

Curing Lights – The LED Invasion Is Complete

By Dr. Michael Miller

Halogen curing lights have been the gold standard due to the fact that they were the only type of curing light that could be counted on to polymerize all types of materials. That advantage has all but disappeared. There are now a small hand-full of LED lights that are capable of curing every material that is currently available and more of these lights are on the way.

The reason that halogen lights are able to cure all materials is their wide bandwidth that extends from about 380nm to 510nm. This allows these lights to cure not only materials that utilize camphorquinone as their initiator, which requires peak activity around 470nm, but also those materials with alternate photoinitiators, which are activated at wavelengths in the 410-430nm range. Since these lower wavelengths are outside the usual coverage of LEDs, you used to have no option but to keep a halogen light around just in case you needed it.

So which lights can perform this curing magic at all bandwidths? At the top of your shopping list should be VALO from Ultradent. It is the top-rated curing light for 2011 by **REALITY** and for good reasons. By emitting light in a wavelength ranging from 395nm to 480nm, it possesses the bandwidth necessary to cure all materials. But on top of that capability, it is extremely lightweight, weighing only 3.0 oz or 85g, which means it is lighter than most highspeed handpieces. The “secret” to its feather-like weight is its cord. That’s right – VALO is one of the few LEDs on the market that is powered by AC current rather than an onboard battery. While the cord could be viewed as a step backward, it is extremely thin and lightweight, which minimizes its inconvenience. And you never have to worry about charging this light.

However, other than the cord, the light has a lot to like. Its wand construction out of black ebony aluminum gives it durability and scratch-resistance. The digital timer is easy to operate and its three modes give you curing options that you may find useful, although I typically use it in the standard mode. Power, which is a virtual given today with LEDs, ranges from 1,100mW/cm² in the standard mode to 3,000+mW/cm² in the plasma emulation mode. And its effective heat sink eliminates the need for a fan.

Not all is perfect, of course, with VALO. Despite its lofty 5 Star **REALITY** rating, its fixed head, which measures 10mm, is not wide enough for large restorations such as MOD composites and veneers. And tests completed by the **Reality Research Lab (RRL)** do not support its very fast curing claims. Nevertheless, its #1 **REALITY** ranking makes it the product of choice in this category.

But if you just can’t live with a cord and/or you don’t like wands, you could consider one of the two offerings from Ivoclar Vivadent, Sticking with a more conventional gun platform (as opposed to the wand design), the almost twin bluephase 20i and bluephase G2 have uber-cool design, interchangeable tips, digital control panels, several modes to choose from, and power to spare. They emit light from 380nm to 515nm, which allows them to polymerize all materials. Their downsides include a trigger that requires too much activation pressure for my taste, tip size that maxes out at 10mm and, with the 20i, a premium price. If you are going to purchase one of these siblings, the G2 is the better buy, although it does not possess the 20i’s turbo mode (1,650mW/cm²). Full testing in the RRL has not yet been completed on these lights, but we suspect they will perform well. For sleek, cordless lights that will cure everything, the 20i and G2 should be on your shopping list.

Beyond this trio, the only other light proven to cure all materials is DentLight's Fusion, an extremely small, lightweight, cordless aluminum wand. Although this slick, reasonably priced entry packs a wallop of power and has more features than you'll ever use, you have to switch the standard light head to the UV version for the extra bandwidth. We doubt very many clinicians will want to be bothered with this inconvenience.

Other units that have scored high in **RRL** tests include the Elipar S10 from 3M ESPE and Demi Plus from Kerr, but neither of these lights has a wide bandwidth. A promising new entry, the SmartLite Max from Dentsply Caulk touts a wide bandwidth, but this product has not yet been submitted to the RRL for testing at the time of this writing.

Other than curing all materials, one other factor that has not received much publicity concerning cordless lights is their possible interference with devices such as cardiac pacemakers. As described in a recent study¹, one cordless LED curing light was found to disrupt the function of a pacemaker using an *in vitro* protocol. The lead author in the study, Dr. Craig Miller, replying to my email inquiry, stated that if a clinician used the curing light with the battery end pointing upward toward the patient's head, the distance would probably be too great to affect the pacemaker.

On the other hand, does this tactic apply to all cordless curing lights? Maybe, but maybe not. While other devices such as ultrasonic scalers can also interrupt the function of devices such as pacemakers, you can always switch to hand scaling if a patient is at high risk. With a curing light, you don't have that type of option.

Nevertheless, I don't want to sound the alarm too loudly, since I am unaware of reports linking pacemaker failures to curing lights. But I do think it is just prudent to be aware of this linkage and to take proper precautions as suggested previously.

With this topic in mind, I was curious whether the manufacturers of curing lights even mentioned this potential adverse effect in their directions. As it turns out, 3M ESPE and Dentsply Caulk expressly warn users about this risk, Ivoclar Vivadent states that their lights are safe to use, while Kerr and DentLight do not even mention the issue. Ultradent, the manufacturer of VALO, also does not broach the subject, but it is unknown whether corded lights produce the same type of interference found in cordless versions.

With the surging tsunami of LEDs, this category of products has almost entered the commodity arena. This is evidenced by online marketers selling their lights for as low as \$170². Virtually all of the new units marketed by established dental manufacturers have plenty of power to cure your restorations, so choosing the right one for you may come down to their features and their ability to cure all materials. While I know it's tempting to buy a light online for a fraction of the price you would pay to a legitimate dental dealer, it's a risky proposition if the light has not been fully tested.

¹ Roedig, J, Shah, J, Elayi, C, Miller, C, Interference of cardiac pacemaker and implantable cardioverter-defibrillator activity during electronic dental device use, JADA, Vol.141, May 2010, p.521-526.

² Amazon.com/Dotamed