

Nackaerts O, Oliviero C, Lambrichts I, Horner K, Jacobs R & the SEDENTEXCT project Consortium (2010) "Density and morphology of jaw bone assessed in 2D and 3D imaging methods" presented at the 12th European Congress of Dento-Maxillo Facial Radiology, 2 - 5 June 2010, Istanbul, Turkey.

Density and morphology of jaw bone assessed in 2D and 3D imaging methods

Nackaerts O¹, Oliveira C², Lambrichts I³, Horner K⁴, Jacobs R¹, SEDENTEXCT consortium⁵

¹Oral Imaging Center, Katholieke Universiteit Leuven, Belgium

²Department of Radiology, Federal University of Bahia, Brazil

³Department of Morphology, University Hasselt, Belgium

⁴School of Dentistry, Manchester University, UK

⁵www.sedentexct.eu

Introduction

Daily interpretation of radiographs by dental professionals remains, to a large extent, subjective and statistically unvalidated. Objective numerical bone assessment would be more suitable for making evidence-based clinical decisions.

Objectives

The aim of this *in vitro* study was to assess clinically applicable methods for objective assessment of bone density and bone morphology on radiographs.

Materials and methods

Twelve dry human bone samples were used. The radiographic methods were periapical radiography (PA RX) and cone beam CT (CBCT), with micro-CT (μ CT) as the reference standard. On all images the following parameters were measured: bone (radiographic) density, bone area and fractal dimension.

Results

P was set at 0.05 for statistical significance. Densities for all imaging modalities were significantly correlated with μ CT ($r=.55$ for PA RX and $r=.70$ for CBCT). Areal measurements on CBCT images were significantly correlated to the areal measurements on μ CT ($r=.55$) and fractal dimension showed a nearly perfect correlation for CBCT and μ CT ($r=.9$). The latter structural measurements showed no significant correlation with PA RX.

Conclusions and discussion

Analysis of three-dimensional images is preferable when information on the structure of the jaw bone is needed. Quantitative methods might be used in the future to assess the jaw bone objectively. For a more generalised bone density evaluation, intra-oral radiographs still provide useful information.

Acknowledgements

The research leading to these results has received funding from the European Atomic Energy Community's Seventh Framework Programme FP7/2007-2011 under grant agreement no 212246 (SEDENTEXCT: Safety and Efficacy of a New and Emerging Dental X-ray Modality).