Demo IV:
Meshing with BioMesh3D and Visualization with SCIRun

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8 stages of BioMesh3D Tooth dataset

- 1. Segmentation/Preprocessing

- 2. Tightening/smoothing

- 3. Medial Axis

- 4. Sizing Field

- 5. Seed Surface

- 6. Particle System

- 7. Generate Surfaces

- 8. Generate Volume Mesh

8 stages of BioMesh3D

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Seg3D
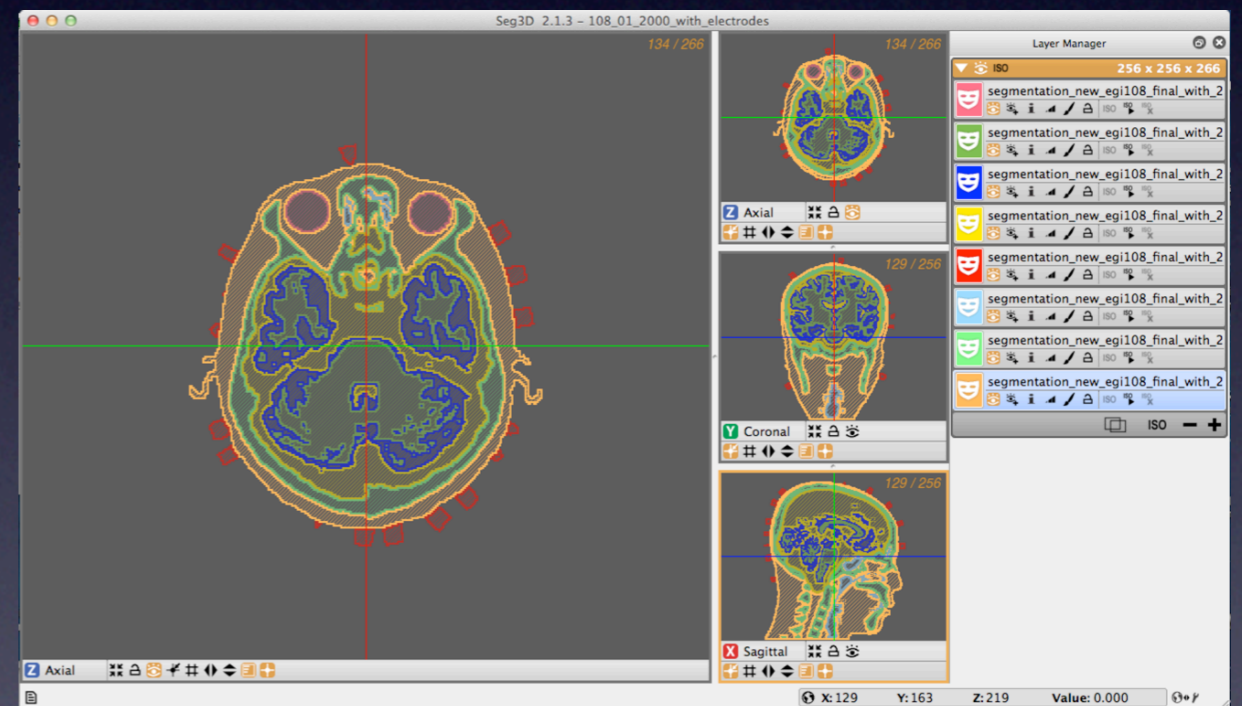
Extract & Separate Materials

Segmentation & Preprocessing

```
model_input_file="108_01_2000.Head_tissue_image_from_CT_seg3d.nrrd"
# This directory must exist....
model_output_path="output"
                              the materials combined
mats = (0,1,2,3,4,5,6,7)
mat_names = ('air', 'skin', 'skull', 'CSF','GreyMatter','WhiteMatter','Eyes','Internal_Air')
mat_radii = 0.3

#Number of refinment levels when generating the medial axis points.
#More levels are needed to capture smaller details.
refinement_levels=4

max_sizing_field = 1.0
sizing_scale_var = 2.0

num_particle_iters=700
# tetgen flags to use when making a volume from a single
# material

# Cap number of processes
max_procs=15

tetgen_joined_vol_flags = "zpAAqa1.4"
```
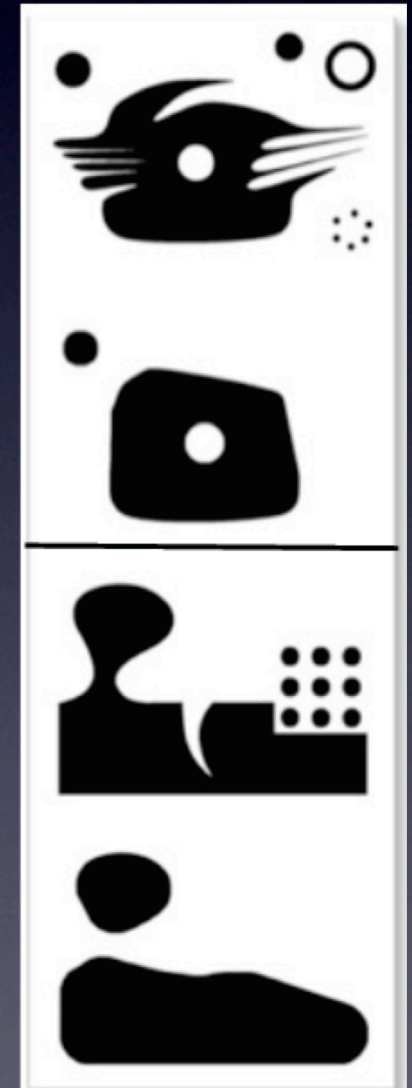
8 stages of BioMesh3D

- 1. Segmentation/Preprocessing
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2. Tightening/Smoothing

```
model_input_file="108_01_2000.Head_tissue_image_from_CT_seg3d.nrrd"
# this directory must exist....
model_output_path="output"
# -1 means all the rest of the materials combined
mats = (0,1,2,3,4,5,6,7)
mat_names = ('air', 'skin', 'skull', 'CSF','GreyMatter','WhiteMatter','Eyes','Internal_Air')
mat_radii = 0.3
```

Smoothing Step - may lose thin structures

```
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# tetgen flags to use when making a volume from a single
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```
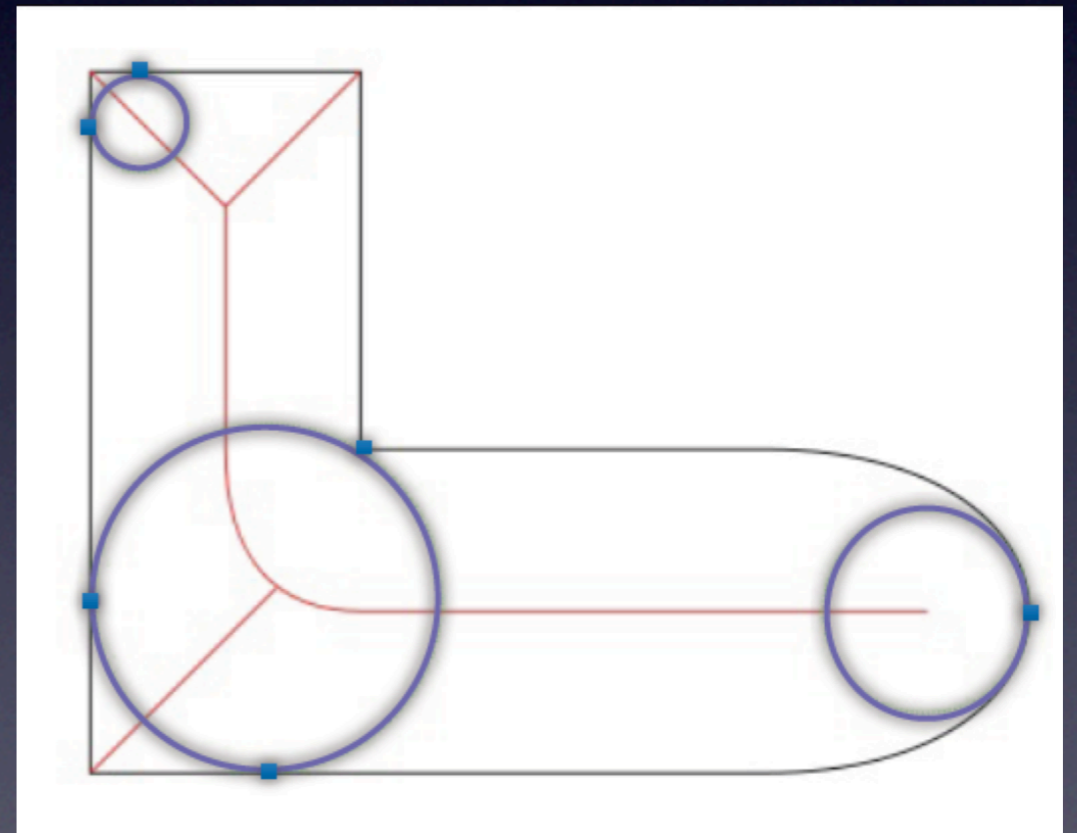
Switch to demo!

8 stages of BioMesh3D

- 1. Segmentation/Preprocessing

- 2. Tightening/smoothing

- **3. Medial Axis**

- 4. Sizing Field

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3. Medial Axis

```
model_input_file="108_01_2000.Head_tissue_image_from_CT_seg3d.nrrd"
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mats = (0,1,2,3,4,5,6,7)
mat_names = ('air', 'skin', 'skull', 'CSF','GreyMatter','WhiteMatter','Eyes','Internal_Air')
mat_radii = 0.3

#Number of refinment levels when generating the medial axis points.
#More levels are needed to capture smaller details.
refinement_levels=4    More refinement for thin structures

max_sizing_field = 1.0
sizing_scale_var = 2.0

num_particle_iters=700
# tetgen flags to use when making a volume from a single
# material

# Cap number of processes
max_procs=15

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```
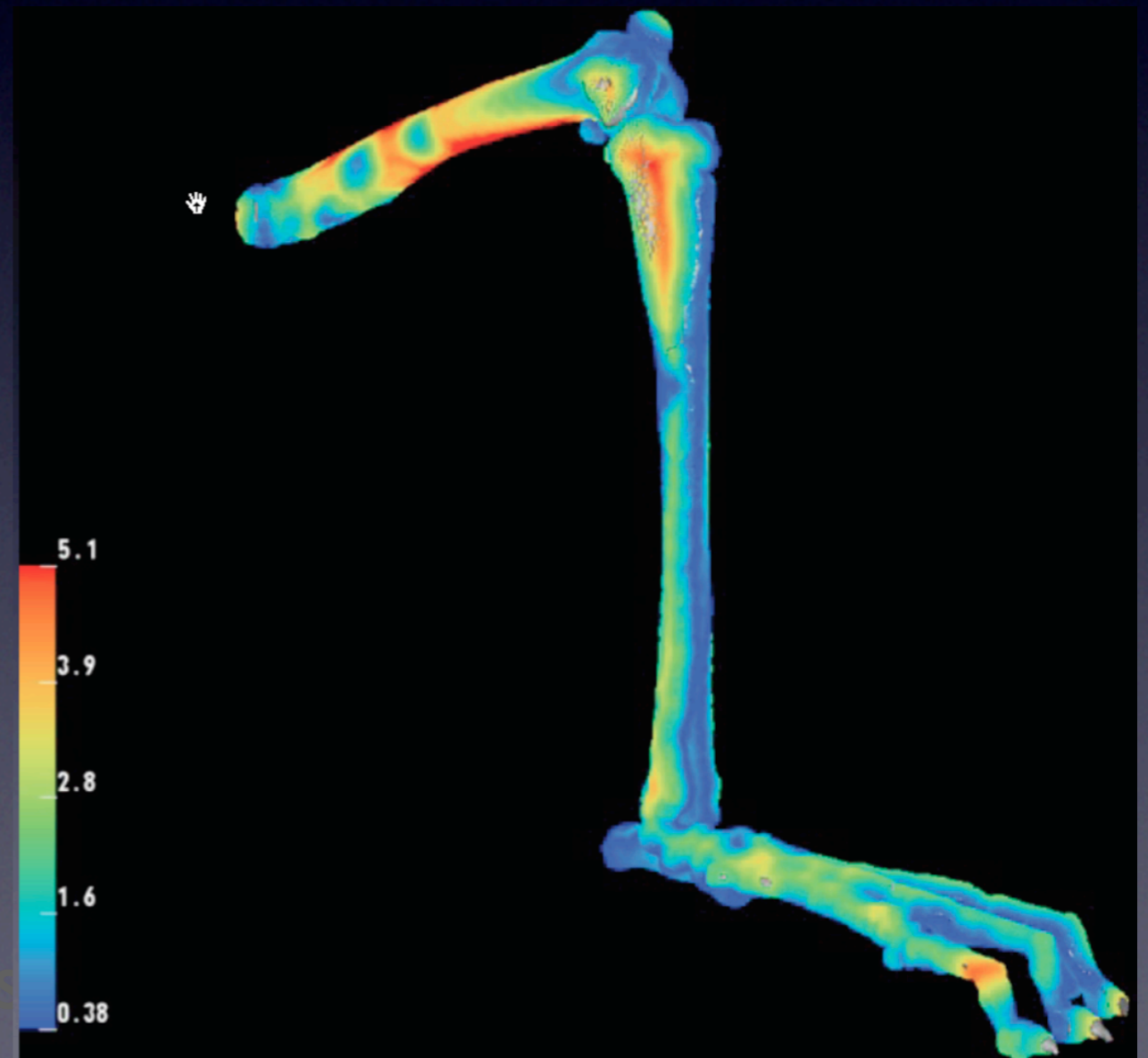
Switch to demo!

8 stages of BioMesh3D

- 1. Segmentation/Preprocessing
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4. Sizing Field

```
model_input_file="108_01_2000.Head_tissue_image_from_CT_seg3d.nrrd"
# this directory must exist....
model_output_path="output"
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mats = (0,1,2,3,4,5,6,7)
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# tetgen flags to use when making a volume from a single
# material

# Cap number of processes
max_procs=15

tetgen_joined_vol_flags = "zpAAqa1.4"
```
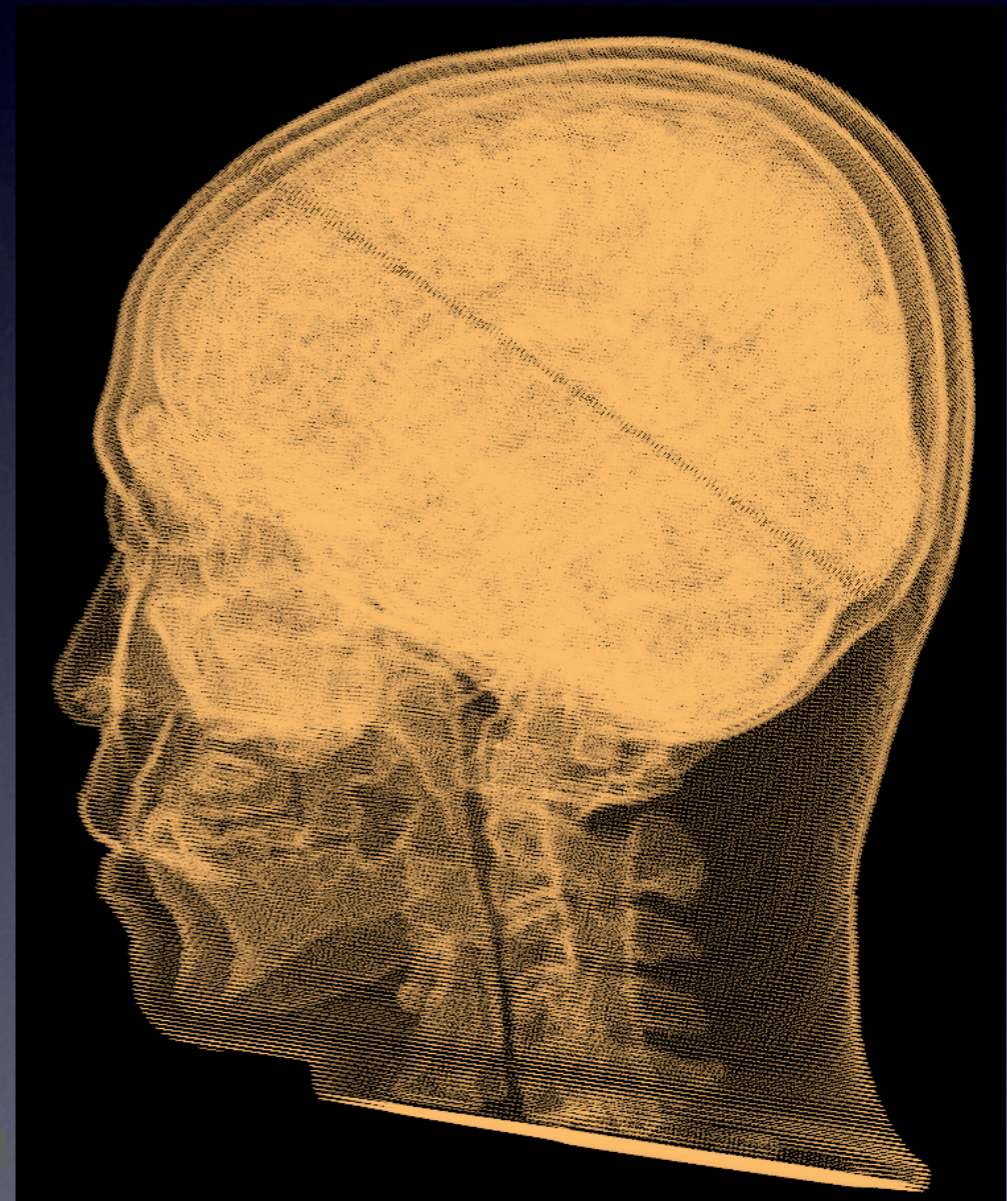
Cap the sizing field
Higher number less resolution

Switch to demo!

8 stages of BioMesh3D

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8 stages of BioMesh3D

- 1. Segmentation/Preprocessing

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- **6. Particle System**

- 7. Generate Surfaces

- 8. Generate Volume Mesh
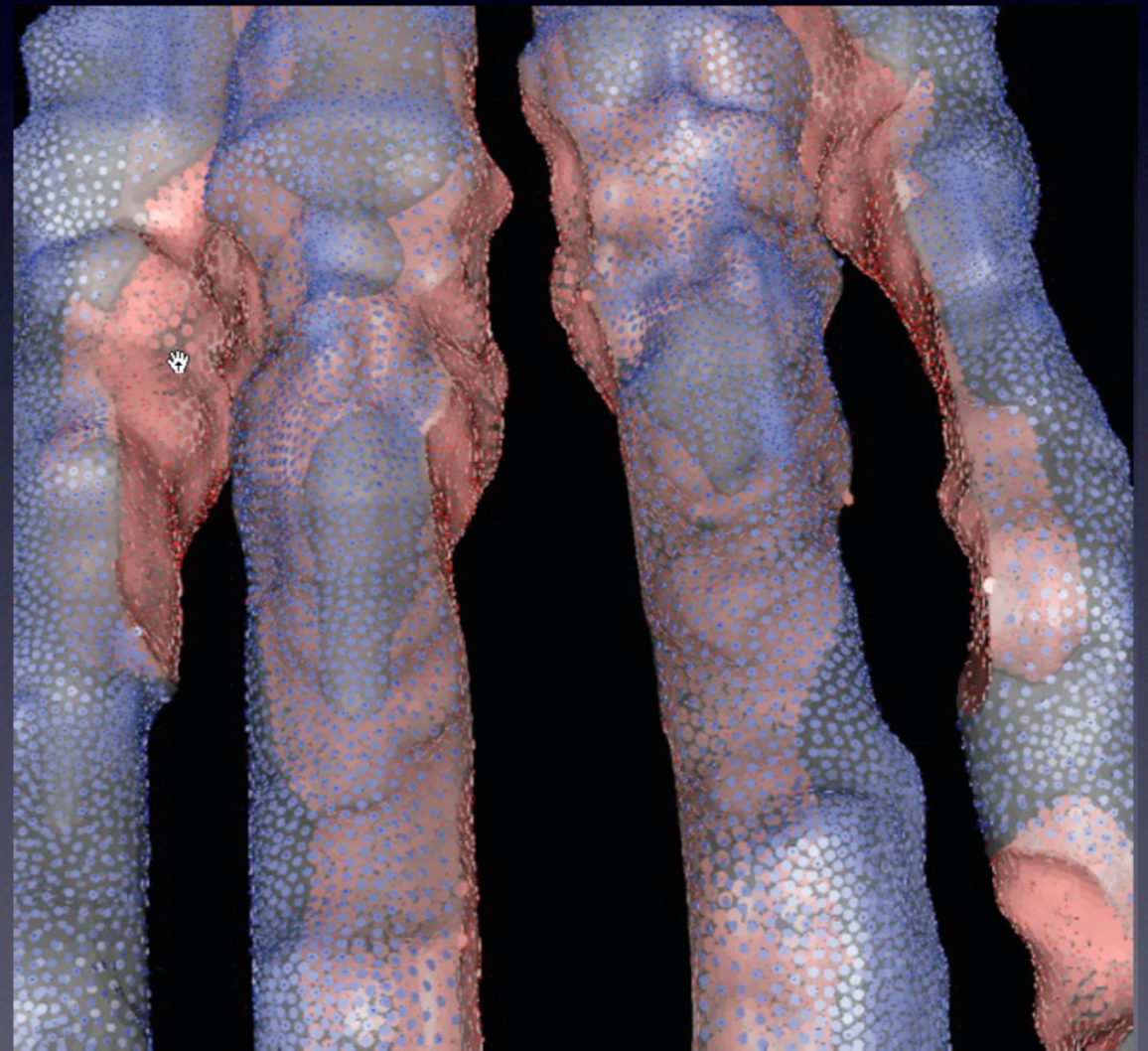
6. Particle System

```
model_input_file="108_01_2000.Head_tissue_image_from_CT_seg3d.nrrd"
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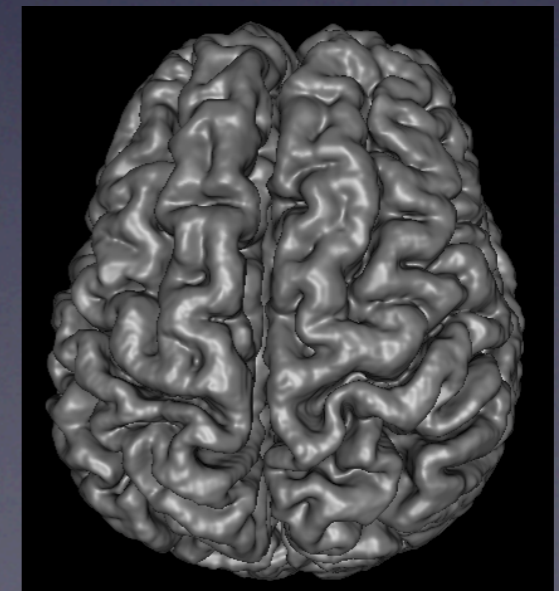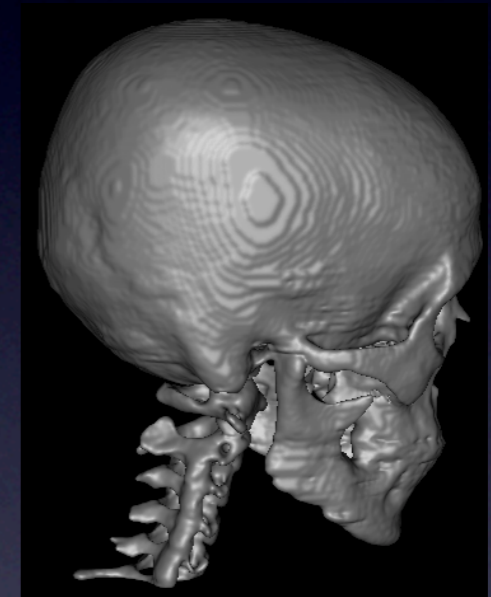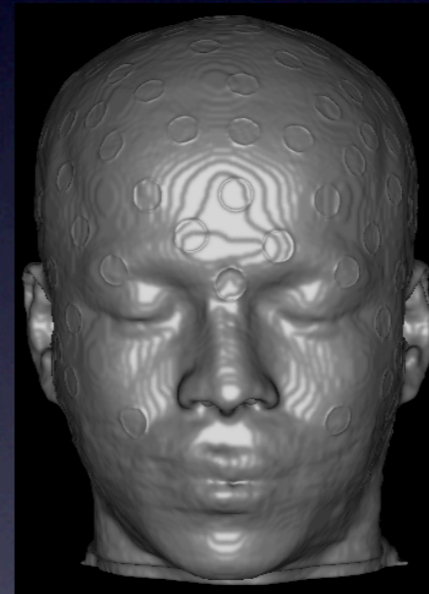
More iterations for better distribution

Switch to demo!

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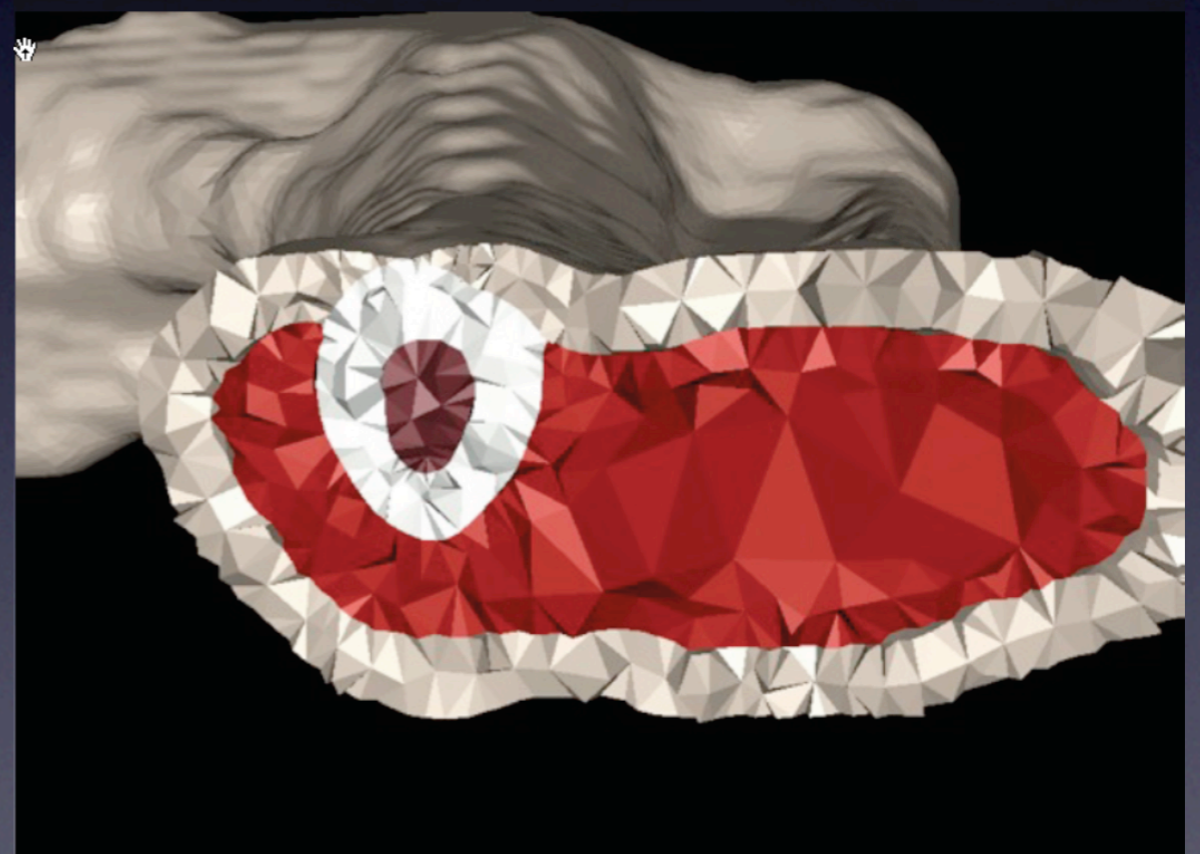- 7. Generate Surfaces

- 8. Generate Volume Mesh

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Configuration File

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