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CONSTITUTIONAL CHARACTERISTICS AND BONE MINERAL CONTENT IN ASTRONAUTS  
BEFORE AND AFTER FLIGHTS

**Abstract**

The purpose of the work was to search for the dependence of the bone mineral content (BMC) and bone mineral density (BMD) of the metabolically significant zones of the human skeleton (lumbar spine L1-L4 and the proximal femur) and their changes after space flight, on the constitutional body characteristics: growth, body weight, weight of soft tissues (body weight excepting fat mass and bone mass). The subjects were cosmonauts aged from 31 to 49 years ( $n = 27$ ). Dependence of BMC and BMD values on growth and weight of soft tissues was determined on the basis of preflight data. The relationship between the changes in BMC and BMD of the studied zones and the constitution of the examined subjects was checked on the basis of pooled pre- and post-flight data. A regression analysis (residue analysis, significance analysis, acceptability of the model as a whole regression analysis, analysis of  $R^2$  regression analysis) was carried out, scatter diagrams were constructed. The results of regression analysis at  $p < 0.05$  were accepted as statistically significant. The presence of a relationship between the changes in the mass of soft tissues and BMC and BMD of the tested zones, and also the relationship between the change in the measured parameters and the growth of the subject during the present study were not confirmed. The obtained results showed that the BMC of the lumbar vertebrae L1-L4 is 40-48% connected with the growth, and the BMC of the proximal femur areas is 30% connected with the mass of soft body tissues. As regards BMD of these zones, one may talk only about a tendency. It could be useful to take into account the constitutional characteristics, determined at osteodensitometry, while selecting and training participants for long space missions.