عنوان مقاله:

Numerical modeling of drug delivery to solid tumors through drug-loaded nanocarriers

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خلاصه مقاله:

Nano-sized drug delivery systems (NSDDSs) suggest a promising therapeutic technology with sufficient biocompatibility, stability, and drug-loading ratestowards efficient drug delivery to solid tumors. We aim to apply a multi-scale computational model for evaluating delivery of drug-loaded nanocarriers topredict treatment efficacy. A geometric model of the tumor and the capillary network was extracted from a real image of tumor. Subsequently, equations regarding intravascular and interstitial flows as well as transport of drug in tissue were solved by considering real conditions as well as details such as drug binding to cells and cellular uptake. The effect of various parameters, including nanoparticle (NP) size, binding affinity of drug, and drug release rate from NPs, were additionally investigated to determine their therapeutic efficacy. Results show that using NPs considerably enhances the fraction of killed cells (FKCs) inside the tumor compared to conventional chemotherapy. FKCs for twostage NSDDS with smaller NP size (۲۰nm) is higher than that of larger NPs (۱۰۰nm), in all investigate release rates.

کلمات کلیدی:

Drug delivery; Solid tumors; Nanocarriers; Tumor penetration

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