Chapter 24
Amphiphilic Cyclodextrin Nanoparticles for Effective and Safe Delivery of Anticancer Drugs

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Cyclodextrins, enzymatic degradation products of starch, emerge as promising biomaterials for the targeted delivery of anticancer drugs to tumor tissues. Once these molecules are chemically modified with aliphatic chains to render an amphiphilic property, they are able to form nanoparticles spontaneously without the help of surfactants.

Amphiphilic cyclodextrin nanoparticles are found to be safe, non-hemolytic carriers for anticancer drugs such as tamoxifen, paclitaxel, and camptothecin which are associated with bioavailability and toxicity problems. Amphiphilic CD nanoparticles are capable of high drug encapsulation, controlled release, and stability improvement of drugs that are labile under physiological conditions.

Recently, we have also worked on novel polycationic cyclodextrins for improved cellular interaction and effective intracellular drug delivery.

Amphiphilic cyclodextrins benefit from the EPR effect being to their size and are also actively targeted by surface modification with cationic groups, PEG chains, and folate residues to target the folate receptors overexpressed in tumor cells in the body. Therefore cyclodextrin derivatives with intrinsic nanoparticle forming abilities can be considered as promising materials for safe and effective delivery of anticancer molecules of different properties to target tissues.

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