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## Title

# Towards investigating the implications of joint incongruity on the elbow joint structure using finite element modelling

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## Abstract

A three-dimensional bio-realistic finite element model of the human elbow was constructed based on the MRI data to analyse the implications of joint incongruity on the elbow joint structure. The MRI data were captured based on scanning a 21-year-old male without previous upper limb abnormalities, with the slice thickness of 0.4 mm to segment different elbow tissues. The model was developed based on image-based Bio-CAD modelling technique [1]. This bio-realistic model consists of the three bones, which are humerus, ulnar and radius, while the relative articulations exist in

the joints were also modelled using the cartilage layers on each bone. Two main ligaments of medial and radial collateral ligaments were modelled to analyse the loading transfer mechanism within the different human elbow joints (the humero-ulnar, humeroradial, proximal radioulnar). The assigned material properties, loading and boundary conditions were captured from the literature [1, 2, 3, 4]. This developed model is a database for different static or dynamic loading and boundary conditions which can represent the realistic degrees of freedom of the human elbow joint movements.

References:

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