

Press release – 4 May 2021

“Flash” radiotherapy: another step towards clinical applications for Institut Curie and SIT



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Institut Curie and the Italian company SIT have sealed their collaboration by signing a first joint research project in the field of "Flash" radiotherapy. After several months of work, the two partners now have a high-performance, reliable and operational experimental research platform (ElectronFlash). This new device paves the way to potential clinical applications of Flash radiotherapy and opens up new horizons in cancer treatment.

Radiotherapy is, along with surgery, the most effective technique for the treatment of solid tumors. In France, about 2 out of 3 people suffering from cancer are treated by radiotherapy during their illness. Although considerable progress has been made in the field in terms of imaging, ballistics and dosimetry, over the last few decades, the technologies used in electron accelerators and the methods of dose delivery have not changed much. **However, over the past 7 years, the discovery of the Flash effect inside Institut Curie's laboratories has led to a real paradigm shift in radiotherapy.** Using very intense beams delivered in a very short time, this "Flash" technique (with ultra-high dose rate) destroys tumor cells in *in vitro* and preclinical models, while sparing healthy tissue and considerably reducing treatment times.

ElectronFlash: a unique and operational device set up at Institut Curie

Since 2019, Institut Curie researchers have been working closely with the company SIT, one of the few companies in the world, capable of designing, manufacturing and distributing miniaturized mobile electron linear accelerators for Intra Operative electron Radiation Therapy (IOeRT) and for FLASH Radiation Therapy systems. SIT, following Institut Curie specifications designed and developed an experimental research platform (ElectronFlash) manufactured in Italy by SIT and now installed at Institut Curie site in France. After the final phases of development and implementation, the ElectronFlash is now operational for the start of a series of new studies and preclinical), which are essential before moving on to a clinical



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Orsay,

(*in vitro*
phase.

"The technology deployed at the heart of our device is unique, extremely precise and very efficient. We have demonstrated that our platform is operational and we are very enthusiastic about pursuing our

research
work

with SIT towards new phases that we hope will lead clinical applications of Flash radiotherapy for **Marie Dutreix**,

CNRS research director and team leader at Institut Curie. "However, we will only be able to carry out our work successfully through collective and interdisciplinary work, involving researchers and teams of physicians, physicists, biologists and radiobiologists from Institut Curie hospital complex."

A step closer towards clinical applications

The partners will start their work by setting three objectives:

- Determine the optimal physical parameters of the device (dose rate, pulse structure...) to maximize the Flash effect.
- Demonstrate the anti-tumor effect of Flash radiotherapy on *in vitro* and preclinical models, and ensure the quality and safety of this treatment.
- Prepare the next clinical applications.

To do so, Marie Dutreix's team will analyze the fundamental biological parameters and molecular mechanisms underlying the Flash effect. They aim to understand what differentiates tumors and healthy tissues regarding the response to radiation, and what are the processes involved in Flash irradiation compared to conventional irradiation.

These studies might lead to the development of the next generation of electron accelerators, and could be used clinically, especially for intraoperative radiation therapy. Patients would benefit from a less heavy treatment, with potentially increased anti-tumor efficacy.

"We are proud and eager to partner with Institut Curie! The development of the research platform ElectronFlash has helped us in focusing, understanding and solving the huge challenges for the next Flash clinical device. It will be able to deliver the treatment as per the indications which Institut Curie will identify through its research," said **Giuseppe Felici, SIT Scientific Director.**

"We are delighted with the signing of this partnership with the Italian company SIT, which will accelerate research and development work on a technology that could revolutionize conventional radiotherapy. With Flash technology, Institut Curie is reviving a century of innovation in radiotherapy, an expertise that goes back to the founding work of Pierre and Marie Curie," concluded **Amaury Martin, PhD, head of Technology Transfer Office at Institut Curie and Institut Carnot Curie Cancer.**

About SIT

Founded in 2012, SIT (Sordina IORT Technologies S.p.A) is the result of the merger and acquisition of NRT (the manufacturer of NOVAC) by Sordina (the manufacturer of LIAC). Offering a top quality combined with a personalized service, SIT is one of the few worldwide players able to design, develop, build, test and sell high-tech linear accelerators. The company guarantees a total control on all the key components of its high performances systems achievable thanks to the in-house high vacuum laboratory, radiofrequency laboratories, assembling areas, testing bunkers and off course extensive field know how. Together with the current IOeRT accelerators and the FLASH preclinical research systems, SIT is developing an all new IOeRT FLASH technological platform which will be available for clinical treatments in 2022.

For more information, visit: www.soiort.com

About Institut Curie

Institut Curie, France's leading cancer center, combines an internationally-renowned research center with a cutting-edge hospital group that treats all types of cancer, including the rarest. Founded in 1909 by Marie Curie, Institut Curie employs 3,500 researchers, physicians, and health professionals across three sites (Paris, Saint-Cloud, and Orsay), working on its three missions: treatment, research, and teaching. A private foundation with public utility status, Institut Curie is authorized to receive donations and legacies, and thanks to the support of its donors, is able to make discoveries more quickly, improving treatments and quality of life for patients.

For more information, visit: www.curie.fr



Since 2011, Institut Curie is certified "Institut Carnot Curie Cancer". The Carnot label is a label of excellence granted to academic research structures with proven high quality and involvement in partnership research. Curie Cancer offers industrial partners the opportunity to

set up research collaborations, benefiting from the expertise of Institut Curie teams, for the development of innovative therapeutic solutions against cancers from the therapeutic target to clinical validation.

For more information: <http://www.instituts-carnot.eu/fr/institut-carnot/curie-cancer>

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