

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)

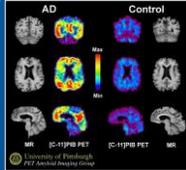
- Reviews human research protocols that involves exposure from clinical radiopharmaceutical or x-ray procedures
- Works in collaboration with IRB
- Addresses appropriate use of radiation and risk statement in consent

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 \approx 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

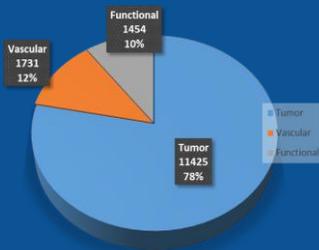


LGK Perfexion 2007



LGK Icon 2016

UPMC Gamma Knife Procedures (1987 - 2017) N = 14,610



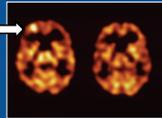
Radioactive Seed Localization (RSL)

- 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



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: Ag-110m, Cd-109, Co-56, Eu-152, Mn-54, Zn-65, Co-60
Total Activity: 60 mCi
Weight: 56364 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