



# Resumption of Operations for Radioisotope Research and Production Laboratory (RRPL) Facility

Presenter: Dmitri Medvedev, Interim Chair  
*Isotope Research and Production Department*

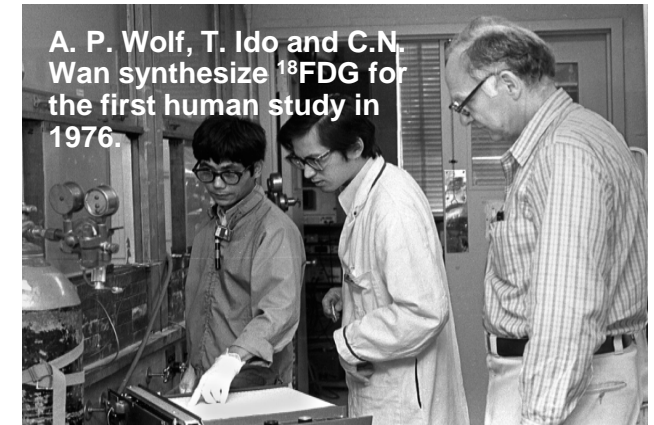
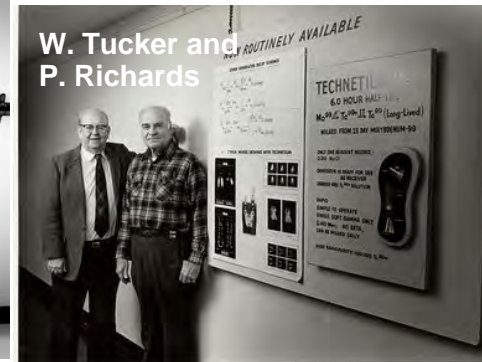
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# BNL is the Birthplace of Nuclear Medicine

- 1950s: BNL scientists Walter Tucker and Margaret Greene developed a generator system for producing Tc-99m and Powell Richards suggested its use for medical imaging. Tc-99m is used in over 10 million patients/year in the U. S. alone
- 1972: BNL pioneered the use of high energy proton beams for isotope production (BLIP)
- 1976: BNL chemists (led by Al Wolf and Joanna Fowler) synthesized the  $^{18}\text{F}$ FDG (fluorodeoxyglucose) molecule, while Penn researchers (Abass Alavi, Martin Reivich) developed techniques to test it on humans, and NIH provided scientific validation
- In 1980, BNL scientists first reported high FDG uptake in tumors, leading to FDG/PET for managing the cancer patient
- 1991: BNL Suresh Srivastava commercialized UltraTag Red Blood Cell kit which is widely used in nuclear medicine
- 2023: BNL isotope team was among those received a Secretary of Energy Achievement Award for their efforts to meet a growing demand for actinium-225 (Ac-225), a medical isotope.
- Many radionuclide generator systems developed at BNL:  $^{132}\text{Te}/^{132}\text{I}$ ;  $^{90}\text{Sr}/^{90}\text{Y}$ ;  $^{68}\text{Ge}/^{68}\text{Ga}$ ;  $^{52}\text{Fe}/^{52\text{m}}\text{Mn}$ ;  $^{81}\text{Rb}/^{81\text{m}}\text{Kr}$ ;  $^{82}\text{Sr}/^{82}\text{Rb}$ ;  $^{122}\text{Xe}/^{122}\text{I}$

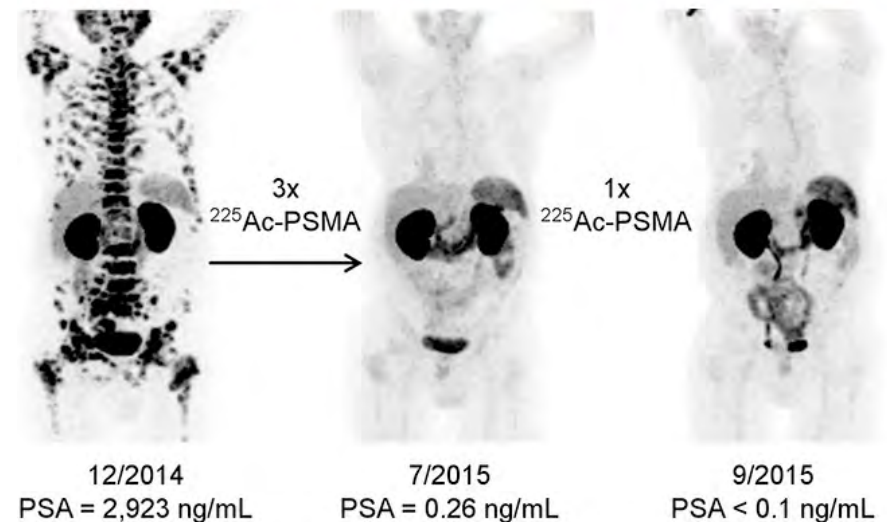
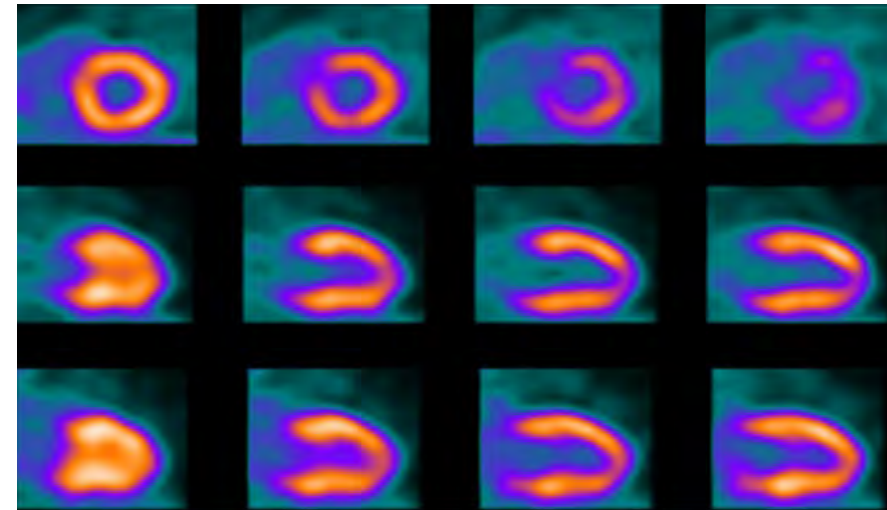
***Long history of excellence in accelerator science and technology and isotope research puts BNL at the forefront of Isotope R&D and Production with charged particles***



# Isotope Applications: Imaging and Therapy

BLIP\* produces Strontium-82, a relatively stable isotope that can be transported and used in hospitals to generate Rubidium-82, a radiotracer that reveals reduced blood flow in heart muscle under stress. This precision scanning points physicians to coronary arteries that need treatment. Credit: Washington University School of Medicine.

Before and after images show how a molecule labeled with Actinium-225 delivers cell-killing alpha particles directly to tumors, eradicating metastatic prostate cancer. The BLIP team aims to increase the production of Ac-225 so scientists can conduct large-scale trials and get this potentially lifesaving treatment to more patients. Credit: ©SNMMI: C. Kratochwil. *J. Nucl. Med.*, 2016; 57 (12); 1941.



# What is (and isn't) changing

## Not changing:

- Nature of work, materials, and mission
  - Research and production of isotopes for medicine and industry to ensure secure, resilient and innovative domestic supply of critical isotopes essential for national health, prosperity and security

## Changing:

- Work now managed under a Nuclear Safety Basis as applies to Hazard Category 3 Nuclear Facility
  - Follow nuclear safety requirements that are stipulated in Federal Regulation 10 CFR
- More formal safety structure and documentation
  - Added support:
    - Nuclear Facility Manager
    - Two nuclear safety analysts
    - Nuclear Safety program manager
    - Nuclear Quality assurance program manager
    - Nuclear training specialist
    - Nuclear system engineer

# What “Nuclear Safety Basis” Means

- **Defined and analyzed hazards**

- Hazard categories are based on their radioactive material inventories and the potential consequences to the public, workers, and the environment
- Hazard Category 3 represents the lowest potential consequence

- **Established controls and safety limits**

- Eliminate, limit, or mitigate hazards to workers, the public, or the environment, including:
  - (1) Physical, design, structural, and engineering features;
  - (2) Safety structures, systems, and components;
  - (3) Safety management programs;
  - (4) Technical safety requirements; and
  - (5) Other controls necessary to provide adequate protection from hazards.

- **Increased rigor, oversight, and consistency**

- A total of 3 Operational Readiness reviews have been completed

# Why This Matters

- Strengthens safety and regulatory alignment
- Provides additional assurance to workers and community
- Supports mission: production of critical isotopes to ensure Nation's prosperity and independence from foreign supply