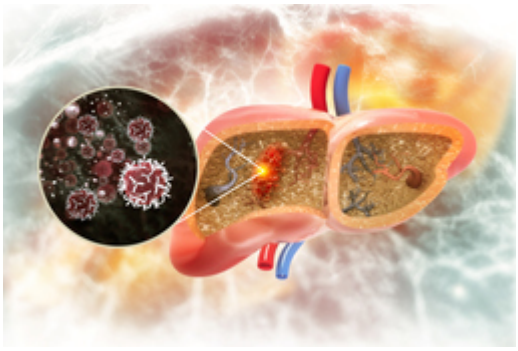
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Peptide Ligand Specific for CD44

TECHNOLOGY NUMBER: 2021-454



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Category
Diagnostics
Life Sciences

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OVERVIEW

A molecular imaging study useful for diagnosing hepatocellular carcinoma (HCC)

- Measures the presence of the cell surface adhesion receptor CD44
- Provides highly specific binding to facilitate various technological applications

BACKGROUND

Hepatocellular carcinoma (HCC) is the most common type of primary liver cancer and often presents as an advanced, incurable illness. Given that HCC is usually asymptomatic in its early phases and is not amenable to effective screening with existing technologies, there is a need to develop novel diagnostic options for this disease.

INNOVATION

Researchers have discovered a molecular imaging strategy for HCC that can potentially improve diagnostic performance. They have developed a method to detect and measure the presence of CD44, a multistructural and multifunctional molecule involved in cell proliferation, cell differentiation, cell migration, angiogenesis, presentation of cytokines, chemokines, and growth factors to the corresponding receptors, and docking of proteases at the cell membrane, as well as in signaling for cell survival. This cell surface molecule is thought to be linked to cancer, and its elevated expression in HCC correlates with increased rates of metastasis, tumor recurrence, resistance to treatment, and decreased survival.

The investigators employ a molecular imaging strategy that fluorescently labels a peptide specific for CD44 and which may be used for real time, in vivo imaging. The technology is sensitive, simple to use, and safe in its delivery. Specific binding to CD44 has been confirmed via

cell staining, knockdown, and competition assays. This cell surface adhesion receptor is highly expressed in many cancers and regulates metastasis via recruitment of CD44 to the cell surface. Its interaction with appropriate extracellular matrix ligands promotes the migration and invasion processes involved in metastases. CD44 has also been identified as a marker for several types of stem cells.

Furthermore, uptake by HCC tumors was shown to be successful in a mouse model with radiographic confirmation of uptake by orthoptic HCC tumors, thereby showing tumor size, shape, and boundaries. And notably, significantly greater peptide binding to human HCC specimens was observed compared to normal human liver specimens. These results demonstrate the peptide is high specific binding to CD44 in orthotopic HCC imaging. This peptide can be used clinically for early cancer detection, image-guided resection, risk stratification, monitoring of therapeutic efficacy and can potentially be used for targeting drug delivery by labeling nanocarriers to achieve site-specific drug delivery of high payloads.