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# IN-VIVO CHARACTERIZATION AND IMAGE-BASED MODELING OF TISSUE BIOMECHANICS

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**MINI-SYMPOSIUM PROPOSAL**

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One of the fundamental aims of tissue biomechanics is to characterize the tissue's function, which is closely related to its biomechanical properties. However, standard *in vitro* testing techniques acquire tissue's properties under significantly different conditions compared to its *in vivo*, functional environment. Hence, *in vivo* characterization of biological tissue's biomechanical properties is increasingly recognized as the most appropriate approach. The progress in this direction has been greatly facilitated by the recent advances in medical imaging technology and image segmentation. The availability of 4D imaging and increased quality in terms of spatial and temporal resolutions provide suitable images for building predictive and reliable biomechanical and computational models. However, several challenges limit the broad use of these models in the clinical research. Novel techniques are therefore needed to utilize these *in vivo* images in order to deduce the biomechanical and functional properties of tissues.

This mini-symposium will bring together researchers working on different biological tissues, underlying the common theme of image-based tissue biomechanical modeling and characterization based on *in vivo* data. Topics of interest include, but are not limited to the following:

- Novel imaging modalities with applications to personalized biomechanical model development
- Image registration and patient-specific tissue deformation calculation
- Non-invasive image-based diagnosis & assessment of organ-level biomechanical performance
- Inverse models for tissues based on *in vivo* imaging
- Shape-based estimation of stress and/or strain from *in vivo* images
- Identification of stress-free state and its effect on the resulting biomechanical properties
- Deduction of tissue's growth and remodeling properties from *in vivo* dataset
- Uncertainty quantification and model selection in image-based tissue biomechanics
- Connecting reduced-order models suited for image-based modeling and detailed multi-scale constitutive models
- Quantification of tissue microstructure and effect of associated uncertainties on organ-level properties