Abstract

The mechanical loading affects the long bone cross-section geometry (CSG). The aim of this thesis was to examine experimentally the relationship between the locomotory parameters and cross-sectional properties of long bones, and to test some partial knowledge of the bone mechanical adaptation. Two groups of B6CBA mice were examined: (a) Lurcher type (model of olivocerebellar degeneration; n = 10) and (b) control (normal mice; n = 10). We analyzed the motor characteristics and the bone cross-sectional geometric properties. The motor tests included the test of spontaneous motor activity (Open field), strength properties (horizontal bar) and motor coordination (rotarod). Cross-sections were taken in 50 % of the left tibia biomechanical length and further processed for fluorescence confocal microscopy. We analyzed the biomechanical properties of cortical bone cross-sections (software ImageJ). There were nonsignificant differences in CSG parameters (TA, CA, I_{max}, I_{min}, J, I_{max}/I_{min}) between Lurcher and control mice. The results did not support our assumption about the effect of motor disorder on CSG properties. We did not demonstrate the effect of local factors on the bone biomechanical adaptation. The results of this thesis may be useful to find new testing possibilities of cortical bone in anthropology.

Key words: mechanical loading, bone adaptation, tibia, CSG, motor disorder, Lurcher