The Effects of Radiation on Zebrafish Development

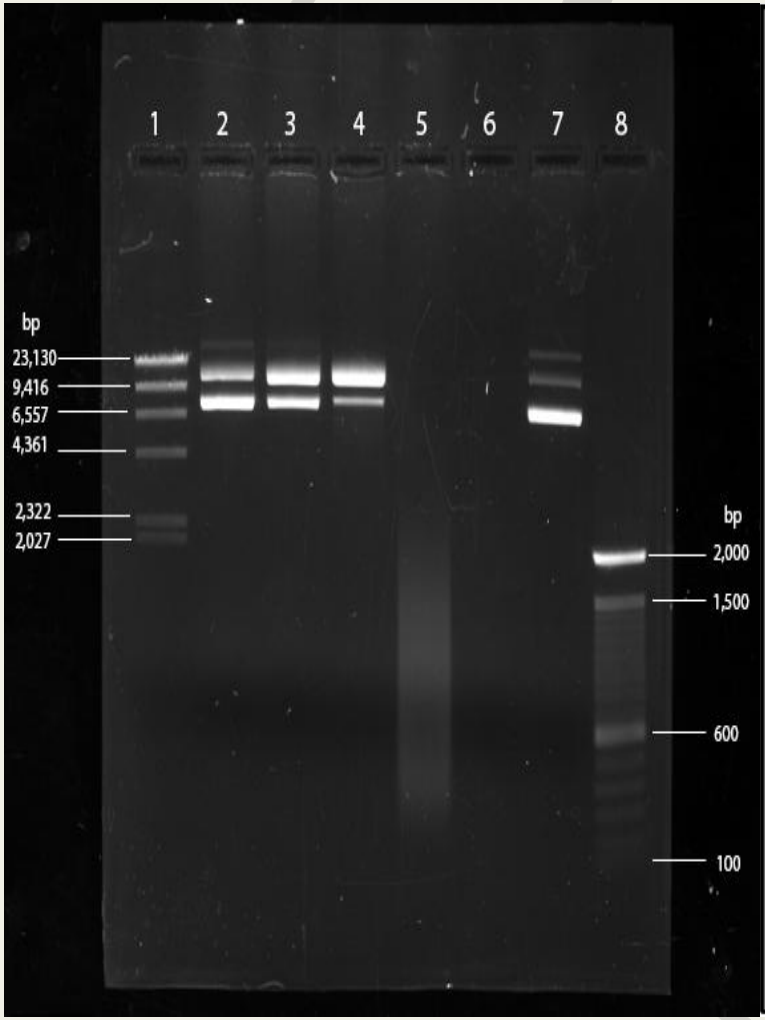
Christina Barrett and Ivy Hellickson

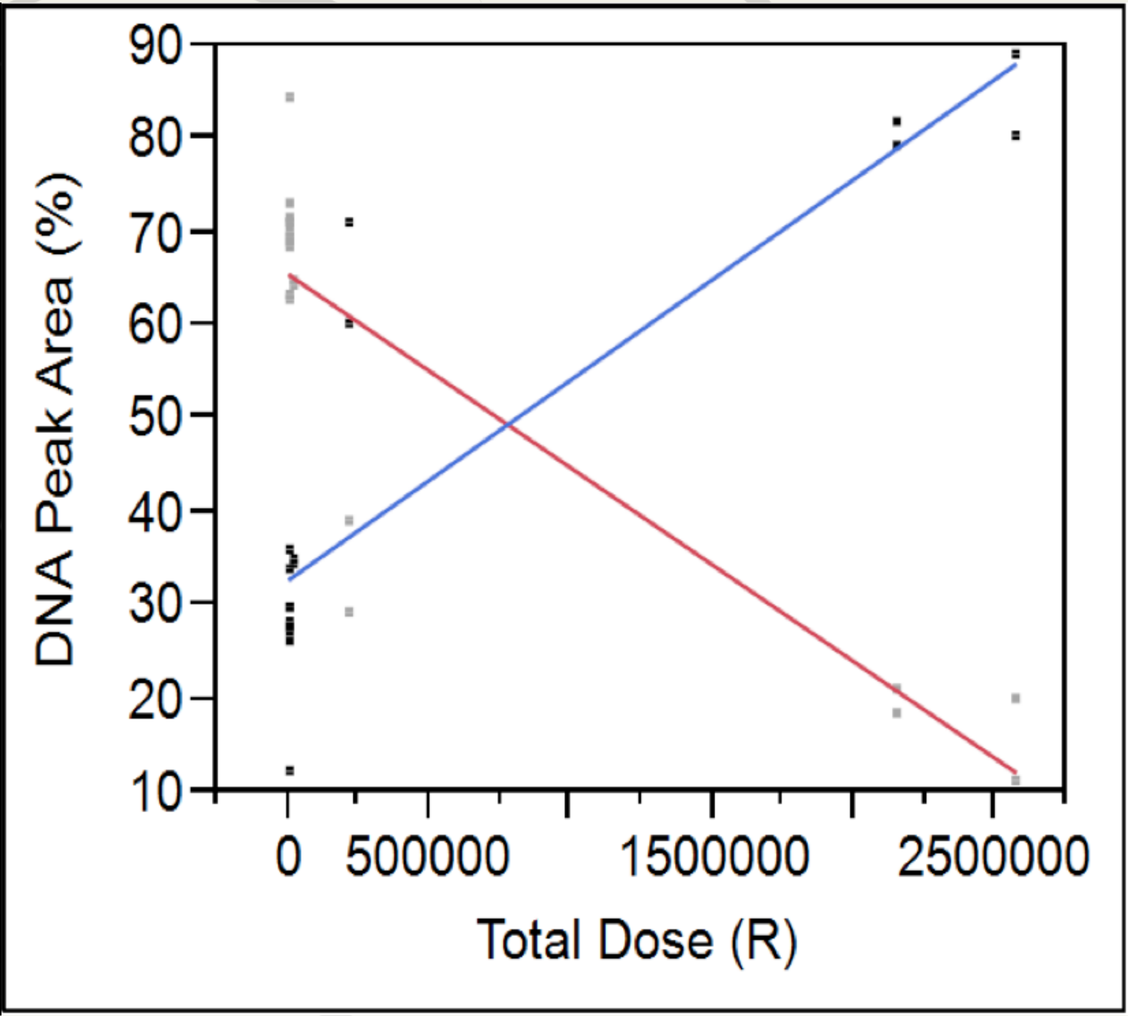
Reed Research Reactor

Reed Research Reactor - Staff

Left to Right: Hannah Choi (Projects Supervisor), Will Horner (Requal Supervisor), Christina Barrett (Operations Supervisor), Ilana Novakosky & Alexandra Mariani (Training Supervisors).

Student Projects – DNA Fragmentation





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Student Projects – Tracking Plant Nutrient Levels

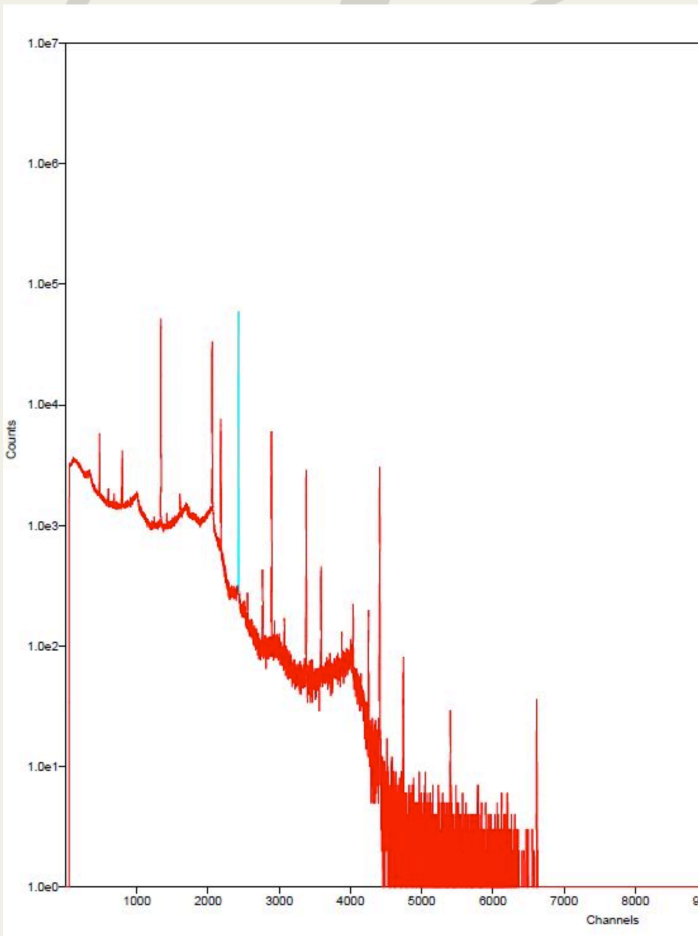

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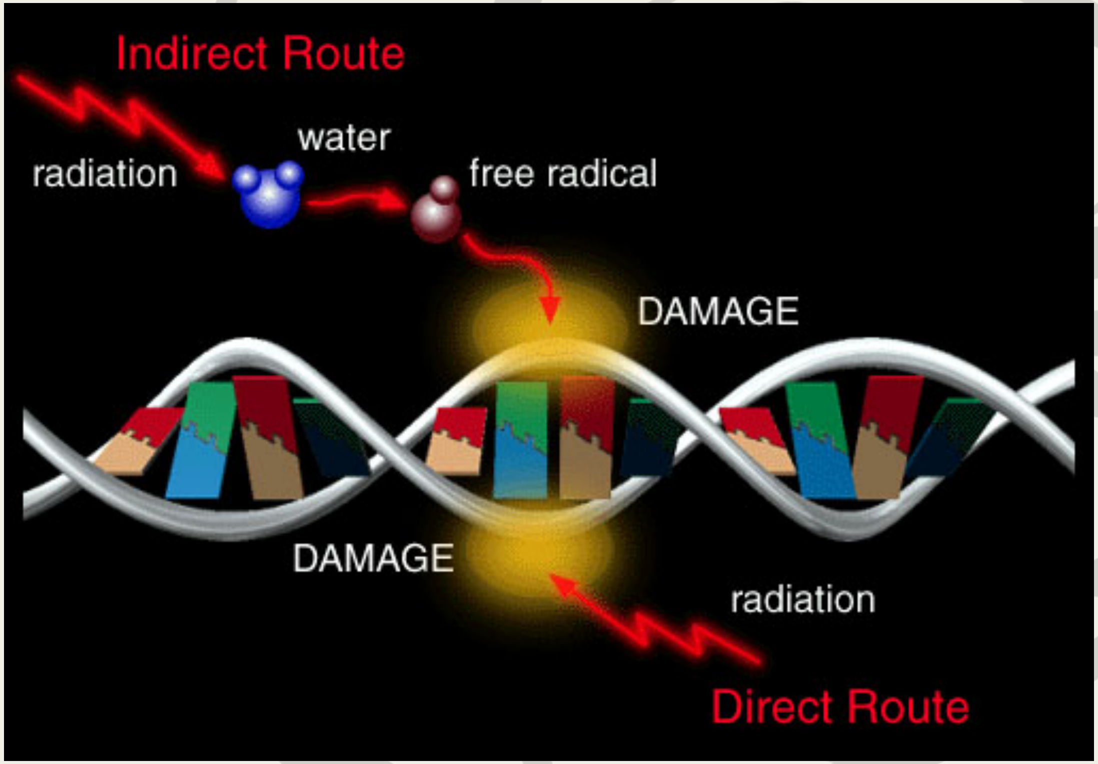
Image Credit: Malcolm McCarthy


SCRAM

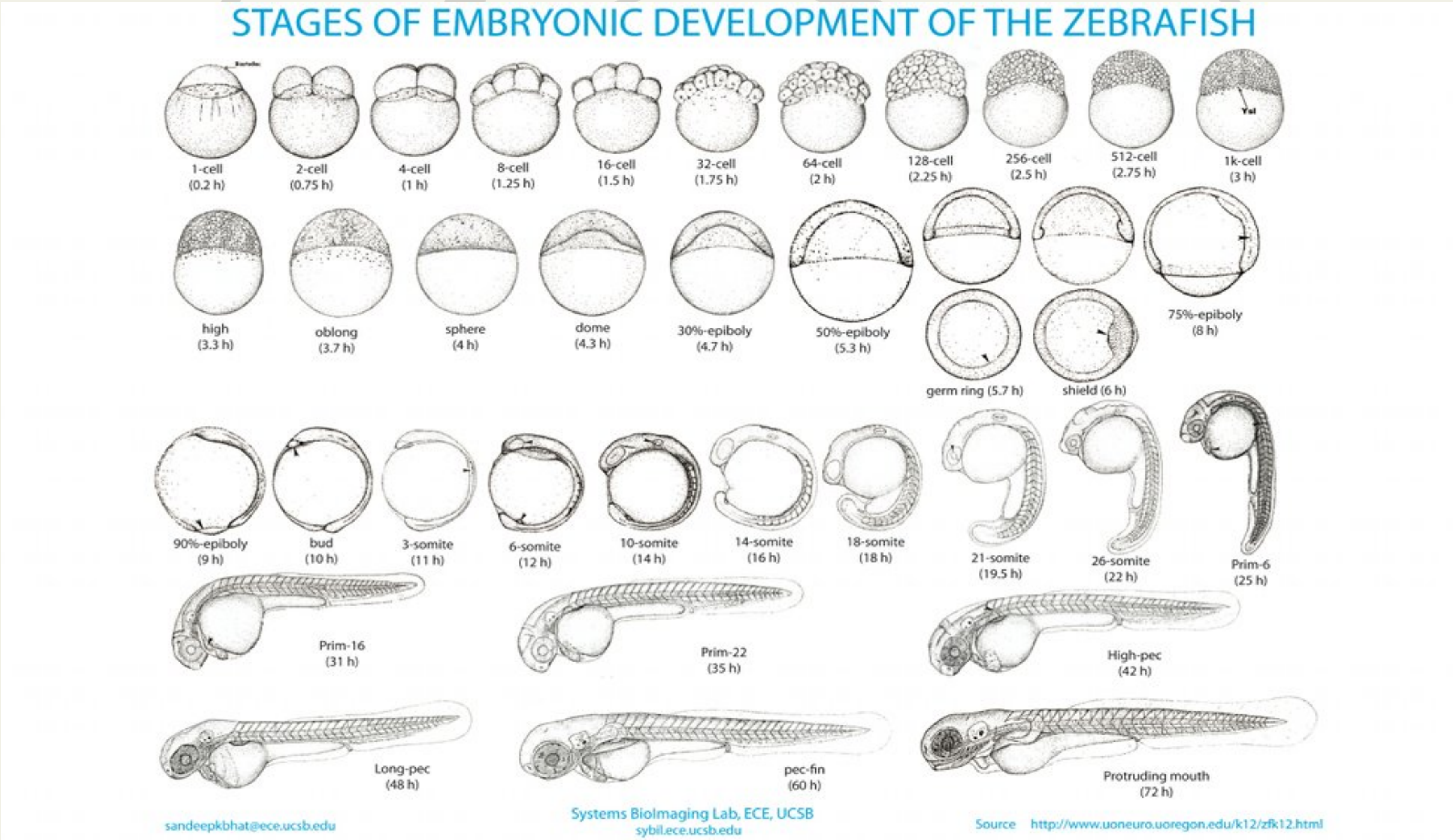
DNA Damage and the Result



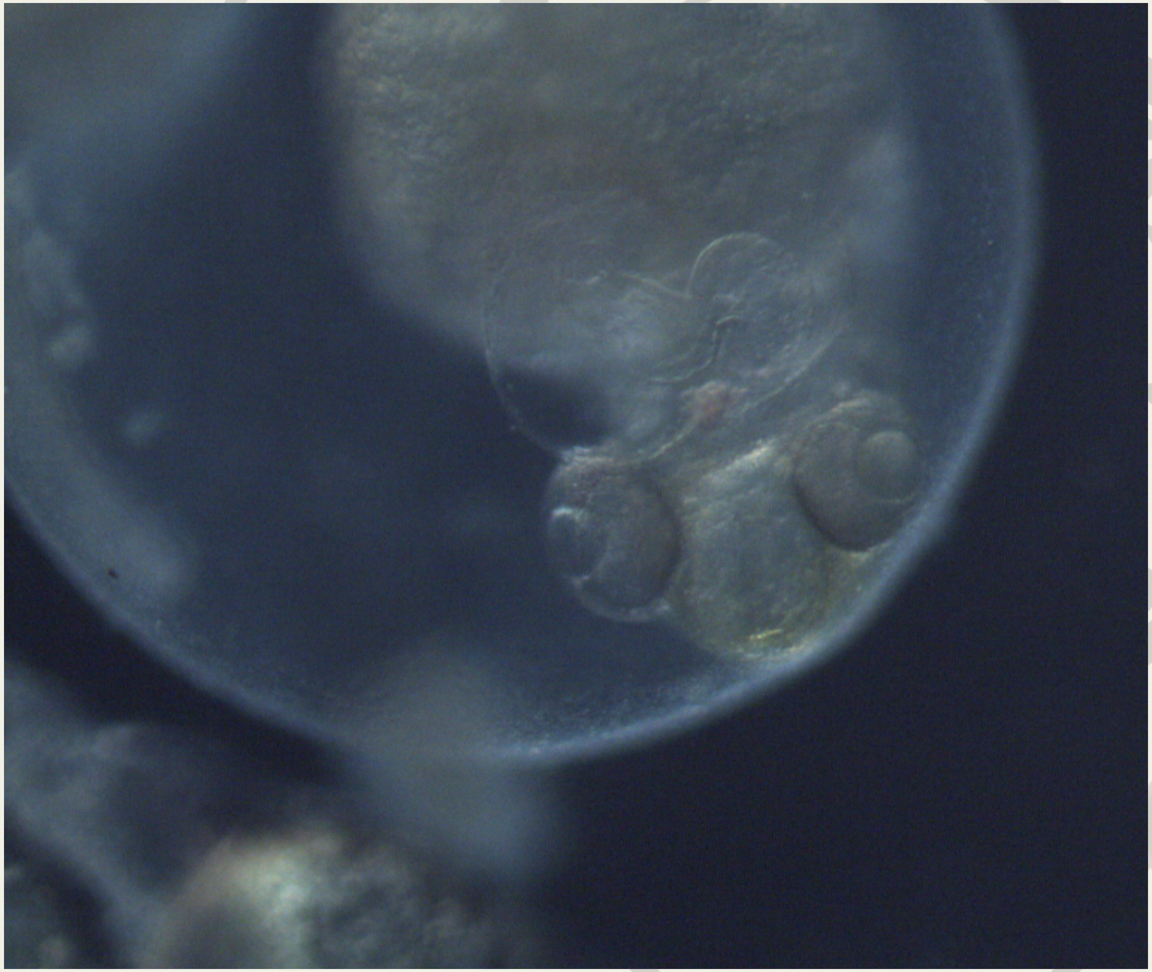
http://www.windows2universe.org/earth/Life/cell_radiation_damage.html

- Repair
- Abnormalities
- Cell Death

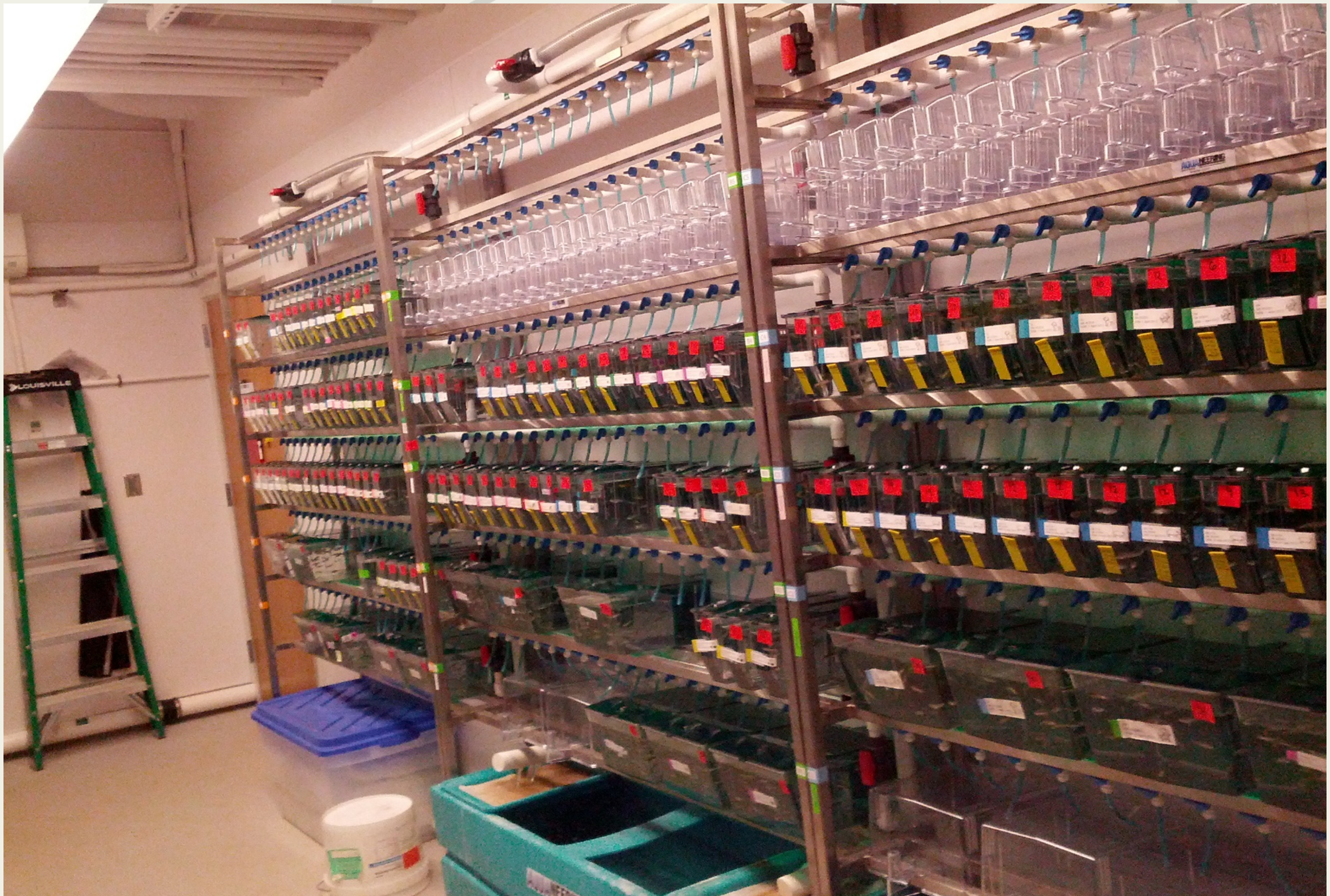
Danio rerio as a model for development



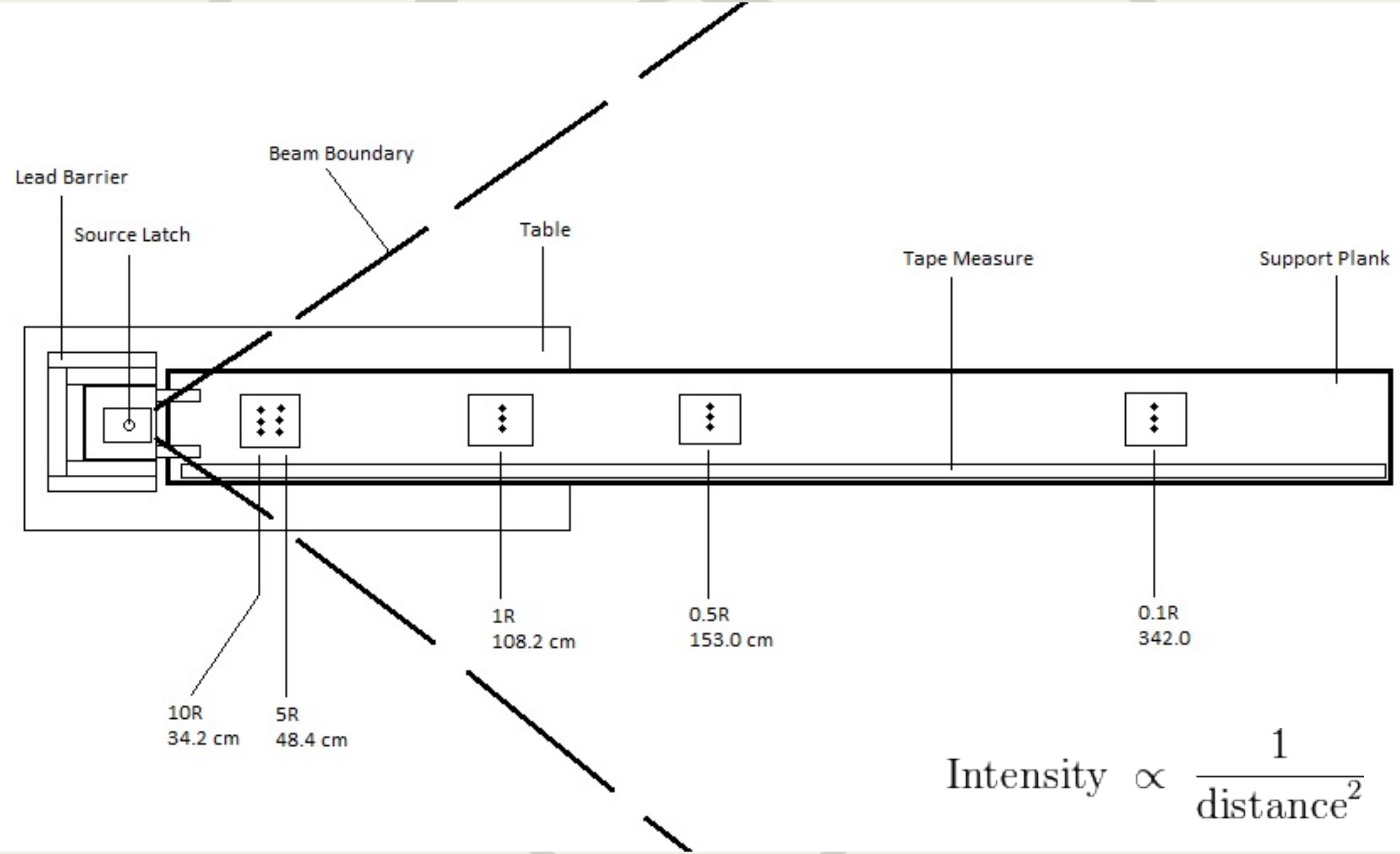
Preliminary Data



Methods: Fish Husbandry



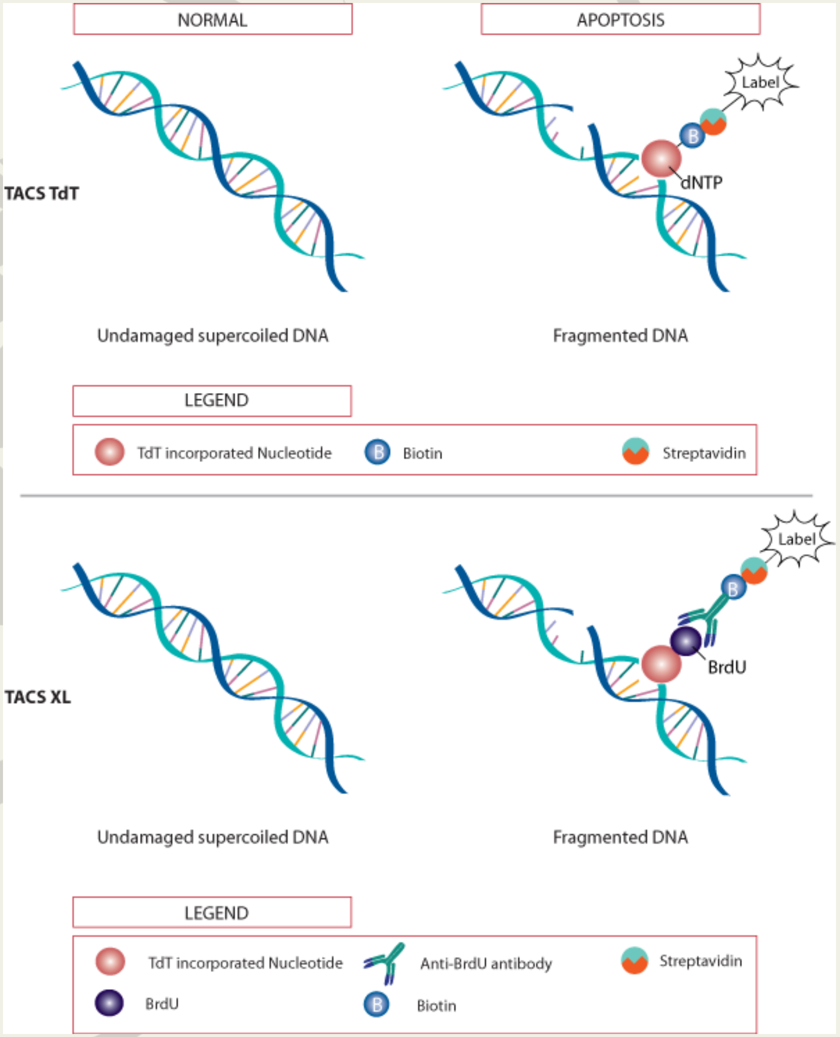
Methods: Gamma Exposure



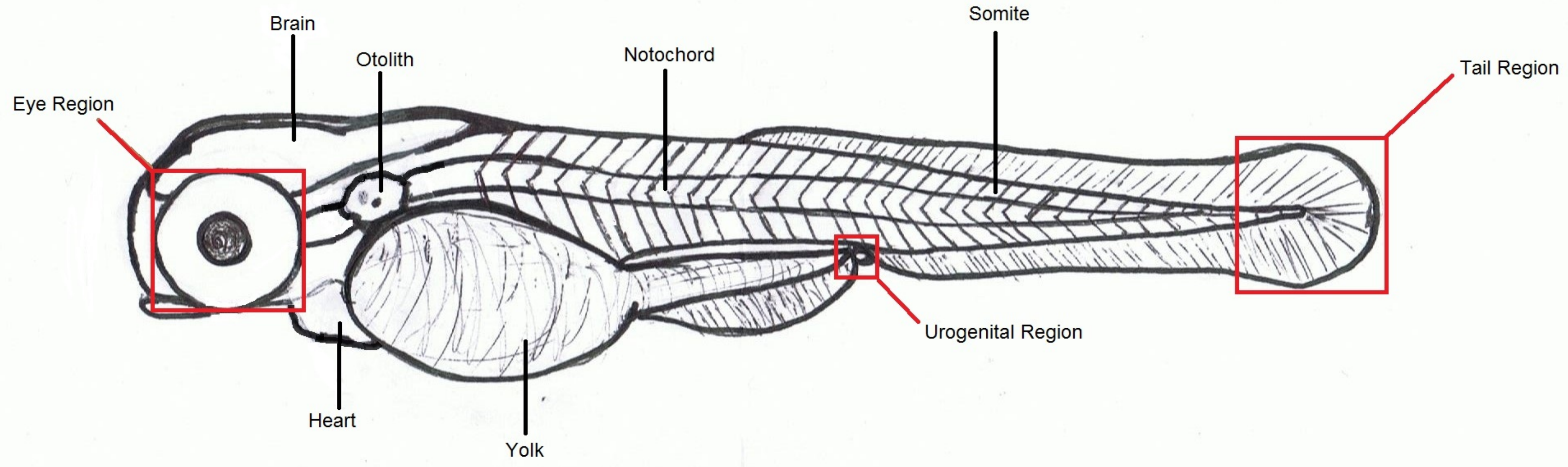
$$\text{Intensity} \propto \frac{1}{\text{distance}^2}$$

Methods: Embryo Preparation and TUNEL Assay

- Fixation in 4% PFA and stored at -20°C in 100% MeOH.
- Stained using the terminal deoxynucleotidyl transferase (TdT) dUTP nick end labeling (TUNEL) protocol.



Data Collection



Methods: Histology

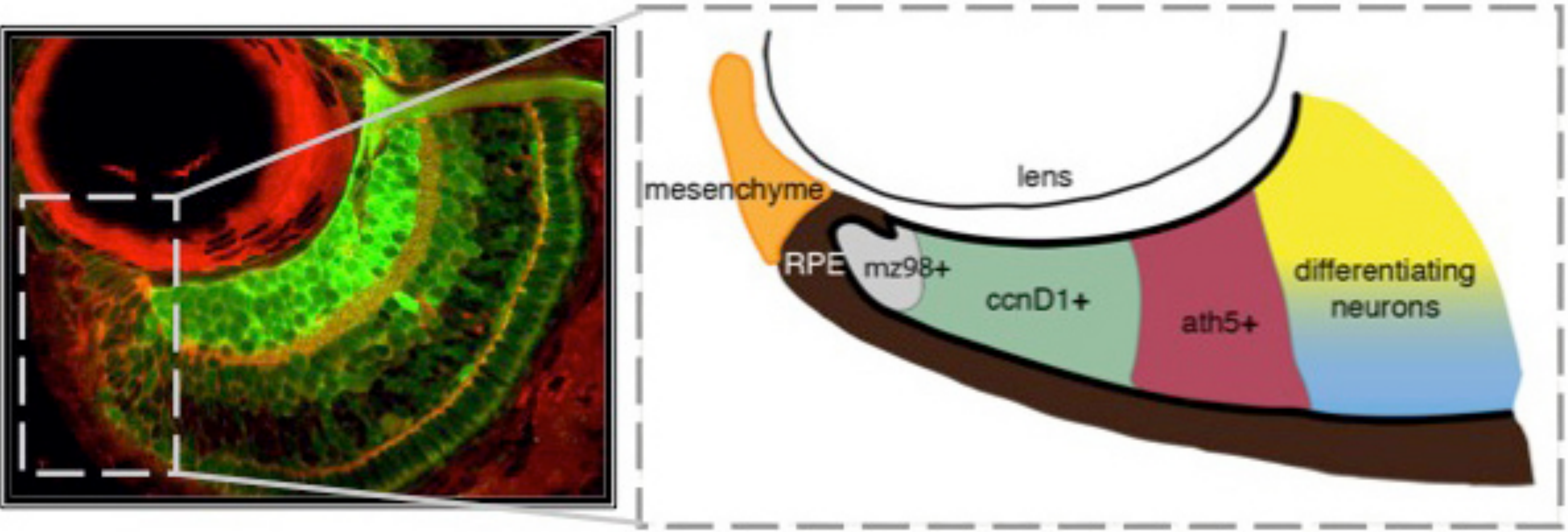
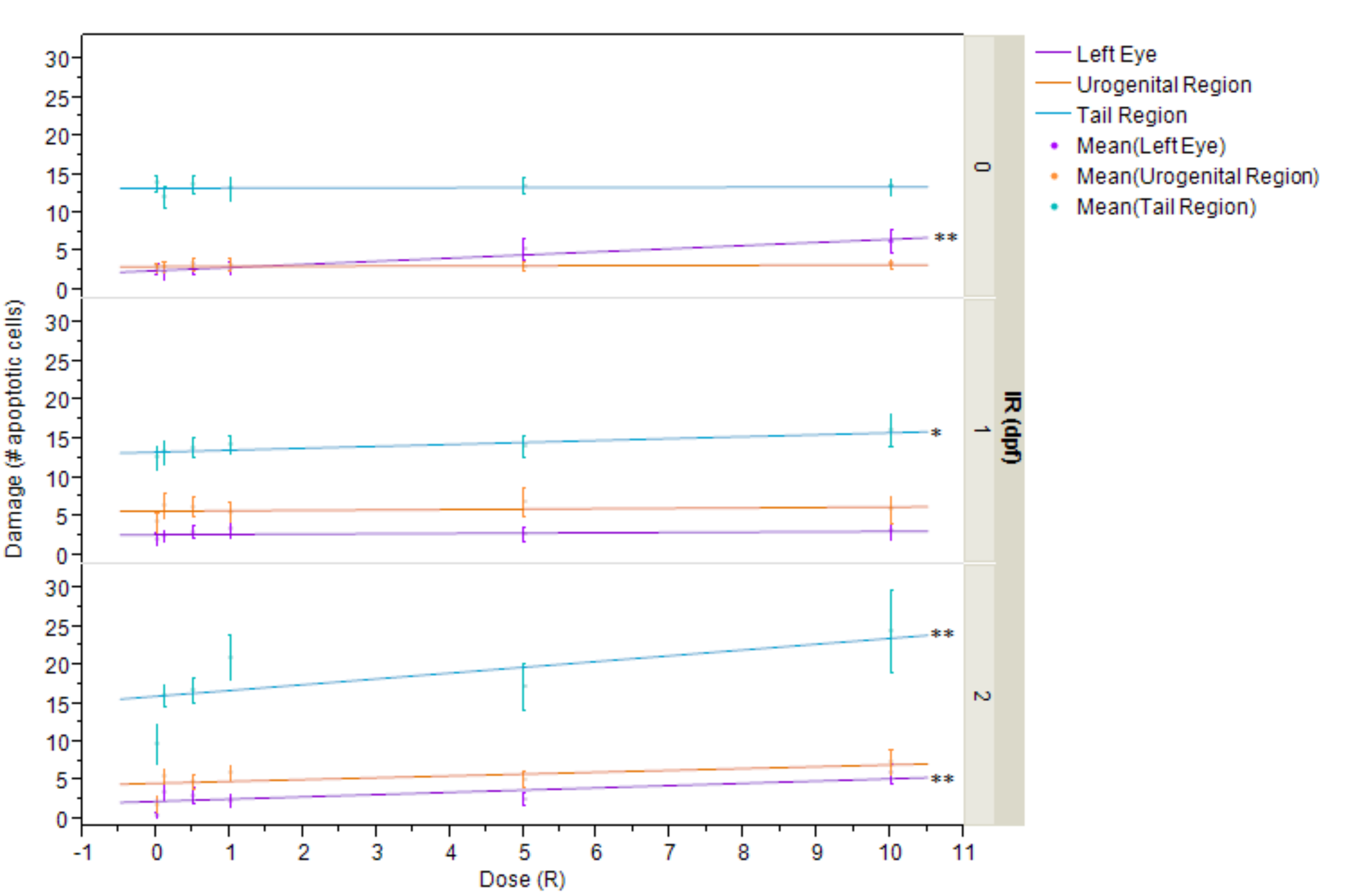


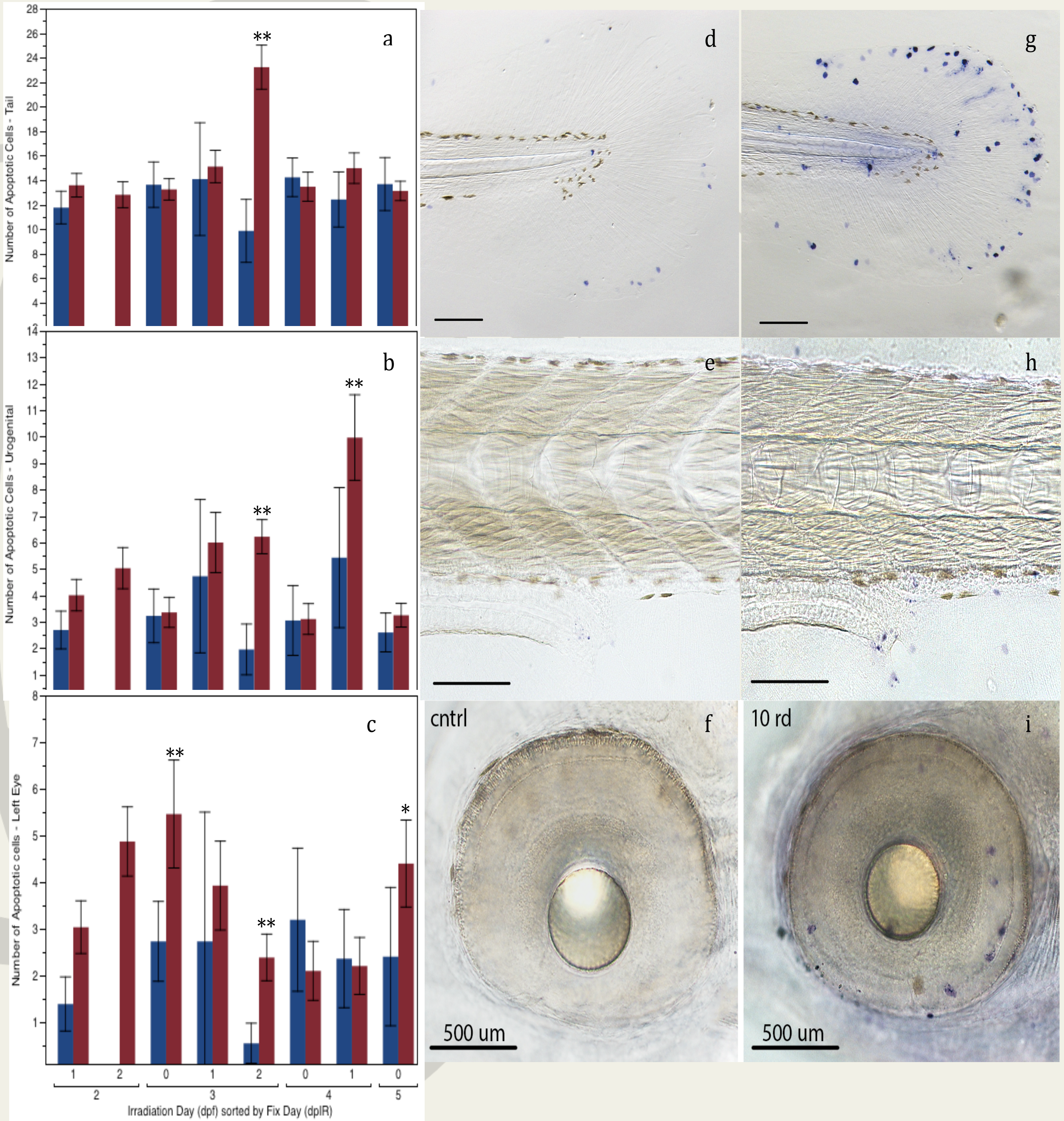
Photo credit to Dr. Kara Cerveny

Gaining more information about the damaged cells

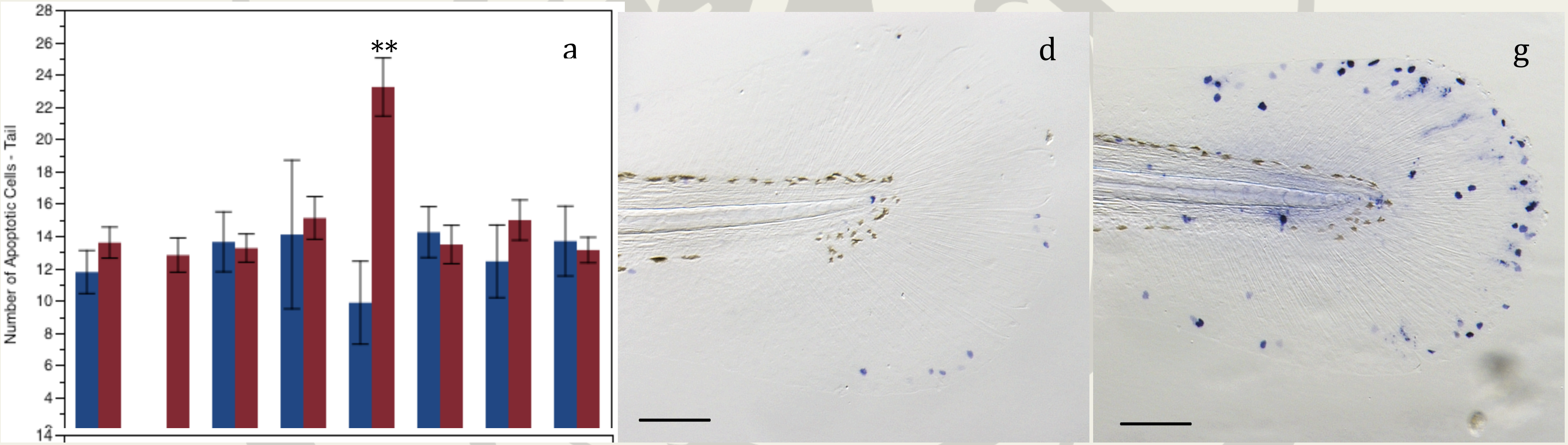
Results: Dose Dependence



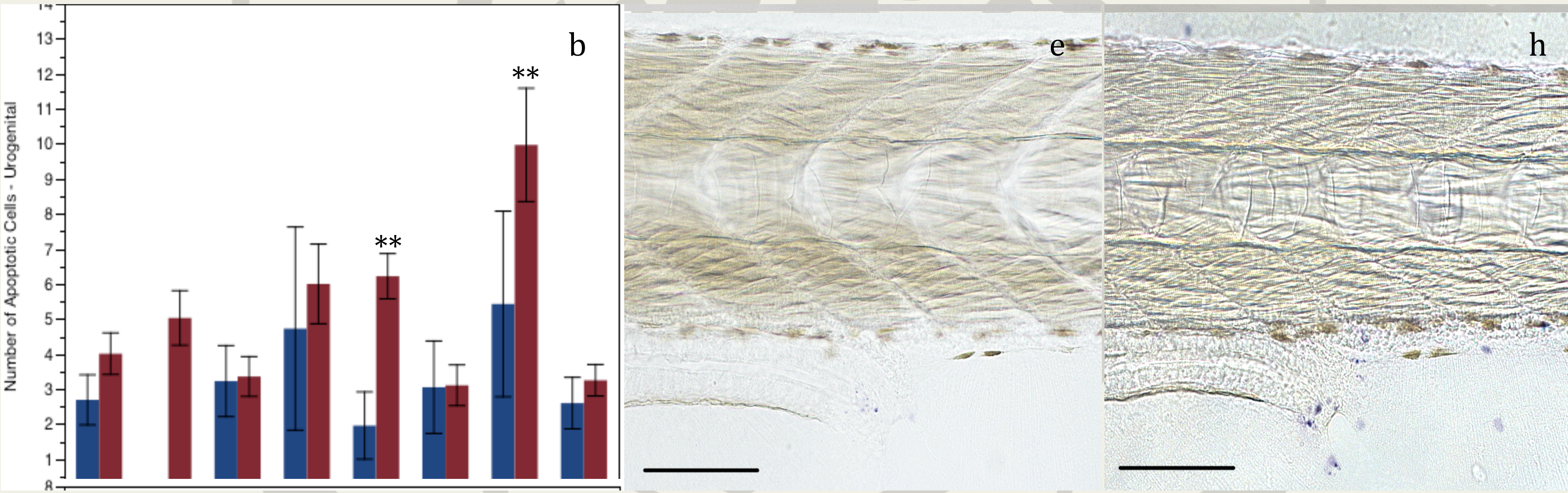
Results:
Age Dependence



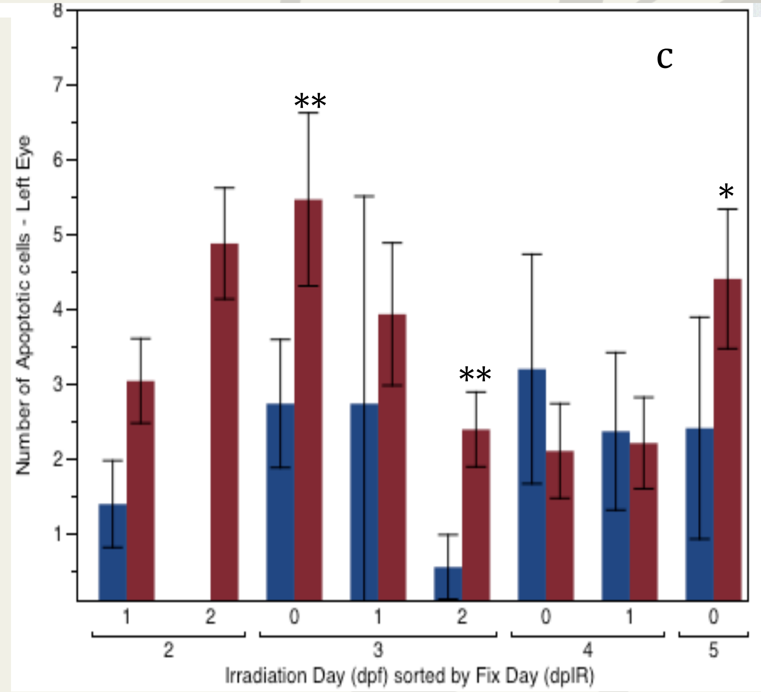
Tail Sample Region

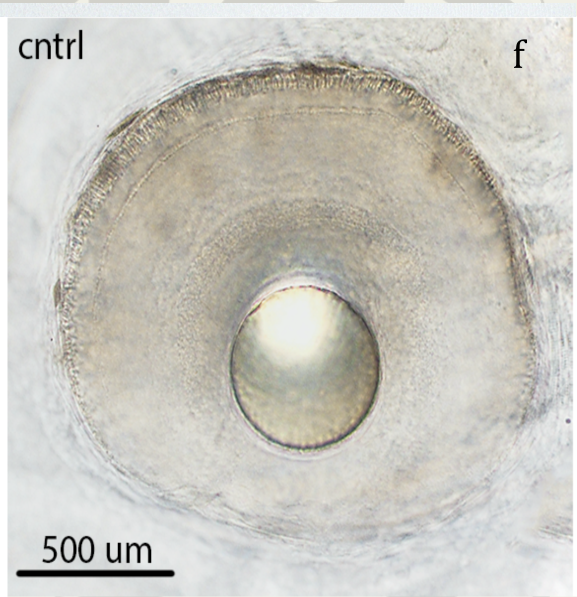


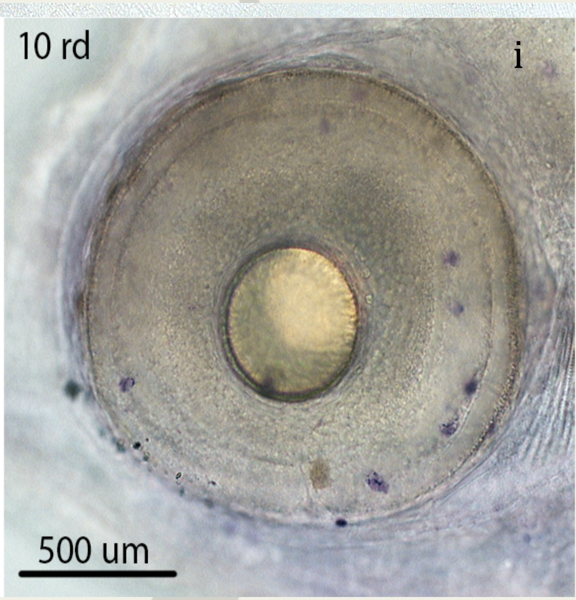
Urogenital Sample Region



Left Eye Sample Region







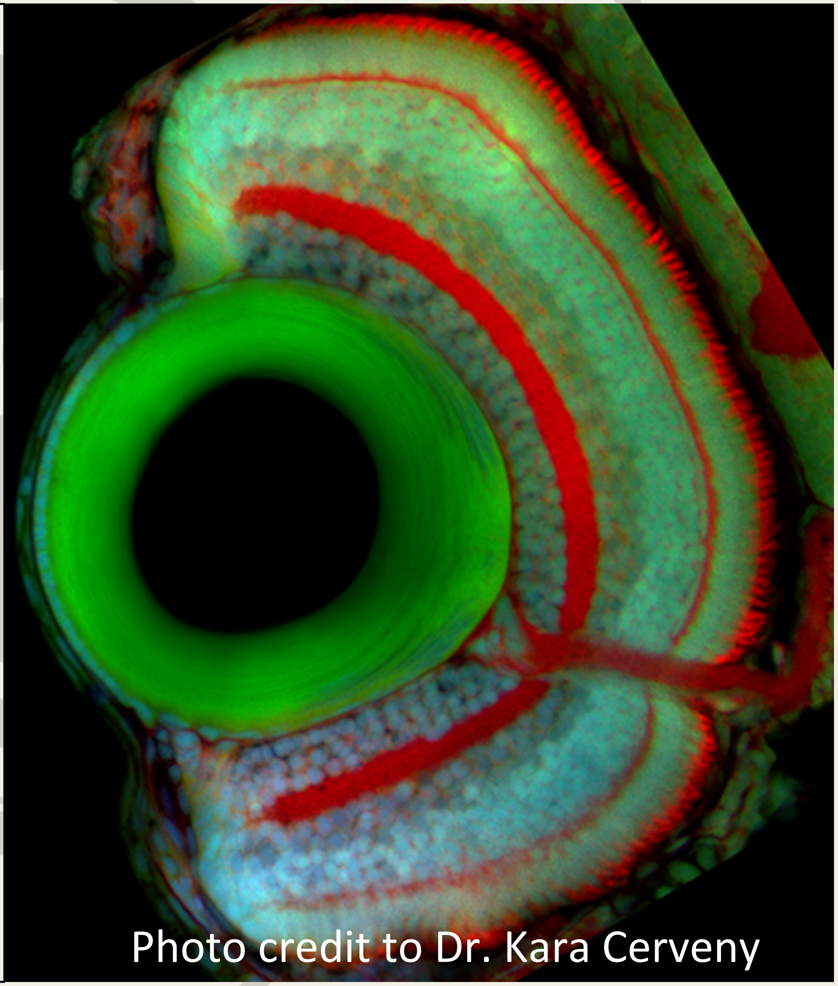
Conclusions

- Extent of dose dependence is tissue and age specific
- System vulnerability is dependent on time specific developmental events
- Latency to effects relies on a variety of coexisting damage response mechanisms

Future Directions

Research:

1. Targeted irradiation during system genesis
2. Identify potential genes of interest and quantify using differential gene expression
3. Histology!



The Future for the RRR

A continued cooperation between the Reed Research Reactor and other Reed departments to incorporate the wide variety of student interests.

We would like to thank Kara Cerveny, Melinda Krahenbuhl, and Brian Fairchild for making this project possible, as well as the entire Reed Research Reactor staff for your continuing help and support.

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