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Short-term exposure to low concentrations of the synthetic androgen methyltestosterone affects vitellogenin and steroid levels in adult male zebrafish (*Danio rerio*)

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Abstract

Short-term effects of methyltestosterone (MT) on the endocrine system of adult male zebrafish (*Danio rerio*) were examined. Males were exposed to 0, 4.5, 6.6, 8.5, 19.8, 35.9, 62.3 ng MT/l and ethinylestradiol (EE2) (26.4 ng/l) for 7 days. Several physiological endpoints that may be affected by endocrine disrupters were analysed, specifically vitellogenin (VTG) concentration, estradiol (E2), testosterone (T), and 11-ketotestosterone (KT) content, brain aromatase activity and gene expression of CYP19A1 and CYP19A2 in the testis. Exposure to the lowest MT concentration (4.5 ng MT/l), and the EE2 increased the concentration of VTG significantly compared to solvent control group. Exposure to higher concentrations of MT did not increase VTG levels. Endogenous KT and T levels decreased significantly in a concentration-dependent manner in response to the MT exposure and the lowest effective concentrations were 6.4 and 8.5 ng MT/l, respectively. The levels of KT and T were also significantly suppressed by EE2 when compared to the solvent control group. Significant decreases in endogenous E2 levels were found in some MT groups but it was not possible to distinguish a simple concentration-response relationship. No effects of MT or EE2 on the brain aromatase activity or on testicular gene expression of CYP19A1 and CYP19A2 were detected. The results show that androgens such as MT can act as endocrine disrupters even at very low concentrations.

Keywords: Aromatase; CYP19; Methyltestosterone; Sex steroids; Vitellogenin; Zebrafish

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Article Outline

1. [Introduction](#)
 2. [Materials and methods](#)
 - 2.1. [Chemicals](#)
 - 2.2. [Experimental design](#)
 - 2.3. [Measurement of VTG](#)
 - 2.4. [Aromatase activity](#)
 - 2.5. [Sex steroid levels](#)
 - 2.6. [Expression of CYP19A and CYP19B in testis](#)
 - 2.7. [Statistics](#)
 3. [Results](#)
 - 3.1. [Water concentrations of MT and EE2](#)
 - 3.2. [Length, weight, and condition factor](#)
 - 3.3. [VTG levels](#)
 - 3.4. [Steroid levels](#)
 - 3.5. [Brain aromatase activity and transcript abundance of CYP19 in testis](#)
 4. [Discussion](#)
 - 4.1. [Effects of MT on VTG synthesis](#)
 - 4.2. [Effects of MT on sex steroid levels](#)
 - 4.3. [Effects of MT on the aromatase](#)
 5. [Conclusion](#)
- [Acknowledgements](#)
- [References](#)

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