Activity Overview and Description

Historically, radiation oncology encompasses all aspects of cancer treatment using radiation therapy and uniquely integrates molecular and cellular radiation biology, radiation physics, radiation technology, and clinical oncology into one discipline. Its success has relied upon both the physics and technology arms that provide precise delivery of radiation dose to the targeted tissues, and the radiation biology arm that offers the understanding of the normal and cancer cells’ response to radiation.

Advances in the applications, technologies and methodologies of radiation oncology continue to evolve rapidly and the delivery of radiation therapy has become more complex, making it imperative that the healthcare professionals in the field remain current in the state-of-the-art techniques and research developments.

It is widely expected that the future improvement of radiation therapy will again heavily rely upon a better understanding of how cancer and normal cells respond to currently established and developing remedies of radiotherapy technology, the identification of molecular and clinically applicable biomarkers and assays that can predict individual therapeutic outcome, and the development of molecular targets and reagents that can be used to modulate cell response to irradiation.

In this symposium, we will discuss the most recent discoveries of basic and translational research involving the mechanisms of biological response of cancer and normal cells to both high and low linear energy transfer (LET) ionizing radiation, novel approaches to modulate radiation response, validation of molecular targets for radiation sensitization, and establishment of novel preclinical models that can be used to assess individual cancer response to radiation therapy. We will also provide
an update on current and future directions of physics research in radiation oncology and the clinical implementation of new technologies which will serve as an opportunity to inspire new ideas and to educate clinical staff members for improved utilization of the existing technologies.

It is expected that participants will be updated on the recent understanding of radiation cancer biology, radiation physics, and clinical radiation oncology research and their translational potential.

**Target Audience**

This educational activity is designed for radiation oncology clinicians, radiobiologists, medical physicists, researchers, residents, fellows, medical students and other allied health professionals involved in radiotherapy treatment and research.

**Learning Objectives**

Upon completion of this activity, participants should be better able to:

- Examine the current and future directions of physics research in radiation oncology and the clinical implementation of new technologies.
- Describe recent discoveries of cancer biology research involving the mechanisms of biological response of cancer and normal cells to radiation.
- Review recent advances in radiation oncology clinical/translational research and their applications to improved patient care.

**Accreditation**

Rutgers, The State University of New Jersey is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Rutgers, The State University of New Jersey designates this live activity for a maximum of 6.0 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The Center for Continuing and Outreach Education at Rutgers Biomedical and Health Sciences certifies that this continuing education offering meets the criteria for up to 0.6 Continuing Education Units (CEUs), provided the activity is completed as designed. One CEU equals 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction.

Rutgers Cancer Institute of New Jersey has applied to CAMPEP for approval of 6 MPCEC hours for this activity.

Physician assistants, nurse practitioners, and nurses may participate in this educational activity and earn a letter of attendance as AAPA, AANP, and ANCC accept *AMA PRA Category 1 Credits™* through their reciprocity agreements.

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This activity is supported in part by an educational grant from IsoRay Medical Inc.
**Method of Participation**

In order to meet the learning objectives and receive continuing education credits, participants are expected to check in at the registration desk, attend the program and complete an online evaluation form at the conclusion of the activity. A letter certifying attendance and credit verification will be emailed to participants upon completion of the online evaluation survey.

**Activity Directors**

**Bruce G. Haffty, MD**, Professor and Chair, Department of Radiation Oncology, Rutgers Cancer Institute of New Jersey, Rutgers Robert Wood Johnson Medical School and Rutgers New Jersey Medical School

**Zhiyuan Shen, PhD**, Professor and Chief, Division of Radiation Cancer Biology, Rutgers Cancer Institute of New Jersey and Robert Wood Johnson Medical School

**Keynote Speaker**

**Eric Hall, DPhil, MA, DSc**, Higgins Professor of Radiation Biophysics Emeritus, Department of Radiation Oncology, Columbia University Medical Center, New York, NY

**Faculty**

**Edouard I. Azzam, PhD**, Professor of Radiology, Rutgers New Jersey Medical School, Newark, NJ

**Soren M. Bentzen, PhD, DMSc**, Professor, Director of the Biostatistics Shared Service, University of Maryland Greenebaum Cancer Center, and Director of the Division of Biostatistics and Bioinformatics, Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD

**Ranjit S. Bindra, MD, PhD**, Assistant Professor of Therapeutic Radiology and of Pathology, Yale School of Medicine, New Haven, CT

**Thomas Bortfeld, PhD**, Professor, Department of Radiation Oncology, Harvard Medical Center, Boston, MA

**Sandra Demaria, MD**, Professor, Department of Pathology, New York University School of Medicine, New York, NY

**Joseph O. Deasy, PhD**, Chair, Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY

**Thomas K. Hei, PhD**, Professor and Vice Chairman of Radiation Oncology, Columbia University Medical Center, New York, NY

**Geoffrey Ibbott, PhD**, Professor and Chairman, Department of Radiation Physics, Division of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX
Atif J. Khan, MD, Associate Professor, Director of Proton Therapy and Brachytherapy Services, Radiation Oncology, Rutgers Cancer Institute of New Jersey and Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ

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Lei Xing, PhD, Jacob Haimson Professor and Director of Physics Division, Department of Radiation Oncology, Stanford University School of Medicine, Stanford, CA

David S. Yu, MD, PhD, Assistant Professor, Department of Radiation Oncology, Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA

Planning Committee

Edouard I. Azzam, PhD, Professor of Radiology, Rutgers New Jersey Medical School, Newark, NJ

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Dallas Sanchez, Administrative Analyst III, Radiation Oncology, Rutgers Cancer Institute of New Jersey and Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ

Zhiyuan Shen, PhD, Professor, Chief of Radiation Cancer Biology, Radiation Oncology, Rutgers Cancer Institute of New Jersey and Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ

Ning “Jeff” Yue, PhD, Professor and Vice Chair, Chief of Radiation Physics, Radiation Oncology, Rutgers Cancer Institute of New Jersey and Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Track 1: Medical Physics</th>
<th>Track 2: Radiation Cancer Biology</th>
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<tr>
<td>7:45 am</td>
<td>Registration and Continental Breakfast</td>
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<td>8:20 am</td>
<td>Welcome and Overview</td>
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<td>8:30 am</td>
<td>Dosimetry and Workflow of MR-Guided Radiation Therapy</td>
<td><em>Track 1: Medical Physics</em></td>
<td><em>Track 2: Radiation Cancer Biology</em></td>
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<td></td>
<td>Geoffrey Ibbott, PhD, MD</td>
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<td>Tom K. Hei, PhD</td>
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<td>9:00 am</td>
<td>Imaging for Proton Therapy</td>
<td><em>Track 1: Medical Physics</em></td>
<td><em>Track 2: Radiation Cancer Biology</em></td>
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<td>Thomas Bortfeld, PhD</td>
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<td>9:30 am</td>
<td>Refreshment Break</td>
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<td>10:00 am</td>
<td>Imaging, Image-Guided Therapy and Beyond</td>
<td><em>Track 1: Medical Physics</em></td>
<td><em>Track 2: Radiation Cancer Biology</em></td>
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<td>Lei Xing, PhD</td>
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<td>Functions of SIRT2 in the Replication Stress Response</td>
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<td>David S. Yu, MD, PhD</td>
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<td>10:30 am</td>
<td>Predicting Radiotherapy Tumor Response Based on Dose Distribution,</td>
<td><em>Track 1: Medical Physics</em></td>
<td>Radiotherapy Partnership with Immunotherapy:</td>
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<td>Fractionation, and Imaging Features</td>
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<td>Mechanisms and Promise</td>
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<td>Joseph O. Deasy, PhD</td>
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<td>Sandra Demaria, MD</td>
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<td>11:00 am</td>
<td>Refreshment Break</td>
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<td>11:30 am</td>
<td>Keynote Address: 100 Years of Radiobiology: Is Radiotherapy Any</td>
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<td>Better For It?</td>
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<td>Eric Hall, DPhil, MA, DSc</td>
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<td>12:30 pm</td>
<td>Lunch</td>
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<td>Development of a Calcium Channel Blocker as a Novel GBM Radiosensitizer</td>
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<td>Ranjit S. Bindra, MD, PhD</td>
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<td>2:00 pm</td>
<td>Advances in Clinical Normal-Tissue Radiobiology</td>
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<td>Soren M. Bentzen, PhD, DMSc</td>
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<td>2:30 pm</td>
<td>Refreshment Break</td>
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<td>3:00 pm</td>
<td>The Challenges Facing Proton Beam Therapy</td>
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<td>Minesh P. Mehta, MB,ChB, FASTRO</td>
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<td>3:30 pm</td>
<td>Improving Treatments for Head and Neck Cancer</td>
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<td>Randall Kimple, MD, PhD</td>
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<td>4:00 pm</td>
<td>Plenary Session: Panel Discussion: Charged Particles in Oncology</td>
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<td>Moderator: Atif J. Khan, MD</td>
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<td>Panelists: Edouard I. Azzam, PhD; Thomas K. Bortfeld, PhD; Tom K.</td>
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<td>Hei, PhD; Minesh P. Mehta, MB,ChB</td>
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<td>5:00 pm</td>
<td>Adjourn</td>
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**Peer Review**

In order to help ensure content objectivity, independence, and fair balance, and to ensure that the content is aligned with the interest of the public, CCOE has resolved all potential and real conflicts of interest through content review by a non-conflicted, qualified reviewers. This activity was peer-reviewed for relevance, accuracy of content, and balance of presentation by: Edouard I. Azzam, PhD, Zhiyuan Shen, PhD, Sharad Goyal, MD, Atif J. Khan, MD, and Ning “Jeff” Yue, PhD.

**Disclosure Declarations**

In accordance with the disclosure policies of Rutgers and to conform with ACCME and FDA guidelines, individuals in a position to control the content of this educational activity are required to disclose to the activity participants: 1) the existence of any relevant financial relationship with any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients, with the exemption of non-profit or government organizations and non-health care related companies, within the past 12 months; and 2) the identification of a commercial product/device that is unlabeled for use or an investigational use of a product/device not yet approved.

**Faculty**

The following faculty have no relevant financial relationships to disclose.

- Edouard I. Azzam, PhD
- Ranjit S. Bindra, MD, PhD
- Thomas Bortfeld, PhD
- Joseph O. Deasy, PhD
- Eric Hall, DPhil, MA, DSc
- Thomas K. Hei, PhD
- Atif J. Khan, MD
- Randall Kimple, MD, PhD
- Amit Maity, MD, PhD
- Minesh P. Mehta, MB, ChB, FASTRO
- David S. Yu, MD, PhD

Soren M. Bentzen, PhD, DMSc, has disclosed the following relevant financial relationship:

- Member, Scientific Advisory Board: EMD Serono

Sandra Demaria, MD, has disclosed the following relevant financial relationships:

- Member, Scientific Advisory Board: Regeneron, Sanofi US Services, Inc.

Geoffrey Ibbott, PhD, has disclosed the following relevant financial relationships:

- Member, Board of Directors: American Board of Radiology, American Board of Radiology Foundation
- Grant/Research Support: Elekta Oncology Systems, Philips Oncology Systems, Varian Medical Systems
- Stock Shareholder: Spouse, Accuray Corporation

Lei Xing, PhD, has disclosed the following relevant financial relationships:

- Grant/Research Support: Varian Medical Systems
- Other Financial Support: National Institutes of Health

The following planners have no relevant financial relationships to disclose.

- Sharad Goyal, MD
- Bruce G. Haftty, MD
- Sharda Kohli, MBA
- Dallas Sanchez
- Zhiyuan Shen, PhD
- Ning “Jeff” Yue, PhD
Off-Label/Investigational Use

This activity contains information of commercial products that are unlabeled for use or investigational uses not yet approved.

Ranjit S. Bindra, MD, PhD: Mibefradil used in tumor control.
Sandra Demaria, MD: Ipilimumab used in combination with radiotherapy in patients with lung cancer.
Geoffrey Ibbott, PhD: Investigational use of high field MRI-guided radiation therapy system
Amit Maity, MD, PhD: Ipilimumab and nelfinavir in combination with radiation used in tumor control.

CCOE Staff

Patrick Dwyer, Director, Continuing Medical Education, Cate MacKay, Program Coordinator, and Tristan Nelsen, MNM, CMP, Senior Program Manager, have no relevant financial relationships to disclose.

Disclaimer

The views expressed in this activity are those of the faculty. It should not be inferred or assumed that they are expressing the views of any manufacturer of pharmaceuticals or devices, or Rutgers.

It should be noted that the recommendations made herein with regard to the use of therapeutic agents, varying disease states, and assessments of risk, are based upon a combination of clinical trials, current guidelines, and the clinical practice experience of the participating presenters. The drug selection and dosage information presented in this activity are believed to be accurate. However, participants are urged to consult all available data on products or procedures before using them in clinical practice.

Rutgers reserves the right to modify the program contents and faculty if necessary.

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For questions or concerns regarding this activity, please call Sharda Kohli MBA at 732-235-6144 or kohlish@cinj.rutgers.edu or Cate MacKay at 973-972-3691 or cate.mackay@rutgers.edu.
AUDIENCE HANDOUTS

There will be no handouts provided at the activity. Speaker slide presentations are available online at:

http://ccoe.rbhs.rutgers.edu/15MR12/

Unless otherwise noted, the handouts are provided in .pdf format and must be read using Adobe Acrobat Reader. If you do not have Adobe Acrobat Reader, download a free copy of this software at

Computers http://get.adobe.com/reader/

FREE WI-FI ACCESS

A free Wi-Fi guest account has been set up for participants. Please use the login information listed below. You can access and view the faculty presentations online during the symposium.

Network: RUWireless
Username: 4R-Symposium
Password: cinjwifi
INSTRUCTIONS FOR EVALUATION AND CME CERTIFICATES AND ATTENDANCE LETTERS

Following the program, please take a few moments to complete the online evaluation survey to assist us in assessing the effectiveness of this activity and to make recommendations for future educational offerings. Your response will help ensure that future programs are informative and meet the educational needs of all participants. **Survey will be available on Friday, February 27, 2015 at 9:00am.**

In order to obtain a CME certificate or attendance letter for this activity, you must complete the online evaluation survey after the activity has concluded. The evaluation survey and certificates/attendance letters are ONLY available online.

Participants must complete the evaluation and claim credit by Thursday, March 26, 2015 at 11:59pm.

Program Pre-Registrants (you registered in advance of the activity)

Enter the CCOE portal at the following web address: [http://ccoe.rbhs.rutgers.edu/portal](http://ccoe.rbhs.rutgers.edu/portal)

Click into the CCOE portal.

Select “Log In” on the top menu.

Enter your “User Name” (email address) and “Password” and Click on the “Log In” button.

Select “View History” on the top menu.

From the “View History” page, Select “Survey” and complete the evaluation survey. Once you complete the survey, click “Continue” and a “Thank You” message will appear. You may now close your browser window.

Note - you may experience a slight delay during the advancement of each page/screen. Please let the page/screen advance after clicking “Continue”.

After you complete the survey, please check your email to receive your CME certificate/attendance letter.

You may also retrieve a copy of your CME certificate/attendance letter at any time by logging into the CCOE portal ([http://ccoe.rbhs.rutgers.edu/portal](http://ccoe.rbhs.rutgers.edu/portal)). From the “View History” page, Select “View Certificate” to download and/or print your CME certificate/attendance letter.

Walk-in Registrants (you registered on-site on the day of the program)

CCOE will contact you via email within five (5) business days with instructions on accessing the registration portal to complete the registration process, and completing the evaluation survey, and obtaining your CME certificate/attendance letter.

If you have any questions or experience any problems within the portal, please contact the Center for Continuing and Outreach Education at 973-972-4267 / [ecoe@ca.rutgers.edu](mailto:ecoe@ca.rutgers.edu).