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Commentary

Nanotechnology in Cancer Treatment

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DESCRIPTION

Nanotechnology can make tumors more prominent in diagnostic imaging. Coating nanoparticles with antibodies or other substances can help find and attach cancer cells. The particles can also be coated with a substance that signals when cancer is found. For example, iron oxide nanoparticles bind to cancer cells and emit powerful signals that make the cancer shine on MRI scans. Nanotechnology helps make cancer treatment safer and more accurate. Specially developed nanoparticles deliver drugs such as chemotherapy directly to the tumor. They do not release the drug until it reaches it. This prevents the drug from damaging healthy tissue around the tumor. This damage causes side effects. Due to the small size of the nanoparticles, the drug can be delivered to areas of the body that are normally difficult to reach. One example is the blood-brain barrier, which prevents toxins from entering the brain. It also blocks some medicines. Nanoparticles are small enough to overcome this barrier, making them a useful treatment for brain tumors.

Doctors have been using nanotechnology to treat cancer for over a decade. Two approved treatments, Abraxane and Doxil, help increase the effectiveness of chemotherapeutic drugs. Abraxane is a nanoparticles made from the protein albumin bound to the chemotherapeutic drug docetaxel. Prevents the division of cancer cells. Abraxane treats breast and pancreatic cancers of metastasized non-small cell lung cancer. Doxil is a chemotherapeutic drug, doxorubicin, wrapped in liposomes, which are fat sac. Cancer cells cannot divide because it interferes with oncogenes. Doxil treats ovarian cancer, multiple myeloma, and Kaposi's sarcoma. Researchers are investigating other nanotechnology therapies in clinical trials. Some of these treatments encapsulate toxic drugs in nanoparticles to make them safer or help the drug survive as it passes through the bloodstream. One day, nanoparticles can also irradiate cancer

Nanotechnology more specifically targets cancer cells to protect healthy tissues. Theoretically, it should have fewer side effects than current therapies such as chemotherapy and radiation therapy. Current nanotechnology-based therapies such as Abraxane and Doxil cause side effects such as weight loss, nausea and diarrhea. However, these problems can be attributed to the chemotherapeutic agents contained in them. Researchers need to learn more about the side effects of these therapies as they study these therapies in clinical trials.

Cancer treatment is currently limited to surgery, radiation therapy, and chemotherapy. All three methods carry the risk of damaging normal tissue or incomplete eradication of the cancer. Nanotechnology provides the opportunity to target chemotherapy directly and selectively to cancer cells and neoplasms, support surgical resection of tumors, and improve the therapeutic efficacy of radiation-based and other current therapies. All of this can help reduce a patient's risk and increase their chances of survival.

Research on nanotechnology most cancers remedy extends past drug shipping into the advent of recent therapeutics to be had handiest *via* use of nanomaterial residences. Although small in comparison to cells, nanoparticles are huge sufficient to encapsulate many small molecule compounds, which may be of more than one types. At the equal time, the extraordinarily huge floor location of nanoparticle may be functionalized with ligands, consisting of small molecules, DNA or RNA strands, peptides or antibodies. These ligands may be used for healing impact or to direct nanoparticle destiny. The bodily residences of nanoparticles, which include electricity absorption and re-radiation, also can be used to disrupt diseased tissue, as in laser ablation and hyperthermia applications

The traditional use of nanotechnology in the treatment of cancer has been to improve pharmacokinetics and reduce the systemic toxicity of chemotherapy by selectively targeting and delivering these anticancer agents to tumor tissue. The advantage of Nano-sized carriers is that the chemotherapeutic agent can increase the overall therapeutic index of the delivered drug the nano-formulation encapsulated or bound to the surface of the nanoparticles. This ability is primarily due to adjustable size and surface properties. Size is an important factor in providing nanotechnology-based therapies for tumor tissue.

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