AbstractID: 5862 Title: High Frequency Ultrasound To Monitor Murine Orthotopic Bladder Cancer Model : An Alternative To Magnetic Resonance Imaging

Purpose: The study of human bladder cancer is often performed using subcutaneous xenograft models. But, a more relevant model is the orthotopic approach where tumors are grown in their native host environment. Studying the growth kinetics of these intraabdominal tumors is much more difficult as they are not accessible for caliper measurements. The purpose of this study is to demonstrate the feasibility of high frequency ultrasound (US) imaging as an efficient and time saving alternative to magnetic resonance (MR) in longitudinal monitoring of an orthotopic bladder cancer model.

Method and Materials: Eleven athymic nude mice underwent orthotopic injection of 10^6 253-J B-V cells into their bladder walls. MR imaging was performed weekly on a 4.7 T small animal MR scanner (Bruker Biospin). Axial T1 weighted spin-echo and T2 weighted fast spin-echo acquisitions (TR: 700ms,TE: 8.5ms,FOV: 4.0cm x 3.0cm,Matrix:256 x 192,duration:45-50 minutes) were performed. 3D US data (step size:0.25mm, range:12mm, duration:5-10 minutes) was collected using a Vevo 660 (Visualsonics) system operating at 40 MHz. Tumor size at necropsy was measured with a caliper, and volume calculated with the formula $\frac{\pi}{6}(a \times b \times c)$, where a, b, c are the tumor dimensions.

Results: The MR volume measurements were made from the fused T1 and T2 images, as done in previous experiments. Two independent observers made the MR and US measurements. There was very good correlation between the MR and 3D US volume measurements with Pearson's correlation coefficient of 0.987 ($p<0.05$). The correlation between the US volume and the specimen measurements was 0.793 ($p<0.05$).

Conclusion: High frequency ultrasound can effectively monitor murine intraabdominal tumor growth. It is a cheaper and faster modality than CT and MR. Extensions of this technology in the future could include orthotopic injections under US guidance, Power Doppler and harmonic imaging with microbubbles for evaluation of tumor vascularity