Light on the Wound: The Possibilities of Low Intensity Phototherapy

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Short Communication

In the last years, researches on clinical application of low intensity phototherapy have been gaining strength, especially considering the versatility of its use and the possibility of using modern technologies such as Light Emitting Diodes (LED), which enable the construction of effective and low-cost equipment.

Different health professionals use low-intensity phototherapy nowadays. That happens because one of the most common clinic use of its application is the red, near-infrared (NIR) or Infrared (IR) light (wavelength range ~600 nm to 1000 nm, power <500 mW) on tissue repair in diverse kinds of wounds [1-4].

The use of phototherapy in open wounds might be affected in cases of infections. In a recent past, due to the lack of scientific knowledge of its eventual side effects, phototherapy had its use in open infected wounds interrupted, what became a common procedure. However, the most recent studies have shown that, not only this interruption of procedure might harm the patient, but also phototherapy can represent a new possibility of antimicrobial therapy, especially at entry sites of infectious agents [5-9].

Apart from the fear that many health professionals have over the effect of phototherapy on infectious agents, most of recent researches have shown that neither the red, nor the NIR or the IR light increases the bacterial proliferation. On the other hand, in some cases, it has even harmful effects on certain bacteria [5-7].

However, considering this specific light band, studies focused on tissue repair observations of superficial infected wounds on in vivo models bring even more promising results. There are indications that wounds show optimized tissue repair due to phototherapy, and the light used does not present important effects on infections. Besides that, phototherapy does not only speed up the process of wound tissue repair, but also increases local immune response and might empower the fight against an infectious agent [8-9]. Thus, phototherapy on the common band of lights used on tissue repair, as the literature has indicated, would not necessarily have harmful effects on infected wounds [5,6,8,9]. On the other hand, it may actually help in resolving superficial infections (especially combined with conventional antimicrobial methods), at the same time as it repairs present wounds. In this sense, contraindicating the use of red/NIR/IR light on infected wounds is not a necessary procedure, as it has been shown by recent literature.

The use of phototherapy itself as an antimicrobial method goes beyond what has been cited so far in this paper. In fact, the idea of using light as an antimicrobial method is not new, once the ultraviolet light (UV) is known for its powerful bactericidal action [10]. However, the clinic use of UV light (on infected wounds) is not practical, since its cytotoxic action affects negatively human tissues [11].

Therefore, many researchers have tried to include the possibility of using light as an antimicrobial method by testing different wavelengths and different light emission methods. In vitro studies have shown an important antimicrobial action over some different infectious agents using a light band between blue and violet (405 nm to 490 nm) [12-15]. Various kinds of works focusing on this theme present diverse protocols, such as the use of different irradiances and fluencies values or different light emission sources. Even though the blue light antimicrobial action shows up present, indicating that, in fact, the most crucial factor of its action is the wavelength.

Besides that, in vivo studies report that blue light moderated fluencies decrease the bacterial proliferation on infected wounds in the same way as they do not cause harmful effects on host tissues...
4. References


