Testing the bluephase 20i
A user report on the new bluephase 20i LED light

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We have been using a first-generation bluephase LED light for more than two years in our dental practice. This curing light offers a light intensity of 1,200 mW/cm² and achieves a wavelength range similar to the spectrum of halogen lights, owing to its poly-wave LED technology. There was therefore no need to purchase a new light unit. Nonetheless, I let myself be persuaded into testing the bluephase 20i for three weeks in my practice, focusing on assessing the light’s performance in the Turbo programme when used at a maximum light intensity of 2,000 mW/cm².

In the past, several suppliers offered curing lights that were claimed to provide high light intensities and short polymerisation times. Unfortunately, most of these lights failed to live up to these claims when they were evaluated in field tests. Against such a background, the employees in my practice were less than enthusiastic about conducting the trial. To overcome their resistance, they were first shown how to operate the four programmes of the bluephase 20i light. In addition, we drew up a table of all the materials that would be used in the trial and their respective curing times in conjunction with the Turbo programme (Fig. 1). Normally, we select the curing programme individually at each step in the treatment together with the dental assistant. It transpired that the well-known bluephase programmes—High, Low and Soft modes—were used whilst the Turbo programme of the bluephase 20i was studiously avoided.

Reclaiming trust

The objective of our field test was to identify the limitations of the new LED light. Given the reservations of the team members, we decided to establish first the depth of cure achieved using the Turbo programme as one of the tests. It was hoped that this would dispel the objections of the team members. The Heliosit test kit, which used to be available for the fabricating of custom-made shade samples, is no longer manufactured. We therefore created our own test samples by cutting an approximately 1 cm-long piece from a straw. Next, we pressed a small amount of low-viscosity silicone into one side of this piece of straw and allowed the material to set. Then, we inserted the piece of straw into an empty composite syringe and filled the syringe with composite.

<table>
<thead>
<tr>
<th>Material</th>
<th>Curing time in conjunction with the Turbo program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetric EvoCeram / Tetric EvoFlow / IPS Empress Direct</td>
<td>5 s</td>
</tr>
<tr>
<td>CompoGlas F /</td>
<td>2 x 5 s</td>
</tr>
<tr>
<td>CompoGlas Flow</td>
<td>5 per mm ceramic and per segment</td>
</tr>
<tr>
<td>Variolink II *</td>
<td>5 s per segment</td>
</tr>
<tr>
<td>Variolink Veneer **</td>
<td></td>
</tr>
<tr>
<td>Multilink Autonomix **</td>
<td></td>
</tr>
<tr>
<td>Heliosit Orthodontic</td>
<td>2 x 5 s</td>
</tr>
</tbody>
</table>

If a light probe is placed on the composite and the material is polymerised, the depth of cure can be established as an alternative test method.

As it is not always possible to place the light probe directly onto the tooth in dental applications, I increased the distance to the material with a matrix in the course of conducting my tests. The results were unambiguous: the bluephase 20i successfully passed all test series conducted with the Turbo programme in conjunction with the composites used in our practice. I repeated the tests in front of the practice team with good effect and all reservations regarding the Turbo programme and its short curing time of five seconds suddenly vanished. From then onwards, nothing hindered the Turbo programme being used routinely. On the contrary, this programme became very popular amongst the team members and they used it frequently. The usual waiting times associated with the layering technique decreased drastically and swift working during light-curing was soon established. All team members repeatedly commented on the substantial amount of time that can be saved by reducing the polymerisation time from twenty to five seconds.

Field test in the dental practice

Several patient cases treated during the trial phase of bluephase 20i are described below to provide examples of how the new light unit may work.

In the first case, two defective restorations had to be replaced, one on the distal side of tooth 11 and the other on the mesial side of tooth 12 (Fig. 2). The defective fillings were removed and the cavities filled with EcoCeram (Figs. 5 & 4). Next, the restorative material was polymerised using the Turbo programme of the bluephase 20i (Figs. 5 & 6). As can be seen on the pictures, the light-curing was clearly noticeable when the six veneers were placed...

Fig. 1: Curing times in conjunction with the Turbo programme of the bluephase 20i for the materials used in the trial.

Fig. 2: A typical case treated during the trial phase: replacement of defective fillings on teeth 11 and 12...

Fig. 3: The defective restorations were removed...

Fig. 4: ...and the cavities were filled with Tetric EvoCeram.

Fig. 5: The composite was polymerised with the Turbo programme of the bluephase 20i light. A common situation: the light probe cannot always be placed in an optimal position. With the Turbo light probe (10 > 8 mm), the curing time only has to be doubled (the distance to the material is 8 mm or more). — Fig. 6: Completed Tetric EvoCeram composite restoration...

Fig. 6: Completed Tetric EvoCeram composite restoration...

Fig. 7: Another test case: a gap between two anterior teeth had to be closed. Veneers made of IPS Empress Esthetic were selected for this purpose.—Fig. 8: When ceramic veneers and Variolink II are polymerised using the Turbo programme (five seconds per mm of ceramic), it is advisable to protect the margins with Liquid Strip...

Fig. 8: The time-saving was clearly noticeable when the six veneers were placed.—Fig. 10: The result: six IPS Empress Esthetic veneers placed on teeth 13 to 23 and bleaching of the mandibular teeth.
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Light probe cannot always be positioned directly onto the tooth. It is therefore essential to use a high-performance polymerisation light to ensure a complete depth of cure in every situation. The polymerisation time only has to be doubled if the distance between the composite and the light emission window is larger than 8 mm if a Turbo light probe (10 > 8 mm) is used.

Furthermore, the blue-phase 20i provides a clear advantage when treating children. In such cases, swift working is of paramount importance to prevent the treatment from turning into a struggle. Reducing the polymerisation time to twice five seconds in conjunction with Compoglass F is very helpful in these circumstances.

Light-curing through ceramic

Ceramic restorations are usually more opaque than composite ones. If a luting composite is light-cured through an all-ceramic restoration, the polymerisation time has to be increased to ensure complete polymerisation. In this case, we had to close a gap between two anterior teeth, as the patient was unhappy with the appearance of the teeth (Fig. 7). The patient did not desire orthodontic treatment. As an alternative, we decided to insert IPS Empress Esthetic veneers. If the Turbo programme of the bluephase 20i light is used, a polymerisation time of five seconds for each millimetre of ceramic and for each segment is required (Fig. 8). The built-in fan presents a real advantage in these situations. Curing lights without integrated cooling tend to overheat after a short time when used in continuous operation and, as a result, have to be switched off repeatedly to allow them to cool down for a few minutes. This situation can be avoided with the bluephase 20i light. The restorations can be placed swiftly. In this case, six veneers had to be placed in the upper jaw and the gain in time was clearly noticeable (Fig. 9). The time-saving is particularly substantial when placing extensive multiple restorations (Fig. 10).

Given the high power of this curing light, a few glimpses of doubt emerged at times. In particular, concerns around heat development during polymerisation were voiced. We asked ourselves if the gingival tissues might suffer thermal damage during polymerisation. To clarify this issue, we placed the curing light on myself by having various sites on my tooth necks irradiated with the light strength of the Turbo programme for five seconds. Then, took the light probe and placed it directly onto my gingiva without help. During all these cycles of irradiation I did not feel the slightest heat-induced pain. Similarly, none of the patients complained about pain when cervical restorations were cured with the bluephase 20i, even when the restorations were inserted without anaesthetic.

Conclusion

Although I had a few reservations at the beginning of the trial, I was satisfied with the bluephase 20i in every aspect. All composites can be reliably cured, as this curing light emits light in a similar spectrum as halogen lights. In addition, the Turbo programme offers substantial time-saving when treating patients.

“None of the patients complained about pain when cervical restorations were cured with the bluephase 20i”