

Correlation of Particle Traversals with Clonogenic Survival Using Cell-Fluorescent Ion Track Hybrid Detector

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Geneva

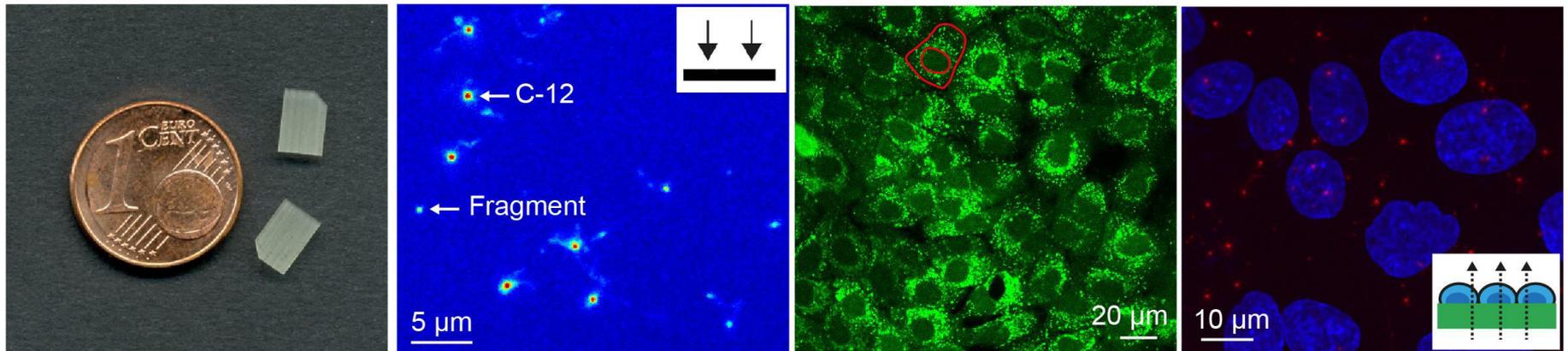
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50 Years – Research for
A Life Without Cancer

Cell Fluorescent Ion Track Hybrid Detector (Cell-Fit-HD)

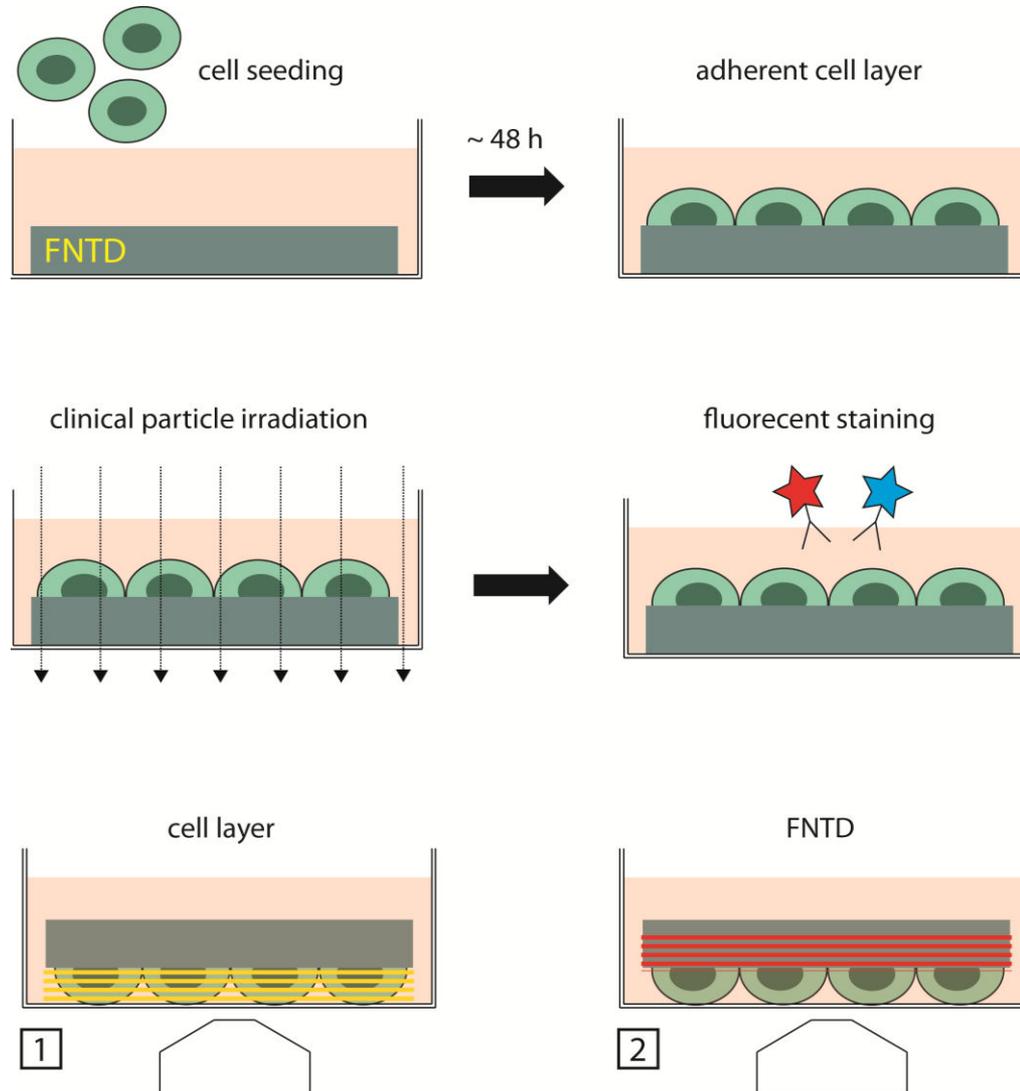


Understanding the interactions of charged particles and cellular structures at microscopic level

Why some of the irradiated cells are able to form colonies and the others not?

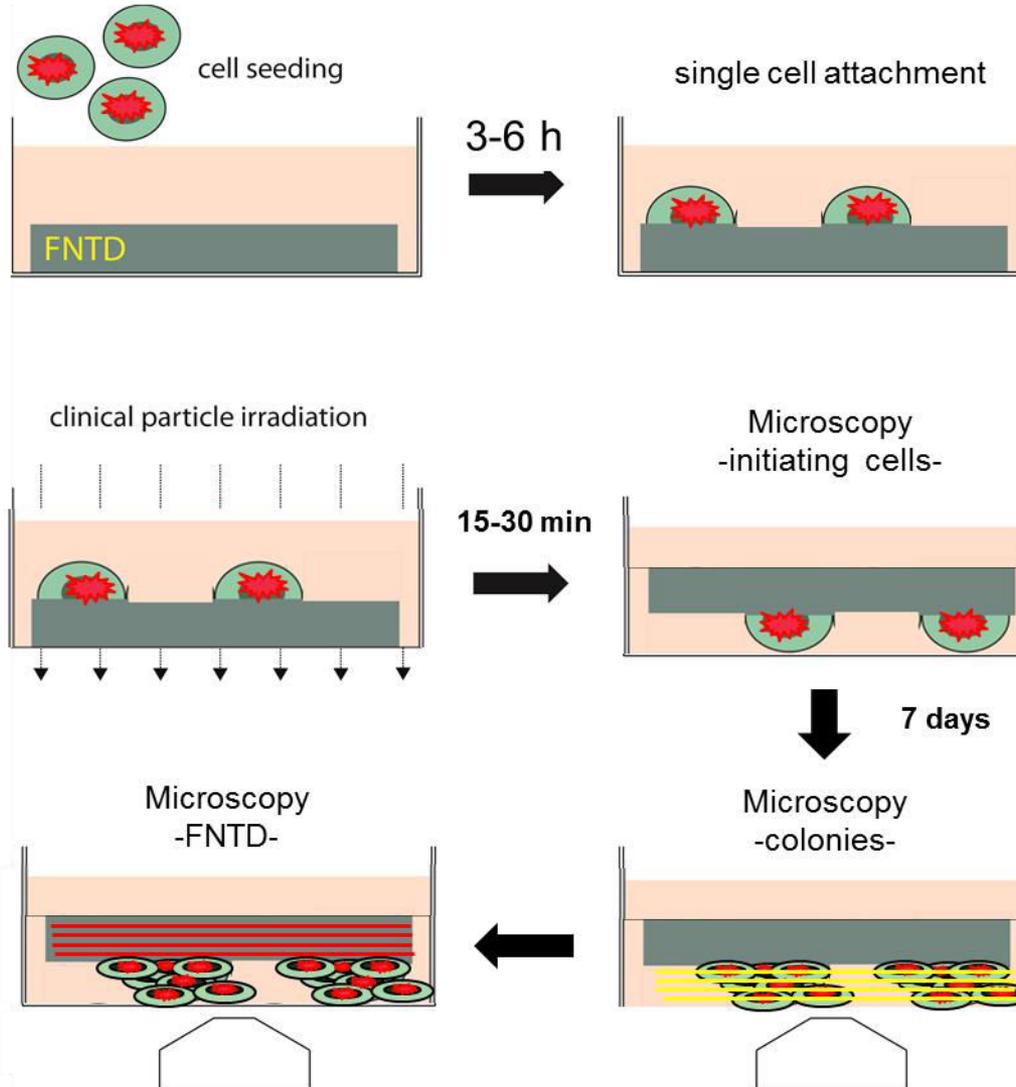
Are certain cells “missed”? How the cell should be “hit”? Where it should be “hit”?

Cell-Fit-HD: Experimental Setup



Colony formation assay using Cell-Fit-HD

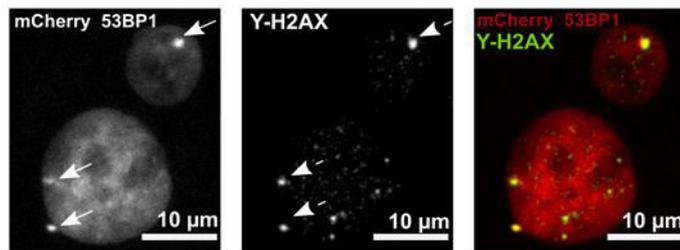
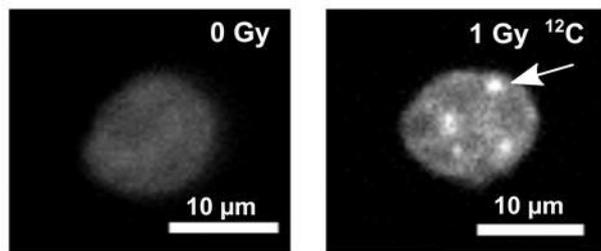
 Cells expressing
fluorescent proteins



Colony formation using Cell-Fit-HD

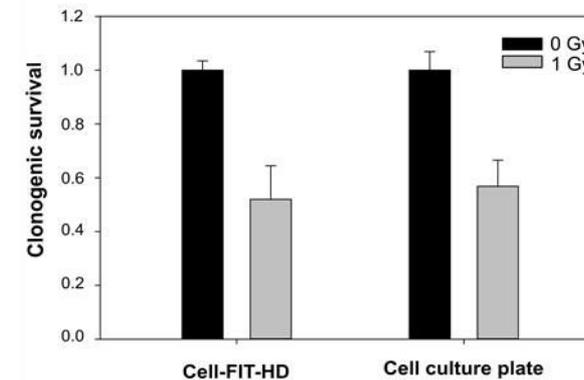
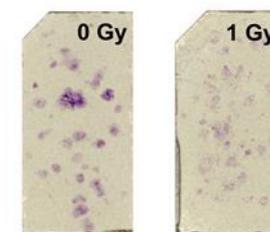
Cells expressing fluorescent proteins

mCherry - 53BP1



^{12}C irradiation @ HIT
mid SOBP dose averaged LET 95 keV/ μm

Colonies on FNTD



Colony formation using Cell-Fit-HD

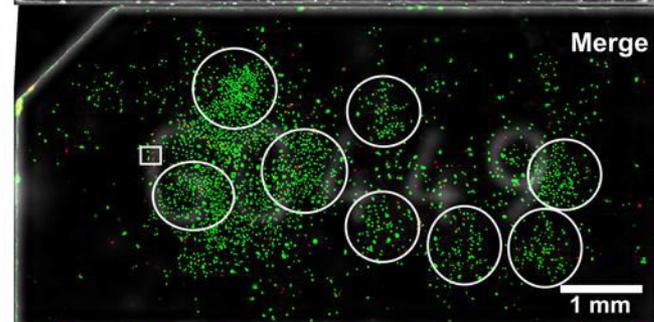
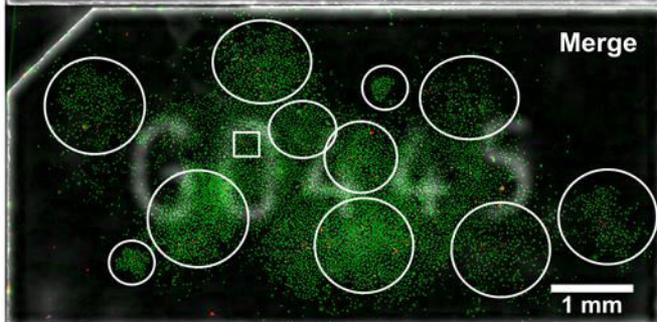
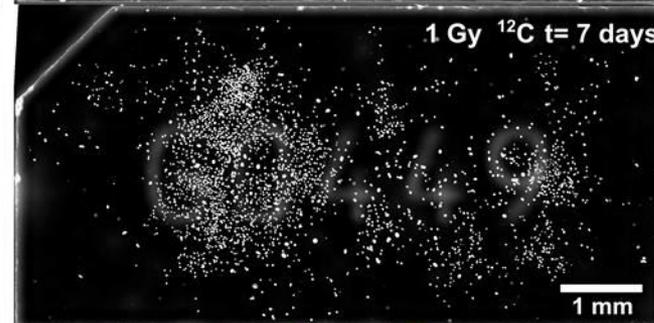
Control

Carbon ions irradiation

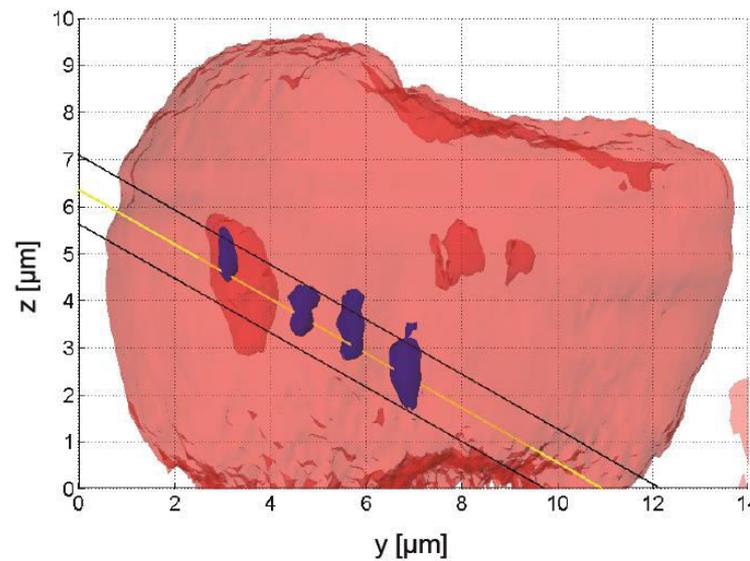
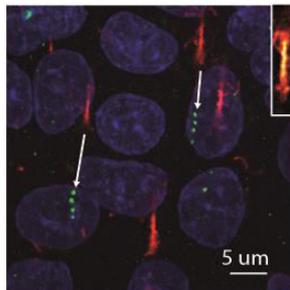
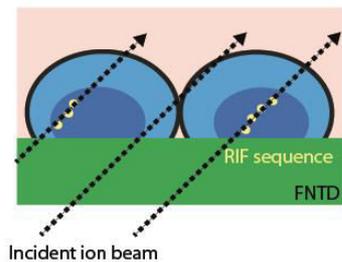
30 min post-IR



7 days post-IR



Spatial correlation of ion traversal and corresponding molecular events

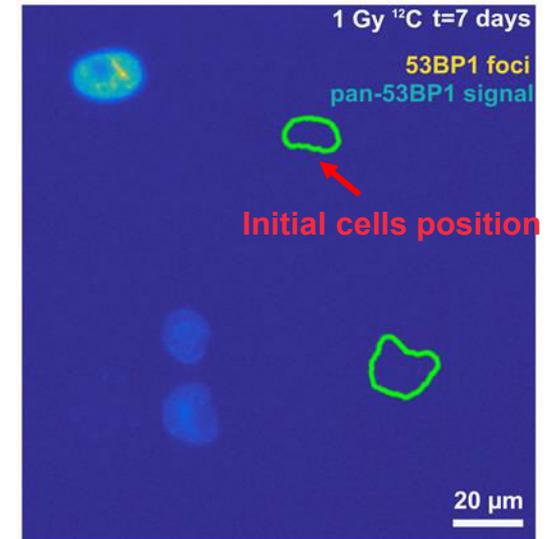
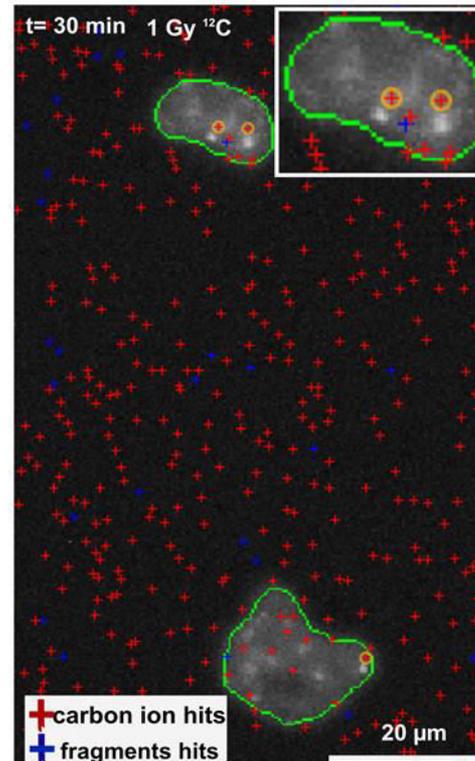
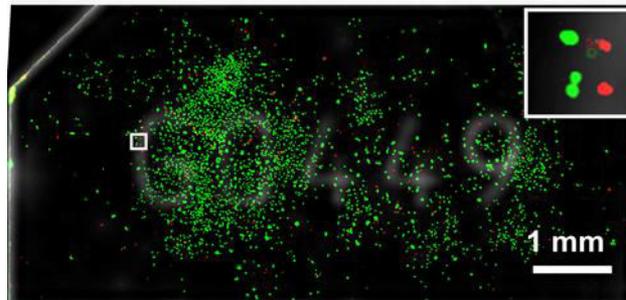


Correlating the primary hits to foci

t=30 Initial cells position

t= 7 days cells position

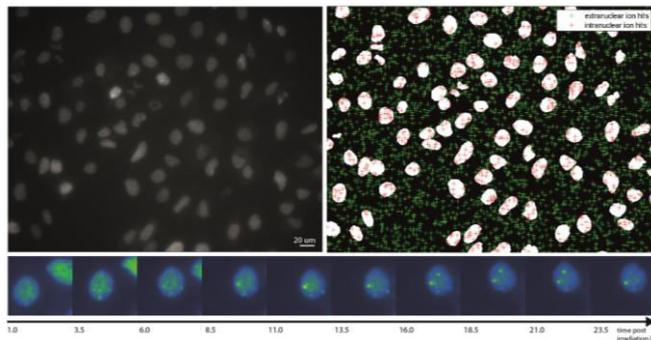
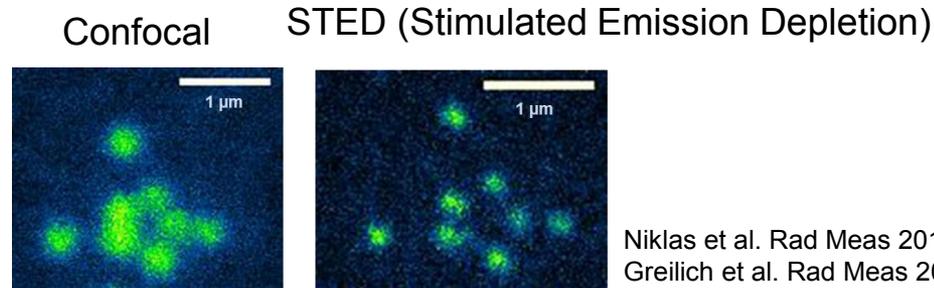
Overview of the FNTD



Following cells' fate

Applications (on cells, living tissues, 3D culture...)

Colony formation as a function of particle quality, number, spatial distribution.



Monitoring DNA repair kinetics associated to single ion traversals

Niklas et al., 2013, *Red Journal*

Studying bystander effect; communication between “hit” and non “hit” cells

Acknowledgements



^{12}C



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