

Tuesday, April 4th, 2023 at 11am
MSB 148 or Zoom

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Title: Nanobugs as Drugs: Bacterial Derived Nanomagnets Enhance Tumour Targeting and Oncolytic Activity of Cancer Killing Viruses



Abstract:

The survival strategies of infectious organisms have inspired many therapeutics over the years. Indeed, the advent of oncolytic viruses (OVs) exploits the uncontrolled replication of cancer cells for production of their progeny resulting in a cancer-targeting treatment that leaves healthy cells unharmed. Their success against inaccessible tumours (deep in the body), however, is highly variable due to inadequate tumour targeting following injection into the circulation. To overcome this, we have developed several Trojans for delivering OV including cells (macrophages), liposomes, nanohydrogels, silk fibroin and magnetic nanoparticles (MNPs). Here we describe the co-assembly of these nanobugs with biocompatible magnetic nanoparticles derived from magnetotactic bacteria. This enables tumour targeting from the circulation with magnetic guidance, protects the OV against neutralising antibodies and thereby enhances viral replication within tumours. This approach additionally enhanced the intratumoural recruitment of activated immune cells, promoted anti-tumour immunity, induced tumour shrinkage, and increased survival in a syngeneic mouse model of breast cancer by 50%. Exploiting the properties of versatile nanocarriers for active tumour targeting, rather than tropism of the virus, offers an exciting, novel approach for enhancing the efficacy of tumour immunotherapies like OV, for disseminated neoplasms. This is particularly pertinent for cancer types that are refractory to immunotherapies such as breast cancer.