

Highlights of a journey with Cyclodextrins and Light

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Cyclodextrins (CDs) are water soluble, biocompatible macrocyclic oligosaccharides, made of α -D-glucopyranose units joined by $\alpha(1-4)$ linkages. Since their discovery in 1891 they have been studied worldwide and nowadays a large number of technologies based on CDs are available also in the biomedical field. Not only monomers and their derivatives but also CD-based polymers (pCDs) have been studied as pharmaceutical excipients, drug carriers and more recently, active principal ingredient (API). Compared to their monomeric models, CD polymers display superior behavior in terms of aqueous solubility and solubilizing power towards guest molecules incompatible with biological fluids. Also, they allow the combination of more than one type of guest molecules in the polymeric system.



In this context we exploited UV Visible light as a most effective tool (1) to interrogate interactions of CDs with guest molecules, (2) to implement light-responsive therapeutic systems for photodynamic therapy (PDT), and (3) to prepare new compounds following a green chemistry approach.

I will present some recent results for each type of exploitation of light. They concern the study by means of circular dichroism of new CD dimers acting as drug able to capture cytotoxic cholesterol metabolites; [1] the successful combination of different types of drugs, antitumoral and antibiotics, with photosensitizers of interest for photodynamic therapy under hypoxic conditions; [2] the preparation of new organic endoperoxides in water by means of homogeneous photocatalysis using CD polymers as reaction vessels. [3]

References:

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