former, the latter being eluted with 10mM-NAD⁺. The efficiency of elution of the lactate dehydrogenase seemed to increase on addition of the substrate lactate to the coenzyme eluent.

Axén, R., Porath, J. & Ernback, S. (1967). *Nature, Lond.*, **214**, 1302.

Larsson, P.-O. & Mosbach, K. (1971). *Biotechnol. Bioengng* (in the Press).

McPherson, A., jun. (1970). *J. molec. Biol.* **51**, 39.

Mosbach, K. (1971). *Sci. Am.* **224**, 26.

A Possible Role of Zinc in the Metabolism of Testosterone by the Prostate Gland

By J. K. GRANT, J. MINGUELL, PATRICIA TAYLOR and MAGDA WEISS.* (*University Department of Steroid Biochemistry, Royal Infirmary, Glasgow C.4, U.K.*)

The prostate gland contains a relatively large concentration of zinc. This is influenced by the endocrine status of the animal, decreasing on castration and increasing on androgen administration. Dependence of the prostate on zinc is illustrated by the damaging effects of administering Zn²⁺ ion-chelating agents such as diphenylthiocarbazon (Whitmore, 1963). The role of zinc in the prostate has not, however, been clarified. The normal structure and function of the prostate gland in men and dogs is also dependent on 5 α -dihydrotestosterone (Siiteri & Wilson, 1970), which we have shown, in superfusion experiments, to be concentrated by human prostatic tissue slices (Giorgi, Stewart, Grant & Scott, 1971). The results now reported suggest that the concentration of free Zn²⁺ in prostatic cells may influence androgen metabolism, on which prostatic function depends.

Nuclei were isolated from fresh human hyperplastic prostatic tissue by the method of Sierralta & Minguell (1970). They were checked for freedom from gross cytoplasmic contamination by examination under the microscope, after staining by haematoxylin and eosin, and were incubated with [1,2-³H]testosterone under the conditions described by Bruchovsky & Wilson (1968). In some experiments EDTA was omitted, apparently without effect. ³H-labelled testosterone and 5 α -dihydrotestosterone were isolated from the incubation mixtures after addition of small amounts of carrier steroid, purified by t.l.c. and, after addition of larger amounts of carrier, recrystallized to constant specific radioactivity. Tritium in these two steroids accounted for by far the greater part of the isotope

added before incubation, in keeping with the findings of Bruchovsky & Wilson (1968).

Zinc chloride (Specpure; Johnson and Matthey, London E.C.1, U.K.) was added to some incubation mixtures in concentrations ranging from 0.05 μ M to 0.5mM (i.e. 6.54ng–65.4 μ g/incubation). In separate experiments these concentrations were shown to be without effect on the production of NADPH in the incubations. Concentrations of 50 μ M and greater did, however, almost completely inhibit the NADPH-dependent reduction of testosterone to 5 α -dihydrotestosterone, whereas lower concentrations of Zn²⁺-stimulated formation of 5 α -dihydrotestosterone by 20–30% of the control values. Concentrations of Cd²⁺, Hg²⁺ or Mn²⁺ up to 0.5mM were without effect.

The zinc content of the amounts of nuclei incubated, as determined by atomic adsorption spectrometry, varied from 61.3 to 183.9nmol (i.e. 4–12 μ g). This zinc appeared to be bound in the nuclei and did not leak out during incubation. The reduction of testosterone by microsomal preparations from human prostatic tissue and by preparations from the rat ventral prostate was also inhibited by 50 μ M-zinc chloride.

Since these observations might be explained by possible effects of Zn²⁺ on the binding of steroids to proteins in prostatic cells, such effects are at present under investigation.

We thank the Cancer Research Campaign for a grant and Dr G. S. Fell for zinc measurements.

Bruchovsky, N. & Wilson, J. D. (1968). *J. biol. Chem.* **243**, 2012.

Giorgi, E. P., Stewart, J., Grant, J. K. & Scott, R. (1971). *Biochem. J.* **123**, 41.

Sierralta, W. & Minguell, J. (1970). *Biochem. biophys. Res. Commun.* **41**, 50.

Siiteri, P. K. & Wilson, J. D. (1970). *J. clin. Invest.* **49**, 1737.

Whitmore, W. F. (1963). *Natn. Cancer Inst. Monog.* no. 12, p. 337.

Selective Increases in Type I Hydrogen from Reduced Nicotinamide-Adenine Dinucleotide Phosphate in Liver from Phenobarbitone-Treated Rats

By F. P. ALTMAN. (*Division of Cellular Biology, The Mathilda and Terence Kennedy Institute of Rheumatology, London W6 7DW, U.K.*)

Phenobarbitone administration to experimental animals is known to increase various microsomal parameters. These include the content of cytochrome P-450 and the activity of the mixed-function oxidase system (Orrenius, Das & Gnosspelius, 1969).

* Present address: Department of Physiology, Monash University, Clayton, Victoria 3168, Australia.