Prolactin and the Ventral Prostate Gland in Juvenile Rats

Progesterone, in short-term experiments, prevented the involution of the ventral prostate in hypophysectomized-orchidectomized juvenile rats. This effect was tentatively ascribed to progesterone-derived androgens. The process was significantly enhanced in orchidectomized animals with an intact pituitary[1]. Certain reports reject the idea of a synergism between prolactin and androgens at the ventral prostate level[2], whereas others are in favour for such growth-enhancing and possibly secretion stimulating effects in the rats' prostate[3].

This communication describes a synergistic action of a prolactin preparation on the ventral prostate tissue in juvenile, progesterone-treated hypophysectomized-orchidectomized rats, and the absence of such beneficial influences under HCG.

Methods. A total of 298 male rats, breed G. Hagemann, Lemgo[4], body weight 33–38 g, were selected at random. During day 1 of trial, 238 animals were hypophysectomized-orchidectomized, 40 were orchidectomized, 20 animals served as controls.

From day 2–7 the following substances were injected s.c. in different combinations (details and doses see Figures 1 and 2): progesterone (daily dosis dissolved in 0.2 ml sesame oil), homogenized rat pituitary equivalents, prolactin[5] and HCG (daily dosis dissolved in 0.5 ml physiological NaCl solution). At day 8 all animals were killed, the ventral prostates were removed, weighed and fixed in Stieve's mixture. After embedding in paraffin, sections were cut at 5–8 μ and stained with haematoxylin-eosin.

Standard errors and Student's *t*-tests were calculated according to SNEDECOR[6]. Measurements of relative potency were done according to BLISS[7]. A valid 3-dose factorial assay, including the covariance procedure, was computed with the help of an IBM machine.

Results. Prolactin, when given together with progesterone, maintained the ventral prostate weight in juvenile hypophysectomized-orchidectomized rats almost at normal (Figure 1). By contrast, prolactin alone was practically ineffective, and progesterone was limited to prevent the involution to a certain extent only. Although there were only flat slopes registered, nevertheless dose-dependent responses were indicated. Hereby it made no difference if a constant level of progesterone was combined with increasing amounts of prolactin or vice versa.

It was found that HCG, when given with progesterone, did not elicit any measureable synergism at the ventral prostate, neither in hypophysectomized-orchidectomized, nor in orchidectomized rats (Figure 2). The same experiment revealed slight but not significant weight increases of the ventral prostate when progesterone was given in combination with homogenized rat pituitary equivalents or with 20 IU of prolactin.

The histology of the untreated 'control' ventral prostate on day 8 after hypophysectomy-orchidectomy showed an almost complete atrophy of glandular epithelium and cessation of secretory activity. Considerable fibrosis observable (Figure 3A). By the treatment with prolactin, there was a much less pronounced atrophy of the glandular epithelium (Figure 3B). The influence of progesterone was striking concerning the prevention of the glandular atrophy and fibrosis. There were distinct signs of secretory activity (Figure 3C). Finally, a clear-cut synergism was found after the concomitant application of progesterone and prolactin, exhibiting a rather pronounced secretion, stored within the follicles (Figure 3D).

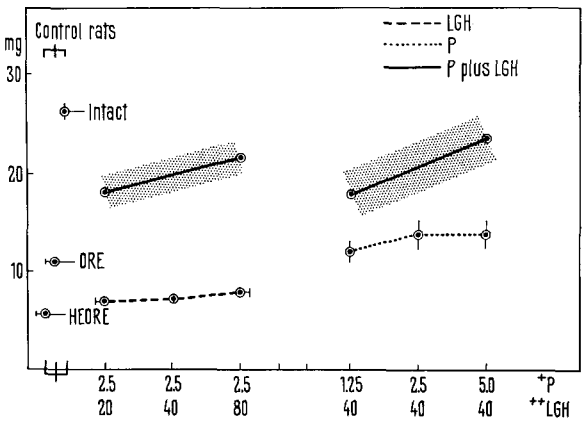

Fig. 1. Synergistic effects of prolactin and progesterone on the ventral prostate weight of juvenile hypophysectomized-orchidectomized rats. The 2 solid straight lines are the computed curves which have confidence limits at $p = 0.05$ shown by the dotted fields. ORE, orchidectomized; HEORE, hypophys-orchidectomized; +P, progesterone (mg/day 2–7); ++LGH, prolactin (IU/day 2–7). *Note*: In this case the factorial design cannot be applied to compute the relative potency of the unknown. Nevertheless, the 2 dosage response curves were parallel. If one would consider the right curve as the unknown, the left one as the standard, the potency of the 'unknown' was assayed as 1.3078 that of the standard ($p = 0.05$ from 1.1507 to 1.6442), a difference which is not significant.

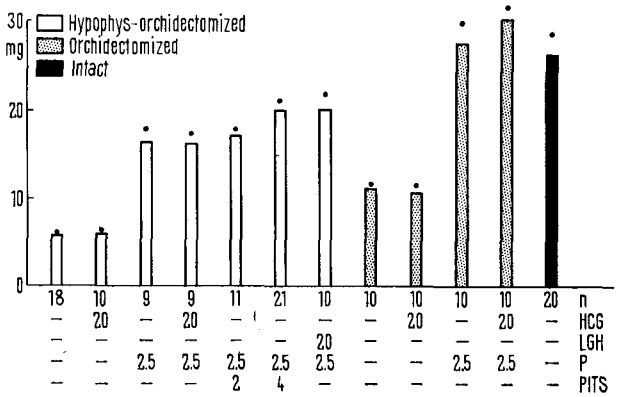

Fig. 2. Effects of progesterone, prolactin, HCG, and pituitary equivalents on the weight of the ventral prostate of juvenile rats. n, number of rats; HCG, human chorionic gonadotrophin (IU/day 2–7, s.c.); LGH, prolactin (ovine) (IU/day 2–7, s.c.); P, progesterone (mg/day 2–7, s.c.); PITS, pituitary equivalents (eq./6 days, day 2–7, s.c.).

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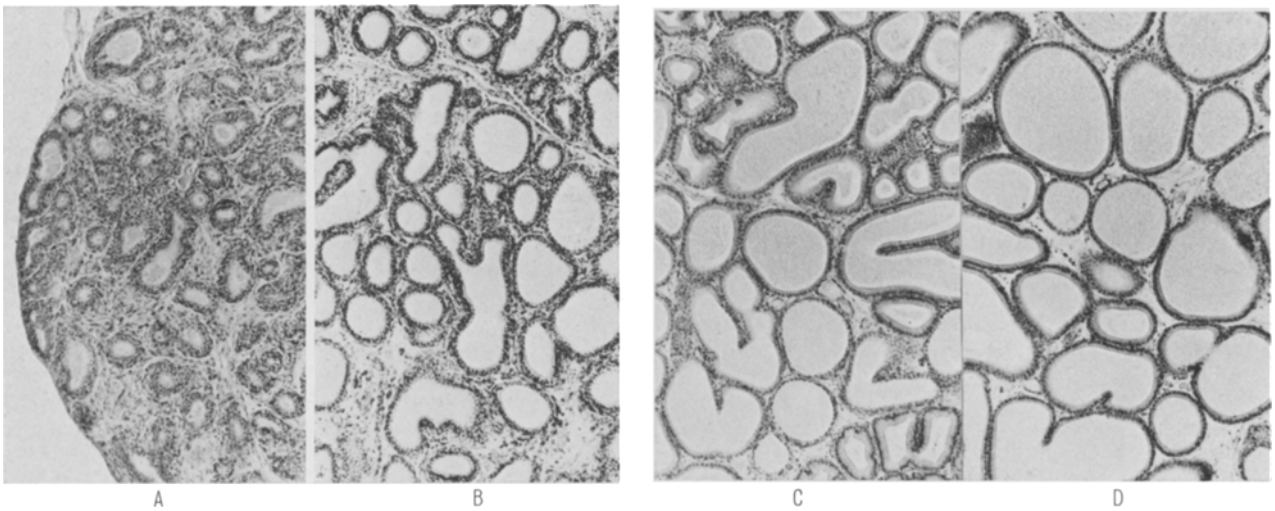

Fig. 3. (A) 'Control' ventral prostate, 8 days after hypophysectomy-orchidectomy: atrophy of glandular elements; predominance of interstitial tissues. × 140. (B) S.c. injections of 40 IU of prolactin/day, day 2–7 after hypophysectomy-orchidectomy: prevention of complete glandular atrophy. × 140. (C) S.c. injections of 5 mg progesterone/day, day 2–7 after hypophysectomy-orchidectomy: considerable secretory activity is maintained. × 140. (D) S.c. injections of 5 mg progesterone plus 40 IU of prolactin/day, day 2–7 after hypophysectomy-orchidectomy: synergistic action of the 2 hormones: distended alveoli by considerable secretory activity. × 140.

Discussion. There is no explanation as yet why there was such an unequivocal synergism between progesterone (presumably metabolized into androgens) and prolactin within the ventral prostate of juvenile hypophysectomized-orchidectomized rats. These results support earlier findings in detail which demonstrated this accessory sexual organ to be a receptor site for prolactin plus androgens in juvenile hypophysectomized-orchidectomized rats[3]. The mechanism by which this pituitary derivative furthered the androgen-dependent events in the ventral prostate remains obscure. In addition, there is no hypothesis available why prolactin might be involved in the physiology of this secretory structure. The question whether a possible synergistic action of prolactin and ACTH was mediated through the adrenals or exerted directly on the prostatic tissue, could not be resolved[8]. There was no definitive evidence that FSH augmented the action of testosterone on accessory organs[9]. Consequently, one should be encouraged to extend these studies in order to find out if this postulated pituitary end organ effect is specific for prolactin, and, if so, dose-dependent.

Zusammenfassung. Die normalerweise der Hypophysorchidektomie juveniler Ratten folgende Prostataatrophie wurde durch Behandlung mit Progesteron und Prolaktin verhindert. Direkte hypophysäre Einflüsse auf die Prostata werden diskutiert.

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Observations on the Neurosecretory Axons in the Aortal Wall of *Halys dentatus* F. (Heteroptera: Pentatomidae)

The morphological and functional patterns of different components of retrocerebral complex in gymnoceratan bugs have been studied by other workers[1–4]. There is a sharp difference of opinion among the authors regarding the storage and release of neurosecretory material (NSM), elaborated by the neurosecretory cells of the pars intercerebralis medialis. Some workers[2–4] have observed that (NSM) is stored in the corpora cardiaca, while others[3,4] noticed it in aortal wall also, which was interpreted as being on its way to the general blood circulation. However, in recent years, some workers have convincingly demonstrated that the aorta in the heteropteran bugs serves as a neurohaemal organ[1,5]. An attempt has been made in the present work to acertain the morphological pattern of the neurosecretory axons within the aortal wall, which has sofar received scanty attention so that its nature remains obscure.

The techniques employed by Dogra and Tandan[6] for fixing and staining the neuroendocrine glands were used

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