ENLIGHT PARTNER MEETING

18-19-JUNE-2009 VALENCIA SPAIN

Radiobiological measurements for extending carbon-ion therapy to other ions

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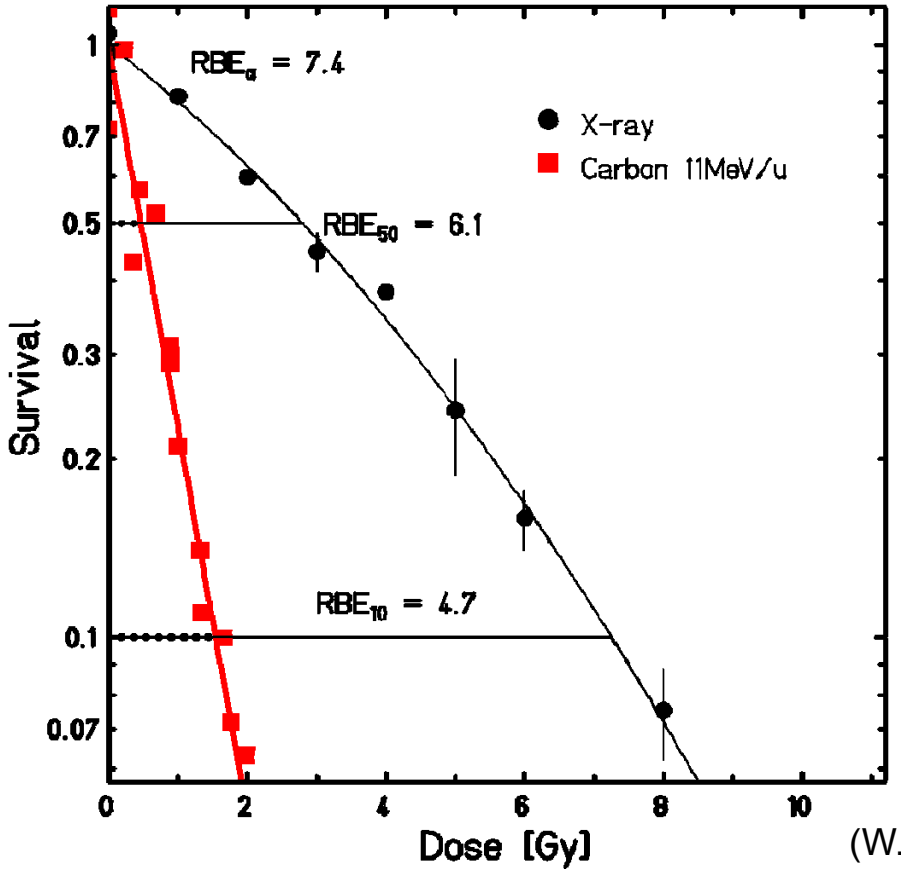
CONTENTS

- Relative Biological Effectiveness (RBE)
- Oxygen Enhancement Ratio (OER)
- Planned experiments

Relative Biological Effectiveness (RBE)



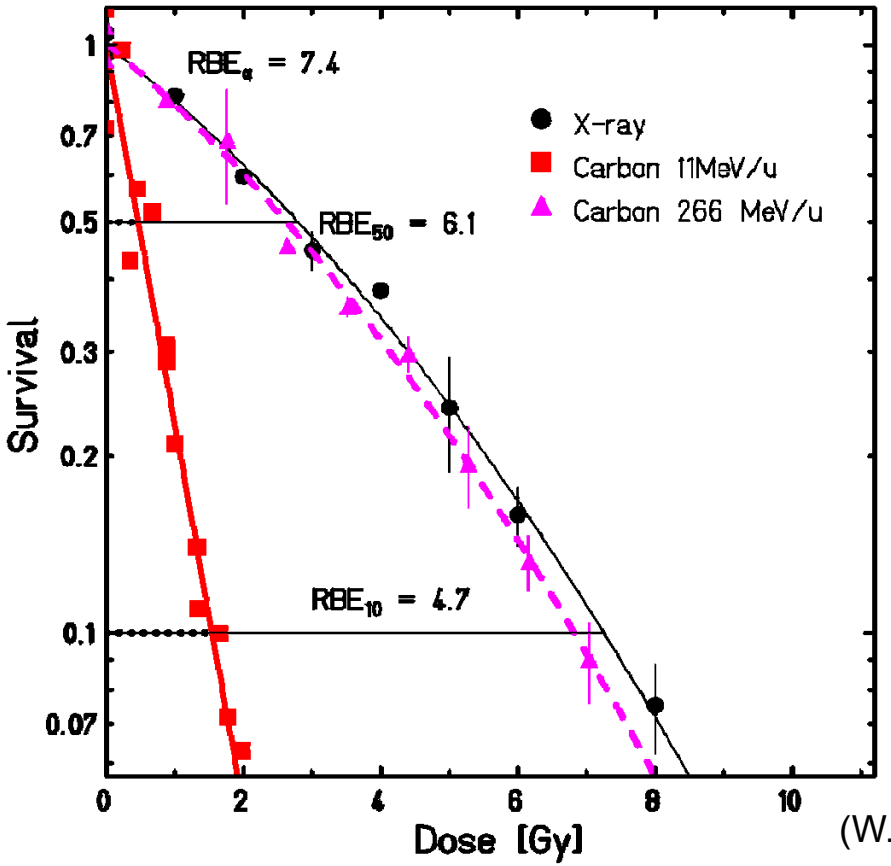
(W.K.Weyrather)

RBE depends on…

- **Survival level**

RBE =D X-ray /D particle (isoeffect)

Relative Biological Effectiveness (RBE)



(W.K.Weyrather)

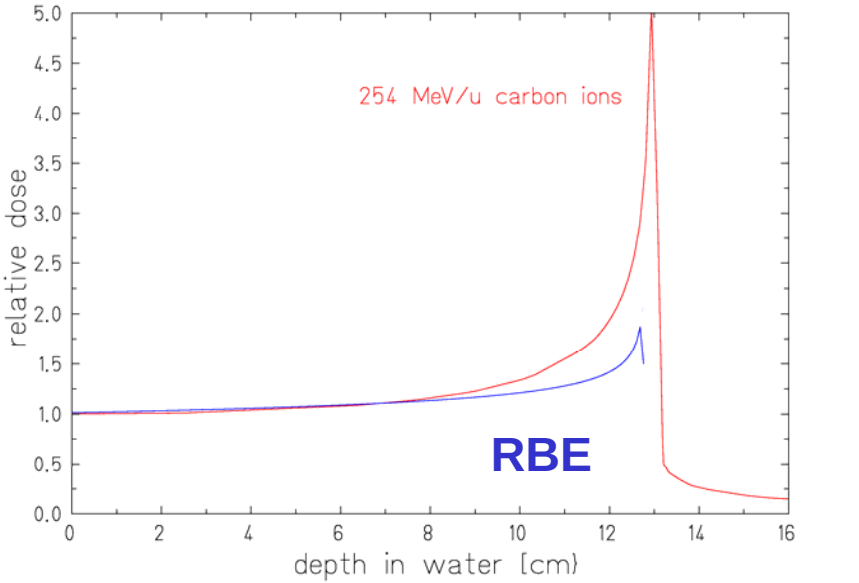
RBE depended on…

- Survival level
- Energy
- Particle
- Repair capacity of the cell
- Oxygen status

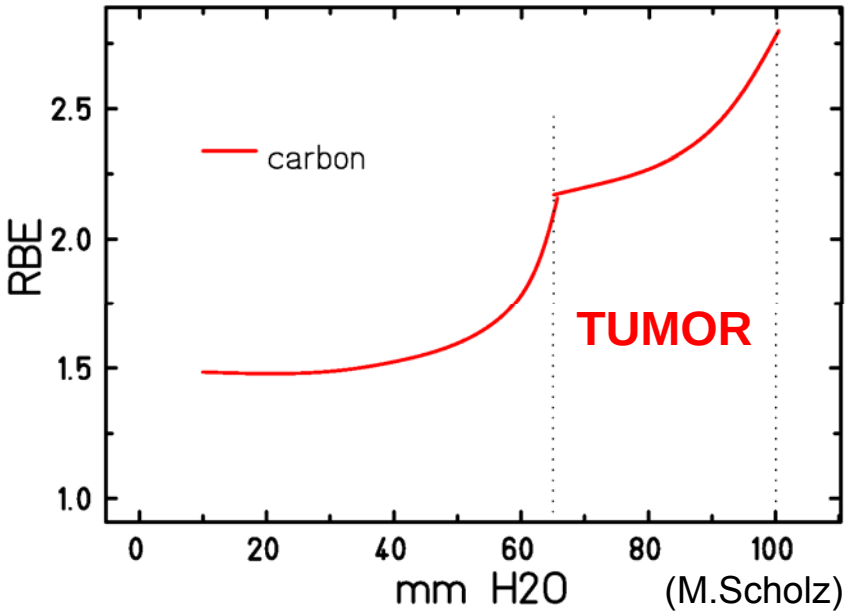
RBE =D X-ray /D particle (isoeffect)

RBE depends on the particle

What we know : Carbon



(W.K.Weyrather)

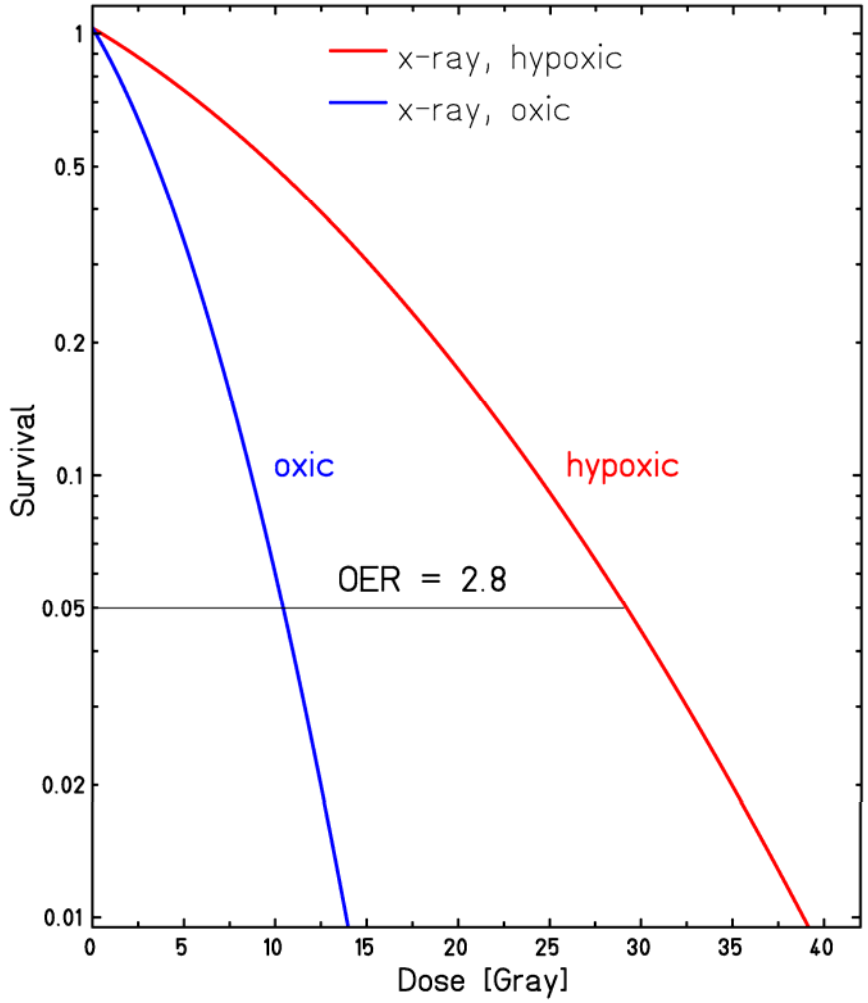


(M.Scholz)

- **RBE maximum in the Bragg Peak**

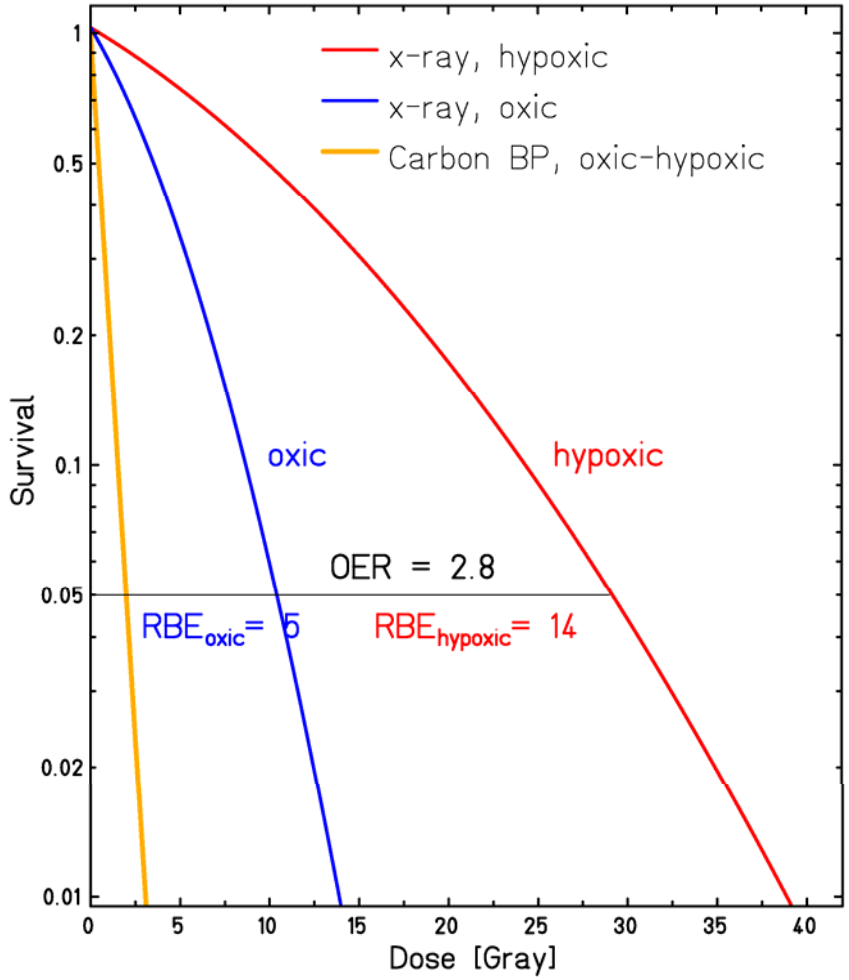
- **Low RBE in the entrance**
- **High RBE in the tumor volume**

Oxygen Enhancement Ratio (OER)



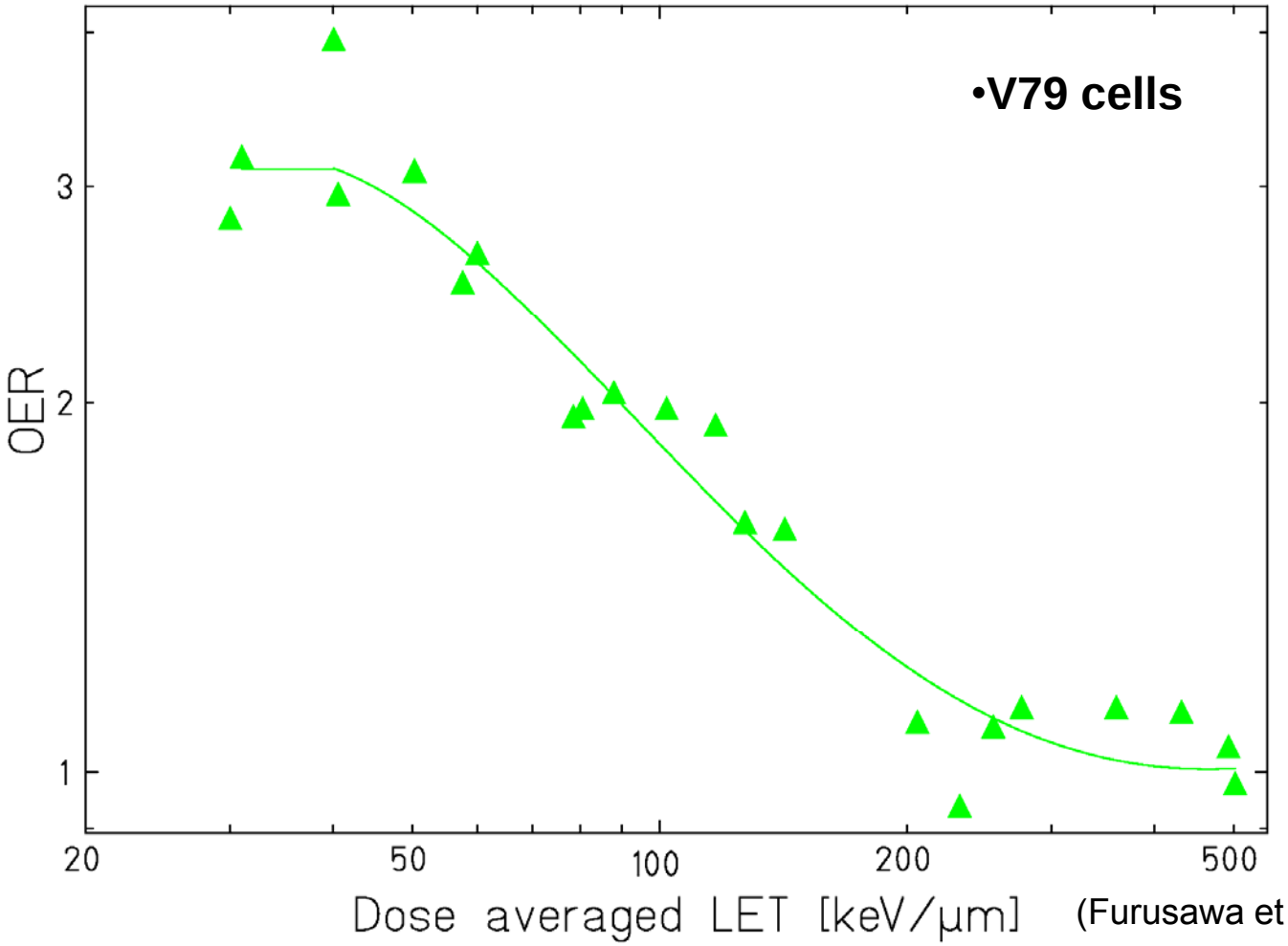
OER =$D_{hypoxic}$ /$D_{aerated}$ (Isoeffect)

Heavy ions reduce the OER effect



OER =$D_{hypoxic}$ /$D_{aerated}$ (Isoeffect)

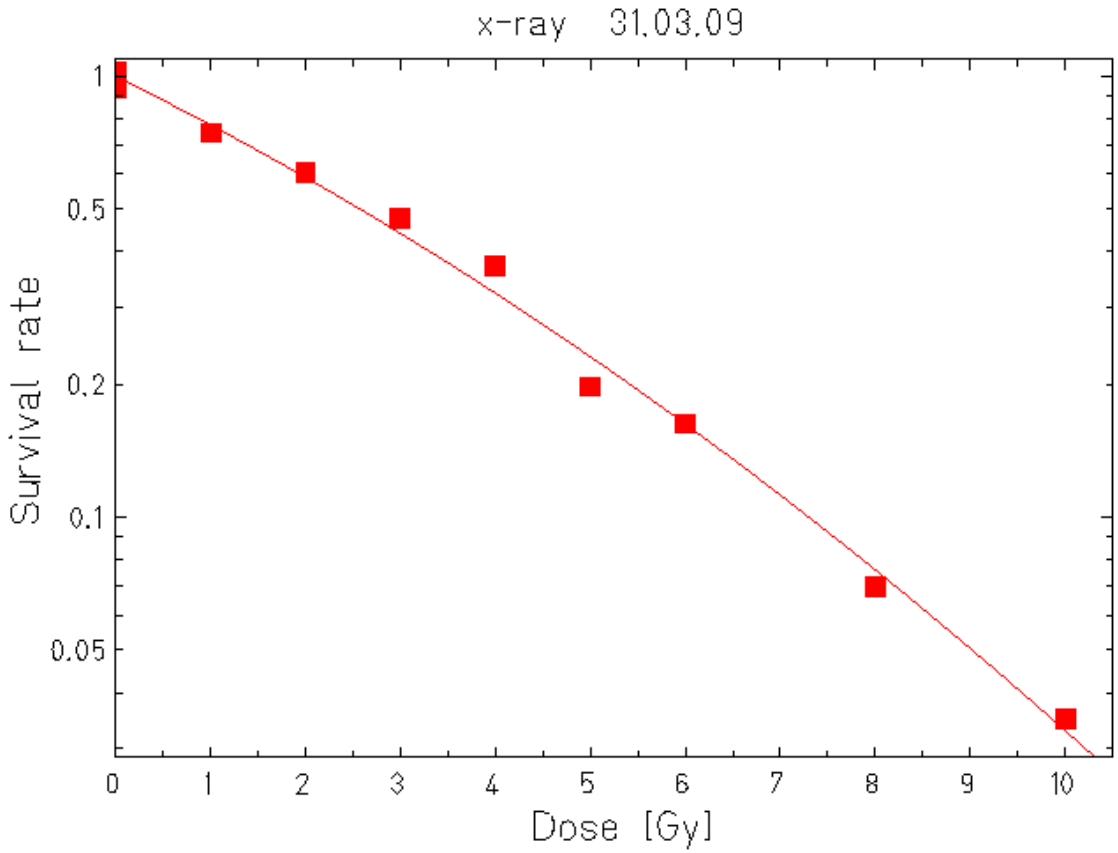
OER Carbon



(Furusawa et el. 2000)

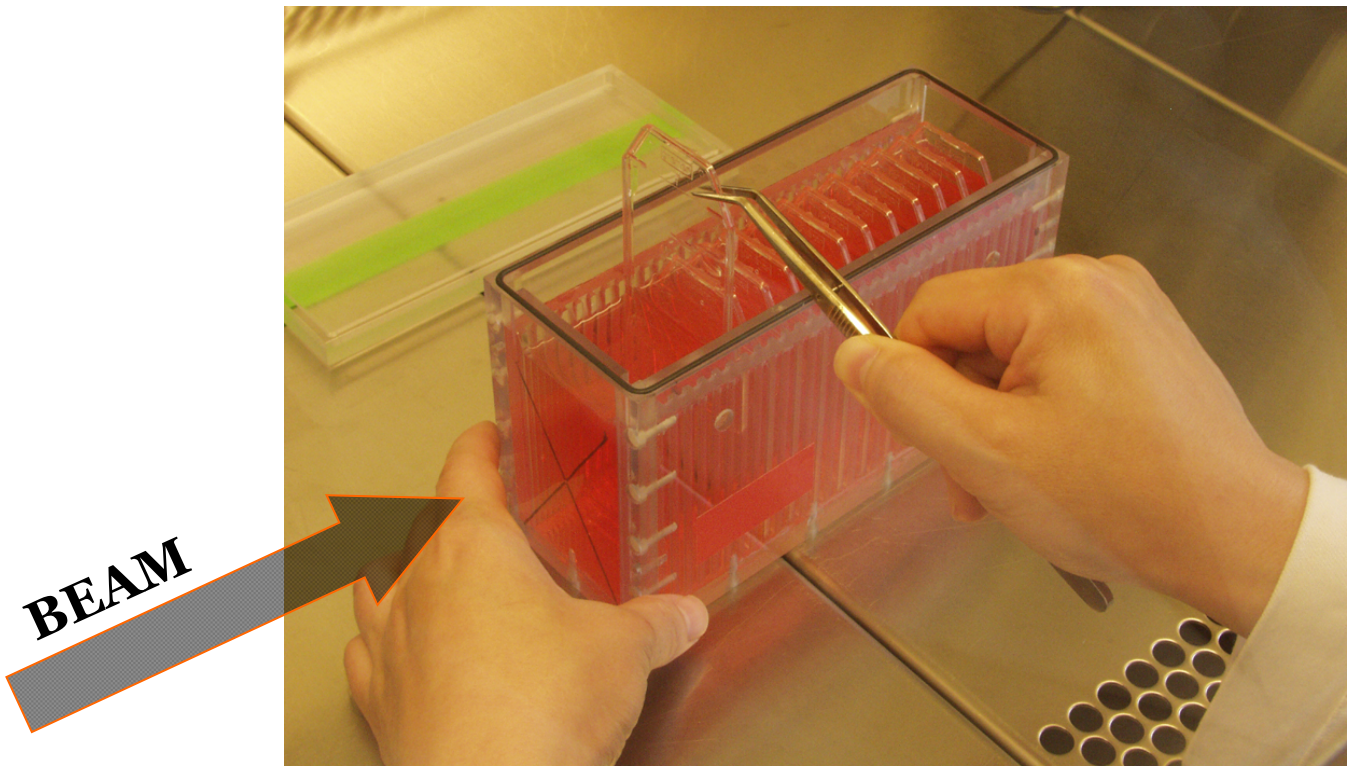
Planned experiments

- **RBE as function of energy for different ions (Lithium, Oxygen)**
- **Set of survival curves**

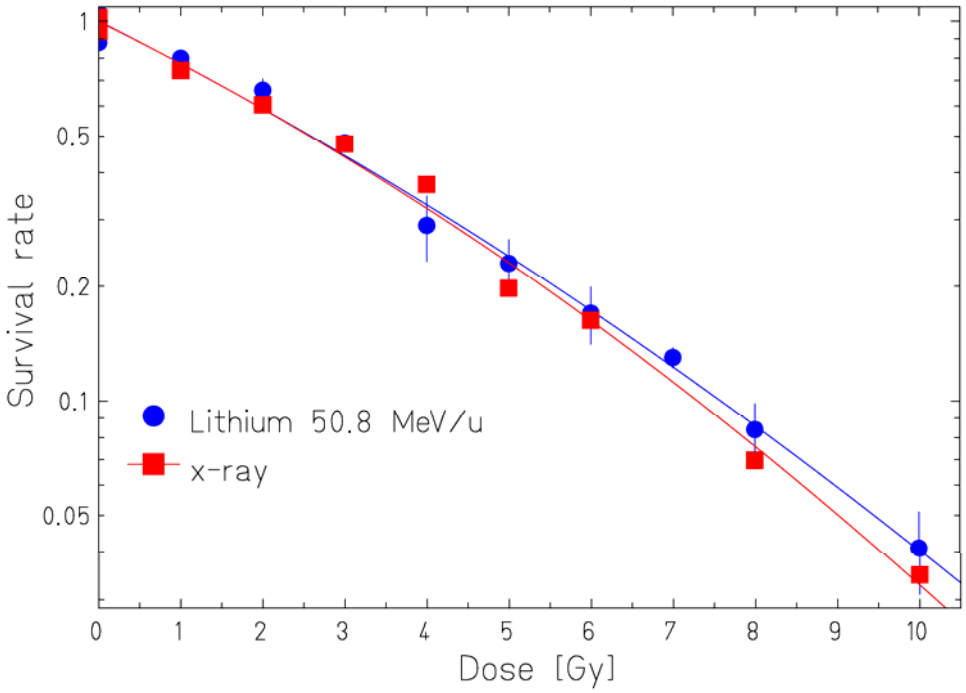


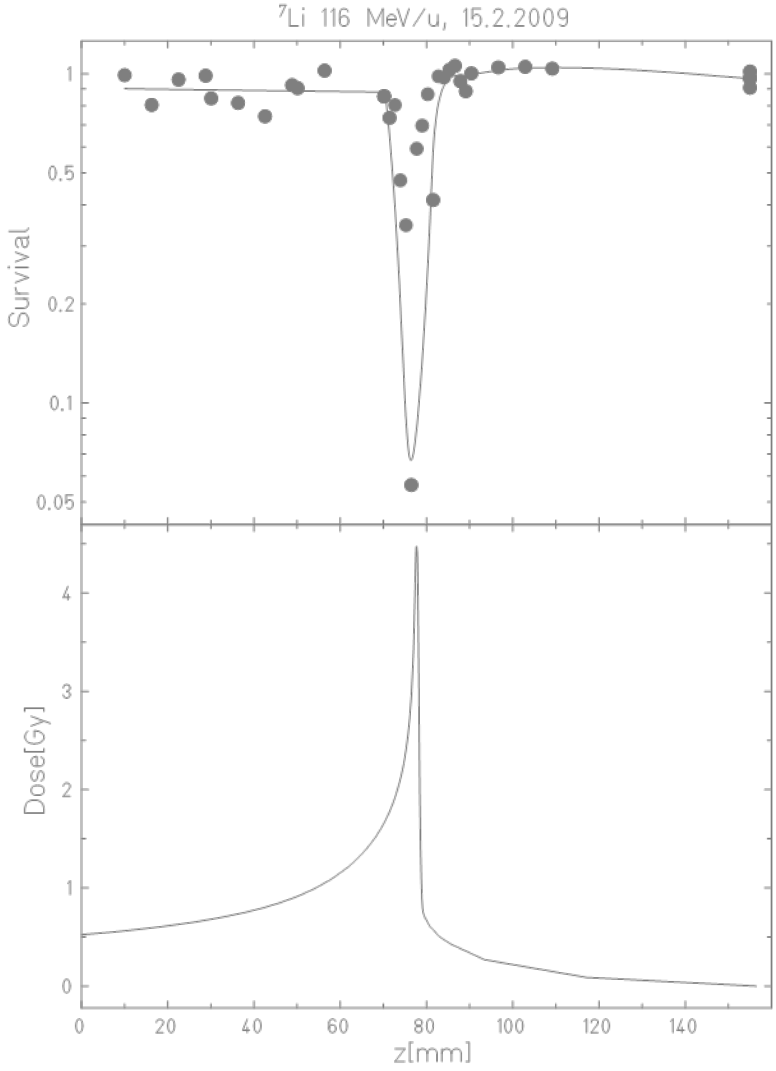
Planned experiments

- **RBE as function of depth**



First Results: ^{7}Lithium

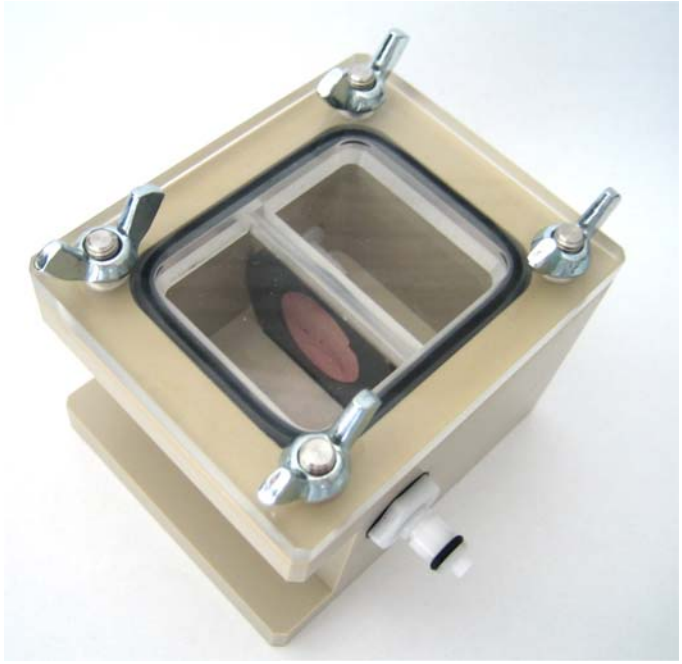




LET: 11.3 Kev/µm
residual range: 17.2 mm

Planned experiments

- **OER measurements for irradiation with oxygen ions**
- **Survival curves for different hypoxic condition**
- **Influence of acute and chronic hypoxia**



(C.Schicker, Diploma Thesis GSI 2007)

Thank You for the Attention