

# FREE ESTROGENS AND PROGESTOGENS IN BENIGN PROSTATIC HYPERTROPHY

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**Summary :** Studies on the presence of free estrogens and progestogens in human prostates clearly differentiate the benign hypertrophied prostates from normals. Both contained 17  $\alpha$ -hydroxypregnenolone, 5  $\beta$ -pregnane-3, 20-dione, 5 $\alpha$ -pregnane-3, 20-dione and 16  $\alpha$ -hydroxyestrone. However, presence of 11  $\alpha$ -hydroxyprogesterone, 20  $\beta$ -hydroxypregnenolone, pregnenolone, 17  $\alpha$ -hydroxyprogesterone, as well as estrone and estriol exclusively in BPH samples pointed to their possible involvement in the development of benign prostatic hypertrophy.

**Key words :** estrogens

progestogens

benign prostatic hypertrophy

## INTRODUCTION

Old age changes in human prostate are distinct and profound. Harbitz and Haugen (3) recorded occurrence of benign nodular hyperplasia in practically all men above 70 years of age. The benign prostatic enlargement is mostly limited to medullary region (2) which develops under the influence of estrogen (4) produced by the testis in human (6). Keeping in view, the role of estrogen in inducing benign prostatic hyperplasia (BPH) present study has been undertaken to examine the differences in the presence of free estrogens and also progestogens in hypertrophied and normal prostates.

## MATERIAL AND METHODS

Normal prostates were collected within 10 hrs post-mortem from two apparently normal men of 55 years and 65 years of age, killed instantaneously due to bullet injuries. Benign hypertrophied prostates were collected from Bhagalpur Medical College Hospital after their surgical removal from patients suffering from urinary obstruction diagnosed to be due to benign prostatic enlargements. The prostates thus collected were immediately deep frozen at  $-15^{\circ}\text{C}$  to  $-20^{\circ}\text{C}$ . Tissue was homogenised in absolute alcohol in concentration of 200 mg per ml and the homogenate was processed for chromatographic separation and identification by the method of Eberlein (1).

*TLC separation and identification of steroids*: The ethanolic homogenate was centrifuged and the supernatant was evaporated under reduced pressure at room temperature. 0.2 ml of ether-alcohol (1:1) mixture was added to the above sample. The above sample alongwith the samples of standard steroids, procured generously from Prof. D.N. Kirk, Westfield College, University of London, U.K., prepared in concentration of 100  $\mu\text{g/ml}$  in ethanol, were spotted on 0.25 mm thick plain silicagel G plates after activation at 60°C. The spotted plates were then run in the glass chromatographic jars containing the solvent (chloroform and acetone in the ratio of 95:5) After an ascent of 10 cms, the plates were room dried and sprayed with picric acid and perchloric acid. The plates were heated at 80°C. The steroids were detected on comparison of the Rf values and colours as well as florescence under UV of the known and unkown samples.

## RESULTS

TLC studies on the presence of free estrogen and progestogens in the seven samples of BPH as presented in Table I, indicated that 17  $\alpha$ -hydroxypregnenolone and

TABLE I : Presence of free estrogene and prgestogens in the normal and hypertrophied human prostates.

Steroid	Sample No.	Normal Samples		BPH Samples						
		1	2	1	2	3	4	5	6	7
Pregnenolone		—	—	+	—	+	—	+	—	—
17 $\alpha$ -hydroxypregnenolone		+	+	+	+	+	+	+	+	+
Progesterone		—	—	—	—	—	—	—	—	—
17 $\alpha$ -hydroxyprogesterone		—	—	+	+	—	+	+	—	+
16 $\alpha$ -hydroxyprogesterone		—	—	—	—	—	—	—	—	—
11 $\alpha$ -hydroxyprogesterone		—	—	—	+	—	+	—	+	+
20 $\alpha$ -hydroxy-4-pregnen-3-one		—	—	—	—	—	—	—	—	—
20 $\beta$ -hydroxy-4-pregnen-3-one		—	—	—	—	+	—	—	—	—
5 $\beta$ -pregnane-3, 20-dione		+	+	+	+	+	+	+	+	+
5 $\alpha$ -pregnane-3, 20-dione		+	+	+	+	—	—	+	+	+
Estrone		—	—	+	+	+	+	+	—	—
16 $\alpha$ -hydroxyestrone		+	+	+	—	+	+	—	+	—
2-Methoxyestrone		—	—	—	—	—	—	—	—	—
17 $\alpha$ -estradiol		—	—	—	—	—	—	—	—	—
17 $\beta$ -estradiol		—	—	—	—	—	—	—	—	—
Estriol		—	—	—	—	—	—	—	—	—
16-Epiestriol		—	—	—	—	—	—	—	—	—

+ = Present, — = Absent

5  $\beta$ -pregnane-3, 20-dione were present in all the samples but 5  $\alpha$ -pregnane-3, 20-dione, 17  $\alpha$ -hydroxyprogesterone and estrone were present in only 5 of the samples. 11  $\alpha$ -hydroxyprogesterone and 16  $\alpha$ -hydroxyestrone were present in 4 of them, pregnenolone in 3, estriol in 2 and 20  $\beta$ -hydroxy-4-pregnen-3-one in only one of the seven BPH samples. It was noted that the samples which did not contain estrone, contained estriol. It was also recorded that the samples contained only 6 or 7 steroids; three of them contained 5 progestational and one estrogenic steroids, three of them contained 4 progestational and 2 estrogenic steroids, whereas only one contained 5 progestational and 2 estrogenic steroids.

However, both the normal prostatic samples indicated the presence of only 4 steroids viz 17  $\alpha$ -hydroxypregnenolone, 5  $\beta$ -pregnane-3, 20 dione, 5  $\alpha$ -pregnane-3, 20-dione and 16  $\alpha$ -hydroxyestrone.

### DISCUSSION

Results of the present study on the samples of human prostate indicate that even though the prostate is a target accessory sex organ for androgens, the distribution of estrogens and progestogens is very extensive in both the normal and BPH samples. Though 17  $\alpha$ -hydroxypregnenolone, 5  $\beta$ -pregnane-3, 20-dione, 5  $\alpha$ -pregnane-3, 20-dione and 16  $\alpha$ -hydroxyestrone present in BPH samples were also present in normal prostate but 11  $\alpha$ -hydroxyprogesterone, 20 $\beta$ -hydroxypregnenolone, pregnenolone, 17  $\alpha$ -hydroxyprogesterone, estrone and estriol present in few or many BPH samples were altogether absent in normal prostates. Whether the presence of some progestogens and estrogens exclusively in BPH samples are the cause or effect of prostatic hypertrophy can not be ascertained in the limitation of the present study. Though estrogens were considered to induce development of BPH (4) and they were shown to be produced by testis in man (6) and stallion (5). The present investigation, therefore, suggests that if estrogens are associated with development of BPH such estrogens are obviously estrone and/or estriol. It is also possible that these estrogens are metabolites produced by BPH from some precursors produced by testis. However, similar role of 11  $\alpha$ -hydroxyprogesterone can not be ruled out.

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