



DATELINE LOS ALAMOS

U . S . D E P A R T M E N T O F E N E R G Y
U N I V E R S I T Y O F C A L I F O R N I A

A RACE AROUND THE WORLD

LOS ALAMOS-RUSSIAN TEAM
SUPPLIES ONLY SOURCE OF ISOTOPES
FOR HEART SCANS

Thousands of heart disease patients nationwide would not be getting important diagnostic tests right now without the efforts of scientists at Los Alamos and a Russian nuclear research institute.



Los Alamos researcher Wayne Taylor inspects a newly arrived strontium-82 "target" in a hot cell at the Laboratory's Radiochemistry Site.

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Los Alamos is providing a precious supply of the medical radioisotope strontium-82, which, when it decays to rubidium-82, is used in positron emission tomography, or PET, a vital imaging technology for diagnosing heart conditions.


Rubidium-82 emits radiation that can be "seen" by special cameras to produce three-dimensional internal images of the heart that show places where circulation is abnormal or blocked.

The three North American facilities — one at Los Alamos' Neutron Scattering Center, one at Brookhaven National Laboratory and one in Canada — capable of producing the irradiated metal sources, or "targets," for the isotope were shut down earlier this year for system upgrades or repairs.

But the collaboration between Los Alamos and the Institute of Nuclear Research in Troitsk, Russia, helped ensure a reliable source of strontium-82 for all the cardiac care clinics doing PET imaging.

The collaboration is a race around the world against the unrelenting decay-rate of the radioisotope itself: with each passing day, another 3 percent of the valuable material is gone.

At the Russian institute, a particle accelerator designed for medium-energy physics experiments is used to irradiate a small block of



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rubidium metal called a "target." The targets — candy bar-sized metal frames that hold the irradiated material inside — are shipped in heavily shielded casks from Moscow to Los Alamos.

After an elaborate chemical extraction process, Los Alamos scientists end up with a precious 13 millionths of a gram of strontium-82 from each source.

The strontium-82 is sent from Los Alamos to Bristol-Myers Squibb in New Brunswick, N.J., where the isotope is mounted on another material to produce a "generator." The generators are distributed to the medical community for use in PET scans by Bristol-Myers Squibb, acting as contract manufacturer for Bracco Diagnostics of Princeton, N.J.

During a PET scan, rubidium-82 is removed from the generator through ion exchange by a normal saline solution and infused directly into a patient. In the bloodstream, rubidium-82 mimics potassium.

Because the heart uses a lot of potassium to do its job, it quickly extracts potassium - and rubidium-82 - from the blood.

The isotope collects in and around the heart and the PET scan reveals places where rubidium-82 piles up. The rubidium-82 decays quickly, so in about 10 minutes the radioactivity in the patient is essentially gone.

Los Alamos first spearheaded a collaboration with the Russian research institute in 1995. The partnership was supported by the Initiatives for Proliferation Prevention program with encouragement from the Department of Energy's Office of Isotope Production and Distribution.

Funded by DOE, the IPP program teams U.S. industry, universities and national laboratories with institutes in the former Soviet Union to develop potential commercial partnerships.

The medical isotope program has now become a source of revenue for all the partners and a success story for the IPP. The Russian institute is incorporated into the global isotope market while its scientists are dissuaded from selling their nuclear expertise to rogue nations.

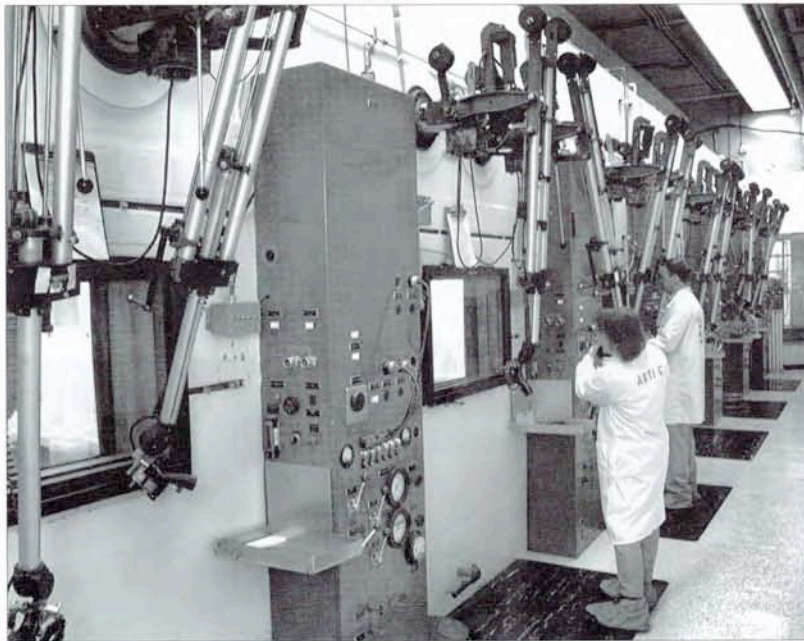


Positron Emission Tomography scans of a heart.

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Linda Jacobson (left) and Jason Kitten manipulate samples with remote mechanical arms behind 18-inch-thick leaded-glass windows.



Technology Commercialization International, an Albuquerque, N.M., company, is the member of IPP's business coalition that represents INR, the Russian institute, in the United States. TCI, which manages a number of joint ventures and partnerships with Russian institutes, helped get FDA approval and imports the rubidium targets. The company is pursuing diagnostic and therapeutic applications of other isotopes INR could produce.

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