

Precision Nanomedicine in Cancer Therapy

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Precision medicine is now at the forefront of cancer treatment but its rapid translation into clinic still represents a challenge. The idea of using patient's biological information for improving and tailoring treatment to the patient's individual needs presents a prime example of personalized medicine. Potential of small non-coding RNAs in that regard is indisputable, considering that one can use this mechanism to silence virtually any gene, with single-nucleotide specificity. Small interfering RNAs (siRNA) and microRNAs have emerged as regulators of post-transcriptional modification of gene expression and are posed to yield extremely promising candidates for cancer therapy. However, the delivery of non-coding RNAs to the tumor site has been hampered by their short blood half-life, inability to cross cell membrane and inability to assess this delivery non-invasively. Image-guided nanocarriers can resolve these problems by simultaneously serving as vehicles for oligonucleotide delivery and as imaging reporters providing vital information about the delivery to the tumor site and assisting in evaluating the therapeutic outcome. While this presentation will focus on developing nucleic acid-based cancer therapies and their application for treating primary tumors and metastatic disease, precision nanomedicine approach has far reaching applications in other human pathologies.