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Opportunities and challenges in the use of antibacterial photodynamic therapy against caries-related bacteria

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Abstract

Nowadays, new technologies for decontaminating oral tissues have been hardly studied in Dentistry. Photodynamic antimicrobial chemotherapy (PACT) has emerged in recent years as a non – invasive therapeutic modality for the treatment of various infections by bacteria, fungi, and viruses. PACT can be considered as an adjunctive to conventional mechanical therapy in deep caries management. Several studies have expressed great effect of this therapy against caries-related bacteria. PACT involves three components: light, a photosensitizer, and oxygen. The light source aim to activate the photosensitizer by exposure to low power visible light at a specific wavelength to kill bacteria treated with a photosensitizer drug. Different LED light sources for photodynamic therapy have become increasingly popular due to their narrow emission spectra that accurately match the absorption spectrum of most common photosensitizers. Photodynamic therapy at low fluency rates has been shown to be as effective as high output irradiation for treatment of caries-related bacteria. We have investigated the antibacterial effect of PACT using LED as light source by a series of laboratorial and clinical studies. In addition, if this technology becomes available at a reasonable cost and the results can be applied in clinical practice, there will be a promising future for it in oral pathologies prevention, such as dental caries.

Biography

Mary Anne Melo received her D.D.S. in 2000 and her M.Sc. and Ph.D. in Dentistry from Faculty of Pharmacy, Dentistry and Nursing, Federal University of Ceará, Brazil. Currently, she is a university professor of Operative Dentistry at the University of Maryland School of Dentistry. Her overall expertise is in the field of conservative approaches against dental caries, including applied laser physics in anti-biofilm approaches, development of antibacterial dental materials and nanotechnology-based strategies against caries-related bacteria. She has authored over 25 papers in peer-reviewed journals and conferences proceedings. She is a fellow of IADR (2009); ORCA (2011) and ADM (2012).