How to make CT DICOMS to 3D STL

3D Slicer (Version 5.2.2)
MeshMixer

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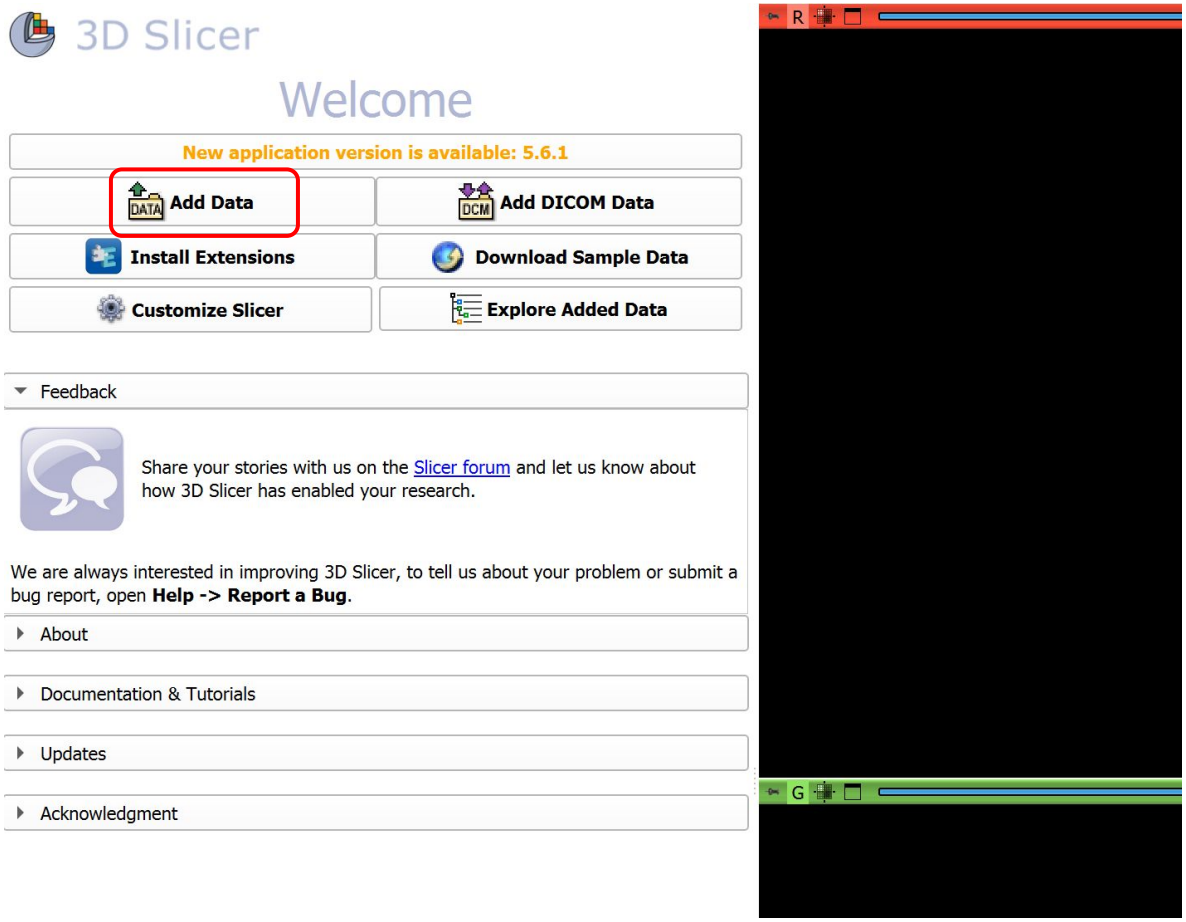
Programs

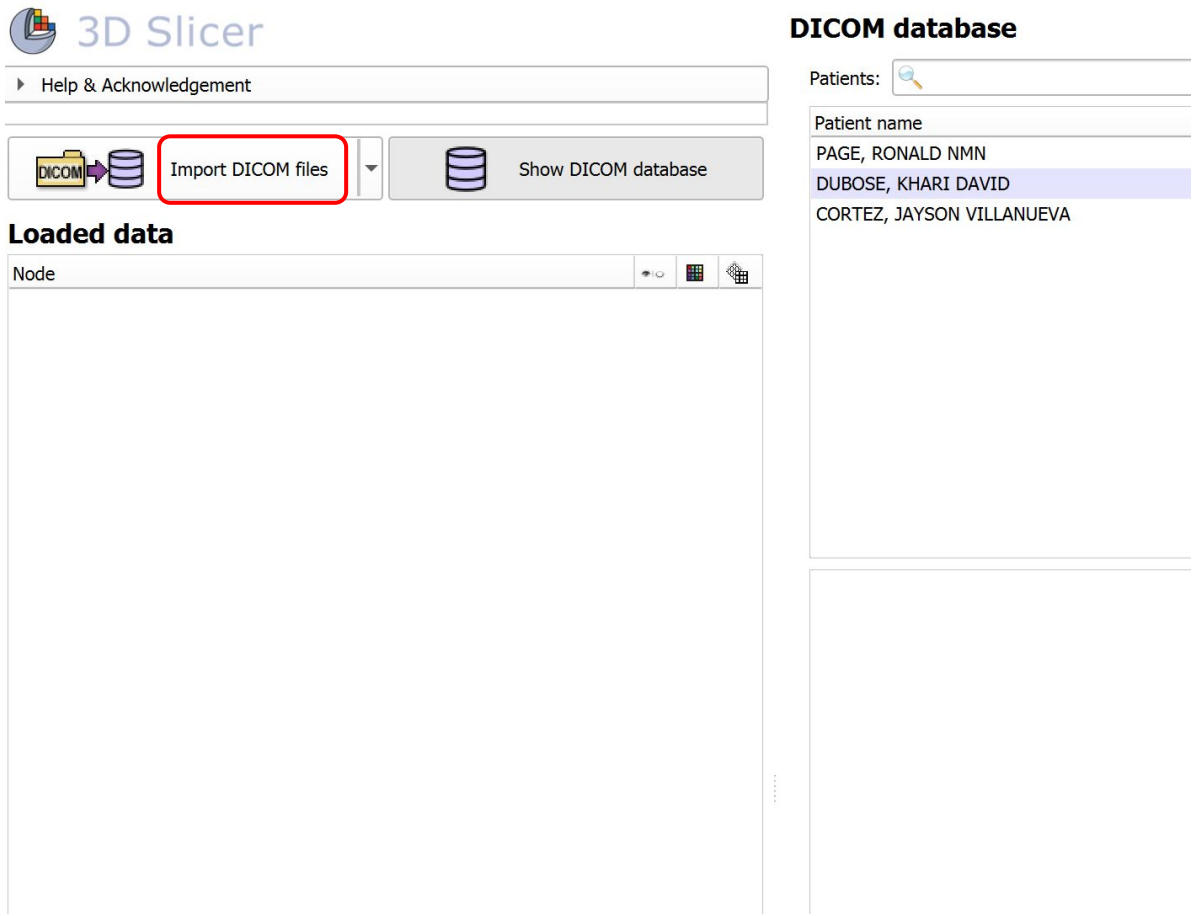
- 3D Slicer (Version 5.2.2)
- MeshMixer

- Youtube: https://www.youtube.com/watch?v=ToIkOpDVfpw "CT or MRI to 3D print DICOM to STL with Local computer Part 1 of 2" by Tomas Lindehell

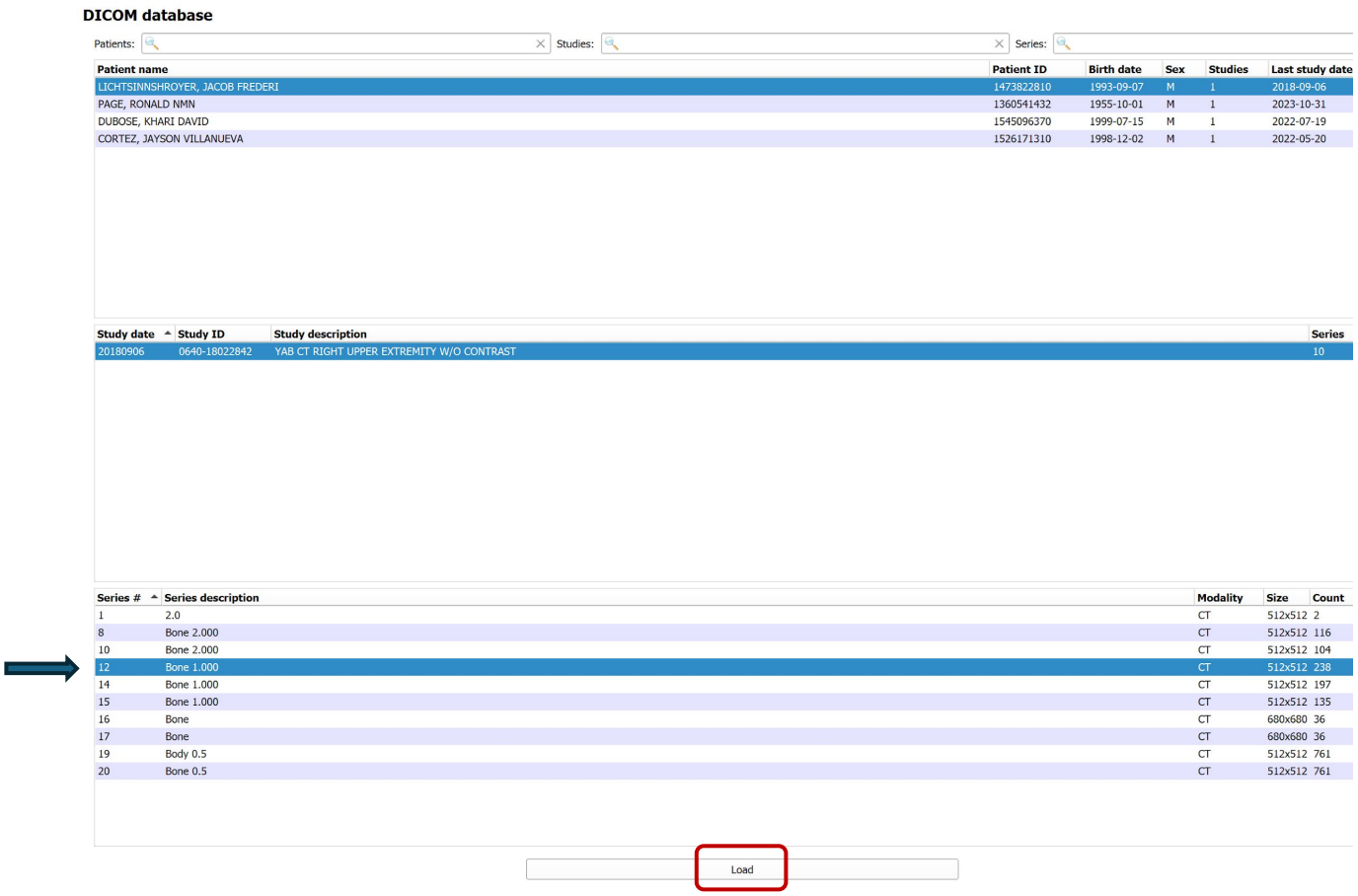
Open Slicer and Add Data



Import DICOM files



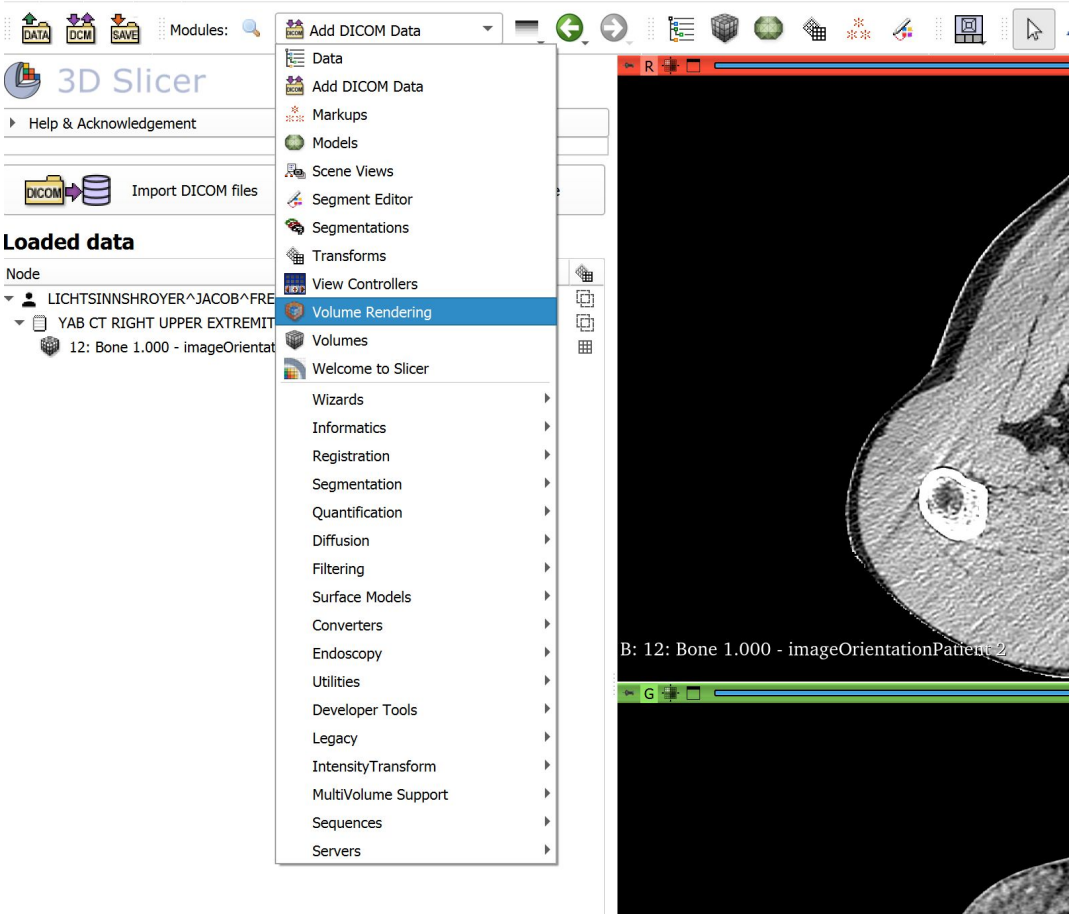
Select the Series to make 3D



Each CD has different series in the folder. If there is a “bone” series, that’s the one you want.

In this case, there were multiple, so I just selected the 1.0 mm slices.

Module: Volume Rendering



Once the images are loaded, there will be four boxes with the images (the top right is currently blank).

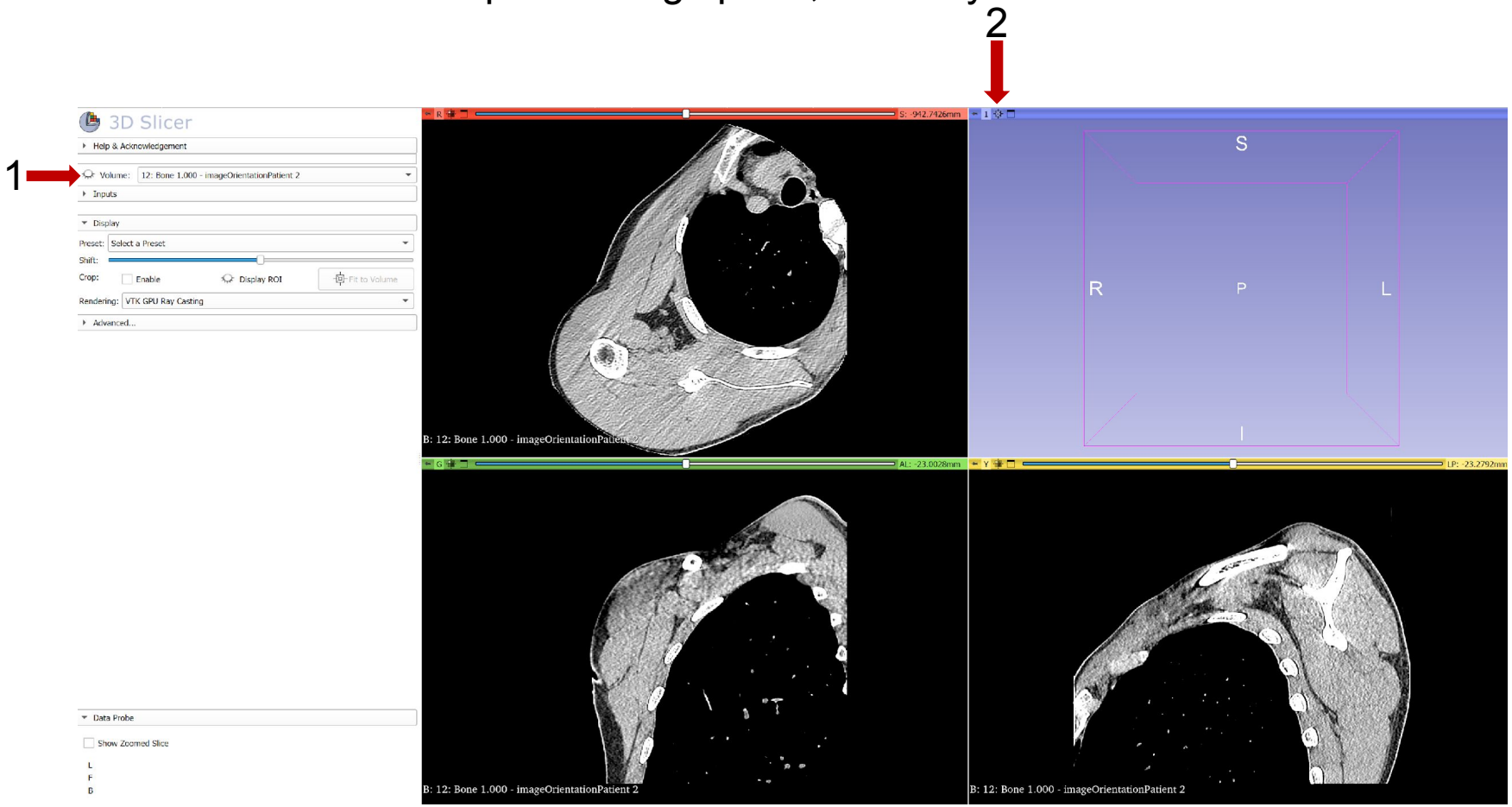
Go to the Module Volume Rendering

Make 3D

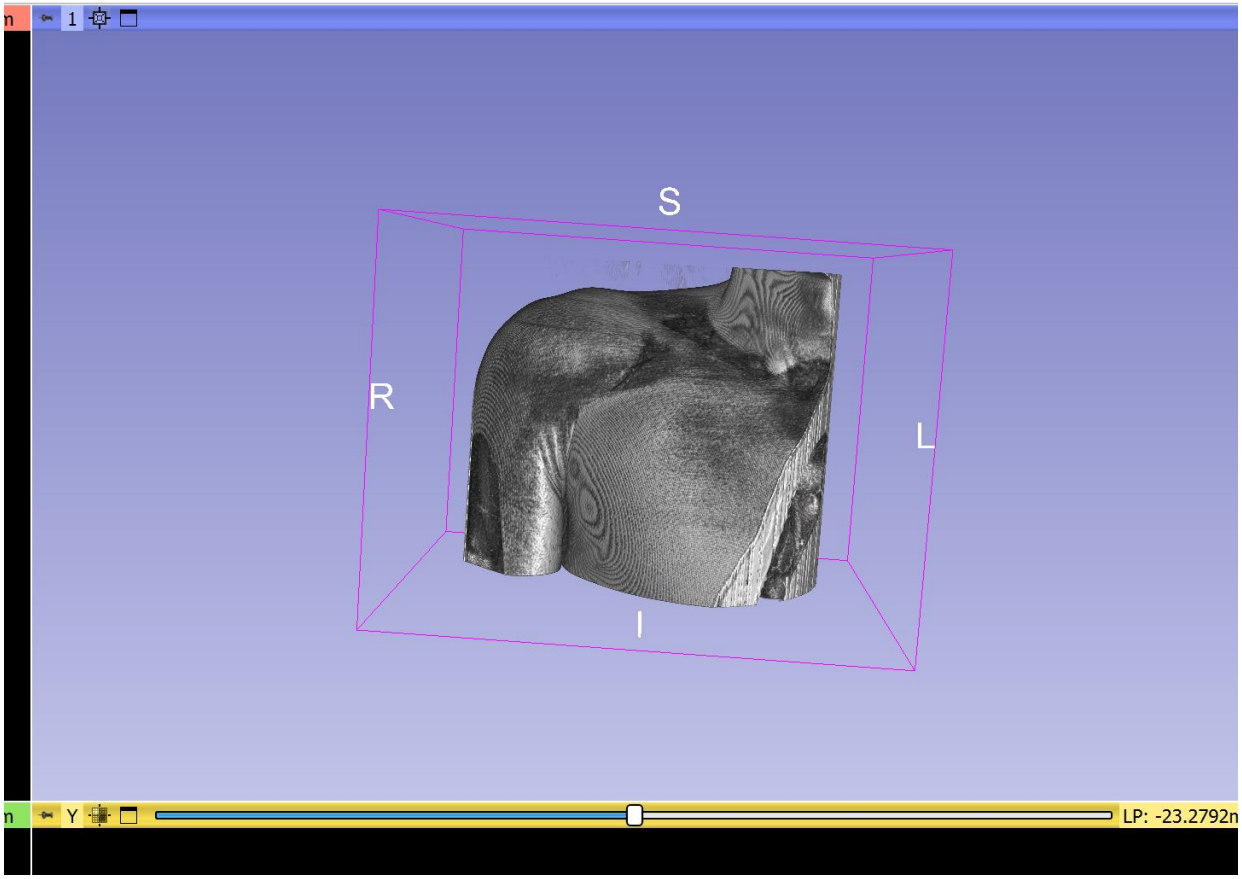
1: Click on the eye next to volume and open it.

2: Then in the top right box, click on the icon shown.

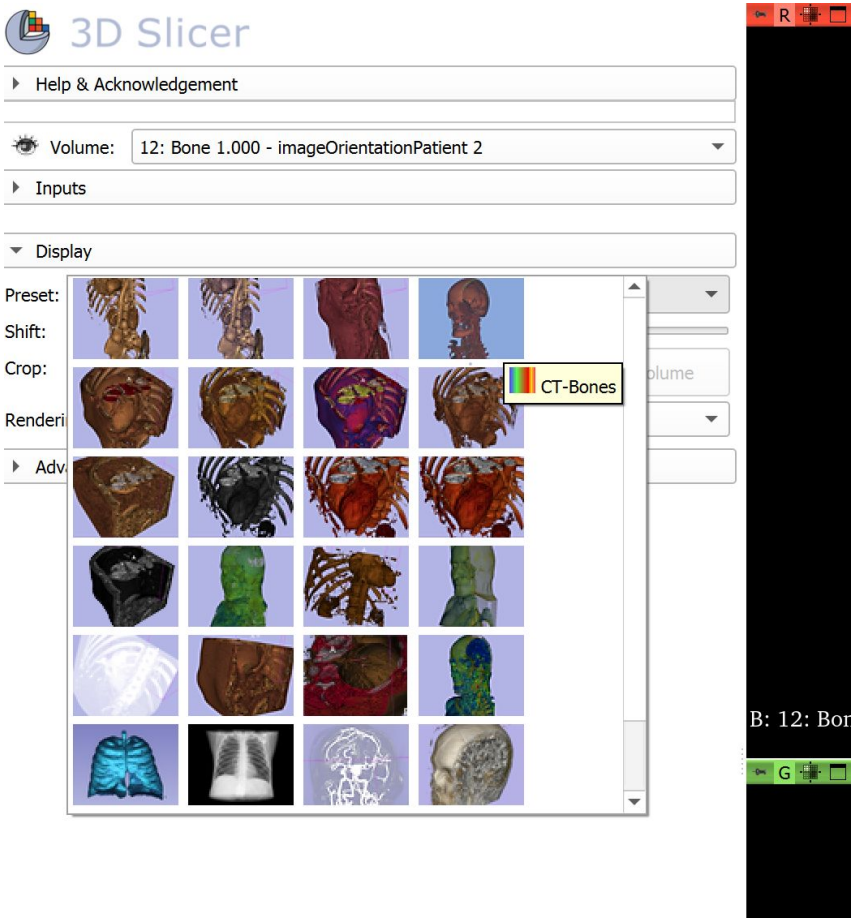
This will display the 3D shoulder. Depending on your processing speed, this may take several seconds.



3D Made



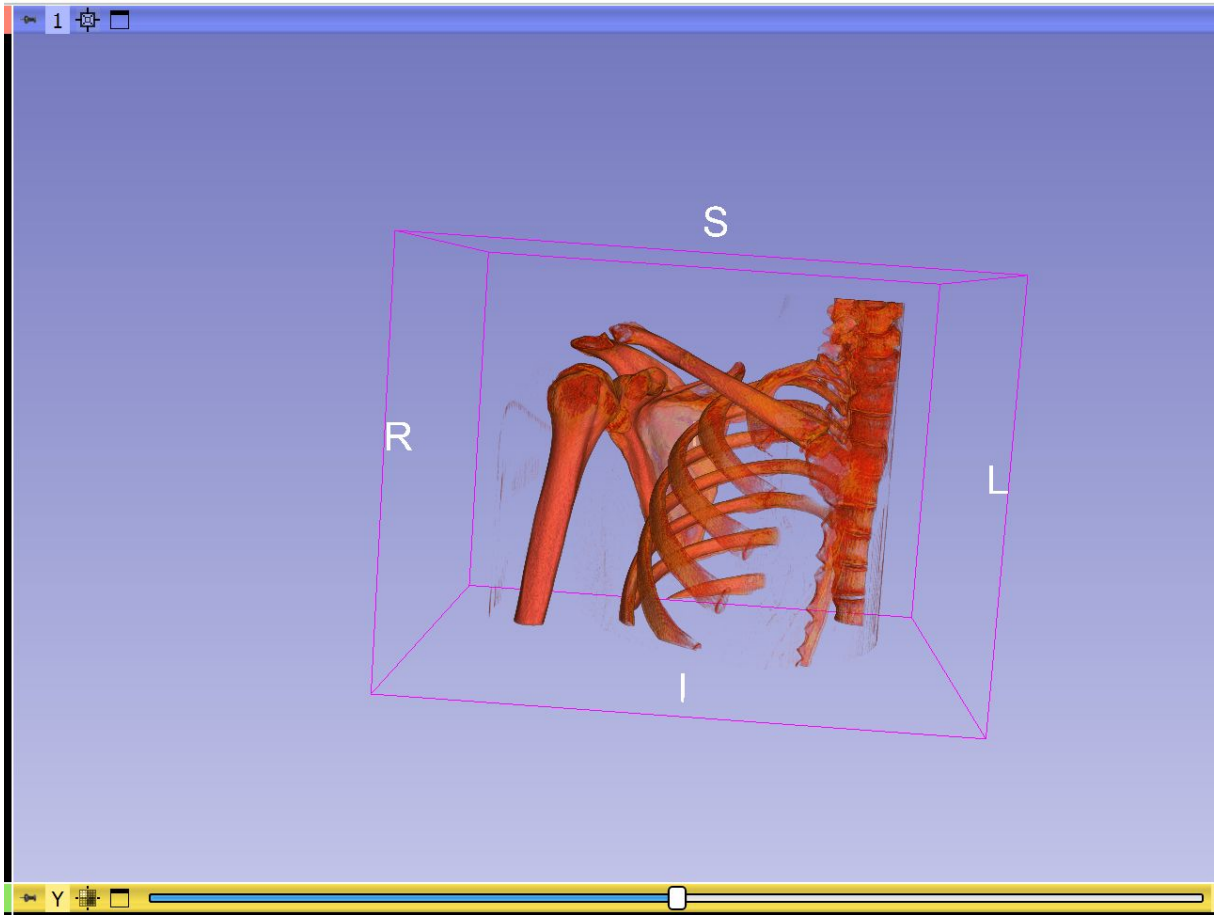
Isolate Bone



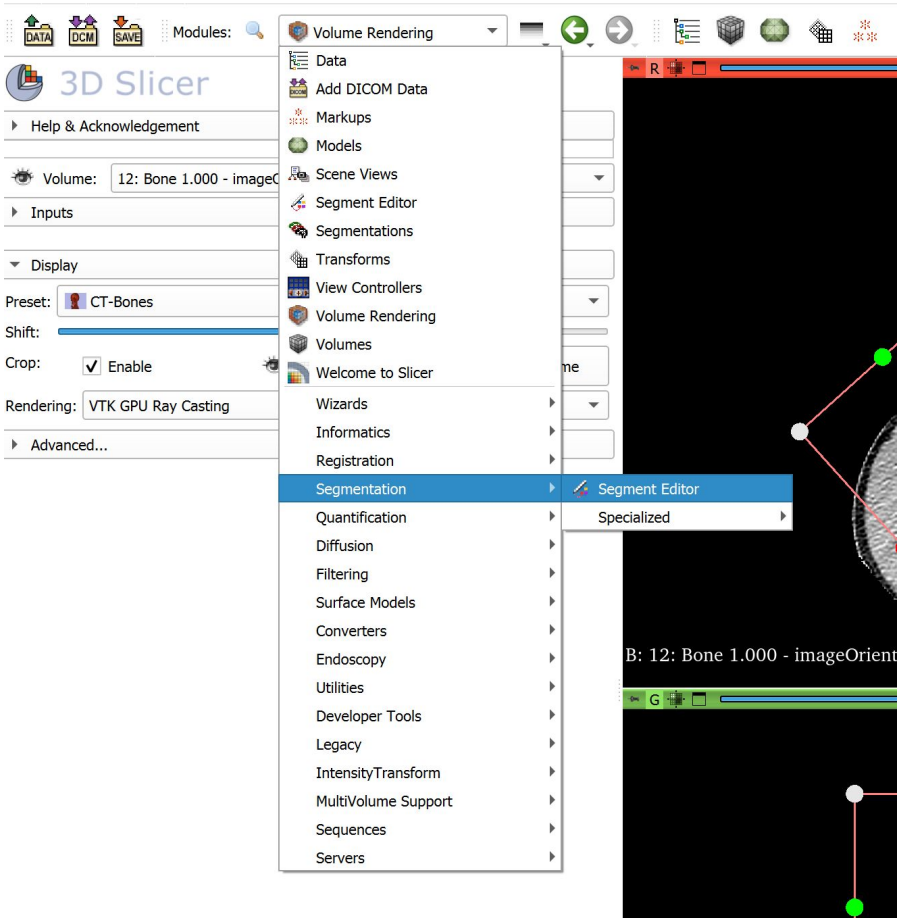
To isolate the bone, there are presets.

Under “Display”, select the CT Bone preset.

3D with just bones



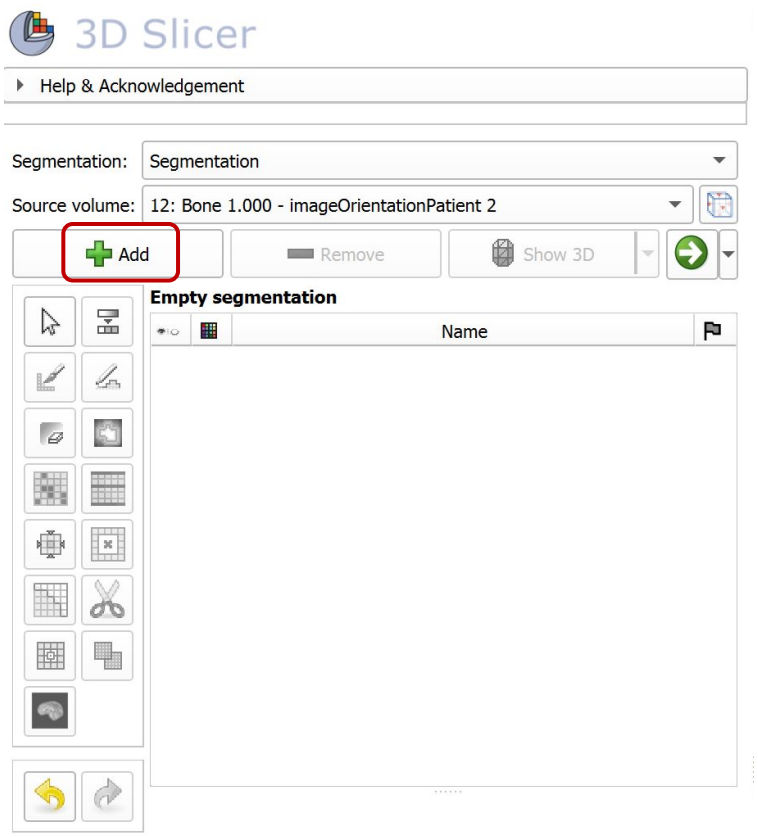
Module: Segment Editor

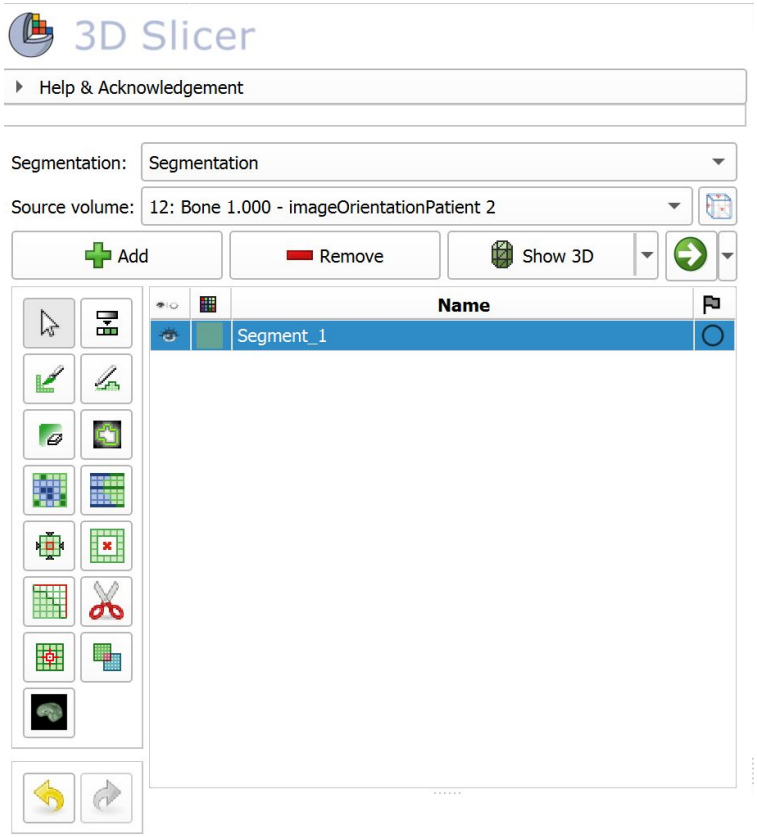


In the segment editor, you are able to isolate various parts of the CT (scapula, humerus, clavicle ribs).
If there is hardware, you can manually select the images to remove it.
For our purposes, we will only make 1 segment.

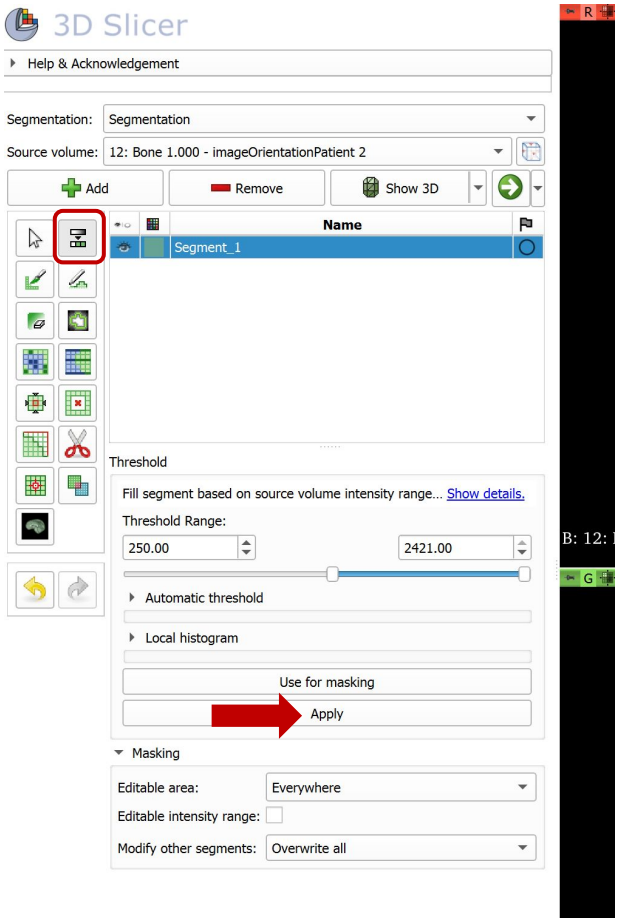
“Threshold” is using various levels of contrast to select our image of interest.

Create a Segment





Establish the Threshold



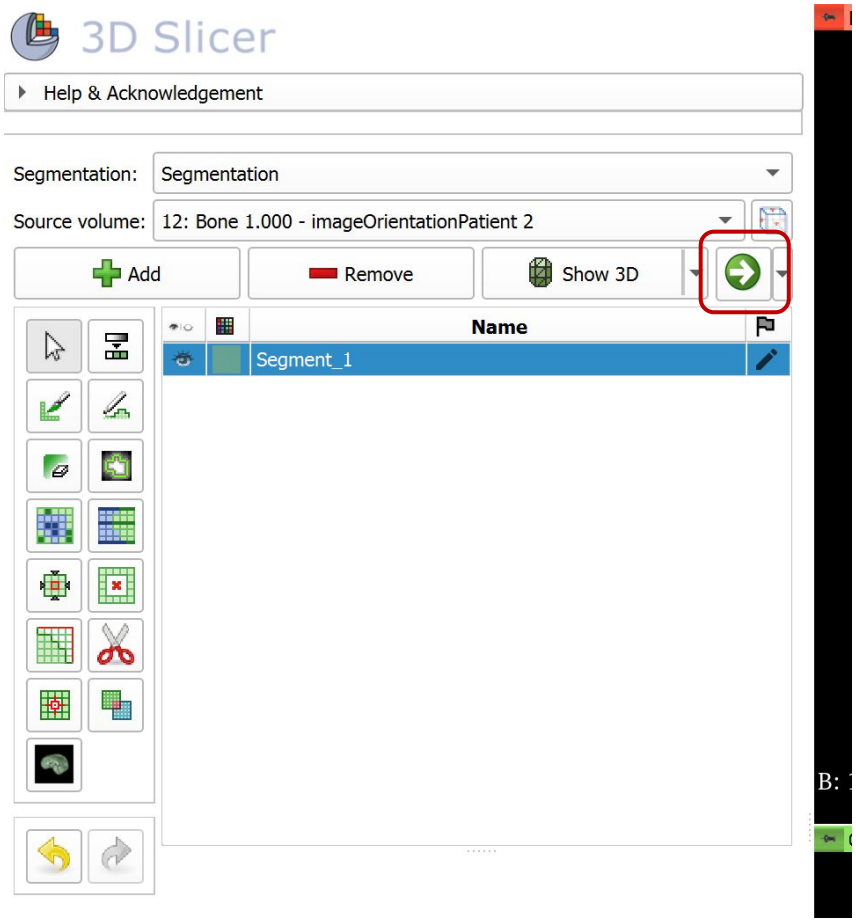
There is an auto-threshold icon, click on in and the images on the right will start blinking. Click on the image and it will stop blinking.

Then adjust the threshold to select only the bone. If the bone of interest in within the set contrast, it will show up as our segment color (in this instance green).

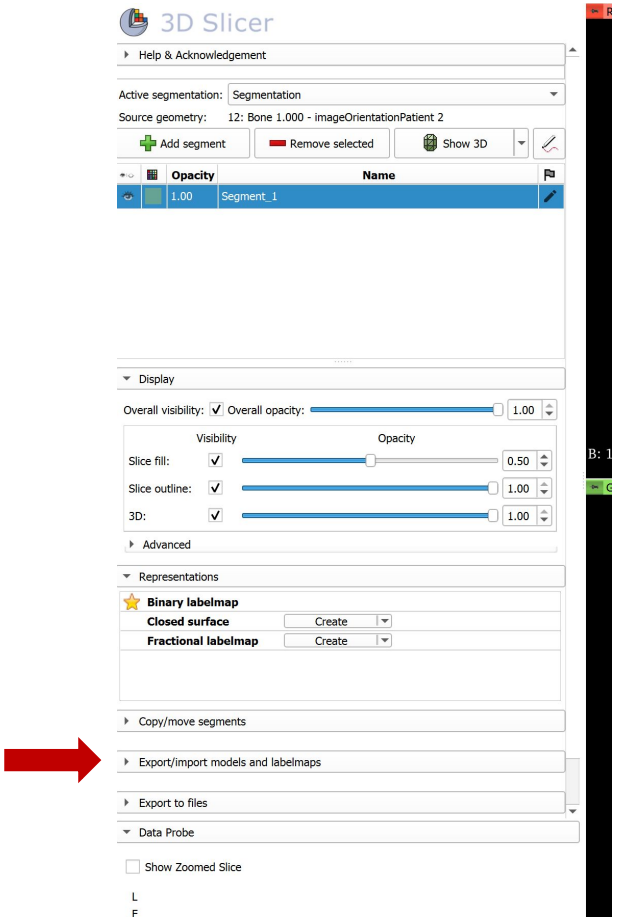
Adjust the contrast accordingly, but 250-2000+ should work well.

Then click Apply.

Export/Save


3D Slicer
Help & Acknowledgement
Segmentation:
Segmentation
Source volume:
12: Bone 1.000 - imageOrientationPatient 2
Add
Remove
Show 3D
Name
Segment_1

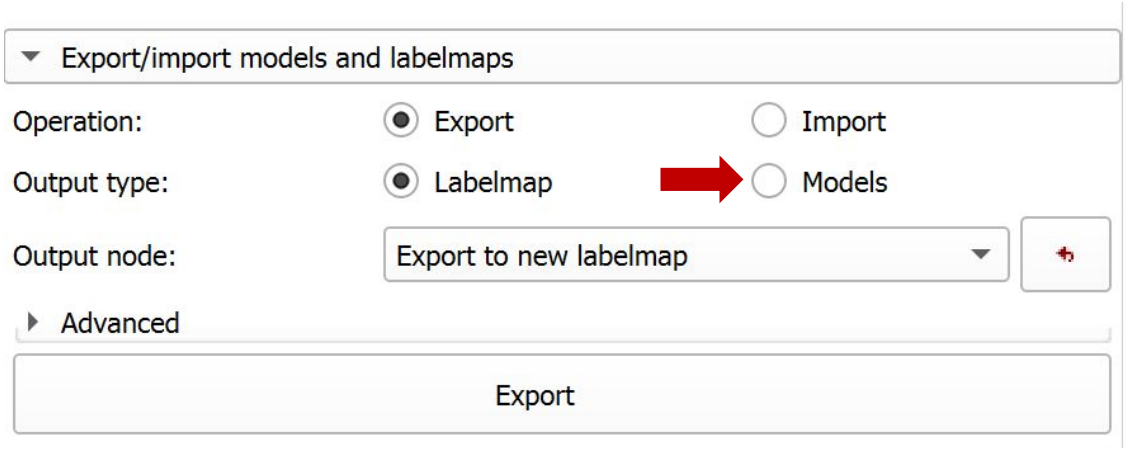
Export/Save



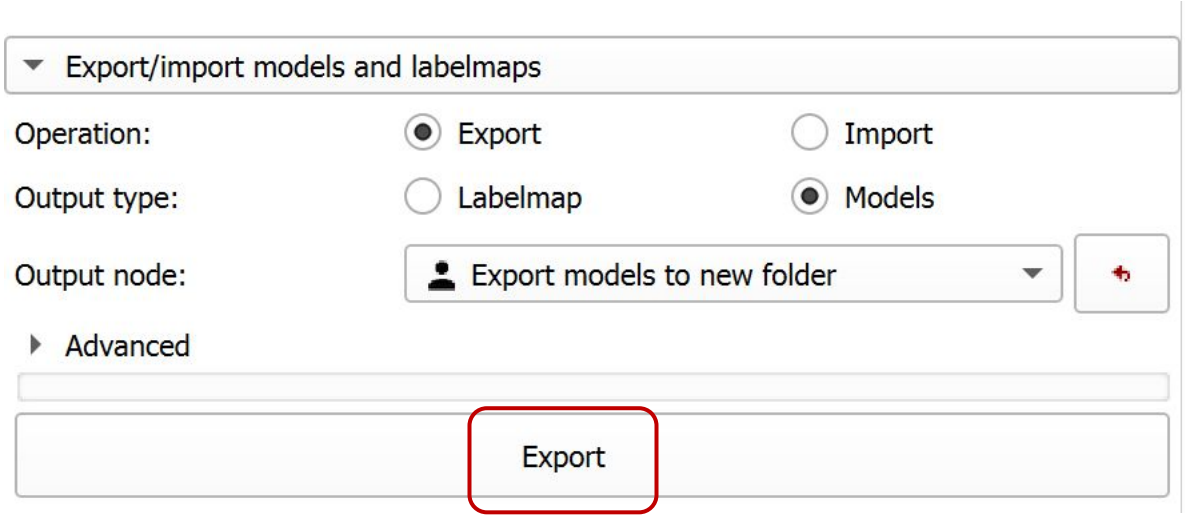
We want to export our segment.

Select the
“Export/import models and labelmaps”

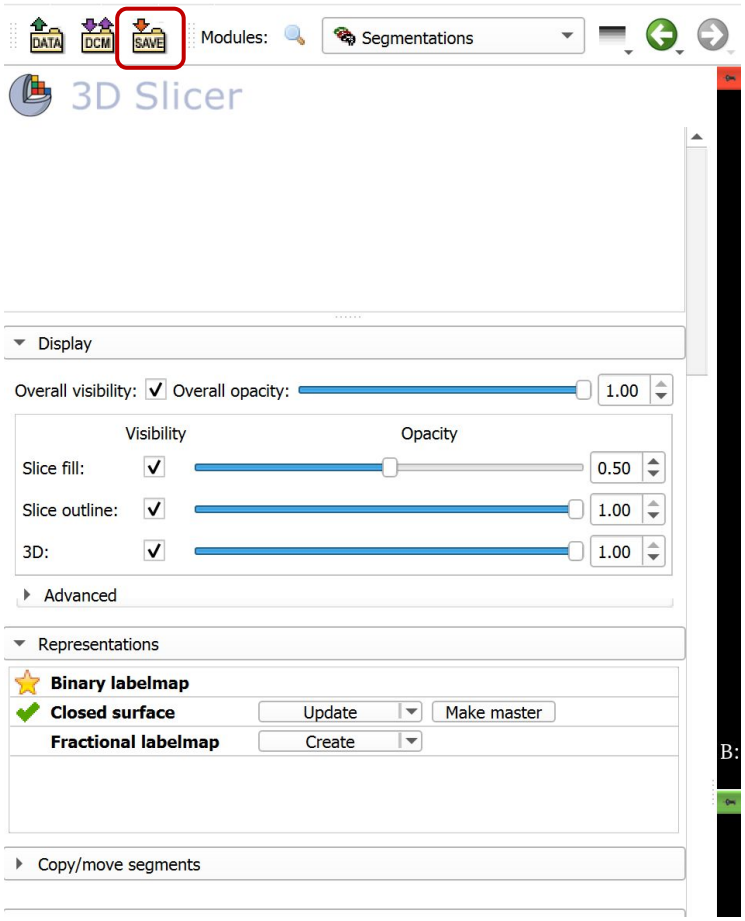
We want to save our model.



Then click “Export”

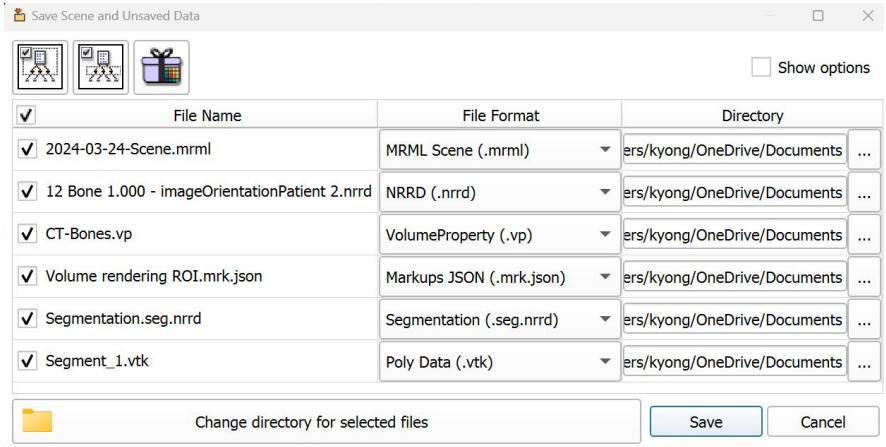


Save

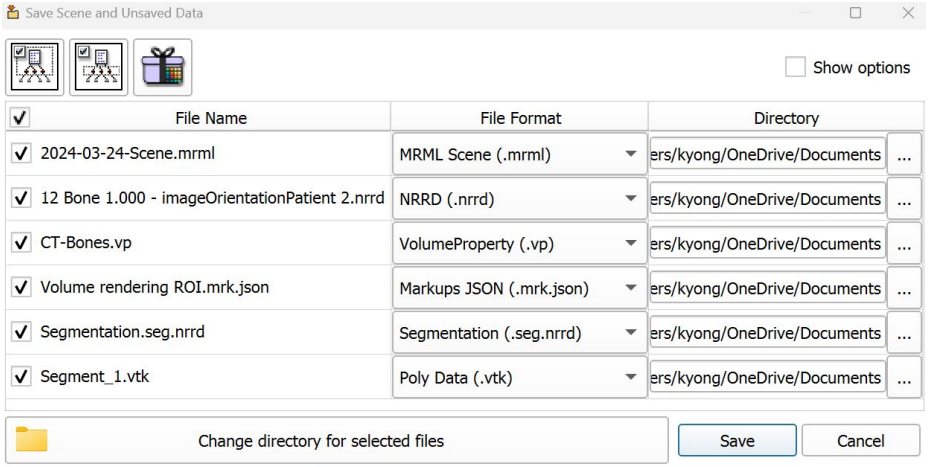


At the top, click the Save icon.

Then a window will pop-up as seen below.

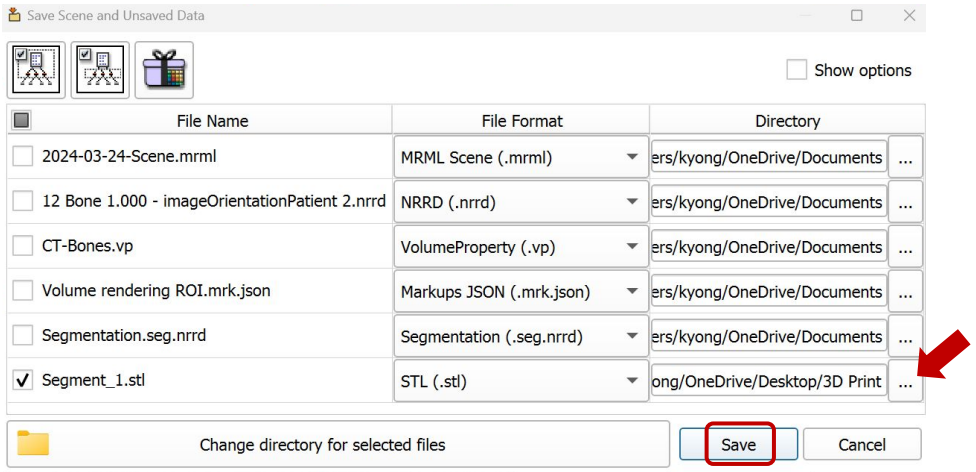


Only STL file

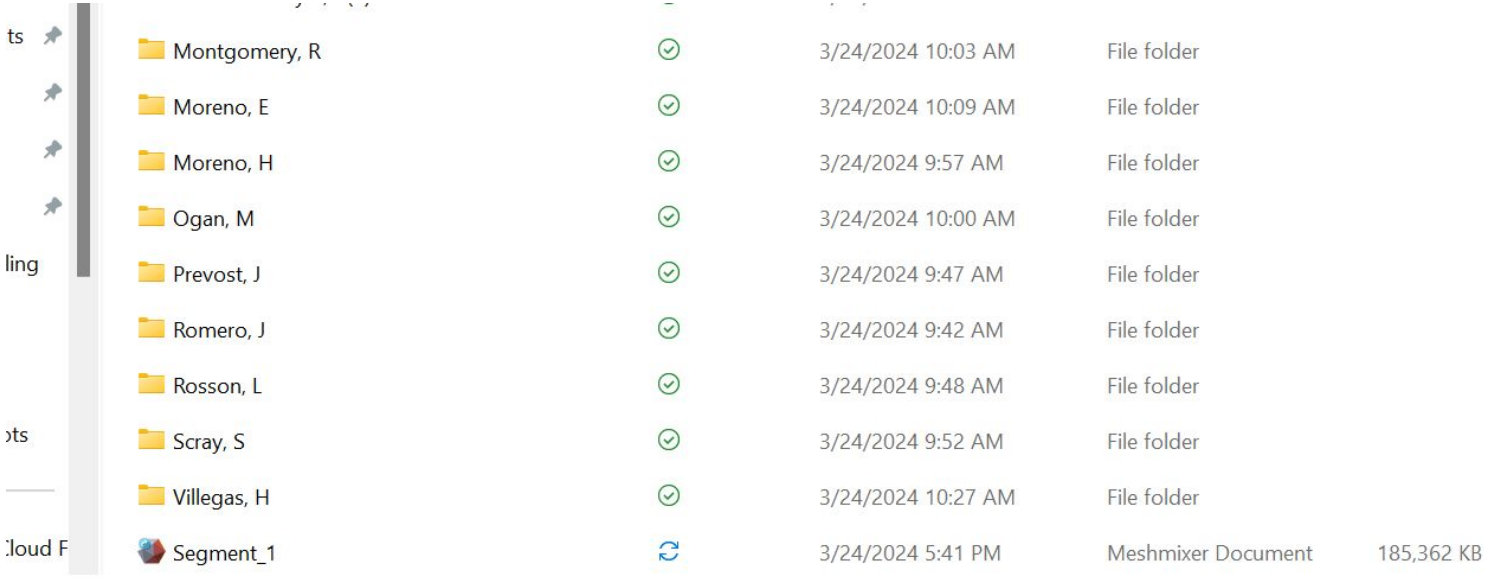


We only want the STL file. So click on our segment (Segment_1) and make the file format STL (.stl).

Make sure you save it to somewhere you can find it (arrow).



File saved in the “3D” Folder



Montgomery, R	3/24/2024 10:03 AM	File folder	
Moreno, E	3/24/2024 10:09 AM	File folder	
Moreno, H	3/24/2024 9:57 AM	File folder	
Ogan, M	3/24/2024 10:00 AM	File folder	
Prevost, J	3/24/2024 9:47 AM	File folder	
Romero, J	3/24/2024 9:42 AM	File folder	
Rosson, L	3/24/2024 9:48 AM	File folder	
Scray, S	3/24/2024 9:52 AM	File folder	
Villegas, H	3/24/2024 10:27 AM	File folder	
Segment_1	3/24/2024 5:41 PM	Meshmixer Document	185,362 KB

Meshmixer

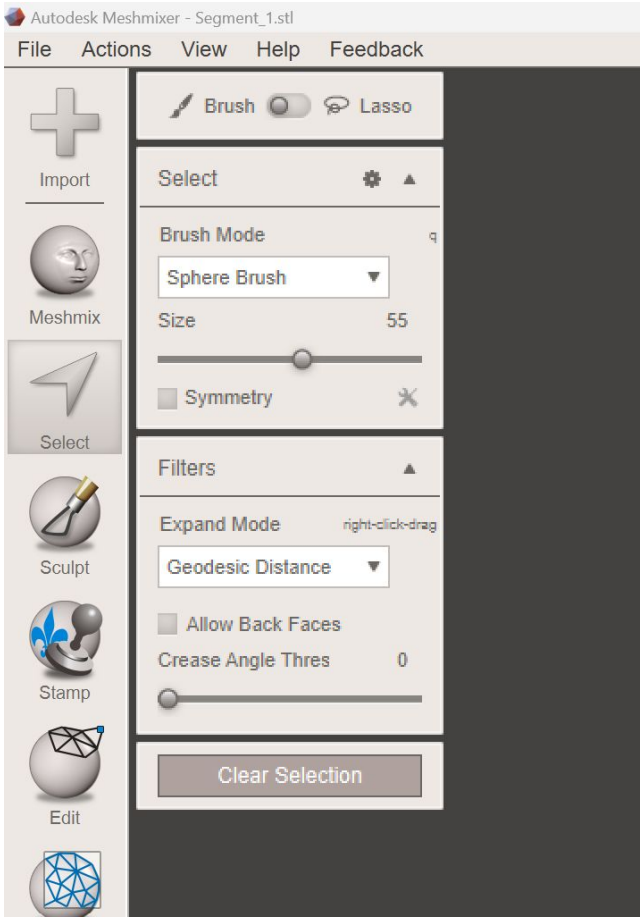
- Meshmixer can be used to further clean up our 3D STL file.
- Use Meshmixer to open our SLT file.

3D-STL file opened in Meshmixer

There is some artifact that was captured and some other structures (spine, clavicle, ect) that we do not need.

So we can use the select tool to delete and remove those items.

Meshmixer: Select tool

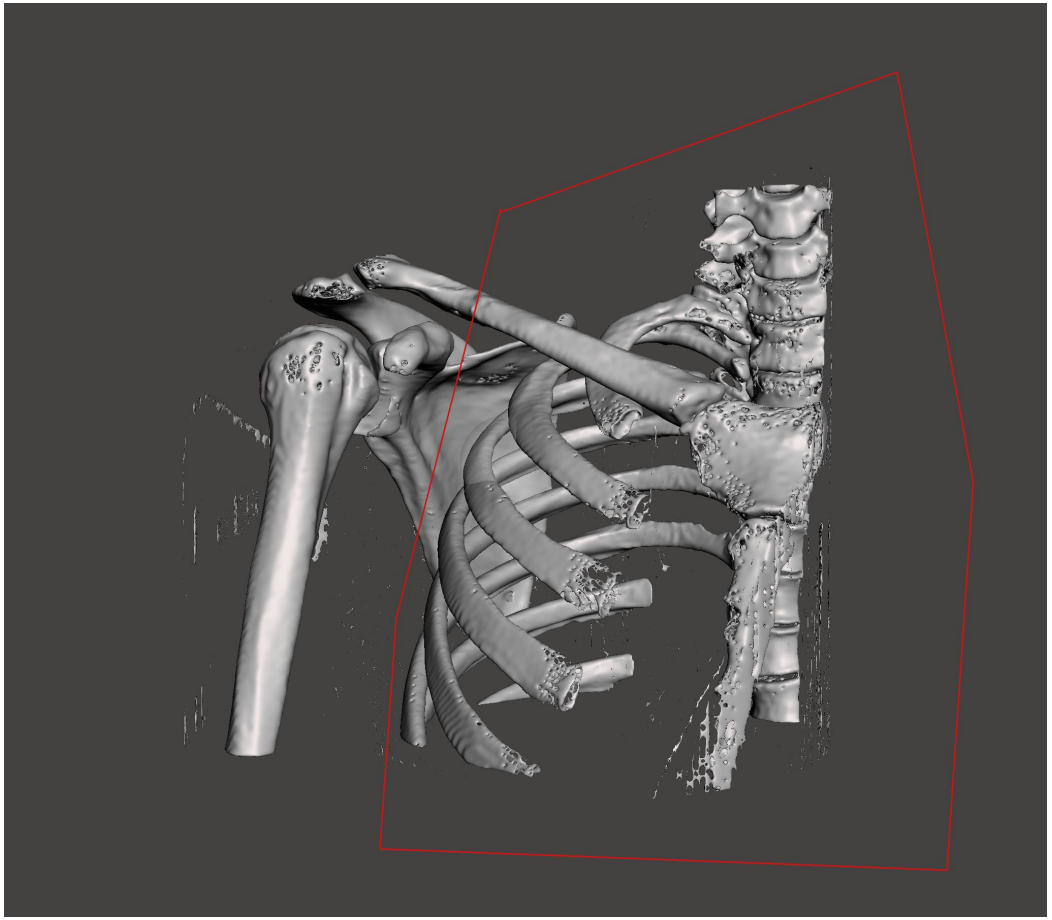


Using the Select tool you can remove parts of the 3D by brushing/erasing or by selecting around the object.

I find it easy to select around and erase.

Click on the Select icon, you don't need to select Brush or Lasso.

Click to highlight and delete

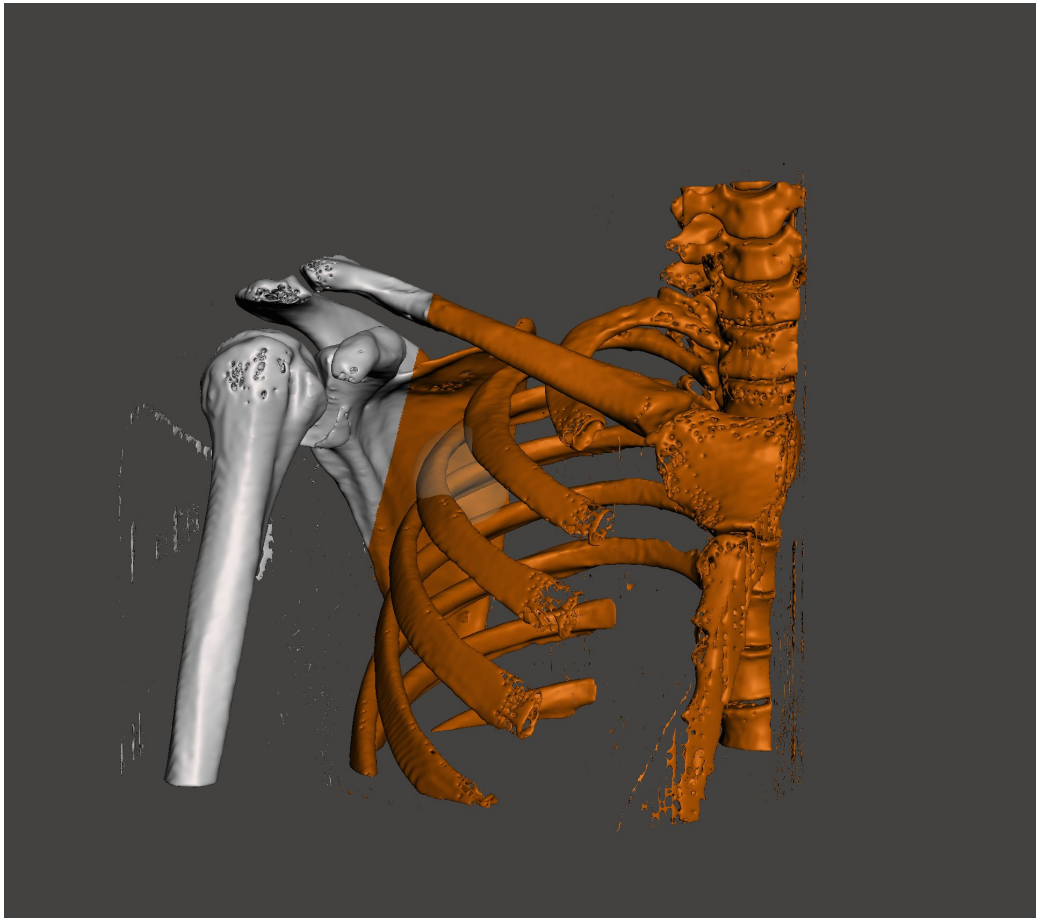


Select around the area you want to delete.

Hold right click and drag to move the image around. You can also Zoom in or out as needed.

Use left click to draw the boundary.

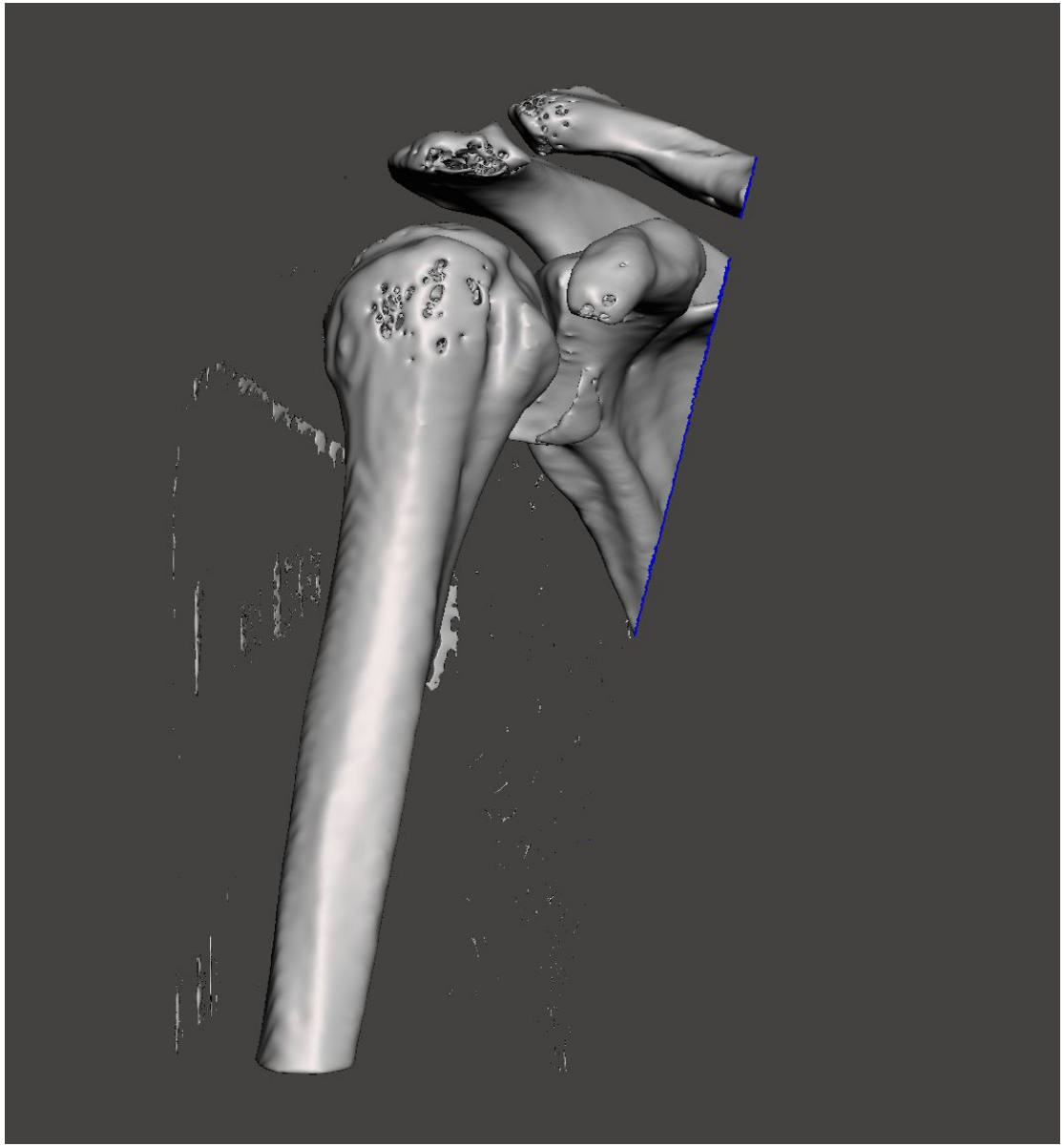
Highlighted section

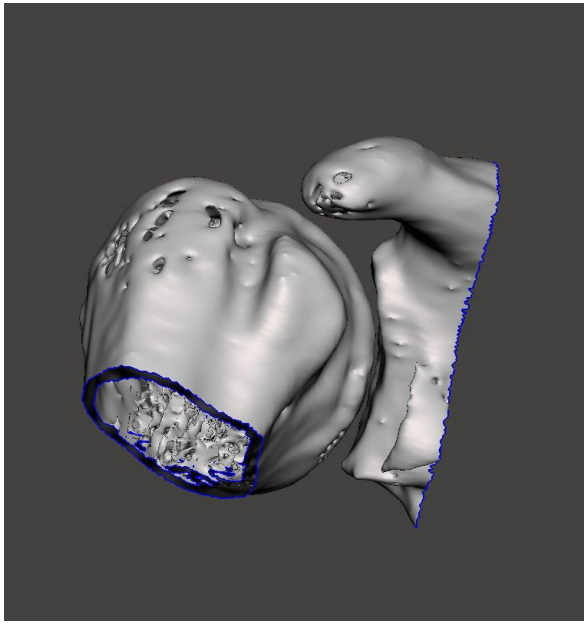


Press “delete” on your keyboard to remove the highlighted section.

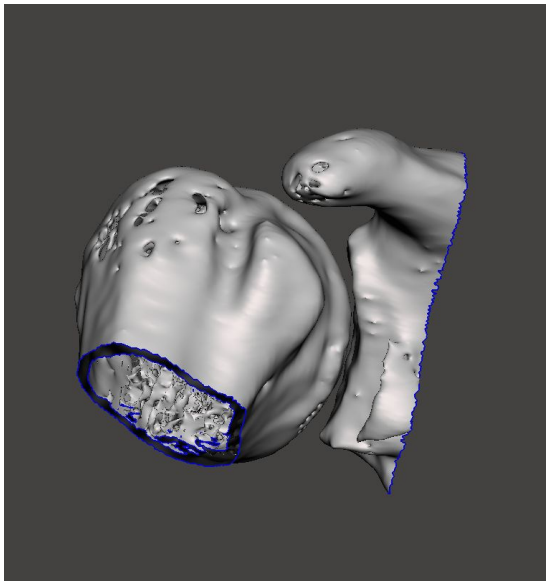
Press “escape” to do it over.

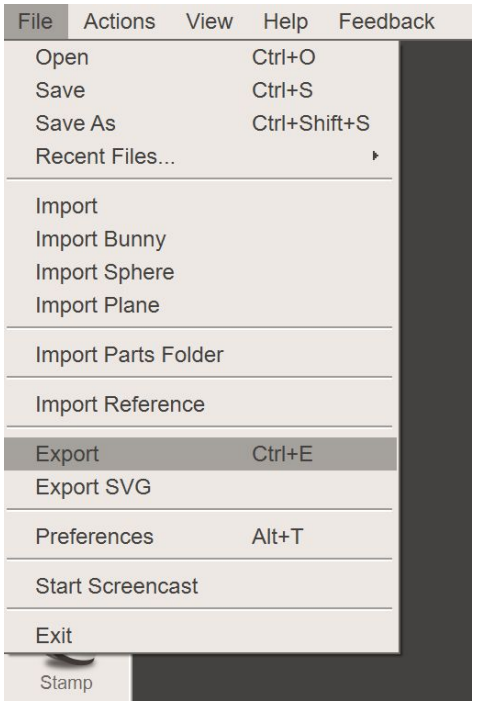
Repeat as needed to isolate our area of interest.





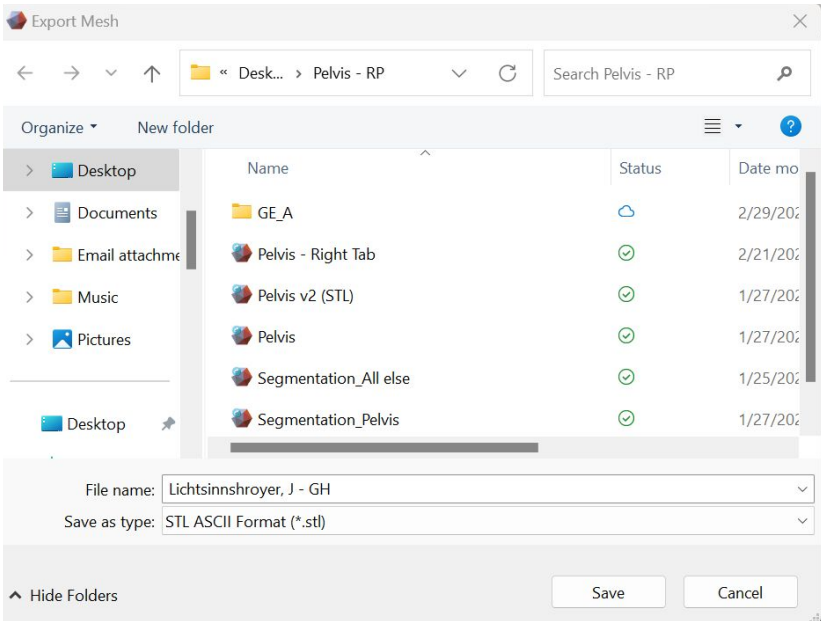
Export (Save)





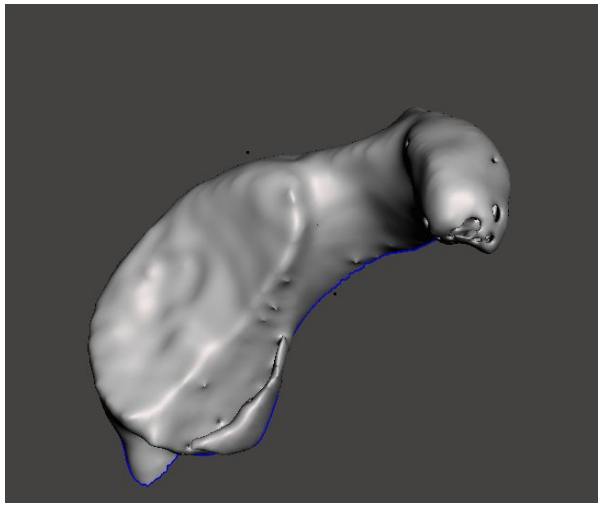
Once we have the isolated glenohumeral joint. Export the file.

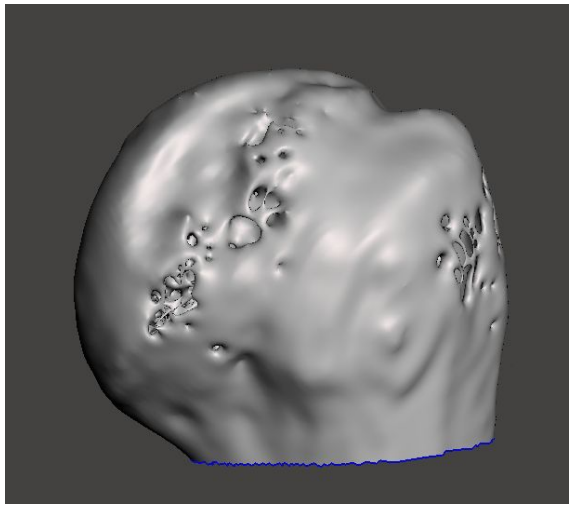
Save it as the patient's name and GH.

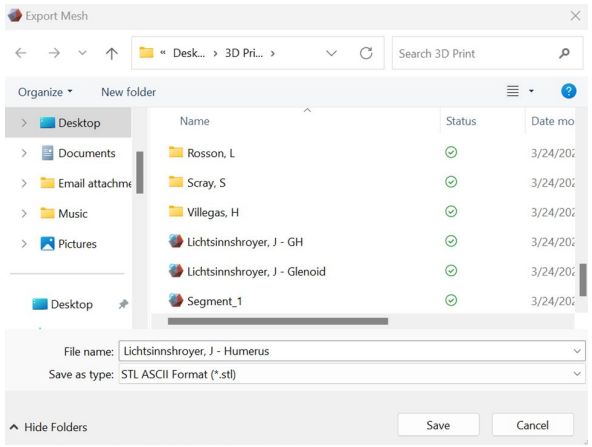


Separate Humerus & Glenoid

- We need the glenoid and humerus as two different files. So use the selection tool to isolate the area of interest and export/save accordingly.







End Product

- In the end, we should have 4 files:
  - Original Segmentation STL, file name:
    Patient Name – All.stl
  - Glenohumeral Joint, file name:
    Patient Name – GH.stl
  - Humerus, file name:
    Patient Name – Humerus.stl
  - Glenoid, file name:
    Patient Name – Glenoid.stl

Printing

- In order to print the SLTs, it needs to be converted to a g-code. This is printer specific. There are various programs that can do this. The most common ones are PrusaSlicer and Cura.
- I use the program that came with my printer (Crealty).
- Each print will probably take 1-4 hours to print depending on the printer and how big the model is.