Beam hardening artefacts occur in dental implant scans with the NewTom cone beam CT but not with the dental 4-row multidetector CT.

OBJECTIVES: The aim of this study was to examine beam hardening artefacts of the NewTom 9000 cone-beam computed tomography (CBCT) device compared with the Philips MX 8000 (4-row multidetector CT (MDCT)).

METHODS: We modified a SawBone skull to become a standardized model for our study. The skull was used for scans with the NewTom 9000 CBCT device and a standard dental multi-detector CT (MDCT) at a comparable reconstruction resolution with a standard Straumann ITI 4.1 mm implant in four implant positions in the maxilla (first permanent premolar in the right maxilla region, second permanent molar in the right maxilla region, first permanent premolar in the left maxilla region and second permanent molar in the left maxilla region). Results were compared with construction data of the dental implant. An image quality assessment of the images from both devices was performed with four experienced physicians and statistically analysed with the two-tailed Wilcoxon test.

RESULTS: Scans with the NewTom 9000 CBCT showed strong beam hardening artefacts in the form of a radiation beam shadow in all reconstructions compared with the MDCT. These imaging artefacts became stronger with greater distance from the centre of the scanned volume. These differences in the imaging quality were proved as significant in a quality evaluation by
frequent physicians (P<0.05). CONCLUSIONS: Visual spatial resolution of the NewTom 9000 CBCT was less accurate than the Philips MX 8000 MDCT in the imaging of metallic dental implants.