Investigating the effect of a new contrast agent in an orthotopic mice model

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Cancer is the second most common cause of death in the world after cardiovascular diseases. However, there has been a lack of effective diagnostic tools at an early stage for this malice. Over the years, there have been significant improvements in the diagnostic field such as ultrasound, computed tomography (CT), positron emission tomography (PET) but not without issues. MRI presents itself as an efficient alternative technique but, with the use of gadolinium (Gd) as contrast agent, there is an urgent need to look for improved contrast agents. Gd has been shown to cause some health problems such as nephrotoxicity. Hence, in this work, an iron oxide nanoparticle-based contrast agent is presented and investigated. These nanoparticles were synthesized using thermal decomposition of iron-oleate and characterized using X-ray diffraction (XRD), transmission electron microscopy (TEM). Further, we functionalize the as synthesized nanoparticles with a polyethylene glycol-gallol (PEG-GA) ligand. These nanoparticles are observed to be of biocompatible nature when interacting with non-cancerous cells. 4T1 cell line was used to induce orthotopic tumor in mice and subsequently particles were injected intravenously before following them under MRI. Also, its injection-excretion cycle is determined by various methods. Although not tested here, this contrast agent has the potential to be used as theranostic agent as well using magnetic hyperthermia or by trapping a chemotherapeutic drug in the polymer matrix or both.

REFERENCES

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FIGURES

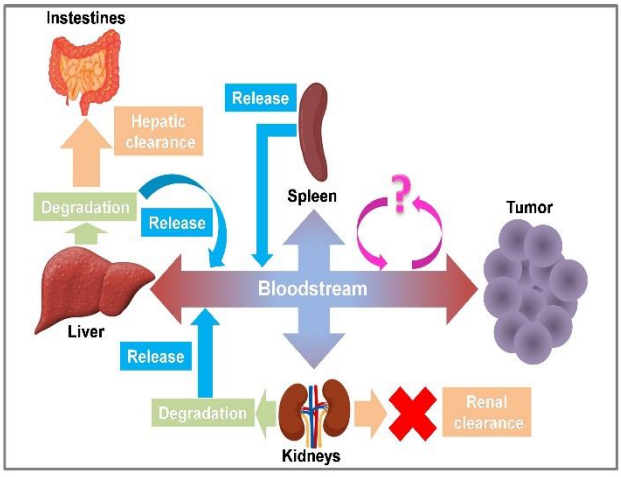

Figure 1: Scheme representing the proposed hypothesis about biodistribution and circulation of nanoparticles