Cellular Effects of Halogen Blue Light from Dental Curing Unit

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Abstract

Halogen curing lights are the most frequently used polymerization source in dental offices. Light-cured bonding systems have become increasingly popular among clinicians because they offer a number of advantages over self-cured adhesives. The effort to increase polymerization quality releases the commercially available high power light density dental curing units. Emitted visible blue light belongs to the range of nonionizing radiation. Common concern in both, patients and dentist grows with regard to the unfavorable effects on the pulp tissue. The aim of study was to evaluate the time and dose dependence effect of halogen light curing unit (Elipar® TriLight, ESPE Dental AG, Germany) at the disposed condition modes *in vitro*. A quartz-tungsten-halogen light source emits radiation of the wavelengths between 400 and 515 nm. This halogen blue light source operates in the three illumination modes, medium (M), exponential (E) and standard (S), and five illumination times. The total irradiance or the light intensity was measured by the light intensity control area on the control panel of device and mean light intensity given by manufacturer was 800 mW/cm^2. Continuous culture of V79 cells was illuminated in triplicate. The influence of medium mode (M), exponential (E) and standard (S) illumination during 20, 40 and 80 sec on the cell viability, colony forming ability and proliferation of V79 cell culture was investigated. Trypan blue exclusion test was used to determine cell viability, both, in the treated and control cell samples. Colony forming ability was assessed for each exposure time and mode by colony count on post-exposure day 7. Cell proliferation was determined by cell counts for each time and mode of exposure during five post-exposure days. Statistical difference were determined at $p<0.05$ (Statistica 7.0, StatSoft Inc., USA). Viability of cells was not affected by blue light in view of exposure time and modes. Regardless to exposure or illumination modes, colony forming ability were slightly but not significantly depressed. Cell proliferation was decreased in samples exposed to M mode for 80 sec on post-exposure day 3 and 4 ($p<0.05$). On the same post-exposure days the proliferation of cells exposed to E and S mode showed a significant inhibition after 20, 40 and 80 sec of exposure ($p<0.05$). Disrupted cellular functionality or observed decreased colony forming ability of V79 cells in addition to time- and dose dependent significant inhibition of cell proliferation might be ascribed to the photo curing blue light intensity and duration of exposure.

Keywords: halogen light curing unit, cell culture, proliferation, colony forming

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