

AbstractID: 14554 Title: Monitoring Cancer Treatment with Contrast-enhanced Ultrasound Imaging

There is growing interest in evaluating cancer therapies that target tumor vasculature. However, assessing these therapies has been difficult because the conventional approach of measuring tumor size does not indicate microvascular activity. Furthermore, cancer microvessels re-grow between treatments, requiring continual evaluation during the course of therapy.

The goal of our studies is to develop techniques that allow longitudinal imaging of tumor microvascular flow. Towards this goal, techniques that employ Doppler or grayscale ultrasound with microbubble contrast agent to visualize blood flow through microvessels will be presented. The metrics used for evaluating vascular changes induced by vascular targeting therapies will be reviewed and their efficacy demonstrated in mice tumors. The antivasular action (decrease in tumor microvascular flow) of three different treatments (combretastatin, ionizing radiation and sonication) will be discussed.

Before antivasular therapy, contrast agent perfusing vascular tumors is seen in the images as a uniform flush of color filling the entire lesion. After treatment, the images show that contrast medium does not enter several regions of the tumor, indicating that these parts of the tumor are now avascular. The decrease in area enhanced by the contrast agent and the rate of inflow of contrast agent in the image plane are useful endpoints for assessing cancer treatments affecting tumor microvascular flow.

Learning Objectives:

1. Understand the techniques of contrast-enhanced ultrasound imaging
2. Understand the issues related to microbubble disruption and ultrasound exposure
3. Understand the issues associated with the use of contrast-enhanced imaging for monitoring vascular targeted therapies