

Interstitial Cell-Stimulating Hormone Activities in the Pituitary Gland and Peripheral Blood of Immature and Mature Male Dogs

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Investigations have been made of the interstitial cell-stimulating hormone (ICSH) activity of the canine pituitary and plasma at different ages. A fairly high activity of ICSH in the pituitary of 3 weeks old animals was observed. At 2 months old the ICSH activity was about twice as high as that in the pituitary of 3 weeks old animals, in potency per mg of tissue weight. However, a somewhat lower activity was found for 2 years old animals than for 2 months old animals. In plasma samples from 3 weeks old and 2 months old animals, no detectable ICSH activity was found but measurable activity was detected in samples from 2 years old animals.

INTRODUCTION

In early, many investigations have been reported on the interstitial cell-stimulating hormone (ICSH or LH) content of the pituitary gland in animals such as the rat, rabbit, pig, horse, cattle and human at various ages.¹⁾ In the present paper we report the results obtained in a study with male dogs.

MATERIALS AND METHODS

Experiments were performed on thirty-seven male dogs at different ages. The dogs were divided into the following 3 groups: 1) twelve immature dogs weighing of 0.40 - 0.43 kg body wt. approximately 3 weeks old; 2) fourteen immature dogs weighing of 1.2 - 2.4 kg, approximately 2 months old; 3) eleven adult dogs weighing of 9.8-13.8 kg,

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approximately 2 years old. The dogs in each group were anesthetized with sodium pentobarbital (25 mg/kg, injected iv) and peripheral blood samples were withdrawn from their carotid artery. The volume of blood collected from each dog was approximately 10 ml. After centrifugation, 4 ml of each plasma sample were taken and pooled in each group. After the animals were sacrificed by exsanguination through the carotid artery, each brain was removed, and the pituitary gland was dissected out and weighed rapidly on a torsion balance. The pituitary glands of each group were pooled, homogenized with isotonic saline solution in a tissue grinder and centrifuged, as described previously²⁾. The resulting opalescent was used for the assay. ICSH activity in test samples was assayed by the ovarian ascorbic acid depletion method of MCCANN and RAMIREZ³⁾ which is referred to as the two-ovary, one-hour test. For an assay, test samples were administered to an assay rat in 1 ml of plasma or of pituitary extracts equivalent to 5 mg wet tissue and 5 or 6 rats were used for each case. Ovarian ascorbic acid was measured according to the procedure of ROE and KUETHER⁴⁾.

RESULTS AND REMARKS

To show whether the canine pituitary extracts evoke an ovarian ascorbic acid depletion in assay rats pretreated with gonadotrophins, one ml of crude saline extracts which

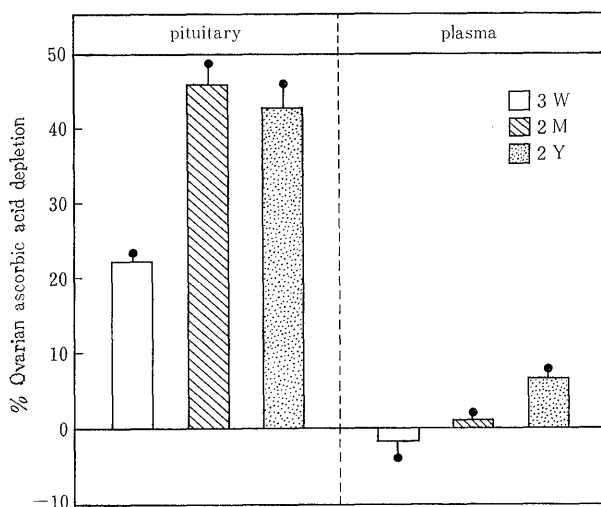


Fig. 1. The ICSH activity of the pituitary and peripheral plasma in intact male dogs of various ages, in which it was expressed in percentage depletion of ovarian ascorbic acid per 5 mg of pituitary wet weight or 1 ml of plasma. Each column represents the mean \pm SE of assays (5–6 rats per assay) performed on different pools of pituitary glands and plasma (11–14 dogs per pool). Abbreviations: 3W, 3 weeks old dogs; 2M, 2 months old dogs; 2Y, 2 years old dogs.

contained the doses from 0.8 to 6.4 mg of pituitary wet weight was administered into the tail vein of an assay rat. A nearly linear log-dose response curve was obtained.

Fig. 1 shows variations with age on the ICSH activity of the pituitary gland and peripheral plasma. The presence of a fairly high activity of ICSH in the pituitary of 3 weeks old animals was observed. At 2 months a high increase in the ICSH activity was found, the activity per mg of tissue weight for this group of animals being approximately 2 times higher than that encountered in 3 weeks old animals. A somewhat lower activity was found for 2 years old animals than for 2 months

old animals, but difference between them was not significant. However, since the weight of the pituitary gland increases with age, as can be seen in Table 1, total ICSH content per gland in adult animals, not content expressed in per mg of tissue weight, appears to be more higher than that in immature animals. Concerning the ICSH activity of peripheral plasma, there was no detectable activity of ICSH in plasma samples from animals in both ages of 3 weeks and 2 months old, but measurable activity was detected in samples from 2 years old animals.

Table 1. The pituitary weight of intact male dogs at various ages

Age	No. of animals	Body wt (kg)	Pituitary wt (mg)
3 weeks old	12	0.42±0.09	11±0.4*
2 months old	14	1.70±0.26	26±2.6
2 years old	11	11.8 ±0.62	48±2.7

* Mean±SE

The present results obtained in immature male dogs indicate that ICSH gradually increases in the pituitary gland during the period of growth from prepuberty to puberty, which follows by a somewhat decrease after puberty, but the release of this hormone by the pituitary is absent or present in only very small amounts below measurable limit.

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REFERENCES

- 1) KIRK, E. (1962): Variations with age in the tissue content of vitamins and hormones. *Vitamins and Hormones*, 20 : 68-132.
- 2) YAMASHITA, K. (1966): Interstitial cell-stimulating hormone-releasing activity of hypothalamic extracts in the dog. *J. Endocr.*, 35 : 401-408.
- 3) MCCANN, S. M. & RAMIREZ, V. D. (1964): The neuroendocrine regulation of hypophyseal luteinizing hormone secretion. *Recent Prog Hormone Res.*, 20 : 131-170.
- 4) ROE, J. H. & KUETHER, C. A. (1943): Determination of ascorbic acid in whole blood. *J. biol. Chem.*, 147 : 399-407.