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IMAGE-BASED CHARACTERIZATION OF FUNCTIONAL SOFT BIOLOGICAL TISSUES

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MINI-SYMPOSIUM PROPOSAL

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One of the fundamental aims of soft tissue biomechanics is to characterize the tissue's functional behaviors and 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 soft 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 extract tissue's mechanical and functional properties.

This mini-symposium will bring together researchers working on different soft biological tissues, underlying the common theme of image-based tissue biomechanical characterization using new and advanced techniques. 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
- Elastography-related techniques for disease diagnosis & tissue mechanical characterization
- Stress and/or strain estimations from *in vivo* images
- Quantification of tissue microstructure and effect of its uncertainties on organ-level properties
- Identification of stress-free state and its effect on the resulting *in vivo* biomechanical properties
- Development of inverse models for soft tissues based on *in vivo* imaging
- Shape-based estimation of soft tissue's mechanical properties
- Constitutive models with connections of soft tissue deformations to their functional properties
- Noninvasive image-based diagnosis & assessment of organ-level biomechanical performance