

AbstractID:9639Title :MR Guided Focused Ultrasound (MRgFU) for Treatment of Prostate Cancer: Feasibility Study of Increasing Intratumoral Uptake of Docetaxel in vivo

Purpose: Docetaxel has been used for the treatment of advanced hormone refractory prostate cancer and is also a potent radio-sensitizer. Our goal is to determine if pulsed MR guided focused ultrasound (MRgFU) will enhance the intratumoral concentration of docetaxel.

Method and Materials: This study was performed on an InSightec ExAblate 2000 HIFU system together with a 1.5T GEMR scanner. Human prostate cancer cells LNC aP10⁵, were grown orthotopically in the prostate of nude mice. Radioactive tritiated Docetaxel (³H-Docetaxel) was used to determine the uptake enhancement into prostate tumor. Fifteen mice were randomly divided into 3 groups (Group 1, MRgFU + ³H-Docetaxel; Group 2, ³H-Docetaxel only; Group 3, control). The tumors (163 ± 9.0 mm³) were treated using pulsed ultrasound with a acoustic power of 4W, pulse width 100 msec and 300 pulses in one sonication. The focal peak was set within the target using MR guidance. Eight to ten sonications were used to cover the whole tumor. Immediately after the treatment ³H-Docetaxel, dissolved in PBS, was given by tail vein injection at doses of 15 mg/kg and a tracer amount of 1.25 uCi/25g. After 0.5 hr, the animals were euthanized and tumors removed. Tumor tissue was digested in solubilizing reagent for 2hr at 55°C and decolorized by hydrogen peroxide. The digested samples were added to liquid scintillation cocktail and counted using a liquid scintillator.

Results: Our preliminary results showed that the animals tolerated well the MRgFU treatment. The average radioactive pm counts in the MRgFU treated group is 2 folds more than that without the HIFU treatment. The variation is large between individual animals and further experiments are being conducted to reduce the experimental uncertainty.

Conclusions: MRgFU may have a great potential as a safe, noninvasive treatment modality for the enhancement of docetaxel for prostate cancer therapy.