



***Workshop:
Patient Centered (Health) Care Solutions***

**The Changes Caused by Modification of Biomechanical Properties
of a Bone**

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Abstract

The paper presents the distribution of the parameters of mechanical stiffness in a sample of animal bone. The parameters are measured at different distances from the cortical bone. As it is widely known, bone properties vary significantly depending on the length of the bone. Additionally, the properties of trabecular bone also depend on its distance from the cortical bone. The study presents the results for both samples of normal bone tissue and samples of bone tissue with chemically modified biomechanical properties.

For each sample a matrix of measurement points was defined. For each measurement point, a micro hardness test was performed in order to define hardness of the micro volume and to measure the Young's modulus. This test was carried out using Micro-Combi-Tester equipment. Micro hardness was measured with Vickers diamond, and the analysis of deformation properties was realized by the Olivier and Pharr method. The application of Oliver and Pharr method enabled the calculation of Young's modulus directly from the unloading curve.

Additionally, mineral density for all samples was measured using Dual Energy X-ray Absorptiometry method. This study allowed for comparison of bone mineral density parameter with Young's modulus. The aim of this comparison was to demonstrate changes caused by modification of biomechanical properties of bone.

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