Implementation of water-soluble crosslinked cyclodextrin-based polymers for light-activated combination therapy

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Cyclodextrin-based polymers (pCyDs) can be prepared starting from the naturally occurring monomers following green and low-cost procedures. They can be selectively derivatized pre- or post-polymerization allowing to fine-tune functionalities of *ad hoc* customized polymers. During the last 15 years these macromolecules have been the object of intense investigations in view of possible biomedical applications as the ultimate goal and large amounts of scientific data are now available. Compared to their monomeric models, already used in the formulation of various therapeutic agents, they display superior behavior in terms of their aqueous solubility and solubilizing power towards drugs incompatible with biological fluids. Moreover, they allow the combination of more than one type of therapeutic agent in the polymeric system. In our group we are interested in the exploitation of pCyDs to implement the combination of chemotherapy and light-activated therapy. We will present an overview of the results obtained so far combining either clinically used antibiotics or antitumorals with photosensitizers of interest for photodynamic therapy.[1] Non-covalent loading of the various therapeutic agents has been investigated mainly by means of time-resolved electronic spectroscopy. Uptake and localization of the loaded systems in cells has been studied with time-resolved fluorescence confocal microscopy, complemented with spectral imaging. Some of the polymers loading multiple therapeutics are very promising for further biological and clinical evaluation.

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References

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