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U.S. X-ray Irradiation Market Size, Share & Trends Analysis Report By Application (Medical Devices, Pharmaceuticals, Biotech & Laboratory Supplies), By Size (Small-scale, Mid-scale, Large-scale), And Segment Forecasts, 2025 - 2033

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Abstracts

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U.S. X-ray Irradiation Market Trends

The U.S. X-ray irradiation market size was valued at USD 365.98 million in 2024 and is expected to grow at a CAGR of 11.95% from 2025 to 2033. The growth is attributed to a combination of regulatory initiatives, healthcare advancements, and national security priorities. A key driver is the Cesium Irradiator Replacement Project (CIRP) led by the U.S. Department of Energy, which provides funding and support for replacing cesium-137-based devices with non-radioactive X-ray systems in hospitals, research labs, and blood centers. The growing prevalence of cancer, transplant procedures, and immunocompromised patient populations has heightened the need for safe, efficient blood irradiation technologies. Moreover, the U.S. hosts one of the world's largest biomedical research networks, where X-ray irradiators are increasingly used for radiobiology, oncology, and preclinical applications, strengthened by federal research grants and institutional investments. With strict regulatory oversight from agencies like the FDA and NRC, the U.S. remains at the forefront of adopting innovative, secure, and compliant X-ray irradiation solutions.

The industry is further propelled by expansions, such as in May 2025, Sterigenics' announcement of new X-ray sterilization capabilities in the Southeast United States, reflecting rising demand for non-radioactive, scalable sterilization solutions. This move

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underscores the growing need for regional access to safe and efficient medical device sterilization, particularly as healthcare providers and manufacturers seek alternatives to gamma and ethylene oxide methods amid increasing regulatory scrutiny. Such investments support faster turnaround times and reduced logistics costs and align with national efforts to modernize sterilization infrastructure and phase out radioactive materials, supporting the U.S. market's leadership in advanced X-ray irradiation technologies.

The growing shift toward outsourcing sterilization services significantly drives the industry, as medical device manufacturers, pharmaceutical firms, and healthcare providers seek more cost-effective and compliant solutions. By partnering with specialized third-party sterilization providers, these organizations can reduce capital investments in in-house infrastructure and benefit from established service providers' expertise, scalability, and regulatory readiness. For instance, IBA's agreement with Steri-Tek in June 2024 to install a fully integrated Be Wide X-ray solution underscores how service providers are expanding capacity to meet growing client needs. These developments illustrate how outsourcing trends fuel investment and innovation in the market.

The rising prevalence of cancer in the U.S. is a major driver of the X-ray irradiation market, as it increases the demand for safe and reliable blood transfusion practices and advanced research tools. Cancer patients undergoing chemotherapy, radiation therapy, or bone marrow transplants are highly immunocompromised and require irradiated blood components to prevent life-threatening conditions such as Transfusion-associated Graft versus Host Disease (TA-GvHD). This has led to the adoption of X-ray blood irradiators in hospitals and transfusion centers as a safer alternative to cesium-based devices. Additionally, the surge in oncology research across U.S. academic institutions and biopharma companies fuels demand for precise, benchtop X-ray systems used in radiobiology and cancer modeling. According to the American Cancer Society, with over 2 million new cancer cases projected in 2024, the need for safe transfusion protocols and cancer-focused research infrastructure continues to support strong growth in the market.

U.S. X-ray Irradiation Market Report Segmentation

This report forecasts revenue growth at the country level and provides an analysis of the latest trends in each of the sub-segments from 2021 to 2033. For this study, Grand View Research has segmented the U.S. X-ray irradiation market report on the basis of application and size:

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Application Outlook (Revenue, USD Million, 2021 - 2033)

- Medical Devices
- Pharmaceuticals
- Biotech & Laboratory Supplies
- Others

Size Outlook (Revenue, USD Million, 2021 - 2033)

- Small-scale
- Mid-scale
- Large-scale

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