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Antimicrobial activity of different treatment protocols of blue light therapy on methicillin-resistant *Staphylococcus aureus in vitro*

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Background: The search for alternative therapies to stem the growing epidemic of methicillin-resistant *Staphylococcus aureus* (MRSA) remains high. Recent reports from our laboratory suggest that blue light in the range of 405 nm to 470 nm kill MRSA.

Objectives: Since MRSA has a logarithmic replication cycle of 20-30 min, we tested the hypothesis that irradiation of MRSA *in vitro* at 30 min intervals will yield greater bacterial suppression than irradiation at 4 h intervals.

Methods: We cultured and plated $5x10^6$ CFU/mL MRSA on tryptic soy agar (TSA). Then, plates were irradiated once, twice or thrice with 405 nm light at either 30 min or 4 h intervals, using either 40.5, 81 or 121 J/cm2 fluence.

Results: Colony counts revealed that each dose produced a statistically significant ($p<0.0001$) dose dependent bacterial suppression compared to controls. In cultures irradiated twice, MRSA growth suppression was commensurate in both the 30 min and the 4h group, with 40.5 J/cm^2 fluence producing 82% and 85% suppression; 81 J/cm^2 producing 90% and 86%; and 121 J/cm2 yielding 98% and 100% suppression respectively. However, thrice irradiation at 30 min intervals yielded 100% bacterial suppression at 81 J/cm2 and 121 J/cm^2 fluence, only at the higher 121 J/cm2 fluence did three times irradiation at 4h intervals clear the bacteria completely.

Conclusion: These findings suggest that irradiation of MRSA with 405 nm light at 30 min intervals yields superior results compared to irradiation at 4 h intervals, even though both treatment protocols are capable of total bacterial suppression.

Biography

Daniela Masson-Meyers completed her PhD from the University of Sao Paulo, Brazil. A part of her research was done at the University of Wisconsin-Milwaukee where she is a Research Associate in the Photomedicine Research Laboratory, College of Health Sciences. Her research interests include: Phototherapy (antimicrobial properties of blue light and use of red and infrared light to promote wound healing), phytomedicine, cell culture, cytotoxicity tests, antimicrobial susceptibility tests, infection, among others.

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