HYPOXIC VASOCONSTRICTION IN THE VENTRAL AORTA OF THE LAMPREY, *PETROMYZON MARINUS*

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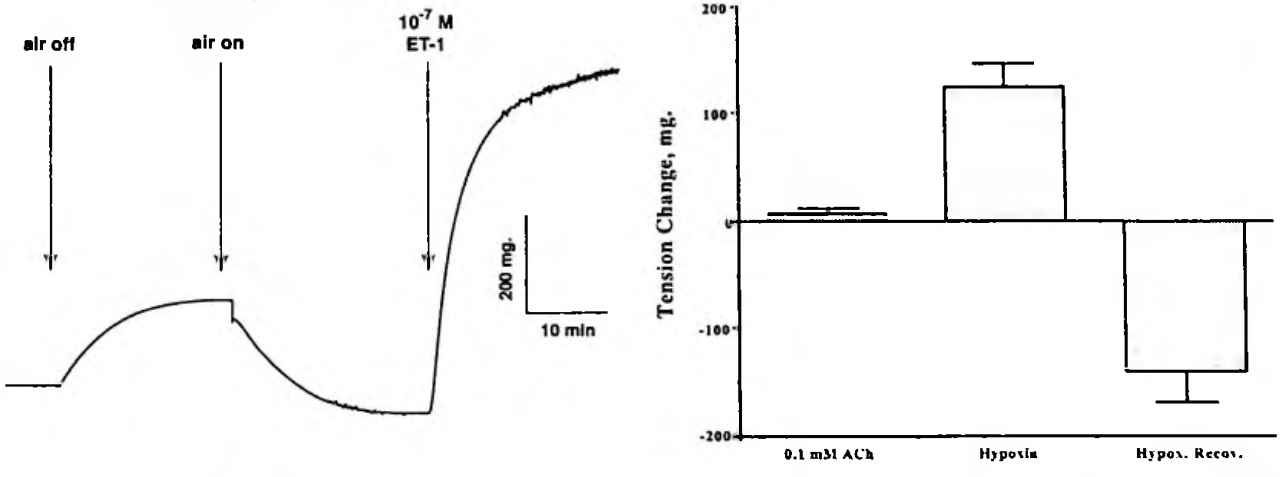
Pulmonary arterioles constrict when alveolar air is hypoxic, diverting blood to regions of normoxia in the lungs (e.g., West, J.B. *"Respiratory Physiology"*, Williams and Wilkins, 1990, 185 pgs). This response is also seen in isolated lungs and pulmonary artery vascular rings, so it is not centrally mediated. Hypoxic vasoconstriction (HVC) is also described for peripheral, coronary, and cerebral arteries in mammals (e.g., Furchgott, R.F. and Vanhoutte, P.M. *FASEB J.* 3: 2007-2018, 1989), so the phenomenon appears to be a general one. It is still unclear if the HVC is the result of inhibition of endothelium-derived dilatory factors (nitric oxide, prostanoids), stimulation of endothelium-constrictory factors (endothelin, adenosine, prostanoids), or independent of the endothelium (e.g., Gaine, S.P. et al. *Am. J. Physiol.* 274: L657-664, 1998), nor when in vetebrate evolution the phenomenon evolved. To date, HVC has only been described in mammals, birds, and reptiles (Crossley, D. et al. *J. Exp. Biol.* 201: 3367-3375, 1998). Our previous attempts to demonstrate a HVC in the shark ventral aorta had failed (data not shown), so this summer we used rings from the ventral aorta of the lamprey to test the hypothesis that fish blood vessels display an HVC. Collection and maintenance of lampreys, as well as preparation of vascular rings have been described in Evans and Harrie(this volume). Once intact rings (no attempt to remove the endothelium) were stabilized at 150-200 mg tension, 10^{-4} M acetylcholine (ACh) was added to test the vasoactivity of the rings. After a stable tension was achieved, the aeration (99% O_2/1 % CO_2) was stopped. After the rings stabilized at a new tension the aeration was turned back on. The left panel shows a typical response, and the right panel summarizes the data for 9 animals (mean±S.E.)



It is clear that even this relatively uncontrolled hypoxia produces a rapid, striking, and reversible response by the lamprey aortic rings. This is the first description of HVC in a fish blood vessel. Similar experiments using aortic rings from the eel, *Anguilla rostrata*, gave negative results. Preincubation of the lamprey rings (endothelium intact) with 10^{-4} L-NAME (inhibitor of nitric oxide synthase) did not alter the hypoxic response (data not shown) suggesting that alterations in synthesis of NO did not play a role in the response, as has been described for canine coronary arterioles (Graser, T. and Vanhoutte, P.M., *Am. J. Physiol.* 261: H1769-H1777, 1991). The mediator of the hypoxic-dependent vasoconstriction in the lamprey ventral aorta remains to be determined. (Supported by NSF IBN-9604824 and REU NSF BIR 9531348)