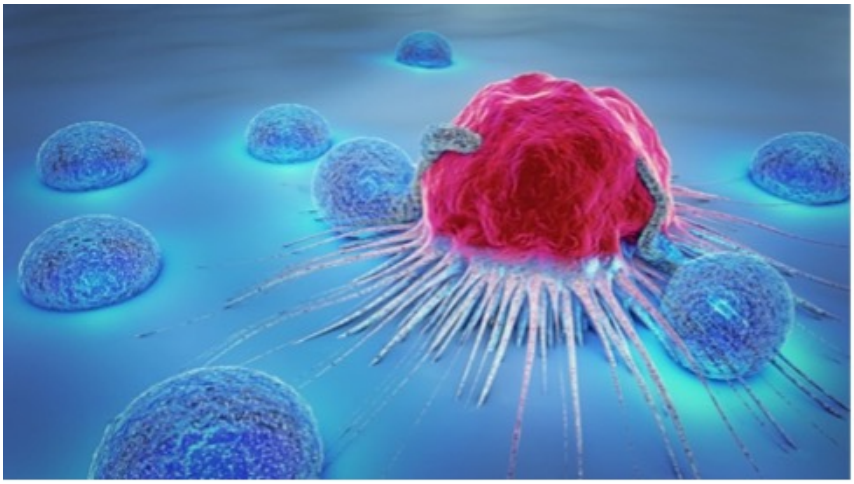
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Synthetic Scaffolds for Metastasis Detection

Technology number: 2022-242



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Category
Medical Devices

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OVERVIEW

Early detection and treatment of cancer metastasis using engineered biomaterials

- Enables identification of metastatic cells before significant tumor burden develops
- Cancer diagnosis, personalized treatment planning, and research in metastasis biology

BACKGROUND

Cancer metastasis remains a leading cause of cancer-related mortality, with existing detection methods often identifying tumors at advanced stages. Historically, imaging techniques and biopsies have been the primary approaches for detecting metastatic spread; however, they often lack sensitivity to early events. These traditional methods can miss subtle biological changes and may not detect small numbers of circulating tumor cells. Consequently, the therapeutic window for effective intervention is often lost. Moreover, existing technologies typically address metastasis after substantial tumor formation, limiting treatment efficacy. A need therefore exists for innovative approaches that can identify the pre-metastatic niche and associated cellular events are essential to enhance early detection and intervention, ultimately improving patient outcomes in cancer treatment.

INNOVATION

The innovation involves engineered biomaterials that mimic the pre-metastatic niche, allowing for the early detection and treatment of metastatic cells. This technology leverages specialized scaffolds designed to attract and characterize circulating tumor cells before they establish secondary tumors. By replicating the biological environment conducive to metastasis, these scaffolds enable real-time monitoring of metastatic activity and facilitate early intervention strategies. The technical advances include enhanced sensitivity in detecting low-abundance tumor cells and the ability to analyze their characteristics in various contexts—such as in vitro, in vivo, and in situ. Potential applications of this technology span across clinical oncology, where it could revolutionize cancer diagnosis and treatment, as well as research settings aimed at understanding metastasis mechanisms, ultimately paving the way for more effective cancer management strategies.