ORS
Office of Radiological Security
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Information on X-ray vs. Radioisotopic Irradiator Considerations

Cesium Irradiator Replacement Project (CIRP) Information:

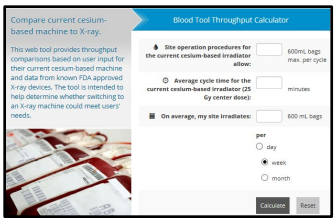
- The **CIRP brochure** is available for download from the Department of Energy.
- Congress passed the John S. McCain FY19 National Defense Authorization Act (NDAA) setting a goal for the DOE/NNSA of "eliminating the use of blood irradiation devices in the United States that rely on cesium chloride by December 31, 2027" (click the paperclip icon on the left navigation bar to open the relevant NDAA excerpt).
- The *Journal of Healthcare Protection Management*, Vol 35, No. 1 highlighted "NNSA Launches ORS 2020 Initiative To Replace Cesium Irradiators" (https://www.iahss.org/resource/resmgr/docs/reducing_and_remove_the_risk.pdf)

Research & Blood Irradiator Technologies information:

- A **good overview for anyone considering irradiator technologies is the presentation by Ms. Carolyn MacKenzie** describing the **University of California**'s irradiator replacement initiative. The presentation entitled "University of California System-wide Approach to Permanent Reduction of Cesium Irradiator's" is attached (click the paperclip icon on the left navigation bar to open this presentation).
- The **University of California (UC)** system collected a set of *research papers and resources* comparing cesium-137 (Cs-137) to X-ray irradiators and made them available for review here. This also has information on the X-ray models available in the U.S. If you have any questions about these resources or how they were collected, please direct them to **Ms. Carolyn MacKenzie at the University of California Berkeley** (**cjmackenzie@berkeley.edu**).
- As part of their replacement initiative, the **University of California** established a working group to investigate the feasibility of irradiator replacement throughout the UC system. The report with their recommendations to the UC President's Office can be found at the following link - University of CA System-wide Radioactive Source Replacement WG

Research & Blood Irradiator Replacements:

- ORS partnered with the **New York City Department of Health and Mental Hygiene** and the **Nuclear Threat Initiative** to hold a workshop in June 2017 in NYC on research and (to a lesser extent) blood irradiator replacement. Click here to watch the videos from the NYC-NTI workshop.
- **Blood Throughput Calculator - Compare current cesium-based machine to X-ray**. This web tool provides throughput comparisons based on user input for their current cesium-based machine and data from known FDA approved X-ray devices. Click here to access this **easy to operate tool** intended to help you determine whether switching to an X-ray machine could meet your needs.



- The **Nuclear Threat Initiative (NTI)** works with decision makers in the United States and across the world taking steps to eliminate the risk of dirty bombs through cesium-137 irradiator replacement. NTI has a number of useful resources on their web site - https://www.nti.org/learn/preventing-a-dirty-bomb/

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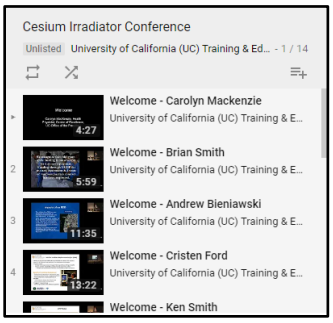

- ORS partnered with the **University of California** and the **NTI** to host workshops at UCLA and UCSF in January 2018. View the workshop presentations here (search for Cesium Irradiator Conference; the full conference video is available through the Video link and the individual presentations are available via the Conference Information link).
- As of January 2018, **Mount Sinai** migrated fully to alternative technology permanently reducing the risk posed by radioactive irradiators used clinically for **blood product irradiation** and in their **laboratory research**. They describe their comparison studies and migration experience, and encourage hospitals and research institutions to follow their lead in this report - https://www.nti.org/media/documents/Mt._Sinai_Final_Report.pdf

Testimonials from Field Experts of Research & Blood Irradiator Replacements:

- **Dr. Jacob Kamen from Mount Sinai Medical Center:**
  - Dr. Kamen spoke on the "Successful Migration from Radioactive Irradiators to X-ray Irradiators in One of the Largest Medical Centers in the U.S." at the 2018 INMM Annual Meeting. His abstract and article are available through INMM (INMM membership or fee required for access) - https://www.inmm.org/INMM-Resources/Proceedings-Presentations/Annual-Meeting-Proceedings.aspx
  - In "Mount Sinai Experience in Reducing and Removing the Risks of Malicious Use of Radioactive Materials," Dr. Kamen provides a full review on preparations for and removal all of **Mount Sinai**'s cesium-137 irradiators
    - The full article can be found on the Nuclear Threat Initiative's website here - https://www.nti.org/media//documents/Mount_Sinai_Experience_paper_6-5-2017.pdf
    - Excerpts from this article are highlighted in the *Journal of Healthcare Protection Management*, Vol 35, No. 1 in a story entitled "Reducing and removing the risks of terrorist use of radioactive materials." (https://www.iahss.org/page/Journal or here https://www.iahss.org/resource/resmgr/docs/reducing_and_remove_the_risk.pdf)
- **Ms. Marissa Hernandez of Morristown Medical Center** spoke on "Cesium-137 Blood Irradiator Replacement & Removal – Experience at Morristown Medical Center" at the 2018 INMM Annual Meeting. Her abstract and article are available through INMM (INMM membership or fee required for access) - https://www.inmm.org/INMM-Resources/Proceedings-Presentations/Annual-Meeting-Proceedings.aspx
- The **University of California** is sharing the attached X-Ray Irradiator comparisons for both blood and research (click the paperclip icon on the left navigation bar to open these excel files). If you have any questions about these comparisons, please direct them to **Ms. Carolyn MacKenzie at the University of California Berkeley** (**cjmackenzie@berkeley.edu**).
- **Dr. Colin, Hill, Ph.D., Associate Professor, University of Southern California Radiobiology Department** made a training video (http://www.youtube.com/watch?v=Lvkwel8XShA) explaining the use of the Precision X-Rad 320 X-ray irradiator at the University of Southern California Health Science Campus. Note that this is one machine and others may have different configurations and capabilities. *Disclaimer: These are Dr. Hill's own opinions and not an endorsement of Precision X-ray. Dr. Hill received no encouragement or remuneration for making this video*.