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## A biomechanical case study on the optimal orthodontic force on the maxillary canine tooth based on finite element analysis

Key words: Biomechanics, Optimal orthodontic force, Finite element analysis, Periodontal

## **Research Summary**

This research article mainly focused on the optimal orthodontic forces on a maxillary canine, using hydrostatic stress and logarithmic strain of the periodontal ligament (PDL) as indicators

- Optimal stress: absolute stress range between 0.47 KPa (capillary pressure) and 12.8 KPa (80% of human systolic blood pressure)
- Optimal strain: strain exceeding 0.24% (80% of peak strain during canine maximal moving velocity)
- Optimal tipping forces ranges: 40-44 g for distal and 28-32 g for labial direction
- Optimal translation forces ranges: 130-137 g for distal and 110-124 g for labial direction





LE, Max. Principal (Abs) (Avg: 100%)







## Innovation points

• Both hydrostatic stress and logarithmic strain of the periodontal ligament (PDL) were adopted as indicators

 The optimal forces intervals were smaller than previous results

• The results provide new insights into orthodontic biomechanics and help to optimize orthodontic treatment plans

