



SAFER, DOMESTIC MEDICAL ISOTOPE PRODUCTION PROVIDES SECURITY FOR PATIENTS

THE CHALLENGE

Every year, millions of medical procedures rely on the radioisotope molybdenum-99 (Mo-99) to quickly and accurately diagnose heart and brain diseases, certain types of cancer, and other common life-threatening ailments.

In recent years though, a combination of planned and unexpected shutdowns of nuclear reactors that produced Mo-99 caused global shortages and delays in critical patient diagnoses.

The shortages especially impact the U.S., which uses half of all the Mo-99 produced worldwide. On top of that, until just recently, the U.S. had to import all of its Mo-99 from foreign producers.

With ceased operation of Chalk River reactor in Canada in 2018, one of the major Mo-99 producers, Canadian company Nordion stopped production of Mo-99 in North America. With Mo-99 having a 66-hour half-life, the U.S. faces time-sensitive transportation challenges.

THE COLLABORATIONS

Argonne National Laboratory works with NorthStar Medical Radioisotopes (Beloit, Wis.), SHINE Medical Technologies (Janesville, Wis.), Niowave (Lansing, Mich.) and other national laboratories to develop new methods that allow the U.S. to produce Mo-99.

With the assistance of Argonne, NorthStar is producing Mo-99 by irradiating enriched Mo and is also moving forward with accelerator-based production of Mo-99. Additionally, Argonne has developed a patented method to recycle the highly valuable enriched Mo-98 and Mo-100 material.

With SHINE, Argonne demonstrated a process that uses low-enriched uranium to produce and purify Mo-99. The separation process produces Mo-99 that meets industry purity standards.

For Niowave, Argonne developed and demonstrated a suite of separation methods to purify fission-made Mo-99.

THE IMPACT

- Thanks to crucial research with Argonne, NorthStar, SHINE and Niowave have the potential to produce 100 percent of the U.S.'s need for Mo-99.
- NorthStar has been commercially producing Mo-99 since 2018.
- In 2019, SHINE filed an application with the U.S. Nuclear Regulatory Commission for medical production of the isotope, and construction of their Radioisotope Processing Facility is underway. SHINE plans to produce Mo-99 commercially in 2023.

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