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Topic of Research: Synthesis and Biomedical applications of Quantum Dots using *Candida albicans* as model organisms

Findings

This study aimed to develop non-toxic, cost-effective, novel fluorescent CQDs nanoconjugates as a powerful tool for medical and biological research using *Candida albicans* as a model representative fungal pathogen. First section of the study showed synthesis of CQDs (pCQDs, nCQDs, sCQDs and gCQDs) by simple, economical and low-cost microwave method and their unique physicochemical properties were characterized. In the second section, cytocompatibilty and microbial toxicity of CQDs were evaluated against mammalian cell lines, NIH-3T3 and fungal pathogen, *C. albicans* respectively, for determining their biocompatible and non-toxic nature. No toxicity of CQDs were observed towards NIH-3T3 and *Candida* cells. Then, CQDs being non-toxic, cellular uptake and imaging were performed in *C. albicans* for use of CQDs in versatile imaging application. In the third section, pCQDs as nanotrackers for imaging of drug sensitive G1 and drug resistance G5 *Candida* strains as well as yeast to hyphal morphogenesis in fungal pathogens were examined through confocal microscopy and AFM. The pCQDs efficiently internalized in G1 and G5 *Candida* strains as well as augmented yeast to hyphal morphogenesis in fungal pathogens, without affecting transition. In the final section, the fluorescent CQDs were demonstrated for targeted imaging application after functionalization with ergosterol (Erg) to form pCQD-Erg conjugates. Uptake and sub cellular localization of pCQD-Erg conjugates were shown using confocal microscopy in morphological (yeast and hyphal) forms of pathogenic fungus, *C. albicans*.

Thus, the thesis clearly establishes that biocompatible CQDs and CQDs nanoconjugates possess promising potential as next-generation multifunctional alternative nanotrackers for targeted *in vitro* and *in vivo* imaging.

1. Summary of Abstract
2. Soft copy in PDF format with Hardcopy