This talk presents the results of an animal study on the effectiveness of the increased uptake of docetaxel by pulsed focused ultrasound (pFUS) in combination with radiation (RT) in prostate tumor control in vivo. The integrated pFUS system with the MR scanner used for the study is described together with the pFUS parameters, which were optimized for the animal experiment. The enhancement of both [3H]-docetaxel and doxorubicin concentration in tumors treated with pFUS have been evaluated quantitatively with an orthotopic animal prostate tumor model. The study results show that both chemotherapeutic agents increase significantly in pFUS treated tumors. Tumor-bearing mice receiving triple combination therapy of docetaxel + pFUS + RT exhibit highest tumor growth delay compared to all other treatment groups. In addition, tumors treated with pFUS alone also demonstrate the non-thermal therapeutic effects of pFUS. The cell killing mechanisms of non-thermal pFUS, the clinical impact of pFUS + RT, the potential use of nanodroplet-encapsulated chemotherapeutic agents + pFUS and thermal ablation + RT for treatment of prostate cancer are discussed.