Alpha particle formulations for treatment of solid tumors

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Technology description

Unmet Need

Hepatocellular carcinoma (HCC) is the fifth most common cancer type worldwide and a leading cause of cancer related deaths. HCC is clinically silent in its early stages, leading to diagnosis at more advanced stages when only non-surgical, palliative treatment is available. One treatment option for advanced HCC is intra-arterial therapy and embolization, as the hepatic artery is the tumor’ s major blood supply. Transarterial radioembolization (TARE), which combines embolization and radiation therapy, has demonstrated promise for treating HCC. However, current TARE strategies rely on emulsified β-emitting particles (βRPT) that are less potent than other radionuclides and have a long range that can expose normal tissue to high doses of radiation and thus toxicity. Post-embolization syndrome (PES) is also a very common side effect of TARE. Consequently, there is a need to develop novel TARE strategies for liver cancer using emulsions that result in lower rates of PES following treatment and radionuclides that are highly damaging over a short range to only cancerous cells.

Technology Overview

Johns Hopkins researchers have developed a novel TARE strategy for HCC and other liver metastases that utilizes αRPT agents, which are potent, have a short range, and are generally impervious to cellular resistance mechanisms. Prior to delivery to the hepatic artery, these agents are emulsified in the FDA-approved Lipiodol, which has been shown to minimize PES when incorporated into embolization formulas. The researchers generated a preliminary αRPT-Lipidol emulsion labeled with ^{225}Ac that was injected into the hepatic artery of rabbits with a VX2 liver tumor. This novel αRPT-Lipidol emulsion accumulated in the tumor but cleared out of normal liver tissue, resulting in a 13:1 tumor to liver ratio. These results indicate that αRPT-Lipidol emulsions could be a novel delivery mechanism for radionuclides in targeted therapy regimens for primary and metastatic liver cancer.

Institution

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