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In Vitro Fracture Force and Marginal Adaptation of Ceramic Crowns Fixed on Natural and Artificial Teeth

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Purpose: Artificial teeth made of acrylic resin or alloy are considered substitutes for rare caries-free human teeth in in vitro examinations. The purpose of this study was to compare the fracture strength and marginal adaptation of all-ceramic single crowns fixed to natural teeth with crowns fixed to artificial teeth after artificial aging. **Materials and Methods:** The fracture force and marginal adaptation were investigated in 28 adhesively luted all-ceramic crowns on human molars of different sizes, as well as on alloy and liquid crystal polymer (LCP) artificial teeth. The fracture force was determined using a universal testing machine, and the semiquantitative marginal adaptation was examined using a scanning electron microscope, in both instances after simulating 5 years of clinical service. **Results:** Fracture force was found to be significantly higher for crowns fixed on substitute materials (alloy = 1,838 N; LCP = 1,392 N) than for crowns on human teeth (888 N). No significant differences in marginal quality could be determined between the groups. All crowns showed marginal gaps of about 10% and perfect margins at about 90%. **Conclusion:** The high in vitro fracture values of all-ceramic crowns on artificial materials may lead to a misinterpretation of the tested restorative materials, overvaluing the material properties in a first preclinical estimation. Human teeth or materials with a comparable modulus of elasticity are therefore preferred in in vitro fracture tests.