In Memoriam of Bob Gorson:

Academic Medical Center
Radiation Protection Program
Broad Scope License
University of Pittsburgh

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Radiation Safety Officer

Radiation Safety Office
(Who we cover)
• University of Pittsburgh
• University of Pittsburgh Medical Center

Radiation Safety Office
(What we cover)
• Radioactive Material (isotope research, nuclear medicine, radiation oncology, gamma knife, gamma irradiator)
• Radiation Producing Devices (x-ray machines, accelerators, cyclotron)
Radiation Safety Office
(What we do)

• Review and establish policies and procedures for the Radiation Protection Program
• Radiation safety training
• Personnel radiation exposure monitoring
• Radiation safety surveys and program audits
• Clinical radiation physics support
• Research and Development support

Radiation Safety Office
(Who we are)

• Staff of 17 (Health Physicists, Medical Physicists, Technologists, Administrative Staff)
• Division within Research Conduct and Compliance Office

Broad Scope License

• Type A Specific License of Broad Scope (10 CFR 33)
  – Authorizes use of curie quantities of RAM
  – Radiation Safety Officer
  – Radiation Safety Committee
  – Administrative Controls
• Radiation Protection Program (10 CFR 20.1101)
• X-ray and Accelerator Requirements
Radiation Safety Committee

• Reviews and approves all uses of radioactive material and ionizing radiation producing equipment
• Approves “Authorized Users” (Principal Investigators)
• Develops policies and procedures of the Radiation Protection Program

Human Use Subcommittee (HUSC)

• Reviews human research protocols that involves exposure from clinical radiopharmaceutical or x-ray procedures
• Works in collaboration with IRB
• Addresses appropriate use of radiation and risk statement in consent

X-ray Research Protocol to Evaluate ACL Repair
Radioactive Drug Research Committee (RDRC)

- Reviews human research use of radioactive drugs not approved by the FDA
- Operates under 21 CFR 361 regulations
- Research must be for obtaining basic information regarding metabolism, physiology, pathophysiology, or biochemistry

Institutional Animal Care and Use Committee (IACUC)

- Oversees appropriate care, use, and humane treatments of animals being used for research
- RSO participates in committee activities
- Reviews procedures involving isotope tracer studies, x-ray imaging, PET/SPECT imaging, or gamma/x-ray irradiation

Hospital Committees

- Radiation Safety Committee
- Environment of Care (Health and Safety)
- Radiation Oncology Quality of Care
- Radiology Tech QA
Audit Program

• Assure compliance with regulatory requirements and Radiation Safety policy
• Quarterly audits performed for:
  – External Departments (Radiology, Nuclear Medicine, Radiation Oncology)
  – Internal RSO programs (Lab survey, sealed source leak test, ALARA program, etc.)
• Audit findings sent to management
• Minor program deficiencies handled as an aside comment

Radiation Safety Training

• Radiation worker training
  – Classroom
  – On-line
• Residents and Fellows using fluoroscopy
  (Radiology, Cardiology, GI, Vascular Surgery)
• Radiology Resident’s Physics Program

Gamma Irradiators

• Used for irradiation of cells and small animals
• Contain ≈ 1000 curies of Cs-137
• Requires source security program (10 CFR 37)
  – Background Investigations and Access Control
  – Physical Protection Requirements
  – Local Law Enforcement Agency coordination
• Disposal Issues
• X-ray Irradiators
Isotope Research

- Radioisotopes used as tracers to map biomedical processes
- Common isotopes: H-3, C-14, P-32, S-35, I-125
- Radiation laboratory
  - Iodination (I-125)
  - Trisorber (H-3)
  - BSL3 Lab

Radioactive Waste

- Decay In Storage
- Sanitary Sewer
- Ship Out

Nuclear Medicine

- Radiopharmaceutical Therapy
  - I-131 NaI
  - Lu-177 Lutathera
- Y-90 Microspheres
  - TheraSphere
  - SirSphere
Radiation Oncology
• External beam devices

• High dose rate brachytherapy

• Manual brachytherapy

UPMC Gamma Knife Program
LGK Model U, 1987
LGK Model B/C, 1997
LGK Perfexion 2007
LGK Icon 2016

N = 14,610

Tumor 12,425 78%
Pituitary 1,404 10%
Vascular 1,771 12%
Radioactive Seed Localization (RSL)

- Method to guide surgical excision of non-palpable breast lesion
- Covered under 35.1000 uses
- Multi-disciplinary effort with many personnel new to radiation safety

Automatic Injector for Epilepsy Ictal Brain SPECT

- Tc-99m Neurolite Ictal SPECT can identify seizure focus
- MEDRAD Spectris Solaris pump
  - MRI contrast injector
  - Off label use

Automatic Injector for Epilepsy Ictal Brain SPECT

Seizure

Set-up

Dose Administration
PET Patient Shielding Problem
• Original clinical PET Facility designed for 5 patients per day
• Soon performing > 15 patients per day
• Novel patient shielding design

Medical Cyclotron Facility
• CTI RDS 112 self-shielded cyclotron
• Used to produce C-11, F-18, N-13, O-15 for PET imaging research
• Radiochemistry labs and scanning rooms on same floor

Cyclotron Location
• Installed on 9th floor of UPMC Presbyterian
• Cafeteria above
• MRI facility below
Cyclotron Replacement Project

Removing the Pieces

View from Above
Waste Ship Out

Nuclides: Ac-110m, Cd-109, Co-56, Eu-152, Mn-54, Zn-65, Co-60
Total Activity: 60 mCi
Weight: 5636 kg (62 tons)

New Siemens Eclipse Cyclotron

Conclusion

• Academic Medical Center Radiation Protection Programs present unique challenges
• Balance between support and compliance
• Always a new project