

Magnetite-based nanomedicine for cancer diagnosis and therapy using loco-regional hyperthermia combined with chemotherapy

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Extended Abstract

Colorectal cancer is now one of the major diseases in the world. With westernized diet in Taiwan, the incidence of colorectal cancer increases. For cancer stem cell therapy, CD133 (prominin-1) is a theoretical cancer stem cell (CSC) marker for colorectal cancer and is a proposed therapeutic target. Cells with CD133 overexpression have demonstrated enhanced tumor-initiating ability and tumor relapse probability [1-6]. To resolve the problem of chemotherapy failure, we will develop a magnetite-based nanomedicine using loco-regional hyperthermia combined with chemotherapy. The targeting carrier has a magnetite nanoparticle (superparamagnetic iron oxide nanoparticles, SPIO) core and a layer-by-layer polyelectrolyte molecule shell that carries irinotecan (CPT-11) and anti-human prominin-1 (PROM1/CD133) monoclonal antibody for cancer stem cell-specific targeting. Besides as a contrast agent for MRI, this nanomedicine plays as an important role to relay the externally delivered radiofrequency energy for tumor hyperthermia [7,8]. Locoregional heat can trigger a drug release from the carrier as it directly damages tumor cells and cancer stem cells. Finally, the use of this nanomedicine can improve the half-life of chemotherapy drugs in the blood and reduce the side effect, and is significantly more efficacious than hyperthermia or chemotherapy alone for colorectal cancer therapy.

References

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