FURTHER EVIDENCE FOR CONTRACTILITY IN THE RECTAL GLAND OF THE DOGFISH SHARK, *SQUALUS ACANTHIAS.*

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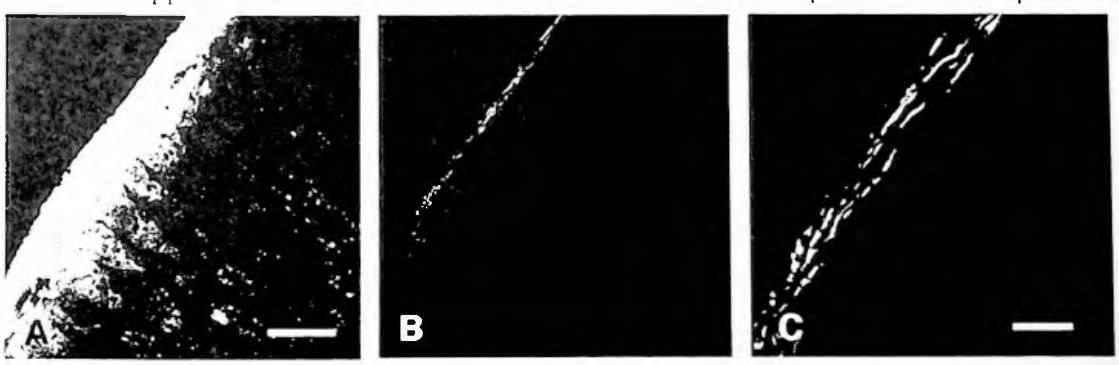
Isolated rings of shark rectal gland contract when endothelin-1 or acetylcholine is applied and dilate when a natriuretic peptide is added. Nitric oxide produces a biphasic response: an initial dilation followed by a much more significant contraction (Evans, D.H. and Harrie A.C. Bull. MDIBL 38: 33, 1999). We suggested that these changes in diameter could be mediated by a circumferential, smooth muscle layer that Bulger (Anat. Rec. 147: 95-127, 1963) had described below the outer connective tissue layer of the gland in *S. acanthias*. To characterize further this putative muscle layer, we fixed thick (500 μ) frozen sections of rectal gland tissue with 3.7% formaldehyde plus 0.5% Triton X-100 in elasmobranch Ringer's and stained for F-actin with rhodamine-phalloidin. The fluorescent staining was imaged using an Olympus Fluorview Point Scanning Confocal Microscope. Fig. 1 depicts a typical localization pattern. Panel A has been overexposed and reveals the intense staining of the outer layer of the gland as well as the weaker labeling of the internal tubules. Panel B shows the same field underexposed and demonstrates the presence of spindle-shaped stained elements in the outer layer. At higher magnification in C these elements appear similar to smooth muscle cells. Bar in A = 10 μ and in C = 20 μ.



To characterize the specific receptors involved in the responses to ET and NP we observed last year, we mounted rings cut from rectal glands as described previously (Evans and Harrie, *Op. Cit.*) and tested the effects of 0.1 μM ET-1 (non-specific, ET_A or ET_B receptor agonist) vs. 0.1 μM Sarafotoxin S6c (SRX S6c; a specific ET_B receptor agonist) followed by either 0.1 μM porcine C-type natriuretic peptide (NPR-B agonist) or 0.1μM eel ANP (NPR-A agonist). All experiments were done on paired rings: one ring was exposed to ET followed by CNP, the second ring was exposed to SRX S6c followed by ANP. ET-1 contracted the rings by 51.5 ± 12.1 mg (initial tension was 150-200 mg), but SRX S6c had no effect on the tension (N = 8 in both experiments). pCNP did not dilate the rings after they were contracted with ET-1, but eel ANP produced a significant dilation (-41.3 mg ± 13.9; N = 8 in both experiments). Thus, contrary to the shark ventral aorta, which expresses ET_B and NPR-B receptors (e.g., Evans, D.H. and Gunderson, M.P. J. Comp. Physiol. 165: 659-664, 1996; Evans, D.H. et al. J. Exp. Zool. 265: 84-87, 1993), it appears that the rectal gland smooth muscle cells express ET_A and NPR-A receptors. The role of these receptors and the circumferential, smooth muscle ring in shark rectal gland function remains to be determined. (Supported by NSF IBN-9604824 to DHE)