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RESEARCH REPORTS

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Title: Characterization of membrane receptor binding activity for cortisol in the liver and kidney of the euryhaline teleost, Mozambique tilapia (*Oreochromis mossambicus*)

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Date: 14 May 2014

Publication Number: AquaFish Research Report 13-321

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Abstract: Glucocorticoids (GCs) regulate an array of physiological responses in vertebrates. Genomic GC actions mediated by nuclear steroid receptors require a lag time on the order of hours to days to generate an appreciable physiological response. Experimental evidence has accumulated that GCs can also act rapidly through a nongenomic mechanism to modulate cellular physiology in vertebrates. Causal evidence in the Mozambique tilapia (*Oreochromis mossambicus*) suggests that the GC cortisol exerts rapid, nongenomic actions in the gills, liver, and pituitary of this euryhaline teleost, but the membrane receptor mediating these actions has not been characterized. Radioreceptor binding assays were conducted to identify a putative GC membrane receptor site in *O. mossambicus*. The tissue distribution, binding kinetics, and pharmacological signature of the GC membrane-binding activity were characterized. High affinity ($K_d = 9.527 \pm 0.001$ nM), low-capacity ($B_{max} = 1.008 \pm 0.116$ fmol/mg protein) [³H] cortisol binding was identified on plasma membranes prepared from the livers and a lower affinity ($K_d = 30.08 \pm 2.373$ nM), low capacity ($B_{max} = 4.690 \pm 2.373$ fmol/mg protein) binding was found in kidney membrane preparations. Competitors with high binding affinity for nuclear GC receptors, mifepristone (RU486), dexamethasone, and 11-deoxycorticosterone, displayed no affinity for the membrane GC receptor. The association and dissociation kinetics of [³H] cortisol binding to membranes were orders of magnitude faster ($t_{1/2} = 1.7$ – 2.6 min) than those for the intracellular (nuclear) GC receptor ($t_{1/2} = 10.2$

AQUAFISH RESEARCH REPORTS are published as occasional papers by the Management Entity, AquaFish Innovation Lab, Oregon State University, Corvallis, Oregon 97333-3971 USA. The AquaFish Innovation Lab is supported by the US Agency for International Development under Grant No. EPP-A-00-06-00012-00. See the website at <aquafishcrsp.oregonstate.edu>.

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h). Specific [³H] cortisol membrane binding was also detected in the gill and pituitary but not in brain tissue. This study represents the first characterization of a membrane GC receptor in fishes and one of only a few characterized in vertebrates.

This abstract was excerpted from the original paper, which was published in *General and Comparative Endocrinology* (2013). 192:107-114.

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