WAYNE STATE UNIVERSITY

The WSU Program for Traumatic Brain Injury Research

presents a Special Topic Seminar featuring

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Georgia Regents University, Augusta, Ga.

"Involvement of stem cells and changes on MRI following antiangiogenic treatments in animal models of glioma"

Monday April 14, 2014

12:00pm – 1:00 pm

Margherio's Family Conference Center
320 E. Canfield, Detroit, MI 48201

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Abstract:

Because of hypervascular nature of glioblastoma (GBM) and associated active angiogenesis, investigators have added anti-angiogenic treatment as an adjuvant to normalize blood vessels and control abnormal angiogenesis. Antiangiogenic therapy disturbs tumor vasculature, leading to marked hypoxia. In GBM, hypoxia leads to up-regulation of hypoxia inducible factor 1-alpha (HIF-1α). HIF-1α up-regulates SDF-1α, which in turn may recruit various pro-angiogenic bone marrow-derived cells. Any therapy that invites more endothelial progenitor cells (EPCs) might promote neovascularization and pro-growth, a paradoxical effect of anti-angiogenic therapy. Therefore, we hypothesize that anti-angiogenic treatment using VEGFR inhibitors would initiate the release of pro-angiogenic factors, causing migration and accumulation of EPCs or bone marrow progenitor cells (BMPCs) (different types of stem cells), and enhanced angiogenesis in refractory tumors. Protein array or western blot can be used to determine the expression of different pro-angiogenic factors.

Because of angiogenesis, vascular parameters will be altered and these changes can be determined by dynamic contrast enhanced MRI. Dynamic contrast enhanced MRI (DCE-MRI) can determine permeability transfer constant (Ktrans), backward transfer constant (kb), extravascular extracellular space volume (Ve) and distribution (tumor blood) volume (Vp), tumor volume, enhancement pattern, and diffusion parameters in the tumors under basal and treated conditions. The migration and incorporation of intravenously administered EPCs in tumors can be detected by SPECT using In-111 labeled cells and the long term incorporation of the administered cells can be detected by cellular MRI using magnetically labeled cells. Migration of endogenous bone marrow progenitor cells can be determined by optical imaging in chimeric animals carrying GFP+ cells.
Correlation of the accumulated administered stem cells with MRI findings and the expression of different angiogenic factors will help clinicians to modify treatment strategy when anti-angiogenic therapy is considered.