

The Effect of DDT Congeners on Reproductive Function in Male Guppy (*Poecilia reticulata*)

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ABSTRACT

Endocrine disrupters (EDs) such as DDT and its metabolite have been implicated in the impairment of reproductive performance via estrogenic actions in fish. This study was to evaluate the effect of DDT congeners on the reproductive performance of male guppies. Thirty male guppies were separated into 5 groups with 6 fish in each group. Group 1 was a control group; group 2 was fed with 0.10 ppb estradiol benzoate (positive control) and groups 3, 4 and 5 were fed with 0.05, 0.10 and 0.20 ppb of DDT congeners, respectively. Every group was treated for 30 days. Survival rates of groups 1-4 were 100% but for group 5, survival rate dropped to 66%. Male courtship behavior, caudal fin color intensity, gonopodial length and offspring sex ratio were not significantly different among groups. However, group 1 had higher rate of male sexual behavior and higher color intensity of caudal fins compared to the other groups. Group 2 fish had lower testis weight and fecundity than group 1 ($p < 0.05$). Histopathological examinations showed that the testis of fish in groups 2, 3, 4 and 5 had more spermatozeugmata and spermatids than spermatocyte. In addition, Sertoli cells and the efferent duct cells were hypertrophied and sperms were detached from the inner cells. In conclusion, DDT congeners impair male reproductive performance in guppies.

Key words: DDT congeners, Reproductive function, Male guppy, Testis

INTRODUCTION

Xenoestrogen, a synthetic chemical in the environment, has been implicated in disrupting normal endocrine function in wildlife and human, e.g., falling sperm counts and decreased semen quality in human, developmental abnormalities of the gonads and abnormal sex hormone concentrations in juvenile alligators from Lake Apopka, Florida and male fish in rivers which show female characteristics (Sumpter, 1995). A group of these chemicals, known as endocrine disrupters, was defined by the 1996 European Commission as “exogenous substances that cause adverse health effects in an intact organism or its progeny, consequent to changes in endocrine function” (Olsson et al., 1998; Valle, 2001). These chemicals include herbicides, pesticides, fungicides, plasticizers, polychlorinated biphenyls (PCBs) and alkylphenolic compounds (Danzo, 1998). The effects of these chemicals are believed to include mimicking or antagonizing endogenous hormones, disruption of the synthesis and metabolism of endogenous hormone and modification of hormone receptors (Sonnenschein and Soto, 1998).