AbstractID: 3801 Title: Refill curve simulations of rabbit kidney and of liver with VX2 carcinoma

Purpose: A flow simulation model (Potdevin et al, 2004) has been adapted for use in vascular structures with varying transit characteristics. The highly structured nature of the kidney tissues were taken into account in the modified simulations and the resulting contrast transit modeled for the case of in-plane destruction followed by imaging of contrast refill. In the liver, the systemic and portal systems are being modeled as well as potential RE uptake of contrast agent and pooling due to leakage of cancerous vasculature.

Methods and Materials: For initial comparisons, real-time refill curves were acquired from rabbit kidneys using the contrast agent Definity (Bristol-Myers Squibb Company,New York,NY). A similar study was then developed for rabbit livers in which VX2 carcinoma was implanted for a varying time of 7 to 22 days. Two tissue classification images were generated: one using the exponential fit method with a Bayesian discrimination, another using the simulated refill curves and a simple RMS error computation.

Results: These initial investigations showed a good correlation between identified medullary and cortical tissues and automated segmentation based on simulations results. Furthermore, the simulations helped reveal information in the refill curves beyond the time constant of a simple exponential fit. Initial analysis of liver images shows differences in transit time behavior at the location of implanted tumors.

Conclusion: The tissue segmentation using either technique matches what is expected of a kidney, with a better discrimination between the medulla and the cortex observed when using the simulations that account for transit characteristics of vascular structures.

We hope to determine whether normal and abnormal liver tissues will be classified using these techniques. The best results were obtained in later phase cancer.