mechanical loading and derive the intrinsic material characteristic of a cell. In this case, the compression tests of a single cell were performed by a Hysitron TI 950 TriboIndenter® [Hysitron, Inc., Minneapolis, USA] nanomechanical test instrument with a 100 um diamond flat end probe (90° fluid cell conical). However, a clear visualization of the living cell needs to be established in order to precisely position the probe with the X and Y coordinates of the cell. There are two microscopy regimes available for the TriboIndenter bright field and fluorescence, both top-down. Based on previous experiences, COS-1 cells [ATCC code: CRL-1650] were used due to their long viability and good adhesion properties. The cell line was derived from an African green monkey kidney; the cells grow attached to the base (adherent) and have the same morphology as fibroblasts [ATCC, USA]. The practical use of green fluorescence of EGFP modified cells exposed to a blue light applied by the TriboIndenter microscope will be discussed and compared to standard bright field microscopy also available for cell localization. Compressive load-displacement data demonstrating a critical bursting force of a cell membrane will be also presented. This research was supported by Grant Agency of the Czech Technical University in Prague, grant No. SGS13/176/OHK2/3T/12.

An investigation of the influence of cartilaginous tissue microstructure on its local mechanical properties

J. Šepitka, J. Lukeš, Z. Burdíková, E. Filová, J. Řezníček
Czech Technical University in Prague and Academy of Sciences of the Czech Republic, Prague, Czech Republic
josef.sepitka@fs.cvut.cz

The research on mechanical properties of a cartilaginous endplate (CEP) seems to be more actual in current biomechanics of a spine. Mechanical properties of the cartilaginous endplate are presented with large range of values in the literature. Elastic moduli are given in the range from 5 MPa to 10 GPa. Which raises the following questions: What causes this large range of values? Is it an erroneously performed experiment? Is it a poorly identified endplate? Is it an inner microstructure of the endplate that causes large range of measured values? We decided to investigate mechanical properties depending on inner microstructure of CEP and thereby detect possible source of scattering of results. A fresh porcine spine was used for an experiment. The lumbar spine motion segments were immediately dissected and ten millimeter thick plates of vertebral body, CEP and annulus fibrosis were cut and polished under running water conditions. The specimen was kept in saline solution for protection from drying out during tests. Second Harmonic Generation imaging method (SHG) was used to identify CEP area and its inner structure. Nanoscale Dynamic Mechanical Analysis (nanoDMA) was used to investigate structural dependent mechanical properties afterwards. This work presents combination of a nanoindentation technique and SHG imaging to determine an influence of the cartilaginous endplate microstructure on its local mechanical

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The dependence of viscoelastic parameters of hair on its structure

M. Skřontová, L. Šimková, J. Zeman, K. Jelen
Charles University, Prague, Czech Technical University in Prague, Czech Republic
skrontova.m@seznam.cz

Hair is a polymer with a composite structure; that´s why its dependence of the total viscoelastic properties on its physical sizes is not surprising. Cross dependencies of the viscoelastic parameters, especially their dependence on the diameter of the hair, allows construction of a viscoelastic model of the hair structure and identify its elements with the anatomical structural parts of the hair, then find the characteristic viscoelastic parameters for these parts. We measured parameters such as activation energy, the work necessary to break the hair, relaxation times, the Young's modulus, the ultimate strength and elasticity. 600 samples of Caucasian women´s hair have been measured. The demonstration of dependence between these parameters is itself a valuable finding of this pilot study.

Experimental test machine for durability evaluation of bifurcated endovascular stent-grafts: verification of testing conditions

M. Ackerman
Technical University of Liberec, Czech Republic
michal.ackermann@tul.cz

Bifurcated endovascular stent-grafts are crucial medical devices for mini-invasive treatment of abdominal aortic aneurysm (AAA). After deployment of stent-grafts into the vessel, it is subjected not only to strongly corrosive environment but also to fatigue. This is due to the cyclic alteration of systolic and diastolic blood pressure in an artery. Proposed paper deals with construction and verification of a machine which is able to simulate conditions in the aorta and thus verify durability of the stent-grafts as a whole. Special attention is dedicated to measurement of the pressure development in a silicone model of the aorta.

The ability of vibrational technique to assess initial fixation of implant

P. Henyš
Technical University of Liberec, Czech Republic
petr.henys@tul.cz