

Table 3

Effect of Hyperbaric Oxygen on Retinal
Oxygen Consumption* (PO_2 3800mm Hg for 4 hr)

Animal	Temp ($^{\circ}C$)	Control	HBO	n
Dogfish	15	2.31 ± 0.17	2.28 ± 0.42	6
Dogfish	22	3.49 ± 0.56	2.35 ± 0.37	11
Flounder	22	6.80 ± 0.65	7.05 ± 0.63	8
Eel	15	6.52 ± 0.84	7.07 ± 1.25	5

* $\mu L O_2/mg$ protein/hr.

No significant differences, paired t-test.

$\bar{x} \pm SE$.

retina was observed. The frog ERG however was abolished during exposure to HBO. Therefore, further experiments are planned in which ERG's of flounder, eel and dogfish will be recorded under HBO.

31 EFFECTS OF HOMOLOGOUS PITUITARY EXTRACTS ON PLASMA ANDROGEN AND 17β -ESTRADIOL LEVELS IN THE SPINY DOGFISH, SQUALUS ACANTHIAS

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Morphological studies of the elasmobranch pituitary show that it is subdivided into 4 distinct regions - ventral, rostral, median and neurointermediate lobes (Dobson and Dodd, Gen. Comp. Endocrinol. 32:41-52, 1977). Although all four lobes have gonadotrophic activity, the ventral lobe has the most (Sumpter, Jenkins and Dodd, Gen. Comp. Endocrinol. 36:275-285, 1978). In *in vivo* studies in female oviparous dogfish S. canicula, an annual cycle in pituitary gonadotropin content and plasma 17β -estradiol (E_2) and testosterone (T) levels has been demonstrated (Sumpter and Dodd, J. Fish Biol. 15:687-695, 1979). Further, caudal vein injections of mammalian gonadotropin releasing hormone can induce significant changes in plasma androgen (T and dihydro-testosterone) and E_2 levels (Jenkins and Dodd, J. Endocrinol. 86:171-177, 1980) and ventral lobe extracts increased plasma androgen levels in hypophysectomized dogfish (Sumpter, et al., Op. Cit.).

In the present study, we have begun to investigate the pituitary-gonadal relationship in the ovoviviparous dogfish, Squalus acanthias. The reproductive cycle in the mature female is divided into stages A through D (Hisaw and Albert, Biol. Bull. 92-92, 187-199, 1947). In summer when fish were obtained, they were either in stage A (uterine eggs enclosed in a membranous envelope "Candle Stage") or in stage C, where pups (12CM to 20CM) are maintained free in the uterus and attached to large yolk sacs.

Fresh pituitaries were collected from both stage A and C animals and stored on dry ice until use. An aqueous extract was prepared according to the method of Sumpter et al., (1978). After a single caudal vein injection of extract, blood was collected via the caudal sinus at 1, 2, 3, 4, 5, 10, 24, 48, 72 hours post injection. Plasma was obtained by centrifugation at 1500 RPM for 20 minutes and frozen until use. After thawing, one ml was taken and extracted with diethyl ether, anesthesia grade and reconstituted in a phosphate-gelatin buffer, pH = 7.4. Duplicate aliquots of each sample were taken and analyzed by radioimmunoassay for T and E_2 content. Since the stage of pregnancy can not be externally detected, this is not determined until autopsy.

Table 1. Changes in plasma testosterone (T) and estradiol (E₂) values (pg/ml) in pregnant females, Squalus acanthias after injection of homologous pituitary extract.

Time (hours)	Stage A controls		Stage A injected		Stage C injected (N=3, mean±sem)	
	T	E ₂	T	E ₂	T	E ₂
0	130	341	311	334	175±11	543±75
1	159	410	269	245	223±38	482±72
2	141	348	305	365	318±51	581±182
3	134	441	356	301	178±24	568±142
4	129	298	352	299	206±33	568±102
5	252	305	396	437	255±32	721±148
10	124	254	361	448	693±309	1703±475
24	73	267	284	1243	247±81	1362±725
48	129	218	161	258	210±65	911±678
72	66	295	152	373	230±82	524±322

In the present study, a single stage A control showed no changes in plasma steroids due to sampling over time. In contrast, in a stage A animal injected with 6 pituitary equivalents, a sharp increase in plasma E₂, but not T, was seen at 24 hours post injection. In 3 stage C animals injected with 6 pituitary equivalents, a biphasic estrogen response was observed with a slight increase at 2-4 hours and a greater increase at 10 hours as compared to the "O" time bleeding. Testosterone levels also increased, but only at 10 hours post injection.

These data suggest direct pituitary involvement in the control of gonadal steroidogenesis in Squalus acanthias. The initial rise in E₃ in stage C animals is possibly due to release of endogenous product whereas the later more pronounced rise in both T and E₂ may be due to gonadotropin induced synthesis. On the basis of the limited observations reported here, there may be some differences in the temporal pattern of response based on the stage of pregnancy. Since follicular size is markedly different in these two stages (3-10MM stage A, 30-35MM stage C), this, as well as corpus luteum activity (Lance and Callard, Gen. Comp. Endocrinol. 13:255-267, 1969) would be expected to influence responsivity to gonadotropins. Studies are currently in progress to evaluate in vitro steroid synthetic capacity of follicular elements obtained at different times of the reproductive cycle. In addition, further in vivo studies using stages B and D, as well as A and C are projected in order to characterize the regulation of steroidogenic tissues of the shark ovary. This work was supported by NSF PCM 78-08201 to I.P.C.