



# From conventional dose-rate to FLASH radiotherapy

Lectio magistralis by  
Vincent Favaudon, Institut Curie



**SAPIENZA**  
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Tuesday, October 25, 2022  
12.00 pm

Aula Francesco Calasso -Law Building  
(Edificio di Giurisprudenza)  
piazzale Aldo Moro 5, Roma

# From conventional dose-rate to FLASH radiotherapy: unveiled aspects of the dynamic of cell and tissue response to ionizing radiation

Lectio magistralis

by Vincent Favaudon, Institut Curie

The radiation dose-rate is the most versatile and badly controlled factor in radiotherapy and research in radiobiology.

From brachytherapy to external beam radiotherapy, most current facilities deliver electrons, photons or protons at dose-rates between 0.001 and 0.40 Gy/s. Eight years ago ultrahigh dose-rate irradiation (UHDR, intra-pulse dose-rate  $\geq 105$  Gy/s) unexpectedly demonstrated dramatic sparing of mouse lung from radio-induced fibrosis without modification of the antitumor efficiency.

This disruptive concept, known as the FLASH effect, has been confirmed in all mouse organs tested so far as well in higher mammals and in a patient treated for surface-seated tumors. Together with the recent expansion of stereotactic radiotherapy without flattening filter, FLASH appeals to reconsider the biological impact of the dose rate and return back to the source, i. e., to analysis of the intimate mechanisms of radio-induced free radical reactions.

In this lecture he shall present some molecular aspects of time-dependent biological responses with attention to cell cycle progression, split-dose recovery, chromatin remodeling at sites of DNA damage, and finally oxylipins in the context of the FLASH effect

Vincent Favaudon, emeritus Professor at Institut Curie, Paris-Saclay University, (Orsay, France) discovered the FLASH effect in 2014. His research activity is focused on pulse radiolysis, free radicals, oxygen activation, radiation biology and Ultrahigh dose-rate "FLASH" radiotherapy. Vincent Favaudon was founder of Inserm unit U612 (2004) at Institut Curie, member (elected) of the Scientific Committee of the Research Section of Institut Curie (1994-2010); member (elected) of the Board of Directors of Institut Curie (1997-2015). Vincent Favaudon is author of more than 150 original papers in peer-reviewed journals, reviews, monographs and book sections; over 170 symposium contributions and over 20 invited conferences on FLASH radiotherapy since 2010.

## Programme

11.30 am **Welcome Reception**

12.00 pm **Greetings**

**Antonella Polimeni**, Rector of Sapienza University of Rome  
**Oliviero Diliberto**, Dean of the Faculty of Law,  
Sapienza University of Rome

12.30 pm **From conventional dose-rate  
to FLASH radiotherapy:  
unveiled aspects of the dynamic of cell  
and tissue response to ionizing radiation**

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CHAIR: **Luigi Palumbo**, Deputy Rector for Strategic Planning

1.30 pm **Closing Remarks**