Selective Size Imaging using Filters via Diffusion Times (SSIFT)

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

Vanderbilt researchers have developed a novel MRI-based method for fast, robust, and accurate imaging of biological tissue by selecting a specific cell size range (such as tumors) without the need for a contrast agent. One exciting application of this method is imaging brain metastases (BM) that are difficult to differentiate from other brain abnormalities such as radionecrosis when using existing approaches.

Addressed Need

During radiation therapy, effective planning is needed in order to ensure the patient does not receive unnecessary radiation during treatment. One critical component of this process is the imaging, as the doctor must be able to differentiate healthy tissue from tumor in order to know the optimal locations for radiation delivery. Unfortunately, existing imaging approaches do not work for patients with certain co-morbidities. One specific example of this is imaging BM after radiation therapy. When the doctor attempts to assess the treatment, there is currently no reliable way to differentiate between recurrent tumor and radionecrosis. Because the radiation therapy plan hinges on this distinction, the inability to distinguish the two types of tissue prevents accurate clinical decisions. Clearly, there is an urgent need to develop a high-resolution MRI method to accurately image and differentiate these tumors and other tissue that is difficult to assess currently.

Technology Description

With this novel imaging method, signals from brain cells and fluid are selectively filtered, leaving only a signal of the BM cancer cells that results in a highly sensitive and specific imaging approach. Furthermore, this method is performed without the need for any contrast agent during the imaging process, further increasing the patient population who can utilize the imaging approach.

Technology Development Status

Preliminary testing has shown that the method is able to clearly delineate BM from the surrounding tissue, and can also differentiate recurrent tumor from radionecrosis. Additional testing is ongoing.

Intellectual Property Status

A patent application has been filed.

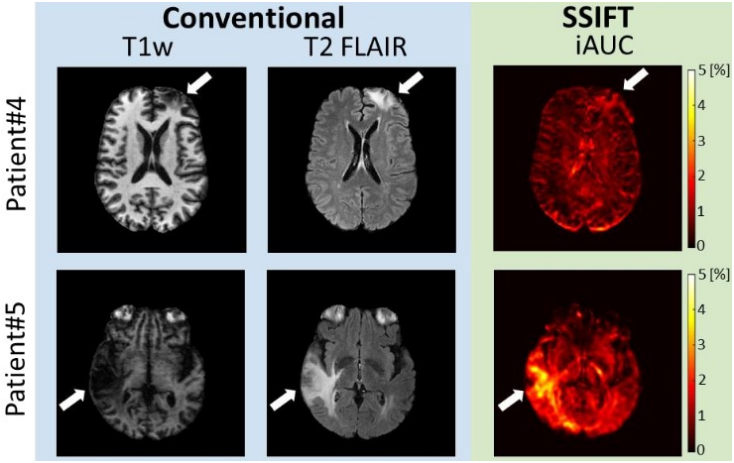

Figure 1: SSIFT correctly differentiates between radionecrosis in Patient 4 and recurrent tumor in Patient 5. This is incredibly difficult to do using conventional MRI T1w and T2 Flair.

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