Chapter VII

INFLUENCE OF CORTICOSTERONE OR GONADOTROPHIC HORMONES EITHER ALONE OR IN COMBINATION, ON TISSUE ASCORBIC ACID CONTENT IN FERAL PIGEONS IN THE QUIESCENT PHASE.

The circannual variations in tissue ascorbic acid (AA) content were earlier related to their annual testicular cyclicity (chapter IV). Induced hypo-or hypercorticalism was also seen to have season specific effects on hepatic, adrenal and testis ascorbic acid content (Ayyar,1987). Corticosterone in the quiescent phase was also reported to increase the tissue AA contents suggesting a role for CORT in positive AA balance (chapter IV). The above observations were taken to indicate a role for CORT in modulating AA metabolism in relation to testicular cyclicity. In another investigation, administration of gonadotrophic hormones in the quiescent phase was seen to induce testicular recrudescence which was further potentiated when fortified with CORT (chapter V). Besides, concomitant alterations in carbohydrate metabolism were also recorded to occur (chapter VI). Hence, it was thought pertinent to study the influence of CORT or gonadotrophic hormones either alone or in combination on AA content of liver, adrenal and testis.

MATERIALS AND METHODS.

As outlined in chapter III.

Experimental setups.

As outlined in chapter V.

Parameters and Methodology of evaluation.

As outlined in chapter IV.

RESULTS.

The hepatic, adrenal and testis AA contents were increased under all treatment schedules with a maximum increment in liver and testis occurring with CORT + FSH (S) treatment and, in adrenal, with CORT + FSH (P) treatment. (Table VII;fig 7)

DISCUSSION.

The present observations reveal an overall positive AA balance either by treatment with CORT or gonadotrophic hormones alone, or even a combination of both. Such an increasing trend of tissue AA content is a generalized feature of pre-recrudescent and recrudescent phases in the

Ascorbic Acid
(mg/100 g tissue)

Treatment	Hepatic	Adrenal	Testes
Control	48.30 ± 1.25	158.72 ± 4.69	83.91 ± 2.70
CORT	58.11* 1.16	197.14* ± 4.47	172.72* 2.68
FSH	51.9* ± 1.89	163.15* 2.27	219.21* ± 9.49
FSH.LH	57.38* ± 1.79	167.61* ± 2.82	148.64* 6.67
CORT+FSH(P)	57.01* ± 1.83	399.07* 9.47	220.95* 8.75
CORT+FSH(S)	61.11* ± 1.34	317.52* 7.14	256.64* ± 8.17
CORT+FSH.LH	56.52* 1.07	174.33* 5.90	142.90* 2.32

Table VII. Alterations in tissue ascorbic acid content of pigeons treated with gonadotrophins alone or with corticosterone in the quiescent phase.
(* Significant at $P < 0.05$; values are $\bar{x} \pm$ SEM)

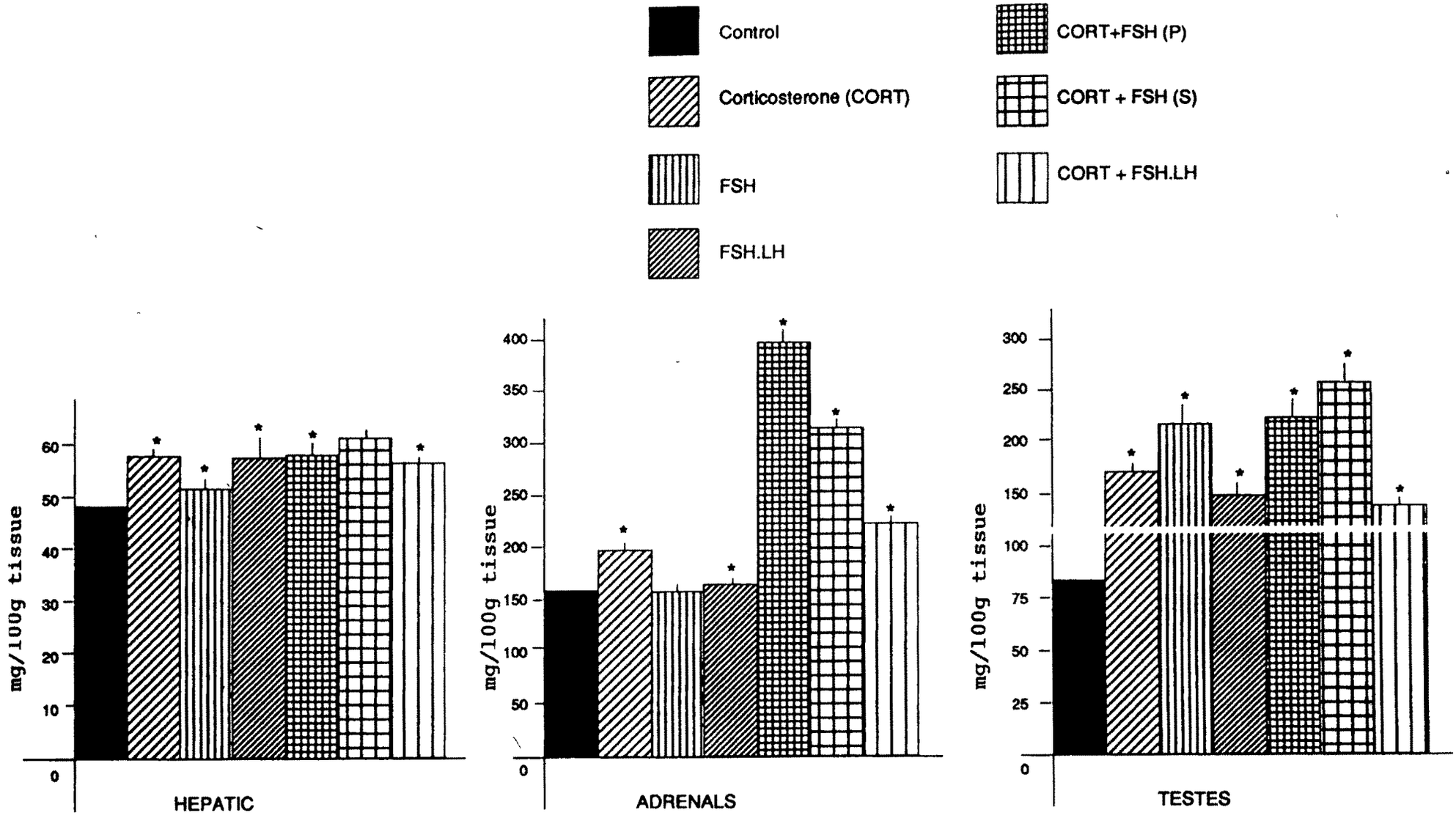

Fig. 7 Alterations in tissue Ascorbic Acid contents of pigeons treated with gonadotropins alone or with corticosterone (CORT) in the non quiescent phase
(* = Significant at $P < 0.05$, values are $\bar{x} \pm$ SEM)

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feral pigeons during its annual testicular cycle (Patel, 1985; Ayyar, 1987; chapter IV).

Pertinently, a previous study had shown the ability of these treatment schedules to activate the quiescent testes. Clearly, CORT and gonadotrophic hormones, apart from activating the gonads are also capable of inducing the characteristic metabolic adaptations. Apart from the currently observed changes in tissue AA content, the previously observed alterations in carbohydrate metabolism also provide evidence to this concept. The ability of CORT to induce positive AA balance is already established (Stubbs and McKernan, 1967; Dieter, 1969; Dieter and Breitenbach, 1971; Majumdar and Chatterjee, 1974; Overbeek, 1985). However, the ability of gonadotrophic hormones to induce such a change as observed herein is very interesting. In this connection it was previously hypothesised that FSH is capable of increasing the hypothalamic CRH activity which was well reflected in the adrenocortical activation and increased serum CORT level (Sakai and Ishii, 1986; Nikolarakis et al., 1990; chapter V). The maximal increase in adrenal and testicular AA content induced by CORT + FSH (P or S) signifies a more favourable influence with a combination of these two hormones, a fact which was well emphasised by the previous observations of increased serum and CORT levels, as well as, the appearance of progressively

advanced stages of spermatogenic cell types in pigeons treated with such a combination in the quiescent phase (chapter V). The moderate influence of FSH.LH or even a combination of CORT + FSH.LH in raising tissue AA levels signifies the more potent role of a higher level of FSH in combination with CORT to induce AA synthesis and mobilization. A closer analysis of the data suggests, though in a hypothetical sense, that during normal testicular recrudescence, an initial increase in FSH in combination with CORT, activates the testes as well as induces AA mobilization and, the subsequent decrement in FSH coupled with LH might lead to AA utilization and increased steroidogenesis. This hypothesis arrived at by the present observations as well as the many related observations made in the feral pigeon in the past (Patel, 1993; chapters I, II and III), needs experimental scrutiny for validation.

Overall, the present observations provide evidence for a favourable action of CORT or FSH or more potently a combination of the two, to induce positive AA balance and promote mobilization of AA by the adrenals and testes and of LH, in utilization subsequently.