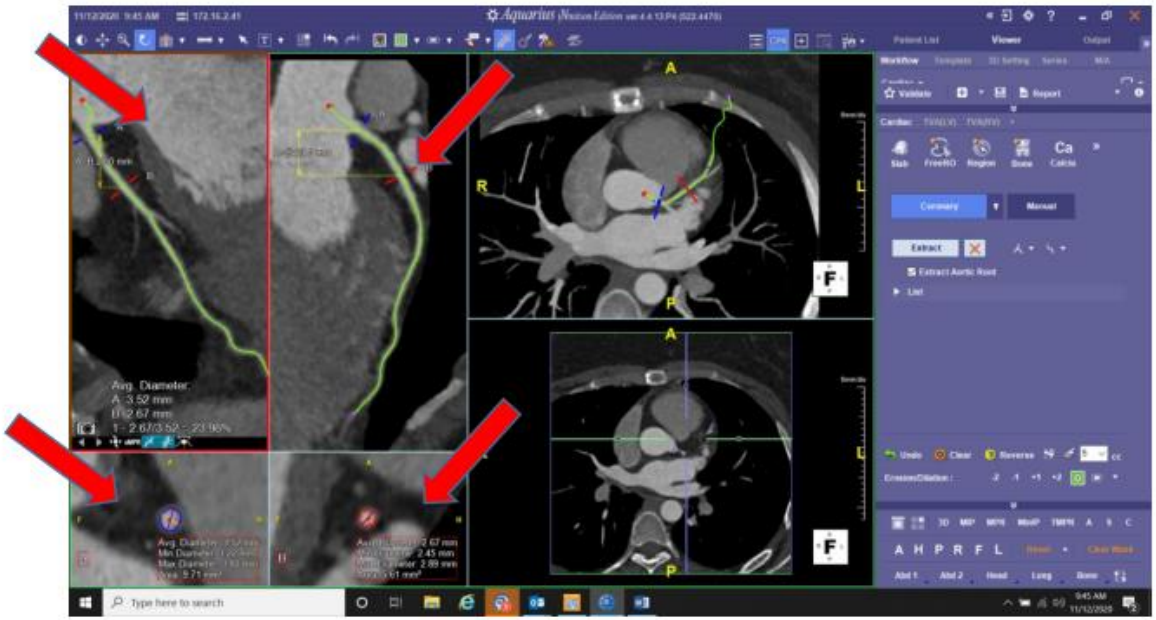
Right click over the top image and select MIP. If you want to work from an axial image press “F” on the keyboard and it will orient the image into foot to head or axial orientation.



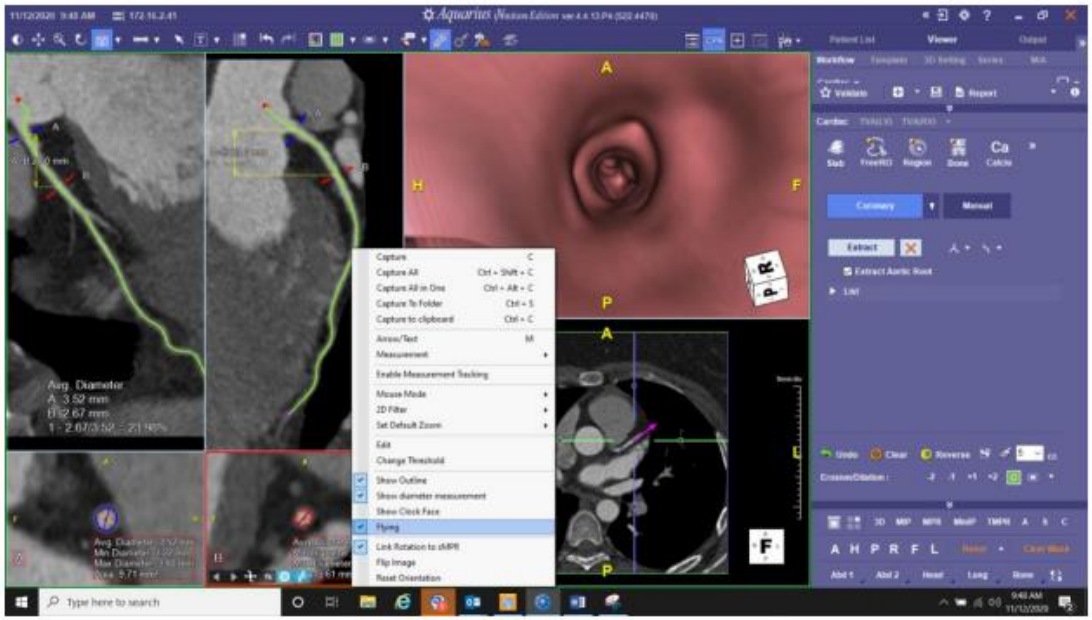
Once the vessel is identified and ready to be reviewed, hold the shift key and left click on the vessel, this will allow you to make a selection and create a centerline.



Once the vessel centerline is drawn, the program will provide you with two images in a vertical plane that are parallel to the centerline and two images that are orthogonal to the centerline

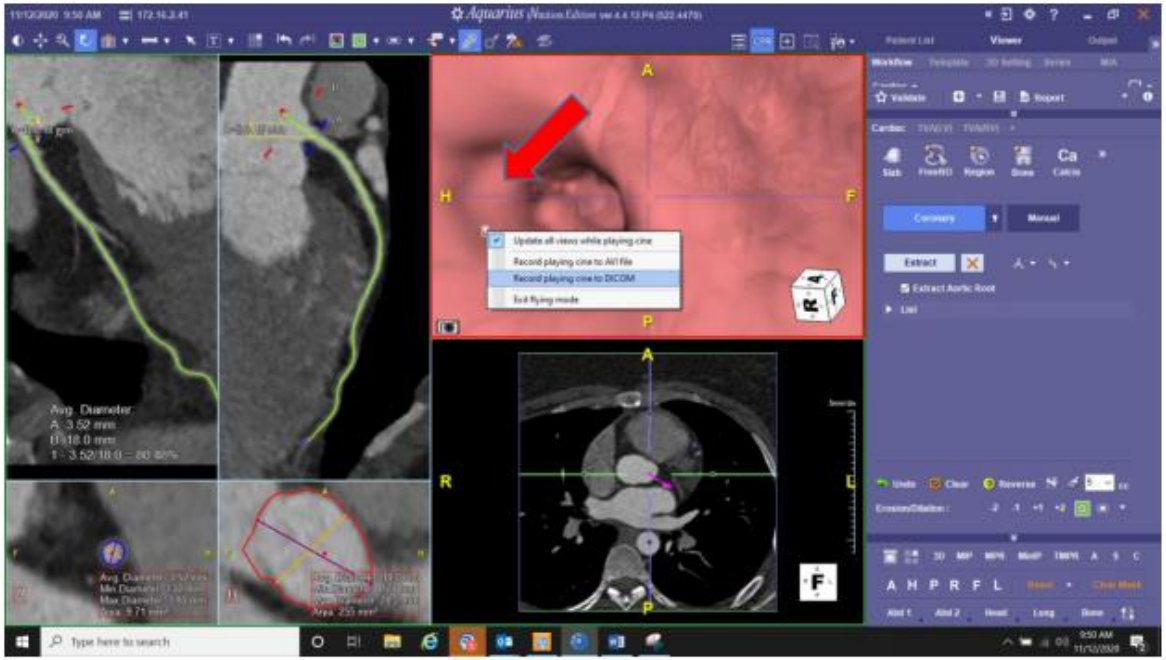


Once the vessel centerline is edited and ready to be viewed, you can right click on the bottom right orthogonal image and select “flying”

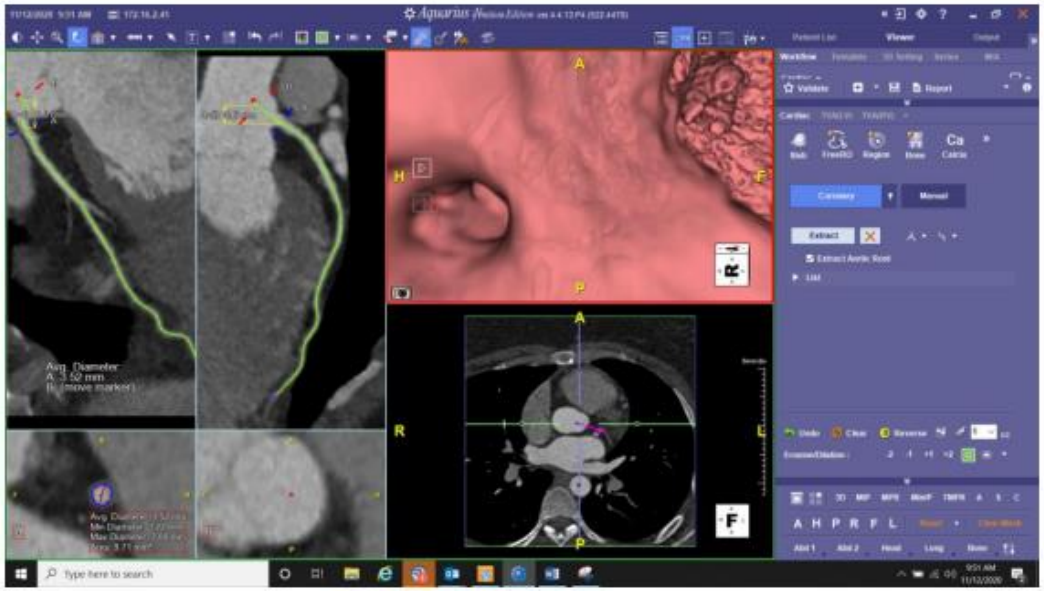


Once the flying feature has been activated you will want to adjust the red “B” line, representing the bottom right orthogonal image, so that it represents your starting point

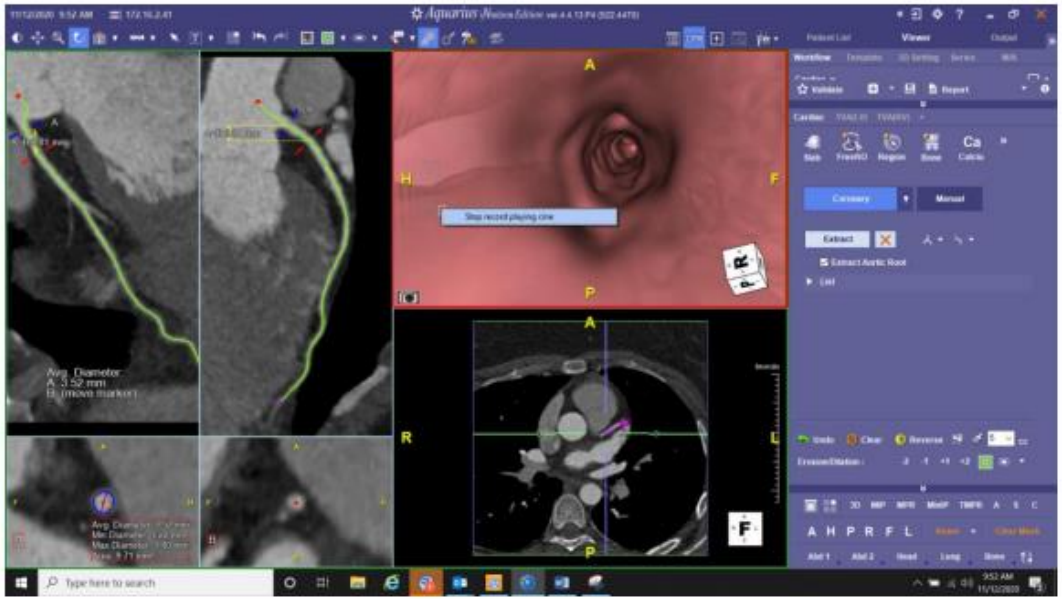
Once the starting point is set you can hover over the 3D images and you will see two arrows and an option for a dropdown to select record



Once the record option is chosen press “play” and the system will record the flythrough. Once you get to the end of your vessel click on the 3D image to stop recording.



Select stop recording.



Select stop recording and the system will give you the option to name the series and then the option to select where to send the series.

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Protocol Review

Protocol(s) Review Date	Reviewed By
9/13/2023	Deanne Young