

## **New MR Activatable Nanoprobe for the Multiparametric Imaging and Treatment of Prostate Cancer**

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An innovative activatable MRI probe is designed for the image-guided prostate cancer (PCa) diagnosis and monitoring of the treatment. This MRI probe is formulated in such a way that the T1 magnetic relaxation (spin-spin) will be activated only after internalization into cancer cells and a bright contrast is expected. In addition, combination therapy approach using doxorubicin and PARP-1 inhibitor, Olaparib, will be used for the effective treatment of prostate cancers. The PSMA receptor over-expressed PCa cells will be selectively targeted by conjugating A10 PSMA aptamer in order to reduce any off-target side effects. We will be using a robust Gd-DTPA encapsulating iron oxide nanoparticles as an activatable T1 MRI contrast agent, which will be activated and provide bright contrast once inside the tumor (1-3). This activatable MRI probe will be used to carry doxorubicin and Olaparib specifically to the PCa cells by conjugating A10 PSMA aptamer on the nanoprobe's surface, minimizing off-target delivery. Towards this end, Gd-DTPA-encapsulating iron oxide nanoparticle (IONP) will be formulated. We hypothesized that the T1 relaxation of Gd-DTPA is quenched upon encapsulation into the superparamagnetic IONPs. The T1 MR activation will be detected using bench-top magnetic relaxometer (0.47T, Bruker) in response to the oxidative stress and acidic pH inside the tumor microenvironment of prostate cancer.

### References:

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- 3)Kaittanis C, Santra, S. et. al., *Nat. Commune*. 2014, 5, 3384-3395.