



PRECLINICAL FLASH RADIOTHERAPY

Accessible
Accurate
Flexible

The first X-ray based FLASH
irradiator suite for translational
radiation research

 **xstrahl**

FLASH – or ultra-high dose rate – radiation delivery has the potential to revolutionize the clinical treatment of cancer. FLASH is a promising emerging technique due to its ability to limit healthy tissue toxicity and potentially allow dose escalation. The clinical evidence to date is positive but preclinical research is paramount to fully investigate the physics, biology, and efficacy of FLASH treatments.



SARRP FLASH



Opposing X-ray tubes



CIX FLASH



Xstrahl, working closely with a leading academic research institution, has delivered the first X-ray based FLASH irradiator suite for translational radiation research.

- **Accessible for everyone:** Delivers an entirely lab-based solution, eliminating the need for large accelerators or electron systems.
- **Accurate targeting:** Generates minimal penumbra compared to electrons due to negligible lateral scatter.
- **Flexible configurations:** Available in both cabinet and image-guided configurations to best support research needs.

CLINICAL POTENTIAL OF FLASH

FLASH radiotherapy (FLASH-RT) is a novel, emerging technique whereby tumors are treated with ultra-high dose rates of radiation magnitudes higher than conventional irradiation. Remarkably, this has been shown to reduce damage to normal tissue while still effectively treating diseased areas when compared to conventional therapy.

Xstrahl's suite of photon FLASH irradiators gives investigators the tools to expand preclinical radiation studies using a patented FLASH technique, further supporting translational research into effective cancer treatments. Xstrahl is proud to connect investigators from diverse audiences to inspire science and advance care with successful preclinical image-guided studies in radiation research.

The Xstrahl FLASH irradiators mark a milestone with the availability of systems specifically designed for preclinical research that can be used in a standard laboratory environment.

Part of the success of translational research is the application of findings from preclinical studies to clinical practice and vice-versa. There are a lot of open questions in FLASH radiotherapy that require dedicated preclinical irradiators. As more investigators seek to further study highly conformal radiotherapy techniques and more thoroughly examine the transformative potential of FLASH

irradiation, a new generation of X-ray irradiators must be developed to meet these preclinical research needs.

A cornerstone of FLASH research is the comparison to conventional radiotherapy treatments to characterize the differential effects of both treatment modalities. Xstrahl's FLASH irradiators can deliver preclinical radiotherapy not only at FLASH dose rates but also at conventional dose rates, thus eliminating any confounding factors in comparative studies.

Exceptional FLASH Options for Research

CIX FLASH is an easy-to-use cabinet system that is ideal for small animal FLASH experiments. It has a quick experimental set-up process with simple collimation and optimal ease-of-use. This system matches the workflow of electron systems with a much smaller footprint and better beam profile.

SARRP FLASH is the first image-guided FLASH system. It leverages Xstrahl's deep preclinical expertise in IGRT delivery. SARRP FLASH provides a clinically relevant workflow with FLASH dose rates and on-board CBCT imaging capabilities.

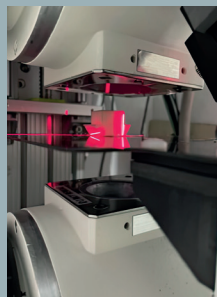
Adaptable for Spatially Fractionated Radiotherapy

Due to the ultra-high dose rate and narrow penumbra, the CIX FLASH and SARRP FLASH systems are well suited for spatially fractionated research. The FLASH suite can be adapted for mini and micro-beam collimation.

PRODUCT CONFIGURATIONS

CIX FLASH

- Easy-to-use, simple cabinet system for small animal FLASH experiments
- Plug-and-play to ensure quick experimental set-up and optimal ease-of-use
- A much smaller footprint and better beam profile compared to electrons



SARRP FLASH

- First image-guided FLASH system, leveraging Xstrahl's deep preclinical expertise in IGRT delivery
- On-board CBCT imaging capabilities
- Clinically relevant workflow, but with FLASH dose rate



“The SARRP FLASH is a leading system that provides us with unparalleled research capabilities to explore radiobiological responses at ultra-high dose rates. We are hugely excited about the potential of the system and how it can be used to advance our understanding of this potentially transformative approach.”

— Dr. Karl Butterworth, Advanced Radiotherapy Group, Patrick G Johnston Centre for Cancer Research, Queen's University Belfast

SARRP FLASH Two opposing X-ray tubes with mirrored anodes to offset heel effect

Tube power 100 kW

Tube voltage 150 kVp

FLASH dose rate >100Gy/s

Dimensions 28" W x 39" D x 81" H
159 cm x 98 cm x 204 cm

Computer controlled robotic motion:

- Independent motion of tubes in radial/ θ directions of gantries
- XYZ motion of animal bed to adjust specimen placement
- Rotation of animal bed

» On-board μ CT capability

» Variable tube separation for FLASH or conventional dose rate delivery

» Lasers for coarse alignment

» On-board anesthesia lines

» Collimators available

» Optical monitoring cameras

» Fully self-shielded

CIX FLASH Two opposing X-ray tubes with mirrored anodes to offset heel effect

Power 100 kW

Max Tube voltage 150 kVp

FLASH dose rate >100Gy/s

Dimensions 28" W x 23" D x 40" H
71 cm x 58 cm x 101 cm

» Variable tube separation for FLASH or conventional dose rate delivery

» Moveable animal bed to adjust specimen placement

» Lasers for coarse alignment

» On-board anesthesia lines

» Collimators available

» Fully self-shielded

References

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Miles D, Sforza D, Wong J, Rezaee M. Dosimetric characterization of a rotating anode x-ray tube for FLASH radiotherapy research. *Med Phys*. 2023; 1-10. <https://doi.org/10.1002/mp.16609>



LEARN MORE ABOUT
XSTRAHL'S FLASH SUITE

About Xstrahl

Xstrahl is a medical technology company that designs clinical and research systems to help eradicate cancer. For more than 25 years, Xstrahl has been shaping the development of superficial and orthovoltage therapies for cancer treatment and advancing pre-clinical research. Xstrahl systems are in operation at more than 700 treatment and research facilities worldwide.

Xstrahl.com

