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#139 REDUCTION OF RADIOTOXICITY BY ULTRA-HIGH DOSE RATE PROTON THERAPY

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1- Introduction

■ Electron beams are widely used for Ultra-High Dose Rate Radiotherapy (UHDR-RT) studies.

■ The novelty of UHDR-RT using protons still requires a lot of knowledge of the parameters involved in its response.

■ **Protons** : -Spread a little along the trajectory.
 -Have a precise targeting.

What are the requirements that allow obtaining a protective effect using proton UHDR-RT ?

2- Materials and Methods

■ Zebrafish embryos



No experimental authorization is required Statistical power Fast beam structure investigations

■ Irradiation at 28 hpf

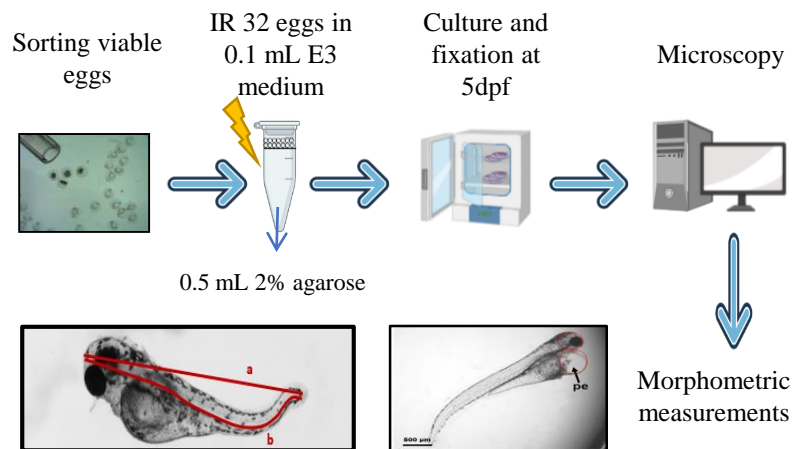
Plateau of 68 MeV protons



Conventional dose-rate
12 Gy/min

Ultra-high dose-rate
8-9 kGy/sec

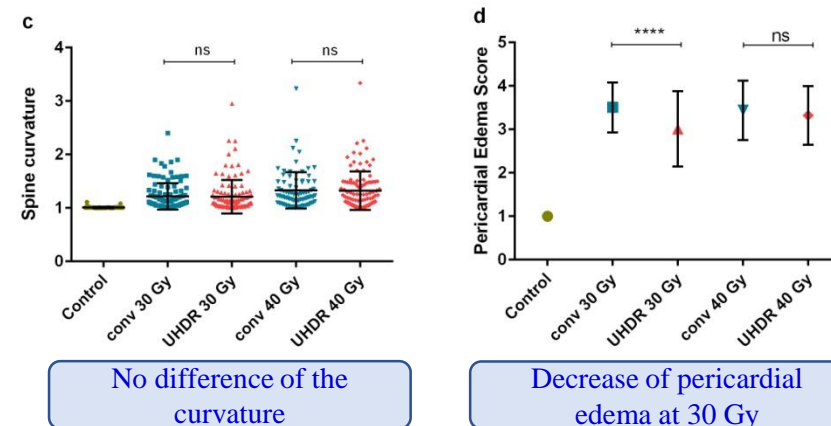
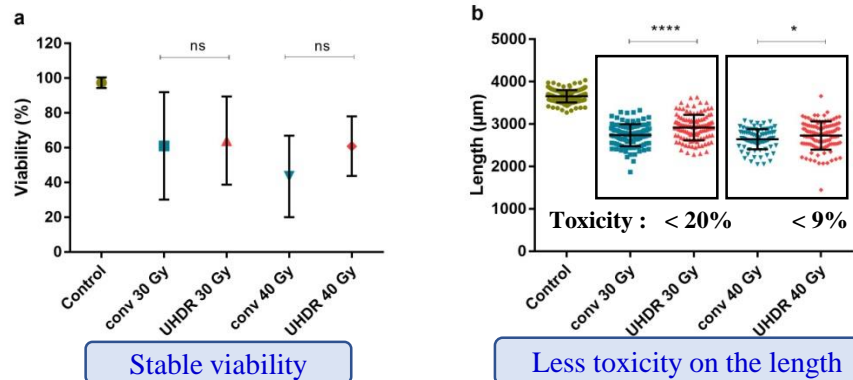
■ Protocol



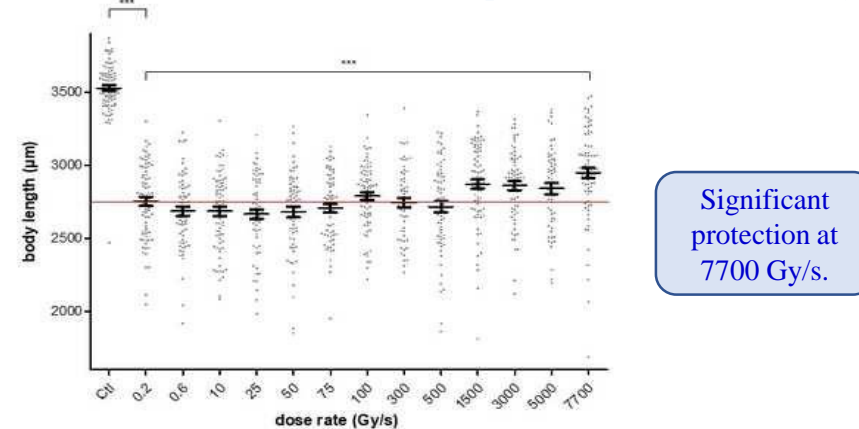
a: Distance (from head to tail)
 b: Length of the body
 b/a: Curvature of the tail
 Scoring pericardial edema

3-Results

■ Effect of proton UHDR-RT on the morphology of zebrafish embryos vs conv RT :



■ Effect of the mean dose-rate on the protection of zebrafish embryos :



4- Conclusion

■ A protection in body length after proton UHDR-RT was demonstrated with the zebrafish embryonic model.
 ■ This model allows to study rapidly several parameters allowing a better understanding of proton UHDR-RT.