Atrial fibres

Standard Operating Procedure for Analysis with CemrgApp

1. Surface to labelled mesh

1. Click on the menu: Window > Open Perspective > Cemrg Universal Atrial Coordinates
2. Click on Step3: Analysis Selector.
    a) Select the project folder when prompted.
    b) Make sure **Surfaces** is selected.
    c) Select your surface (it can have any name), which will be converted into a segmentation (LA)
3. Check your segmentation is OK. If it is not, do the following:
    a) Once finished, click on the resulting segmentation (LA) and click on the Preprocess Segmentation button.
        i) The Segmentation Utilities view opens on the right
        ii) Select Morphological Operations
        iii) Doing an Opening/Closing: Select an appropriate radius (3-5) and click on Opening/Closing
        iv) NOTE: Opening: separates joined PVs / Closing: will make some thin structures thicker
4. Select the segmentation in the Data Manager. Click Step5: Identify PVs
    a) When prompted about the parameters, default work in most cases.
    b) Select (and identify) all PVs and the LAA by hovering the mouse over the desired point and pressing the space bar on the keyboard.
    c) Click on the Find Centrelines button.
    d) Click on the Display Clippers button.
        i) Move the clippers on each PV and LAA using the different tools.
        ii) Make sure the clippers do not overlap and do not intersect with other structures of the atrium, for example, do not allow the clippers to intersect with the atrial body.
5. Click Step6: Create Labelled Mesh

2. Mesh to fibres

2.1 Mesh preprocessing and PV clipping

1. Click Step6: Mesh Preprocessing.
    a) Fix any mislabelling, selecting points with “X” and the **Fix Mesh Labelling** button
    b) Identify PVs, MV, and LAA using the Spacebar. (Note: No need to Identify & Clip MV manually if used Automatic image pipeline in Step 1.).
    c) Click Store Landmarks and Labels
    d) Adjust the clippers’ sizes using the slider at the bottom.
    e) Move the sphere centre pressing “C” on the keyboard (tip: make the sphere small before moving)
    f) Click Save clippers (at the bottom right)
    g) Close panel
2. Click Step7: Clip PVs and/or MV. This step clips the mesh using the previously saved clippers and relabels the PVs and LAA to the default values.

2.2 UAC and Atrial fibres

1. Click Step 9: Select Landmarks
   a) Select Rough (spacebar) landmarks. Then click the Save Rough Landmarks button.
   b) Select the Refined ("X") landmarks. Then click the Save Refined Landmarks button.
2. Click StepW: Verify Labels. This step runs a connectivity filter on each of the labels.
   a) If the labels are correct, the user is notified.
   b) If there is a connectivity issue, click to fix automatically. If this fails, then go to Step4 and fix the labels manually.
3. Click StepX: Mesh Improvement. Use default values.
   a) This creates clean-Labelled-reg-refined.vtk
   b) Make sure to check the resulting file is not empty.
4. Click StepY: Convert format. Select clean-Labelled-reg-refined.vtk. Use default values.
5. Click Step7: Calculate UAC. Select carp pts file (clean-Labelled-reg-refined.pts) when prompted. Select Position: BiLayer, Fibre File 1, with Labelled PVs box ticked
   a) Click UAC Stage 1 button
   b) Click UAC Stage 2 button
6. Click Step8: UAC Fibre Mapping
   a) For 'delete auxiliary and temporary files?' click Yes.