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CORRELATION BETWEEN METABOLIC MARKERS AND BONE MINERAL DENSITY IN DIAGNOSIS OF OSTEOPOROSIS

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The aim of investigation: to study correlation between concentration of metabolic markers and bone mineral density in men and women with age-related osteoporosis.

Introduction: Osteoporosis (OP) is a systemic disease that causes a decrease in strength and fractures of bones. Quantitative measurements of mineral density and ultrasonic methods for determining the quality of bone tissue have clinical value for generalized osteopenia (Engelke K. et al., 2006). Biochemical indices can determine the balance between bone tissue formation and resorption (Masheiko I.V., 2017; Cohen-Solal M.E. et al. 2006).

Materials and methods of investigation. We have examined 28 women (66.1 ± 5.7 years) and 26 men (67.3 ± 6.2 years) with age-related OP. Control group consisted of 24 women (30.3 ± 5.1 years) and 23 men (32.8 ± 4.6 years) without osteoporotic changes. We investigated levels of osteocalcin (OC, ng/ml) and procollagen I C-terminal propeptide (PICP, ng/ml), tartrate-resistant acid phosphatase activity (TRAP, U/l) and alkaline phosphatase activity (ALP, U/l) in serum, concentration of β -C-terminal telopeptides of type I collagen (β -CTX, ng/ml) in urine. Projection bone mineral density (BMD, g/cm²) was measured by dual-energy X-ray absorptiometry (DXA) Lunar Prodigy (GE Medical Systems) of lumbar spine (L_{1-IV}) (Pisani P. et al., 2013). Statistical analysis was performed using the Statistica 6.0 (Statsoft Inc., USA).

Results and discussion. The most significant decrease of BMD in comparison with control group was found in men with age-related OP ($40.45 \pm 3.96\%$, $P < 0.05$). Increased TRAP activity (6.02 ± 0.97 , $P < 0.05$) and β -CTX concentration (1.32 ± 0.17 , $P < 0.001$) in women with age-related OP testifies to active bone resorption. However, the concentration of OC (18.21 ± 2.53 , $P < 0.05$) and ALP activity (49.74 ± 5.76 , $P > 0.05$) are close to normal and indicate sufficient activity of bone tissue formation. We also established low and moderate negative correlation of BMD with TRAP concentration (-0.176 , $P < 0.05$) and β -CTX (-0.328 , $P < 0.01$) in men with OP and low negative correlation of these parameters in women with OP: TRAP (-0.192 , $P < 0.05$), β -CTX (-0.221 , $P < 0.05$). In men with OP decrease of OC concentration (12.51 ± 1.92 , $P < 0.001$) and low positive correlation of BMD with OC concentration (0.157 , $P < 0.05$) was revealed, this indicates decrease of osteoregenerative activity.

Conclusions: In women with age-related osteoporosis the osteoregenerative activity of bone tissue is normal. In men with age-related osteoporosis the high activity of bone tissue resorption and decreased osteoregenerative activity are detected.