DNA damage repair and DEAD Box 1 (DDX1) in embryonic development

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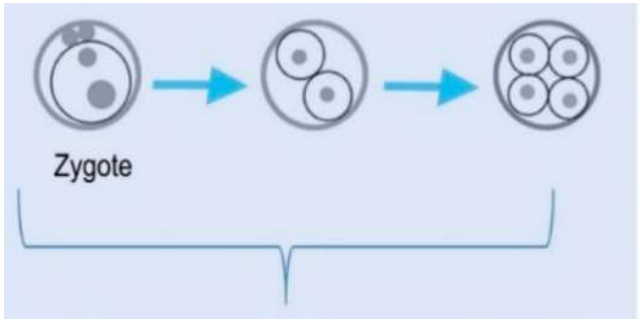
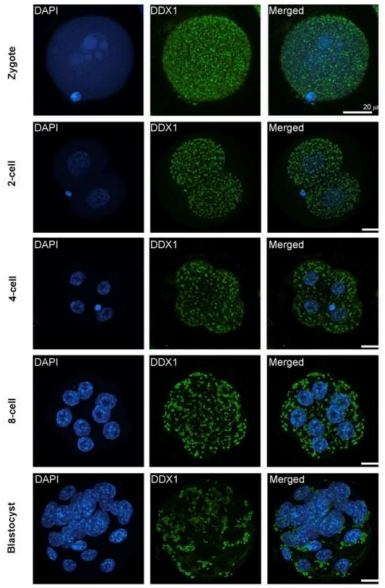
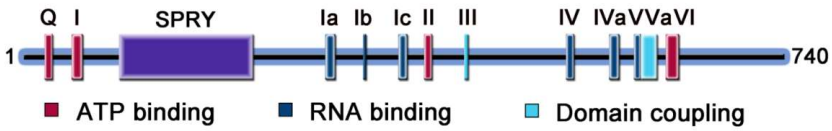


HR, NHEJ, BER, NER, MMR , ?



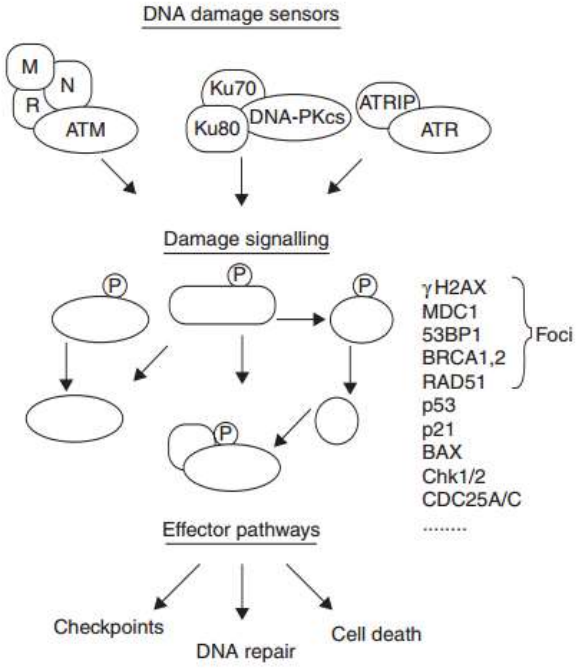
DDX1 expression in embryos, Dev. Biol. 2019, 455 (2).



Domain structure of DDX1

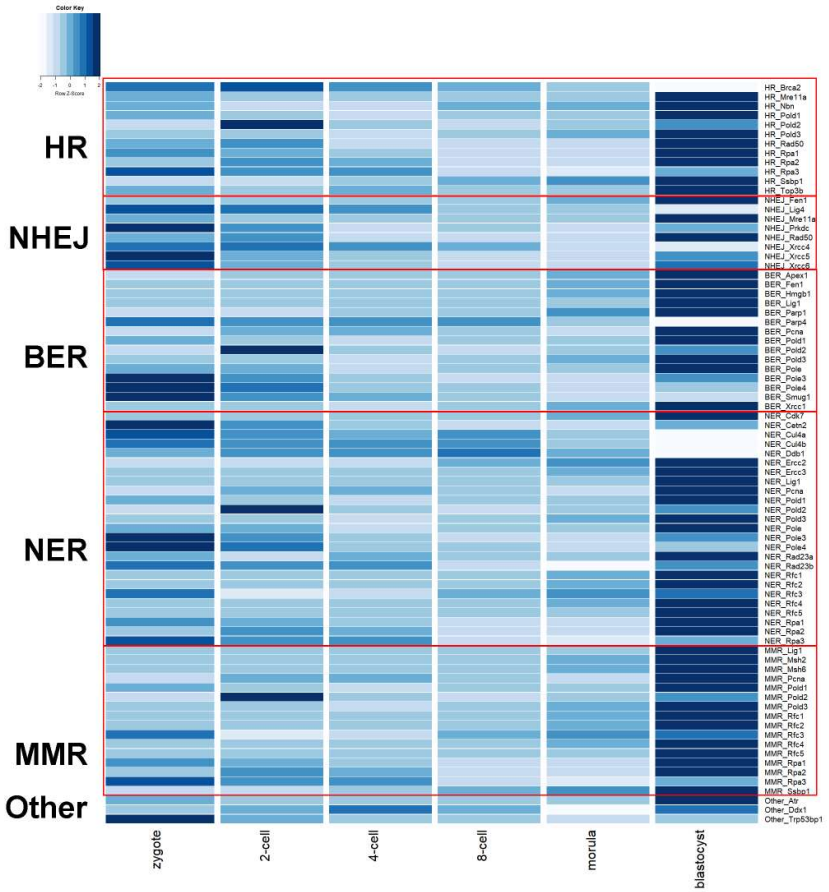
- Genome integrity during early embryonic development is essential
- In the absence of key DNA repair proteins, embryos will either die or else survive with defects
- DEAD Box 1 (DDX1) protein is a member of a family of DEAD box proteins

DNA repair protein expression in embryonic development



from Joiner & van der Kogel

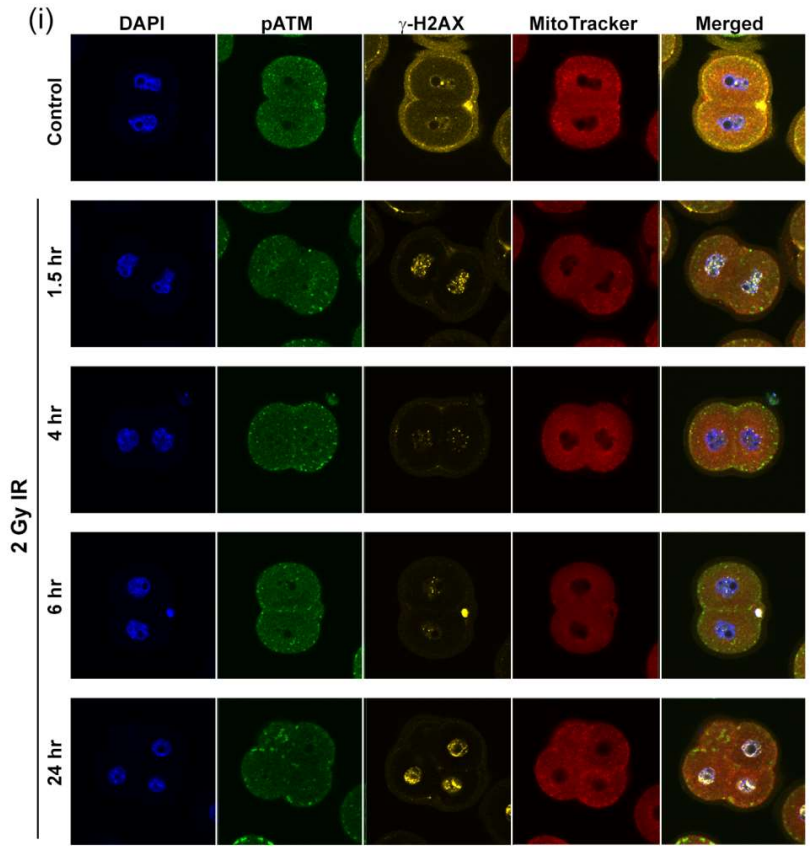
Analysis using published Mass Spectrometry data on mouse embryos



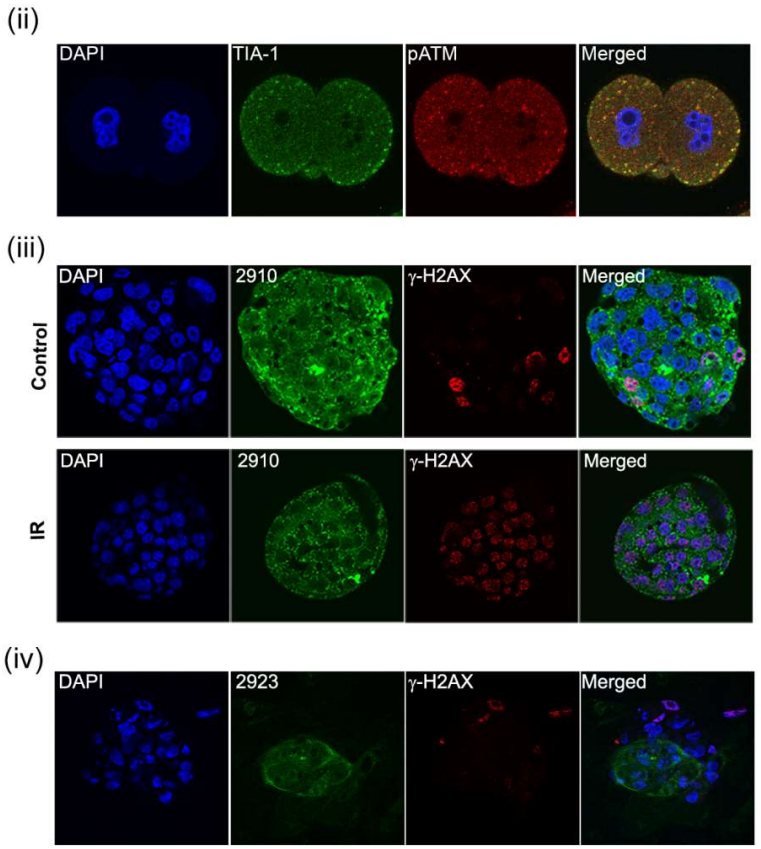
ATM
RAD50
BRCA1
MRE11

DDX1 and DNA double strand breaks in 2-cell and later developmental stages

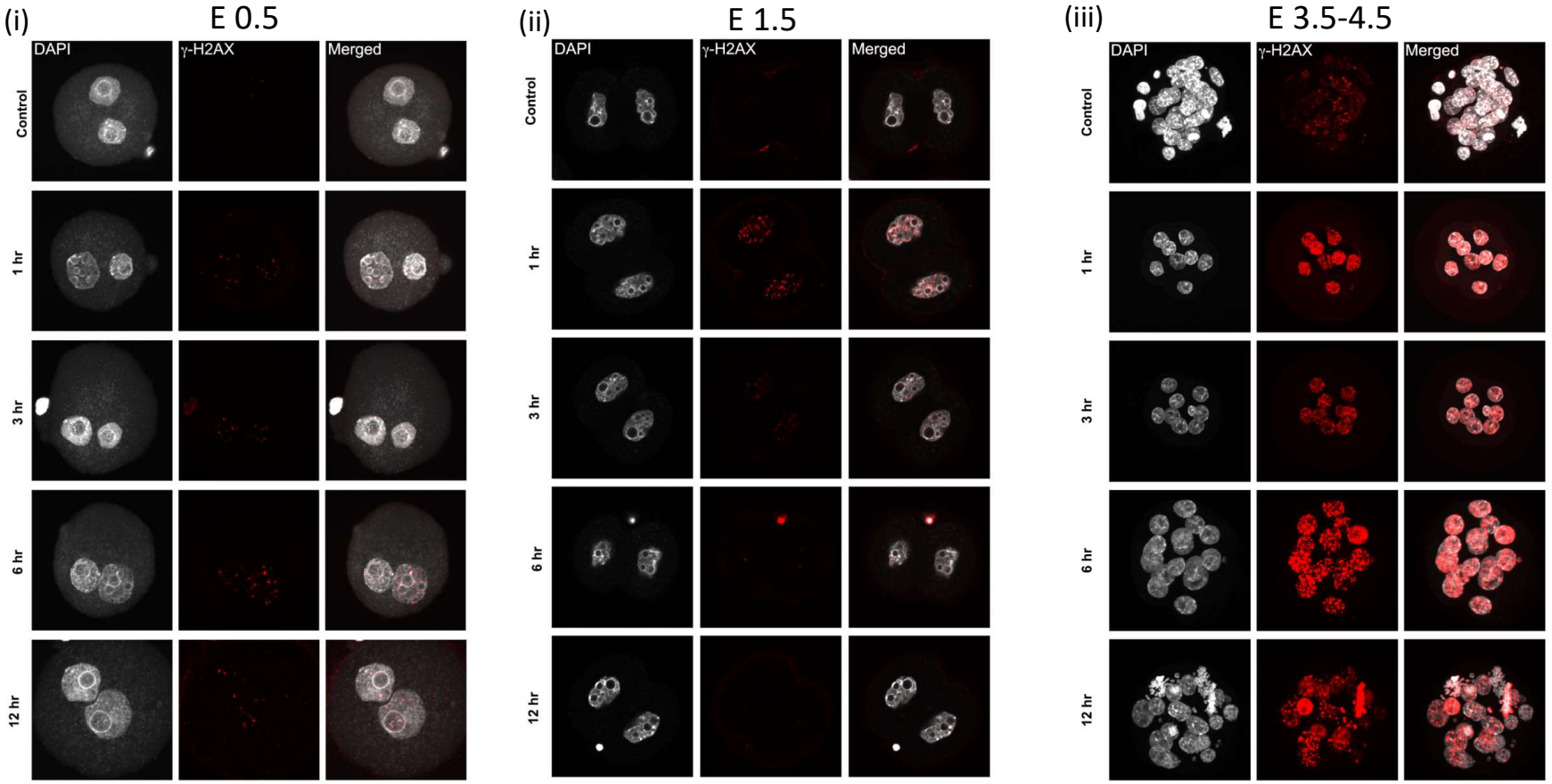
2 Gy radiation



5 Gy radiation

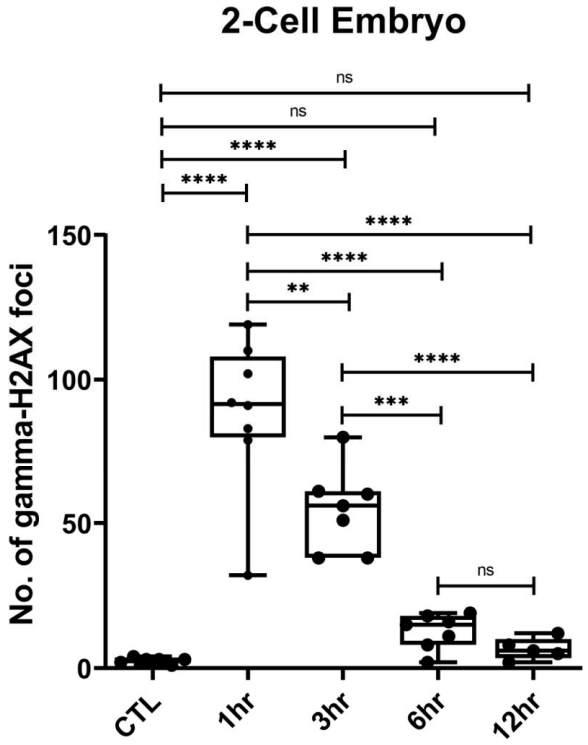


Kinetics of DNA double strand break repair in embryos

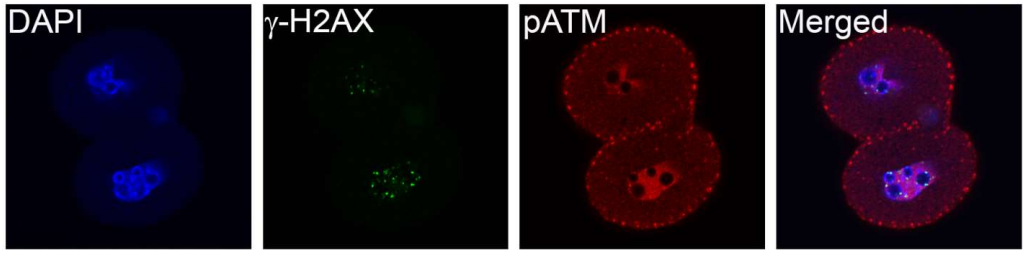


Quantification and localization of gamma-H2AX and pATM in irradiated embryos

(i)



(ii)



Summary and future directions

- Unlike other cell types, DDX1 is not recruited to sites of DNA double strand breaks in early and late stage embryos
- γ-H2AX foci are significantly reduced after 6 hours post-irradiation in 2-cell embryos
- Pursue analysis using antibodies to homologous recombination and non-homologous end joining proteins to further investigate the repair of DSBs in early stage embryos