AAPM Medical Physics Tutorial Session 1

Saturday, Nov. 25, 12:00 PM - 2:00 PM Room: E351

**LEARNING OBJECTIVES**

1) Present a coherent set of talks covering major women's imaging practices and technology with a look both at current practices as well as state of the art. 2) Present the information in a forum that includes a diverse audience of students, physicians, physicists and other imaging professionals. 3) Eventually translate this information if appropriate to enduring materials such as those found in the RSNA Radiographics journal under the Physics Tutorial series.

**ABSTRACT**

Digital Breast Tomosynthesis (DBT) is rapidly becoming the standard of care for breast cancer screening and diagnosis. DBT is a form of computed tomography, in which a limited set of projection images are acquired over a small angular range and reconstructed into tomographic data. It is equally valid to treat DBT as the digital equivalent of classical tomography. DBT shares many common features with classical tomography, including the radiographic appearance, dose, and image quality considerations.

In this lecture, we will contrast DBT to projection radiography, linear tomography, and CT in order to gain a better understanding of DBT as it is practiced today, and forecast how it might evolve in the future.

**Active Handout:** Andrew D. A. Maidment


**LEARNING OBJECTIVES**

1) Understand the fundamental principles behind tomosynthesis. 2) Analyze the differences between tomosynthesis, projection imaging, and computed tomography. 3) Explore the determinants of image quality. 4) Explain the factors that affect radiation dose. 5) Examine future trends in tomosynthesis.

**ABSTRACT**

CT Breast Imaging

Participants

John M. Boone, PhD, Sacramento, CA (Presenter) Patent agreement, Isotropic Imaging Corporation; Consultant, RadSite;

**LEARNING OBJECTIVES**

1) To demonstrate the pendent geometry and scanner design for cone beam breast CT. 2) Show mathematical metrics comparing breast CT images with mammography and breast tomosynthesis. 3) Show observer performance comparisons, both computer and human, comparing breast CT with projection imaging of the breast.

**LEARNING OBJECTIVES**

1) The primary and secondary goals of the TMIST Trial. 2) How TMIST will be conducted. 3) The design of the Physics QC Program. 4) The specific QC tests, standards and approaches to problems.

**SPPH01D Streotactic Breast Biopsy**

Participants

Ingrid Reiser, PhD, Chicago, IL (Presenter) Nothing to Disclose
LEARNING OBJECTIVES

1) Understand the clinical role of stereotactic breast biopsy. 2) Understand the physical principle of conventional two-view stereotactic breast biopsy systems. 3) Understand the advantages and drawbacks of different system configurations. 4) Understand the principles of tomosynthesis-guided breast biopsy.

ABSTRACT

Breast core needle biopsy is a minimally invasive procedure used in the diagnosis of breast lesions. It is an established diagnostic breast imaging procedure, which can be performed in an outpatient setting and results in minimal trauma and no disfigurement of the breast, in comparison with open surgical biopsy. Stereotactic breast biopsy is mostly performed to assess lesions associated with microcalcifications, that are not visible on ultrasound. This tutorial describes the current clinical use of stereotactic breast biopsy, reviews conventional clinical systems and system configurations. It also describes the principles of tomosynthesis-guided breast biopsy.
NIH Grantsmanship Workshop
Saturday, Nov. 25 1:00PM - 5:00PM Room: E253AB

LEARNING OBJECTIVES
1) Gain greater understanding of the NIH grants process: a. Understand the process for preparing a research or training grant application. b. Learn the elements of a competitive grant application. 2) Gain insight into the new features of the NIH review process. 3) View the review process in action through a mock study section.

Sub-Events

SPGW01A  Welcome and Introductory Remarks
Participants
Gayle E. Woloschak, PhD, Chicago, IL (Moderator) Nothing to Disclose

SPGW01B Preparing an R01 Research Application
Participants
Maryellen L. Giger, PhD, Chicago, IL (Presenter) Stockholder, Hologic, Inc; Stockholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Toshiba Medical Systems Corporation

SPGW01C Preparing K Awards
Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (Presenter) Nothing to Disclose

For information about this presentation, contact:
rcarlos@umich.edu

SPGW01D Clinical Trials in Applications
Participants
Michael W. Vannier, MD, Chicago, IL (Presenter) Nothing to Disclose

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SPGW01E Program Perspectives
Participants
David George, PhD, Bethesda, MD (Presenter) Nothing to Disclose

Active Handout:David George
The Process of Review

Participants
Gayle E. Woloschak, PhD, Chicago, IL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View Learning Objectives under main course title

Mock Study Section

Participants
Gayle E. Woloschak, PhD, Chicago, IL (Presenter) Nothing to Disclose
Maryellen L. Giger, PhD, Chicago, IL (Presenter) Stockholder, Hologic, Inc; Stockholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Toshiba Medical Systems Corporation
Ruth C. Carlos, MD, MS, Ann Arbor, MI (Presenter) Nothing to Disclose
Michael W. Vannier, MD, Chicago, IL (Presenter) Nothing to Disclose
Elizabeth A. Krupinski, PhD, Atlanta, GA (Presenter) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES
1) Understand how an NIH review session takes place.

ABSTRACT
To understand how an NIH review session takes place.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:https://www.rsna.org/Honored-Educator-Award/ Ruth C. Carlos, MD, MS - 2015 Honored EducatorMichael W. Vannier, MD - 2015 Honored EducatorElizabeth A. Krupinski, PhD - 2017 Honored Educator

Questions to the Faculty

Participants
Gayle E. Woloschak, PhD, Chicago, IL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View Learning Objectives under main course title

Summary

Participants
Gayle E. Woloschak, PhD, Chicago, IL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View Learning Objectives under main course title
AAPM Medical Physics Tutorial Session 2

Saturday, Nov. 25 2:15PM - 4:15PM Room: E351

SPPH02A Ultrasound Breast Imaging

Participants
Thaddeus A. Wilson, PhD, Memphis, TN (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
1) Present a coherent set of talks covering major women's imaging practices and technology with a look both at current practice as well as state of the art. 2) Present the information in a forum that includes a diverse audience of students, physicians, physicists and other imaging professionals. 3) Eventually translate this information if appropriate to enduring materials such as those found in the RSNA Radiographics journal under the Physics Tutorial series.

Sub-Events
SPPH02A Ultrasound Breast Imaging

Participants
Wendie A. Berg, MD, PhD, Pittsburgh, PA (Presenter) Nothing to Disclose

For information about this presentation, contact:
wendieberg@gmail.com

LEARNING OBJECTIVES
1) Review technical aspects of breast ultrasound including harmonic imaging. 2) Discuss clinical uses of breast ultrasound in diagnostic breast imaging including evaluation of lumps, nipple discharge, and pain. 3) Consider approaches to use of ultrasound to screen for breast cancer, including whole breast ultrasound.

SPPH02B MRI Breast Imaging

Participants
Donna M. Reeve, MS, Houston, TX (Presenter) Nothing to Disclose

For information about this presentation, contact:
dmreeve@mdanderson.org

LEARNING OBJECTIVES
1) Understand breast MR imaging objectives, challenges and technical requirements. 2) Review breast MRI protocols, acquisition criteria and protocol optimization. 3) Describe common image quality problems, including artifacts.

SPPH02C Contrast Enhanced Mammography

Participants
John M. Lewin, MD, Denver, CO (Presenter) Consultant, Hologic, Inc; Consultant, Novian Health Inc

For information about this presentation, contact:
lewinjz@gmail.com

LEARNING OBJECTIVES
1) Explain the rationale behind the use of dual-energy subtraction for contrast-enhanced mammography. 2) Explain the physical principles underlying dual-energy subtraction for contrast-enhanced mammography and how to obtain optimal images. 3) Discuss the clinical studies comparing contrast-enhanced mammography to MRI and other modalities.

ABSTRACT
Contrast-enhanced digital/spectral mammography (CEDM, CESM) is an FDA approved, clinically utilized modality for breast cancer detection. The technique utilizes an intravenous injection of a standard FDA approved iodinated contrast agent combined with dual-energy subtraction mammography. The dual-energy subtraction greatly increases the visibility of the contrast agent by subtracting out the 'structured noise' of the image (i.e., the equalizing the density of the fibroglandular tissue and the fat). CEDM/CESM has been shown to have diagnostic performance superior to standard digital mammography and approximately equal in performance to contrast-enhanced breast MRI when tested on subjects with a known breast cancer. Other small studies have shown usefulness for diagnostic (problem solving) applications and evaluating treatment effect in neoadjuvant chemotherapy. Studies testing the technique for other applications, such as high-risk screening, are in progress.

SPPH02D Molecular Breast Imaging

Participants
Michael K. O'Connor, PhD, Rochester, MN (Presenter) Royalties, Gamma Medica, Inc

For information about this presentation, contact:
mkoconnor@mayo.edu
LEARNING OBJECTIVES

1) Understand the technical aspects of molecular breast imaging. 2) Compare the strengths and weakness of molecular breast imaging with other breast imaging modalities. 3) Understand the potential applications for molecular breast imaging in the diagnostic and screening environments.