Science.

Technology.

Innovation.

Medical Isotopes at PNNL

Innovative. Experienced. Pacific Northwest National Laboratory provides private industry and government clients with innovative solutions to their radioisotope separation and purification needs. Together with top-of-the-line advanced biology, computational chemistry, and spectrometry research capabilities, PNNL also helps pharmaceutical companies and medical research centers develop new drugs, medical devices, and delivery systems.

Cutting-Edge Radiochemical Separations

To provide high-quality, ultrapure radioisotopes, Pacific Northwest National Laboratory uses state-of-the-art separation technologies. When the state of the art does not meet the clients' needs, PNNL develops new ways to separate the needed isotopes.

PNNL has the most experience and the most interest in alpha emitters. Our transfer of technology to MedActinium for bismuth-213 generator improvement and for actinium complexation for treating leukemia and metastatic solid-tumor cancers was awarded a 2004 Federal Laboratory Consortium Award.

Our depth of experience and desire to enable the commercial success of innovative new products makes PNNL a preferred research and development partner. For example, PNNL developed an efficient method for preparing ultrapure yttrium-90 from strontium-90. PNNL quickly became the world's major supplier of yttrium-90. In 1999, our yttrium-90 production technology was transferred to NEN Life Science Products (PerkinElmer), where sales continue to increase. This effort won a Federal Laboratory Consortium Award for Excellence in Technology Transfer. We have continued to develop new separations technologies for yttrium-90 and other radionuclides for innovative new drug products.

PNNL prepares high-purity actinium-225, bismuth-213, bismuth-212, and radium-223 for medical applications. We were selected by the U.S. Department of Energy as a research partner with Isotek Systems and Theragenics for recovery of thorium-229 from uranium-233 stockpiles and preparation of ultrapure actinium-225 and bismuth-213.

New Drugs, Medical Devices, and Delivery Systems

Bringing together advances in nuclear physics, radiochemical sciences, and advanced biological sciences, PNNL helps clients design and test drugs, medical devices, and delivery systems. Recent projects include

- Radiogels and fibrin composites for applications in cancer treatment
- High-dose radionuclide labeling of cell-directed proteins

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

- Novel concepts for diagnostic imaging and radioisotopes for more effective cancer treatment
- Advanced strontium-90 capillaries for restenosis stents
- Next-generation cesium-131 brachytherapy seeds for treating certain cancers.

PNNL supported IsoRay in the now FDA-approved method to develop an advanced radioactive seed product to treat prostate cancer. In the procedure that's now commonly used in medicine, radioactive seeds about the size of rice grains are implanted in the prostate to deliver radiation to cancer cells.

Novel Isotope Production Methods

Producing valuable radioisotopes can be an expensive proposition for many smaller pharmaceutical and medical companies. To make radionuclides affordable, PNNL is developing novel ways of producing isotopes including low-cost, bench-scale methods. In addition, PNNL is investigating new approaches for producing positron-emitting radioisotopes, used in positron emission tomography to evaluate neurological, cardiac, and metabolic disorders.

Strong Local Support for Radioisotopes Work

PNNL's Radioisotopes Program is centered in Richland, Washington, a nuclear-friendly and supportive community. The community has a growing nuclear medicine practice at the local cancer center and hospitals. Local nuclear medicine activities are supported by University of Washington and Fred Hutchinson Cancer Research Center. Continued interest in this area is envisioned thanks to a new Washington State University Tri-Cities nuclear pharmacy program. Fueled by regional interest and strong support from the local economic development agency, local small businesses are experiencing solid successes with radioisotopes, and many are expanding.

Easy Contracting, Easy Collaboration

PNNL's private industry contracting method, one of the few in the national laboratory system, is easy to use and focused on customers' needs. Our contracting methods, unique facilities and equipment, and highly talented staff have led us to form key research collaborations, including

- AlphaMed Inc., Acton, MA
- Bio-Nucleonics, Inc., Miami, Florida
- Fred Hutchinson Cancer Research Center, Seattle, WA
- IsoRay, Inc., Richland, WA
- Isotek Systems, Oak Ridge, TN
- Isotope Products Laboratories, Burbank and Valencia, CA
- Louisiana State University, New Orleans, LA
- Lynntech, Inc., College Station, TX
- MedActinium, Inc. and PharmActinium, Inc., Knoxville, TN, and Alexandria, VA
- NeoRx Corporation, Seattle, WA
- PerkinElmer Life Science, Wellesley, MA
- Theragenics, Inc., Oak Ridge, TN, and Buford, GA
- University of Missouri, Columbia, MO
- University of Washington, Seattle, WA
- Washington State University, Pullman, WA
- XL Sci-Tech, Richland, WA.

Richland, Washington, where PNNL's main office is located, is a nuclear-friendly community with a growing interest in nuclear medicine and other uses of radioisotopes.

PNNL is the nation's sole supplier of bismuth-212 generators for nuclear medicine research and cesium-137 for homeland security and medical equipment applications.

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