

Schwitalla AD; Spintig T; Kallage I; Müller WD, Pressure behavior of different PEEK materials for dental implants. Journal of the mechanical behavior of biomedical materials; VOL: 54; p. 295-304 / 20151019/

ABSTRACT: Due to its mechanical properties, the biocompatible high-performance material PEEK (polyetheretherketone) and PEEK-based compounds may represent viable alternatives to titanium in the field of dental implantology. Therefore we performed static pressure tests with 11 PEEK materials (two unfilled grades, two grades filled with titanium-dioxide-powder, two grades filled with barium-sulfate-powder, two grades reinforced with short carbon fibers, one grade reinforced with glass fibers and two grades reinforced with continuous carbon fibers) in the form of cylindrical specimens with a diameter of 4, 5 and 6mm. The specimens had a height to diameter ratio of 2:1 and were therefore 8, 10 and 12mm high. The parameters elastic modulus, elastic limit and pressure strength were evaluated. The elastic moduli ranged between  $2.65 \pm 0.03$  GPa for specimens of a titanium-dioxide-filled grade and  $106.71 \pm 14.83$  GPa for specimens reinforced with continuous carbon fibers. The elastic limits ranged between  $808.1 \pm 42.44$  N for specimens of a barium-sulfate-filled grade and  $7256.4 \pm 519.86$  N for specimens reinforced with continuous carbon fibers. The lowest pressure strength of  $122.77$  MPa was observed for specimens of an unfilled grade, whereas the highest pressure strength of  $712.67 \pm 66.02$  MPa could be evaluated for specimens containing continuous carbon fibers. Regarding the maximum bite force of a first molar, all tested materials seem to be suitable for the use as dental implants.

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