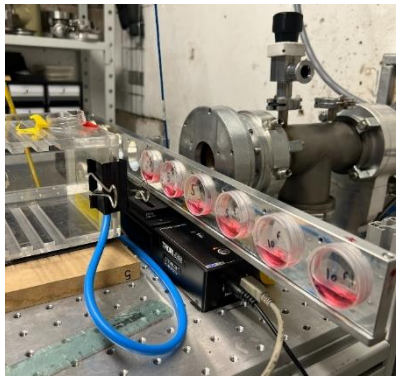
Utilising the unique radiobiology resources for translational research into HNSCC and GBM

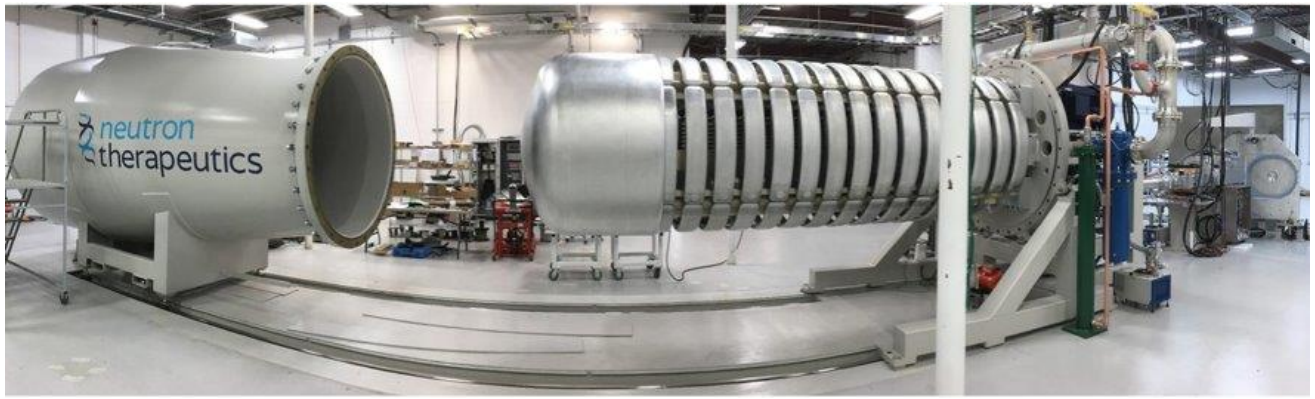
To perform translational research using ionising radiation and HNSCC/GBM models in order to devise novel and optimal strategies using radiotherapy in the clinic for patient benefit

Specific objectives:-

- Compare effects of X-rays, protons and BNCT at the molecular (DNA) and cellular (survival/RBE) level.
- Identify strategies to overcome hypoxia (reduced oxygen) induced radioresistance.
- Investigate the effect of ultra-high dose rates (FLASH) on normal and tumour models.
- Explore the impact of targeted and novel drugs/inhibitors on radiotherapy effectiveness



MC-40 cyclotron for particle (proton and helium) ion irradiations, including at FLASH (100 Gy/s) dose rates



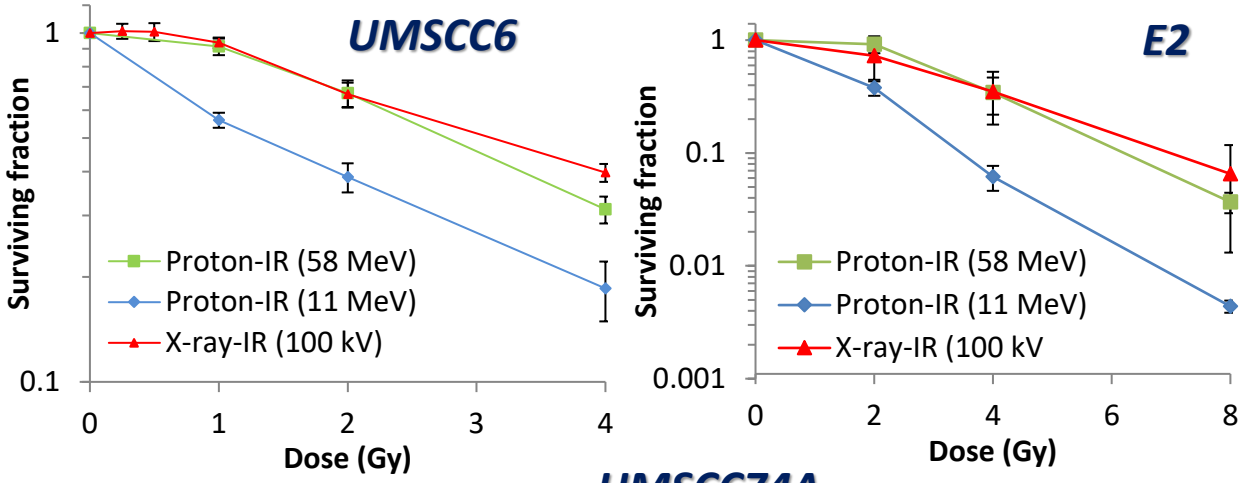
High-flux accelerator neutron source for boron neutron capture therapy (BNCT)

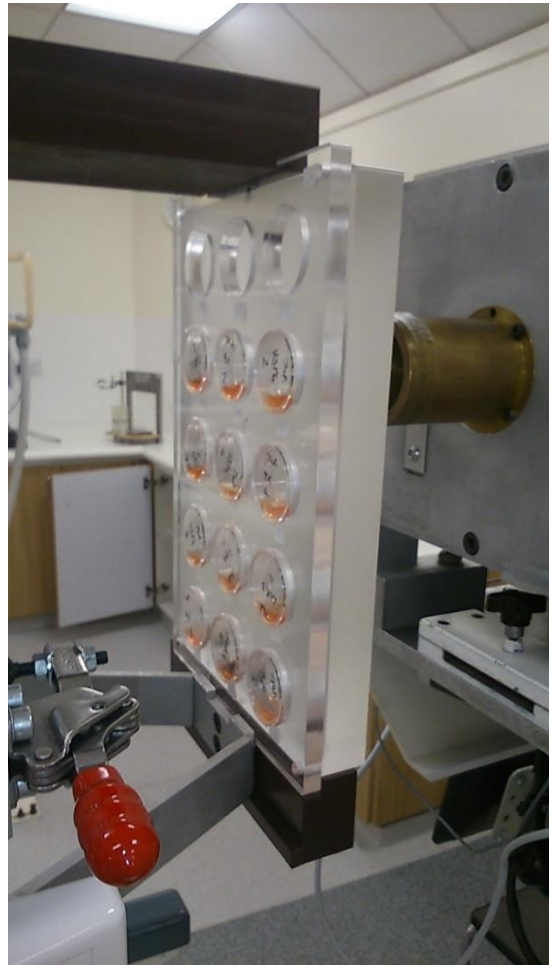
MRC Medical Research Council

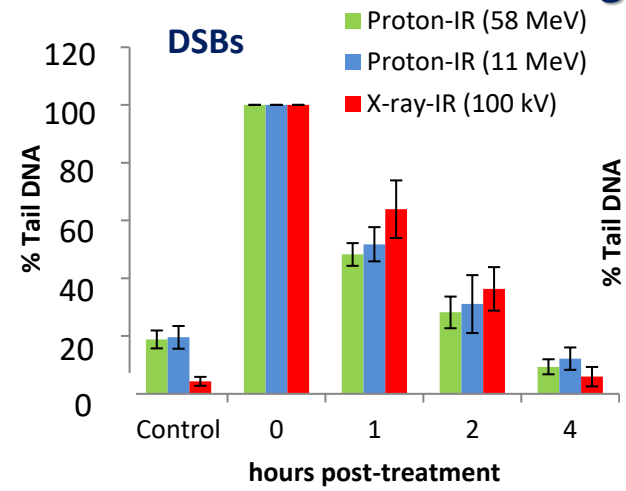
R01CA256854-01

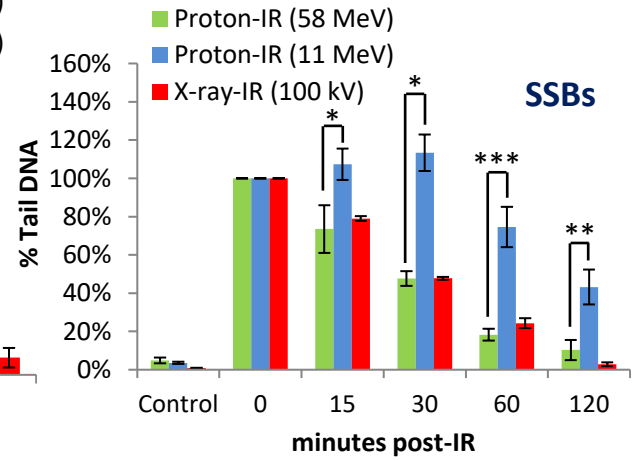
NIH National Institutes of Health
Turning Discovery Into Health

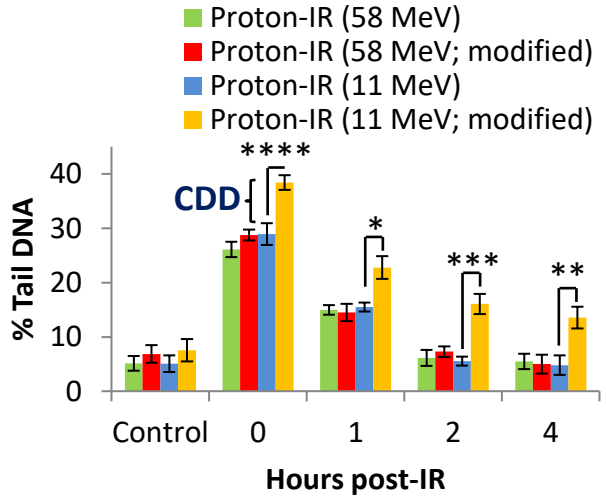
Examining the radiobiology of protons at the Clatterbridge Cancer Centre (CCC)





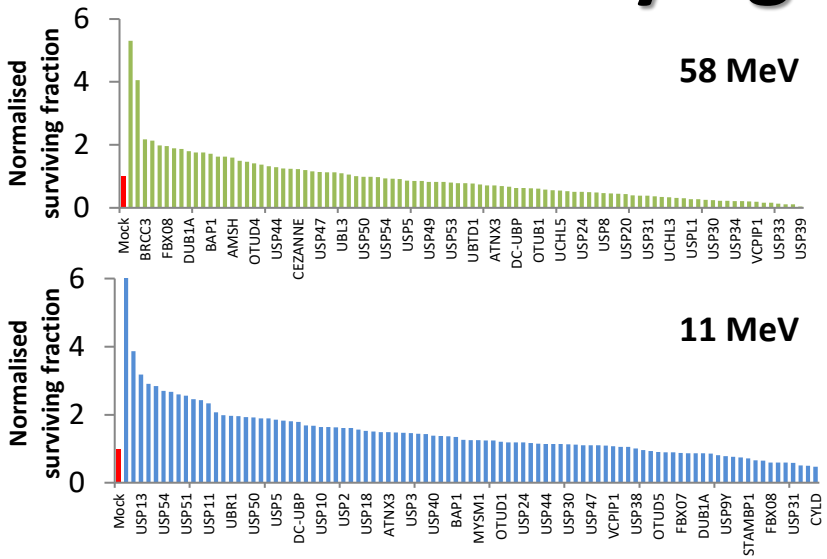


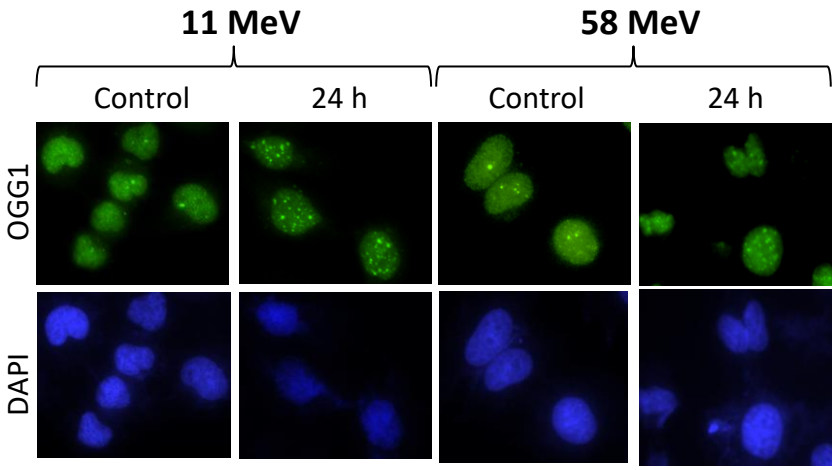


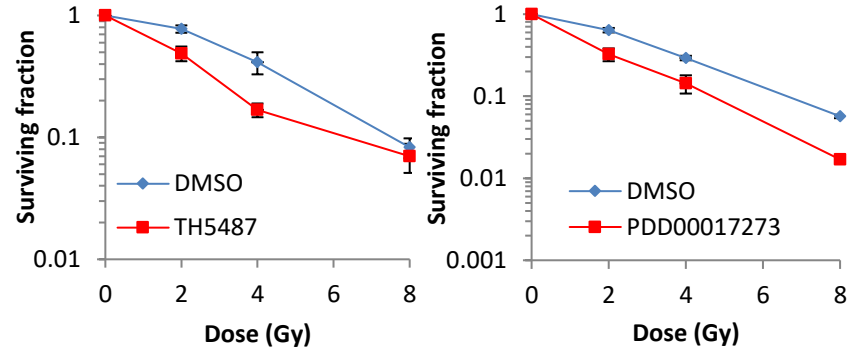


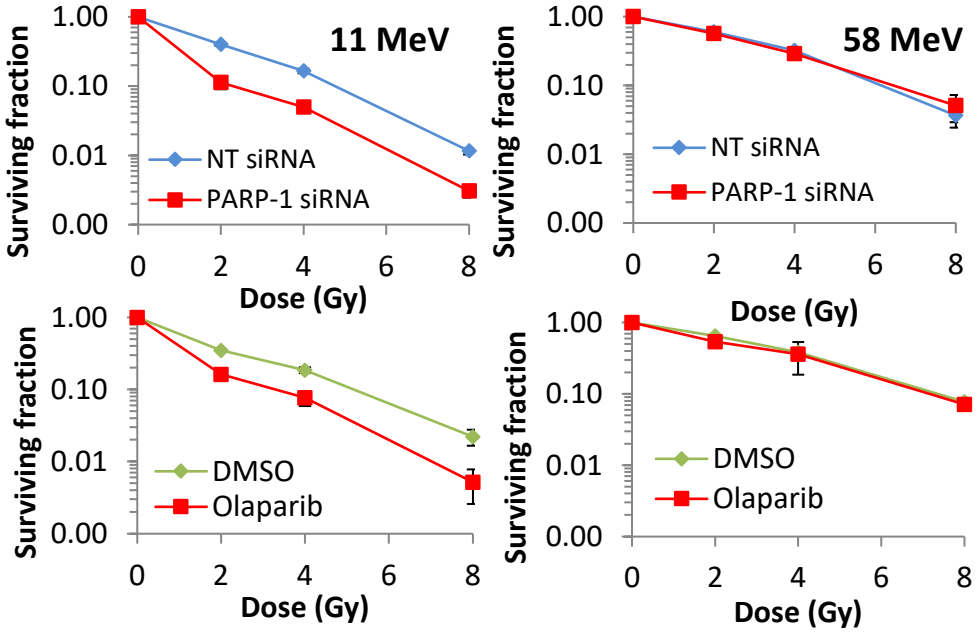
Carter *et al.*, (2018) *Int J Rad Oncol Biol Phys*
Carter *et al.*, (2019) *Int J Rad Oncol Biol Phys*
Nickson *et al.*, (2021) *Front Oncol*

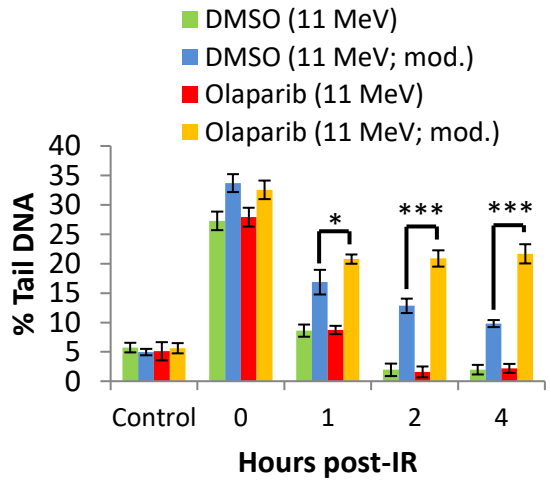
Identifying cellular targets for radiosenitisation

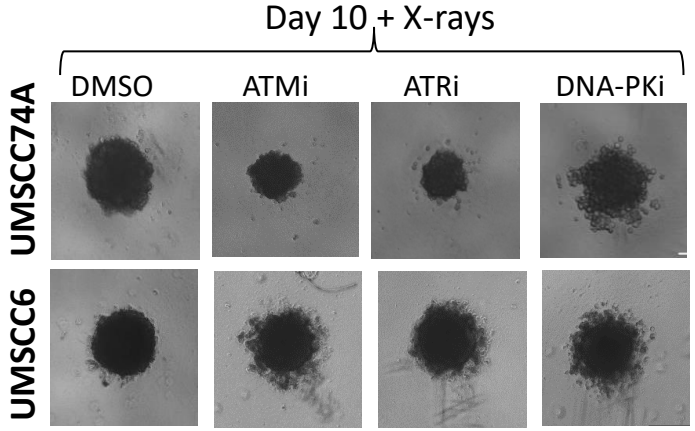


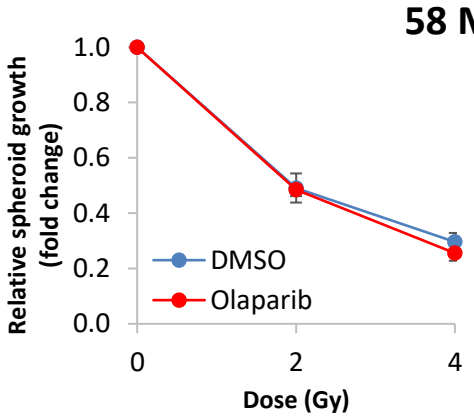


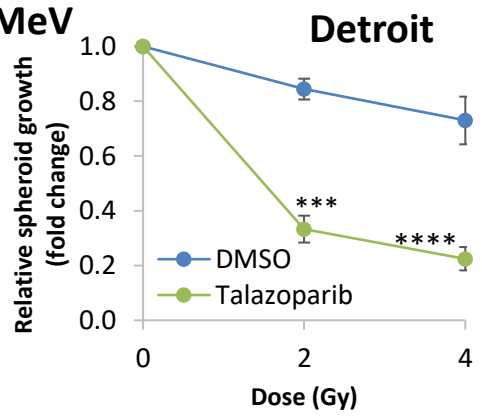






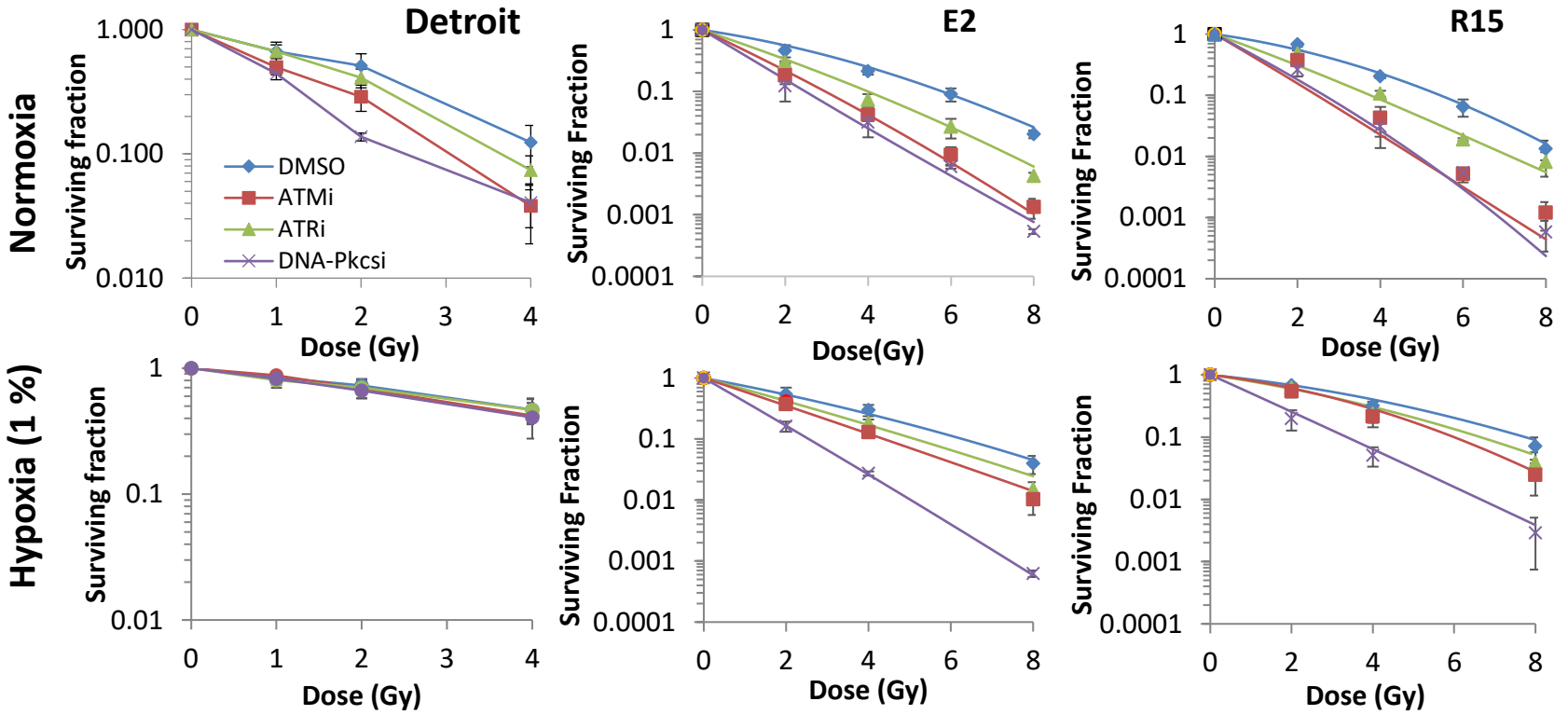


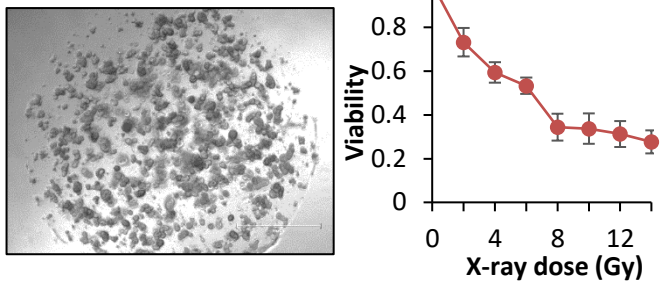


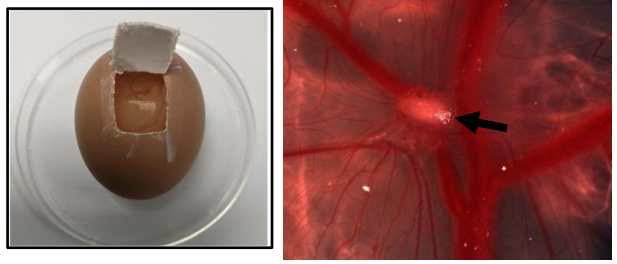


Carter *et al.*, (2019) *Int J Rad Oncol Biol Phys*
Nickson, Fabbrizi *et al.*, (2021) *Front Oncol*
Vitti, Kacperek and Parsons (2020) *Cancers*
Zhou *et al.*, (2022) *Front Oncol*

The impact of hypoxia and FLASH on radiobiology

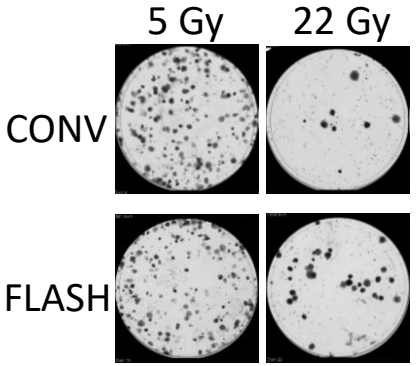




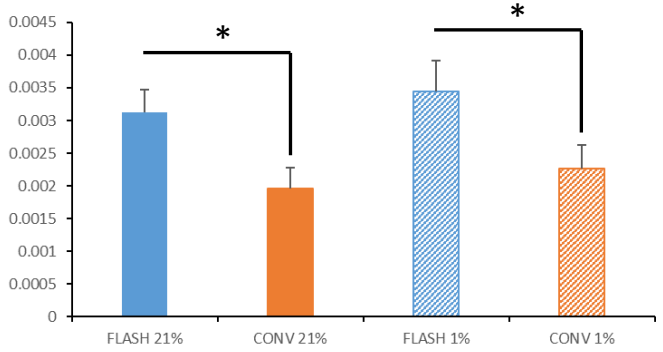


Development of patient-derived organoids and chick embryo model

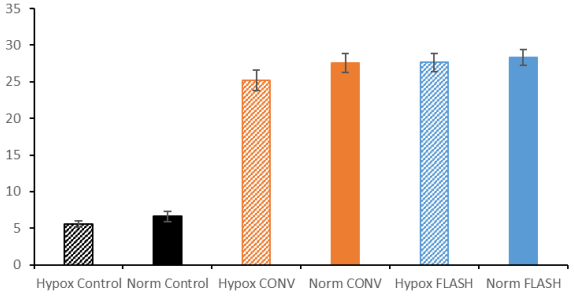
FLASH irradiations

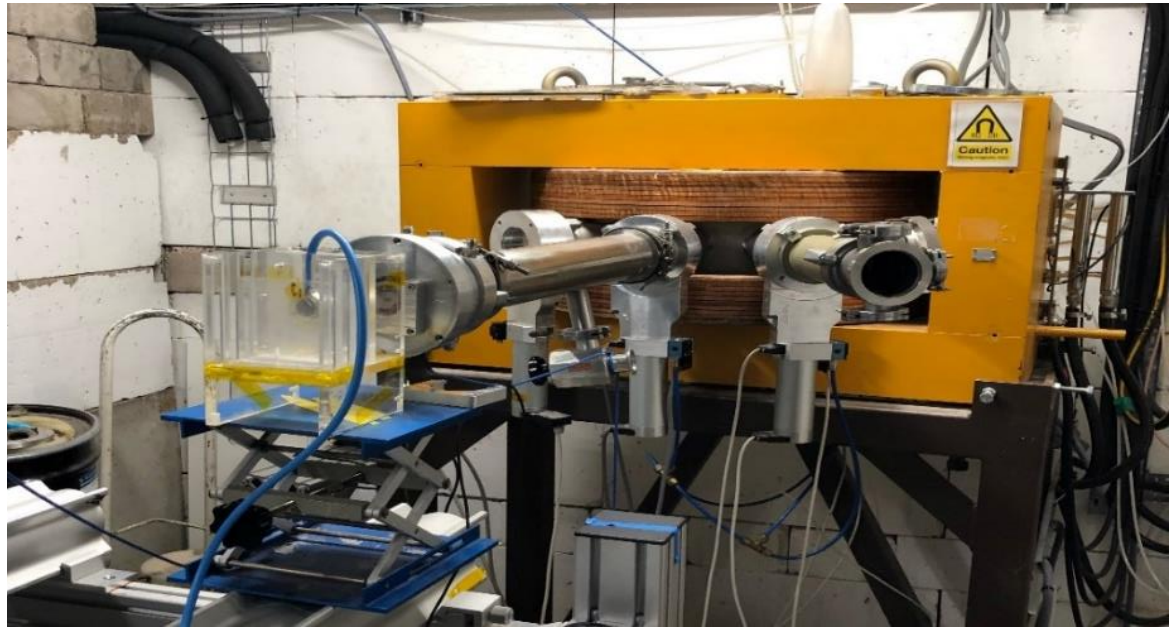


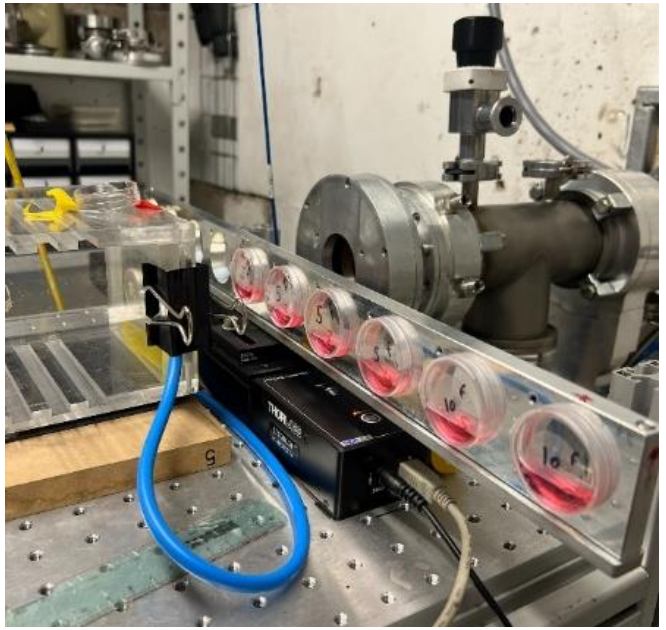
HeLa cells (survival)



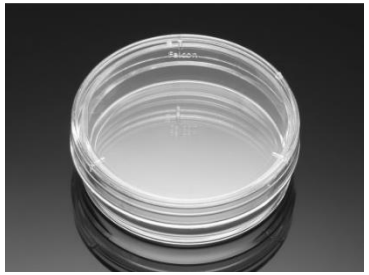
FaDu cells (γH2AX)



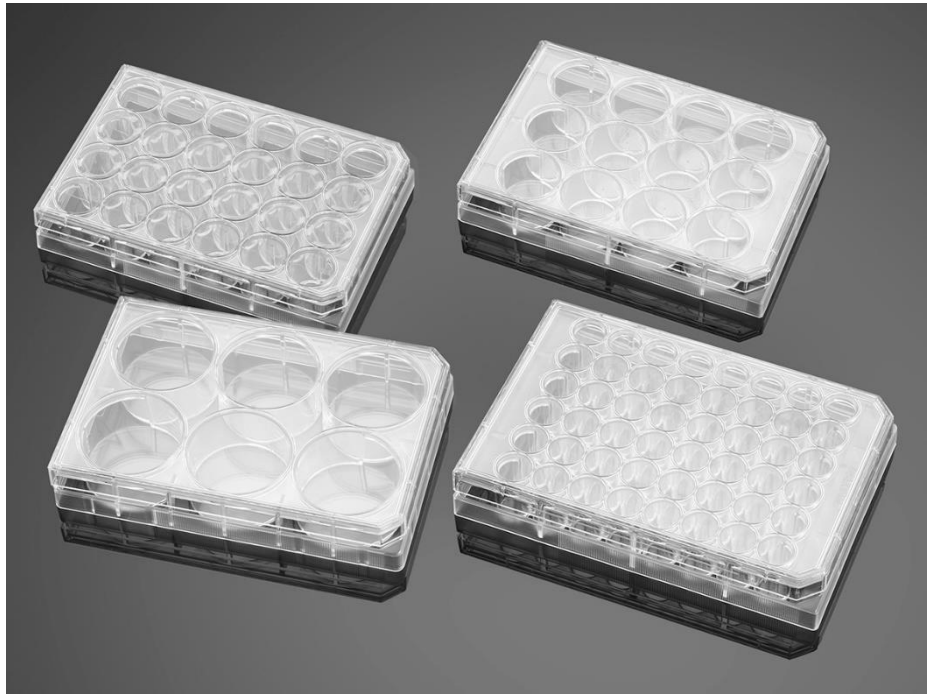




MC-40 cyclotron in Birmingham



35 mm dishes
9.6 cm^2 growth area
1.01 mm thick



Multi-well plates (127 mm x 85.5)

	6-well	12-well	24-well	48-well	96-well
Diameter (mm)	35.43	22.73	16.26	11.56	6.86/ 6.35
Area (cm^2)	9.5	3.83	1.93	0.95	0.32
Thickness (mm)	1.27	1.27	1.27	1.27	1.27
Elevation (mm)	2.54	2.16	2.54	2.87	3.55

Acknowledgements

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AstraZeneca
Stephen Durant
Alan Lau

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north west cancer research
Putting our region's cancer needs first