

Innovative Photosensitizer Approaches for *Candida* Infections: From Nanocellulose-Delivered Rose Bengal to Tailored BODIPY Dyes

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Photodynamic therapy (PDT), which employs photosensitizers (PS) activated by light to generate cytotoxic species against microorganisms, holds vast therapeutic potential for bacterial, fungal, viral, and parasitic infections. This research aims to expand the PDT arsenal by investigating two complementary strategies: adapting clinically known PS and synthesizing novel compounds to address diseases with limited or problematic therapeutic options.¹ First, Rose Bengal (RB), a PS used in ophthalmology, was covalently conjugated with nanocellulose (CNC), a sustainable biomaterial, to develop drug delivery systems targeting the treatment of onychomycosis via enhanced transungual delivery.² Second, leveraging established expertise in BODIPY chemistry, new derivatives of this scaffold were synthesized, aiming to optimize key properties such as water solubility, cell permeability, and antimicrobial efficacy. Notably, both the RB-CNC conjugates and the novel BODIPY derivatives were tested against various *Candida* strains, yielding promising antifungal results. These findings underscore the potential of these tailored photosensitizer strategies to significantly advance PDT, paving the way for innovative therapeutic solutions against challenging microbial infections, particularly fungal ones.

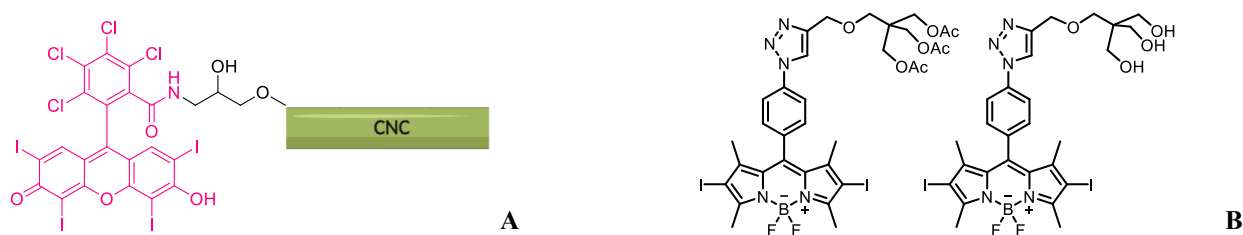


Figure 1: **A.** Rose Bengal covalently conjugated with Nanocellulose (CNC) **B.** Novel BODIPY derivatives

References:

- [1] R. Youf, M. Müller, A. Balasini, F. Thétiot, M. Müller, A. Hascoët, U. Jonas, H. Schönherr, G. Lemerrier, T. Montier, T. Le Gall, *Pharma*. 2021, 13, 1995.
- [2] J. Houang, C. Halliday, S. Chen, C.-H. Ho, A. Bekmukhametova, A. Lauto, *J. Biophotonics*. 2021, 14.

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