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Nanosized block copolymer carriers of hydrophobic bioactive compounds

Polymeric micelles, defined as core-shell nanosized aggregates formed via self-assembly of amphiphilic block copolymers in selective solvent, have great potential for developing nanocarriers of poorly water-soluble biologically active substances (BAS) for biomedical applications. Such aggregates can encapsulate hydrophobic substances in their core, while the hydrophilic shell minimizes protein adsorption on micelles and, thus, slowdown the non-specific capture of carriers by the reticuloendothelial system. The size of polymeric micelles is above the threshold for filtration by kidneys and they can achieve prolonged circulation in blood stream and accumulation in solid tumors and sites of inflammation because of the enhanced permeability and retention effect. In the present study we focused on development and evaluation of novel block copolymer carriers of curcumin, propolis and caffeic acid phenethyl ester (CAPE). Different core-shell micelles were obtained from biocompatible and biodegradable amphiphilic block copolymers with defined composition, structure and functionality. Modern synthetic techniques like atom transfer radical polymerization (ATRP) and click chemistry were applied for the synthesis of block copolymers with specific molecular parameters and properties. The micelles were formed and loaded with BAS by the solvent exchange technique, achieving high drug loading capacity and encapsulation efficiency. All systems obtained possessed hydrodynamic diameter bellow 100 nm. *In vitro* tests revealed sustained release of BAS from micellar carriers as well as enhanced anti-tumor activity as compared to the free bioactive substances.

Biography

Petar D Petrov is the Head of Laboratory Structure and Properties of Polymers at the Institute of Polymers, Bulgarian Academy of Sciences. He has completed his PhD from the University of Chemical Technology and Metallurgy, Sofia, and Postdoctoral studies from University of Liege, Belgium and University of Bayreuth, Germany, as an Alexander v Humboldt Fellow. His efforts have been devoted to the development of novel polymer (nano)materials for applications in medicine and pharmacy, biotechnologies, etc. He has co-authored 65 papers in peer-reviewed journals, three patents and five book chapters.

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