Purpose: We demonstrated a significant increase of 3H-docetaxel in the prostate tumor treated with pulsed focused ultrasound (pFUS). This study is to study the efficacy of the increased uptake of docetaxel (doc) by pFUS in prostate tumor growth delay in vivo in combination with radiotherapy (RT).

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 1.5 T GE MR Scanner. When the tumor volume reached 36 ± 5.9 mm3, mice were randomly divided into 7 groups (n=5): (1) pFUS only; (2) RT only; (3) doc only; (4) doc + pFUS; (5) doc + RT; (6) doc + pFUS + RT; and (7) control. Animals involved with pFUS were treated with 1 MHz; 5W acoustic power for 60 sec with 50% duty cycle per sonication. Animals treated with doc received a dose of 5 mg/kg by tail vein injection. The doc injection was performed before the pFUS and RT treatments. For the RT treatment, animals were irradiated on a Cesium 137 irradiator with a 2 Gy dose. Animals were allowed to survive for 4 weeks post-treatment. Tumor volumes were measured by MRI at 1 and 4 weeks post-treatment.

Results: Results showed an average reduction in the tumor volume by 59% for animals treated with doc only; 37% with RT only; 54% with pFUS+doc; 65.8% with RT+doc, and 72% with pFUS + doc + RT, respectively, compared with that in the control group.

Conclusions: Triple combination therapies of doc, pFUS and RT may have a potential for the treatment of prostate cancer. Due to the large variations in tumor growth between individual animals more experiments are needed for better statistics and to find optimal treatment doses, parameters and fractionation schemes.