The Use of High Intensity Focused Ultrasound to Induce Tissue Ablation

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Although most physics departments in the US don’t have much research ongoing in acoustics, [BYU a notable exception] there are a lot of important problems in which a physics background is practically essential in order to develop a rigorous approach to the solution of these problems. This is especially true in the area of Medical Ultrasound, a research speciality that provides great benefit to the broad health community. I shall address a particular aspect of medical ultrasound research, namely non-invasive, (ultrasound) image-guided therapy. When high intensity focused ultrasound is directed toward a tissue, such as a tumor, mechanical and thermal effects can be generated that totally emulsify the tissue in the focal region. The mechanism for this ablation may either be cavitation, in which gas–filled cavities can be made to violently grow and collapse; or superheat boiling, in which the explosive growth of a superheated region occurs. This presentation will describe the relative effectiveness of these two methodologies to ablate a region of interest, such as benign and malignant tumors. The development of clinical applications of this technology has high promise for radically changing the current approach to tumor therapy.

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