

High resolution peripheral quantitative CT: Precision of bone mineral density measurements and of analyses of bone microarchitecture

Introduction: High resolution peripheral quantitative computed tomography (hrpQCT, XtremeCT®), can be used for measurements of volumetric bone mineral density of cortical and trabecular bone as well as for analyses of trabecular structure parameters. For interpretation of follow-up measurements the knowledge of the precision errors and of the resulting least significant changes by a given error probability is necessary. **Method and patients:** We examined the proximal radius of 28 men and women, mean age 52,4 years (21 y to 81 y) and the tibia of 29 persons with a mean age of 53,7 years (21 y to 87 y). Measurements were performed by XtremeCT® (Scanco Medical, Switzerland) three-times at the distal radius and the proximal tibia in short time intervals within one day. From those results precision errors and least significant changes were calculated for each parameter. **Results:** The table shows the precision errors and the least significant changes (LSC) at an error probability of 5% of various parameters of bone density and trabecular structure. The results show low precision errors for measurements of bone mineral density. **Discussion:** The hrpQCT enables us to measure not only bone mineral density at the peripheral skeleton but also the analysis of the trabecular structure. The precision error and least significant change of parameters of bone density are markedly lower than in DXA. Significant changes in BMD can be expected earlier than by DXA in patients under medical treatment of osteoporosis. Changes of the various density and structural parameters under different medications of osteoporosis promise new insights into the mechanisms by which the substances work at the bone tissue level.