

Difference Between Dorsal and Lateral Components of Dorsolateral Prostate of Rat in Zn^{65} Uptake.*† (22370)

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In a previous communication it was reported that the dorsolateral prostate of the rat concentrates Zn^{65} from 15 to 25 times more than any other tissue(1). In view of the observation that there is a marked difference grossly and microscopically between the dorsal and lateral portions of the dorsolateral prostate, the possibility of a functional difference in the capacity of the two glandular components to take up Zn^{65} was investigated.

Procedure. Eighteen male Wistar rats (350-450 g) were used in these studies. The technic of Zn^{65} experiments was similar to that outlined previously(1,3). Zn^{65} (0.4 μ c/g)[‡] was administered by intracardiac injection. The rats were sacrificed by chloroform and exsanguination at various intervals post-injection, 20 min, 40 min, 2, 4, and 24 hrs. The right and left dorsolateral lobes of the prostate were exposed and on one side the intact dorsolateral lobe was removed for study. On the other side the dorsal and lateral portions were separated for individual study. With experience it became easy to differentiate the blanched area dorsal to the urethra from the pink glistening lateral portion of the lobe. The dissected tissues were placed in metal planchets, dried

overnight at 110°C, and weighed. Radioactivity was measured by an end-window Geiger-Müller counting tube in conjunction with a decade scaler. The experimental results are expressed in the Figures as counts/min/mg of tissue. For the histological study of the dorsolateral prostate, tissues were fixed in 10% formalin and stained by routine hematoxylin and eosin methods. The histochemical study for zinc was carried out according to the techniques outlined by Mager, McNary and Lionetti (4).

Results. The results show (Fig. 1) a striking difference in the degree of uptake of radioactive zinc by the lateral and dorsal portions of the dorsolateral prostate 24 hrs after the intracardiac administration of Zn^{65} . The dorsal portion of the dorsolateral prostate is satu-

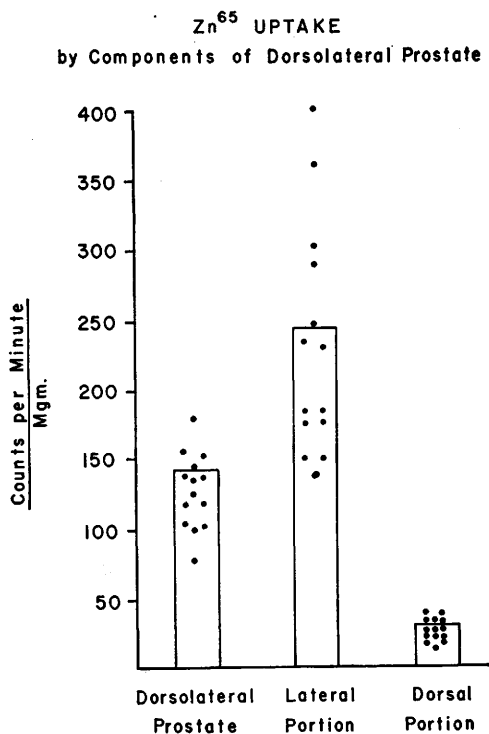


FIG. 1. 24-hr uptake of Zn^{65} by dorsal and lateral components of dorsolateral prostate of mature rat.

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‡ Zn^{65} was purchased from Carbide and Carbon Chemicals Co. as $Zn^{65}Cl_2$ in HCl solution with a specific activity of 236 mc/g. The solution was diluted with 0.85% NaCl containing sufficient NaOH to neutralize some of the acid present compatible with solubility. The dilution was made so that the administered dose was contained in less than 0.4 ml.

RATE OF ACCUMULATION OF Zn⁶⁵
in Components of Dorsolateral Prostate

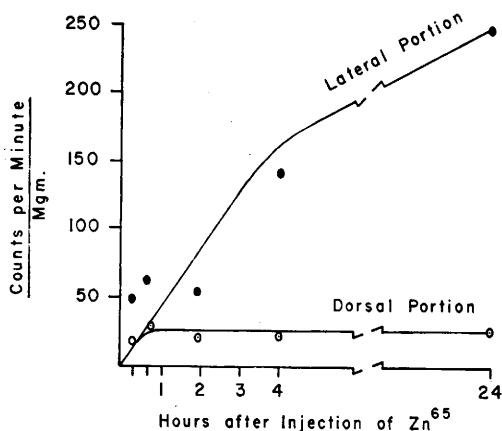


FIG. 2. Comparison of rate of accumulation of Zn⁶⁵ in dorsal and lateral components of dorsolateral prostate of mature rat.

rated with a very low level of Zn⁶⁵ by 20 to 40 min after injection of the radioactive material (Fig. 2), whereas the lateral portion of

the gland continues to accumulate Zn⁶⁵ until 4 to 24 hrs post-injection. Results of an earlier study(1) showed that the concentration of Zn⁶⁵ in the whole dorsolateral prostate does not increase after 24 hrs.

In view of this striking difference between the two portions of the dorsolateral prostate to concentrate Zn⁶⁵, a more intensive histological study of the gland was undertaken. As mentioned previously, in gross dissection the dorsal part of the gland can be differentiated by its lack of pink coloration so evident in the lateral portion. The two parts of the gland also differ histologically. In the lateral portion (Fig. 3a) the cells are tall columnar with large vesicular nuclei, and the lumina are filled with acellular, homogeneous material as seen in apocrine glands. In contrast the cells of the dorsal portion (Fig. 3b) are low cuboidal with more pyknotic nuclei, and the material within the acini is composed of desquamating cells in various stages of disintegration, the typical picture of a holocrine gland.

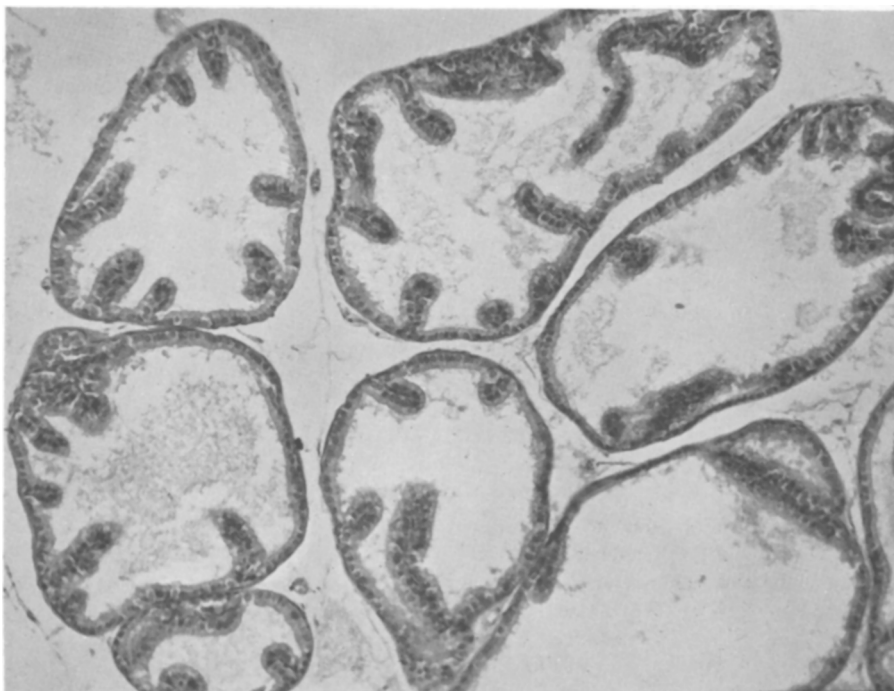


FIG. 3a. Lateral portion of dorsolateral prostate of mature rat showing acini lined by tall columnar cells and lumina filled with acellular, homogeneous secretion. Hematoxylin and eosin $\times 136$.

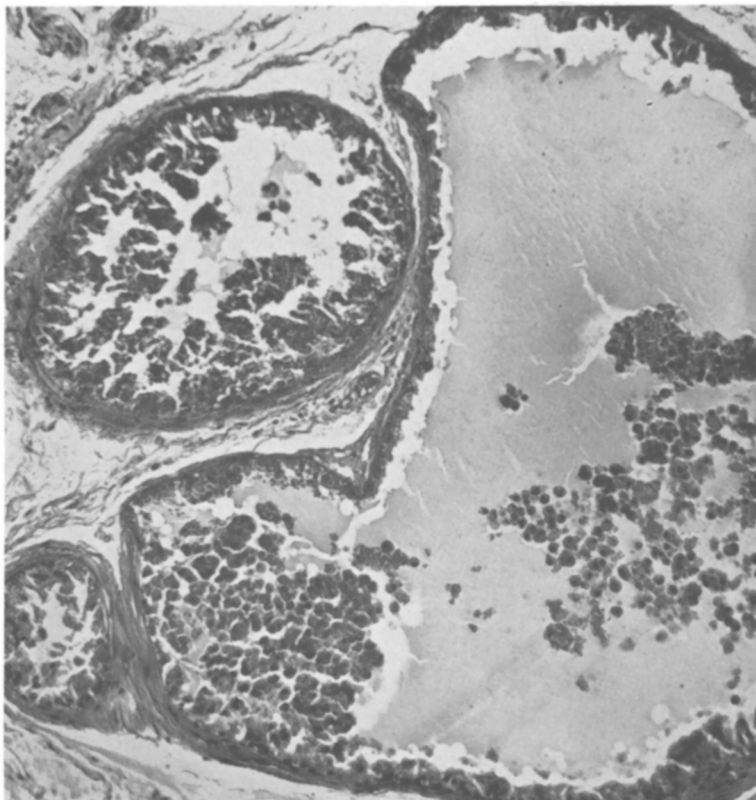


FIG. 3b. Dorsal portion of dorsolateral prostate of mature rat, showing acini lined by low cuboidal cells with pyknotic nuclei and secretion composed of desquamating cells in various stages of disintegration. Hematoxylin and eosin $\times 136$.

Histochemical studies with the dithizone zinc stain show an intense positive reaction in the lateral portion in contrast to a negative reaction in the dorsal portion of the dorsolateral prostate (Fig. 4).

Discussion. Although the dorsolateral prostate is seemingly one lobe enclosed within one capsule, the data reported indicate marked differences between the dorsal and lateral components of the gland. Grossly the lack of pink coloration in the dorsal portion distinguishes it from the adjacent lateral component. Microscopically the cells of the dorsal portion can be distinguished from those of the lateral portion(5). Moreover histological evidence presented in this paper illustrated that the two components of the gland differ strikingly in their manner of secretory formation.

Fischer, Mawson and Tikkala(2) reported

that the lateral part of the gland contained more zinc than the dorsal portion, and histochemical studies presented here confirm their observation. In addition the results of studies with radioactive zinc suggest there is a functional difference between the two portions of the dorsolateral prostate in view of the fact that the lateral component of the gland can concentrate administered Zn⁶⁵ to a much greater degree than the adjacent dorsal portion.

Summary. The authors reported previously that the dorsolateral prostate of the rat concentrates administered Zn⁶⁵ from 15-25 times more than any other tissue(1). The present study reveals that this selective uptake of Zn⁶⁵ is confined to the lateral portion of the dorsolateral prostate, suggesting a functional difference between the two parts of the gland. Histological study also lends evidence to this

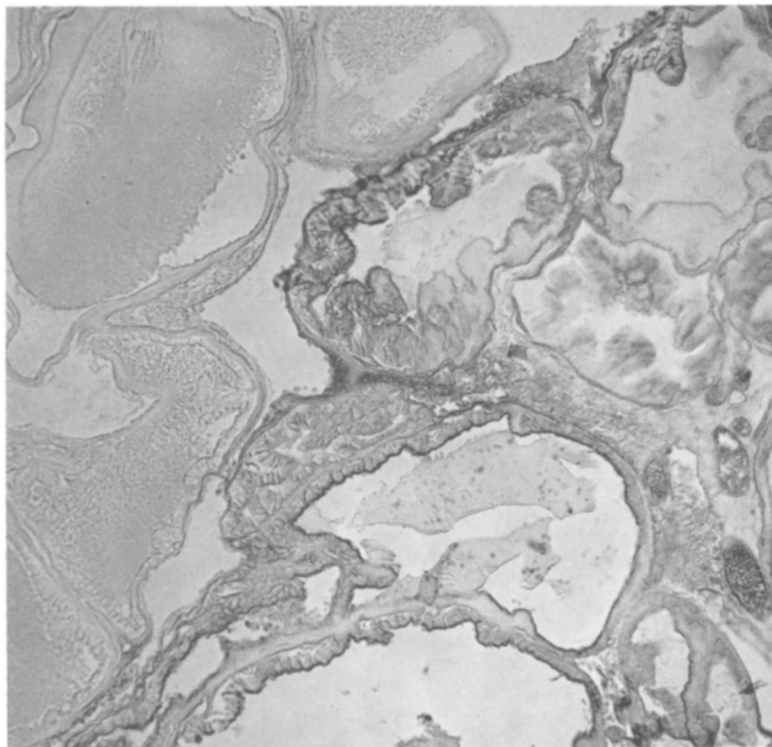


FIG. 4. Zinc stain of dorsolateral prostate of mature rat at junction of dorsal (left) and lateral (right) components of the gland, showing positive zinc stain in the lateral portion (black in photo) and negative reaction in dorsal portion (light gray in photo). Dithizone $\times 136$.

observation.

1. Gunn, S. A., Gould, T. C., Ginori, S. S., and Morse, J. G., *PROC. SOC. EXP. BIOL. AND MED.*, 1955, v88, 556.

2. Fischer, M. I., Tikkala, A. O., and Mawson, C. A., *Canad. J. Biochem. and Physiol.*, 1955, v33, 181.

3. Gunn, S. A., and Gould, T. C., *Endocrinology*, 1956, v58, 443.

4. Mager, M., McNary, W. F., Jr., and Lionetti, F., *J. Histochem. and Cytochem.*, 1953, v1, 493.

5. Korenchevsky, V., and Dennison, M., *J. Path. and Bact.*, 1935, v41, 323.

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Inhibition of Insulin Degradation by Amino Acids and Related Compounds.* (22371)

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Shmidt and Saatchian(1) and Mirsky and Broh-Kahn(2) have shown that insulin is readily inactivated by liver preparations at

pH 7.5. Insulin labeled with I^{131} is likewise degraded and the accumulation of radioactive material soluble in 10% trichloroacetic acid has been found(3,4) to parallel the biological inactivation of insulin and the formation of non-protein nitrogen from insulin. These ob-

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