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Chapter 14 - Nanoparticle-based radio immune therapy in cancer care

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Abstract

Cancer is reported to be the second leading cause of death worldwide. Although the radiotherapy remains one of the proven methods to treat tumors, its potential toxicity to healthy tissues cannot be overruled. To minimize this toxicity newer technologies are always exploited by researchers. Radio immune therapy (RIT) is the targeting of tumors with the help of monoclonal antibodies (mAbs)-tagged radionuclides. The development of nanotechnology encouraged an emerging trend in nanomedicine for targeted delivery of radionuclide payloads to the tumors. Nanoparticles (NPs) provide a huge advantage for attachment of hundreds of radionuclides to their surface ensuring an adequate payload to reach the target. The major nanomaterials studied are liposomes, dendrimers, quantum dots, iron oxide NPs, and carbon nanotubes. The surface functionality of NPs is favorably used for attachment of radionuclide with the help of bifunctional chelators or chemical linkages. To understand the conjugation of radionuclide to NP surface and mAb, both the labeling methods have been discussed separately in this chapter. Pretargeted approach in RIT using nanomaterials is of special importance as it further reduces the possible exposure of radiation to healthy tissues. However, extensive preclinical, clinical, and toxicity studies must be performed to translate NP-based RIT to an effective treatment

option for cancer care.

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Keywords

Radio immune therapy; radiolabeling; bifunctional chelators; immunoliposomes; dendrimers; carbon nanotubes

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