

COLLEGE OF ENGINEERING
Department of Biomedical Engineering

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 3, 2008

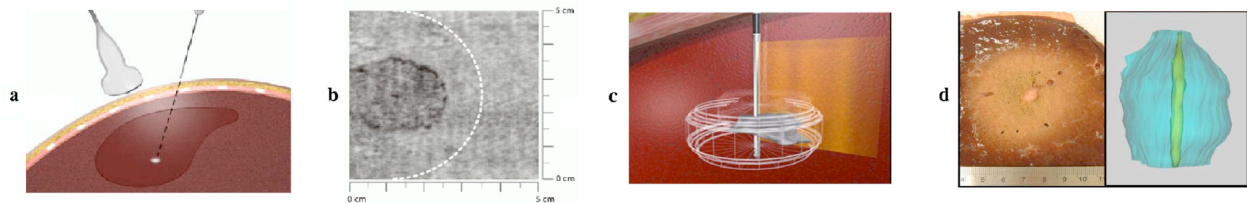
The Department of Biomedical Engineering is pleased to offer the following research project for the summer of 2008. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and if possible, develop a timetable for the twelve-week research period.

Ultrasound Image Guidance for Thermal Ablation

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The Biomedical Acoustics Laboratory at the Department of Bioengineering, University of Cincinnati, is devoted to research on use of sound for medical imaging, therapy, and monitoring of therapeutic procedures. A major focus is development of ultrasound-based devices and techniques for treatment of cancer, which will improve upon existing methods such as radiofrequency ablation. We currently are collaborating with a medical device company on development and testing of novel miniaturized ultrasound array devices, which can be used to image the target region of tissue, selectively kill targeted tissue by thermal ablation, and monitor the ultrasound therapy in real time to ensure complete, specific treatment.



Concept for interstitial ultrasound imaging and therapy system. (a) An ultrasound probe, capable of imaging and therapy using the same array elements, is inserted into target tissue, shown here with a percutaneous approach. (b) B-scan imaging by the interstitial probe facilitates user treatment planning, including specification of the volume of tissue to be ablated. (c) Rotation of the probe allows imaging and ablation to be performed at multiple angles to cover a large volume. (d) Representative ablation results from an *in vitro* interstitial treatment on bovine liver tissue. Left: cross section of thermal lesion volume. Right: 3D reconstruction of lesion from multiple tissue slices (blue), showing probe track (green).

In this summer project, the student will work with novel ultrasound imaging and therapy methods using a unique image-guided ultrasound ablation system. The student will design and perform experiments testing ultrasound ablation of cancer tissue, as well as ultrasound image guidance of other thermal therapy methods. Analytic work will include evaluation of tissue ablation histology and correlation of tissue effects with ultrasound image data.