

# A Statistical Shape Model of the Thumb Carpometacarpal Joint

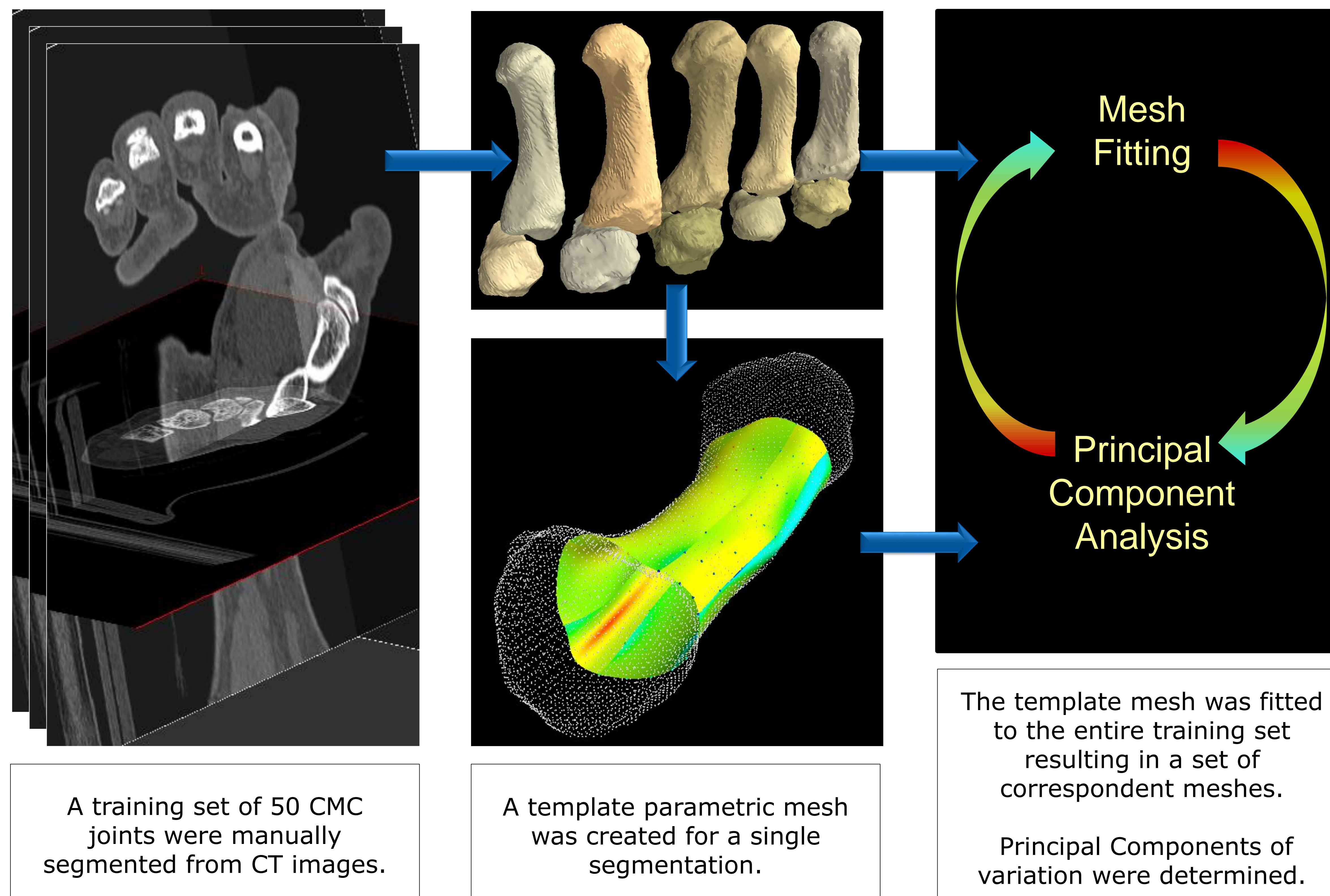
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## Introduction

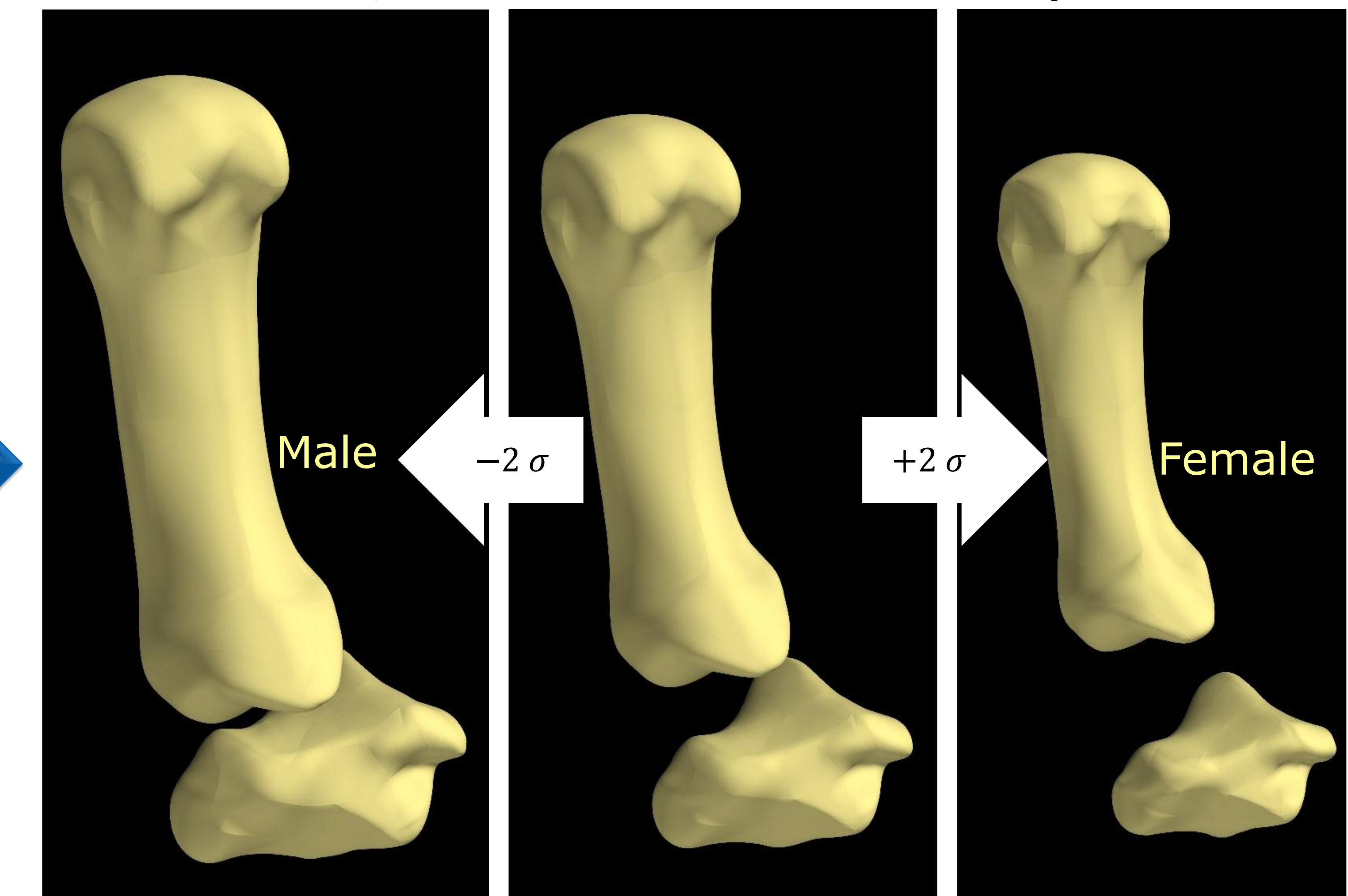
The first carpometacarpal (CMC) joint performs a range of dexterous movements, all of which are influenced by the morphology and articulation between the first metacarpal and trapezium bones. However, the CMC joint is highly susceptible to osteoarthritis (OA), which is more prevalent with age and 2-3 times more prevalent in women than in men. Here we present a statistical shape model of the CMC joint to investigate age and sex differences in CMC joint morphology.

## Methods



## Results

- Over 90% of CMC joint morphological variation was described to an accuracy of  $\sim 0.3$  mm RMS by the first 10 modes of the shape model.
- None of the modes showed significant correlation with age.
- There was a very strong correlation ( $p$ -value  $< 0.0001$ ) between sex and the 1<sup>st</sup> mode, which described the size of the CMC joint.



## Discussion

- Our statistical shape model accurately describes CMC morphology.
- This shape model will drive an automatic segmentation tool, which will enable us to investigate a larger cohort and support our findings.
- Size could account for the higher incidence of CMC OA in women, given that a smaller joint contact area would experience greater cartilage stress for a given force.

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