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**Using a chewing simulator for fatigue testing of metal ceramic crowns****S. D. Heintze<sup>1</sup>, A. Eser<sup>1</sup>, D. Monreal<sup>1</sup>, V. Rousson<sup>2</sup>**

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**ABSTRACT**

*Objective:* Dynamic loading is a more important predictor for the clinical longevity of ceramic crowns than static loading. However, dynamic loading machines are costly and mostly have only one chamber. The Willytec simulator may be a cost-effective alternative to evaluate the fatigue resistance of metal ceramic crowns.

*Method:* Four metal ceramic materials were tested on lower first molar crowns: GC Initial, Creation (Willy Geller), IPS InLine (Ivoclar Vivadent) and the new low-fusion IPS Style Ceram (Ivoclar Vivadent). The ceramic material was manually layered on frames made of the nickel-chromium alloy 4all (Ivoclar Vivadent) by using a silicone mould. The crowns were adhesively luted to PMMA dies. Dynamic loading was carried out with a Willytec simulator (SD Mechatronik) using additional bars with weights. A steel antagonist ( $\varnothing$  4mm) with 40mm/s downward speed hit the disto-buccal cusp of the crown with minimal impulse while sliding for a distance of 0.7mm. The starting load was 250N. The forces at each load level had been verified with a 3D force sensor (Kistler). Four crowns per group and load were submitted to four decreasing load levels for 200,000 cycles at 0.8 Hz and simultaneous thermocycling (5°C/55°C) until all four crowns no longer showed chippings. Statistical analyses had been carried out using an exponential, a Weibull and a lognormal model. The fatigue resistance was defined as the maximal load for which one would observe less than

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