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Impact of Dental Ceramics Cavity on the Degradability

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Editorial

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Editorial

Multiple ceramic systems have been introduced over the past four decades with considerable advances in material properties. Survival rates of all-ceramic crowns differ by type of ceramic used, fabrication method and clinical indication. Zirconia and lithium silicate are the most commonly used contemporary ceramic materials in dentistry. Survival data for these types of restorations appears to be promising; however, there is a lack of high-quality long-term clinical data on the success of these restorations. In the absence of robust longitudinal clinical research, laboratory studies have provided some useful information on the performance of ceramic restorations. Further high quality long-term clinical studies are needed to inform us of modes of failure of these restorations and the range of clinical circumstances in which each type of ceramic restoration may be used. The degradation of dental ceramics generally occurs because of mechanical forces or chemical attack. The possible physiological side-effects of ceramics are their tendency to abrade opposing dental structures, the emission of radiation from radioactive components, the roughening of their surfaces by chemical attack with a corresponding increase in plaque retention, and the release of potentially unsafe concentrations of elements as a result of abrasion and dissolution. The chemical durability of dental ceramics is excellent. With the exception of the excessive exposure to acidulated fluoride, ammonium fluoride, or hydrofluoric acid, there is little risk of surface degradation of virtually all current dental ceramics. Extensive exposure to acidulated fluoride is a possible problem for individuals with head and/or neck cancer who have received large doses of radiation. Such fluoride treatment is necessary to minimize tooth demineralization when saliva flow rates have been reduced because of radiation exposure to salivary glands. Porcelain surface stains are also lost occasionally when abraded by prophylaxis pastes and/or acidulated fluoride. In each case, the solutes are usually not ingested. Further research that uses standardized testing procedures is needed on the chemical durability of dental ceramics. Accelerated durability tests are desirable to minimize the time required for such measurements. The influence of chemical durability on surface roughness and the subsequent effect of roughness on wear of the ceramic restorations as well as of opposing structures should also be explored on a standardized basis. Thermo luminescence (TL) emission of dental ceramics could be potentially used for retrospective dosimeter purposes as this allows a quick and reliable dose assessment in case of nuclear accident or bad use of a nuclear attack. This paper reports on the chemical and luminescence characterization of glass, Feld spathic and lithium dislocate glass ceramic (LS_2). Swedish and Turkish dental ceramics supplied by Divalent Ivoclar considering: (i) the dose response in the range 10 Gy to 6.9 kGy which displays a linear dose-response at low dose values up to 36 Gy (glass and Feld spathic ceramics) and shows sub linear behaviour from 12 Gy to 6 kGy (lithium dislocate glass ceramics), (ii) a reproducibility of the TL signal in which the area under the glow curve increased about 25% after 10 cycles for glass and lithium disilicate ceramics and increased about 30% after seven cycles for Feld spathic ceramics, (iii) stability of the luminescence emission with the elapsed time and (iv) effect of the heating rate. Glass, lithium silicate and Feld spathic ceramics display a complex UV-blue glow emission that can be respectively fitted to five and four groups of components assuming first-order kinetics behaviour. Monolithic zirconia restoration is an acceptable treatment option in restorative dentistry and a developing trend in esthetic dentistry. Digital dentistry has simplified fabrication of monolithic zirconia restorations. Zirconia ceramic has introduced an opportunity to achieve both esthetic and mechanical requirements for restorations. This is rarely found for a ceramic in dentistry. Monolithic zirconia restorations represent an acceptable durability, comparable to metal-ceramic restorations, while they are superior to metal-ceramic restorations aesthetically; however, difficulties to gain an optimal shade reproduction and a colour

match with monolithic zirconia restorations still remain. The colour of these restorations may be influenced by manufacturing processes, laboratory procedures, and clinical factors. Manufacturing processes determine basic optical properties of zirconia ceramics. Different laboratory procedures may create optical changes in zirconia ceramics. Also clinical factors such as dental background, cement, and zirconia restoration features may affect the resulting color. This literature review aimed to discuss potent factors in the colour of monolithic zirconia restorations. An electronic search of the PubMed/Google Scholar database was performed to key terms of background, cement, ceramic; colour, aesthetics, shade, spectrophotometry, thickness, translucency, and zirconia were used both individually and simultaneously. Also, a manual search was conducted, and five classic articles of colour science were added. Thus 192 articles were included. In the last decade, shade reproduction of monolithic zirconia restorations has been highly regarded; however, further improvements are required in the manufacturing process to produce tooth-like zirconia ceramics. An aesthetic guideline named background-cement-ceramic colour harmony was suggested in this study; however, more clinical practice guidelines should be established for monolithic zirconia restorations on aesthetics, and therefore, more studies are required.