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Editorial

# Curing light: An important device in adhesive dentistry

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Today's dentistry, in terms of operative and rehabilitative dentistry, focuses on adhesive dentistry. Since the introduction of light-curing resin-based materials such as composite resins, adhesive systems, resin cement, and orthodontic adhesive systems, the use of curing lights has expanded. So curing light is a dental device of prime necessity. The selection of curing lights should be based on their characteristics that directly influence the polymerization process.

In many cases, the use of the curing light is underestimated by many dentists, mainly by recent graduates, as one of the main factors for its acquisition is the cost. However, it is important to understand the characteristics of the curing light are of great relevance during the polymerization process of light-requiring materials. The first refers to the amount of energy produced per unit of time (Joules/second or Watts). It is directly related to the second concept, irradiance, which is defined as the power per unit area ($mW/cm^2$)[1,2]. These two parameters will

allow the arrival of light to our materials to be optimal and allow the carbon-carbon double bonds to be broken. It has been reported that at least 800 mW/cm$^2$ are required to polymerize for 20 seconds, or an irradiance of 1500 mW/cm$^2$ to polymerize for 10 seconds[3].

These minimum irradiance values are necessary as long as they are as close as possible to the restorative material, as it has been shown that moving the tip of the curing light away from the material affects the amount of light reaching the material, which can decrease the irradiance by 26% to 45%[4]. In this sense, the most appropriate way to optimize the polymerization process in cases of very deep cavities, such as Class II cavities or post-endodontic reconstruction, would be to increase the exposure time.

One cannot avoid taking into consideration the size of the polymerization tip. Smaller diameters will produce less irradiance and the polymerization surface will be smaller[3], so that more polymerization is required in larger areas to cover the entire restoration, e.g. in cases of overlays, endolay, vonlays, etc. Moreover, current lamps can have a single wavelength (mono waves) or two or three wavelengths simultaneously (poly waves), justifying their use according to the photoinitiators of the resin-based materials. It has been said that mono wave lamps should be used only for materials containing camphor quinone, while poly wave lamps, besides being able to activate camphor quinone, can polymerize other photoinitiators such as phenylpropanedione, lucerne or ivorine. However, in the latest systematic review conducted in 2024 evaluating whether the use of mono wave or poly wave lamps influences the physical and mechanical properties of resin-based materials, it was concluded that there is no statistical difference between using single wave or multi-wave lamps[5], even though the homogeneity of light in polywave lamps can be more scattered than in single wave[3].

Therefore, it can be concluded that the cost of the lamps should not be considered as a factor of choice, but rather a deeper understanding of the characteristics associated with the light phenomena, which will allow dentists to have materials with better properties, less color change, less adhesive failure, less cytotoxicity and therefore successful long-term treatments.

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