AbstractID: 1706 Title: Mechanical Testing of Human Organs

Human tissue elastic properties have been applied to perform image based deformable organ registration. However, knowledge of these properties is limited. In this study, an innovative measurement method was proposed for tissue measurement with consideration of the non-uniformity and anisotropy of the tissues.

In the measurement, human tissues, such as rectum, bladder, and prostate, were cut into small size specimens and loaded in a quasi-static testing machine. Instead of using an extensometer for displacement measurement, measurements of elongation (in loading direction) and shrinkage (in lateral directions) were made on multiple points through digital photographing and image analysis. Multiple markers were labeled on the surface of a specimen so that their displacements could be easily observed and analyzed. This multiple-point measurement method could take into account of the non-uniformity of the tissue specimen sections. The anisotropic behavior in the two orthogonal lateral directions was well characterized through the analysis of the images captured in their corresponding directions. Stress-strain relationship, Young's modulus, and Poisson's ratios can be obtained through such a setup. Tests were also performed on rubber specimens to verify the experiment procedures. The testing results of rubber specimens agree well with published data.

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