BIO_25 - Evaluation of the effect of antifungal activity with AmB-NP in synergy with mAbs

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Introduction: Globally, more than one billion people are affected by fungal infection, resulting in approximately 13.5 million life-threatening infections and more than 1.7 million deaths annually. Therapeutic strategies against systemic mycoses can involve antifungal resistance and significant toxicity. One of the main approaches to overcome biopharmaceutical challenges is the use of polymeric nanoparticles, which can carry drugs, such as amphotericin B. Its main advantages over other nanostructured systems are the increased potential for drug solubilization in small doses, great encapsulation capacity and possibility of functionalization of the surface of the nanocarriers.

Objectives: To assess the in vitro effect of AmB-NP in synergy with mAbs on pathogens fungal.

Methodology: To assess the effect of associating the anti-chitooligomer antibodies with NP, C. neoformans and C. albicans were inoculated in RPMI 1640 supplemented with 2% glucose and adjusted to pH = 7. The cells were inoculated at 107107 cells/mL to C. neoformans and 106106 cells/mL to C. albicans in 96-well plates in a final volume of 200 µL. The NP minimal effective concentration was established before investigating a spectrum of murine antibody concentrations (25 – 0.3 µg/ml) against C. neoformans and C. albicans. The AmB-NP synergistic potential, both alone and associated with the mAbs, was evaluated by calculating the fractional inhibitory index (FII). The categorization of synergistic effect was determined as follows: FII < 1 denoted a synergistic effect, while FII = 1 indicated an additive effect.

Results: The nanoparticles that were associated with mAbs, a notable inhibition of fungal growth was observed for both antibodies at varying concentrations. Furthermore, the interaction between the mAbs and AmB-loaded NP was assessed by calculating the fractional inhibitory index (FII), revealing a synergistic interaction between these components.

Conclusion: The AmB-NP has shown notable efficacy in augmenting the antifungal action, enhancing the overall drug efficacy. This prospect holds the potential to reduce drug dosages and associated adverse effects. Employing mAbs targeting chitooligomers as a biopharmaceutical component for fungal disease treatment with lower doses of nanoformulated AmB could potentially reduce healthcare costs related to therapy and hospitalizations.

Keywords: Nanoparticles; Fungal infection; Amphotericin B