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13. ABSTRACT (Maximum 200)  Our training program in the detection and treatment of breast cancer has provided an excellent training opportunity to those interested in pursuing research careers in this interdisciplinary area. We have structured our program so that each of the four predoctoral trainees were assigned dual advisors. Each trainee was supervised by a well trained basic scientists as well as a clinician. In addition, each trainee attended weekly journal club meetings and monthly seminars. The field of research encompassed a wide variety of disciplines including Genetics, Biophysics, Biochemistry, Physiology, Tumor Biology, Electrical Engineering, and Computer Science as well as many clinical fields (including Surgery, Radiology, Oncology, Radiation Therapy).  The University of Pennsylvania has developed a unique broadly based interdisciplinary program of graduate education aimed at applying physical principles to the clinical problems inherent in the detection and treatment of breast cancer. During the past year our main research effort was aimed at improving the detection and treatment of breast cancer. This effort involved many aspects of detection both by imaging breast cancers as well as genetic screening. We began the development of improved treatment protocols based on increased knowledge of the metabolism of breast disease.				
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Date

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## INTRODUCTION

The training program in Breast Cancer Detection and Treatment has provided excellent training opportunities in basic and clinical research dealing with breast cancer. This program established many working relationships in the technical developments and clinical problems involved in breast cancer.

Under the dual mentorship system the training program is designed so that each trainee has a clinician and a basic scientist as their advisors. This system is providing an unique opportunity for the trainees on this program. Each trainee is benefiting enormously from complementary nature of expertise of their advisors. They are being trained in early detection methods of breast cancer, learning the underlying details of the disease and the therapies for breast cancer. Due to the clinical advisor trainees are able to gain access to the clinical research and understand clinical aspects of breast cancer detection and therapeutic approaches. The extent of clinical research performed by trainees is variable mostly dependent on the specialization (in breast cancer research) in which they are being trained.

The training faculty have been selected in terms of their specialization (basic scientist/clinician) to fill either one or both of these roles. Our program builds on existing collaborations between the basic scientist and clinicians working in the area of breast cancer.

Our main goal was aimed at improving and developing the detection and treatment methods of breast cancer. These efforts have involved many aspects of detection both by imaging breast cancers as well as genetic screening.

## BODY

### Trainee 1 - Jeffrey Souris

Jeff Souris is a graduate student in the Structural Biology and Molecular Biophysics Graduate Group. Jeff completed his second year in the training program on August 31, 1996 and was reappointed for a third year. During the year, Mr. Souris has alternated lab rotations between his two advisors, Drs Britton Chance and Mitchell Schnall. Dr. Schnall is both a skilled clinician and researcher. His expertise includes the development of NMR techniques for diagnosing breast and prostate cancer. Jeff's training enabled him to learn a technique in photon diffusion imaging. Photon Diffusion Imaging holds great promise as a new modality in the early detection of breast cancer, without the hazards associated with x-rays. For Photon Diffusion Imaging to be clinically useful, several issues must first be addressed. These include further refinement of the technique, additional empirical control studies, and evaluation of its clinical relevance with respect to other imaging modalities. In working with his clinical advisor he has learned about breast cancer, currently available diagnostic tools and their advantages and drawbacks for early detection of breast disease. Jeff presented his work at SPIE's 1997 International Symposium on Lasers and Applications and Biomedical Optics in California, February 9 to 14, 1997. Jeff has successfully completed all his course work for the program and is working on his training

### Trainee 2 - Donald Li

Donald Li is a graduate student in the Structural Biology and Molecular Biophysics Graduate Group. Donald completed his second year in the training program on July 31, 1996 and was reappointed for a third year. Donald is being trained in the clinical assessment of tumor detection using contrast agents. His clinical advisor is Barbara Fowble, MD, who is a radiation oncologist who primarily treats breast cancer in patients. Having a clinical advisor enables him to obtain human subjects needed for his research. It also helps him in correlating the clinical research with the patient history. Donald's work was presented at the 4th Annual Society of Magnetic Resonance Meeting held in April, 1996 and at the Annual Biochemistry and Biophysics Retreat in June, 1996.

### Trainee 3 - Enn-Ling Chen

Enn-Ling Chen is a graduate student in the Structural Biology and Molecular Biophysics Graduate Group. Enn-Ling is at the dissertation level of her studies. She no longer attends regular classes. All her training in research was spent on experiments and writing her thesis. Enn-ling will probably finish during the year and a new student will be signed on. Enn-ling's advisor is Gilles McKenna, MD/PhD. Dr. McKenna is chairman of the Department of Radiation Oncology and his interests are in the identification of molecular and genetic markers of radio resistance and radio sensitivity in tumors.

### Trainee 4 - Erik Insko, MD/PhD

Erik Insko completed his training on May 31, 1996. He began his residency program at Albert Einstein Hospital in Philadelphia, Pennsylvania for internal medicine. Erik graduated from medical school and defended his thesis project on "Optimized High Resolution Sodium -23 and 1-H MRI" during this year. Erik interfaced with the clinicians of the Radiology Department on diagnosis and evaluation of breast cancer through magnetic resonance imaging (MRI). Recent studies have indicated that Magnetic Resonance Imaging (MRI) may provide an important new tool for the diagnosis and evaluation of breast cancer. In collaboration with the Hospital of the University of Pennsylvania, He has constructed the second generation of a local gradient set which meets the requirements of such imaging. The second generation gradient design has been modified to be 20% stronger than the original design with the same high degree of homogeneity and improved acoustic noise reduction capabilities. In addition, the materials used to construct the gradients will help eliminate prior problems with heating of the local gradient set. Erik's advisors are John S.

Leigh, Ph.D. and Susan Orel, MD. Dr. Orel's interests lies with mammography and MRI techniques for the detection of breast cancer. In addition to the weekly meetings and seminars held by the other departments in the medical center, Erik presented his work at the Third Annual Scientific Meeting of the Society of Magnetic Resonance in Nice, France.

#### Trainee 5 - Holly Kurzwa

Holly Kurzawa was appointed on June 1, 1996. Holly is a student in the Cell and Molecular Biology Graduate Group. Holly attended the 4th Annual Retreat sponsored by the Institute for Human Gene Therapy. Her advisors are Anne Kennedy, D.Sc., who is the program leader of the Cancer Prevention Program at the Cancer Center and Barbara Weber, M.D., Ph.D. who specializes in breast cancer tumor markers. Holly spent the summer studying in the lab of Dr. William Lee, Associate Professor in the Department of Medicine, Division of Hematology/Oncology. Part of her training includes attending a seminar series in the Department of Medicine, Division of Hematology/Oncology.

All trainees are required to attend The Women's Health Research monthly seminar series called FOCUS dealing with issues in women's health.

The activities undertaken by this program to disseminate the technological developments include brochures describing the program, newsletters describing the research, publications in scientific journals, seminar presentations, and travel to and presentations at scientific meetings.

Our external advisor is Joann S. Ingwall, Ph.D. She is professor of Medicine at Harvard Medical School. Dr. Ingwall's responsibilities focus on giving advise and guidance to the Director of the Training Program. She reviews the progress of all present trainees and makes recommendations where needed.

We have found that this training program is successfully producing scientists with enormous clinical knowledge on breast cancer detection and therapy. In the future, we would like to expand this program to accommodate more trainees.

We actively recruited minority individuals and women into the training program. We recruited two women and two men in the program and we currently have two minority trainees. We plan to continue to actively recruit qualified minority candidates through the following mechanism.

1) Sending information and brochures about the program to the following:

Medical and Engineering Schools with large minority populations,

Individuals who are resource persons in the University of Pennsylvania's Medical School, Biomedical Graduate Studies Office, and Engineering School, in order to obtain referrals of interested candidates and to assure that the training program is advertised by these office in their minority outreach efforts. These contact people advertise information about the program at their institutions and encourage potential candidates to write a letter of inquiry. We then obtain names of potentially eligible minority candidates, by sending letters to these candidates and inviting them to submit applications and visit the facility and talk with faculty members about the research program available.

2) Announcements of scientific workshops, seminars and training sessions, as well as the program's newsletters, are sent to the contact lists compiled. We encourage attendance of interested minority candidates to give them a chance to interact with the training faculty in an informal manner and learn "first-hand" about the research opportunities available.

3) All members of the Training Faculty advertise the program through personal contact at scientific meetings.

The list of trainees supported this year include their period of appointment and their basic scientist and clinical advisors :

<b><u>Trainees</u></b>	<b><u>Period of Appt.</u></b>	<b><u>Advisors</u></b>
Jeff Souris	9/1/95 - 8/31/96	Britton Chance, Ph.D. Mitchell Schnall, MD/PhD
Donald Li	8/1/95 - 7/31/96	Robert Lenkinski, Ph.D. Barbara Fowble, MD
Enn-Ling Chen	9/1/95 - 8/31/96	John S. Leigh, Ph.D. Gilles McKenna, MD/Ph.D.
Erik Insko	6/1/95 - 5/31/96	John S. Leigh, Ph.D. Susan Orel, MD
Holly Kurzwa	6/1/96-5/31/97	Anne Kennedy, D.Sc. Barbara L. Weber, MD/Ph.D.

## ABSTRACTS

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