MedicalXpress

Using microbubbles to improve cancer therapy

April 24 2013

Microbubbles decrease the time and acoustic power of ultrasound required to heat and destroy an embedded target, finds research in BioMed Central's open access journal *Journal of Therapeutic Ultrasound*. If these results can be replicated in the clinic, microbubbles could improve the efficiency of high intensity ultrasound treatment of solid tumors.

High intensity ultrasound is already used to treat solid tumors. Ultrasound can be focused through soft tissue and, because it does not require probes or surgery, is non-invasive. However if the tumor is behind the ribcage or skull, the bone absorbs some of the ultrasound. Consequently the length of treatment needs to be increased, plus there is a potential for heat damage to the bone.

In order to improve ultrasound therapy, especially in these difficult to treat cases, a team from Boston University has developed phase shift nanoemulsions (PSNE), which produce tiny microbubbles when blasted with high intensity ultrasound. Microbubbles smaller than 200nm passively accumulate in tumors and this study shows that microbubbles of this size can amplify the effects of ultrasound in hydrogels designed to mimic solid tumors inside the body.

Holes formed in a predictable manner and with a predictable shape which altered with acoustic intensity. The acoustic intensity and exposure time required for thermal destruction of tumor tissue were both reduced by more than half, compared to ultrasound without

microbubbles. The lower power levels and time needed to destroy a target in the presence of microbubbles could potentially improve cancer therapy, especially in hard to reach areas.

The first stage in any new treatment is to show safety and efficacy. Prof Tyrone Porter, who led this study explained, "We used PSNE of phospholipid coated perfluorcarbon which have no known toxicity and have already be shown to be safe clinically. Our technique pushes forward the possible applications of ultrasound therapy in treating solid tumors."

Open access publisher BioMed Central is proud to announce the launch of *Journal of Therapeutic Ultrasound* in partnership with the Focused Ultrasound Foundation and the International Society for Therapeutic Ultrasound.

"Focused ultrasound technology has enormous potential to improve the quality of lives for millions around the world," noted Neal F. Kassell, M.D., Chairman and Founder of the Focused Ultrasound Foundation. "The research reported in the *Journal of Therapeutic Ultrasound* will be central to advancing the field and will help accelerate the progress of focused ultrasound towards clinical adoption."

More information: The impact of vaporized nanoemulsions on ultrasound-mediated ablation Peng Zhang, Jonathan A Kopechek and Tyrone M Porter Journal of Therapeutic Ultrasound 1013 1:2 doi:10.1186/2050-5736-1-2

Provided by BioMed Central