EFFECTS OF TWO ENDOCRINE-ACTIVE PHARMACEUTICALS, TAMOXIFEN AND ANASTROZOLE, ON REPRODUCTION IN A MARINE FISH, *Tautogolabrus adspersus*

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Endocrine-active pharmaceuticals entering the aquatic environment through sewage effluent may have unintended, adverse impacts on the reproduction of aquatic organisms, which in turn may affect the sustainability of exposed populations. Laboratory experiments were conducted with the marine fish cunner (*Tautogolabrus adspersus*) to evaluate whether the pharmaceuticals, tamoxifen and anastrozole, affected reproduction in spawning adults. Tamoxifen, a widely-used treatment for breast cancer, has been detected in high ng/ml concentrations in British waters. Anastrozole, an aromatase-inhibitor, represents a class of pharmaceuticals that is used to supplement or replace tamoxifen treatment. Aromatase inhibitors are relatively new as a medical option and their concentration has yet to be determined in aqueous environments. The prospect of aromatase inhibitors entering aquatic environments is of concern because aromatase is a key enzyme in estrogen biosynthesis and is critical to normal reproduction. Reproductive endpoints of egg production, egg viability, and egg fertility were assessed daily in spawning cunner treated with tamoxifen (nominal concentrations of 0, 2 or 20 mg/kg) or anastrozole (nominal concentrations of 0, 0.3 or 3 mg/kg) by oral gavage on days 0, 4, 8, 12 and 16 of the experiment. Male and female fish were sacrificed on day 17, and gonadosomatic (GSI) and hepatosomatic index (HSI) were determined. In tamoxifen-treated fish, egg production was significantly reduced (40 - 45%) at both nominal concentrations, while egg fertility and viability exhibited a downward, but not significant, trend. In anastrozole-treated cunner, egg production was significantly decreased (about 35%) in the 3 mg/kg treatment, but no effect was seen on egg fertility or viability in either anastrozole treatment. Results indicate tamoxifen and anastrozole can impact fish reproduction, but further work needs to be done to determine if these effects occur at environmentally-relevant concentrations.

Key words
fish; reproduction; tamoxifen; anastrozole; pharmaceuticals