

## Single-ion/Single-cell microbeam: a powerful tool for low-dose radiation effect investigations

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Assessment of human ionising radiation exposure risk deserves particular attention especially for low doses (and low dose rates), which concern environmental and occupational exposure. At these dose levels, exposures involve mainly isolated charged particle tracks, which strike individual cells at time intervals averaging from weeks to several years apart.

Accelerator-based microbeam irradiation technique offers a unique chance to targeting single cells individually with micrometer or sub-micrometer precision and with a preset counted number of charged particles, down to one particle per cell.

In the past decade a continuous increasing number of ion microbeam facilities for radiobiology studies came in operation and others are under development in many laboratories around the world (1-4).

In the present lecture the rationale, the basic requirements and the practical choices adopted in the different laboratories will be discussed and details on the horizontal single-ion microbeam facility for single-cell irradiations designed and set up at the INFN-LNL 7MV CN Van de Graaff accelerator (5,6) will be reported.

1. S. Gerardi, Radiat. Prot. Dosimetry (2006), Vol. 122, pp. 285–291
2. S. Gerardi, Jour. Radiat. Res. (2009), Vol. 50 (Suppl A), A13-A20
3. Y. Kobayashi et al., Jour. Radiat. Res. (2009), Vol. 50 (Suppl A), pp. A29-A47
4. K. Prise et al., Radiat Prot Dosimetry (2011), Vol. 143, pp. 335–339
5. S. Gerardi et al., Radiat Res. (2005), Vol. 164, pp. 586-590
6. M. Skoczystylas et al., Radiat. Prot. Dosimetry (2011), Vol. 143, pp. 353–357