7-pentoxyresorufin-\textit{O}-depentilase and 7-benzyloxyresorufin-\textit{O}-debenzylase as potential biomarkers of exposure to 17\textbeta-estradiol in Nile tilapia.

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Abstract

Several estrogenic compounds have been detected in sewage treatment plants, surface water, groundwater and drinking water in several countries. These compounds can cause serious physiological disturbances in aquatic organisms at very low concentration, thus the development of sensitive biomarkers to diagnose impacted areas are needed. Considering that most hormones are metabolized by different cytochrome P450 isoforms in fishes, in this work we were interested to evaluate how some of these isoforms respond to low concentrations of 17β-estradiol (5 and 15 µg/L) for 7 days, by measuring the activities of 7-ethoxyresorufin-O-deethylase (EROD), 7-benzyloxyresorufin-O-debenzylase (BROD) and 7-penthydroxyresorufin-O-depentylase (PROD). GST activity was measured as well. EROD and GST activities were unchanged. PROD activity was ~ 6-fold increased in animals exposed to 15 µg/L of the hormone, while BROD was ~ 4-fold increased after 7 exposure days to 5 and 15 µg/L, which indicate these enzymes as potential new biomarkers for the presence of 17β-estradiol at very low concentrations in the aquatic environment.

Keywords: 7-ethoxyresorufin-O-deethylase, 7-benzyloxyresorufin-O-debenzylase, 7-penthydroxyresorufin-O-depentylase, 17β-estradiol, biomarker, tilapia.

According to Soto et al. (1995) endocrine disruptors (EDs) can be defined as exogenous agents that interfere with the synthesis, secretion, transport, reception, action or the elimination of endogenous hormones in organisms. Their action is characterized by the blocking, mimesis, stimulation, or inhibition of natural hormones. Among the most important endocrinial disrupters found in aquatic environments are natural and synthetic estrogens, because they are extremely active at very low concentrations and are related to the etiology of numerous cancers (Reis Filho, et. al. 2006; Sodré, et. al. 2007). Natural estrogens like 17β-estradiol, estriol, estrone and synthetic estrogens, developed for medical purposes in reposition therapy and in the treatment of infertility and endometriosis or menstrual disorders (Kuster et al. 2004), are among the most important concern, due to their high potency and the continuous use, with an increasing input in the environment. A significant amount of estrogens are excreted by humans in domestic wastes, being the