


## 1. Importing

- Import DICOM data into 3D Slicer
  - Drag and drop the file/folder in the 3D Slicer window
  - 'Select a Reader' pop-up window: Click OK
  - 'Directory import completed' pop-up window: Click OK
- Load DICOM data using 'Welcome to Slicer module'
  - Navigate modules using dropdown menu (see diagram for 3D Slicer interface)
- Volume opens in DICOM module
- Adjust viewport using button if needed (see diagram for 3D Slicer interface)
  - Use 'Conventional' for segmenting

## 2. Creating a volume render

- Volume Rendering Module - select 'Volume' to view from drop down menu
  - NB. Smaller slice thickness and higher filter values for better resolution of bone
- Toggle eye-shaped button to turn volume render on/off in display 
- Select a suitable 'Display' from 'Preset' dropdown menu (hover mouse over different displays to see name)
  - Presets for viewing bone: 'CT Bones' or 'CT-AAA2'
- Select button to 'Centre the 3D view on the scene' (see diagram for 3D Slicer interface)
- Slide 'Display - Shift' bar to adjust threshold level or render if needed

## 3. Manoeuvring model

- Use trackpad/mouse [click and drag] to rotate model in space
- Zoom model in and out using mouse/trackpad
- Translate model's position [shift + click and drag] to move model in space
- Use pin button to change view (left; right; inferior; superior; anterior; posterior) (see diagram for 3D Slicer interface)

## 4. Cropping volume

- Volume rendering module
- Enable volume cropping
  - Under 'Crop', turn 'Enable' on: tick tickbox
- Enable ROI view to be on
  - Toggle eye button under 'Crop' 'Display ROI'
- Adjust ROI to desired region, use all four viewports (2D and 3D)
- Go to Crop Volume module
  - Under 'IO' choose 'Input volume' (should be correct)
  - Output volume: create new volume (will appear with 'cropped' on end of original volume name)
  - Select 'Apply'
- Volume Rendering module
  - Turn 'Display ROI' off (toggle eye button) and disable cropping (tickbox)
  - Select new cropped volume to view, adjust pre-set so can view bones
  - Turn volume render view off (toggle eye button)

## 5. Segment data using Thresholding effect

- Editor module
- Master volume: select original volume or new cropped volume
- Popup window asking to select 'Generic Anatomy Colors' label map: click OK
- Under 'Edit Selected Label Map' select tool 'ThresholdEffect'
- Select a thresholding label to use (this applies colour/name to volume data)
  - E.g. label 2 uses a yellow colour called 'bone'
  - Adjust 'Threshold Range' using slider bar to ensure bone is labelled (coloured in), scroll through R, Y, G views
  - NB. You can hover mouse over a ROI to see its value (Hounsfield unit, HU) under 'Data Probe' section
  - NB. By ticking 'Show Zoomed Slice' you can visualise ROI zoomed in for more detail
  - NB. Lower value for thresholding bone is generally around 100-300 HU
- Click 'Apply' (ROI is filled in with label)

## 6. Make model

- Editor module
- Under 'Edit Selected Label Map' select tool 'Make Model Effect'
  - Ensure the correct Label is selected (e.g. 'bone')
  - Alter name of model if needed
  - Click 'Apply'
- 3D model will appear in 3D viewport (click button to 'Centre the 3D view on the scene' if not)
- Check quality of modelling. If model is over/under labelled, undo and repeat step 5, adjusting the threshold value as needed
- Access models in 'Model Maker' module

## 7. Export model as STL

- Click 'Save' button (see diagram for 3D Slicer interface) to view 'Save Data' window
  - 3D model appears as a Poly Data (.vtk) file
  - Change file format to STL (.stl) and change directory to desired location
  - Click 'Save'