THE BONE TURNOVER MARKERS IN SERUM AND BONE TISSUE IN YOUNG RATS WITH EXPERIMENTAL CHRONIC RENAL FAILURE

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Key words: *chronic renal failure, bone turnover markers, young rat*

Objectives. Chronic Kidney Disease (CKD) is a condition associated with progressive kidney failure and bone disorders. The typical biochemical derangement, including abnormalities in mineral homeostasis and the progress of CKD-mineral and bone disorder (CKD-MBD) frequently occurs in CKD. Biochemical markers reflect the processes involved in bone remodeling. Bone turnover is represented by markers such as: alkaline phosphatase (ALP), an indicator of the bone formation rate, and tartare-resistant acid phosphatase (TRAP), which is regarded as a marker of osteoclastic activity and bone resorption.

Aim. We used the experimental 5/6 nephrectomy model of chronic renal failure (CRF) to explain the impact of age, disease progression and secondary hyperparathyroidism on bone turnover markers in serum and femoral tissue of young growing rats.

Materials and methods. One-month-old Wistar male rats were randomly allocated into 5/6 nephrectomy and sham operation. Serum samples and femurs were collected one and three months after surgery. Bone turnover markers activity was measured in serum (sALP, sTRAP), trabecular (tALP, tTRAP) and cortical (cALP, cTRAP) femoral tissue. Next, the TRAP/ALP ratios, reflecting the predominance of bone resorption process, have been calculated. Moreover, serum parathyroid hormone (PTH) and creatinine concentrations were measured.

Results. PTH and creatinine levels were higher in CRF in comparison with appropriate controls. sALP, sTRAP and sTRAP/ALP ratio were similar in CRF and controls, however the age-dependent reduction in sALP was observed in all animals. tALP was significantly decreased in CRF animals compared to controls, and its age-dependent reduction was also observed. tTRAP was significantly higher in CRF compared to controls after one month of CRF development, and

tTRAP/ALP ratio were significantly higher in CRF than in healthy animals. There were not differences in cALP, cTRAP and cTRAP/ALP ratio between CRF and controls. sALP was inversely associated with PTH and creatinine levels both in CRF and in controls. sALP correlated with tALP in CRF rats, and the positive association was between ALP and TRAP in trabecular but not in cortical tissue. Moreover, tALP and tTRAP were inversely associated with PTH and creatinine levels in CRF rats. There was no correlation between trabecular and cortical markers of bone turnover both in CRF and controls. However, in healthy animals the positive relationship between cALP and cTRAP was observed.

Conclussions. The disturbances of bone turnover with a predominance of resorption were observed in trabecular bone of CRF rats. The uncoupling bone turnover existed between trabecular and cortical bone both in CRF and controls, which may be explained by modeling process dominant in rapidly growing rats. The factors associated with renal insufficiency adversely affected bone turnover in trabecular tissue of CRF rats.

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MARKERY OBROTU KOSTNEGO W SUROWICY ORAZ TKANCE KOSTNEJ U MŁODYCH SZCZURÓW Z EKSPERYMENTALNĄ PRZEWLEKŁĄ NIEWYDOLNOŚCIĄ NEREK

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Słowa kluczowe: *przewlekła niewydolność nerek, markery obrotu kostnego, młody szczur*