

ADDRESSING INITIAL CONDITION UNCERTAINTY IN LARGE- DEFORMATION TESTING OF SOFT TISSUES

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In the context of experimental research on the mechanical properties of soft tissues under large deformations, classical mechanical testing methods mainly include uniaxial and biaxial tensile tests, compression, and indentation. One of the major methodological challenges associated with these tests lies in the determination of initial conditions, in particular the definition of the reference length L_0 and the initial pre-stress state.

To address this issue, a preliminary study was conducted on uniaxial tensile tests performed on porcine fat tissues. This study proposes to use a suction-based device, VLastic [1], to estimate the Young's modulus under small deformation *in situ*, with the aim of recalibrating the equivalent reference length L_0 used to analyse the conventional tensile curves.

The results show a significant reduction in the inter-sample dispersion of the tensile curves, suggesting the potential relevance of the proposed approach. However, its applicability is limited to tissues compatible with suction-based measurements. Further studies involving a larger number of specimens will be required to confirm and generalize these findings.

References

1. Connesson, N., Briot, N., Rohan, P. Y., Barraud, P. A., Elahi, S. A., & Payan, Y. (2023). Bilayer stiffness identification of soft tissues by suction. *Experimental Mechanics*, 63(4), 715-742.