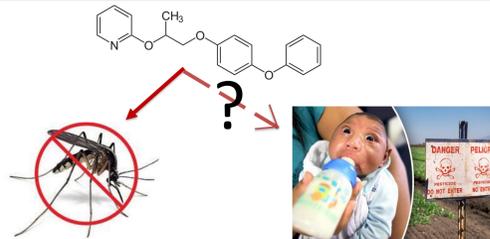


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Introduction

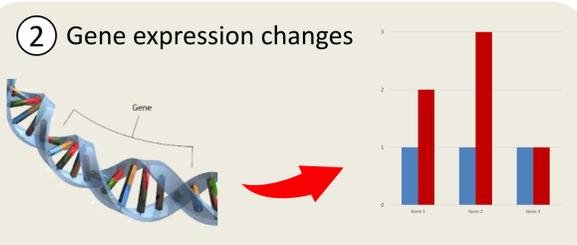
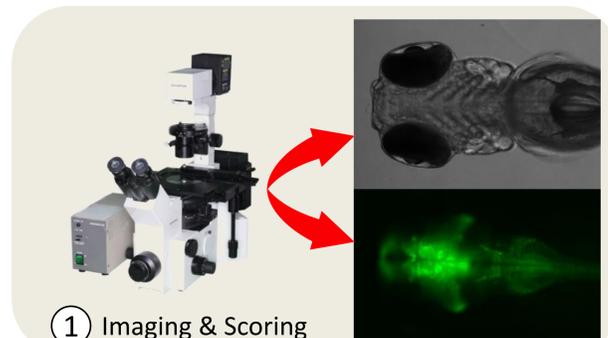
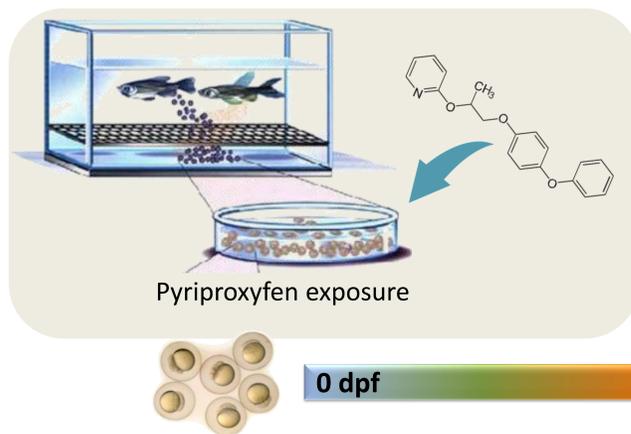
Pyriproxyfen is used in agricultural and veterinary pests¹. It is also used to treat drinking water sources, to prevent mosquito breeding¹. Therefore, it is debated that pyriproxyfen treated water consumption can cause microcephaly in newborns¹. We aimed to study the effect of pyriproxyfen on nervous system development, and whether it can cause brain defects.



Methodology

1. Head & brain malformations

Transgenic zebrafish embryos expressing GFP in the nervous system (Ngn1:GFP) were used. The embryos were exposed to increasing concentrations of pyriproxyfen around 4 hpf and were imaged at 4 dpf to assess head and brain malformations.

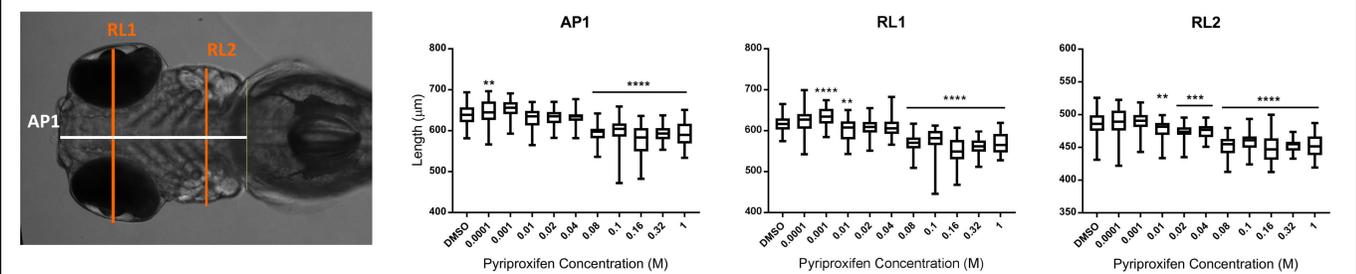
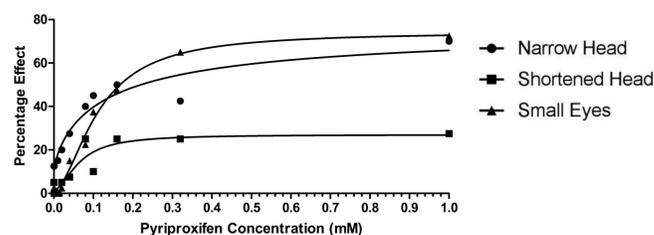
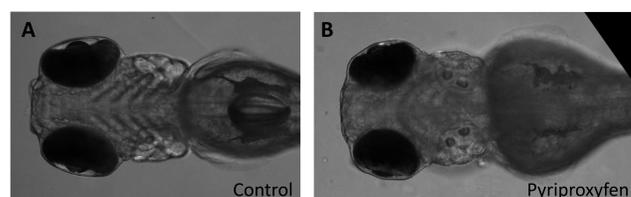


2. Gene expression changes

Ngn1:GFP embryos were exposed to pyriproxyfen and RT-qPCR was performed to assess the gene expression.

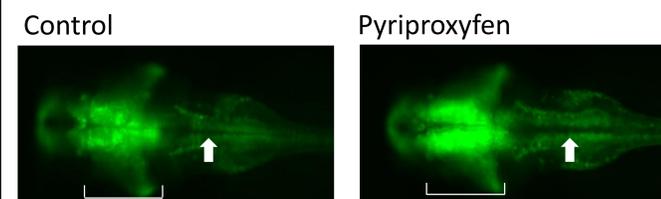
Results

1.1 Head malformations



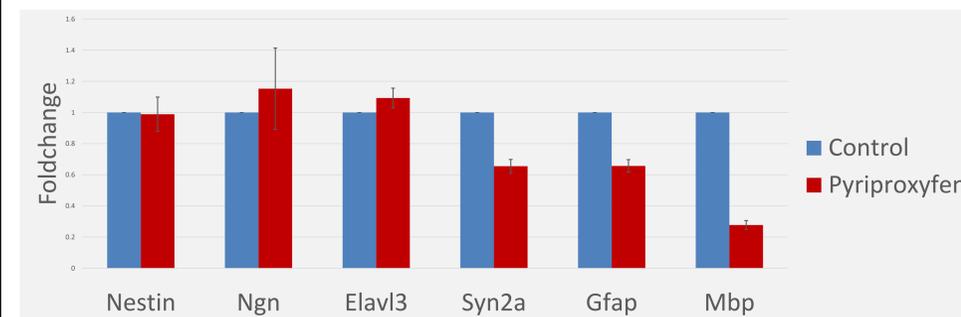
Pyriproxyfen exposure leads to smaller heads and small eyes. The percentage of fish with these malformations increases with increasing concentrations of pyriproxyfen. Quantification of images show significantly shorter and narrower heads at high concentrations of pyriproxyfen.

1.2 Brain malformations



Pyriproxyfen exposure causes midbrain (square brackets) and hindbrain (arrows) malformations.

2. Gene expression changes



Pyriproxyfen exposure does not change nestin, ngn and elavl3 genes expression. However, it lowers the expression of syn2a, gfap and mbp.

Conclusions and Future Directions

Conclusions:

- Exposure to pyriproxyfen causes head and brain malformations.
- It also leads to downregulation of syn2a and glial cell markers, gfap and mbp.

Future directions:

- Detailed analysis of brain malformations by sectioning and staining.

Acknowledgements

- The transgenic Ngn1:GFP fish line was obtained from Uwe Strähle, Karlsruhe Institute of Technology, Germany.

References

- Dzieciolowska, S., Larroque, A. L., Kranjec, E. A., Drapeau, P. & Samarut, E. The larvicide pyriproxyfen blamed during the Zika virus outbreak does not cause microcephaly in zebrafish embryos. *Scientific reports* 7, 40067, doi:10.1038/srep40067 (2017).