

The in-vivo biological effectiveness physiological and dosimetric aspects

Marco Diego Dominietto



MediNet Network Meeting Vinča Institute of Nuclear Sciences, Belgrade, 12-14 March, 2018

tumor point of view

ECM

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Nature. 2001 May 17;411(6835):375-9. The microenvironment of the tumour-host interface. Liotta LA1, Kohn EC.

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tumor point of view



Mouse model Human glioblastoma



- what is happening in the interface region ?
 sharp dose gradient infiltration region (tumor vs immune cells)
- how large is the interface region ?

A non-efficient therapy will only determine an artificial selection of resistant cells

tumor point of view



- 1 It is not only a question of homogeneous tumor cells several types of tumor cells
- 2 It is not only a question of homogeneous healthy cells several types of healthy cells
- 3 It is not only a question of dose

LET is not constant along dose curve deposition

Several types of particle-cells interactions

and therefore

different physiological effects

particle point of view



Dose distribution of lineal energy of 12 C ions (250 MeV/u) at different depths in phantom. Simulated volume $1\mu m$.

Microdosimetric Characterization of the Therapeutic Heavy Ion Beam R. Gerlach et al.

Micro-dosimetric spectra



Microdosimetric spectra collected at four different depths.

Physica Medica á Vol. XX , N. 2, April-June 2004 Microdosimetric Assessment of Nice Therapeutic Proton Beam Biological Quality L. De Nardo et al.

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Biological effects



Biological effects



Biological effects



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Results are based on the effective particle-tissue (patients) interactions

Mol Oncol. 2015 Jan;9(1):1-16. *Integrative analysis of cancer imaging readouts by networks.* Dominietto M, Tsinoremas N, Capobianco E. Front Pharmacol. 2016; 7: 451. *Expected Impacts of Connected Multimodal Imaging in Precision Oncology* M. Dominietto and E. Capobianco

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