

Cancer scans to be revolutionised by nuclear start-up

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BBC

Research scientists at the Bristol start-up are trying to transform the production of nuclear material for cancer scans. Nuclear scientists believe they have found a way to transform the supply of vital material used for scanning cancer patients.

Doctors use so-called radioisotopes to pinpoint the growth of cancer in patients. But the radioactive material is all produced by ageing reactors outside the UK, and sometimes the supply is interrupted.

Dr Tom Wallace-Smith, technical director of Bristol's Astral Systems, said they developed a technique that produces the material here in the UK.

He said this has the potential to "eliminate the delays that have plagued" cancer treatments.

The team in Bristol have come up with a whole new approach, using nuclear fusion rather than fission.

And rather than requiring a new nuclear plant, which would cost about £400m to build, they can develop the material in small plants "right by hospitals" for about £1m, Dr Wallace-Smith said.



A patient is scanned at the Bristol Royal Infirmary. Every year 300,000 people are given scans using radioisotopes

Every year, radiologists scan about 300,000 patients using these radioactive radioisotopes, with consultants saying they would not be able to do their work without them.

In October, the world of nuclear medicine was hit by a major crisis. Outside the niche speciality, few noticed because doctors and health managers implemented a rapidly assembled rationing system for vital scans.

Britain gets all of its supply from three reactors in Europe. In October two of them shut down for planned maintenance at the same time, and then the third sprung a fault.

"Something like 75% of our supply was lost," said Dr Stephen Harden, from the Royal College of Radiologists.

All patients needing urgent diagnostic scans were seen on time, but thousands of more routine check-ups were delayed.

The interruption only lasted three weeks, but it highlighted what Dr Harden called the "ageing and fragile" supply chain.

He explained: "It makes a really strong case for making these radioisotopes in the UK."



Dr Tom Wallace-Smith wants to "reignite Britain's neutron industry"

In 2017 a UK Government report said six nuclear reactors made 85% of the radioisotopes used worldwide. By 2030, five of them will be retired.

Many of these reactors were built in the 1960s and 1970s. Building a new one is expensive and takes years.

In North Wales, there are plans to build such a reactor, which will cost £400m.

Like all nuclear fission plants, they are controversial. Their raw material is uranium, and the radioisotopes they produce are, by design, radioactive.



There are 18 staff at the new start-up firm, Astral Systems, but that will grow in the next year.

Astral Systems has developed technology that can now make the same radioisotopes used in hospitals, on demand.

Small reactors could be built for under £1m, less than the price of the scanner that uses the radioactive product.

Now, the team is building a new kind of fusion reactor, which will be able to produce any kind of radioisotope for research or medicine, right by the hospitals that need it.



Dr Randeep Kulshrestha runs the Nuclear Medicine department at the Bristol Royal Infirmary

At the Bristol Royal Infirmary, I watched as a patient lay on the scanner bed, ready for his session. He was fully clothed, but the vital preparation was internal.

"Three hours before the scan, we inject patients with a tiny amount of radioactivity," explained consultant radiologist, Dr Randeep Kulshrestha.

The radioisotope is tagged to substances that will go to whatever area doctors are interested in, for example the bones.

The camera will then pick up the radioactivity in such a way that doctors can see how, for example, a cancer has spread.



Images from a scan using radioisotopes that show how cancer has spread to a patient's bones. The areas lit up orange or purple are affected.

Dr Kulshrestha showed me pictures taken from an anonymous patient, where doctors suspected cancer had spread from his prostate to his bones.

Sadly for the person involved, the images are stark. Areas on the bones are lit up orange, where the cancer has grown on their bones.

"These radioisotopes form a vital part of the diagnostic process", Dr Kulshrestha told me.

"We couldn't work without them these days."

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