7 Summary

The goal of this in vitro study was to examine the molar fracture resistance of IPS Empress 2 crowns compared to natural teeth. The effect of luting media (composite luting material Variolink 2, zinc phosphat cement Harvard) as well as of thermocyclic aging (5°C/55°C) was analyzed. Orthogonal stress was applied with the use of the universal checking device Instron. An average fracture resistance of 1738 ± 714 N for natural teeth and of 2420 ± 720 N for Empress 2 crowns without aging and 1974 ± 477 N for Empress 2 crowns with aging were measured. Without aging, the average fracture resistance in crowns luted with zinc phosphate cement was at 1935 ± 402 N. Crowns luted with composite luting material measured at 2904 ± 665 N. In aged crowns, the corresponding values were 1717, 1 ± 413, 5 N (zinc phosphate cement) and 2230,2 ± 404,7 N (composite luting material). Regarding the fracture resistance, thermocycled crowns do not statistically significantly differ from natural teeth, however for crowns without thermocycling, the differences between natural teeth and crowns luted with zinc phosphat cement or composite luting material were statistically significant. Thus, this study – on the one hand – proves the expected influence of thermocyclic aging on the fracture resistance of Empress 2 crowns independent from the choice of cement. On the other hand, the fracture resistance of zinc phosphat cement-luted crowns with as well as without aging was lower than of crowns cemented adhesively with composite luting material. Already the group with the lowest fracture weight (thermocycled crowns cemented with zinc phosphate cement) was similar to the fracture strength of natural teeth and amounted to at least twice the highest values stated in literature for maximal forces in the oral cavity. The fracture resistance of the IPS Empress 2 inlay system is thus sufficient for the use as single molar crown.