Detecting Hypoxia-associated Peptides for Cancer Prognosis

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Technology description

Most cancer cells undergo some level of hypoxia due to limited oxygen delivery capacity of the surrounding vasculature and high oxygen consumption of tumor cells. Hypoxia has been observed to be a key determinant of cancer behavior and treatment outcomes, particularly poor treatment outcomes. The gold standard for characterizing tumor hypoxia uses polarographic electrodes, but this is highly invasive. Imaging techniques have been investigated to measure tumor hypoxia, however, because of rapid and dynamic changes in hypoxic statuses, these techniques are not sufficiently accurate. Effective detection and characterization of tumor hypoxia could provide predictive information related to treatment outcomes and help personalize treatment plans. More reliable and less invasive strategies for hypoxia assessment and prognostic prediction are thus highly desirable. Prof. Tony Hu, at Arizona State University, has developed a minimally-invasive method to measure tumor hypoxia and predict treatment outcomes in patients receiving therapy for pancreatic cancer. This method looks at peptide signatures that are unique to specific hypoxic conditions and measures the ratios of certain peptide that are enriched from a patient's blood. Variations in the ratios of those peptides can be used as an indicator of tumor hypoxia status and as a predictive marker for treatment response and patient survival. A pilot study was performed that demonstrated that elevated pre-therapy levels of certain peptide ratios correlates with poor responses to neoadjuvant treatment. This method offers a minimally invasive, fast and sensitive platform for measuring hypoxia-related markers for convenient and consistent predictions of disease prognosis in response to cancer treatments.

Application area

• Predicting clinical treatment prognosis for pancreatic cancer
•Could possibly apply to other cancers as well
• Aid in the development of personalized treatment plans

Advantages

• Provides dynamic information regarding the status of tumor hypoxia

• Minimally invasive

• Rapid and high-throughput

• High accuracy – provides more comprehensive and dynamic information regarding a tumor's hypoxic status

• Eliminated the need to develop specific hypoxia-specific probes for imaging studies, which is time consuming

Institution

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