

Influence of stress simulation parameters on the fracture strength of all-ceramic fixed-partial dentures.

[Rosentritt M](#), [Behr M](#), [Gebhard R](#), [Handel G](#).

Department of Prosthodontics, University of Regensburg, D-93042 Regensburg, Germany.
martin.rosentritt@klinik.uni-regensburg.de

OBJECTIVES: This in vitro study tested the influence of diverse stress simulation parameters on the fracture strength of all-ceramic three-unit fixed partial dentures (FPDs). **METHODS:** All-ceramic FPDs made of Empress 2 (Ivoclar-Vivadent, FL) were exposed to thermal cycling and mechanical loading (TCML) with varying loading parameters such as chewing force (amount, frequency), thermal loading, lateral jaw motion, abutment material, artificial periodontium or antagonistic denture. To investigate the influence of the abutment material, human teeth, polymer abutments and alloy abutments were used. Two different TCML devices with pneumatic or weight loading were compared. FPDs without aging were used as a control. **RESULTS AND SIGNIFICANCE:** Combined thermal and mechanical loading significantly reduced the FPD fracture resistance from 1832N to 410N. Duplication of chewing frequency, phase load increase or additional lateral movement did not effect the results. Increasing chewing force, artificial periodontium, and antagonist or abutment material reduced the fracture resistance of the tested FPDs. Different devices with weight or pneumatic loading had no significant influence on the loading capacity of the FPDs. Artificial aging should be performed combining thermal cycling with mechanical loading. Simulation of the artificial periodontium, human antagonists and abutments should be included to achieve a significant aging.

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