

24th World Nano Conference

May 07-08, 2018 | Rome, Italy



Fatemeh Bahadori

Bezmialem Vakif University, Turkey

Opportunities and challenges in design and applications of nano drug delivery systems

Nano Drug Delivery Systems (NDDS) continue to attract the attention of drug discovery and design studies because of their superior properties compared to free drugs. These nanosized vehicles provide controlled release period for drug molecules or allow targeting a specific organ, tissue or cell. NDDS not only carry therapeutic drugs but also diagnostic agents could be localized at disease site using these nano-engineered particles. Moreover, combination of therapeutic and diagnostic agents has opened the new era of nano-theranostics to clinical applications. Targeting disease site carries the benefit of using less therapeutic or diagnostic doses with higher efficacy, which, consequently results in protection of healthy tissues from side effects of these. Lots of NDDS consisting of different materials have been produced and studied for almost last two decades. Biocompatibility and biodegradability are the common property of these materials. These properties are the major restrictive factors in synthesis of NDDS. Particle size and shape are the latter factors to be considered. Spherical particles with sizes less than 300 nm are applicable to biological systems without causing any harmful effect. Clearance of particles from body by reticuloendothelial system is another point that NDDS must cope with. Surface modification with highly hydrophilic materials is a strategy to scape this obstacle. However, lots of hydrophilic materials are negatively charged and this is where, only neutrally or positively charged particles are able to internalize the cells. While the main mechanism of passive targeting the cancer, tumor is Enhanced Retention and Permeability (EPR) the lack of lymph drainage at this site causes a very high pressure which causes repulsion of the accumulated particles. Active targeting is possible by surface modification of NDDS with the ligands of the over-expressed receptors on the cancer cell surfaces. NDDS could not be accepted as highly talented vehicles unless all, or at least the majority of above mentioned challenges being considered.

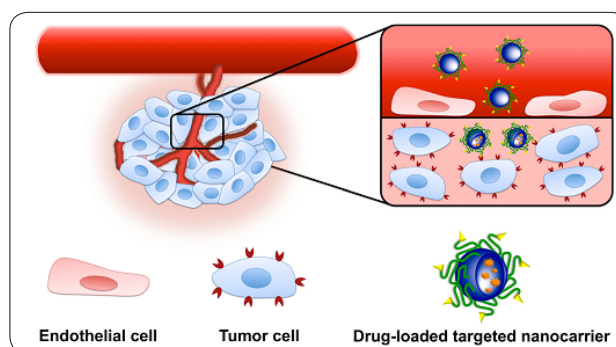


Figure 1: Overview of nanocarrier-mediated targeted drug delivery. Passive targeting relies on accumulation of size-controlled nanocarriers at the tumor site due to the leaky vasculature and impaired lymphatic drainage. Active targeting is mediated by selective interactions between ligand-decorated nanocarriers and receptors overexpressed or uniquely expressed by the tumor cells (with permission from Sunoqrot, S., et al.,CTMC, 2017. 17(13):1451)

24th World Nano Conference

May 07-08, 2018 | Rome, Italy

Recent Publications

1. Florence A T (2012) Targeting nanoparticles: the constraints of physical laws and physical barriers. *Journal of Controlled Release*. 164(2):115-124.
2. Luk B T, R H Fang and L F Zhang (2012) Lipid- and polymer-based nanostructures for cancer theranostics. *Theranostics*. 2(12):1117-1126.
3. Wei A, J G Mehtala and A K Patri (2012) Challenges and opportunities in the advancement of nanomedicines. *Journal of Controlled Release*. 164(2):236-246.
4. Sun Q, M Radosz and Y Shen (2012) Challenges in design of translational nanocarriers. *Journal of Controlled Release* 164(2):156-169.
5. Kratz F and A Warnecke (2012) Finding the optimal balance: challenges of improving conventional cancer chemotherapy using suitable combinations with nano-sized drug delivery systems. *Journal of Controlled Release* 164(2):221-235.

Biography

Fatemeh Bahadori has completed his PhD in Organic Chemistry from Istanbul Technical University, Istanbul, Turkey. During the course of her PhD thesis she was presented at University of Illinois at Chicago as Research Assistant, studying nano-formulations of natural products. She is an Assistant Professor since 2012 at Faculty of Pharmacy, Department of Pharmaceutical Biotechnology, Bezmialem Vakif University, Istanbul- Turkey. She has published 17 papers and 2 reviews in reputed journals and 3 book chapters. She holds 2 international patents. She has published a peer reviewed international special issue consisting of 11 papers as Guest Editor. She has supervised 5 Bachelor's students, 4 Master's and 2 PhD students thesis. She has presented more than 15 national and international presentations. She has been serving as Director or Researcher at 15 national grants. Her area of interest is the enhancement of bio-availability and bio-distribution of natural products using nano drug delivery systems.

fbahadori@bezmialem.edu.tr

Notes: