Biomedical Engineering
College of Engineering

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

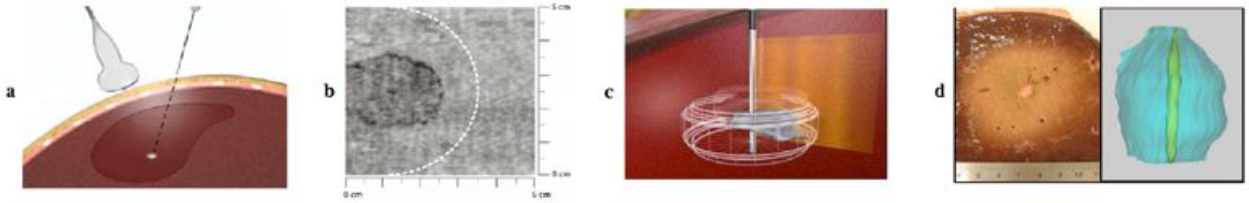
APLICATION DEADLINE: March 1, 2006

The Department of Biomedical Engineering is pleased to offer the following research project for the summer of 2006. 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.

Image-Guided Ultrasound Ablation

Professor Douglas T. Mast
Department of Biomedical Engineering
University of Cincinnati
6168 Medical Science Building
ML 0586
Cincinnati, Ohio 45267-0586
Tel. (513)558-5609
Fax. (513)558-5958
Email: doug.mast@uc.edu

The Biomedical Acoustics Laboratory at the Department of Bioengineering, University of Cincinnati, is a new laboratory 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. In one approach under investigation, the same ultrasound array is 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 a novel image-guided ultrasound ablation system to perform experimental imaging and thermal ablation treatment on *ex vivo* tissue. The student will help to develop and test methods for monitoring thermal treatment using ultrasound, such as measurement of tissue temperature from ultrasound echoes.