

## SUMMARY

**Background:** Patients treated with chronic dialysis show extreme mortality, particularly due to cardiovascular disease. Renal failure is associated with different risk factors of cardiovascular complications than those defined for non-renal population. One of these factors, currently considered most important, are vascular calcifications. At the same time, patients on dialysis regularly suffer from derangements of calcium-phosphate metabolism, including skeletal demineralization. As a consequence, both incidence and prevalence of bone fractures are high.

**Aims:** This study therefore investigates vascular calcifications and skeletal demineralization, their clinical implications and associations in patients treated with long-term dialysis.

**Methods:** Two groups of patients were examined in a prospective manner (follow-up > 1 year); 32 patients treated with peritoneal dialysis and 72 treated with regular hemodialysis. Treatment parameters and biochemical markers of calcium-phosphate metabolism were monitored throughout the study. Bone mineral density of lumbar spine (together with vertebral fractures) as well as coronary artery, valvular and aortic calcifications were determined repeatedly. All radiological parameters were measured during one computed-tomography scanning session.

**Results:** A significant decrement of bone density was found in both groups which was more rapid than in general population and independent of any recorded therapeutical or laboratory parameters. Maximum bone loss occurred in the cortical region and the cortical density was proved as the most reliable predictor of prevalent vertebral fractures. The deepest decrease of cortical bone density was ascertained in patients reaching low tertile of plasma alkaline phosphatase. Coronary artery and valvular calcifications reached high above the average of control group governed by the traditional atherosclerosis risk factors and did not differ from patients suffering from coronary artery disease. Moreover, the calcification scores were tightly correlated with the history of major cardiovascular events. Yet another significant increase in coronary artery calcifications was detected during the follow-up which was related to the trend in bone density. This correlation, however, was found different in males (positive) than in females (negative). Large arteries calcifications were associated with the total duration of renal replacement therapy.

**Conclusions:** Our results confirmed previous findings documenting massive vascular calcifications and serious skeletal demineralization, their clinical consequences (coronary artery disease, pathological fractures) as well as a rapid progression of both. Major contribution of our studies lies in proving cortical bone density the best predictor of fractures and in demonstrating the correlations between coronary calcification scores and vertebral bone density.