

Abstracts of Funded National Institutes of Health Grants

The following abstracts of diagnostic radiology research and training grants funded by the National Institutes of Health (NIH) were awarded to principal investigators (PIs) whose primary appointments are in medical school departments of radiology. These abstracts are listed on the NIH Web page (<http://www-commons.cit.nih.gov/crispl>) and are printed here verbatim.

The grant identification number (eg, 1RO1AI12345-01) contains a three-digit activity code (in the previous example, RO1) that identifies a specific category of extramural activity. All current NIH activity code titles and definitions can be obtained at the NIH Web page <http://silk.nih.gov/silk/brownbooks/actcod>.

IRG (Internal Review Group) refers to the study section that reviewed the application. ICD (Institute, Center, Division) refers to the NIH funding source.

The abstracts of the funded grants are printed alphabetically by author according to the funding institute or center.

National Institute Of Biomedical Imaging And Bioengineering

FEASIBILITY OF CT MAMMOGRAPHY USING FLAT PANEL DETECTORS

PI Name: Glick, Stephen J.

Abstract: Detection of lesions in planar mammogram is a different task, predominantly due to the masking effect of superimposed parenchymal breast patterns. Tomographic imaging can provide the radiologist with image slices through the three dimensional (D.) breast possibly reducing this masking effect. The goal of the proposed research is to investigate the feasibility of using an amorphous silicon, flat-panel image for volumetric compound tomography (CT) of the breast. Our hypothesis is that dedicated CT mammography using state-of-the-art digital detectors can provide high quality images and three dimensional visualization of breast tissue, with a radiation dose approximately equivalent to that given in screening mammography. We propose to investigate the characteristics of such a system by integrating a commercial prototype, flat panel image, with an optical bench plate containing precision rotational and transnational stages. This would allow the acquisition of projection imaged by rotating phantoms in angular steps over 360 degrees. We also propose to theoretically investigate optional CT mammography system configurations using mathematical models of single and noise propagation through the flat panel

detector, and realistic models of the lesion detection task in breast imaging. Design and acquisition parameters such as tomographic sampling requirements, imaging geometry, x-ray converter characteristics, and x-ray energy spectrum incident on the braes will be investigated. Previous reports have suggested great potential for tomographic breast imaging. To evaluate improvements in tomographic mammography, if any, we plan to compare lesion detection accuracy using human observer studies and stimulated images generated with planar mammography, tomosynthesis, and CT . An important component of these studies will be the use of realistic models for lesions and breast tissue. These models will be determined based on the statistical characterization of surgically removed lesion and breast tissue specimens.

Thesaurus Terms: breast neoplasm, computed axial tomography, mammography, radiation detector, mathematical model, model design/development phantom model

Institution:	Univ Of Massachusetts Med Sch Worcester Office Of Research Funding Worcester, MA 01655
Fiscal Year:	2004
Department:	Nuclear Medicine
Project Start:	01-Sep-2001
Project End:	31-Aug-2006
ICD:	National Institute Of Biomedical Imaging And Bioengineering
IRG:	DMG

GRADUATE TRAINING IN BIOMEDICAL IMAGING AND SPECTROSCOPY**Grant Number:** 5T32EB000809-02**PI Name:** Gmitro, Arthur F.

Abstract: Description (provided by applicant): A multidisciplinary predoctoral training program in biomedical imaging and spectroscopy (BMIS) is proposed. The BMIS program will provide a unique educational experience based on a solid fundamental training in the mathematical and engineering principles of image science combined with a focus on and exposure to a broad range of biological applications. This program will draw on the existing strength of faculty and research programs in biomedical imaging and spectroscopy at the University of Arizona. Areas of emphasis include magnetic resonance imaging, magnetic resonance spectroscopy, gamma-ray imaging, x-ray imaging, optical spectroscopy, optical imaging, image processing, and image quality assessment. A specialized curriculum is proposed for students during the first two years that will involve courses in applied physiology, biology, the mathematical principles of image science, as well as the physics and engineering principles at the foundation of modern imaging and spectroscopic systems. These courses will provide students with the knowledge base necessary to carry out advanced research on the development and utilization of advanced biomedical imaging and spectroscopic technologies. In addition to the course work, students enrolled in the program will be required to complete semester-long rotations in three different research laboratories prior to selecting a laboratory and mentor for their Ph.D. dissertation work. These rotations will provide students with exposure to multiple disciplines and research environments and will help create and foster increased collaboration among researchers at the University of Arizona. Students will be recruited into BMIS through existing graduate-level education programs at the University of Arizona. The primary conduits for recruiting students will be through the graduate programs in Optical Sciences, Biomedical Engineering, and Physiological Sciences, although outstanding students from other programs such as Electrical and Computer Engineering, Physics, Chemistry, Cancer Biology, and/or Biochemistry will be eligible to participate. Program funds will be used to fully support students during their first three years. Third year students will be required to serve as student mentors to individuals entering the program.

Thesaurus Terms: There are no thesaurus terms on file for this project.

Institution: University Of Arizona
P O Box 3308
Tucson, AZ 857223308

Fiscal Year: 2004

Department: Radiology

Project Start: 01-May-2003

Project End: 30-Apr-2008

ICD: National Institute Of Biomedical
Imaging And Bioengineering

IRG: ZGM1

RAPID MRI FOR EVALUATION OF OSTEOARTHRITIS**Grant Number:** 1R01EB002524-01**PI Name:** Gold, Garry E.

Abstract: Description (provided by applicant): The goal of this proposal is to develop and validate a comprehensive examination of osteoarthritis. Osteoarthritis is a leading cause of chronic disability on the United States, affecting approximately 10% of those over 30 years old. Over the past 20 years, study of osteoarthritis with imaging has been primarily limited to evaluation with radiography. Magnetic Resonance Imaging (MRI), with its multi-planar capability and multiple contrast mechanisms, has emerged as the most promising non-invasive method to study osteoarthritis. The examination of osteoarthritis includes easement of articular cartilage integrity as well as other important structures. Osteoarthritis affects many joints, but is most evident in the knee. MRI has the potential to non-invasively evaluate both cartilage morphology and physiology, which is crucial to follow the effects of new osteoarthritis therapies. Current methods, however, suffer from long scan times that limit the amount of information that can be acquired in a reasonable examination time. As a result, there is a gap between what is feasible and what is currently applied in osteoarthritis studies. Our goal in this proposal is to eliminate the gap between the potential of MRI and current practice in evaluation of articular cartilage in osteoarthritis. Our group has pioneered many of the components that will be useful in the comprehensive evaluation of cartilage morphology and physiology in osteoarthritis, including rapid imaging of cartilage structure and rapid relaxation time measurements. In this proposal we will integrate those components and validate them into a comprehensive thirty-minute knee MRI exam for osteoarthritis progression.

Thesaurus Terms: bone imaging/visualization/scanning, magnetic resonance imaging, osteoarthritis, technology/technique development articular cartilage, knee bioimaging/biomedical imaging, clinical research, human subject

Institution: Stanford University
Stanford, CA 94305

Fiscal Year: 2003

Department: Radiology

Project Start: 20-Sep-2003

Project End: 31-Jul-2008

ICD: National Institute Of Biomedical
Imaging And Bioengineering

IRG: ZRG1

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