

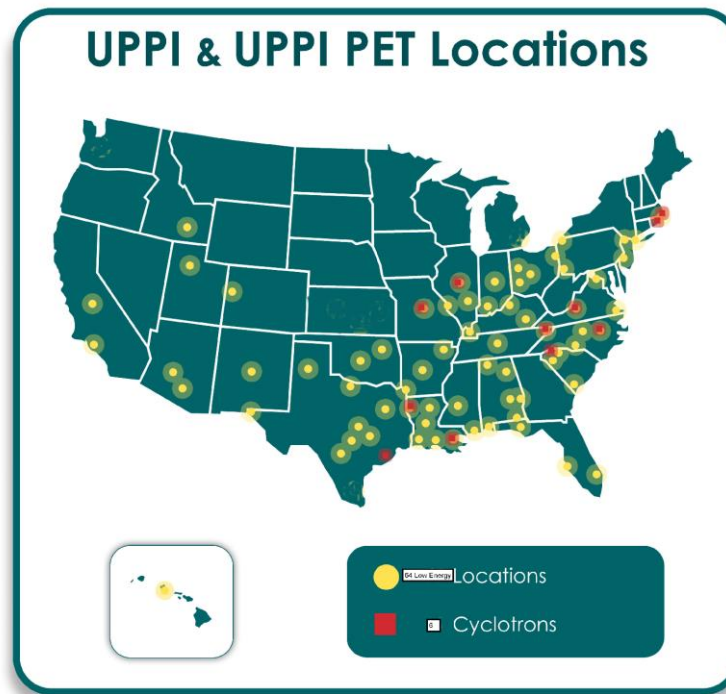
U.S. Mo-99 Supply Status – Industry Perspectives

**NNSA Mo-99 Stakeholder Meeting
Agenda**

June 22, 2022



About UPPI



- UPPI is an alliance of small business and hospital/university-owned nuclear pharmacies.
- Formed in 1998, with 60 low energy (Tc-99m) and 6 high energy (PET) nuclear pharmacies.
- UPPI represents 8,000 Tc-99m unit doses dispensed nationally each day.

UPPI LEU Walk



LEU Walk provided distribution in a limited, and growing, non-HEU Mo-99 generator placement in the early stages of availability.

Supply Chain: Contrast Media Supply Disruption Causes Increased Demand for Xe-133

May 26, 2022

Patients Face Long Delays for Imaging of Cancers and Other Diseases

Many U.S. hospitals are postponing scans used to diagnose diseases after a Covid lockdown in China hobbled the main U.S. supplier of an imaging chemical.

Lawmakers expressed concern about the scarcity of imaging agents. “In the wealthiest nation on Earth, there should be no reason doctors are forced to ration lifesaving medical scans to compensate for a shortage of material,” Representative Rosa DeLauro, Democrat of Connecticut, said in a statement. “We are seeing supply chains break down because of consolidated industries experiencing manufacturing shortages and offshoring American jobs to China.”

<https://www.nytimes.com/2022/05/26/health/dye-contrast-scan-shortage.html>

Supply Chain: Contrast Media Supply Disruption Causes Increased Demand for Xe-133

Testifying before a Senate committee on Thursday, Dr. Robert Califf, the commissioner of the U.S. Food and Drug Administration, said the shortage of contrast media was “just unbelievable.” Noting that some members of Congress had recently suffered serious illnesses, he added: “Someone with a stroke or heart attack wouldn’t be able to get an angiogram.”

<https://www.nytimes.com/2022/05/26/health/dye-contrast-scan-shortage.html>

The ACR offered the following recommendations for operating under a contrast shortage:

- Use alternative studies such as noncontrast CT, MR with or without gadolinium-based contrast, ultrasound with or without ultrasound contrast agents, or use nuclear medicine or PET/CT, when feasible.

<https://www.auntminnie.com/index.aspx?sec=sup&sub=cto&pag=dis&ItemID=135791>

Omnipaque and Visipaque disruption moved spiral CT lung imaging back to nuclear medicine lung V/Q scans increasing demand for Xe-133. The timing occurred after IRE return to service in Xe-133 production.

Conversion limiting factor –availability of masks for Ventilation Studies!

Supply Chain Possible Remedies for the Contrast Media Disruption

- *Allotment expectations.*
- *Prioritizing distribution for the most critical services.*
- *Distribution expectations.*
- *Managing demand for rescheduled services.*

https://www.radiologybusiness.com/topics/healthcare-management/leadership/aha-presses-ge-detailed-progress-report-ct-contrast?utm_source=newsletter&utm_medium=rb_policy

Sound familiar?

Remedies worked through with Mo-99 supply resilience improvements.

UPPI Efforts

- Distribution of non-HEU Mo-99 which led to growth of users (2013 to present).
- Advocacy for the CMS added-on reimbursement for LEU (non-HEU) Tc-99m that continues through 2022.
- VA Preferential Procurement continues with LEU (non-HEU) Tc-99m.
- IAEA TECHDOC Mo-99 and UPPI Model to be released in 2022.

FDA Efforts

FDA's Role in Helping a Critical Medical Isotope Meet Sufficient Supply in the US for First Time

Joseph Rajendran, M.D. from CDER's OND (Office of New Drugs), OSM (Office of Specialty Medicine), DIRM (Division of Imaging and Radiation Medicine) discusses how FDA's commitment helps to provide benefits to drug supply chain, national security. Recently FDA's CDER and the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA) recognized that the U.S. has reached a sufficient supply of molybdenum-99 (Mo-99) produced without highly enriched uranium (HEU). Mo-99 is an important radioactive isotope used in medical imaging to detect cancer and other potentially fatal conditions.

**Speaks to support of the supply chain of Mo-99,
new modalities to produce domestic Mo-99 and support for I-131.**

U.S. Food and Drug Administration usfda@public.govdelivery.com May 13, 2022

Views of the Current Market for Mo-99

- Mo-99 production, processing, generator fills and delivery to UPPI radiopharmacies held up with the HFR off-line situation.
- Mo-99 supply improved with NorthStar Medical Radioisotopes RadioGenix® placements.
- Concern for the production of Lu-177 and Y-90.
- New concern for the cold kit supply outages due to vial and stopper shortages with shift of components to worldwide COVID-19 vaccine production.

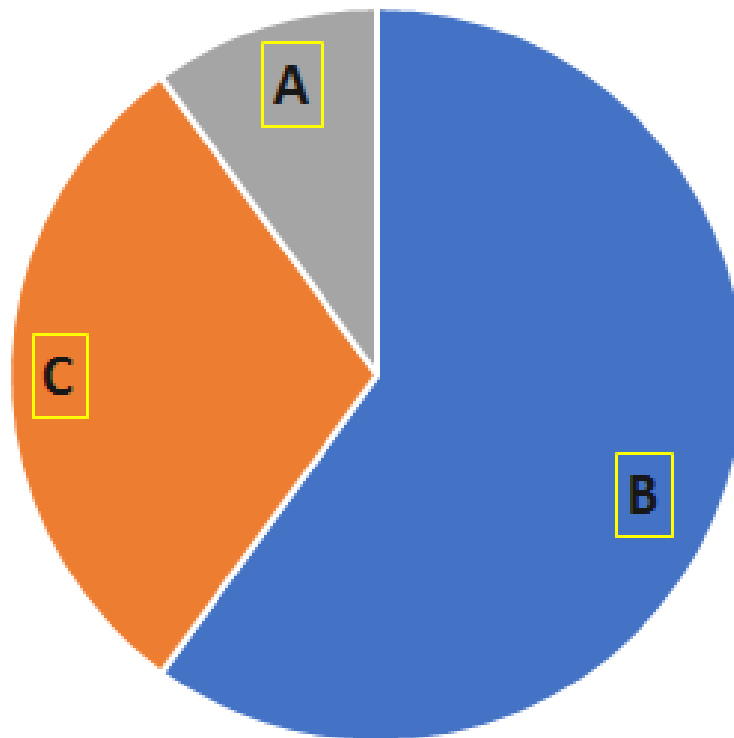
Supply Chain Shortages: Tc-99m Labeled Products

- Tc-99m methylene diphosphonate
- Tc-99m pyrophosphates
- Tc-99m mebrofenin
- Tc-99m human serum albumin
- Tc-99m sulfur colloid
- Tc-99m Cardiolite/sestamibi
- Tc-99m mertiatide
- Bone imaging
- Bone/blood pool imaging
- Biliary imaging
- Blood pool imaging
- Liver, sentinel node imaging
- Heart imaging
- Renal imaging

Cold kit shortages leads to loss of patient studies
and Mo-99/Tc-99m waste.

View of the Current Mo-99 Generator Market

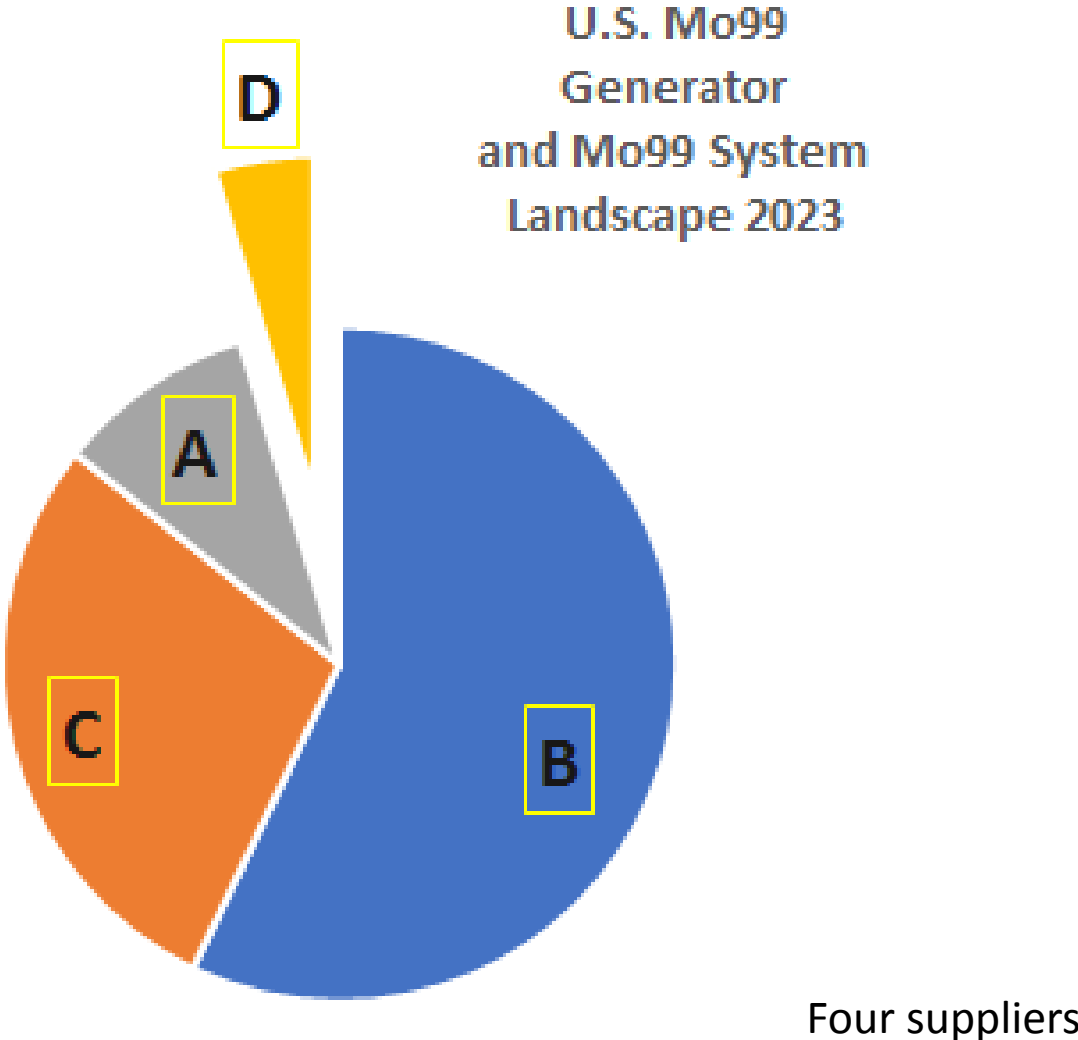
Current U.S. Mo99
Generator and
System
Landscape



Three suppliers.

U.S. Mo-99 Supply Status – Industry
Perspectives

View of the Near Term Mo-99 Generator Market



U.S. Mo-99 Supply Status – Industry Perspectives

Future Development and Trends: Beyond 5 Years

- Tc-99m products for breast, colon and lung creates production demands for Mo-99 generators.
- Number of SPECT cameras greater than PET cameras –provides greater number of imaging opportunities.
- Increased approval of radiotherapeutics drives imaging –potential pre-treatment and post treatment imaging.

Steps to Effectively Integrate the New Producers into the U.S. Supply Chain –The Longer Term

- Continue to harmonize regulatory agency approval processes between agencies.
- Funding might remain a consideration due to rising costs for new producers to reach completion of projects and final approvals.
- Modulate the transition from current Mo-99 production sources to new producers in the US.
- Consider action steps if sole producers of needed medical isotopes (i.e. Russia) drop out or cannot remain part of the supply chain.

End

Thank You

