The effects of Triclosan on the metabolism of developing sheepshead minnow (*Cyprinodon variegatus*) larvae.

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Introduction

The aquatic environment repesents the final sink for many chemicals including bactericidal agents. Among them Triclosan (TCS) has been shown to affect the thyroid system of teleosts. Thyroid hormones are involved in the control of metabolism, so changes in hormone levels induced by triclosan may affect respiratory rates and antioxidant stress in exposed fish.

Two research questions are put forward :
- Does TCS have an effect on respiratory rates ?
- Is there a change in activity of enzymes involved in the management of oxidative stress ?

Methods

- Study model: *Cyprinodon variegatus (fig 1)*.
- Individuals were exposed to TCS concentrations of 20, 50 and 100 μg/L.
- Measurements were conducted on larvae at 15 and 30 dph.
- Measurement of O_2 consumption by respirometry (*fig.* 2).
- Assay of antioxidant enzymes (Glutathion reductase (GR) and Glutathion-S-transferase (GST).

Fig 1: Cyprinodon variegatus.

Fig 2: Respiratory rates mesure.

Results

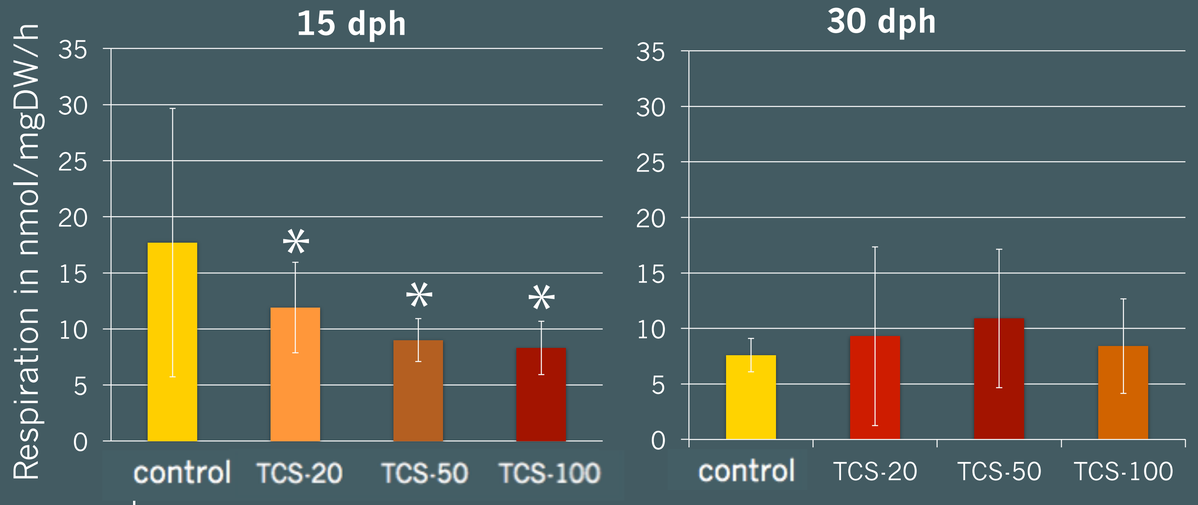


Fig 3: Respiration rate at 15 and 30 dph (mean ± SD). There are at least a significant difference (p<0,05) between control and conditions (*).

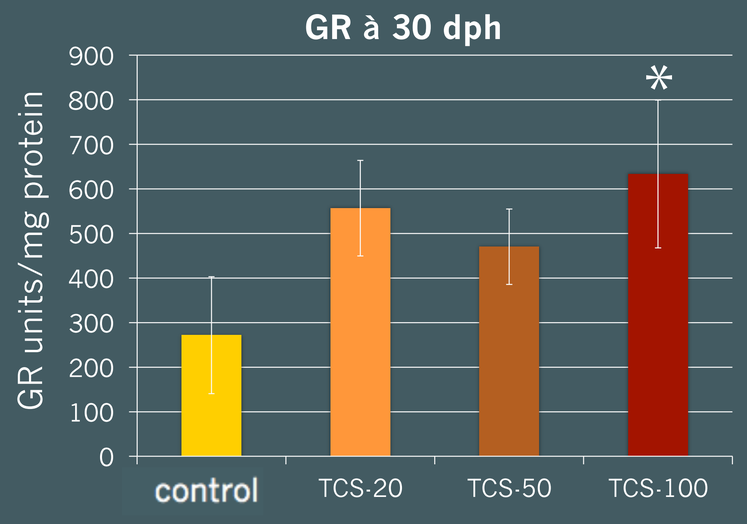
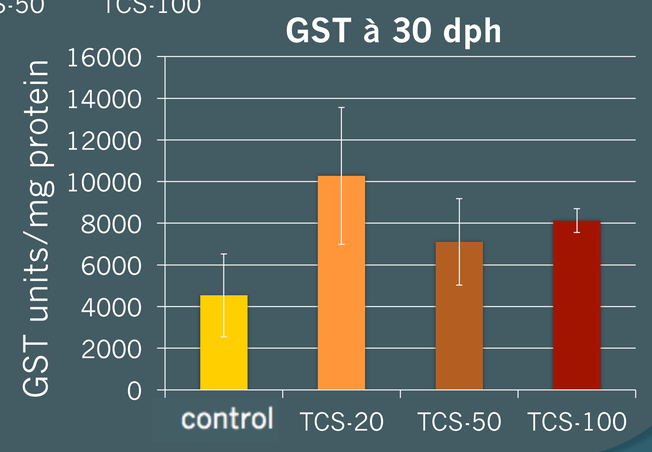


Fig 4: Activity of GR and GST at 30 dph (mean ± SD). There is at least a significant difference (p<0,05) between the control and the conditions (*).



→Respirometry showed that TCS decreased the metabolism at 15 dph, whereas no differences in respiration rate could be observed between control and exposed larvae at 30 dph (*fig. 3*).
→At 15 dph no difference was observed for any of the antioxidant enzymes.
→At 30dph a sharp increase in the activity of GR was observed between the control ans TCS exposed fish. The activity of GST remained stable (*fig. 4*).

Discussion

→Thyroid hormones are major factors controlling the metabolic rate related to respiration and oxidative stress.
→TCS reduced the metabolism at 15 dph that corresponds to the moment where larvae to juvenile transition of sheepshead minnows occur.
→Previous experiments showed that TCS induces an increase in thyroid hormone concentrations *(Benichou, 2014 & Rahmouni, 2014)* and that hyperthyroidism (*Villanueva & al. 2013)* may induces oxidative stress.
→Increase of antioxidant protection mechanisms could be a way to compensate oxidative stress.
→The changes in GR activity observed at 30 dph may also be related to the reduced metabolism at 15 dph.

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