Investigation of the Mechanical, Collagen Microstructural, and Morphological Properties of Human Intracranial Aneurysms

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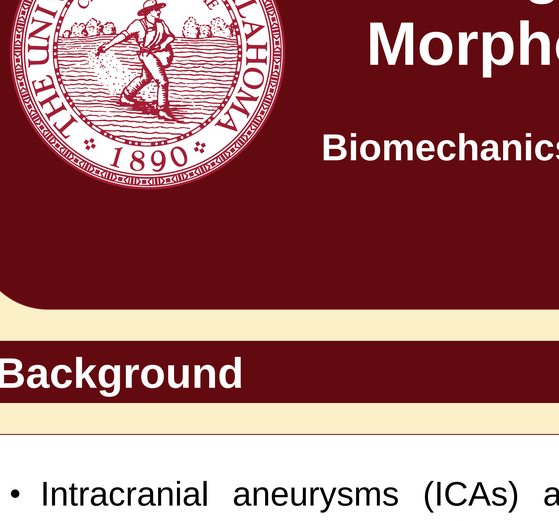
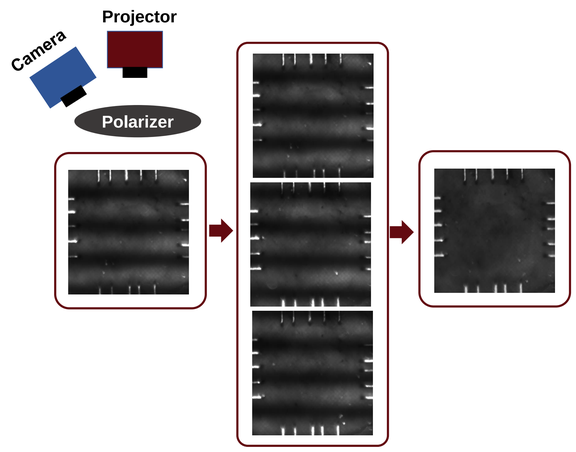
Background

- Intracranial aneurysms (ICAs) are focal dilations of cerebral arteries caused by the weakening of the arterial wall. [1]
- The resulting turbulent flow can cause further stress and growth of the site until its eventual rupture.

Methods

- Biaxial tension and stress relaxation tests were performed to examined the mechanical behaviors of the human resected aneurysm tissue.





- Load-dependent changes in aneurysm tissue's collagen microstructure were examined using polarized spatial frequency domain imaging.

References

[1] Laurence D.W., *et al.* Scientific Report, 11 : 3525 (2021).

Acknowledgements

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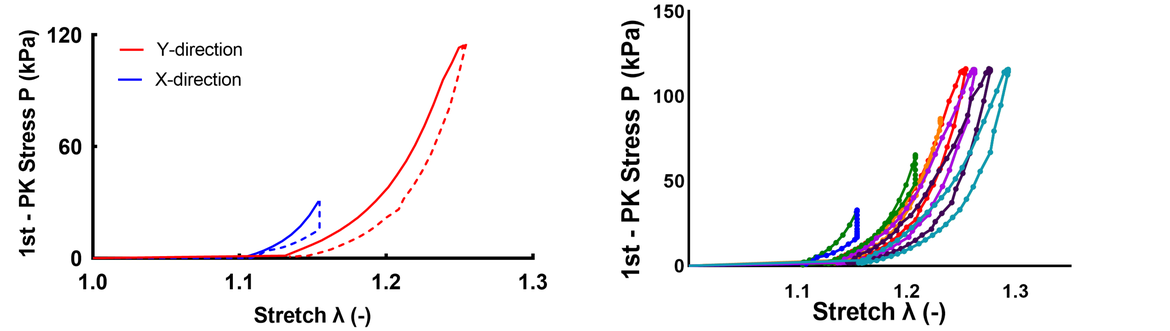
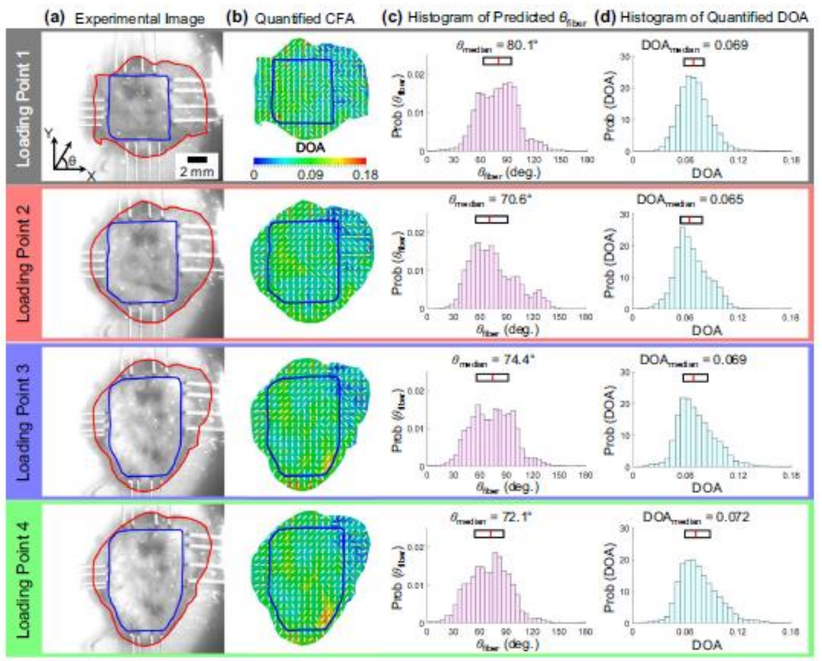
Results

Mechanical Properties



Collagen Fiber Architecture



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Discussion and Conclusion

- Our novel biomechanical and microstructural characterizations of human aneurysm tissue can help provide key insights into aneurysm growth and potential rupture risk.
- Such enhanced understanding of aneurysm tissue biomechanics is crucial for developing aneurysm therapeutics that has improved outcomes.