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Isotopes line up against cancer cells

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March 14, 2005

Long before the Albuquerque Isotopes played its first professional baseball game, Los Alamos National Laboratory and the University of New Mexico had dreamed up medical cures with isotopes.

Now, this 20-year collaboration has turned into a formal enterprise — the New Mexico Center For Isotopes in Medicine. It will be located at UNM's College of Pharmacy.

Isotopes are elements, such as iodine and iridium, that give off energy, or radiation. They can be used for the diagnosis or treatment of diseases. Like magic bullets, they attack cancer cells from inside the body out, causing less harm to healthy tissues and organs than an external shot of radiation does. They can be implanted in the body, taken as a pill or pumped into the bloodstream through a vein.

What Los Alamos offers is in short supply throughout the world — an accelerator that can produce more than 35 medical isotopes. There are only two others like it in the world.

"It's a huge deal," said Alexander McEwan, director of oncologic imaging at the Cross Cancer Institute in Canada.

Making this kind of drug is difficult because isotopes can decay as quickly as a couple of days. But there's another battle: Researchers need to find the best carrier, or tracer, that will deliver the cancer-killing isotope to the sick cells. The isotope must be linked to a protein or antibody.

"What the clinical community needs is access to those tracers to do the research," McEwan said. Los Alamos is a "hugely important resource," he said, because it offers that capability without the profit motivation of a private company.

By using the Isotope Production Facility at Los Alamos lab, the new medical isotope center plans to develop new drugs for cancer and mental illness, and perform patient testing. But before a director can be hired — and the real work begin — the center must raise millions of dollars. The lab has $100 million worth of equipment, which with additional funding could be redirected toward health care, said Jeff Norenberg, director of radiopharmaceutical sciences at UNM's College of Pharmacy.

In short, the center may not be in full swing for five years.

Before then, the center hopes to develop a new drug that uses an isotope to help diagnose lymphoma — a blood disease — and predict its spread. "We don't have anything that specifically can target and elucidate lymphoma in the body," Norenberg said. "So we're desperately in need of an agent like that."

Currently, doctors take a tissue sample from the patient's body to do this.

At the moment, isotopes are used more often for diagnosis than treatment of diseases. And then there's the stigma factor.

"It's not a multibillion-dollar drug sector as you would expect from chemotherapy drugs, because whenever you say 'radioisotope' it conjures up negative connotations in people. They're concerned about radiation safety, public-health risks," Norenberg said.

"For medical isotopes, we're really limited to very short-lived and very specific applications of radioisotopes. We know it's safe for the family members and the general public. And we're trying to work hard to refute the perception that it's dangerous, or that it somehow could harm the environment, which especially around our neck of the woods people are very concerned about and perhaps rightly so given some of the history of the lab in other areas," he said.

For certain kinds of cancers, medical isotopes can strike a tumor more effectively and with less harm than chemotherapy.

"Unfortunately, most of cancer therapy is based on very nonspecific chemotherapy drugs, which cause great toxicities. It's capable of killing cancers but in the process kills many healthy normal tissues as well," Norenberg said.

But McEwan said radioactive isotope therapy won't replace chemotherapy. "It's always going to be a niche treatment," he said, because it's difficult to find the right tracers to carry the isotopes to the cancer.

The new center will have an economic-development drive and an educational drive.

The University of New Mexico, the birthplace of commercial radiopharmacy, spawned an industry in the early 1970s, Norenberg said. He hopes, out of this collaboration, new products, companies and jobs will be created in New Mexico. Most of the medical isotopes used in U.S. hospitals and clinics come from Canada.

The effort could lead to new drugs — and more.

"It's not just to develop isotope-based medicines, but it's to use the isotope-based technologies to study medicine in the treatment of cancer," Norenberg said.

Meanwhile, doctors need to be better trained in nuclear medicine. UNM plans to make it part of medical oncology training, he said.

Clinical testing would be the work of Lovelace Respiratory Research Institute, UNM's Cancer Research and Treatment Center, and the MIND Institute. Marketing and distribution would involve TCI Medical and other companies.

Dr. Don Shina of St. Vincent's cancer center said a great breakthrough would be to find isotopes that can attack widespread cancer in the body.

"I think the biotechnology, which this represents, potentially has a great benefit to patients by controlling diseases while limiting the side effects of treatment," he said.

The key is to be able to target cells precisely without causing toxicity or damage to normal tissue. "I don't think anyone's ever achieved that yet," he said. "There's always a risk of some minimal damage to normal surrounding tissue."

The center is looking for $2 million to $3 million a year in state and federal funds.

Last week at New Mexico's capitol, Gov. Bill Richardson said, "We've got to get this thing moving. I'll help you."

Comments

By Chris Mechels (Submitted: 03/14/2005 10:57 am)

Missing from this article is balance. We hear from the advocates; how about the critics? An advantage is claimed for LANL in that it is not subject to the "profit motivations of a private company". This is another way of saying that LANL is not cost effective; and is wasting large amounts of taxpayer funds on this project. Since when is wasting tax money a good thing?

The whole idea of producing isotopes with an accelerator, rather than a reactor, is suspect. Canada uses a reactor to produce the isotopes mentioned. Another one of LANL's schemes to justify their accelerator; which has been funded through the efforts of Domenici, in the face of ecomonic constraints.

This article presents none of the counter arguments, against this program. There are many.

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