Evaluating Systemic Cancers

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Technology description

Assessing treatment response in cancer patients is essential to manage their disease and evaluate therapy. Computed tomography (CT) is widely used to monitor cancer treatment by measuring changes in the diameters of particular tumor lesions (e.g., RECIST). However, this strategy can be too simplistic and may not represent the disease as a whole.

A more sensitive approach is positron emission tomography (PET), or other methods for molecular and functional imaging, which can distinguish different types of tissue based on the uptake of a specific agent targeted to a tumor. Functional and molecular imaging, such as PET, can be used in addition to CT.

Still, PET-based assessments concentrate largely on the growth and shrinkage of a few selected lesions. This is acceptable for localized diseases but inadequate for systemic ailments such as leukemia, lymphoma and metastatic diseases that involve multiple lesions. Focused measurement of such continuous lesions isolated from other tissue has been difficult to achieve. UW–Madison researchers have developed a technique for extending molecular and functional imaging (e.g., PET, fMRI) assessment of the total disease and disease heterogeneity to a variety of different cancers, including systemic types throughout the body.

The method uses a combination of anatomical and functional masking to isolate multiple dispersed lesions from surrounding tissue. In this way, automatic identification tools can target likely tissue on a case-by-case basis, as guided by information about the type of cancer and imaging materials.

First, a patient is administered an imaging agent that identifies tumor tissue. After scanning, a program helps identify and measure the progression of multiple tumor locations based on how and where the agent is taken up. A color-coded output shows measurements at different locations.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing strategies for assessing cancer treatment using PET/CT or other imaging methods to enable automatic measurement of all tumor lesions.

Vanderhoek M., Juckett M.B., Perlman S.B., Nickles R.J. and Jeraj R. 2011. Early Assessment of Treatment Response in Patients with AML Using [(18)F]FLT PET Imaging. Leuk Res 35, 310-316.

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Liu et al. 2011. Pharmacodynamic Study Using FLT PET/CT in Patients with Renal Cell Cancer and Other Solid Malignancies Treated with Sunitinib Malate. Clin Cancer Res 17, 7634-7644.
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Application area

Assessing whole body disease and treatment progress
Research tool to study drugs and imaging biomarkers

Advantages

Automatic assessment of all lesions
Automatic assessment of disease heterogeneity
May help guide cancer treatment and prognosis
More comprehensive, accurate understanding of disease progression
Results are easy to comprehend.
High sensitivity by eliminating false positive regions (e.g., liver)
Can be performed throughout treatment stages

Institution

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