

Mechanism of PFOS effects on posterior swim bladder chamber inflation in zebrafish larvae

Lucia Vergauwen¹, An Hagenars¹, Evelyn Stinckens¹, Lieven Bervoets², Natàlia Garcia-Reyero³ and Dries Knapen¹

¹Zebrafishlab, Dept. Veterinary Sciences, Univ. of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium

²Systemic Physiological and Ecotoxicological Research (SPHERE), Dept. Biology, Univ. of Antwerp, Groenenborgerlaan 171, 2020 Antwerpen, Belgium

³Mississippi State Univ., Inst. Genom. Biocomp. & Biotechnol., Starkville, MS 39759 USA

E-mail contact: lucia.vergauwen@uantwerpen.be

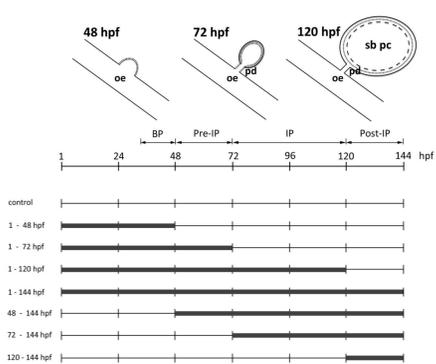
Background

- Perfluorooctane sulphonate (PFOS) is one of the most commonly detected perfluorinated alkylated substances.
- The main effects of PFOS in zebrafish larvae are impaired inflation of the posterior chamber of the swim bladder and spinal curvature.
- These sublethal effects impair feeding behaviour, predator avoidance, growth and reproduction.

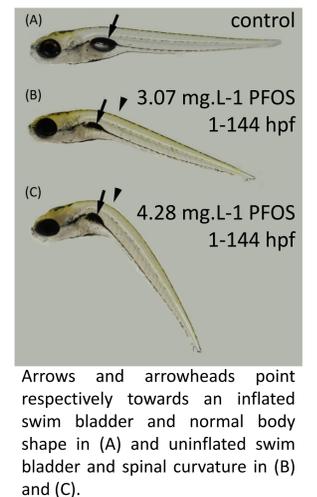
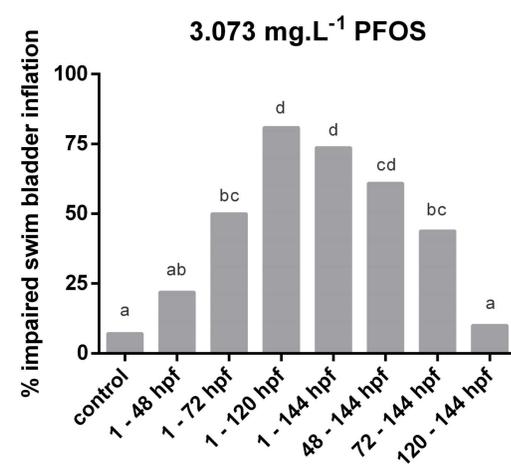
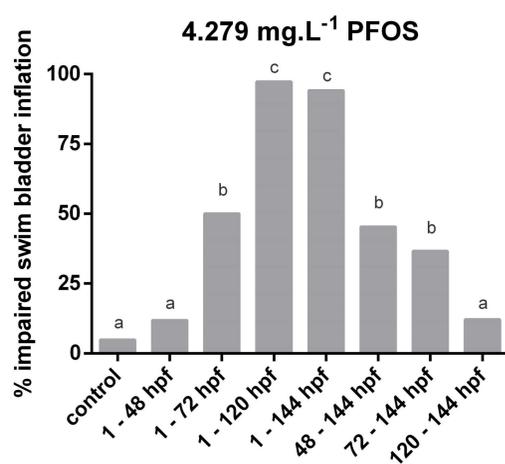
Study goal

Investigate mechanism of impaired posterior swim bladder chamber inflation due to PFOS exposure in zebrafish larvae, by applying different exposure windows and microarray analysis.

Results & Discussion



Hagenars et al., 2014



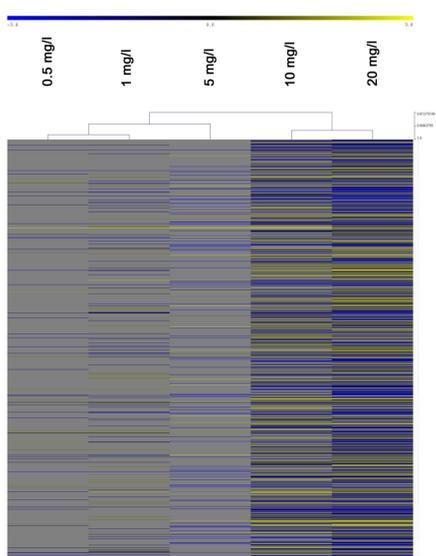
Arrows and arrowheads point respectively towards an inflated swim bladder and normal body shape in (A) and uninflated swim bladder and spinal curvature in (B) and (C).

No effect on swim bladder inflation:

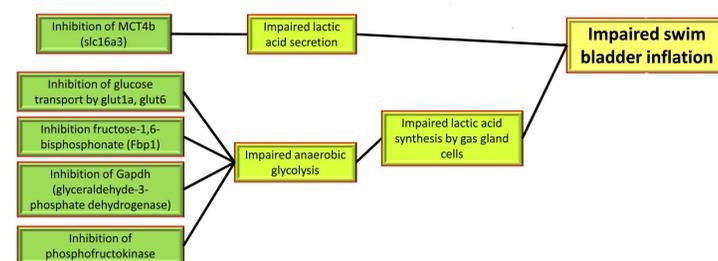
- 1 – 48 hpf: budding phase → PFOS does not affect budding stage
- 120 – 144 hpf: post-inflation phase → PFOS does not cause deflation of inflated swim bladders

Impaired swim bladder inflation:

- 72 – 144 hpf → PFOS affects swim bladder inflation during the inflation phase
- 1 – 72 hpf → PFOS affects swim bladder growth during pre-inflation phase and/or accumulated PFOS affects swim bladder inflation during the inflation phase

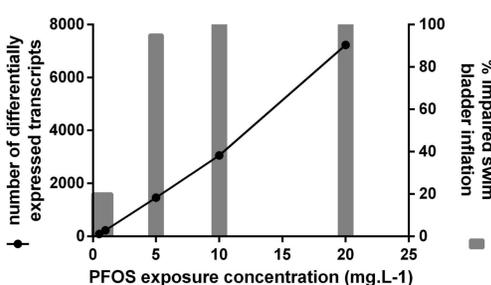
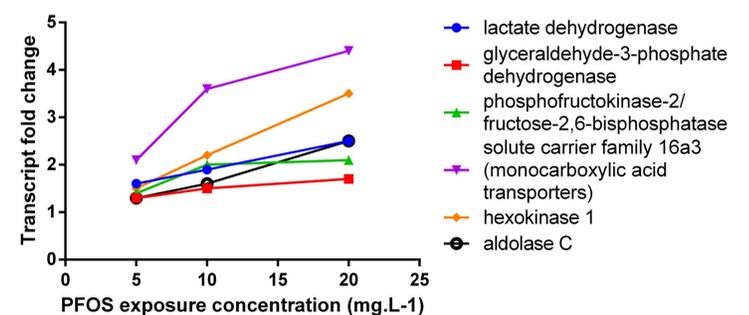


Upstream biological perturbations plausibly linked to the key event of impaired swim bladder inflation, and related to the inflation phase:



(part of figure from Villeneuve et al., 2014)

Ingenuity pathway analysis: Glycolysis significantly affected after exposure to 5, 10 and 20 mg.L⁻¹



We found a dose-response relation between the PFOS exposure concentration and the transcriptional expression of genes involved in glycolysis and lactic acid secretion needed for swim bladder inflation.

Sponsored by



Supported by

