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# INNOVATIVE SCANNER

**Scientists at the Jagiellonian University in Cracow are building an innovative positron emission tomography (PET) scanner that will diagnose diseases such as cancer and heart problems as well as neurological and mental disorders.**

The new scanner will be much cheaper to use than standard devices of its kind. At the same time, the scanner will make imaging of physiological processes throughout the patient's body possible during a single examination—something that cannot be done with today's scanners, according to the inventors.

The new scanner is being tested in laboratories. It differs from standard computed tomography (CT) scanners currently in use in many hospitals and clinics. It is based on innovative technology that allows for non-invasive examination and imaging of physiological processes occurring inside the human body.

The design involves the use of a specially synthesized type of polymer that acts as the scanner's scintillator—a material in which light flashes are generated by gamma rays. These flashes enable the operator to examine radioactive decay in the patient's body and to observe the growth of a tumor, even at an early stage of cancer impossible to notice with the naked eye.

In most existing PET devices, special artificially grown crystals are used to register (detect) gamma rays. These are expensive, as a result of which scanners are usually fitted with narrow rings that allow only individual body organs to be examined in a single run. The Cracow inventors have shown that these crystals can be replaced with organic materials that are several times cheaper.

Another important advantage of the new scanner is that its diagnostic chamber can be easily enlarged. Physicians will thus be able to scan a much larger area of the patient's body than before—and thus diagnose the problem more fully and more accurately.

CT scans play an important role in monitoring the results of medical treatment, especially in oncology, cardiology, neurology, psychiatry, and gastroenterology. They are also a fundamental tool in studying the brain.

Project leader Prof. Paweł Moskal, from the Jagiellonian University's Faculty of Physics, Astronomy and Applied Computer Science, says he came up with the idea six years ago while on a research fellowship in Jülich in Germany, one of the largest interdisciplinary research centers in Europe. He adds he was motivated by sheer scientific curiosity and a passion for experimentation.

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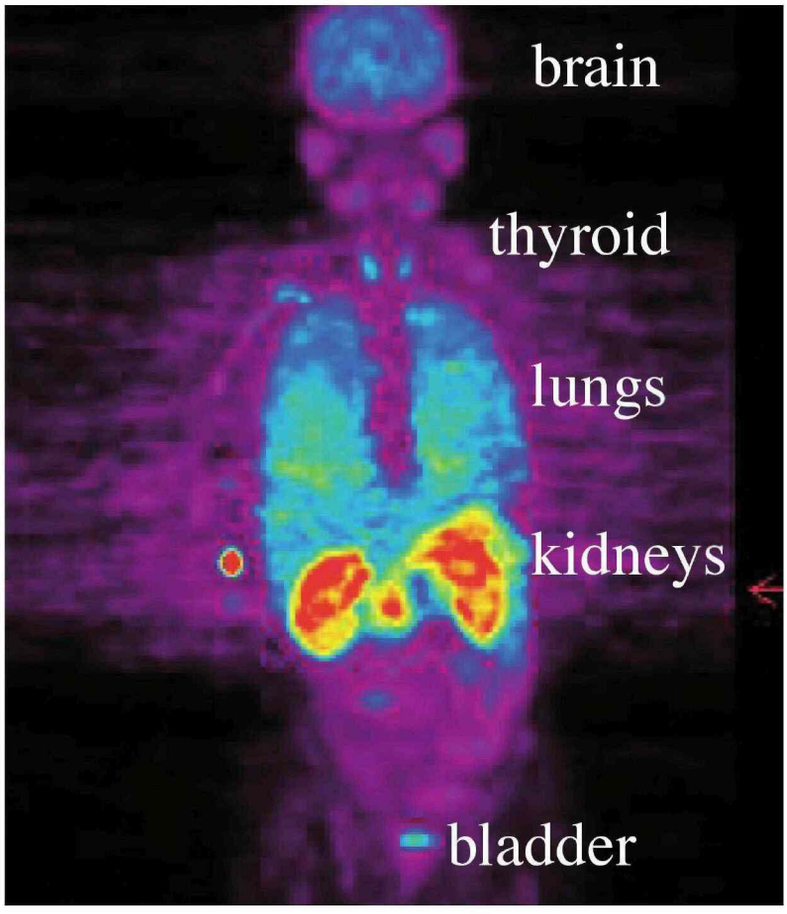


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The idea of building an innovative scanner slowly matured. With time a growing number of experts enthusiastic about the idea, among them mathematicians, chemists, nuclear physicists, specialists in materials science and electronics, computer scientists and doctors, began to gather around Moskal. Eventually they created a project that won a gold medal at the Eureka international exhibition of inventions and new technology in Brussels. Last year Poland's National Center for Research and Development (NCBiR) forked out zl.5 million to support the research project. A prototype of the positron emission tomography scanner should be ready in two years.

Experts say the project could result in a unique scanner—a piece of equipment that no one else has constructed so far, not even major PET scanner producers such as Siemens or Philips.

When will that be? For now, there is no clear answer to this question, but the project is well advanced. The technical solutions proposed by the scientists—aided by experts from various disciplines—are the subject of two patent applications.

All scanners available on the market at the moment use expensive and specially grown inorganic crystals to record (detect) nuclear radiation. In the device developed by the Cracow scientists, these will be replaced by polymers, which are several times cheaper and will help significantly reduce the costs.

The use of polymers, which, unlike crystals, can be of any size and shape, will make it possible to build chambers of various sizes and to scrutinize physiological processes throughout the patient's body. The chamber can be enlarged without pushing the costs of the scanner up.

The Jagiellonian University's Center for Innovation, Technology Transfer and University Development (CITTRU) is in charge of promoting the invention and putting it to commercial use. The center is in talks with prospective business partners interested in using the device.

Teresa Bętkowska