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Editorial

Laser Watch—New Generation 2021: Modern Integrative Photomedicine Equipment for Photobiomodulation

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Abstract

In the recent past, laser therapy has made immense progress as it is known to change microcirculation, modulate vegetative parameters, and stimulate mitochondrial activity in the human body. This editorial briefly describes a new laser watch prototype (generation 2021), which can be used to perform continuous and simultaneous blood irradiation at the radial and/or ulnar artery of the wrist with different wavelengths of laser light. In a preliminary measurement, the increase in regional oxygen saturation at the crook of the elbow during laser light stimulation with the watch was observed using near-infrared spectroscopy. Apart from this, laser stimulation applied via a newly designed laser watch can modulate biological parameters (photobiomodulation). However, presently, the possible long-term effects are not known, as there are no studies on this topic available to date.

Keywords

Laser watch; photobiomodulation (PBM); laser; laser blood irradiation; light; integrative and complementary medicine; near-infrared spectroscopy (NIRS); regional oxygen saturation (rSO_2)

1. Introduction

More than five years have passed since the publication of the first two articles on the term "laser watch" by the author of this editorial [1, 2]. Only two further articles, one in an unlisted journal [3], have dealt with this topic [3, 4]. During this period, at least four more generations of the so-called laser watch were brought into the international market, mainly in China and Germany. The fact that the laser watch constitutes a new and promising therapeutic approach for different diseases is undisputed; however, its practical implementation seems extremely difficult due to the lack of published scientific data on these photo stimulation watches.

In this editorial, the prototype of a newly developed laser watch (Figure 1) is described briefly, which can be used for non-invasive blood irradiation at the radial and ulnar arteries with different wavelengths; it can also deliver a laser dose that is many times higher than that of previous comparable stimulation watches [1-4]. The first presentation of this prototype equipment (EndoLight®) from Weber Medical (Lauenförde, Germany) should take place in the context of this editorial, since photobiomodulation (PBM) in connection with, for example, COVID-19 is an important topic of current discussions among scientists [3-11].

Figure 1 a, b: Laser watch prototype of the new generation 2021; the watch is assigned to laser Class 1C (please note that the interruption of the laser stimulation by the green area is cancelled for demonstration purposes). All figures © G. Litscher, October 14, 2021.

2. Methods

The new laser watch prototype (Figure 2) is a Class 1C laser category product, as mentioned in the legend of Figure 1. These laser products are explicitly designed for contact application on the skin or non-ocular tissue. During operation, any eye hazards must be prevented with the help of technical measures (i. e., the design of the laser-emitting equipment should not damage the eyes of

the patient or other people). In addition, the exposure levels can exceed the maximum permissible exposure (MPE) of the skin (level of laser radiation to which people can be exposed under normal circumstances without any impairment), provided that this is necessary for the intended treatment method. Please note that Class 1C is a new category of laser products [12] and, therefore, the related data cannot be found in older textbooks or publications [13].

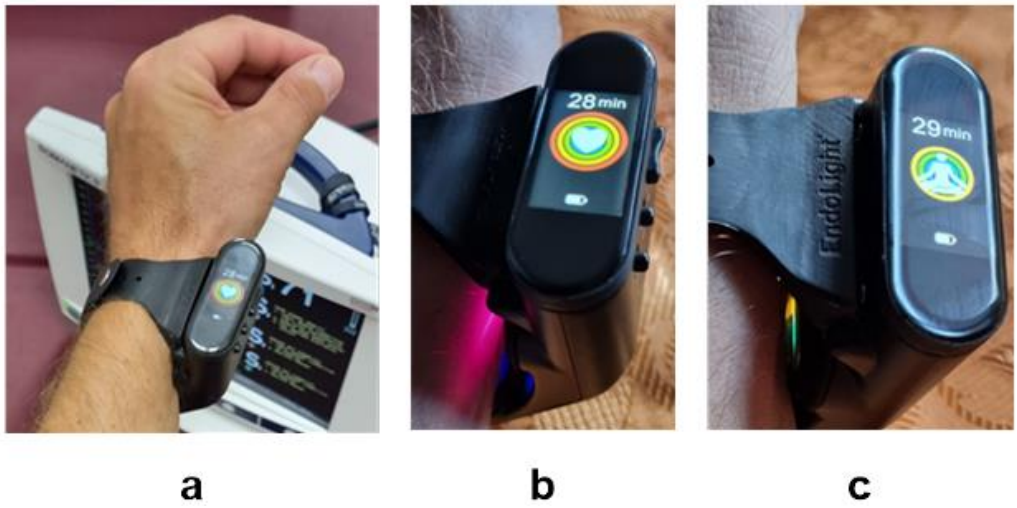

Figure 2 a–c: The new laser watch in practical research use (a). It supplies infrared light and red light, (b) but other wavelengths (green, blue, and yellow) are also available simultaneously or individually (c).

The technical details have not (yet) been disclosed by Weber Medical; however, information about the intensity (35 mW) per laser has been personally communicated to this author. With this prototype, irradiation with the following wavelengths is possible: red (658nm), with a penetration depth of about 2–4 cm; infrared (808 nm), with a penetration depth of about 3–4 cm; yellow (590 nm), with a penetration depth of about 3 cm; green (505 nm), with a penetration depth of about 0.5–1 cm; and blue (450 nm), with a penetration depth of about 0.5–2 mm [14].

A pilot measurement of the changes in regional oxygen saturation (rSO_2) was performed with an INVOS 5100C Oximeter (Somanetics Corp., Troy, MI, USA) on October 14, 2021 (Figure 3a). In this measurement, near-infrared light (730 nm and 805 nm) was made to pass through the skin at the crook of the elbow (Figure 3b), and, after passing through different kinds of tissue, the reflected light was detected at two distances from the light source (3 cm and 4 cm). The spectral absorption of the blood in deeper structures (2–4 cm) was determined and defined as the rSO_2 values [15].

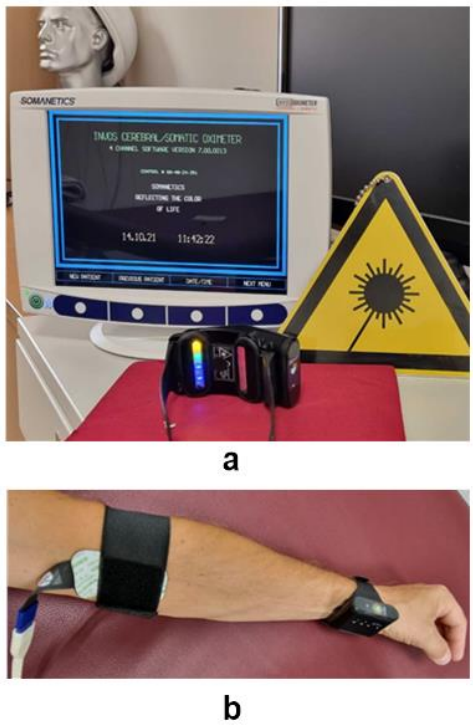

Figure 3 a, b: INVOS 5100C Oximeter (Somanetics Corp., Troy, MI, USA) (a). Laser stimulation is performed at the wrist (b). The rSO_2 sensor is applied at the crook of the elbow (b).

3. Preliminary Results

The purpose of this preliminary measurement, which was carried out with near-infrared spectroscopy (NIRS), was to investigate peripheral rSO_2 for the first time, before, during, and immediately after laser watch stimulation. The results indicate that the rSO_2 values were significantly higher during laser watch blood irradiation of the radial and ulnar artery with the different available wavelengths (see methods section) as compared to the baseline values before stimulation (Figure 4).

Figure 4 Continuous rSO_2 measurement values in percentage before, during, and after laser watch stimulation at the wrist of the left arm, which was recorded in the crook of the left elbow. Note the increase during the stimulation period with a duration of about 10 min.

4. Discussion

Even if the author of this work is convinced that direct laser light stimulation can change blood oxygenation [14−22], it should be noted that there are still many unanswered questions on the subject. PBM can be used to treat and/or alleviate certain disease conditions [23−26], but technical parameters like power density, the duration of the exposure, the frequency of the light, and many others are largely undetermined. It is, therefore, the author's conviction that further research needs to be carried out before these methods can find broad clinical application in mainstream medicine.

The quality of scientific experiments is determined by the incorporation of appropriate controls. This applies in particular to PBM, regardless of whether it is a highly sophisticated large-scale device or a comparably simple stimulation device that can be used as a wristwatch. A non-critical use should be expressly waived before any conclusions are drawn and published. As already mentioned in the introduction, there is still a lack of published knowledge on so-called laser watches. Even if the first pilot measurements show positive effects [1, 2], it is important to prove their reproducibility in smaller test series as well as their clinical significance in large-scale studies.

5. Conclusion

For the first time, a newly designed sophisticated laser watch prototype (generation 2021) is presented. The preliminary results indicate an increase in peripheral rSO_2 during and immediately after using the laser watch stimulation in a single far-field-recording session. Of course, no statement can be made about possible long-term effects, since this would certainly require at least a comprehensive investigation, which was not the goal of this editorial. However, this could be the subject of follow-up studies and could potentially be included in a controlled and/or cross-over research study design.

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Author Contributions

The author did all the research work of this study.

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Competing Interests

The author hereby declares that no conflict of interests exists in connection with the publication of this article. No funding has been received from Weber Medical (Lauenförde, Germany) or any other company developing this laser watch prototype.

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