



# What is the **relevance** of the operator's **technique** in the **photoactivation**?

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After understanding the importance of light curing units and the influence of their characteristics on the photoactivation, it is possible to discuss factors related to the operator's technique that are relevant during light curing.

The first factor to be discussed is the distance between the light curing unit and the resin-based material to be light cured. The light beam emitted by light curing units is not collimated like the light beam emitted by lasers (light amplification stimulated emission of radiation), in other words, the light beam

spreads with the increase of the distance between their tip and the resin-based material. Therefore, the distance increase leads to a considerable decrease of the irradiance that reaches the restorative material.<sup>1</sup>

There is equipment that emit light beam in a more collimated way than others.<sup>2</sup> Equipment that emit a more collimated light beam will lead to less irradiance loss with the distance increase. Studies show a 75% irradiance loss when a light curing unit that presents a less collimated light is used with a 6-mm distance from its tip to the target.<sup>3</sup>

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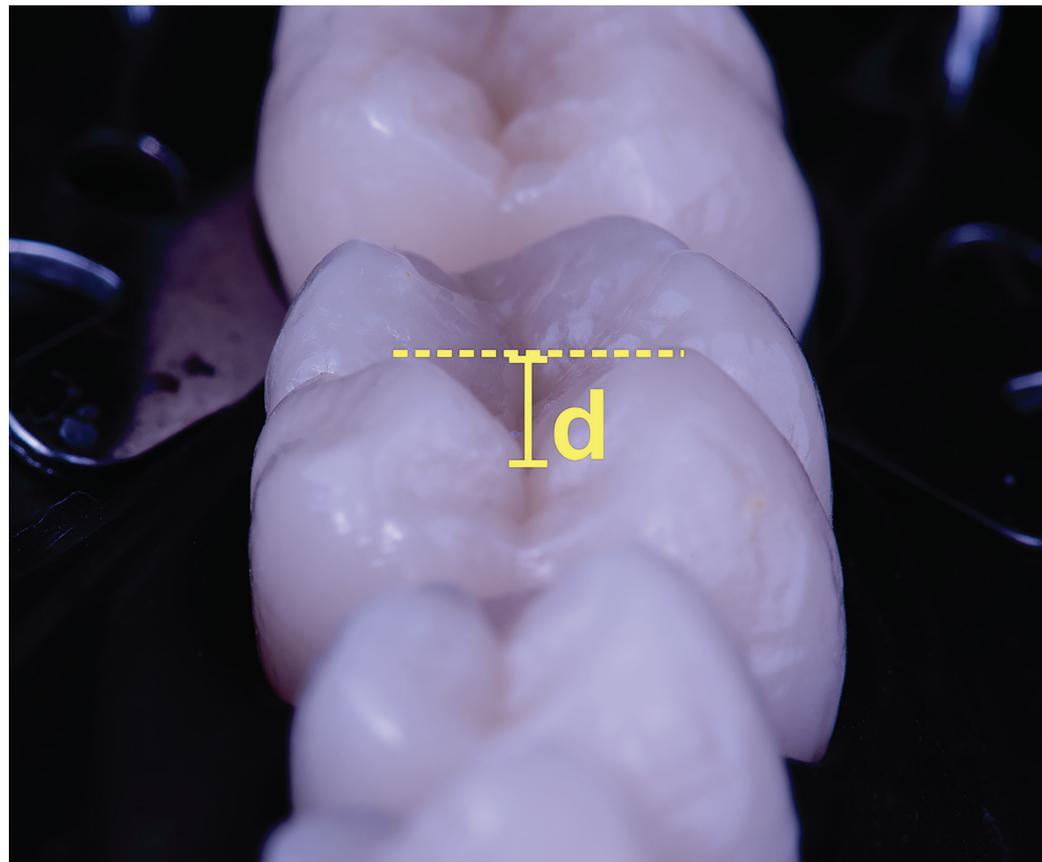
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The distance effect must be considered in the light curing procedure, especially in deep restorations, such as class II restorations. The adhesive system and the deeper layers of restorative material will not be irradiated with all the light emitted by the light curing units, but with the light after the irradiance loss that occurs due to the distancing. The professional may be irradiating his restorations

with only 25% of the irradiance that he thinks to be using, what may lead to a decreased polymerization.

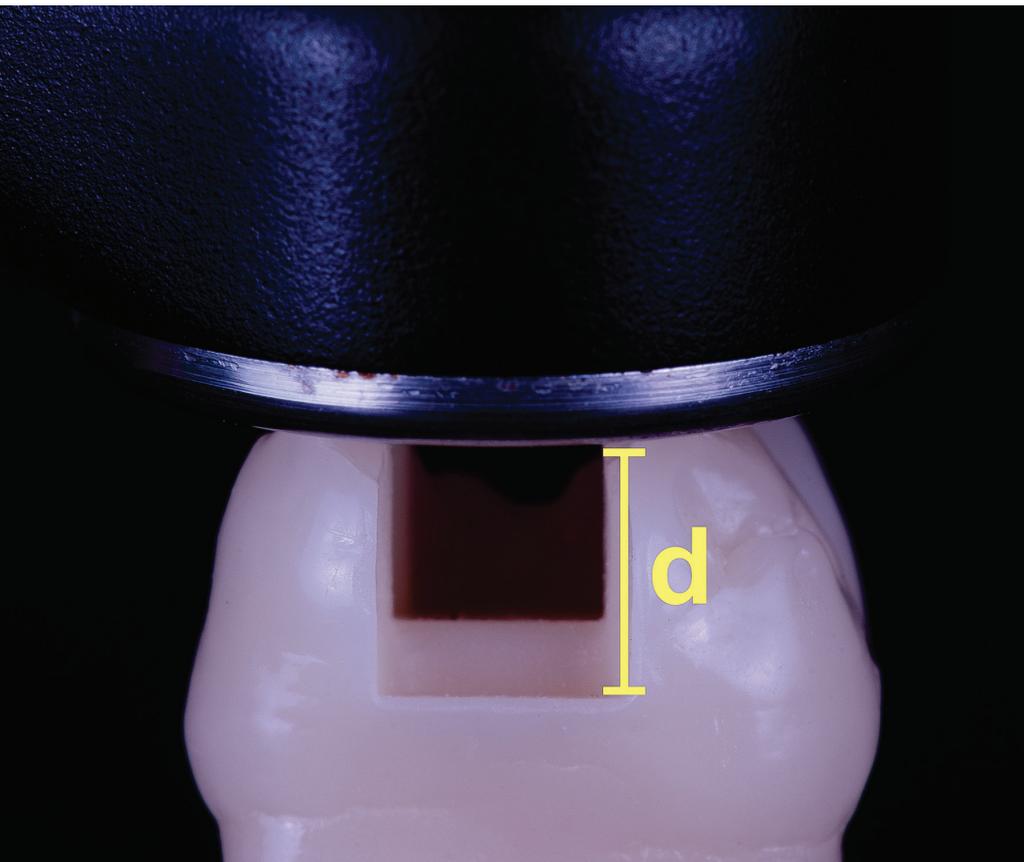
The cusps height also must be considered when evaluating the distance between light curing units' tips and resin-based materials, since they can impair the equipment's positioning close to the restorative material, even in occlusal class I restorations (Fig 1).

**Figure 1:** The cusps height may impair the light curing unit's tip to be positioned close to the restorative material. Therefore, even in occlusal class I restorations, an irradiance loss may occur due to the distance between equipment and material. The radiant emittance at the tip of the light curing unit reported by manufacturers and researchers rarely will be equal to the irradiance received by the material in posterior restorations.

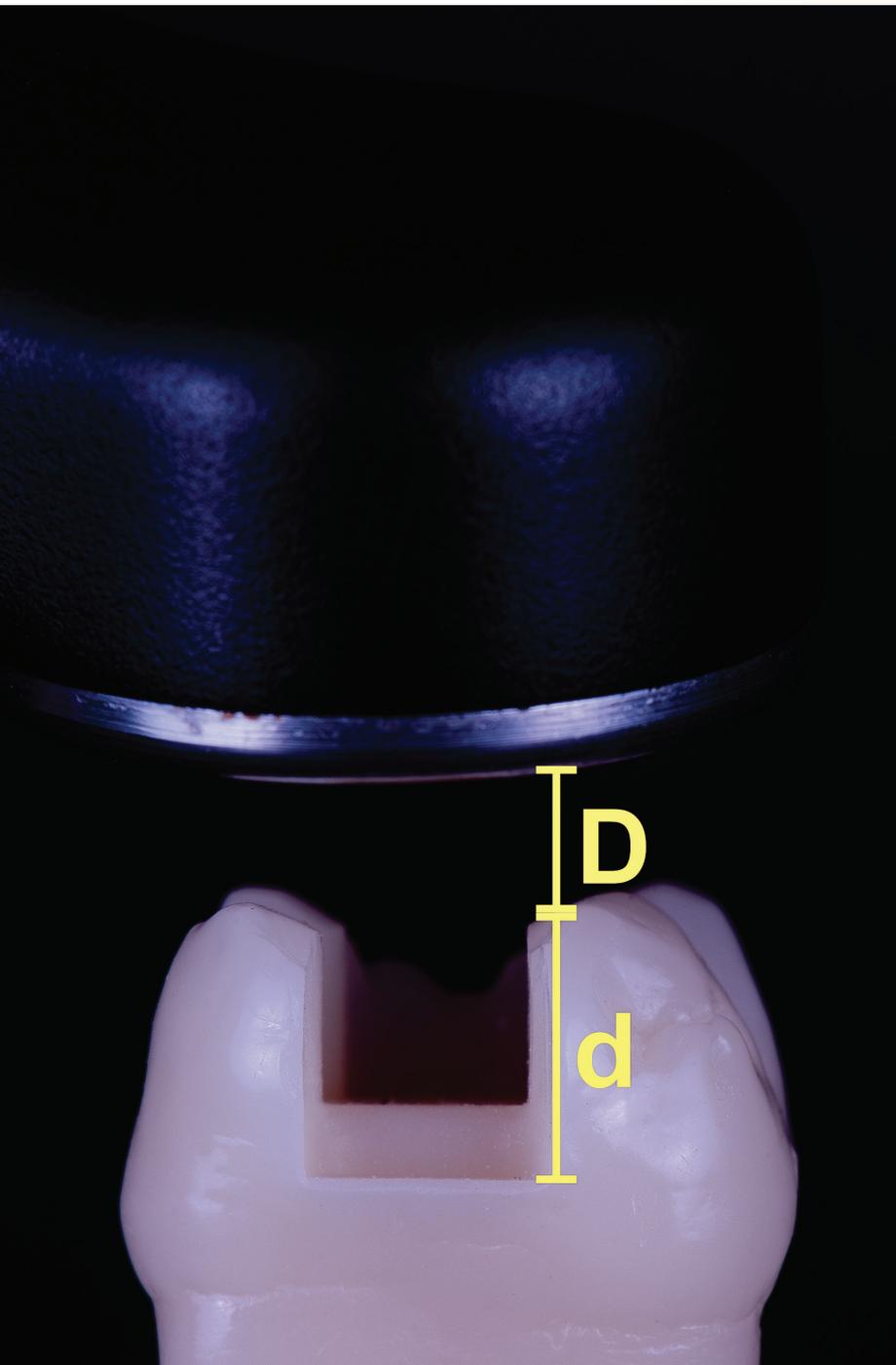


Therefore, one can conclude that the correct light curing unit's positioning, with its tip as close as possible to the restorative material, is necessary to its adequate photoactivation (Fig 2).<sup>4</sup> When the clinical situation does not allow this positioning, an increase in

the exposure time may be advisable to compensate the irradiance loss.<sup>5</sup> If the equipment's tip is positioned far away from the restorative material, this distance will be added to the distance to the bottom of cavities, leading to a higher irradiance loss (Fig 3).



**Figure 2:** Correct positioning of the light curing unit's tip over restorations. The equipment's tip must be positioned as close as possible to the restorative material, aiming to avoid the reduction of the irradiance that reaches the material. Even though, if the restoration is deep, one should consider the irradiance loss promoted. If the distance (d) is 6 mm, the irradiance that reaches the bottom of the proximal box may be reduced of up to 75%, depending on the equipment. In other words, if an equipment with a radiant emittance of 1000 mW/cm<sup>2</sup> is used, the restorative material will be irradiated with only 250 mW/cm<sup>2</sup>, leading to an inadequate polymerization.



**Figure 3:** Incorrect positioning of the light curing unit's tip over restorations. If the tip is not correctly positioned, besides of the distance to the bottom of the cavities (d), there will also be a distance from the tip to the tooth (D) added to the total distance, increasing significantly the irradiance loss.

It is evident the great relevance of the operator's technique during the photoactivation. The best available light curing unit may not be efficient if used in an incorrect way. However, the distance between light curing unit's tip and restorative material is not the only factor dependent of the operator's technique that can influence the photoactivation, and in the next number of the column, other factors related to the operator will be discussed.

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