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Lipid based sterically stabilized micelles as effective drug carriers for cancer and inflammatory diseases

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Abstract

Sterically stabilized micelles (SSM) composed of PEGylated phospholipids can be used as carriers for water insoluble small molecules and peptide drugs for targeted delivery to site of action. These micelles are very effective nano-carriers for parenteral applications and promising for transition to the clinics, due to multiple reasons: First, the PEGylated lipid used in SSM composition is already approved in another pharmaceutical product by FDA for human use, so safety concern is minimum. Second, their reproducible and industrial scale preparations are easy, since SSM are formed by self-assembly of PEGylated lipids in aqueous media and they are thermodynamically stable. Third, the final product can be freeze- dried without any use of cryo- and lyo-protectants and stored in dry form for required shelf-life. Fourth, SSM have very low CMC therefore after dilutions in blood, the number of micelles break is not significant. Since monomers in equilibrium with SSM are low, in vivo lipid toxicity should be also low. Sixth, PEG on the surface of the micelle forms a protective layer and avoids the opsonization of the particles and RES up-take. Seventh, PEG can be used to attach active targeting ligand. Last, but not least, the size of SSM (~15nm) is ideal for passive targeting to leaky vasculature by EPR effect, at the same time SSM size is too big to extravasete at the normal vasculature and for renal clearance. My talk will show some data on in-vitro characterization of SSM, and also in-vivo performance of SSM as a drug delivery system on cancer and rheumatoid arthritis animal models.

Biography

Hayat Onyuksel is a Professor at the Department of Biopharmaceutical Sciences, College of Pharmacy, and University of Illinois at Chicago (UIC). She received her BS Degree in Pharmacy from Ankara University, Turkey and Ph.D. degree in Pharmaceutics from University of London. She completed her post doctoral studies at University of Michigan, USA. Her research for the last two decades specifically deals with targeted lipid-based drug nanocarriers to address solubility, stability and safety problems of small organic molecules or peptide drugs for parenteral delivery. More recently she is developing targeted nanomedicines to kill cancer stem cells and nanocarriers for siRNA delivery. She has over 115 scientific journal papers and 10 issued patents.

She is a member of several professional organizations including the American Association of Pharmaceutical Scientists (AAPS), American Academy of Nanomedicine and Controlled Release Society. She is special editor of the journal named Nanomedicine; Nanotechnology Biology and Medicine, and on the Editorial Boards of nine other nanotechnology and pharmaceutical science journals. She also serves in many grant review panels especially of National Institute of Health since 1992.

She was the UIC Inventor of the Year, and also Woman of the Year in 2003. She is selected as AAPS Fellow in 2006. In 2008 she received AAPS Lipid Based Drug Delivery Outstanding Researcher Award.