Imaging Sciences Pathway
Washington University in St. Louis

Imaging Science Seminar

MRI at the Intersection of Basic and Clinical Science: Studies of Placental Function and Radiated Brain

Joel R. Garbow
Biomedical MR Laboratory, Mallinckrodt Institute of Radiology
Washington University in St. Louis

Abstract: The placenta performs a wide range of physiological functions; insufficiencies in these functions may result in a variety of severe prenatal and postnatal syndromes with long-term negative impacts on human adult health. Recent advances in magnetic resonance imaging (MRI) studies of placental function, in both animal models and humans, have contributed significantly to our understanding of placental structure, blood flow, oxygenation status, and metabolic profile, and have provided important insights into pregnancy complications.

Delayed radiation injury, also known as radiation necrosis (RN), is a serious complication of radiation therapy, seen in up to 23% of patients, which can occur months to years after radiation. We have developed a mouse model of focal RN generated via stereotactic radiosurgery with the Leksell Gamma Knife®. This mouse model recapitulates all of the histologic features of RN observed in patients and can, thus, serve as a platform for a wide variety of studies aimed at better identifying RN and distinguishing it from recurrent tumor, as well as providing a test-bed for the development of new therapeutics and neuroprotectants.

Despite state-of- the-art treatment, overall outcome for patients with glioblastoma (GBM) remains poor. Recurrent tumor growth is highly infiltrative, invasive, and associated with poor outcomes. Late, radiation-induced alterations to the tumor microenvironment may contribute to recurrent GBM regrowth of more aggressive phenotypes and treatment resistance, with a corresponding decrease in patient survival. Based on our RN model, we have recently developed a novel, clinically relevant, tumor/irradiated-brain mouse model that provides a powerful platform for characterizing tumor growth and development, and imaging signatures of tumor regrowth, in previously irradiated brain. Our mouse model permits the investigation of the clinical impact of delayed radiation-modulated changes to the tumor microenvironment and the mechanisms associated with tumor regrowth and resistance to subsequent therapies.

This talk will provide an overview of recent developments in our characterization of both placental function and radiated brain.

Time: 8:40-9:30 a.m.
Date: Friday, October 20, 2017
Room: 0120 Green Hall

Washington University in St.Louis
School of Engineering & Applied Science

Washington University in St.Louis
Graduate School of Arts & Sciences

Washington University in St.Louis
School of Medicine