A Novel Mathematical Model for the Microstructural Adaption of the Collagen Fabric during Aneurysm Evolution

H. Chen [1], A. McDonald[2], X.Y. Lou[2] and *P. N. Watton[3]

[1]Department of Engineering Science, University of Oxford, Oxford, UK
[2]School of Mathematics and Statistics, University of Glasgow, Glasgow, UK
[3]Department of Computer Science & INSIGNEO Institute of *in silico* Medicine, University of Sheffield, UK

*Corresponding author: P.Watton@sheffield.ac.uk

Watton et al [1] introduced the novel concept of *attachment stretch* to denote the stretch with which collagen fibres are configured to the arterial extra-cellular matrix in the physiological configuration. However, the observation that collagen fibres are distributed with a range of waviness in unloaded arterial tissue [2] implies that in the physiological configuration they are configured with a distribution of *attachment stretches*. In this study, we extend a conceptual model of intracranial aneurysm evolution [3] to incorporate a distribution function for the collagen *attachment stretches*. We examine the influence of temporal adaption of the distribution function on the evolution of the aneurysm. We conclude that more sophisticated representations of the collagen fibre attachment stretch distribution (and its adaption) are essential to accurately predict the evolution of the collagen fabric and thus the evolution of the aneurysm.

Keywords: aneurysm, arterial wall, collagen, growth and remodelling, mathematical modelling

Reference:

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