Glycosylated amphiphilic polymeric nanoparticles in active drug targeting

Alejandro Sosnik,

Laboratory of Pharmaceutical Nanomaterials Science, Department of Materials Science and Engineering, Technion-Israel Institute of Technology, Haifa, Israel

sosnik@technion.ac.il

The overexpression of energy-dependent and independent glucose receptors and transporters has been identified in different cell populations (e.g., macrophages). For example, in pediatric sarcomas, overexpression of glucose transporter 1 (GLUT-1) is associated with the more efficient uptake of this vital energy source and faster proliferation and metastasis. Nanotechnology has made sound contributions to treat disease due to the ability to target drug-loaded nanomaterials by the enhanced permeation and retention effect (passive targeting). Furthermore, the design of nanocarriers surface-modified with ligands recognized by receptors overexpressed in specific cell types is an extensively investigated (though still unrealized in the clinical practice) strategy for active targeting and reduce off-target accumulation and toxicity. Among the platforms, polymeric micelles with core-corona nanostructure and amphiphilic polymeric nanocarriers displaying more complex self-assembly patterns have gained great attention owing to their ability to encapsulate and target hydrophobic cargos and the chemical versatility to modify their surface. Aiming to confer them with active targeting features, in recent years, we designed a plethora of glycosylated amphiphilic polymeric nanocarriers and demonstrated that by tuning their composition and size, they undergo selective accumulation in solid tumors [1-3]. In this presentation, I will overview the strategies developed in my laboratory to improve the efficacy of the pharmacotherapy in cancer and also tune the phenotype of immune cells by using this unique type of nanoparticle.

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