The Development of EGFR-based Glioblastoma Targeting Imaging Agents.


Magnetic resonance imaging (MRI) is a popular medical imaging technique for solid tumors because of its non-invasive nature and high soft-tissue contrast. Contrast agents, such as iron oxide, are administered to enhance the MRI signal by increasing proton relaxation times. These agents accumulate at the tumor site due to the altered vessel architecture commonly observed in cancerous tissue. Currently, the standard therapy for glioblastoma multiforme (GBM), the most abundant and severe type of brain neoplasm, is surgical resection. Precise delineation of the tumor outline is therefore crucial for efficacious removal of the mass and is expected to reduce the probability of recurrence.

The epidermal growth factor receptor (EGFR) is overexpressed by gene amplification in half of GBM patients, with a mutant form of the receptor often being expressed. In particular, the highly invasive cells at the tumor edges display increased levels of receptors on their surface.

We propose to develop a nanoparticulate iron oxide contrast agent, which targets EGFR, and thus is anticipated to improve the visualization of tumor outlines in MR imaging. Furthermore, the small size of the nanoprobe may improve tissue penetration and allow for the detection of infiltrating cancer cells in the surrounding brain.