Scientists identify an alternative system for producing the medical isotope scandium-44

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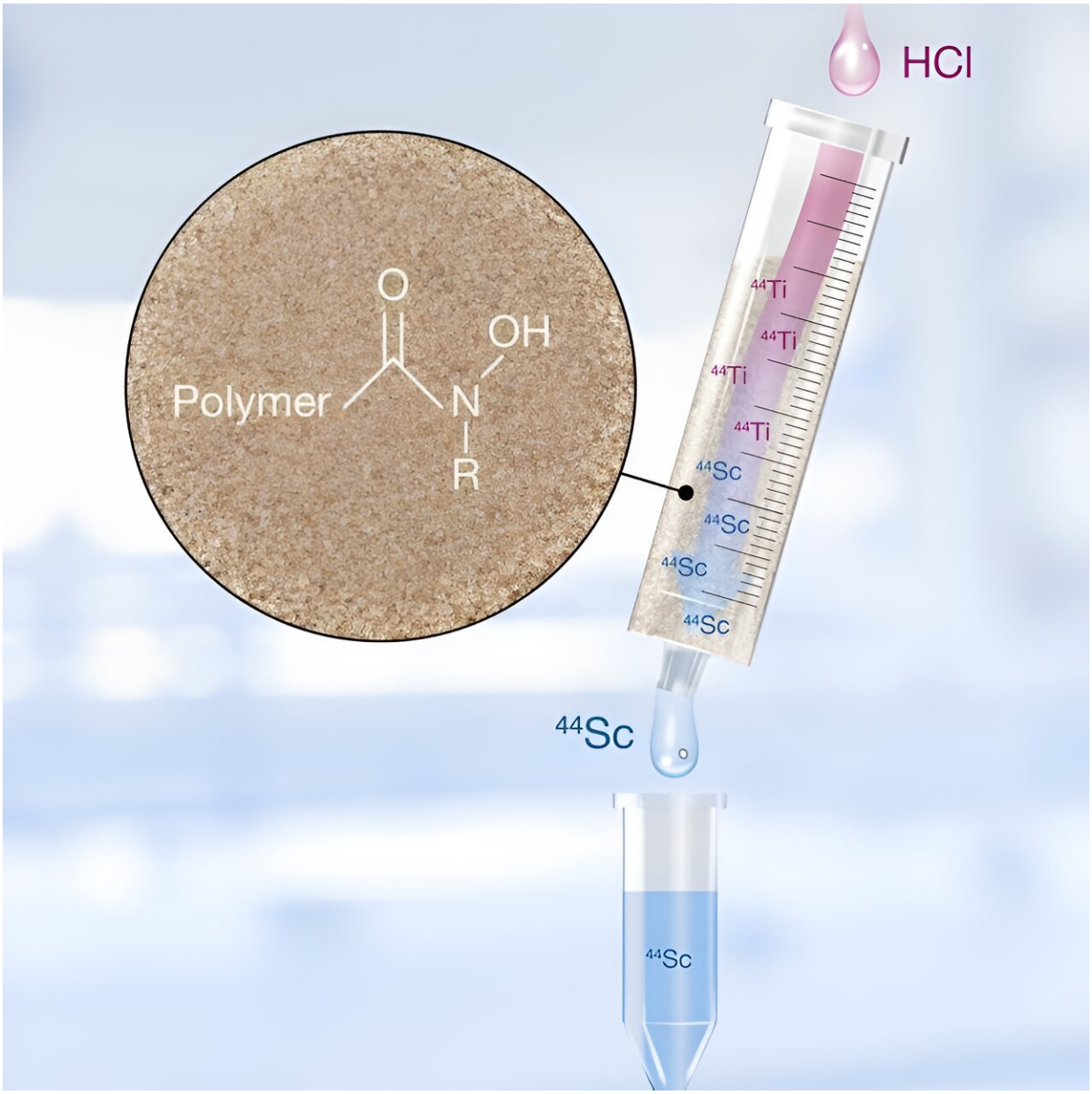

Depiction of a titanium-44/scandium-44 generator. The generator consists of a hydroxamate-based resin undergoing scandium-44 elution with hydrochloric acid. Credit: Brookhaven National Laboratory

Scandium-44 is a promising medical isotope for positron emission tomography (PET) imaging. PET allows doctors to measure the activity of the cells in the body to help identify cancer, heart disease, and other conditions. Scandium-44 can be produced through the radioactive decay of titanium-44. Because it decays much more slowly than scandium-44, the same batch of titanium-44 can produce enough scandium-44 for many years of PET scans.

The challenge is to reliably separate scandium-44 from titanium-44 at hospitals. Now researchers have a new solution. They used an organic molecule called hydroxamate to immobilize titanium-44 on a resin. Next, they passed a liquid designed to remove only the scandium-44 through the resin. This process can be repeated as more scandium-44 is produced each day.

Their paper is published in the journal *Applied Radiation and Isotopes*.

The isotopes used for PET imaging today are mostly made at hospitals with particle accelerators. This limits access to PET imaging procedures. The researchers behind the new resin technology want to change that. They incorporated the new resin into a device called an isotope generator. Generators are portable and their use requires facilities routinely available at hospitals. This new approach will enable medical staff to use isotopes such as scandium-44 more easily. The Department of Energy Isotope Program's goal is to make scandium radioisotopes routinely available in the near-term.

The researchers collected key data demonstrating the potential of this approach. Importantly, they saw improved reliability and durability compared to other isotope generators for scandium-44. The researchers also demonstrated that the scandium-44 was pure enough for efficient radiolabeling. This is an important indicator that the scandium-44 can be used to make PET imaging agents. With these exciting developments, scandium-44 is one big step closer to being evaluated for use in medical procedures.

More information: Leah Gajecki et al, Evaluation of hydroxamate-based resins towards a more clinically viable 44Ti/44Sc radionuclide generator, *Applied Radiation and Isotopes* (2022). DOI: 10.1016/j.apradiso.2022.110588

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