A joint NASEM-RAS symposium—in cooperation with the IAEA

Mo-99 Production: Past, Present, and Future

Rania Kosti, Study Director
on behalf of

Dr. Hedvig Hricak, Co-Chair
Memorial Sloan Kettering Cancer Center
Previous Academies Studies on Medical Isotopes

Chair: Dr. Hedvig Hricak
Year: 2007

Dr. Chris Whipple
Year: 2009

Dr. S. James Adelstein
Year: 2016
Why are we here?

- Pursue opportunities for engagements between U.S. and Russian scientific and technical organizations
Global Mo-99 supplies are adequate at present to meet U.S. domestic needs. … The committee judges that there is a substantial (> 50 percent likelihood) of severe Mo-99/Tc-99m shortages after October 2016, lasting at least until current global Mo-99 suppliers complete their planned capacity expansions.
Panel Convened at Society of Nuclear Medicine and Molecular Imaging Meeting Say MO-99 Supplies are Secure

Leading experts outline investments made to bolster future of supply at Nuclear Medicine Meeting in Denver.

ST. LOUIS, MO (PRWEB) JUNE 28, 2017

Supplies of the critical medical isotope molybdenum-99 (Mo-99) are secure and reliable according to a panel of leading experts gathered at the Society of Nuclear Medicine and Molecular Imaging (SNMMI) 2017 annual meeting in Denver, Colorado in June. Mo-99 is the parent isotope of technetium-99m (Tc-99m), which is used in 30 to 40 million nuclear medicine procedures worldwide every year. (1)

Sally Schwarz, President of SNMMI, and Professor of Radiology at the Mallinckrodt Institute of Radiology at the Washington University School of Medicine in St. Louis, moderated the panel. The panel of top executives from Mo-99 producers addressed the specific steps that their companies are taking to ensure that the approximately 100,000 patients who rely on nuclear imaging testing worldwide each day will have access to the diagnostic care they need.
Why are we concerned about Mo-99?

• ~80% of all nuclear medical imaging procedures utilize Tc-99m.
• The United States consumes about 50% of global supplies of Mo-99 but currently does not produce any.
Demand for Mo-99/Tc-99m Drives Supply

• Decline in Tc-99m use in U.S. (and globally)

• Some factors responsible for decline:
  – More efficient use of Tc-99m
  – Decreasing office-based medical imaging
  – In U.S. introduction of Evidence Based Guidelines
  – Increased preference for competing imaging modalities (PET/CT)

• These factors will continue to operate in the future

Severe global shortages

Courtesy of Dr. Kathryn Morton, University of Utah
Demand for “Associated” Medical Isotopes

I-131

Xe-133

Estimated Number of Radiopharmaceutical Doses Approved by Medicare

- I-131 Nal total mCi
- I-131 Nal therapeutic mCi
- I-131 Nal diagnostic mCi

Estimated Number of Radiopharmaceutical Doses Approved by Medicare

- Tc-99m MAA
- Xe-133
- Tc-99m DTPA
Why are we concerned?

• Users around the world have been relying on a very small number of mostly old reactors.
• Severe global Mo-99 shortages in 2008-2010 highlighted need for supply reliability.
GLOBAL Mo-99 SUPPLY (July 2017)

FUEL
- LEU
- HEU
- LEU/HEU

TARGETS
- LEU
- HEU

BR2 (1961)
LVR-15 (1957)
HFR (1961)
NRU (1957)
Maria (1974)
SAFARI (1965)
OPAL (2006)
Mo-99 SUPPLY (~2020 SPECULATIVE)

- JHR (2020)
- BR2 (1961)
- Maria (1974)
- LVR-15 (1957)
- HFR (1961)
- FRM-II (2005)
- SAFARI (1965)
- OPAL (2006)

**FUEL**
- LEU
- HEU
- LEU/HEU

**TARGETS**
- LEU
- HEU
Mo-99 SUPPLY (~2030 EVEN MORE SPECULATIVE)

FUTURE

OPAL (2006)

FRM-II (2005)

PALLAS (2020)

JHR

LEU/HEU

HEU

LEU

FUEL

TARGETS

LEU/HEU

HEU

LEU
Who will we hear from?

Reliability in supply is crucial in meeting patient needs.
It is not just about making Mo-99

- Regulatory approval applications for Mo-99 and Tc-99m are demanding and require detailed manufacturing information, quality control information, and other.
THANK YOU