



MEDICAL
UNIVERSITY
OF VIENNA



COMPREHENSIVE
CANCER
CENTER VIENNA



A Christian Doppler Laboratory

Non-Clinical Research at MedAustron – Applied and Translational **RA**dio**BI**ology (**AT**RAB)

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ATRAB at MedAustron

MedAustron



Radiobiology

Radiobiology

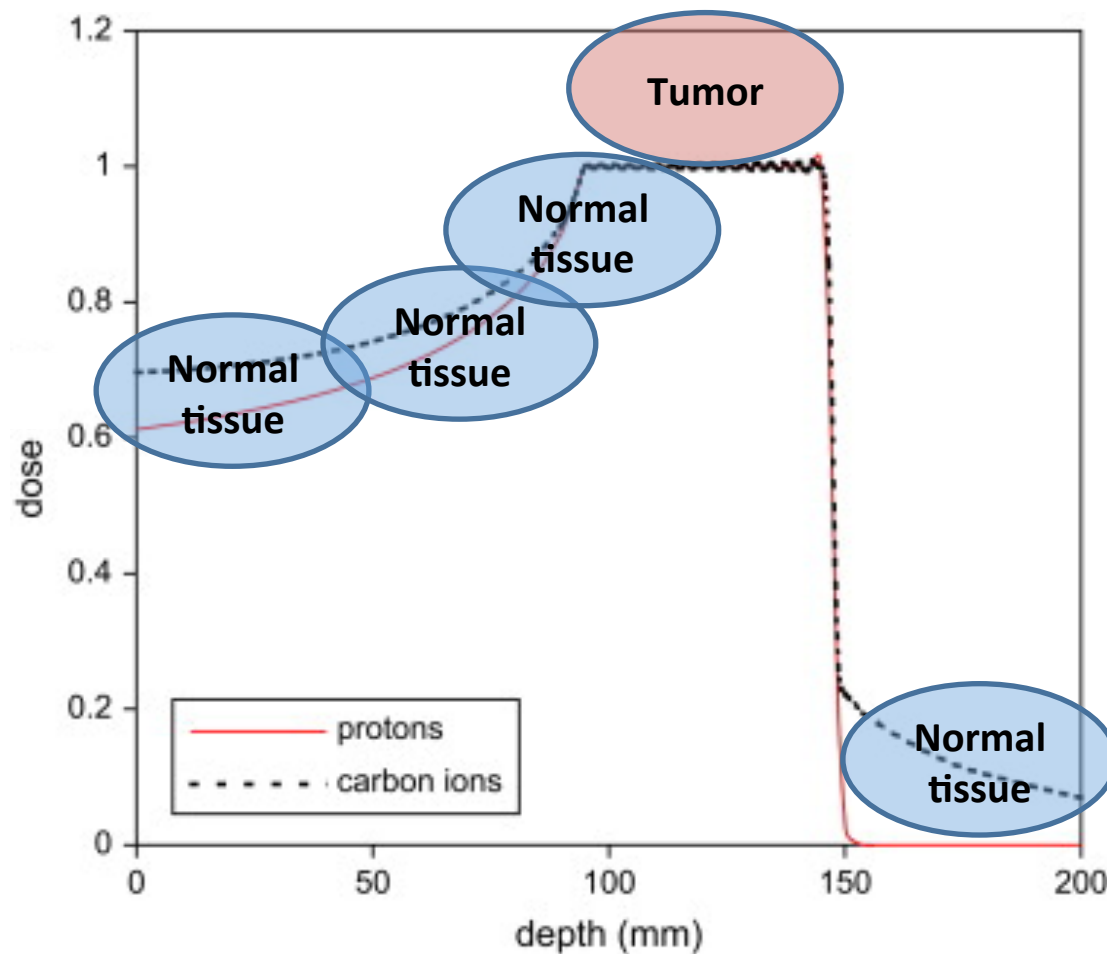
Experimental physics

Medical physics

ATRAB at MedAustron – Objectives

- Radiobiology of normal tissues
- Radiobiology of tumors
- Radiopathogenesis of normal tissue adverse effects
- Effects / adverse effects of combination therapies (chemotherapy, biologicals) with conventional and particle therapy
- Biomarkers: radiotherapy efficacy, normal tissue morbidity
- Interventional / mitigation strategies for normal tissue adverse effects

Particle Therapy – a Biological Perspective



- Tumor position ✓
- NT – reduced dose exposure ✓
- NT – dose inhomogeneities ?
- NT – fractionation effect ?
- Relative biological effectiveness (RBE) ?

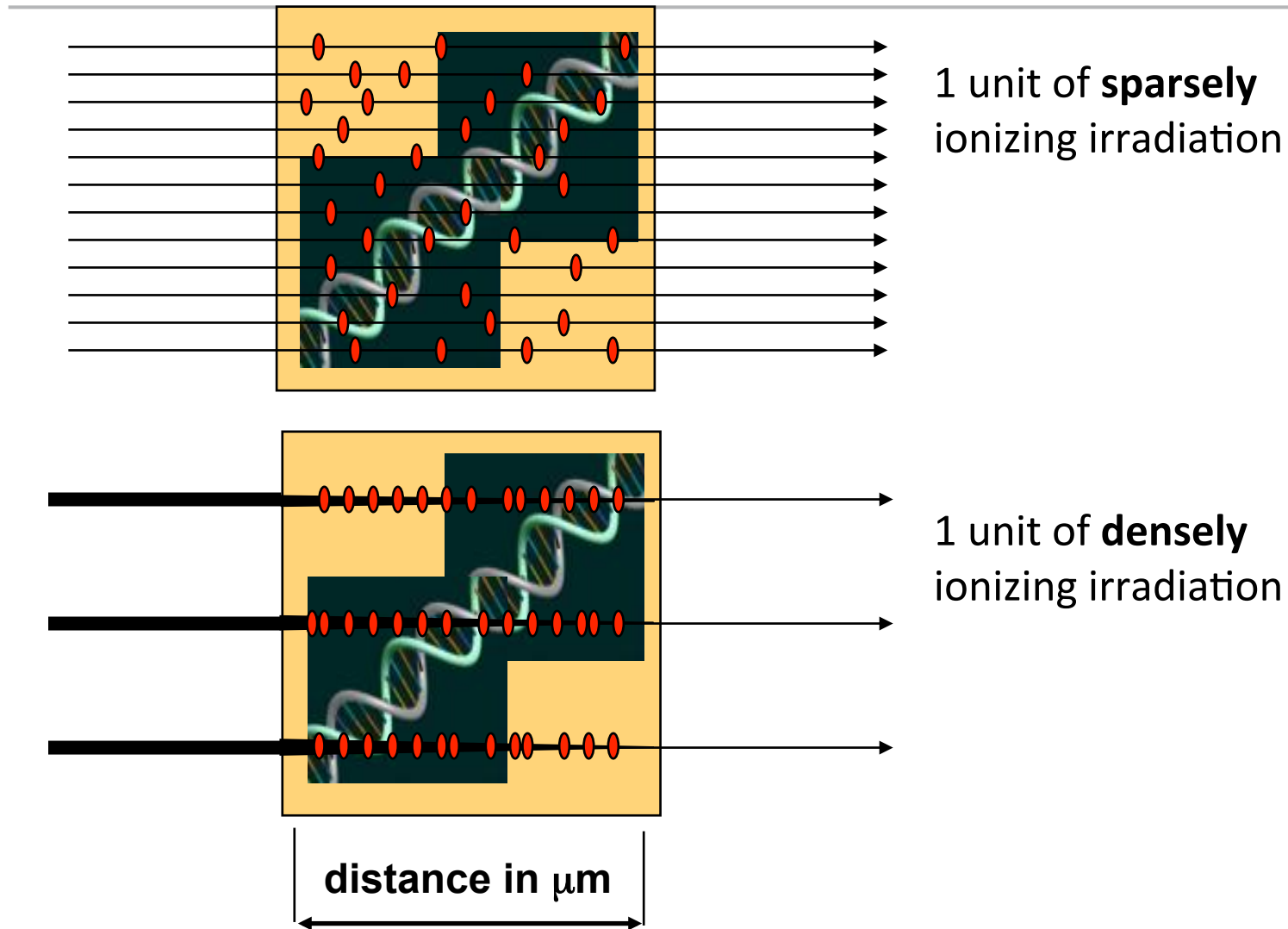
Relative biological effectiveness (RBE)

$$\text{RBE} = \frac{\text{Physical dose (Gy) from a reference source (250 kV X-rays)}}{\text{Physical dose (Gy) from a test irradiation source}}$$

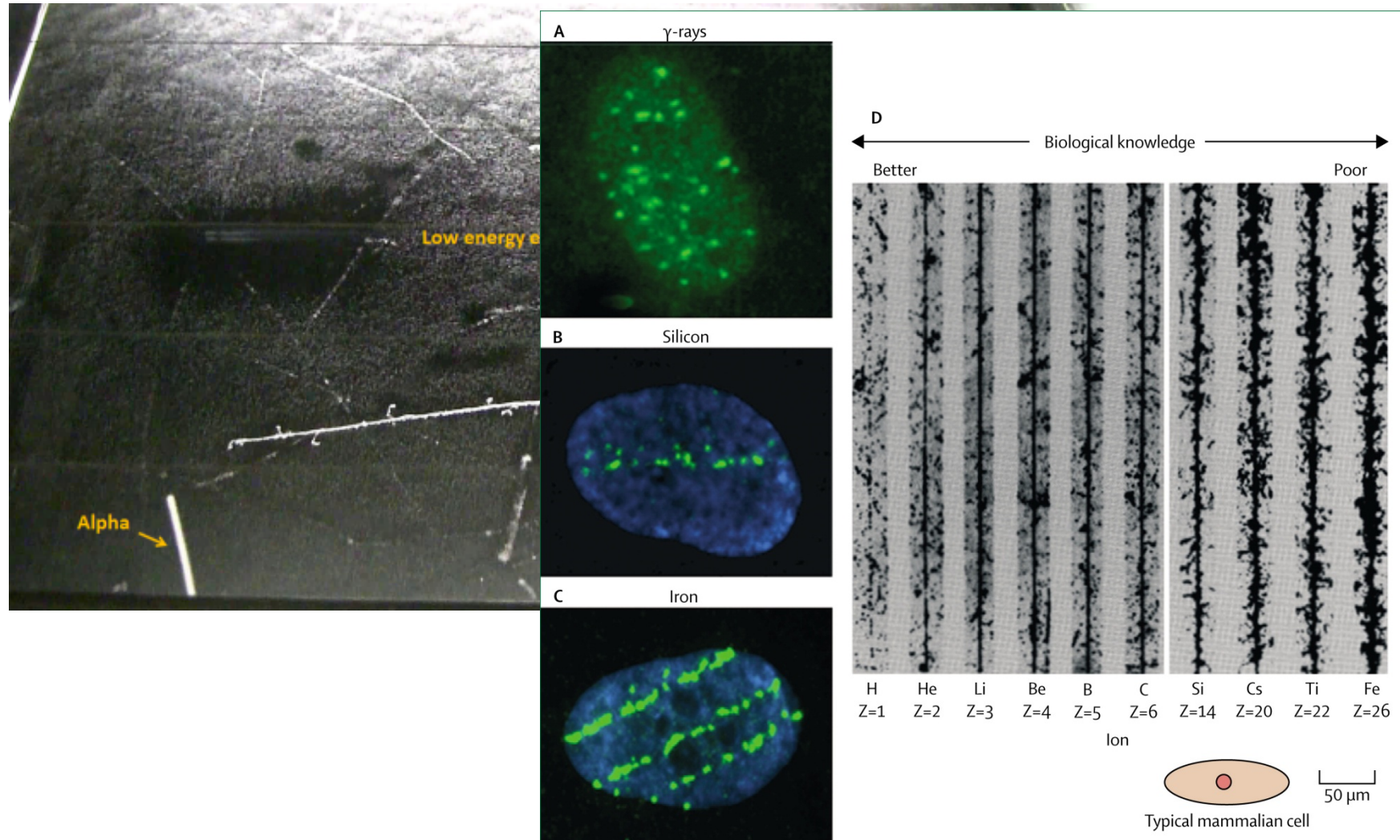
to produce the SAME biological response

- Radiation “amount or quantity” is expressed as **absorbed dose** (Gy), which is a measure of energy absorbed by unit mass of tissue
- Different radiation qualities generate different pattern of energy deposition

Target Structure Damage

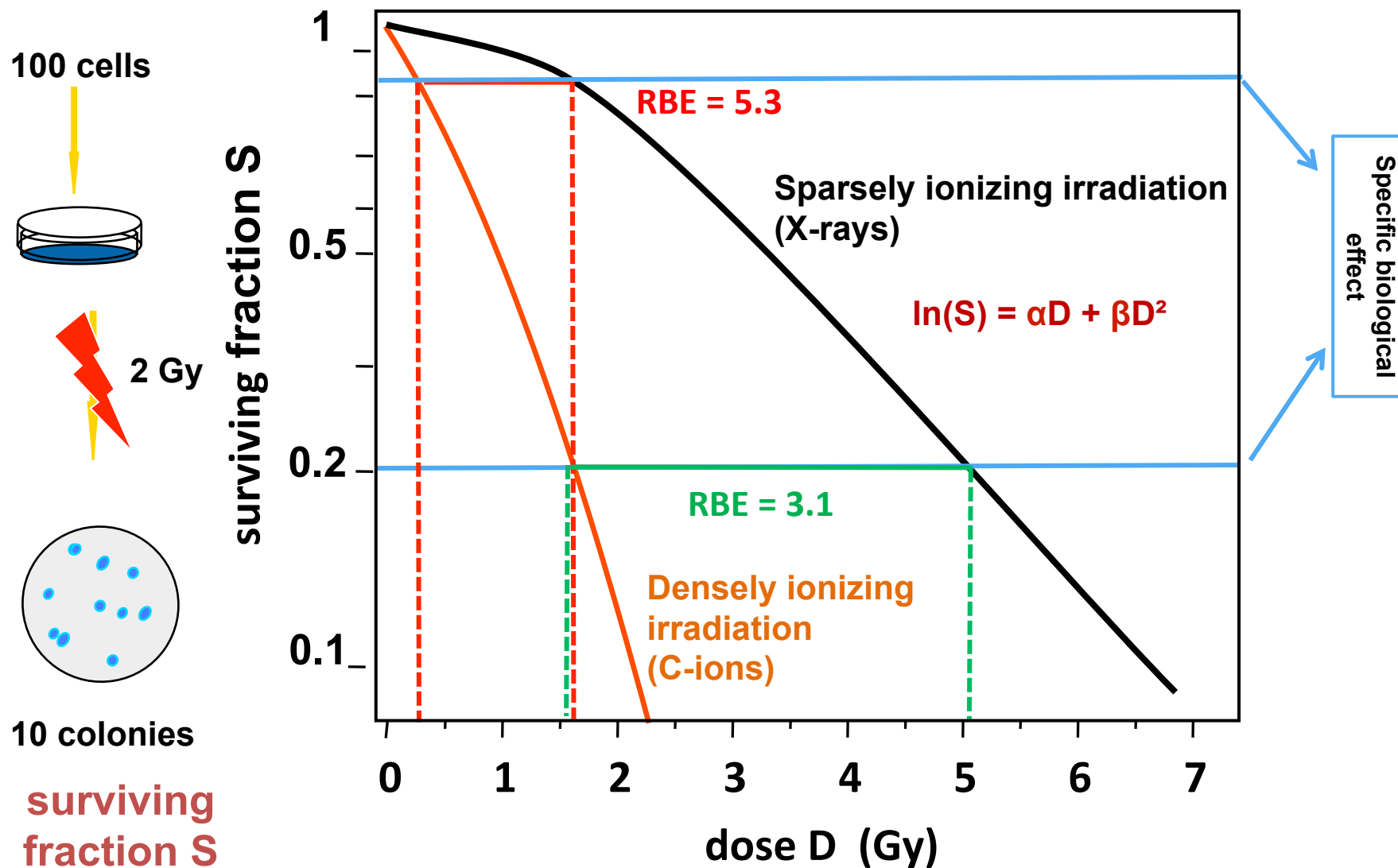


Ionization Events Visualized

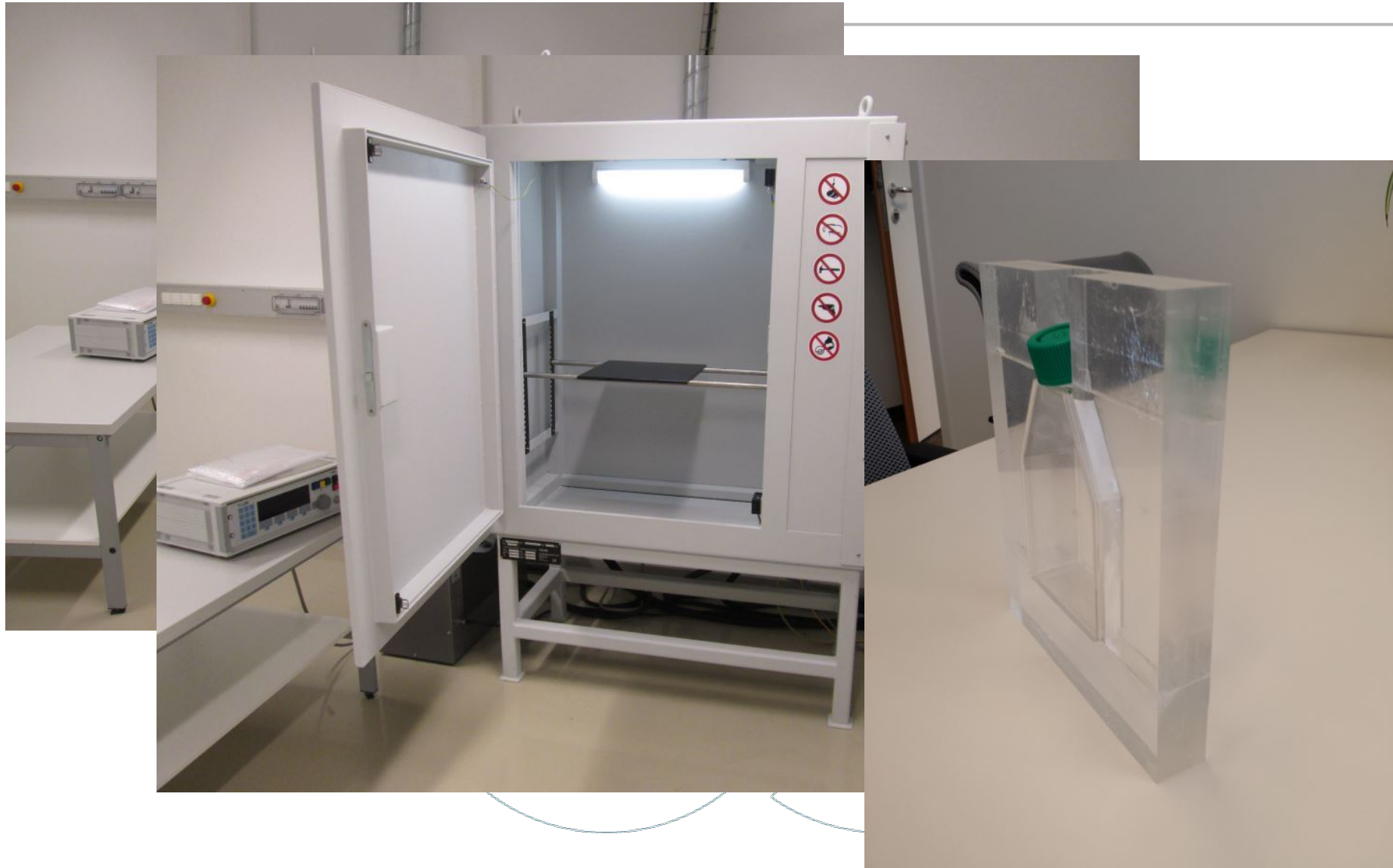


Lancet Oncol. 2006 (5):431-5.

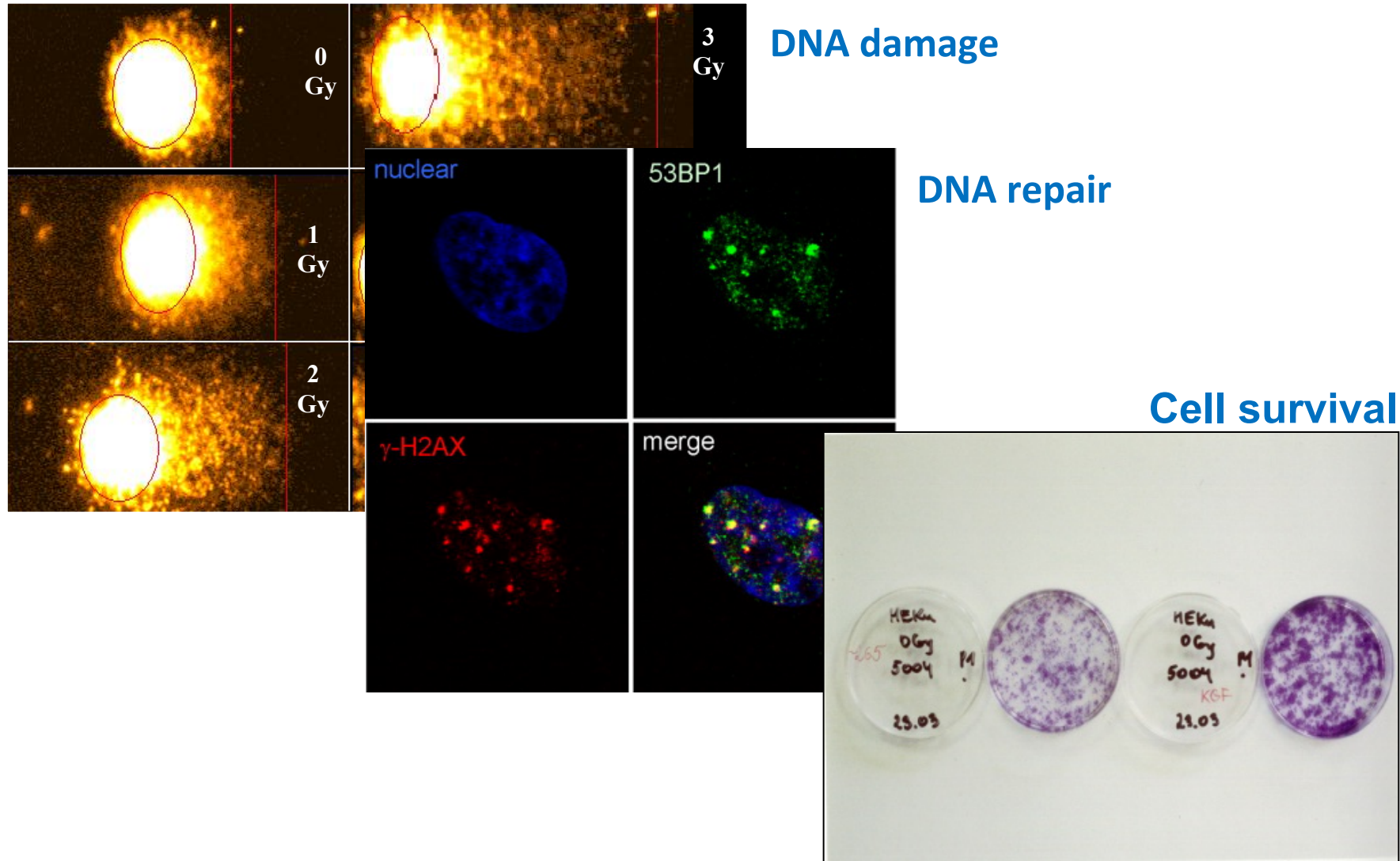
Endpoint Dependency of RBE



Initiation of Experimental Work - First Steps

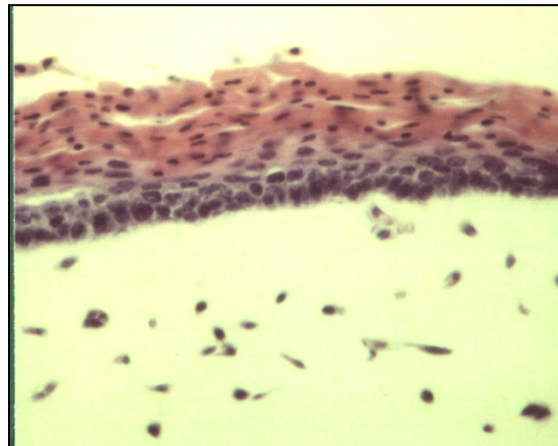
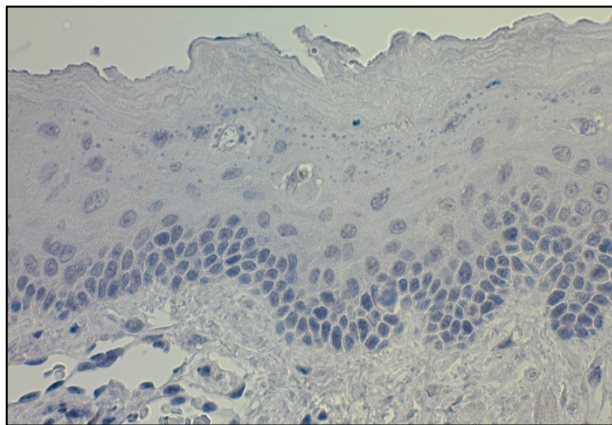
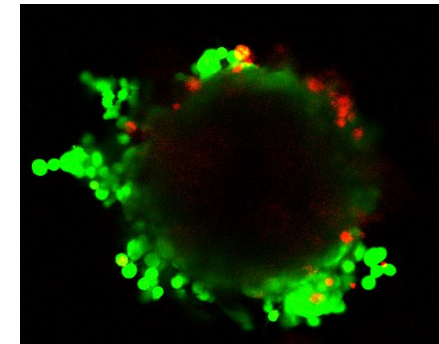
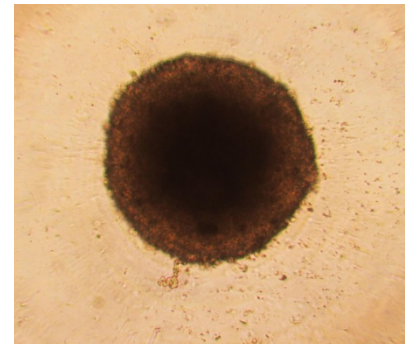
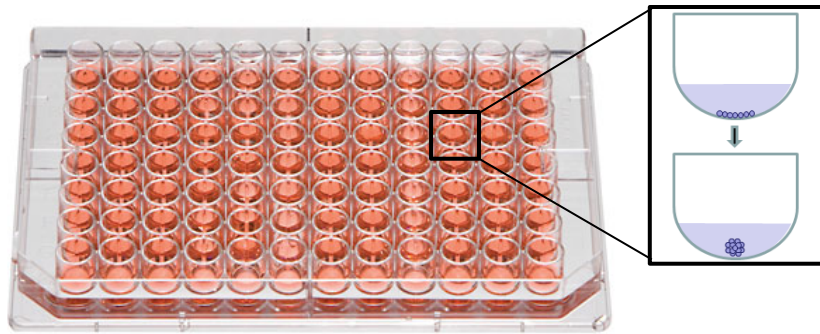


Initiation of Experimental Work - First Steps



Experimental Work – Perspective

3 D tumor / normal tissues cell culture models



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The ATRAB Team



Tour Station

Thank You for
Your Attention!

- See you in the afternoon at our lab station

