

AbstractID: 14633 Title: Imaging Tumor Vasculature and Angiogenesis: Biology, MR Imaging, and Anti-angiogenic Therapies

Tumor angiogenesis is the important biological process whereby new blood vessels are formed to supply nutrients and oxygen and to remove waste products for growing tumors. Angiogenesis plays key roles in forming and regulating the tumor micro-environment, enabling metastatic disease, and greatly affects the delivery and response of targeted therapeutic agents. Targeting the tumor vasculature may represent a promising strategy to inhibit tumor growth and progression. Thus, this key biological process is being vigorously studied with the goal of impacting human clinical care. Physical approaches to understanding tumor angiogenesis include magnetic resonance imaging (MRI), which through various dynamic techniques can assess blood flow and other bioanatomic parameters relevant to angiogenesis. These advanced imaging techniques can be used in both pre-clinical animal models as well as humans. Importantly, anti-angiogenic therapies include pharmacologic and biologic agents that target tumor vascular through various biomolecular mechanisms, and tumor response can be monitored using advanced MR imaging.

For the benefit of the medical physicist who may be involved with angiogenesis research using MRI, targeted biochemical agents, and/or ionizing radiation, this symposium will review the biology of tumor angiogenesis, advanced MR imaging techniques, and translational efforts, including clinical trials and angiogenesis research challenges.

Specific objectives of the symposium are to:

1. Provide a primer on the biology of tumor angiogenesis and the tumor microenvironment
2. Review the important role of angiogenesis for the formation of metastases
3. Discuss biological mechanisms for the interruption of angiogenesis that would lead to a therapeutic result
4. Describe pre-clinical and clinical magnetic resonance imaging techniques and applications for tumor vascular imaging
5. Review techniques and research challenges for quantitative MR imaging of angiogenesis, including national initiatives
6. Describe promising anti-angiogenic therapies with targeted biochemical agents and ionizing radiation
7. Describe angiogenesis clinical trials, challenges in translating angiogenesis research to the clinic, and roles for medical physicists in angiogenesis imaging and therapeutics.