Efficiencies in the Use of Nanorobots in Targeted Drug Delivery for the Treatment of Cancers

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Abstract: Cancer has been one of the leading causes of death worldwide. Accurate diagnosis of these cancers often takes time, and traditional treatments may cause harmful side effects on the patients. Nanotechnology has provided revolutionary breakthroughs in the diagnosis and treatment of cancers due to the biocompatibility, accessibility, control, and targeting characteristics of the nanoparticles. This research study focuses on the use of nanoparticles and nanorobots for targeted drug delivery specific to the tumor cells to minimize the adverse side effects of cancer treatment. There are various studies of nanoparticles that have been found to contribute to the drug delivery process. These include “Cornell Dots” (C Dots), bioadhesive nanoparticles, logic-gated nanorobots, and self-propelled autonomous nanorobots. Some of these nanoparticles, like C Dots, focus on the detection of the tumor and signifying the tumor location. Others, such as bioadhesive nanoparticles, are designed for the release of drug candidates once the tumor is detected. This research study aims to identify recommendations for improving upon drug delivery to target tumor cells using combined approaches from these studied uses of nanoparticles. One focus is the use of multi-gated aptamers to release drugs based on certain conditions being met, thus opening the nanostructure to release the drugs. Another option would be the controlled release of a drug using gated aptamers with bioadhesive properties. If these recommendations can be successfully evaluated in laboratory research, then it will significantly reduce the need for high doses of chemotherapy, increase the treatment efficiency, and also minimize the side effects of these anti-cancer drugs on the patient.

Keywords: nanoparticles, nanorobots, drug delivery, cancer treatment

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