Enabling Preclinical Imaging and Radiotherapy Research

Funding received from the Canadian Foundation for Innovation (CFI) enabled recent technology improvements at the Research Innovation Core Facility known as STTARR (Spatio-Temporal Targeting and Amplification of the Radiation Response). A cutting-edge SmART + preclinical irradiator system, from Precision X-Ray, was installed in November 2022, and the 7T small-bore MRI scanner was upgraded to Bruker's state-of-the-art platform in May 2023. Both units are located on the 7th floor of the Princess Margaret Cancer Research Tower.



Naz Chaudary, Ph.D. STTARR Manager; Rita Chen, B.Sc. SmART+ Lead

SmART + preclinical radiotherapy irradiator is now available at UHN's STTARR Innovation Core facility.





An inside view of the SmART+ irradiator located in the STTARR facility.

The SmART + system replaces the X-RAD225 precursor, which had been used as a preclinical irradiator at UHN for over a decade. The new system is based on the X-RAD225, which was co-developed at UHN by Dr. David Jaffray and the late Dr. Richard Hill in collaboration with Precision X-Ray.

The new radiotherapy system will continue to enable researchers to precisely irradiate tissues and cells in pre-clinical models. The SmART + system provides a fully integrated animal treatment planning (ATP) and delivery software. The multi-modality image guidance of cone-beam computed tomography (CT) feature enables researchers to accurately target the anatomy or tumor of interest, and the Bioluminescent Imaging (BLI) feature can precisely deliver the irradiation to specific cells, tissues/tumour of interest with minimal exposure to surrounding tissues.

The lead researchers on the CFI John R. Evans Leaders Fund were Drs. <u>Marianne Koritzinsky</u> and <u>Michael</u> <u>Milosevic</u>. Support for the CFI application was provided by the *Strategic Research Initiatives Development (StRIDe)* team. Digital support for the SmART + ATP software is provided by the *UHN Digital* computational consultant and technical specialist Steve Ansell. Support for the operation of the equipment is provided by the STTARR radiation physics team: Drs. <u>Patricia Lindsay</u>, <u>Edward Taylor</u>, <u>Jan</u> <u>Seuntjens</u>, and <u>Daniel Letourneau</u>. Dr. Naz Chaudary, the STTARR facility manager and research scientist, oversees the operation of the equipment. The purchasing process was supported by Piryanka Sasidharan, a junior project manager from *Research Facilities Planning and Implementation*, who worked in collaboration with *Research Laboratory Services* and *UHN Safety Services*.