Purpose:To date, detailed studies assessing histological changes in prostate tumors upon treatment with non-thermal pulsed focused ultrasound (pFUS) are scarce in the literature. The purpose of our study was to evaluate the effect of non-thermal pFUS on the morphology of mouse prostate tumor tissues by light microscopy.

Methods:The orthotopic implantation of 106 LNCaP cancer cells in nude male mice resulted in prostate tumor growth that was monitored by MRI. When tumors reached approximately 100mm3 in volume, the animals were treated with non-thermal pFUS using the following parameters: 1MHz; 25W acoustic power; 5Hz frequency and 0.1duty cycle for 60sec with temperature kept below 42 degree C (InSightec ExAblate 2000 with a 1.5T GE MR scanner). On average 6-8 sonications were used to cover the tumor volume.Animals were sacrificed immediately after pFUS treatment and tumors were fixed in formalin, embedded in paraffin and 5 microns thick tissue sections were stained with H&E. Tumors from untreated animals were used as controls.

Results:Morphological analysis of prostate tumor tissues revealed poorly differentiated cancers. The main histological findings in both pFUS-treated and untreated tumors were coagulation necrosis and hemorrhage. The extravasation of blood cells, hemorrhage, was predominant in the periphery, while necrosis was present in the central zones of the tumor, in both pFUS-treated and control, untreated prostate tumors. However, the main distinction between the treated and untreated tumors was the increased hemorrhage in the treated group. This finding is consistent with our previous studies.

Conclusions:Our results indicated that non-thermal pFUS increased extravasation of blood cells in prostate tumors compared to controls. We are performing more detailed histological and immunohistological analyses at different time points post pFUS treatment to look for markers of apoptosis in prostate tumors.