PROTOCOLOS DE INVESTIGACIÓN - ODONTOLOGÍA

OPTIMIZING ANTIMICROBIAL PHOTODYNAMIC THERAPY FOR CANDIDA ALBICANS BIOFILMS: MECHANISMS, BARRIERS, AND THERAPEUTIC POTENTIAL

Giovanna Fontgalland Ferreira (giovannafontgallandf@gmail.com)

Claudio Teruo Kassa (claudiotkassa@hotmail.com)

Shirlene De Holanda Lima (shirlene.holandal@uni9.edu.br)

Valherya Silva Rodriguez (svalherya@gmail.com)

Ilka Tiemy Kato (ilka.kato@ufabc.edu.br)

Sarah Marinho Figueiredo (marinho.sarah@aluno.ufabc.edu.br)

Mark Wainwright (mark_wainwright@hotmail.com)

Renato Prates (pratesra@gmail.com)

Candidiasis, a fungal infection primarily caused by Candida albicans, predominantly affects immunocompromised individuals, compromising mucosal surfaces, skin, and consequently, quality of life. Although conventional antifungal agents demonstrate clinical efficacy, the progressive increase in microbial resistance and the presence of biofilms reduce treatment effectiveness. These therapeutic limitations highlight the need for complementary strategies, among

which antimicrobial photodynamic therapy (aPDT) stands out as a promising approach. aPDT combines light at a specific wavelength, photosensitizers, and molecular oxygen to generate reactive oxygen species (ROS) capable of inactivating microorganisms without inducing resistance. This project aims to investigate the mechanisms of action of aPDT at different stages and developmental times of C. albicans biofilms, optimizing parameters such as irradiation time and photosensitizer concentration, including Methylene Blue (MB) and Butyl Toluidine Blue O (BuTBO). Relevant barriers to therapeutic success, such as the biofilm extracellular matrix and cellular efflux of photosensitizers, will be addressed. Samples will be cultured in vitro, subjected to aPDT with two different photosensitizers under various experimental conditions, and comparatively evaluated among experimental groups regarding fungal growth, cell viability, photosensitizer uptake, and, finally, C. albicans susceptibility to macrophage interaction. It is expected that this study will demonstrate the efficacy of aPDT as an alternative or adjuvant to conventional antifungals, contributing to the prevention of microbial resistance associated with Candida albicans infections.

Palavras-chave: biophotonics; microbial resistance; photosensitizer.