



You have **Guest** access to ScienceDirect
[Find out more...](#)

Login:
Register

[Home](#) [Browse](#) [My Settings](#) [Alerts](#) [Help](#)

Quick Search Title, abstract, keywords Author e.g. j s smith
 search tips Journal/book title Volume Issue Page Clear Go

Aquatic Toxicology

Volume 68, Issue 3, 24 June 2004, Pages 277-291

[Abstract](#) [Full Text + Links](#) [PDF \(348 K\)](#)

Add to my Quick Links E-mail Article

doi:10.1016/j.aquatox.2004.03.018 [Cite or Link Using DOI](#)
Copyright © 2004 Elsevier B.V. All rights reserved.

Androgenic and estrogenic effects of the synthetic androgen 17 α -methyltestosterone on sexual development and reproductive performance in the fathead minnow (*Pimephales promelas*) determined using the gonadal recrudescence assay

S. Pawlowski^a, A. Sauer^b, J. A. Shears^c, C. R. Tyler^c and T. Braunbeck^b

^a Institut für Biologische Analytik und Consulting IBACON GmbH, Arheilger Weg 17, D-64380, Rossdorf, Germany

^b Department of Zoology, Section V: Morphology/Ecology, Aquatic Toxicology and Ecotoxicology Group, University of Heidelberg, Im Neuenheimer Feld 230, D-69120, Heidelberg, Germany

^c Environmental and Molecular Fish Biology, The Hatherly Laboratory, School of Biological Sciences, University of Exeter, Prince of Wales Road, Exeter, Devon EX4 4PS, UK

Received 18 November 2003; Revised 15 March 2004; accepted 23 March 2004. Available online 10 May 2004.

Abstract

The effects of the androgen, 17 α -methyltestosterone were assessed on sexual development and reproductive performance in the fathead minnow (*Pimephales promelas*) using a gonadal recrudescence assay. In this assay, mature male and female fathead minnow, previously kept under simulated winter conditions (15 °C; 8:16 h light:dark regime) were transferred to simulated summer conditions (25 °C water temperature; 16:8 h light:dark regime) to induce gonadal recrudescence. To assess sexual development fish were exposed to nominal concentrations of 0, 0.1, 1, 5 and 50 μ g/L 17 α -methyltestosterone. After 3 weeks of chemical exposure, effects on condition (condition factor, CF), plasma vitellogenin (VTG), secondary sex characteristics, gonad growth (gonadosomatic index; GSI) and gonad histology were investigated. Reproductive performance, including reproductive output (egg production), spawning behaviour, and fertilisation rate were measured over a subsequent 3-week-period in breeding adults maintained in clean water. 17 α -Methyltestosterone had no effects on the condition of fish at any of the doses tested. 17 α -Methyltestosterone induced both androgenic and estrogenic effects with females generally more affected by 17 α -methyltestosterone than males: atretic follicles and male-specific sex characteristics (androgenic effect) were induced in females at ≥ 0.1 and ≥ 1 μ g/L 17 α -methyltestosterone, respectively. An inhibitory effect on ovary growth occurred at an exposure concentration of 50 μ g/L 17 α -methyltestosterone. In males 1 μ g/L 17 α -methyltestosterone induced a concentration–response induction of plasma vitellogenin (estrogenic effect) likely due to its conversion into 17 α -methylestradiol, rather to the competition with endogenous steroids and their

Purchase the full-text article

- PDF and HTML
- ALL references
- All images
- All tables



Related Articles in ScienceDirect

- Effects of 17[alpha]-ethinylestradiol in a fathead minn...
[Ecotoxicology and Environmental Safety](#)
- Relationship of plasma sex steroid concentrations in fe...
[Aquatic Toxicology](#)
- Evaluation of a commercial kit for measuring vitellogen...
[Ecotoxicology and Environmental Safety](#)
- Mechanistic basis for estrogenic effects in fathead min...
[Aquatic Toxicology](#)
- Aspects of basic reproductive biology and endocrinology...
[Comparative Biochemistry and Physiology Part C: Toxicol...](#)

► [View More Related Articles](#)

+ Add to

Request Permission

[View Record in Scopus](#)
[Cited By in Scopus \(16\)](#)

Integrate
your
library's
resources?

refine your research
SCOPUS

cross reactivity with the estrogen receptor. In the fish breeding studies, concentration-dependent reductions in egg number, fertilisation rate and increases in abnormal sexual behaviour in females were observed. All of these effects occurred at exposure concentrations of ≥ 5 $\mu\text{g/L}$ 17 α -methyltestosterone. Thus, it could be assumed that the observed estrogenic effects in male fathead minnow were likely to the conversion of 17 α -methyltestosterone into the estrogen 17 α -methylestradiol, rather to the acting of 17 α -methyltestosterone itself. In conclusion to this, showing hormonally activity of 17 α -methyltestosterone in fish down to 100 ng/L, indicates that its potency was close to the range of several naturally occurring estrogens.

Author Keywords: Fathead minnow (*Pimephales promelas*); Gonadal recrudescence assay; 17 α -Methyltestosterone; Endocrine disruption; Biomarker



Corresponding author. Tel.: +49-6154-697-348; fax: +49-6154-697-371.

Aquatic Toxicology

Volume 68, Issue 3, 24 June 2004, Pages 277-291

[Home](#) [Browse](#) [My Settings](#) [Alerts](#) [Help](#)



[About ScienceDirect](#) | [Contact Us](#) | [Terms & Conditions](#) | [Privacy Policy](#)

Copyright © 2008 Elsevier B.V. All rights reserved. ScienceDirect® is a registered trademark of Elsevier B.V.