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Novel Polymeric Nanoparticles Loaded with New Second Generation Photosensitizers with Probable Phototoxic Action †

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Abstract: There are promising data on the use of poly(acrylamide) nanoparticles (PAA-NPs) in the development of third-generation photosensitizers for application in antimicrobial photodynamic therapy. These nanoparticle delivery systems are suitable for biological applications and have the potential for drug delivery due to their biocompatibility, chemical flexibility, easy preparation, and low cost. The objective of this work was to obtain new PAA-NPs for the vehiculization of the monobrominated derivatives of Azure B (AzBBr) and Neutral Red (NRBr). These two dyes were found to have promising properties as photosensitizers. However, the use of nanotechnology was required to overcome difficulties in solubility, aggregation, and stability in order to optimize their photodynamic efficiency. The combination of different proportions of acrylamide:N-isopropylacrylamide allowed us to obtain five new vehicle systems. These systems were loaded with AzBBr and NRBr and characterized according to their morphology, size, and polydispersity index. The new third-generation photosensitizers showed better photochemical reactivity and chemical stability than the free photosensitizers. This vehiculization strategy improved the properties of the second-generation photosensitizers (AzBBr and NRBr) studied. This improvement in their properties makes them good candidates for potential phototherapeutic applications against numerous pathologies.

Keywords: second-generation photosensitizers; third-generation photosensitizers; nanotechnology; polymeric nanoparticles.

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Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.