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Simple is better in nanomedicine

Nanoparticle-based drug delivery systems can potentially overcome several barriers to drug delivery, reduce toxicity to the patient, and thus improve therapeutic outcomes. Over time, nanoparticles have undergone evolution from simple to more complex systems, yet the nanoparticle formulations developed as “nanomedicine” for clinical use remain quite simple. Our laboratory research has shown that simple nanoparticle formulations, developed with a solid rationale, are very effective in treating complex conditions. This overview will describe nanoparticles that are straightforward in design yet effective in treating complex diseases in animal models. One example is a formulation that successfully treats bone metastasis, considered the primary cause of death in many types of cancers but more particularly in prostate and breast cancers. A second example is a formulation that effectively modifies the after-effects of stroke. This presentation will also define the challenges in moving complex nanoparticles through regulatory pathways and the scale-up process toward eventual commercialization.

Biography

Vinod Labhasetwar, PhD, is a Professor of Biomedical Engineering, Lerner Research Institute, Cleveland Clinic, both in Cleveland, Ohio, USA. The primary research focus of his laboratory over the past 25+ years has been on nanoparticle-mediated drug delivery in the context of translational and clinical medicine, particularly focusing on disease conditions where no effective treatments yet exist. His team's specific interests are in developing effective approaches to cancer therapy (against drug resistance and metastasis), cardiovascular diseases (particularly inhibition of restenosis), and facilitating neuromuscular repair mechanisms in stroke and spinal cord injury. Recently, his group's efforts have been expanding into two new areas: retinitis pigmentosa, with the goal of slowing the progression of photoreceptor degeneration; and transplantation research, with the objective of extending the critical window of time for organ preservation. He has published over 180 peer-reviewed articles and book chapters. He is listed among the 2014 and 2015 Highly Cited Researchers by Thomson Reuters, based on the top 1% of citations during the past 10 years. He has over 25 issued US and international patents and 4 provisional the US patents filed/pending. He is Editor-in-Chief of Drug Delivery and Translational Research, an official journal of the Controlled Release Society.

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