Circle of Willis CTA

Circle of Willis CTA – Workflow Overview

Overview:

The Circle of Willis is easily post-processed using Automated bone removal and the Vessel Grow tool. Analysis of any vessel can be accomplished using the Vessel Probe tool. This application tracks the centerline of the vessel and produces Curved Planar Reformations. The Cross Vessel view displays the lumen area and diameter of the vessel. The views can be edited, measured, captured and exported.

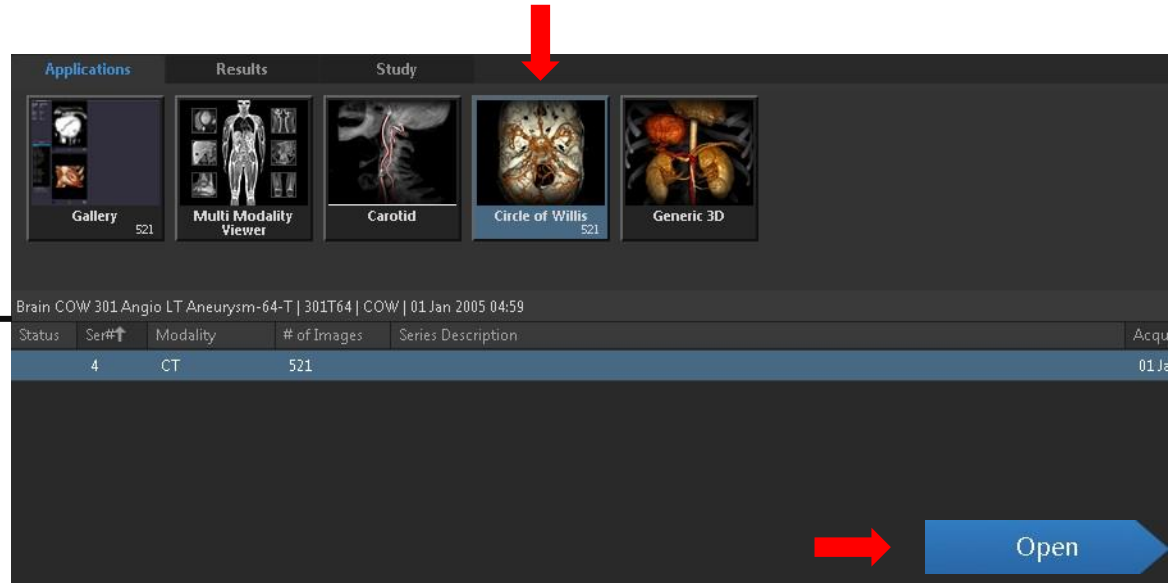
The Steps:

- **Load** the data and select the appropriate protocol **Vascular CoW CT**.
- **Pick** 3D Analysis.
- **Review** images using 5-on-1 screen format including the Point of Interest (POI) Cube.
- **Verify** Segmented Vessels are displayed.
- **Add** vessels using Vessel Grow.
- **Edit** the Vessel Grow Area.
- **Select** the Vessel Probe tool and click a point inside the vessel.
- **Add** additional vessels by choosing the vessel using the Vessel Probe tool.
- **Use** the Extend tool to extend the internal carotid or vertebral arteries.
- **Name** the vessels.
- **Check** for accuracy and **Edit** Centerline.
- **Select** Native thickness MPR to view a VR MIP image.
- **Create** 3D Batch Rotations of vessels.
- **Create** and **Export** snapshots and batch reformats.

Circle of Willis CTA – Select the Application

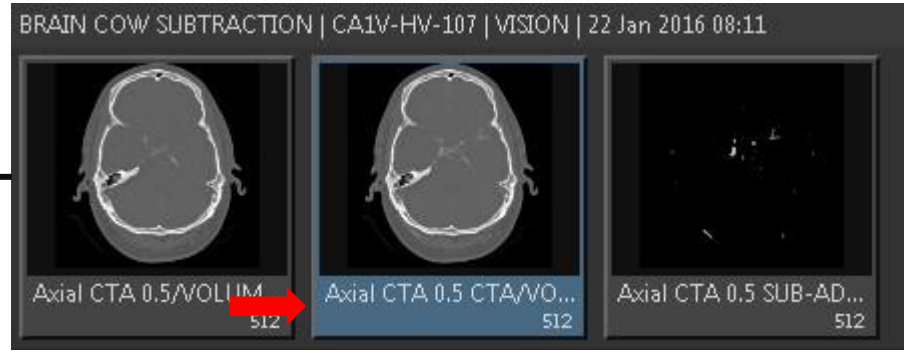
Select Patient

Double-click to select the application or **single-click** on thumbnail and then choose open.



OR

The **series** are located below the applications automatically. Choose the desired data set. Double-click the Circle of Willis Application thumbnail.

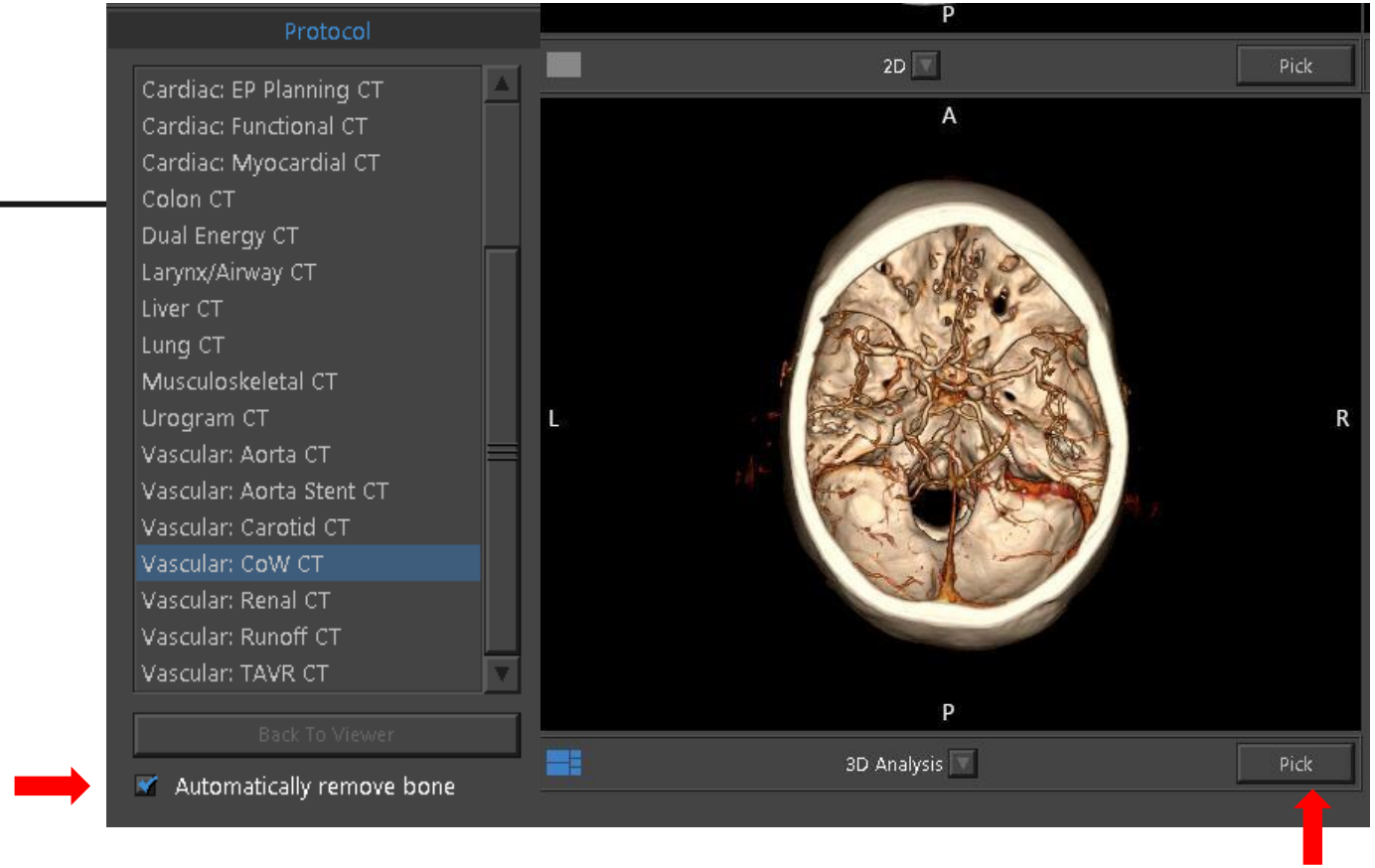


Circle of Willis CTA – Bone Removal

Select Protocol Vascular CoW CT.

Select 3D Analysis.

Click on Pick

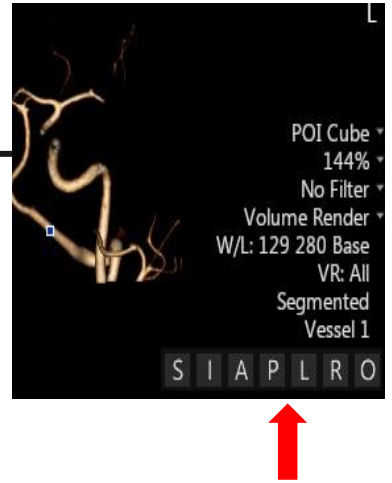


Tip: Preview image from the Gallery Tab. If the contrast is not dense enough the vessels will not display well. Clear the box next to Automatically Remove Bone to restore bone to the image.

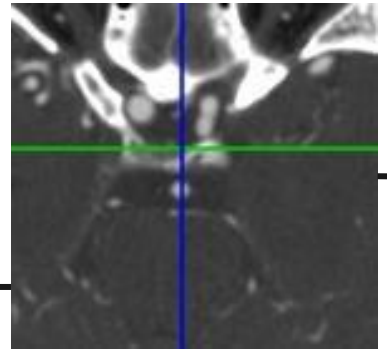
Circle of Willis CTA – POI Cube

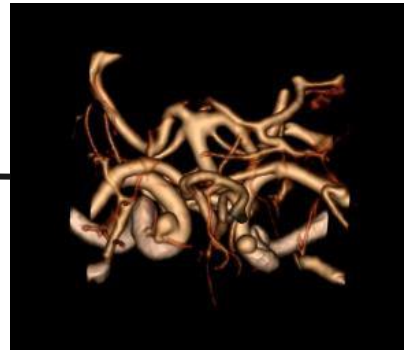
The POI Cube shows the volume surrounding the current crosshair.

Select the 5:1 format for the POI Cube.

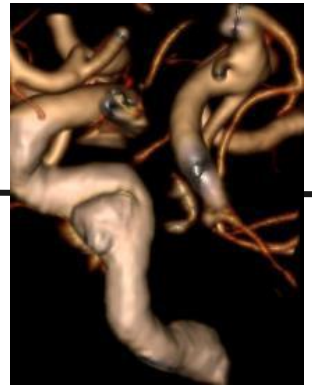


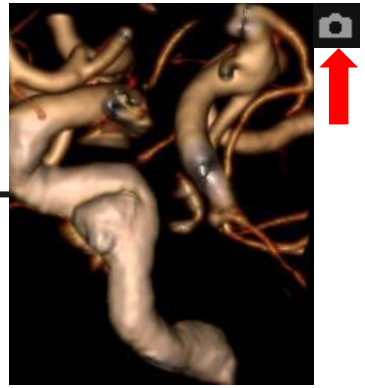
Click crosshair on anatomy of interest in the 2D. The **POI Cube** jumps to the crosshair location.





In the POI Cube, roll the mouse wheel to trim or expand the point of interest.
Take snapshots.





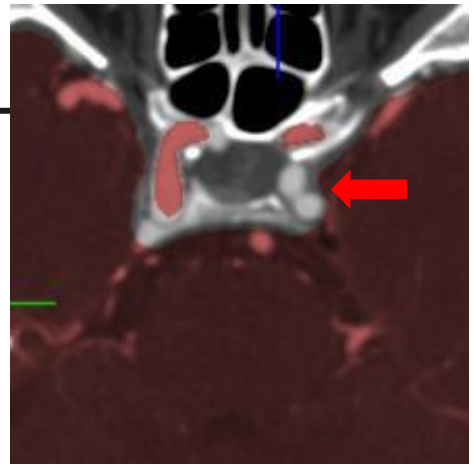
To rotate the image - right-click and drag.

Circle of Willis CTA – Segment Vessels

To verify if the segmented vessels are correctly displayed -

Click **Vessels.**

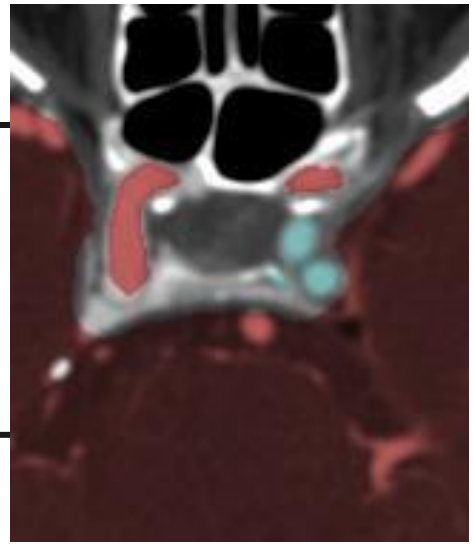
Click Tint MPR.



Scroll through the data set and identify missing vessels.

To **Add vessels**: Click arrow next to Vessel.

Click Grow.

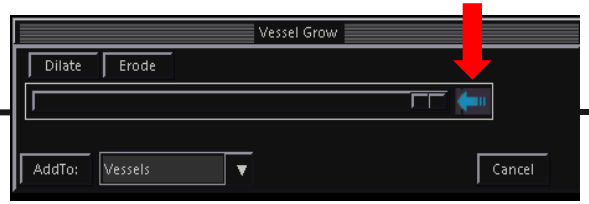


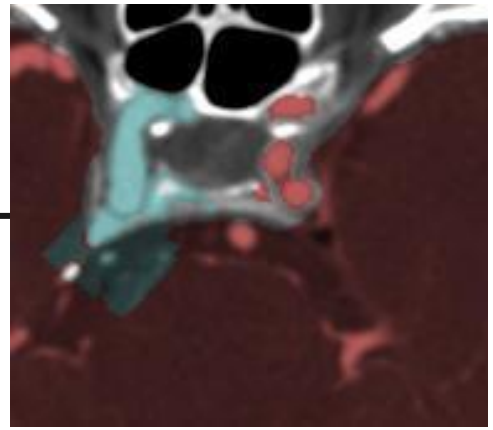
Click and hold on the vessel. Watch the blue section grow. Repeat for the other vessels.
Add to Vessels.

Circle of Willis CTA – Edit Vessel Grow

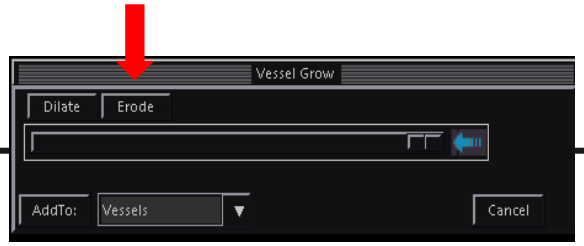
The steps below will help edit the blue selection area and remove unwanted anatomy.

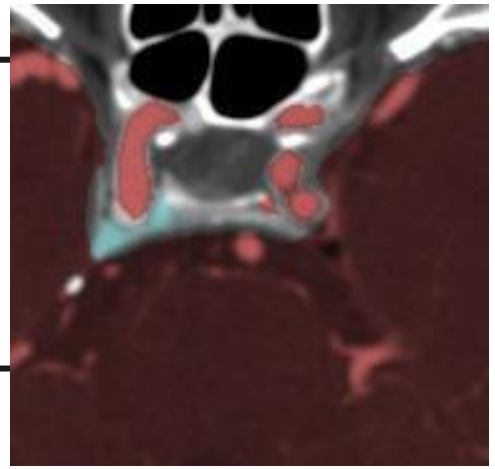
Click and move the history bar. The blue area will decrease.



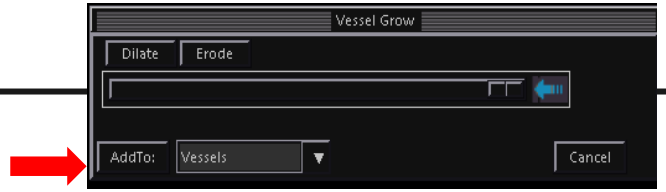


Click Dilate or Erode. Each click changes edge detection by one pixel.





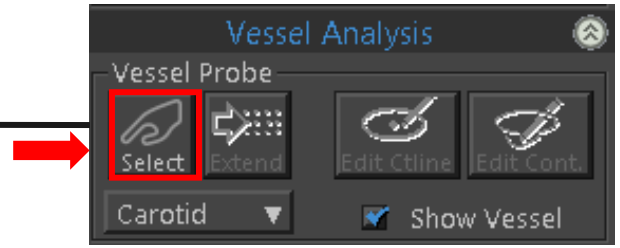
Add To Vessels



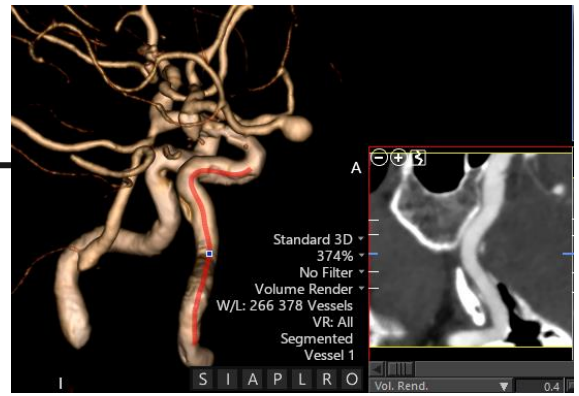
Circle of Willis CTA – Vessel Probe Analysis

Vessel Probe is an option for CoW to isolate and analyze the vessels.

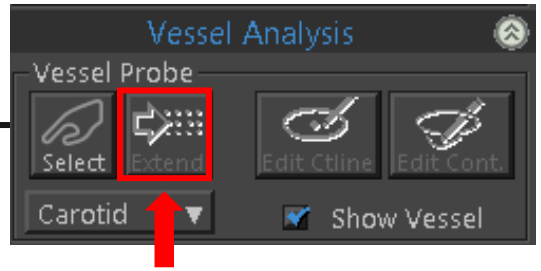
Under Vessel Probe click on **Select.** Click on the vessel in the 2D or 3D image.



Vessel Probe will generate a centerline.



Click **Extend**. Click proximal or distal on the 2D or 3D. This extends the visualized vessel.



Extend will not go beyond the point you select.

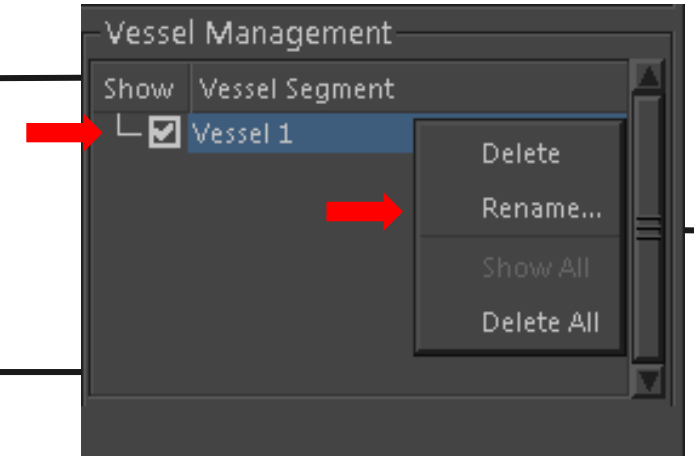
Circle of Willis CTA – Rename the Vessel

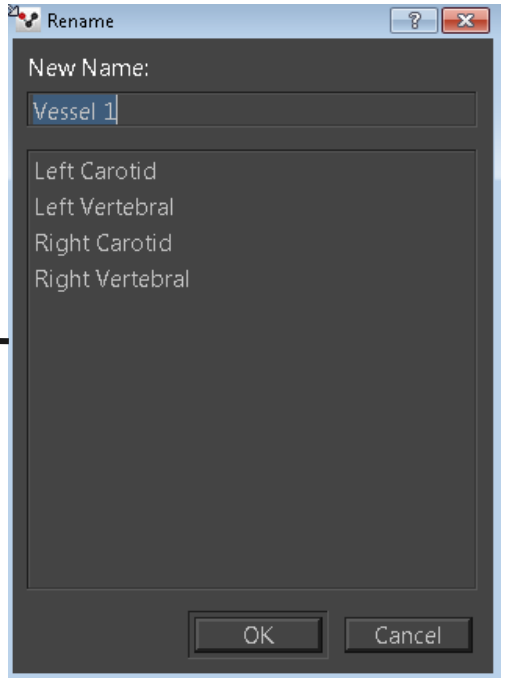
Under Vessel Management – Verify Show Vessel is selected.

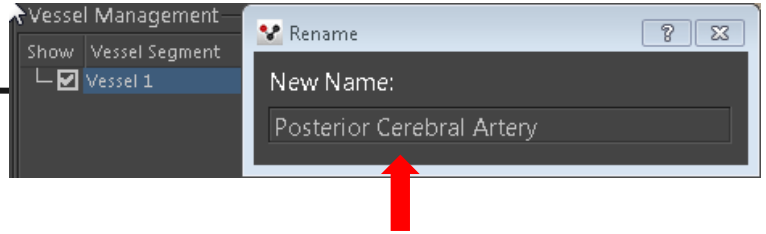
Right-click on Vessel Segment. Select Rename. The Rename dialog box displays.

Type a New Name.

Click OK





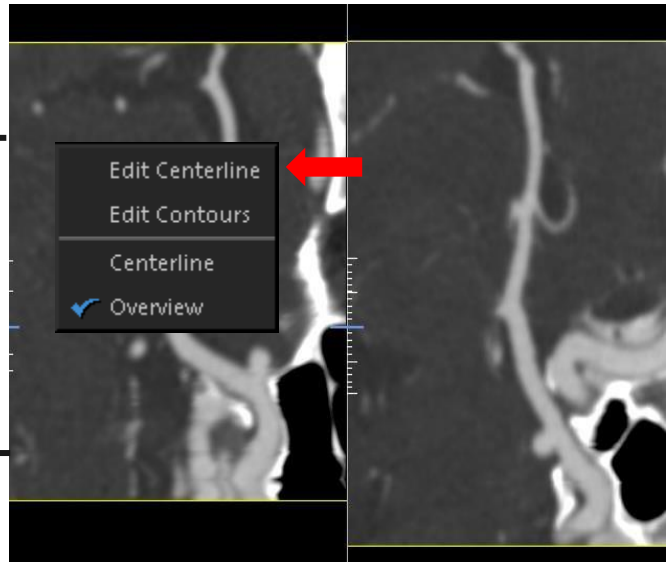


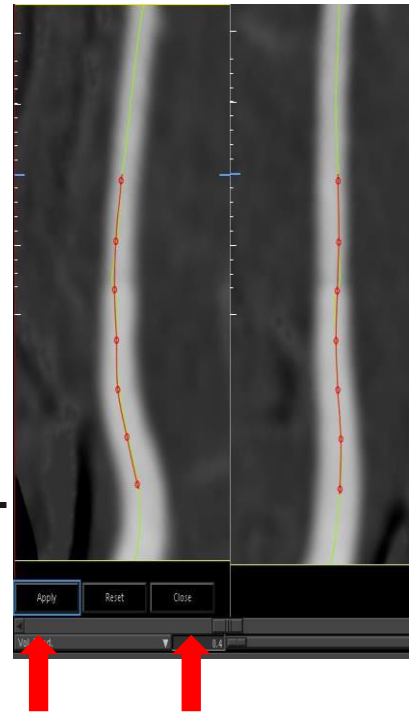
Circle of Willis CTA – Centerline Edits

Right-click in the CPR view**. Select** Edit Centerline.

Click and deposit red points to adjust the center line in either longitudinal view.

Click Apply to save the edits. Click Close to end.





The yellow line is the center line.

Click and drag the red corrected line to edit.

Circle of Willis CTA – Snapshot

Click **Global Snap** to capture whole page.

Click on camera in the upper right hand corner of the 3D or 2D image to capture the image.

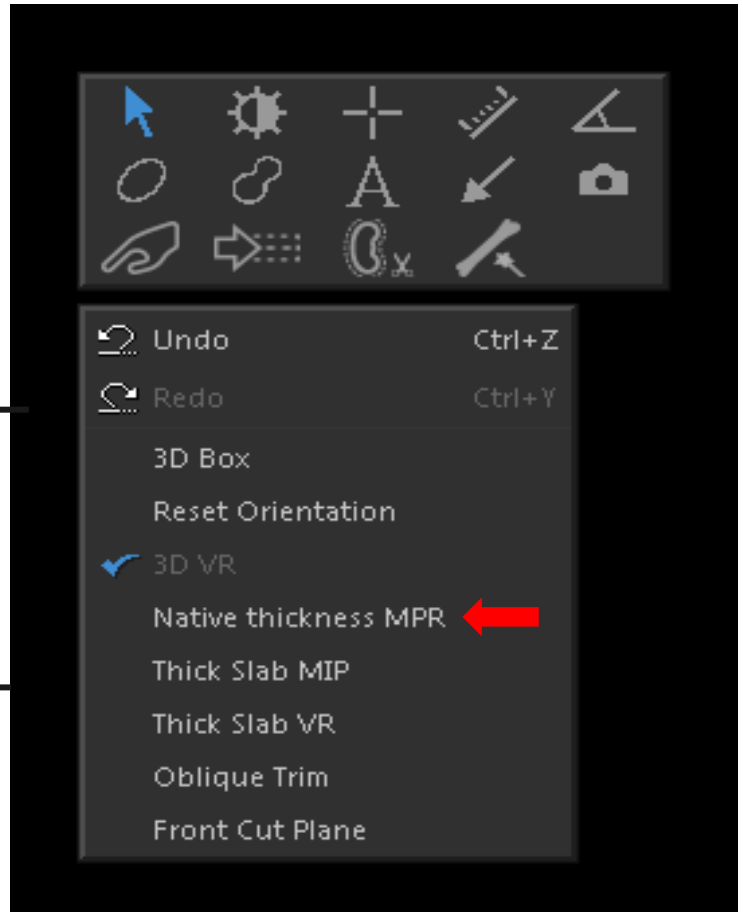
Tip: It is important to remember to take a snapshot. **Only a snapshot** can be restored at a later date. Once a snapshot is restored, you will be able to continue post-processing your image.

Circle of Willis CTA – Native Thickness MPR

Double-click in Viewport to 1 up Image.

Right-click on the 3D image to open the Menu.

Select Native thickness MPR.

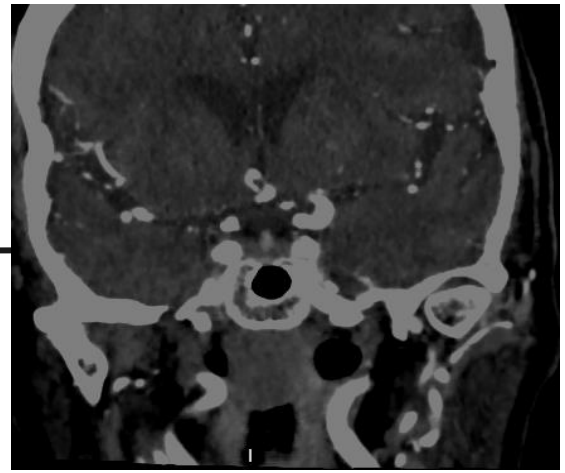


Tip: This tool provides the capability to view the CoW in a VR MIP projection.

Circle of Willis CTA – Native Thickness MPR

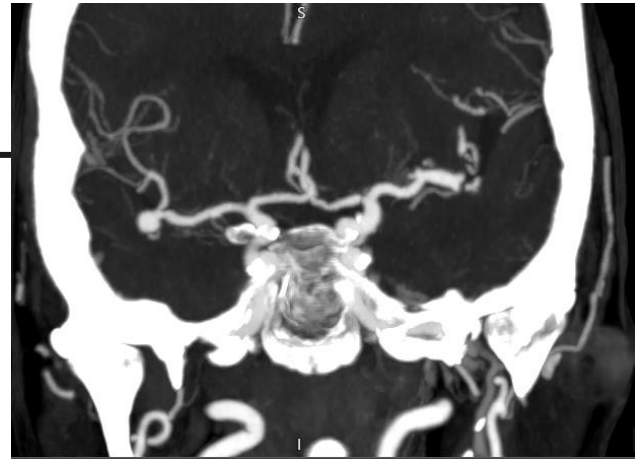
Hold down right mouse and two arrows display.

Continue to hold right mouse and move.



Move up and down scrolls through the data set.

Move side to side to increase and decrease the MIP thickness.



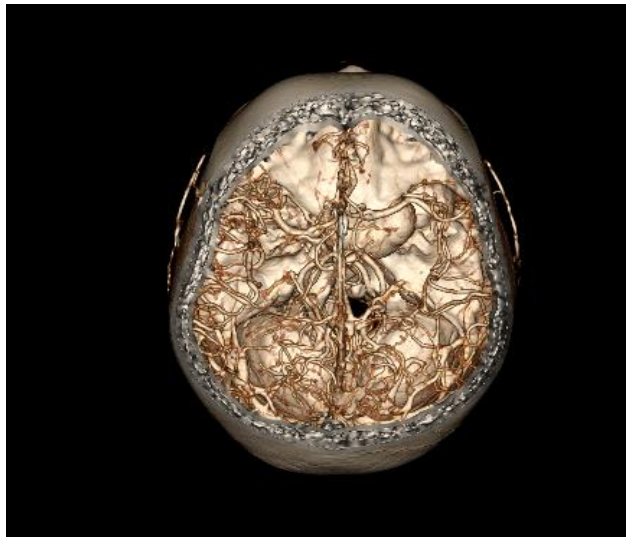
To rotate – select the 3D rotate tool and use left mouse.

Tip: Locate the ROI. Press the wheel to display the yellow crosshairs. Center the ROI on the crosshairs. This will lock the ROI at the centerpoint and allow you to rotate the surrounding vessels.

Circle of Willis CTA – Front Cut Plane

Right mouse click in 3D image and click Front Cut Plane.

Hold down right mouse and move up/down to cut into the Volume Rendered image.

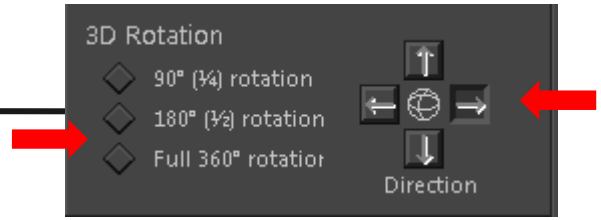


To **rotate image** – select the 3D tool and use left mouse to rotate.

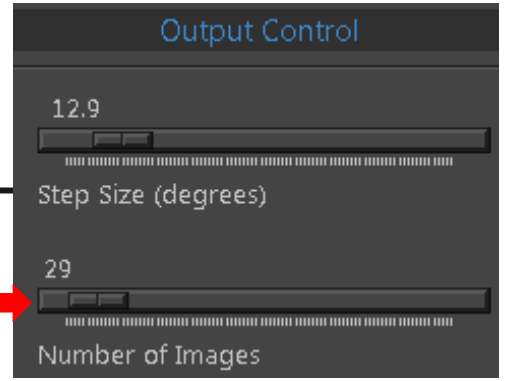
Circle of Willis CTA – 3D Batch Rotation

Select Batch to create a 3D Batch rotation.

Select the degree of rotation and select the direction of the rotation.

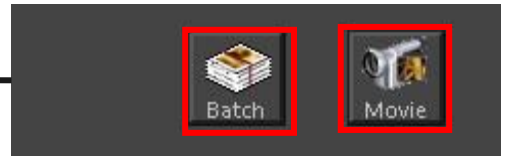


Move the slider bar to the desired number of images or degrees between images.



As you increase number of images the step size decreases.

Select **Batch** for PACS. Select **Movie** to create an .avi file

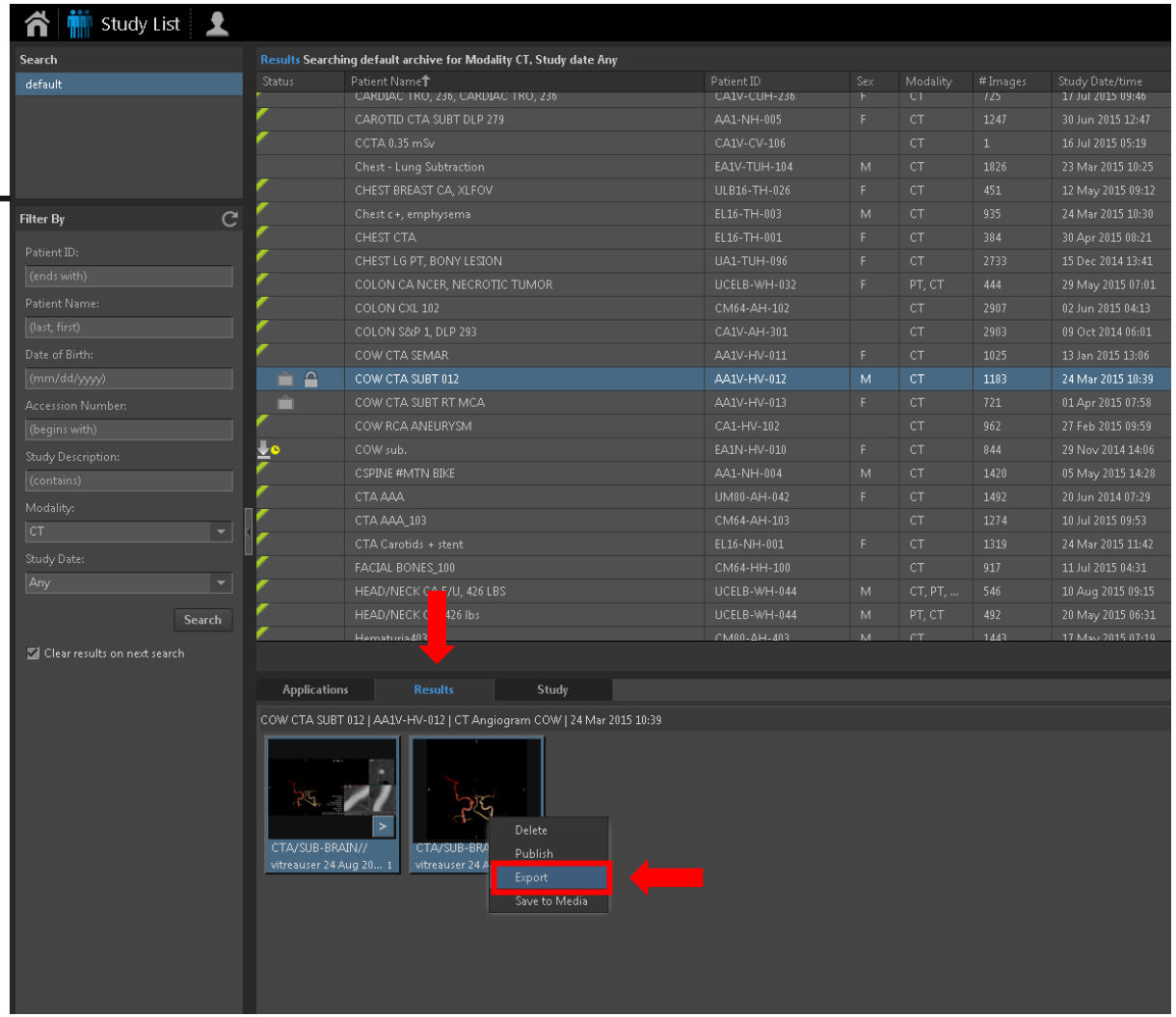


Circle of Willis CTA – Export

Return to Study List. Click on Results tab on bottom.

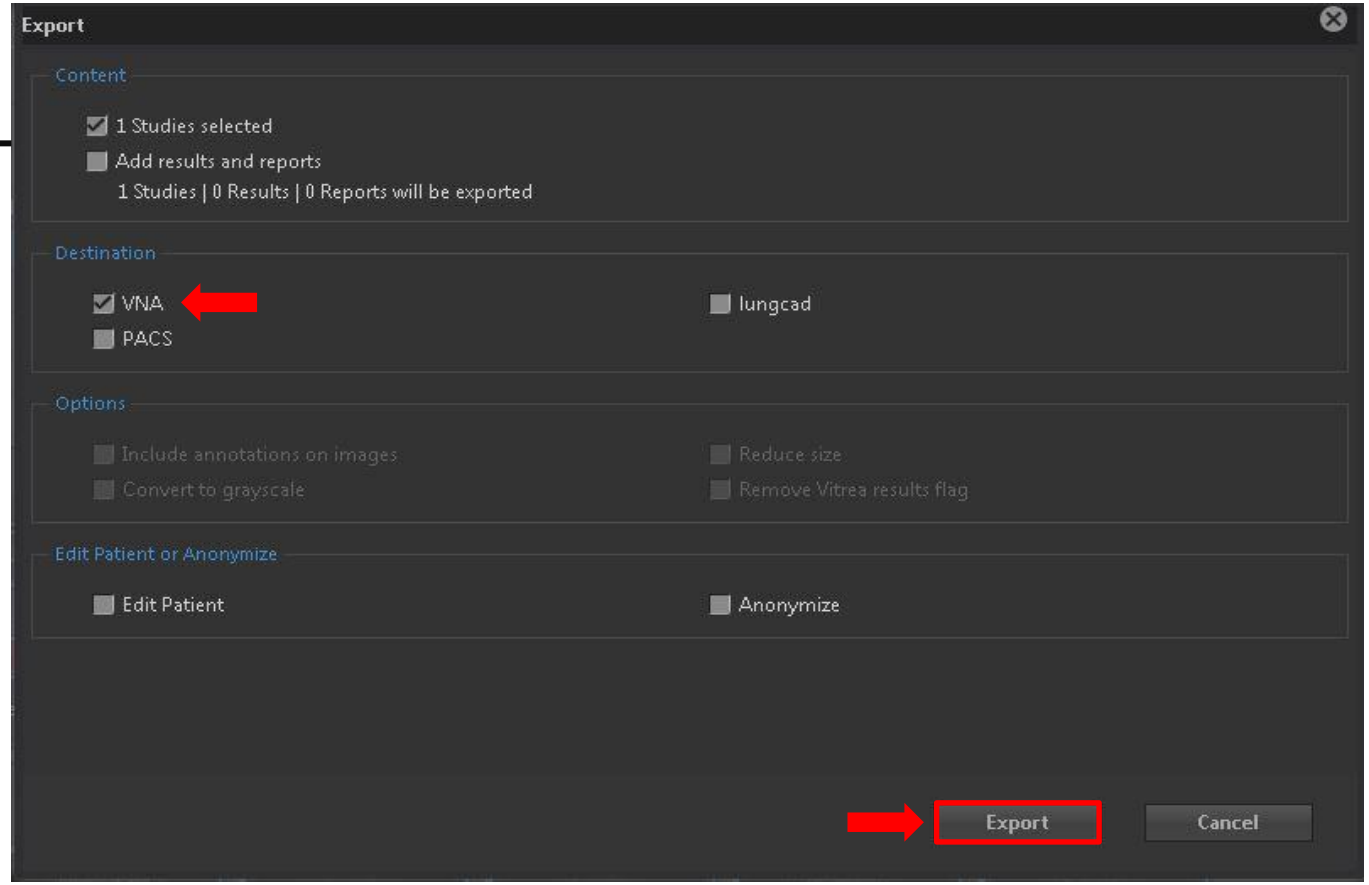
Each Snapshot and Batch displays in the **Results Tab**. Click and hold CTRL to add select images.

Right-click to Export to DICOM Destinations.



Circle of Willis CTA – Export

Export locations are listed in the Destination section. Choose desired destinations, click Export.



Circle of Willis CTA – Workflow Summary

Summary:

Selecting the **Vascular COW Application** Protocol you can:

- **Verify Segmented Vessels** are displayed.
- **Add** vessels using **Vessel Grow**.
- Select the **Point-of-Interest mode** to investigate surrounding vessels.
- Select the **Vessel Probe** tool to interrogate vessels.
- Select **Extend** to continue the artery down to the internal carotid arteries or vertebral arteries.
- **Name** each vessel in the Vessel Management area.
- **Edit** the Centerline of a vessel probe.
- Create **Batch Rotations** of the Circle of Willis.
- **Select** Native thickness MPR to view the VR MIP image.
- **Export** Images to PACS or other DICOM destinations from the Results Tab.