



## DELAWARE VALLEY SOCIETY FOR RADIATION SAFETY

### A Chapter of the Health Physics Society

#### Program Rob Forrest Memorial Medical Health Physics Symposium June 22, 2018

- 08:30 – 09:00 Registration and continental breakfast
- 9:00 – 09:15 Welcome and Opening Remarks; Announcements
- 09:15 – 09:55 Radiation Safety Perspective on CivaSheet Implants  
*Kendall Berry, M.S.P.H., Radiation Safety Officer, Bryan Edwards, BS, Senior Health Physicist, and Jessica Kendrick, M.S., Health Physicist, Fox Chase Cancer Center, Philadelphia. Pa.*
- 09:55 – 10:15 Challenges in Establishing a Lu-177 Therapy Program  
*Kendall Berry, M.S.P.H., Radiation Safety Officer, Bryan Edwards, BS, Senior Health Physicist, and Jessica Kendrick, M.S., Health Physicist, Fox Chase Cancer Center, Philadelphia. Pa.*
- 10:15 – 10:45 An Introduction to Alpha DaRT (Diffuse Alpha Radiation Therapy)  
*John Keklak, M.S. Hyg., CHP, Radiation Safety Officer, and Patrick Hann, M.S., Senior Health Physicist, Thomas Jefferson University Hospital, Philadelphia. Pa.*
- 10:45 – 11:00 Break
- 11:00 – 11:40 Nuclear Innovation to Serve the Commonwealth of Pennsylvania  
*Eric Schwarz, M.S., Franklin & Marshall College & Exelon Generating Company, LLC, Lancaster, Pa; Robert Walter, Ph.D.; Franklin & Marshall College; Will Walters, Ph.D., Jim Turso, P.E. Ph.D.; Amanda Johnsen, Ph.D., Logan Seminsky, B.S., William Rapella, B.S., Derrick Edmiston, B.S, Pieter Rijken, B.S., Chee Hau Teoh, B.S.; The Pennsylvania State University*
- 11:40 – 12:30 Dose-reducing Advances in X-ray Imaging  
*Eric Gingold, Ph.D., DABR, Director of Imaging Physics, Thomas Jefferson University, Philadelphia. Pa.*
- 12:30 – 01:30 Lunch
- 1:30 – 02:10 Radiation Safety Process for Radiopharmaceutical Patient Treatment Using High Activities of I-131  
*Sandy Konerth, M.S., DABR, DABMP, Versant Medical Physics and Radiation Safety*
- 02:10 – 02:50 Assessment of a Conversion Factor for Estimating Extremity Dose in Interventional Fluoroscopy  
*Karen Colucci, M.S., Radiation Safety Officer, Lehigh Valley Health Network, Joseph G. Och, M.S. DABMP, System Director, Medical & Health Physics, Geisinger Health System, Stephen King, M.S, CHP, Radiation Safety Officer, Hershey Medical Center, and Michael Sheetz, M.S., CHP, DABR, Radiation Safety Officer, University of Pittsburgh Medical Center*
- 02:50 – 03:05 Break
- 03:05 – 03:35 Skin Dose Estimation for <sup>131</sup>I-MIBG Staff Contamination  
*Dennise, Magill, M.S. DABR, Medical Physicist, Megan Harkins, Health Physics Technician, Natalie Beckmann PhD, RT(R), Medical Physicist, and Marc Felice MS, DABR, Associate Director of Diagnostic Medical Physics, University of Pennsylvania, Philadelphia, Pa.*
- 03:35 – 04:25 Radiation Dosimetry in Nuclear Medicine Therapy  
*Michael Stabin, Ph.D., CHP, Vanderbilt University, Nashville TN*
- 04:25 – 04:30 Closing remarks and Adjournment



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## **2018 Rob Forrest Memorial Medical Health Physics Symposium Presentation Abstracts**

### MORNING SESSION

#### **1. Radiation Safety Perspective on CivaSheet Implants**

CivaSheet™ is a low dose rate (LDR) brachytherapy device that can be used on several cancers such as: colorectal, gynecological, head and neck, soft tissue sarcomas and pancreatic cancer. The palladium-103 sources are shielded with gold on one side to deliver a unidirectional dose. The sources are embedded in a bio-absorbable substrate which can be cut in the OR to the exact size needed and then sutured into the tumor bed as a permanent LDR implant. While this is a low dose and low energy therapy, the procedure typically involves general surgeons and plastic surgeons working with and very close to radiation sources, necessitating expansion of specific radiation safety training. How long does it take the plastic surgeon to close the surgical site after the sources were sutured in place by the general surgeon? These sources are implanted as permanent implants, but will they become temporary implants due to the patient's inability to heal at the surgical site? This presentation will cover these questions and others that have been encountered at Fox Chase Cancer Center.

#### **2. Challenges in Establishing a Lu-177 Therapy Program**

[What a Difference a Year Makes]

Lutathera (Lutetium 177) received FDA approval this past January. We will present the hurdles that needed to be addressed as we transitioned from a clinical trial to commercial product program. The first commercial Lutathera therapy at Fox Chase was administered on April 5<sup>th</sup>. The two months in between FDA approval and treatment were filled with multiple meetings and e-mails. The information presented will help RSO's understand the complexity of the Lutathera program and some key questions to raise if your site is interested in offering Lutathera.

#### **3. An Introduction to Alpha DaRT (Diffuse Alpha Radiation Therapy)**

Diffuse Alpha Radiation Therapy is an innovative radiation therapy modality now entering clinical usage for the treatment of solid tumors. Alpha DaRT takes advantage of the decay of Ra-224 to short-lived Rn-220, which can diffuse throughout the tumor, and then deliver high LET radiation to the tumor cells from additional alpha emissions in the decay chain. Potential radiation safety considerations in utilizing this mode of therapy will be discussed.

#### **4. Nuclear Innovation to Serve the Commonwealth of Pennsylvania**

A collaborative effort by Penn State, Franklin & Marshall College (F&M) and Exelon Generation Company, LLC has developed new capabilities at the Radiation Science and Engineering Center (RSEC) at Penn State in isotope production. The initial driver for a targeted-demand was F&M's Department of Earth and the Environment, which needed Beryllium-7 as part of soil erosion studies in Pennsylvania. However, we present principles here which can be applied to the entire class of proton-generated isotopes regarded, until recently, as inaccessible at research reactor facilities. The impact is the potential for RSEC to supply the Commonwealth's academia, industry and government users with a more-local supply at a competitive cost.

#### **5. Dose-reducing Advances in X-ray Imaging**

This talk will summarize recently-introduced technologies that provide the ability to reduce patient dose in medical imaging. Examples include new scintillators for digital radiography and synthesized 2D mammograms. In CT, there are automatic exposure control, dynamic collimation, and dual-energy protocols that reduce dose directly, and iterative reconstruction that reduces dose indirectly by reducing image noise. Fluoroscopically-guided intervention, historically the imaging procedure of greatest concern for radiation-induced injury to patients, has benefited recently from advanced post-processing methods that reduce image noise and allow dose reduction of 50% or more.



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#### **AFTERNOON SESSION**

##### **6. Radiation Safety Process for Radiopharmaceutical Patient Treatment Using High Activities of I-131**

Radiation safety has been achieved by using infusion pump shielding, room shielding contamination control and limits on time spent with the patient by staff. Patients were trained by the radiation safety officer on best practices for contamination control. Radiation measurements provided important information on exposure rates in the patient room. Lessons learned throughout the study were communicated to other sites.

##### **7. Assessment of a Conversion Factor for Estimating Extremity Dose in Interventional Fluoroscopy**

Policies and procedures aimed at preventing hospital acquired infections have increasingly made the use of ring dosimeters in sterile field surgical and perioperative environments untenable. This results in apparent conflict with the 10 CFR Part 20 and equivalent state regulatory requirements to use individual monitoring devices to assess extremity dose when there is a likelihood of exceeding 10% of the applicable occupational dose limit. Data is being collected at participating institutions to evaluate whether extremity dose in interventional fluoroscopy can be reasonably assessed from the radiation dose recorded by a dosimeter worn at the collar through use of an appropriate conversion factor when a ring dosimeter cannot be worn by the operator.

##### **8. Skin Dose Estimation for <sup>131</sup>I-MIBG Staff Contamination**

A methodology for performing a rapid assessment of the radiation dose to upper extremity skin from an <sup>131</sup>I-Metaiodobenzylguanidine (MIBG) contamination will be presented. Using the skin contamination measurements and calculated skin dose for each contamination incident at our facility, a conversion factor was derived that estimates skin dose based on the initial contamination measurement in cpm. This methodology yields an estimate of the final skin dose accounting for radioactive decay, decontamination and other factors, such as skin sloughing. Our method provides an early projection of the expected skin dose as a simple rule of thumb that the resultant dose in millirem will be >10% of the initial GM reading in cpm.

##### **9. Radiation Dosimetry in Nuclear Medicine Therapy**

Dose estimates for radiopharmaceuticals may be established based on data from preclinical (i.e. animal species) or clinical studies (involving human patients or volunteers). This session will describe current approaches in both areas, and show examples. Traditional mathematical model-based anatomical models have now been replaced with more realistic standardized anatomical models based on patient image data and have been incorporated into the software code OLINDA/EXM 2.0. The code employs these anthropomorphic models, the new ICRP human alimentary tract (HAT) model and updated (ICRP 103) tissue weighting factors for calculation of effective dose. Adjustments to traditional dose calculations based on patient-specific measurements are routinely needed, especially in therapy calculations, for marrow activity (based on measured blood parameters or image data), organ mass (based on volumes measured by ultrasound or Computed Tomography (CT)), and other variables. Many interesting radiopharmaceutical therapy agents are currently in use, for thyroid disorders, neuroendocrine tumors, and treatment of bone metastases. Clinical experience, success rates, and management of normal tissue toxicity with many nuclear medicine therapy agents will be reviewed. The need for patient-individualized approaches to therapy will be emphasized. Discussions of relevant release criteria for therapy patients and current issues in radiobiology will be included.