

Electron beam irradiation of dental composites.

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OBJECTIVES: Electron beam irradiation can be used to influence the mechanical properties of polymers. It was the aim of this study to investigate whether dental composites can benefit from irradiation in order to achieve increased fracture toughness, work of fracture, hardness or less wear. **METHODS:** Two hundred rectangular specimens of five veneering composites were electron beam irradiated with 25, 100 and 200 kGy using an electron accelerator of 10 MeV. Fracture toughness, work of fracture, Vickers hardness, color changes and three-medium wear were measured and compared with non-irradiated specimens. **RESULTS:** Visible color changes ($\Delta E^* > 3$) were observed with all composites and with all dose rates. Fracture toughness, work of fracture, Vickers hardness and resistance against wear increased significantly with few exceptions. Composites with a simple curing process needed higher dose rates while systems with a more complex curing procedure should be irradiated with lower dose rates. **SIGNIFICANCE:** Electron beam irradiation can significantly change the mechanical properties of dental composites. However, color changes can limit the use of irradiation for dentistry.

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