Purpose: An increased 3H-docetaxel concentration in the prostate tumor in the group of mice treated with pulsed focused ultrasound (PFUS) versus the control group in vivo was observed in our previous study. The purpose of this study is to investigate if the increased uptake of docetaxel by PFUS will improve tumor growth delay in vivo.

Methods: LNCaP cells were grown in the prostates of nude mice. The tumor growth was monitored by MRI. Pulsed FUS treatment was performed using an ExAblate 2000 system with a 1.5 T GE MR Scanner. When the tumor volume reached 45 ± 8.5 mm3 on MRI, mice were randomly assigned to 4 groups (n=8): (1) PFUS+docetaxel, (2) PFUS only, (3) docetacel only, and (4) control. For groups 1 and 2, each mouse was treated with PFUS under general anesthesia for 2 fractions (one treatment per week for two consecutive weeks). For groups 1 and 3, each animal received docetaxel by tail vein injection at 10 mg/kg for 2 fractions (one injection per week for two consecutive weeks). For group 1 the docetaxel was injected immediately after the PFUS treatment. For the control group, a sham FUS treatment was given. Animals were allowed to survive for 4 weeks. The tumor volumes were measured by MRI at 1 and 4 weeks after the treatment.

Results: The mean tumor volume was 36%, 78% and 89% smaller for PFUS alone, docetaxel alone and the combination of PFUS+docetaxel compared with the control group. The combination of PFUS and docetaxel showed the best tumor control; the average tumor volume was smaller than that prior to the treatment both 1 week and 4 weeks after the combined PFUS+docetaxel treatment.

Conclusions: Our in vivo results indicated that PFUS enhanced the therapeutic effect of docetaxel on prostate cancer.