PITUITARY LEVELS OF FSH AND LH AT VARIOUS INTERVALS AFTER OVARIECTOMY IN THE RAT

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Summary. The pituitary contents of FSH (HCG augmentation method of Steelman & Pohley) and LH (ovarian ascorbic acid depletion method of Parlow) were determined at 0, 2, 9, 13 and 25 weeks and at 0, 2 and 13 weeks, respectively, after bilateral spaying. The FSH concentration ($\mu\text{g}/\text{mg}$) increased up to 9 weeks with no changes thereafter, but the FSH content ($\mu\text{g}/\text{gland}$) and also LH levels increased up to 13 weeks.

Increased pituitary gonadotrophin content following removal of the ovaries has been observed by a large number of workers (for a review see Allanson & Parkes, 1966), some using more refined techniques (Parlow, 1964). However, changes in the pituitary content of FSH and LH associated with increasing length of time following ovariectomy have been studied by only a few workers. Evans & Simpson (1929) reported that the ability of donor pituitary glands to stimulate ovarian weights of immature recipients increased sharply during the first 8 weeks after ovariectomy, with much slower changes thereafter. Cozens & Nelson (1961) reported that a minimum effective dose (MED) of the donor pituitary required to stimulate follicular growth in the hypophysectomized assay rats decreased up to 8 weeks post-ovariectomy and remained constant thereafter, indicating reciprocal changes in FSH. Assays of pituitary FSH and LH carried out over the past 2½ years in spayed rats which served as controls for various other experiments, together with additional data are incorporated in the present note to describe changes in the FSH and LH levels at various intervals after removal of the ovaries by employing specific bio-assays using a reference standard.

Rats of the Holtzman strain were bilaterally spayed under ether anaesthesia by a dorso-lumbar approach. They were maintained under standardized conditions of light (14-hr artificial illumination) and temperature (72 to 75° F), and permitted free access to food and water. The pituitary glands were obtained from 2- to 3-month-old rats weighing 200 to 300 g after a 10- to 14-day post-ovariectomy interval. To minimize the effect of age in rats killed at longer intervals following ovariectomy, all the remaining groups were bilaterally spayed at 30 to 40 days of age and killed at the periods indicated (Text-fig. 1). This precaution was found necessary since age itself has been found

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to modify the pituitary gonadotrophin levels (Labhsetwar, 1969). The glands were pooled within each group and kept frozen until assayed.

FSH was estimated by the HCG augmentation method of Steelman & Pohley (1953) and LH by the one ovary—4-hr modification of OAAD of Parlow (1961) involving oestrogenized assay rats (Labhsetwar, 1969). The FSH was assayed using either a 2+2 or a 2+1 assay design and a symmetrical 2+2 assay design was employed for LH. In all instances, four assay rats/dose were used.

TEXT-FIG. 1. The pituitary FSH (●, μg equivalents of NIH-S-4) and LH (○, μg equivalents of NIH-S-12) levels at various intervals after the removal of ovaries. Each value in the lower figure represents mean concentration ($\mu\text{g}/\text{mg}$ pituitary) and 95% confidence limits.

The assay data were analysed by the method of Gaddum (1953) as adapted by Borth (1960) for multiple design analysis. The indices of precision in all cases were below 0.3, i.e. within the acceptable range.

The results show that the pituitary FSH concentration ($\mu\text{g}/\text{mg}$) increased up to 9 weeks following ovariectomy and then remained stable (Text-fig. 1). By contrast, the total FSH content ($\mu\text{g}/\text{gland}$) increased up to 13 weeks, primarily because of the continued growth of the anterior lobe of the pituitary. Both the LH concentration and content increased up to 13 weeks, the longest post-ovariectomy period studied.

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