CHARACTERIZATION OF ENDOTHELIN, NITRIC OXIDE, PROSTAGLANDIN E, AND NATRIURETIC PEPTIDE RECEPTORS IN THE BULBUS ARTERIOSUS OF THE EEL, *ANGUILLA ROSTRATA*

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The bulbus arteriosus (BA) connects the cardiac ventricle of teleosts to the ventral aorta; it expands during cardiac systole and rebounds, pushing blood into the ventral aorta, during diastole. The result of this "windkessel effect" is a smoothing of blood flow to the delicate gill vessels. Various studies (e.g., Holmgren, S., *Acta Physiol. Scand.* 99: 62-74, 1977; Watson, A.D. and Cobb, J.L.S., Cell Tiss. Res. 196: 337-346, 1979; Farrell, A., *J. Exp. Zool.* 209: 169-173, 1979) suggest that the BA is controlled by a variety of neurotransmitters and paracrines and may be more than a simple windkessel. Our preliminary studies have demonstrated that the BA of the eel, *Anguilla rostrata*, expresses receptors for endothelin, porcine C-type natriuretic peptide, and prostaglandin E_1, and also responds to NO (Evans, D.H. and Harrie, Bull Mt. Desert Isl. Biol. Lab. 38: 31, 1999). The present study was undertaken to determine, more specifically, the receptors expressed in this tissue. We used techniques described previously (e.g., Evans, D.H. and Gunderson, M.P., *Am. J. Physiol.* 274: R1050-R1057, 1998; Evans, D.H. and Gunderson, M.P. *Bull. MDIBL* 37: 107, 1998) for the capture and maintenance of eels (*Anguilla rostrata*) and preparation of vascular rings from the BA. Resting tensions of 500 mg were set and maintained in each species before the sequential addition of putative vasoactive agonists.

The bulbus arteriosus rings constricted when either ET-1 or sarafotoxin S6c (SRX, specific ET_B-receptor agonist) were applied, dependent upon the concentration, but the constriction only reached statistical significance at concentrations above 10^{-7} M (N = 8). This suggests a rather low sensitivity to these ET agonists, but it does indicate the presence of ET_B as well as ET_A receptors. After BA rings were preconstricted with 10^{-7} M ET-1, the NO donor sodium nitroprusside dilated the BA vascular smooth muscle in a concentration-dependent manner over the range of 10^{-8}M to 10^{-4} M (N = 8), with the exception of 10^{-7} M, where dilation was not statistically significant (p =0.13). Thus, it appears that the intracellular receptor (soluble guanylyl cyclase) for NO is present in this tissue. Similarly, both the prostaglandin EP_1/EP_3-receptor agonist sulprostone and EP_2-receptor agonist butaprost dilated ET-preconstricted rings in a concentration-dependent manner, reaching statistical significance at $3x10^{-9}$ M and 10^{-8} M, respectively. The dilation produced at the maximum concentration (10^{-6} M) was the same for both agonists (N = 6). These data suggest that at least two types of receptors are present that bind to PGE_2 in this tissue. Natriuretic peptides also produced concentration-dependent dilation of ET-preconstricted rings, reaching statistical significance at $3x10^{-10}$ M ANP (eel) and 10^{-7} M for CNP (porcine). Lower concentrations of pCNP appeared to produce dilations (starting at $3x10^{-9}$ M), but high variability precluded statistical significance. In addition, the maximal dilation produced at $2x10^{-7}$ M was 47% less for CNP than ANP (N = 8). Thus, it appears that both Natriuretic Peptide Receptor-A and NPR-B are present. Our data are preliminary, but it appears that a variety of receptors are expressed in the eel BA, suggesting a complex local and regional control of this vessel. (Supported by NSF IBN-0089943 to DHE and an REU supplement to MSK from this grant, as well as NSF DBI-9820400 to the MDIBL)