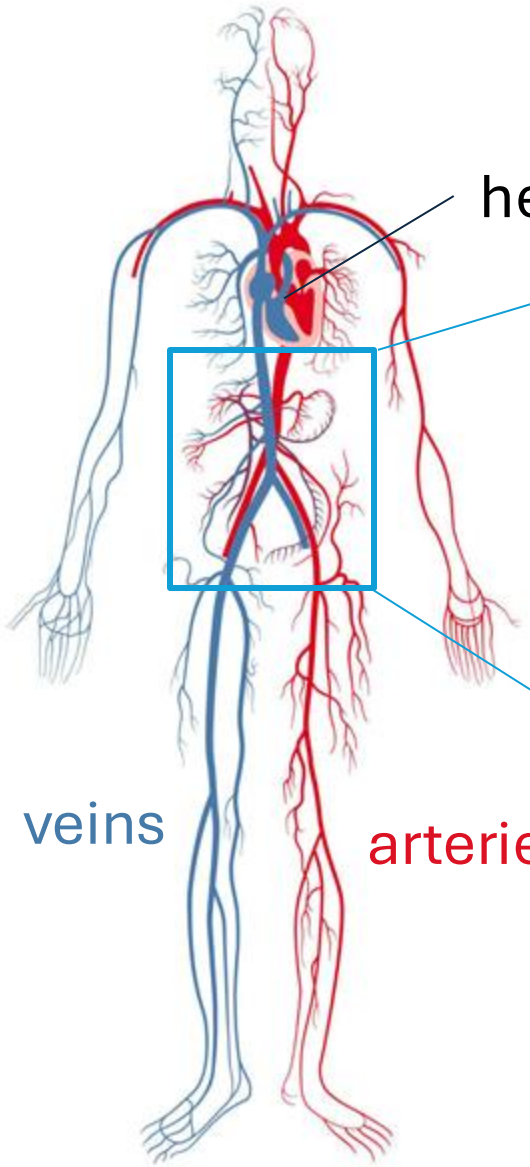
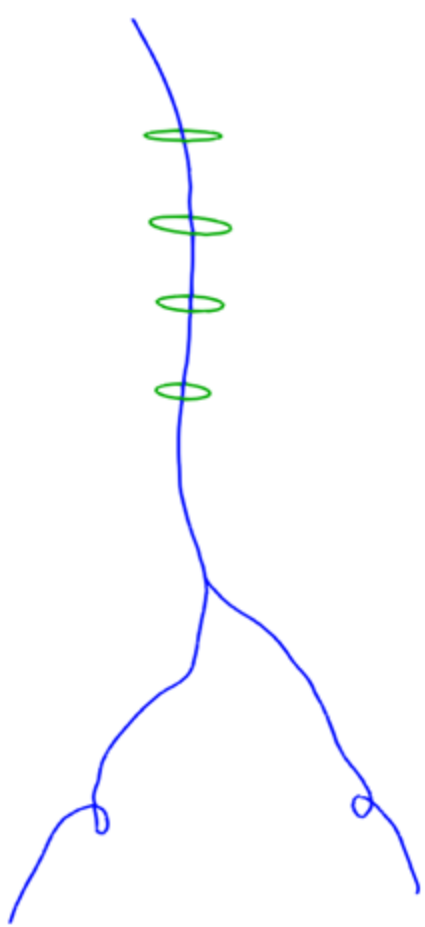

SimVascular

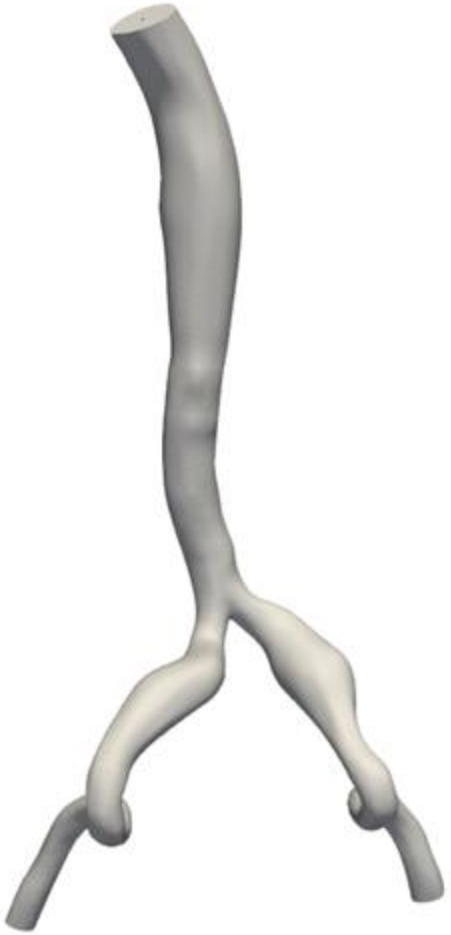


X-Ray images of aorta and iliac arteries

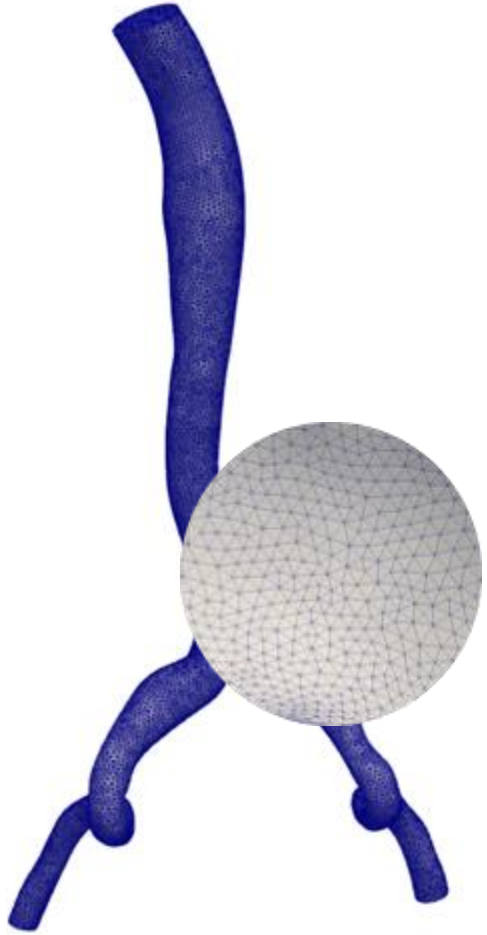
PATH



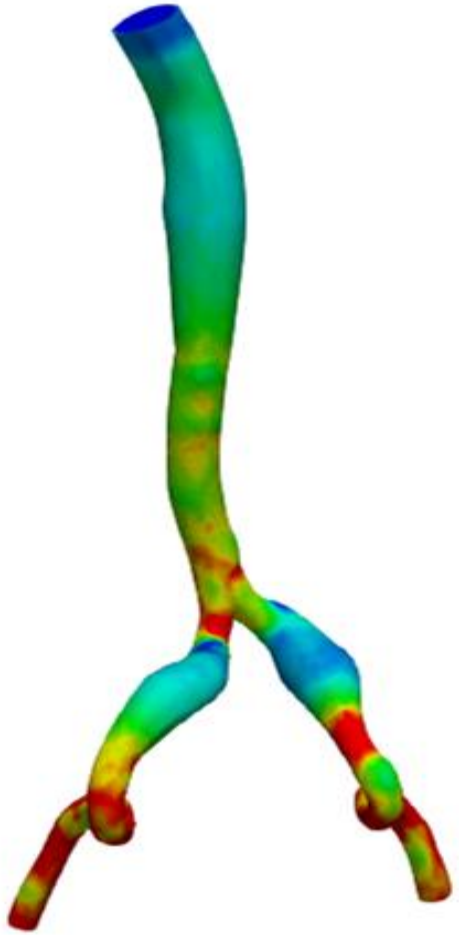
SEGMENTATION



GEOMETRIC MODEL

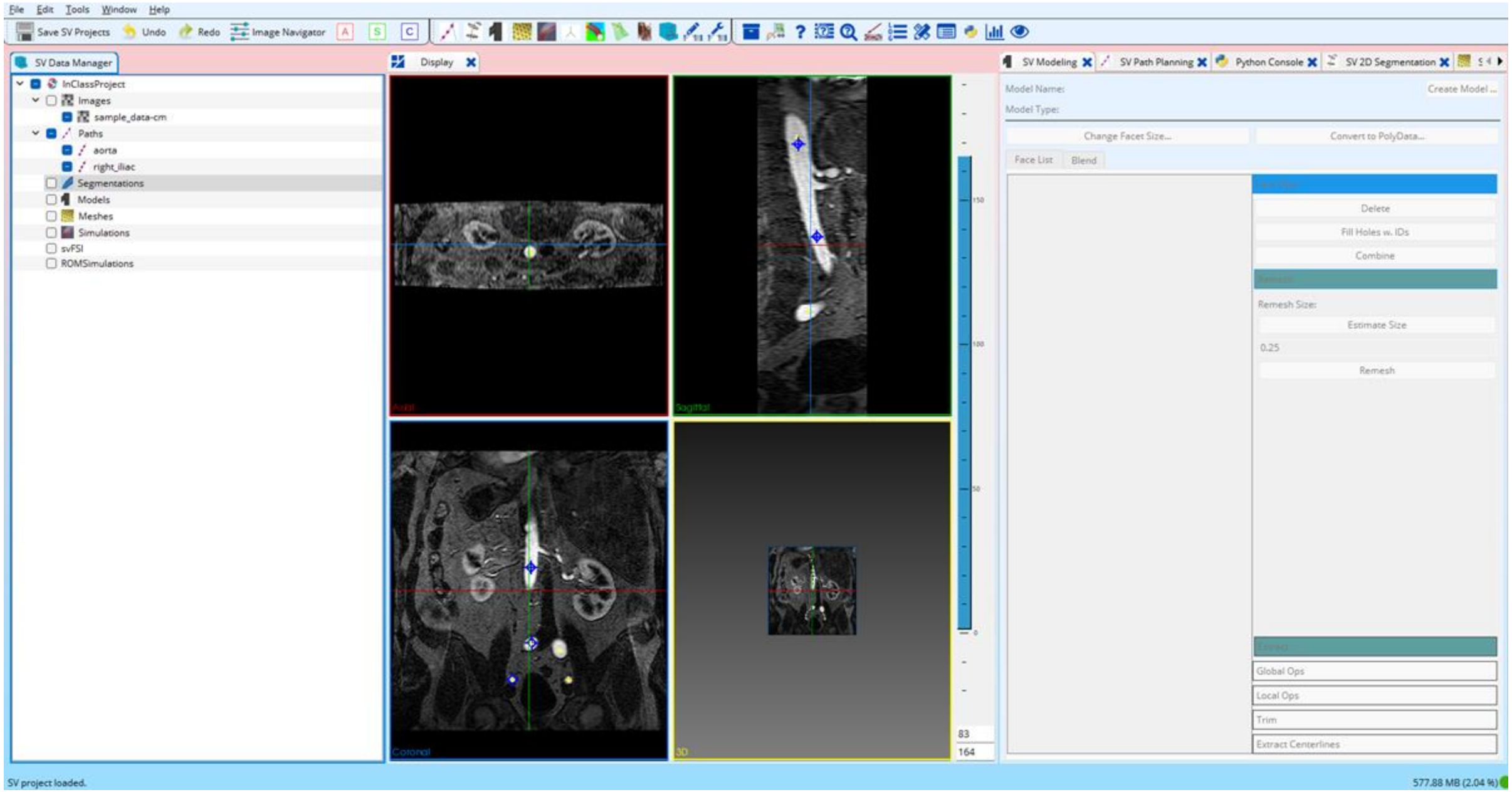


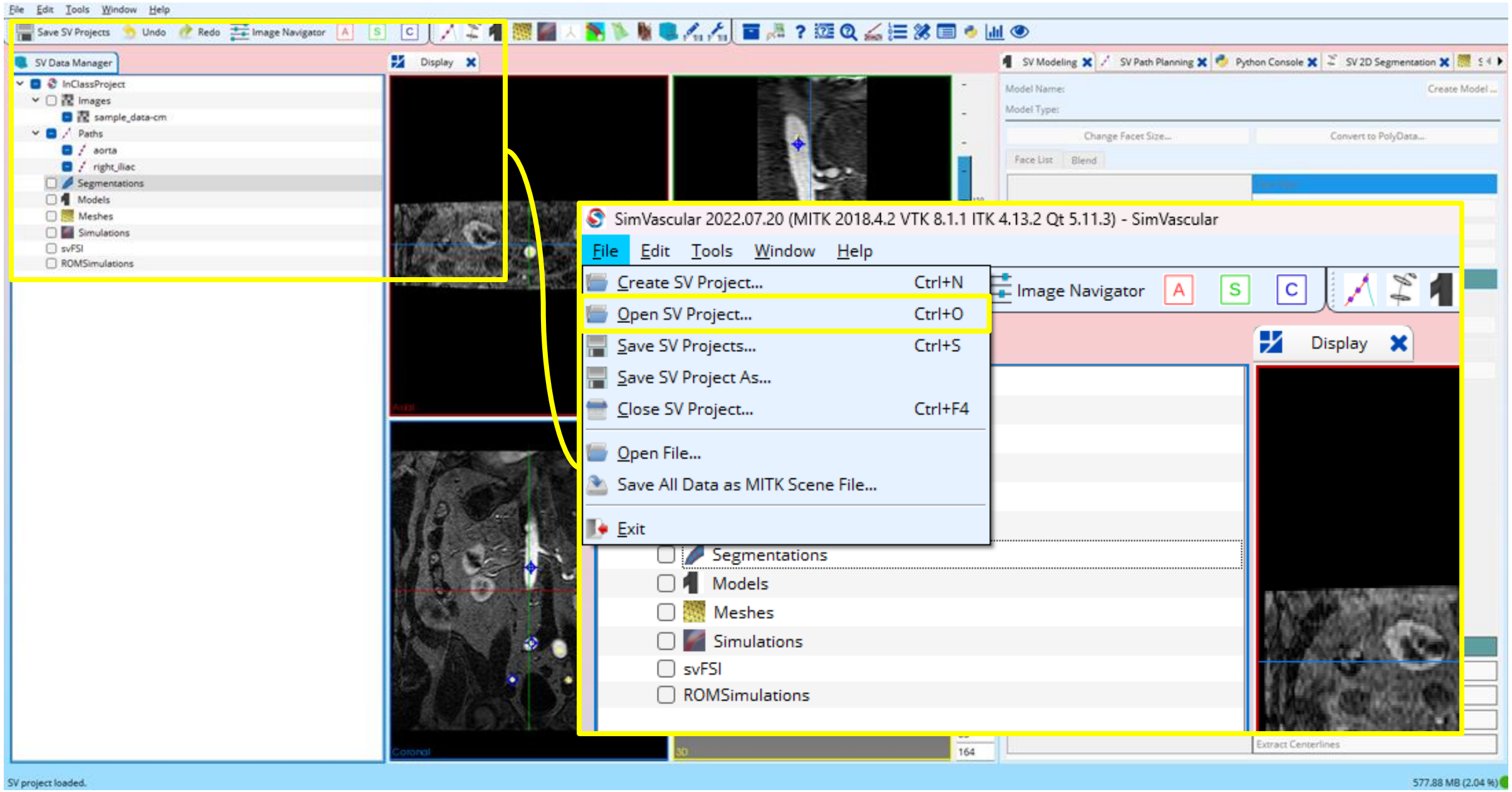
MESH

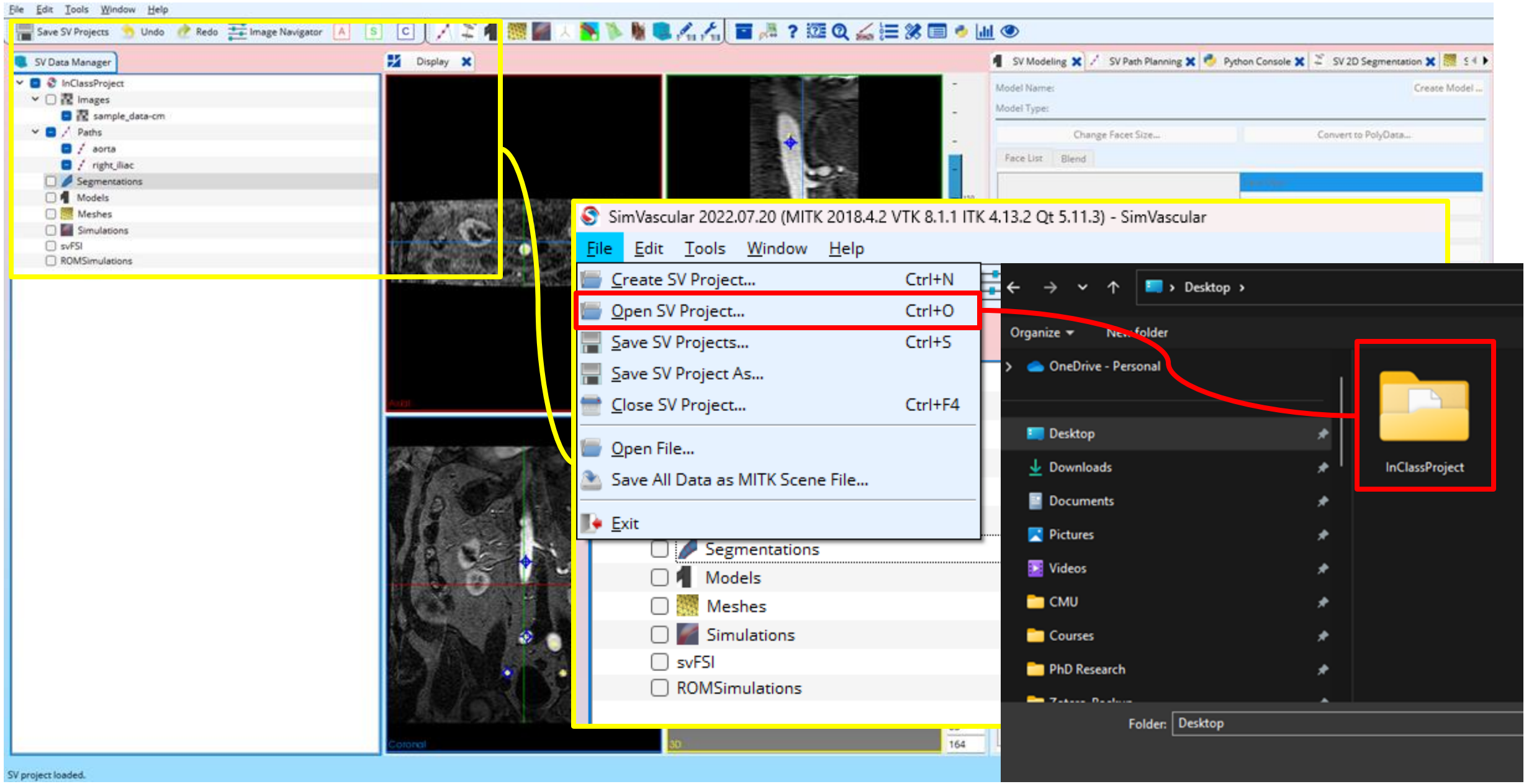


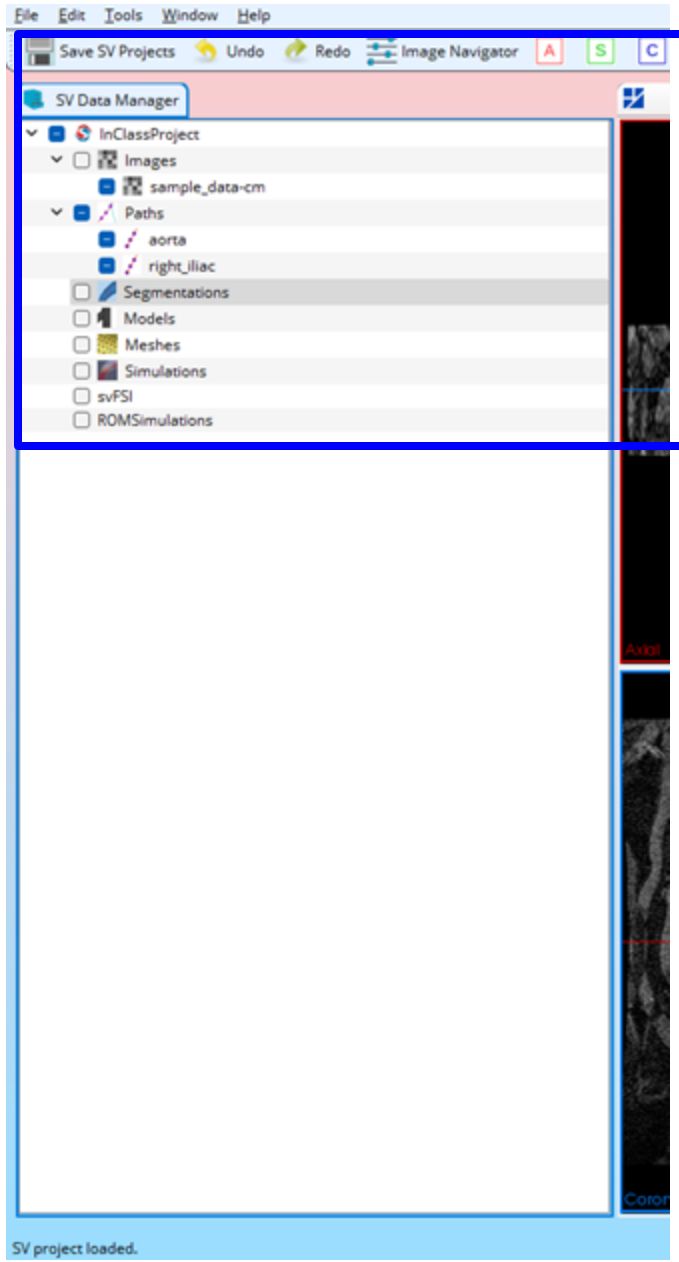
SIMULATION

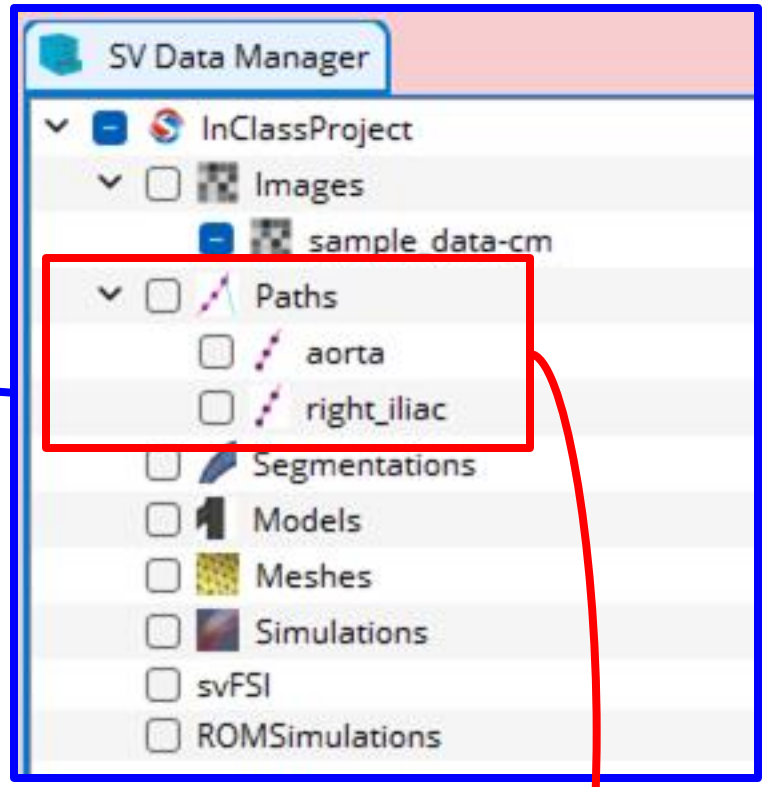
We will build models of these blood vessels!

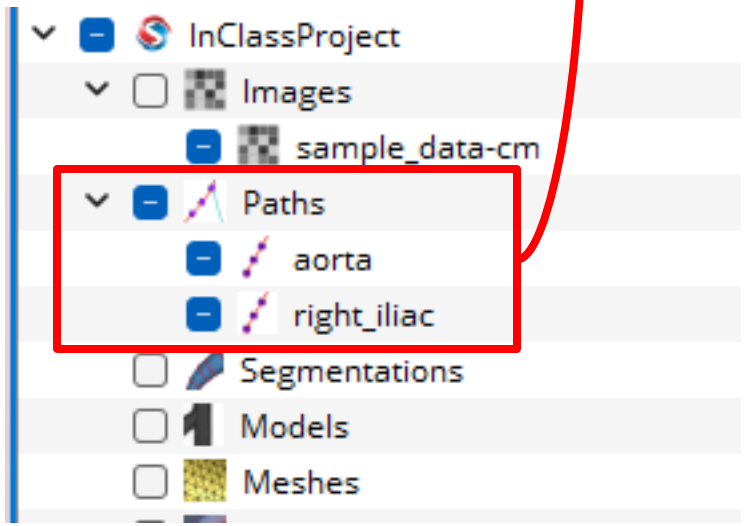

File
Edit
Tools
Window
Help
Save SV Projects
Undo
Redo
Image Navigator
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
Models
Meshes
Simulations
svFSI
ROMSimulations
Display
Axial
Sagittal
Coronal
3D
SV Modeling
SV Path Planning
Python Console
SV 2D Segmentation
Model Name:
Create Model ...
Model Type:
Change Facet Size...
Convert to PolyData...
Face List
Blend
Delete
Fill Holes w. IDs
Combine
Remesh Size:
Estimate Size
0.25
Remesh
Global Ops
Local Ops
Trim
Extract Centerlines
SV project loaded.
577.88 MB (2.04 %)

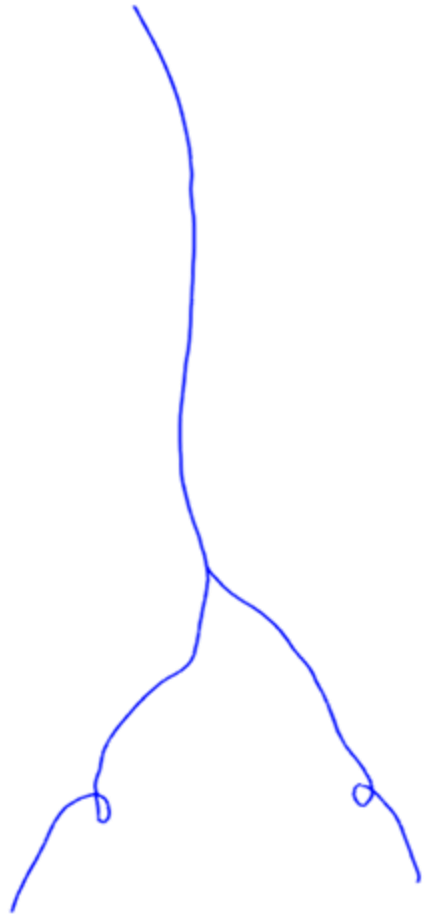

File Edit Tools Window Help
Save SV Projects
Undo
Redo
Image Navigator
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
Models
Meshes
Simulations
svFSI
ROMSimulations
Display
SV Modeling
SV Path Planning
Python Console
SV 2D Segmentation
Model Name:
Model Type:
Create Model ...
Change Facet Size...
Convert to PolyData...
Face List
Blend
SimVascular 2022.07.20 (MITK 2018.4.2 VTK 8.1.1 ITK 4.13.2 Qt 5.11.3) - SimVascular
File Edit Tools Window Help
Create SV Project... Ctrl+N
Open SV Project... Ctrl+O
Save SV Projects... Ctrl+S
Save SV Project As...
Close SV Project... Ctrl+F4
Open File...
Save All Data as MITK Scene File...
Exit
Image Navigator
Display
Segmentations
Models
Meshes
Simulations
svFSI
ROMSimulations
Extract Centerlines
SV project loaded.
577.88 MB (2.04 %)


File Edit Tools Window Help
Save SV Projects
Undo
Redo
Image Navigator
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
Models
Meshes
Simulations
svFSI
ROMSimulations
Display
SV Modeling
SV Path Planning
Python Console
SV 2D Segmentation
Model Name:
Create Model ...
Model Type:
Change Facet Size...
Convert to PolyData...
Face List
Blend
SimVascular 2022.07.20 (MITK 2018.4.2 VTK 8.1.1 ITK 4.13.2 Qt 5.11.3) - SimVascular
File Edit Tools Window Help
Create SV Project... Ctrl+N
Open SV Project... Ctrl+O
Save SV Projects... Ctrl+S
Save SV Project As...
Close SV Project... Ctrl+F4
Open File...
Save All Data as MITK Scene File...
Exit
Segmentations
Models
Meshes
Simulations
svFSI
ROMSimulations
Desktop
Organize
OneDrive - Personal
Desktop
Downloads
Documents
Pictures
Videos
CMU
Courses
PhD Research
InClassProject
Folder: Desktop
Coronal
3D
164
SV project loaded.

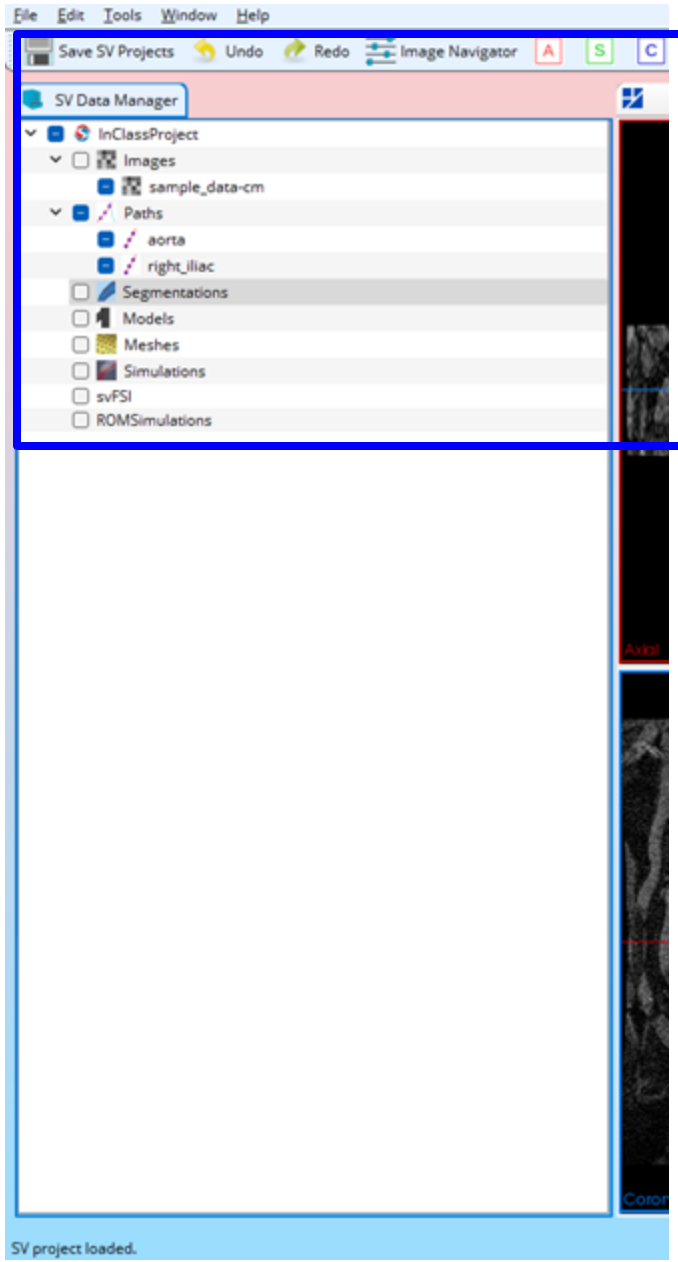


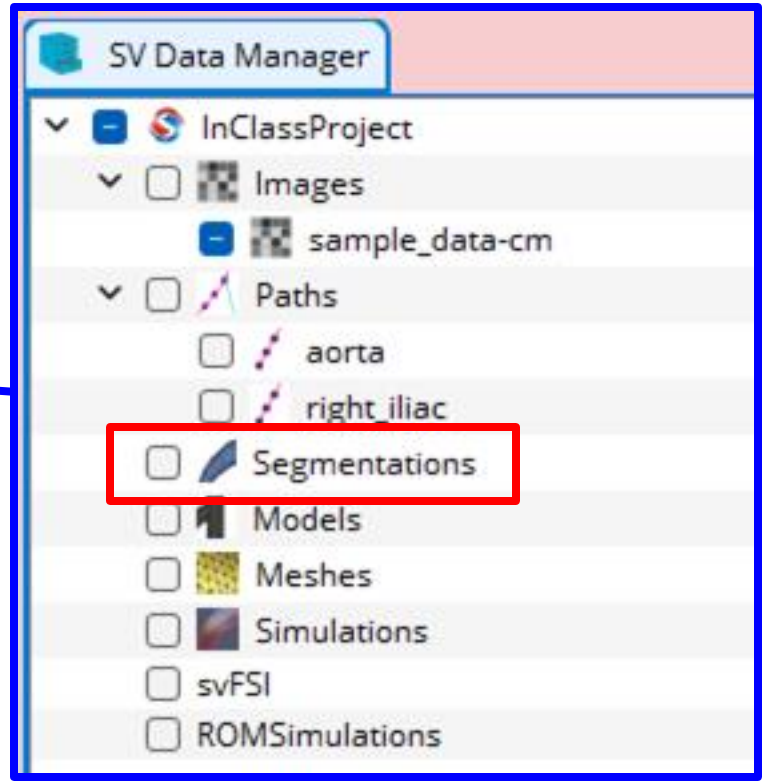


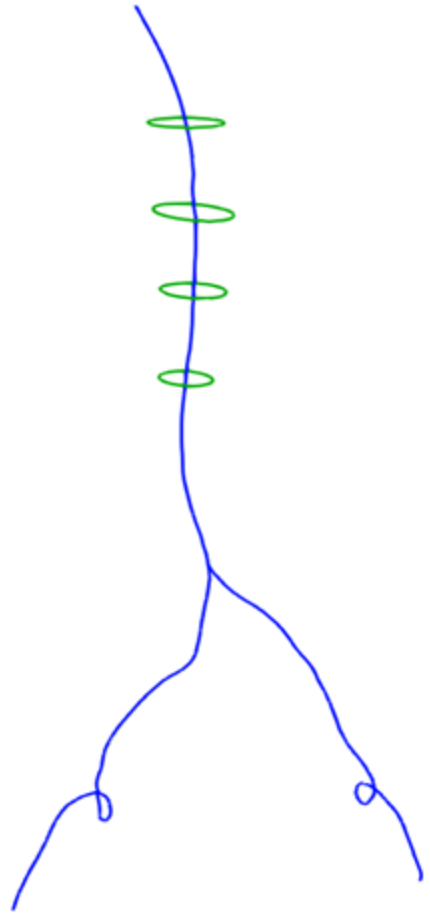




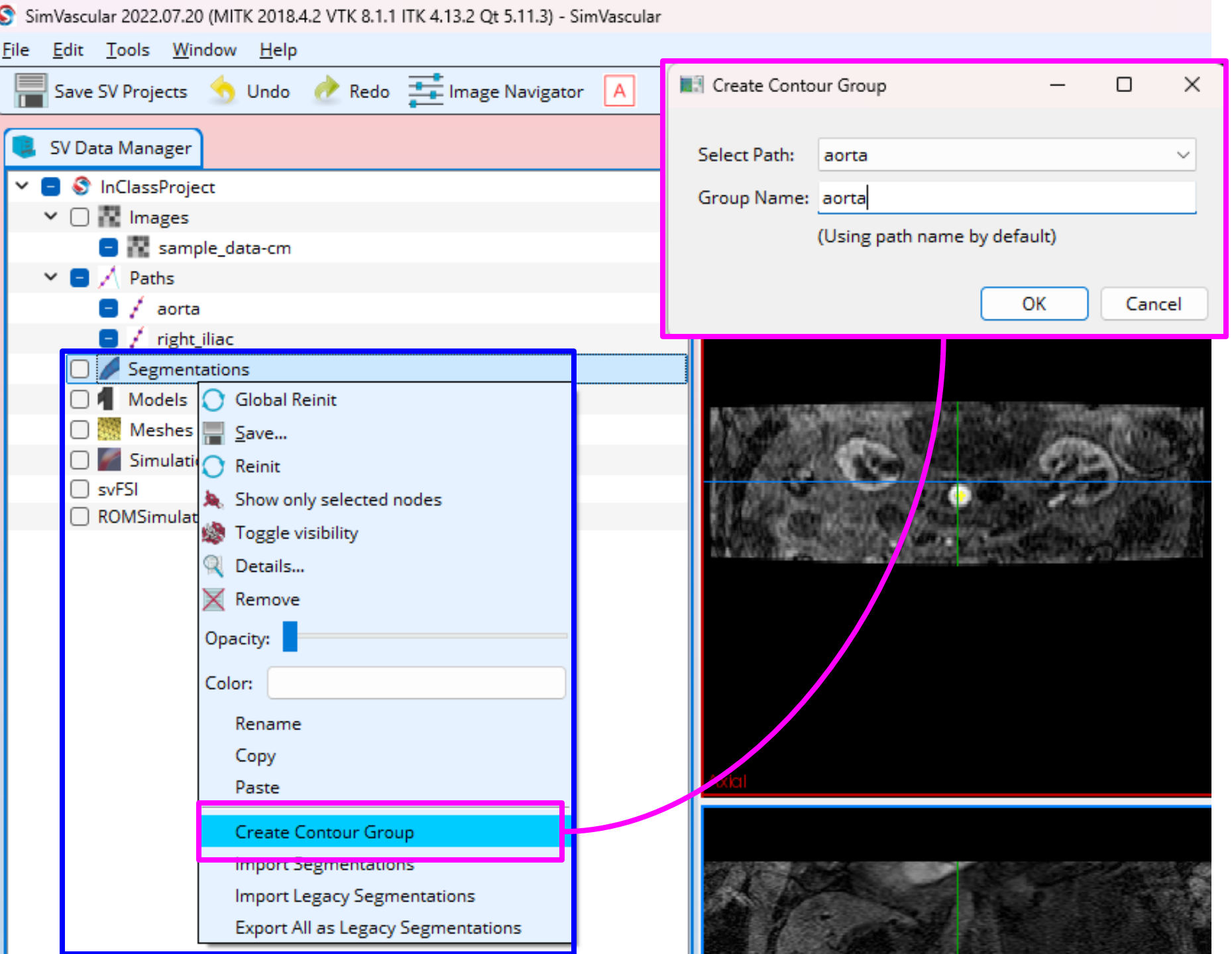
Click the empty box besides **Paths**

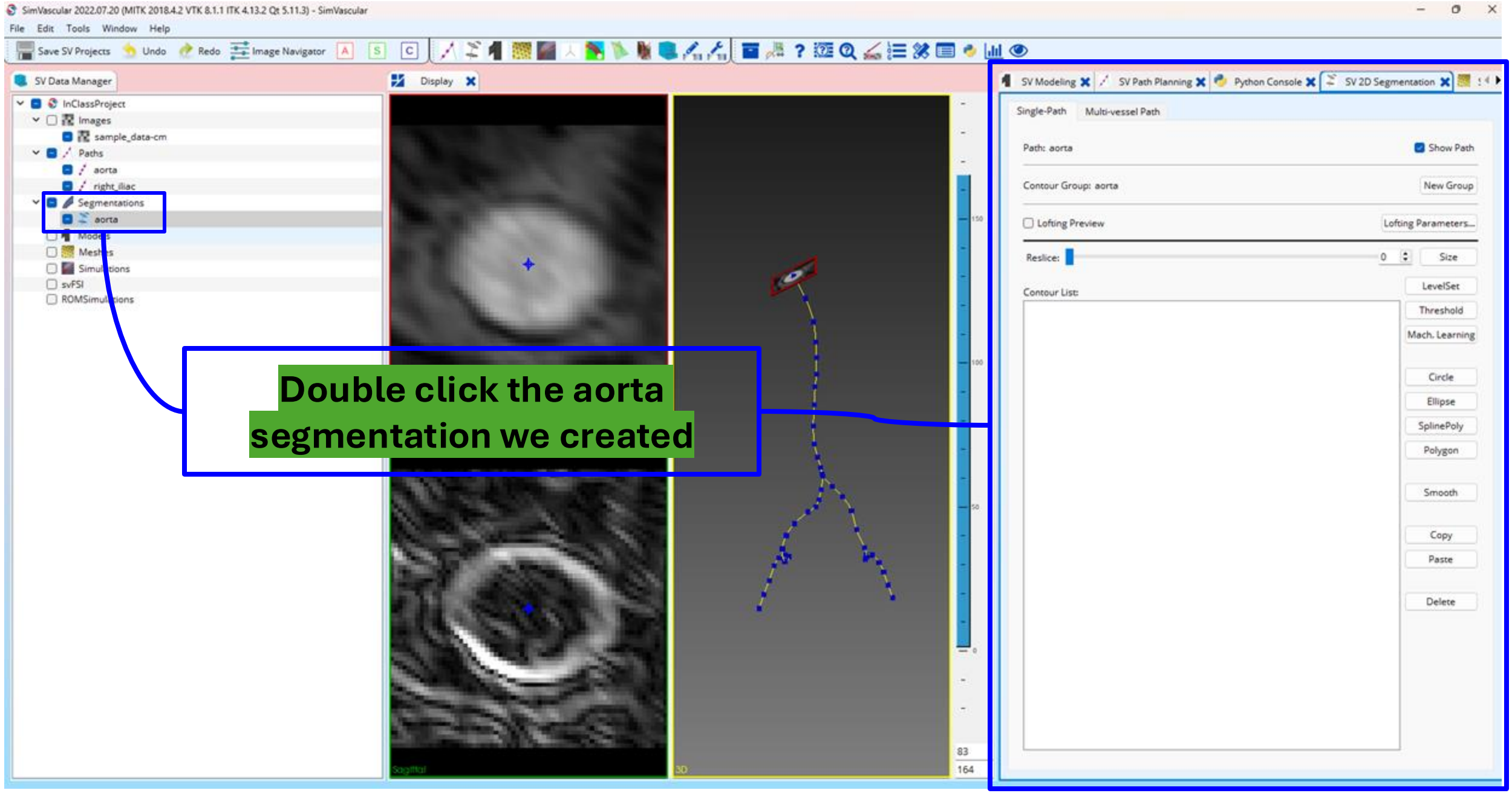


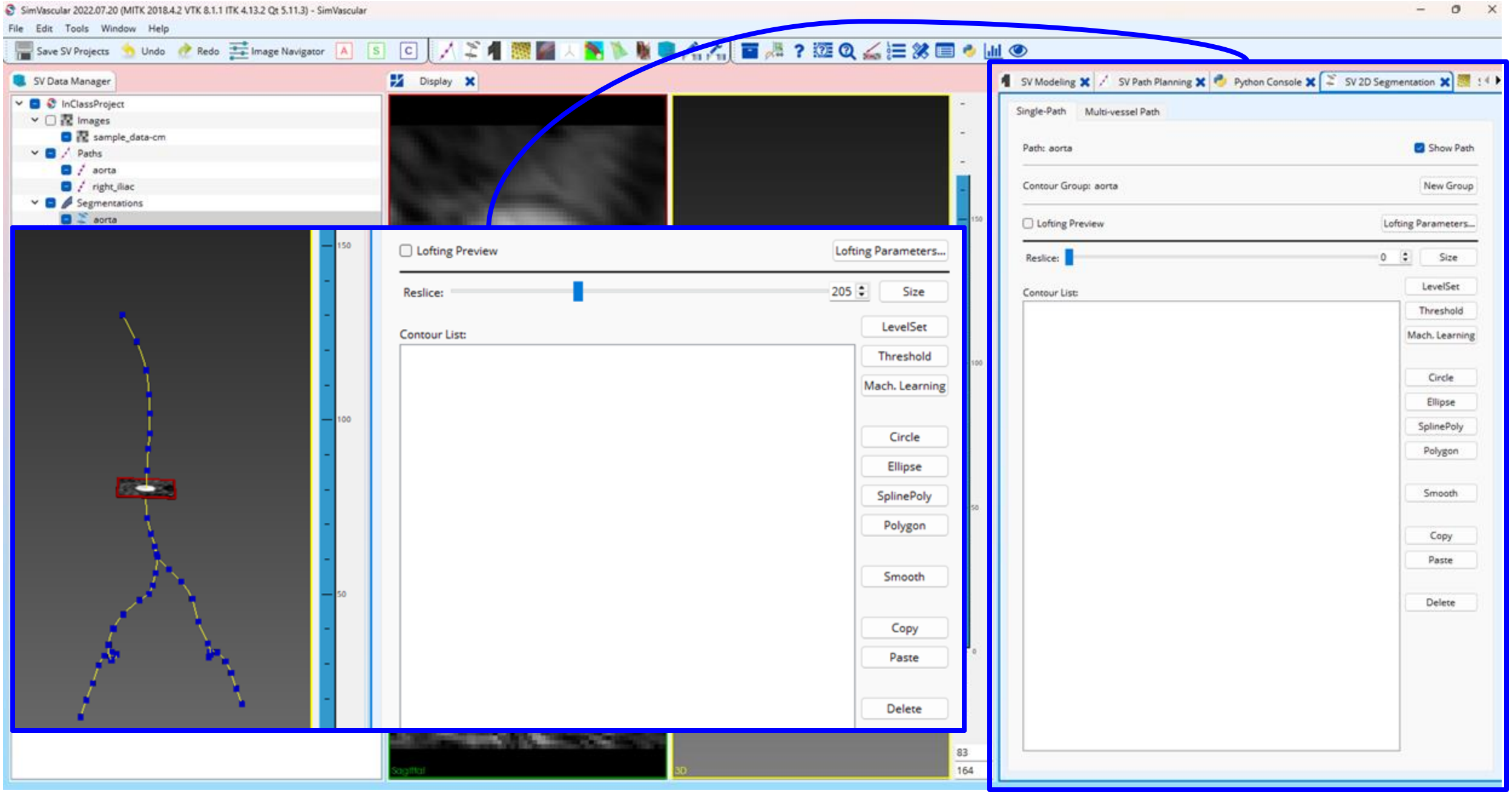




We will create segmentations of the aorta and right iliac arteries


SimVascular 2022.07.20 (MITK 2018.4.2 VTK 8.1.1 ITK 4.13.2 Qt 5.11.3) - SimVascular
File
Edit
Tools
Window
Help
Save SV Projects
Undo
Redo
Image Navigator
A
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
Models
Meshes
Simulati
svFSI
ROMSimulat
Global Reinit
Save...
Reinit
Show only selected nodes
Toggle visibility
Details...
Remove
Opacity:
Color:
Rename
Copy
Paste
Create Contour Group
Import Segmentations
Import Legacy Segmentations
Export All as Legacy Segmentations
Create Contour Group
Select Path:
aorta
Group Name:
aorta
(Using path name by default)
OK
Cancel
Axial


SimVascular 2022.07.20 (MITK 2018.4.2 VTK 8.1.1 ITK 4.13.2 Qt 5.11.3) - SimVascular
File Edit Tools Window Help
Save SV Projects Undo Redo Image Navigator
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
aorta
svFSI
Display
SV Modeling
SV Path Planning
Python Console
SV 2D Segmentation
Single-Path
Multi-vessel Path
Path: aorta
Show Path
Contour Group: aorta
New Group
Lofting Preview
Lofting Parameters...
Reslice:
Size
Contour List:
LevelSet
Threshold
Mach. Learning
Circle
Ellipse
SplinePoly
Polygon
Smooth
Copy
Paste
Delete
Double click the aorta segmentation we created


SimVascular 2022.07.20 (MITK 2018.4.2 VTK 8.1.1 ITK 4.13.2 Qt 5.11.3) - SimVascular
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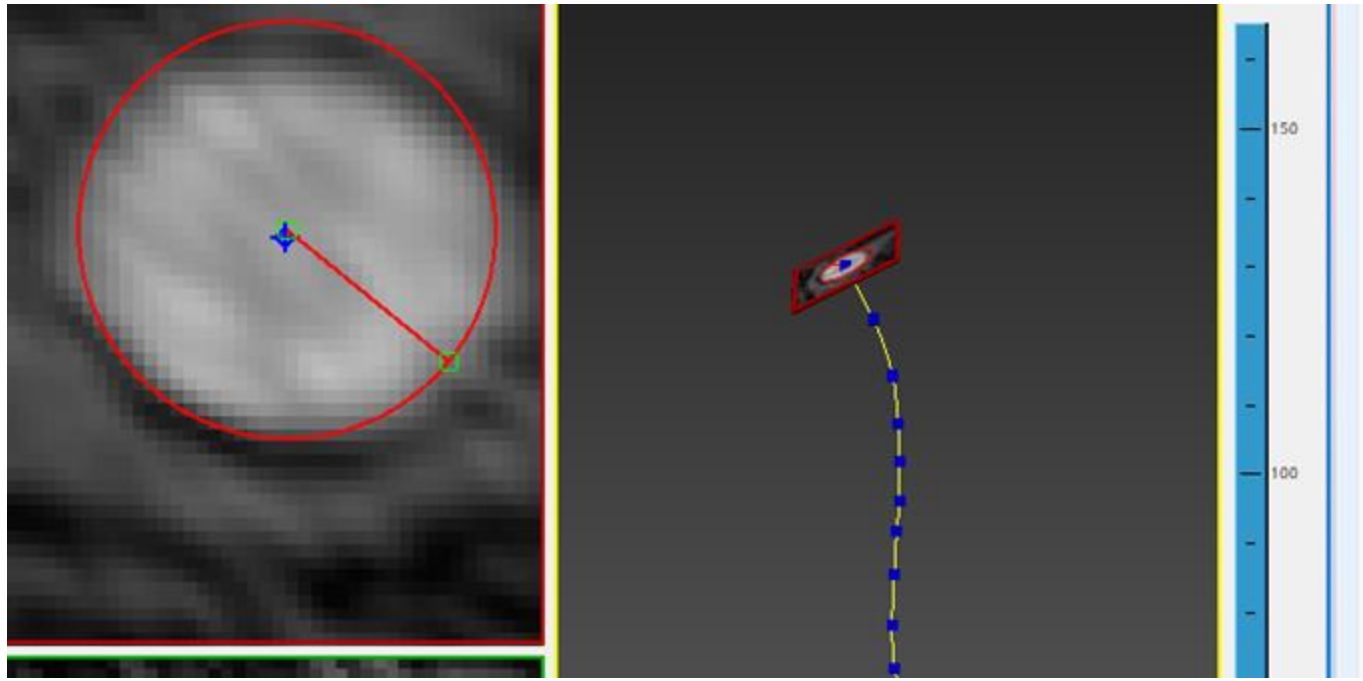
Save SV Projects Undo Redo Image Navigator
SV Data Manager
InClassProject
Images
sample_data-cm
Paths
aorta
right_iliac
Segmentations
aorta
Display
Lofting Preview
Lofting Parameters...
Reslice:
205
Size
Contour List:
LevelSet
Threshold
Mach. Learning
Circle
Ellipse
SplinePoly
Polygon
Smooth
Copy
Paste
Delete
SV Modeling
SV Path Planning
Python Console
SV 2D Segmentation
Single-Path
Multi-vessel Path
Path: aorta
Show Path
Contour Group: aorta
New Group
Lofting Preview
Lofting Parameters...
Reslice:
0
Size
Contour List:
LevelSet
Threshold
Mach. Learning
Circle
Ellipse
SplinePoly
Polygon
Smooth
Copy
Paste
Delete



Contour Group: aorta

New Group

Lofting Preview

Lofting Parameters...

Reslice: 0

Size

Contour List:

LevelSet

0: Circle, Manual

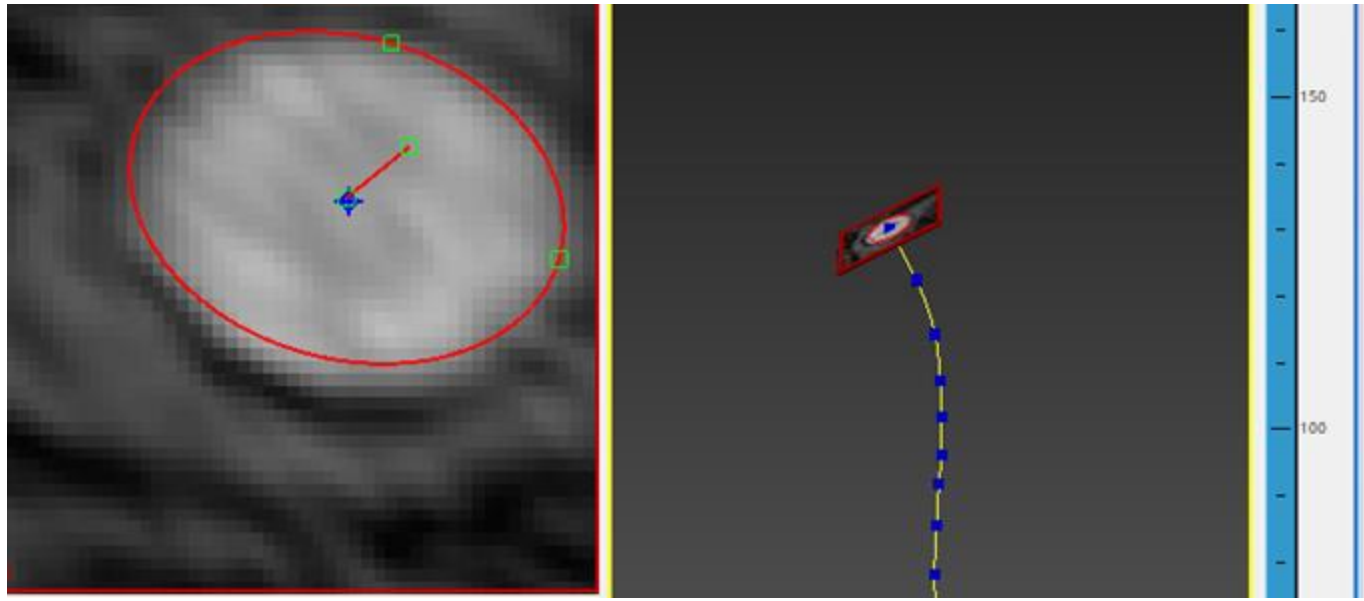
Threshold

Mach. Learning

Circle

Ellipse

SplinePoly



Contour Group: aorta

New Group

Lofting Preview

Lofting Parameters...

Reslice: 0

Size

Contour List:

LevelSet

0: Ellipse, Manual

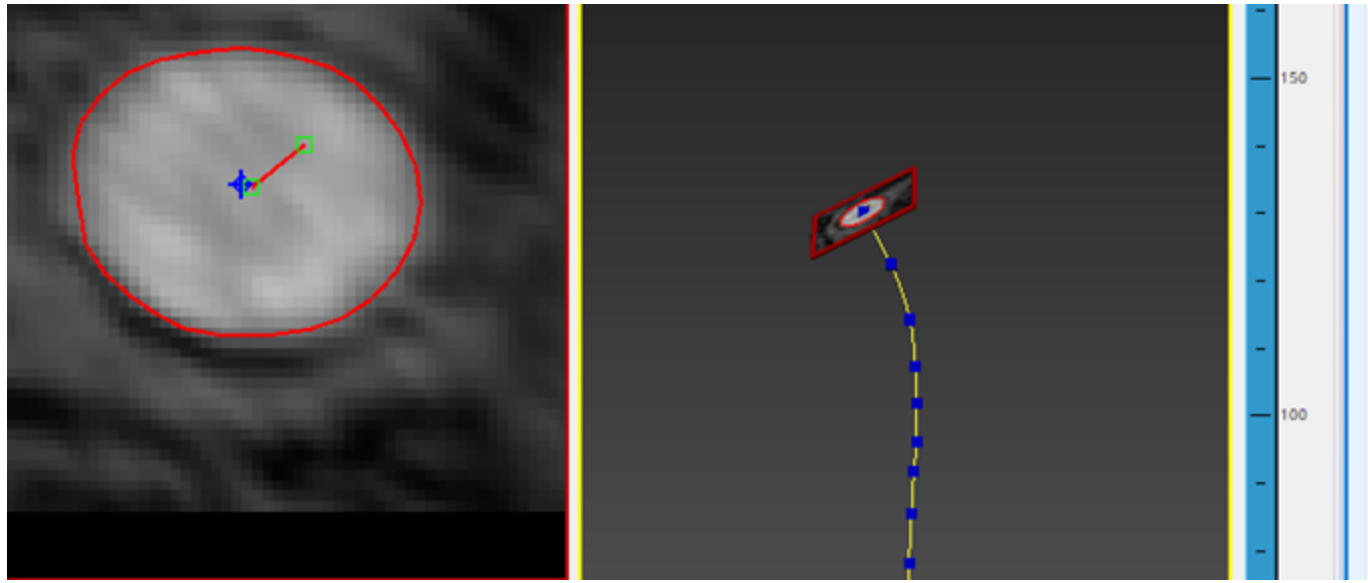
Threshold

Mach. Learning

Circle

Ellipse

SplinePoly



Lofting Preview
Lofting Parameters...

Reslice: 0
Size

Smooth Fourier Number: 10
LevelSet

Convert to Spline Ctrl No.: 10
Threshold

Batch Mode List:
Mach. Learning

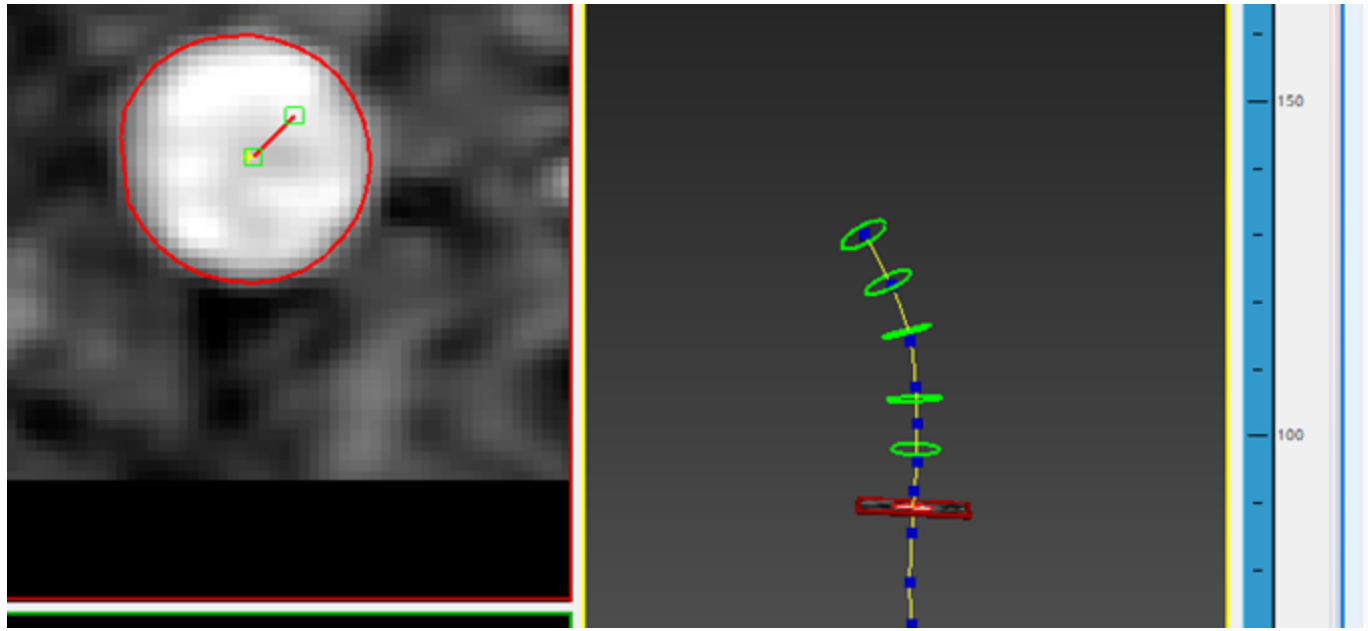
Contour List:

0: Contour, ML

Circle

Ellipse

SplinePoly



Contour Group: aorta
New Group

Lofting Preview
Lofting Parameters...

Reslice: 170
Size

Smooth Fourier Number: 10
LevelSet

Convert to Spline Ctrl No.: 10
Threshold

Batch Mode List:
Mach. Learning

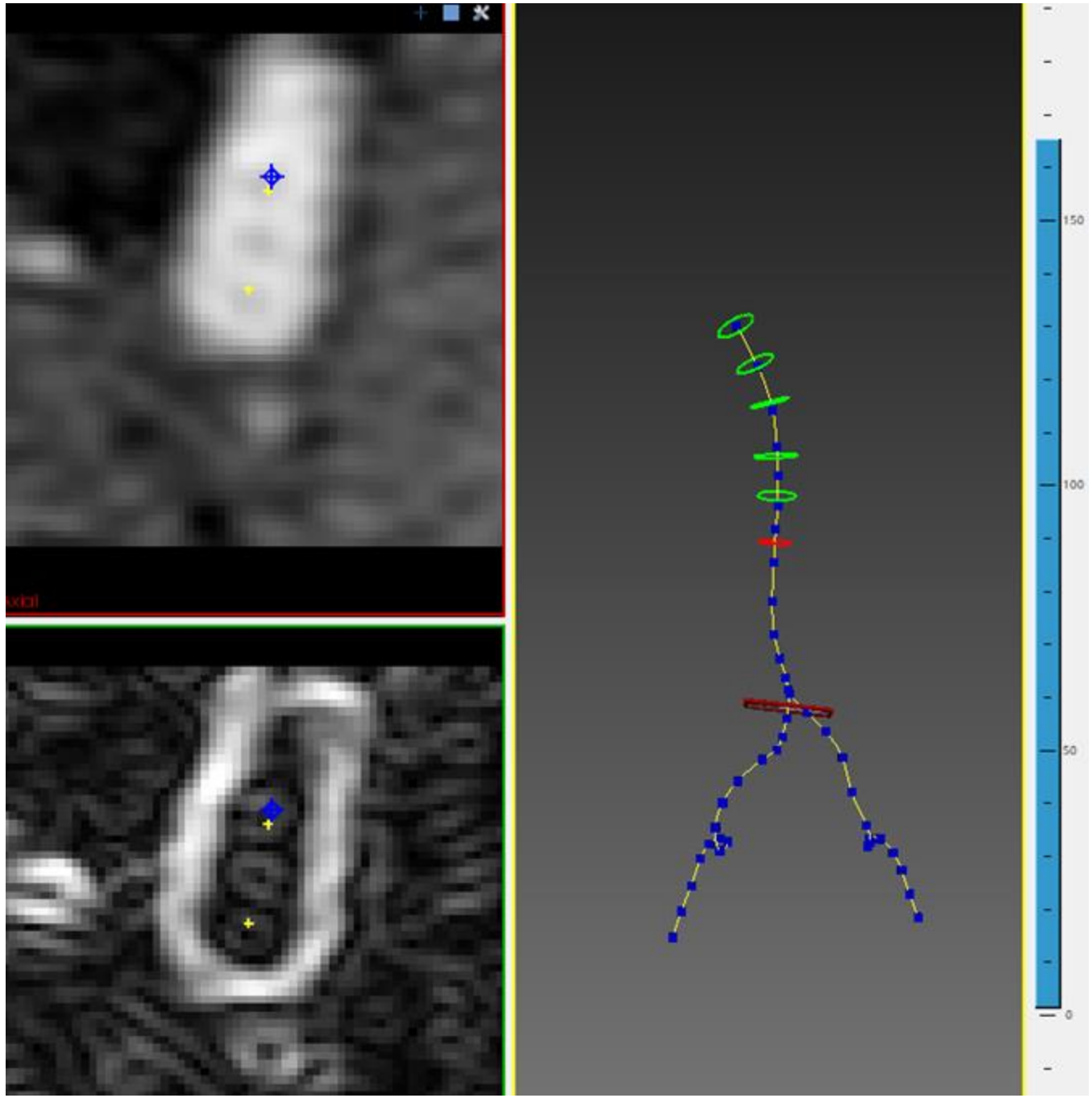
Contour List:

0: Contour, ML
1: Contour, ML
2: Contour, ML
3: Contour, ML
4: Contour, ML
5: Contour, ML

Circle

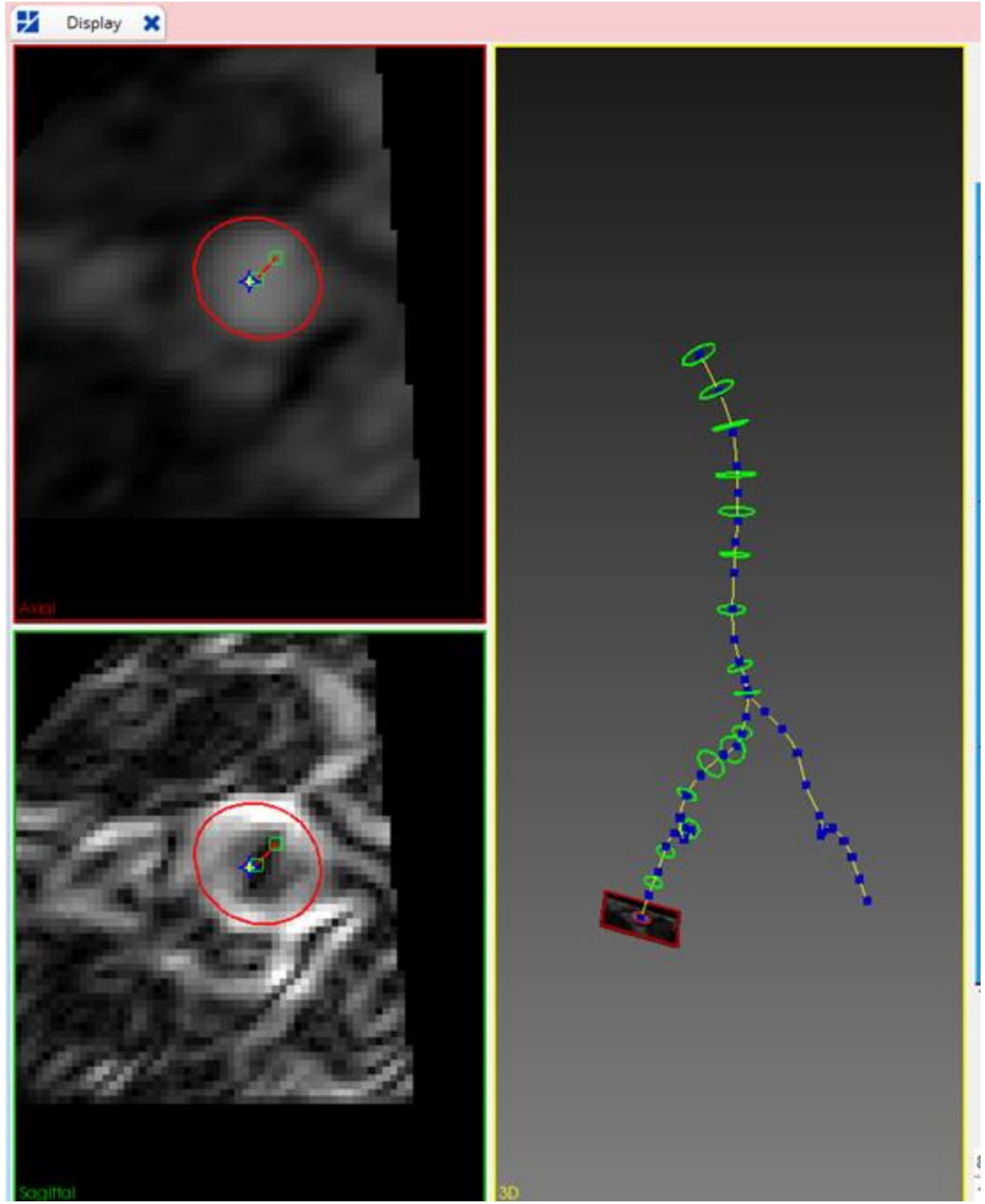
Ellipse

SplinePoly

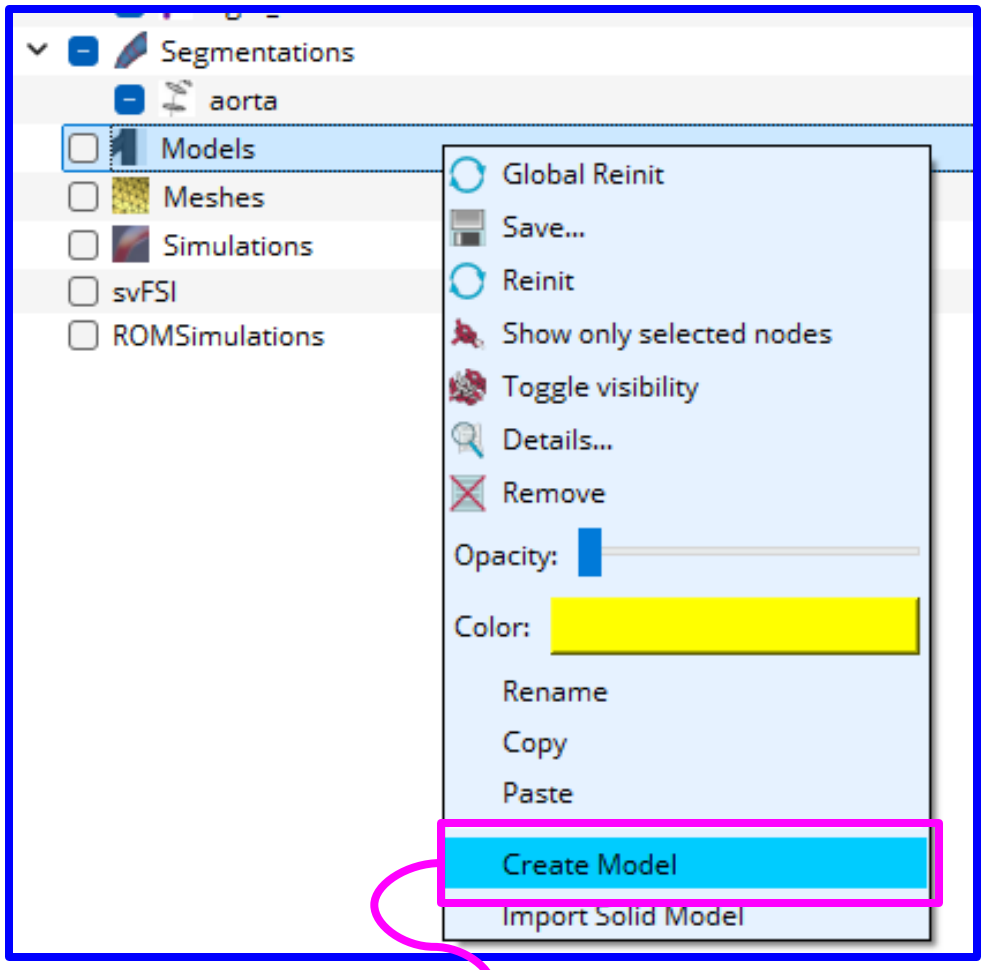


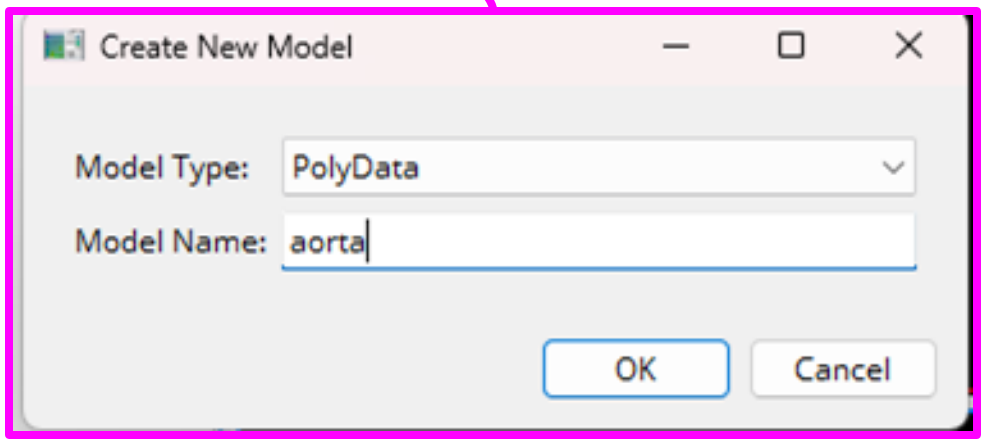
Sometimes, it is hard to tell where the blood vessels are in CT images!

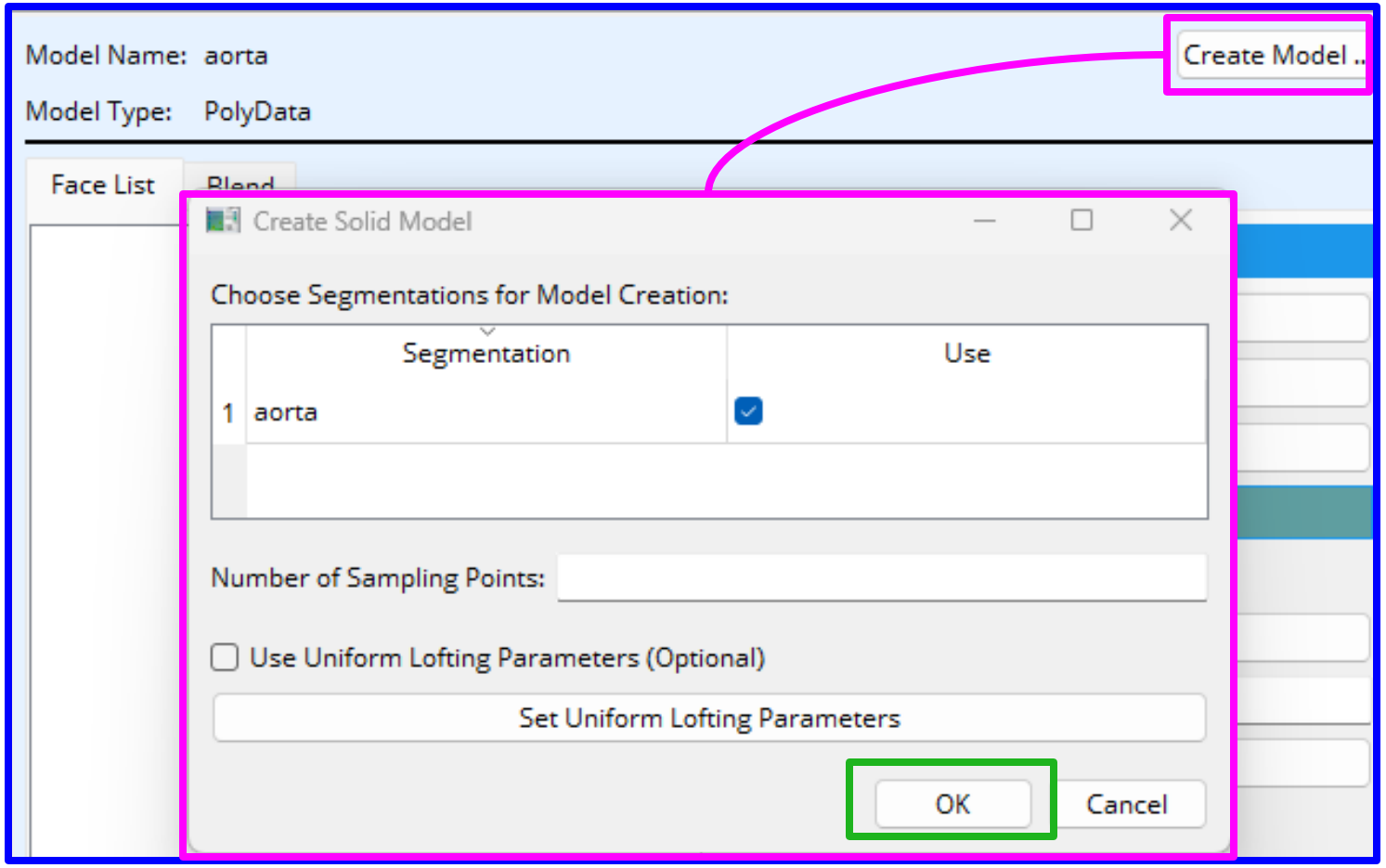
Let’s try to skip past them.

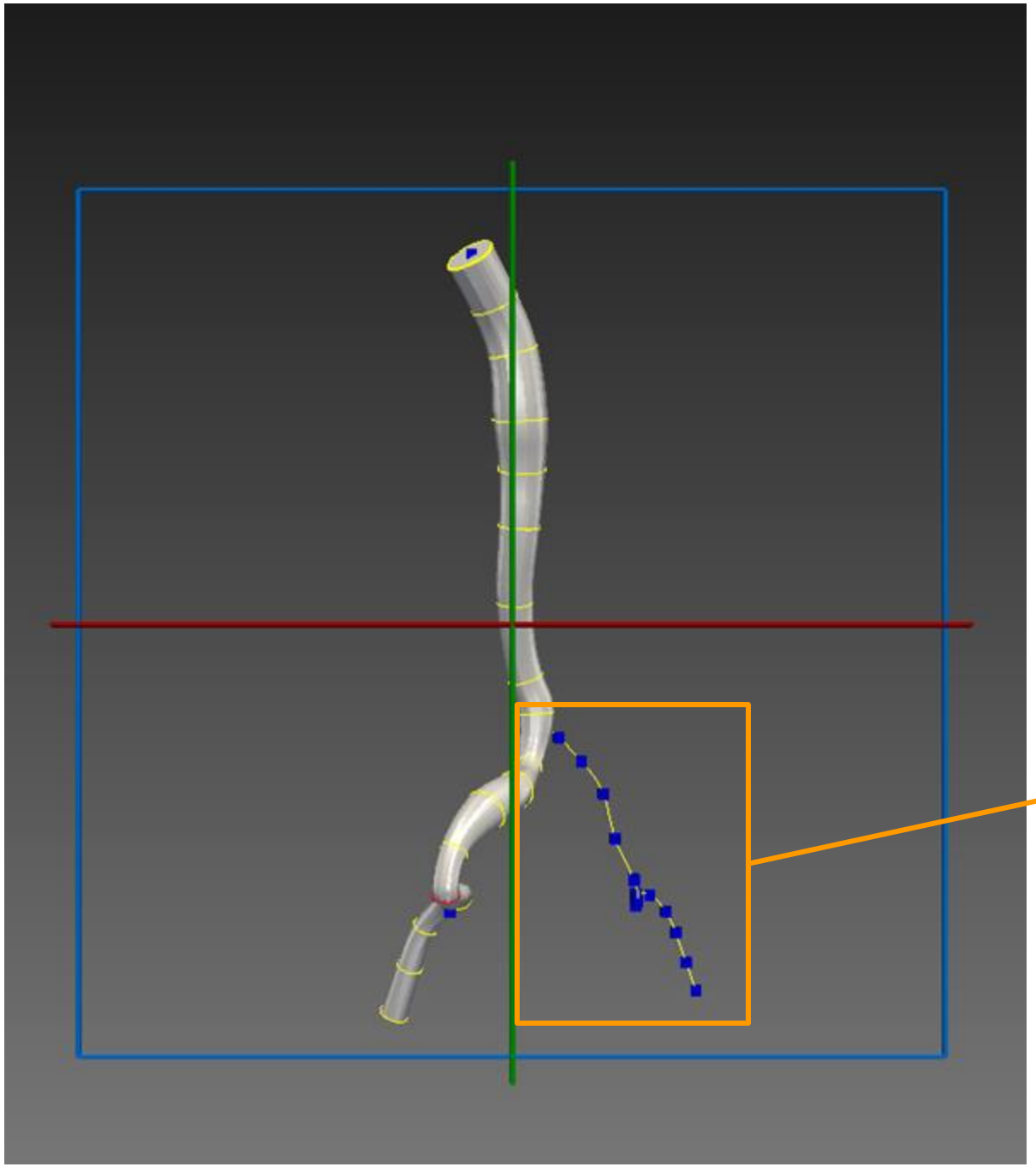


Once we have added enough segmentations, we will build our model for the aorta


Segmentations
aorta
Models
Meshes
Simulations
svFSI
ROMSimulations
Global Reinit
Save...
Reinit
Show only selected nodes
Toggle visibility
Details...
Remove
Opacity:
Color:
Rename
Copy
Paste
Create Model
Import Solid Model

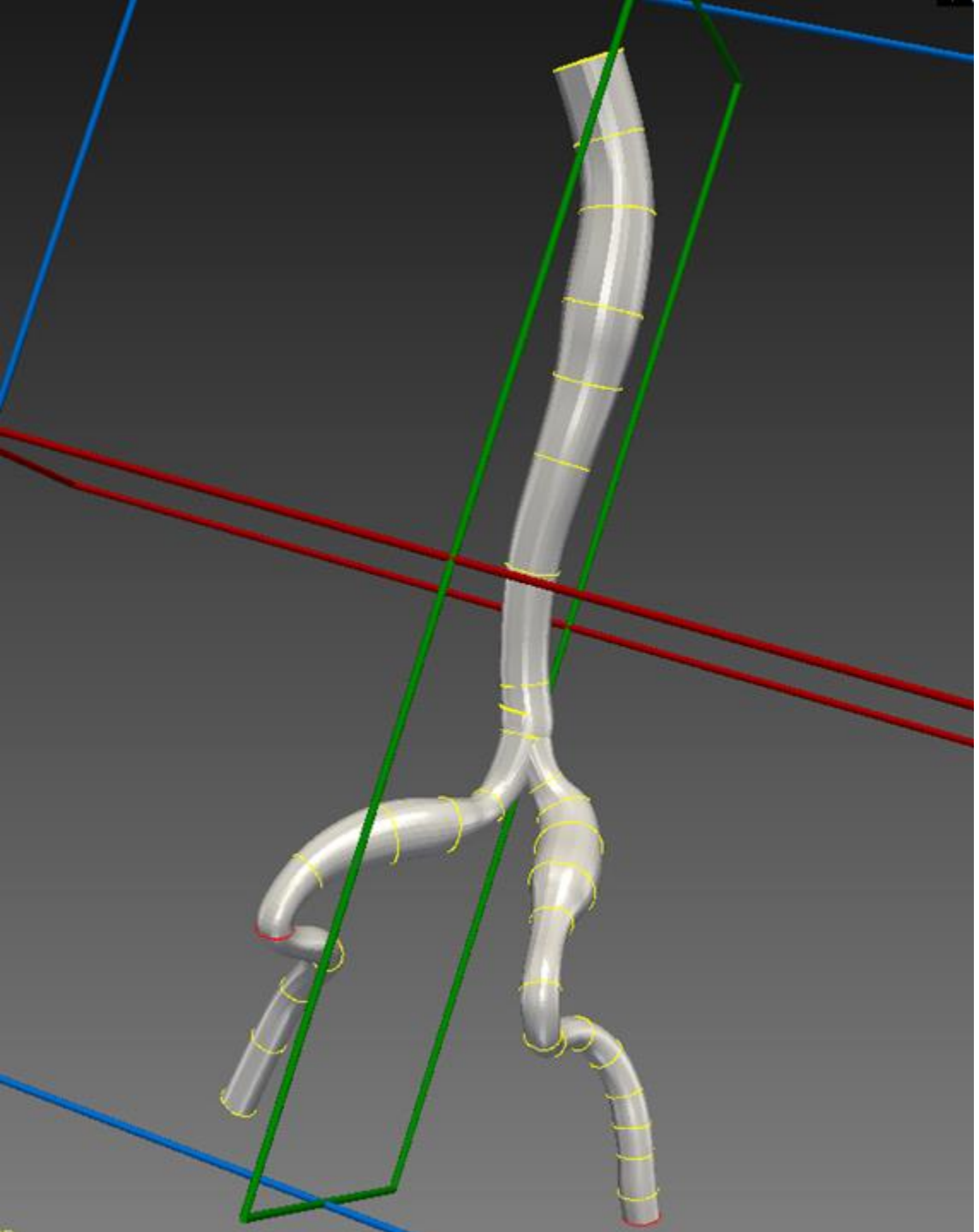

Create New Model
Model Type:
PolyData
Model Name:
aorta
OK
Cancel


Model Name: aorta
Model Type: PolyData
Create Model ..
Face List
Blend
Create Solid Model
Choose Segmentations for Model Creation:
Segmentation
Use
1
aorta
Number of Sampling Points:
Use Uniform Lofting Parameters (Optional)
Set Uniform Lofting Parameters
OK
Cancel



We have built our first model!

Now, we need to repeat this process for the right iliac artery



Model Name: test

Model Type: PolyData

Create Model ...

Face List | Blend

Face Ops

Create Solid Model

Choose Segmentations for Model Creation:

	Segmentation	Use
1	aorta	☑
2	right iliac	☑

Number of Sampling Points:

☐ Use Uniform Lofting Parameters (Optional)

Set Uniform Lofting Parameters

OK | Cancel