Thesis Title	The Effects of Beam Hardening on Bone Density Measurements
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ABSTRACT

The effects of beam hardening on bone density measurements study by using dual energy x-ray absorptiometry. We studied with spine aluminium phantom that has 4 values of bone mineral density 0.92, 1.076, 1.239 and 1.403 g/cm^2 (which is called standard BMD) in the water tank by varying the water thickness to 10, 15, 20 and 25 cm, with 8 mm back thickness.

The exposure parameters were set to 0.84 mm collimator 150 uA current, 1.68 mm collimator 150 uA current, 0.84 mm collimator 750 uA current and 1.68 mm collimator 750 uA current with the constant 76 kV_p.

The results showed that when the water thickness or the spine phantom density changed, the calculated bone mineral density also changed. First, at the constant water thickness, the calculated BMD was higher than the standard BMD in most of spine phantom levels and the more standard BMD, the more calculated BMD. Second, when the water thickness was increased, the different between the calculated BMD and the standard BMD was decreased. Both of these changes were not linear.

In conclusion, for this study, the effects from the medium (water thickness and aluminium spine density) became to be the beam hardening effect on bone density measurements. The calculated BMD is nearly equal to the standard BMD at the lowest standard BMD (0.92 g/cm^2) at 25 cm water thickness, but the calculated BMD is very different from the standard BMD at the highest standard BMD (1.403 g/cm^2) at 10 cm water thickness.