

Fibrotic tissue remodelling in persistent atrial fibrillation: quantitative analysis using high-resolution histology imaging

C.M.M. Afonso^(1,2), R.A.B. Burton⁽³⁾, B. Maesen^(4,5), U. Siedlecka⁽²⁾, S. Zeemering⁽⁵⁾, U. Schotten⁽⁵⁾, V. Grau⁽¹⁾ & P. Kohl^(2,6)

- (1) Institute of Biomedical Engineering and Oxford e-Research Centre, University of Oxford.
- (2) The Heart Science Centre, National Heart and Lung Institute, Imperial College London.
- (3) Department of Physiology, Anatomy and Genetics, University of Oxford.

- (4) Department of Cardiothoracic Surgery, Maastricht University Hospital.
- (5) Department of Physiology, Maastricht University.
- (6) Department of Computer Science, University of Oxford



Introduction

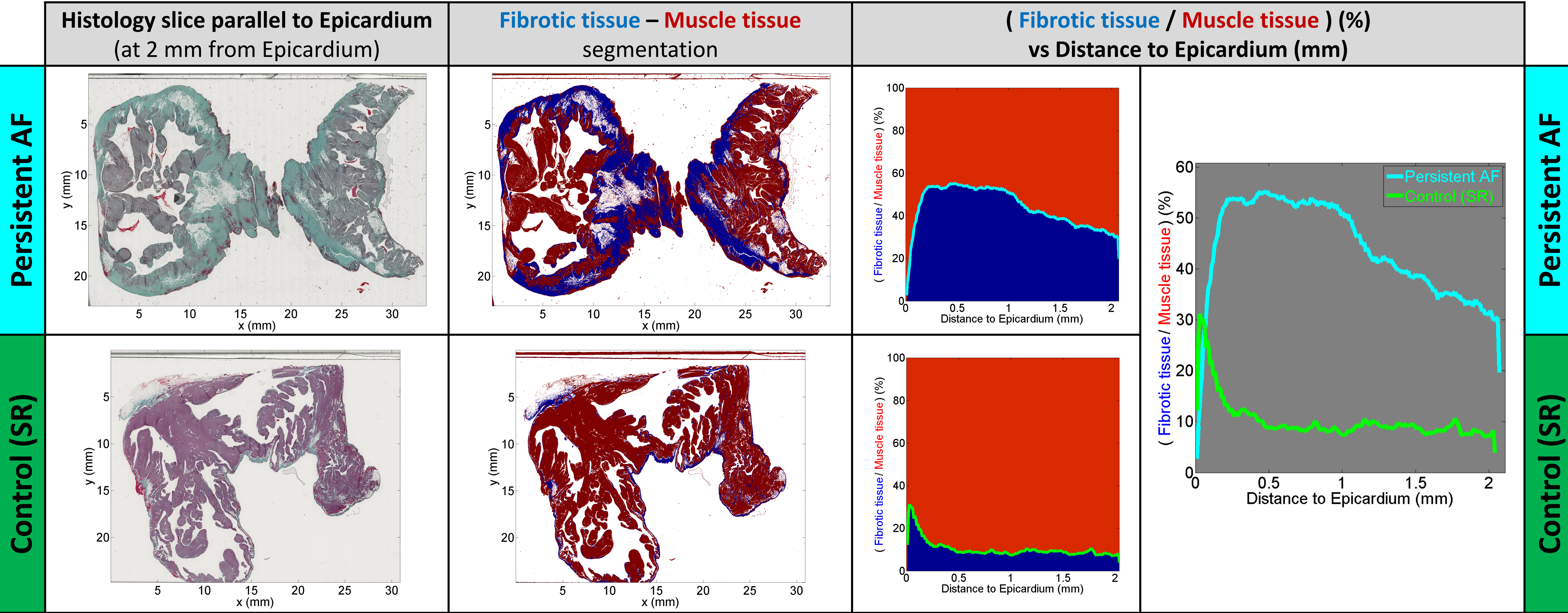
Structural remodelling: a major contributor for atrial fibrillation (AF) [1].

Fibrotic tissue remodelling: a main feature of the remodelled atrial tissue in AF, is thought to impose important electrical and mechanical constraints in AF [2].

Fibrosis anatomical characterization: necessary to better understand fibrosis mechano-electrical role in AF [2].

In this study: we analyse the accumulation of fibrotic tissue in goat atria during persistent AF.

Results

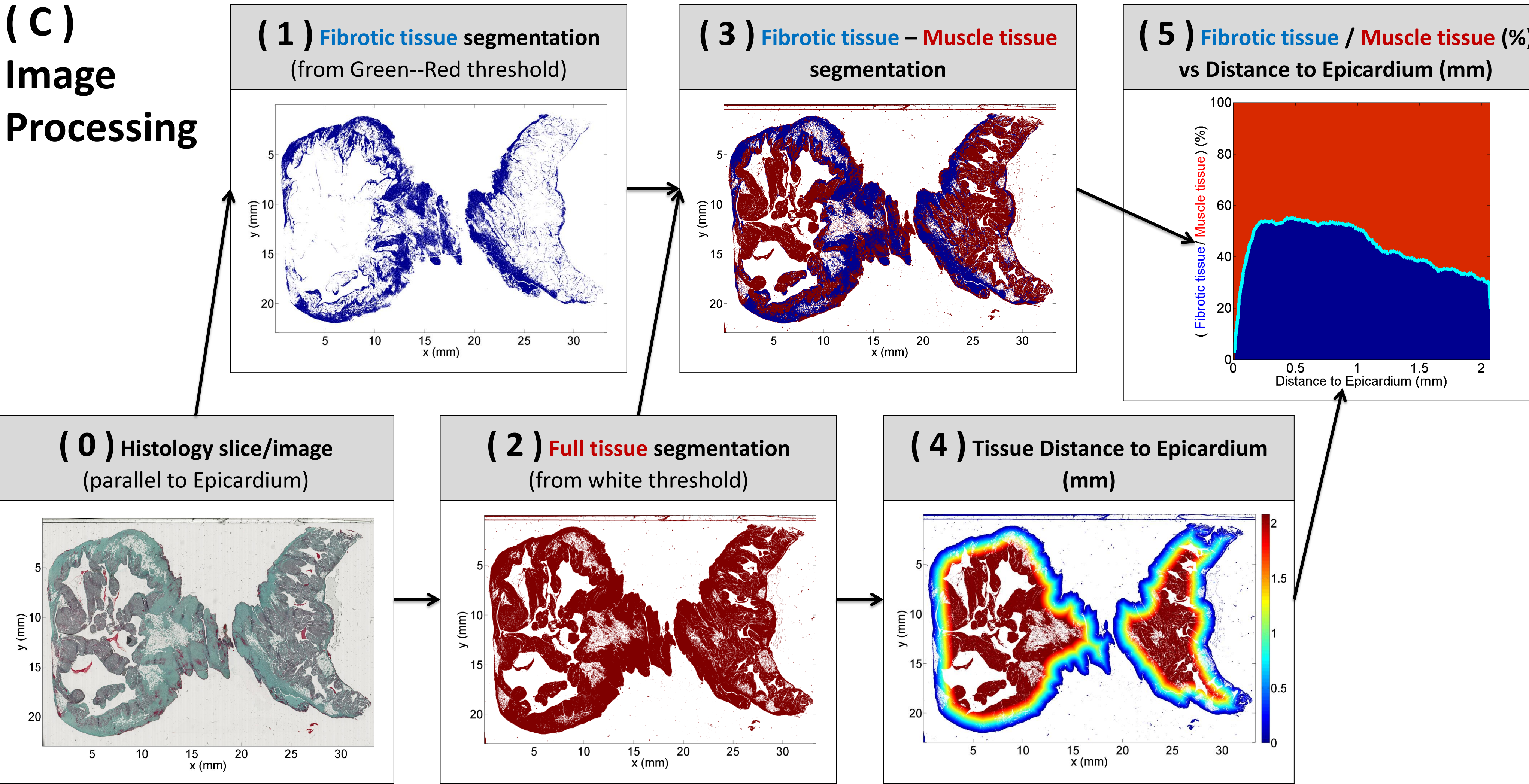


Methods

- ### (A) Tissue Samples

 - Goat left atrial wall tissue from two groups: goats with **persistent AF** induced by burst-pacing for a period of 7 to 12 months (n=5); and **control (SR: sinus rhythm)** goats (n=6).
 - Excised in open chest experiments, after electrophysiological investigation, maintaining the external tissue outline using rigid clip-on frames.
 - Tissue immediately fixed and stored in Karnovsky's fixative.
- ### (B) Histology [3]

 - After initial high-resolution anatomical magnetic resonance imaging.
 - Tissue samples were dehydrated, wax-embedded, and **serially sectioned (10 µm) in a plane parallel to the epicardium**.
 - Each section was collected, **Trichrome stained**, mounted, and digitally imaged using an Hamamatsu NanoZoomer with a **20× objective**, to obtain whole cross-section images with **0.5 µm × 0.5 µm pixel dimensions**.



Conclusions

We developed a method to **identify, quantify, and characterize the fibrotic tissue** in histology slices from goat left atrial wall tissue.

We analysed and compared the results for histology slices from two goat groups: **persistent AF vs control (SR)**. And we show how the **percentage of fibrotic tissue** varies with the **distance to the epicardium**.

These are preliminary results (here we present only one AF and one control slice as typical results for each group), which indicate that:

- Both AF and control groups show a **maximum density of fibrotic tissue in the sub-epicardial layers**; but this maximum is **higher and wider in the AF group**.

We are currently finishing the analysis of the other samples to test the statistical significance of these results.

Acknowledgements & References

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