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DIFFERENT PHYSIOLOGICAL CONDITIONS IN ALBINO RAT

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ABSTRACT

Cytological studies of prostate were performed in immature, adult, castrated and testosterone treated precastrated albino rat. Cytology of prostate showed distinct changes in each condition. The number and shape of the prostate cell changed gradually from immature to adult stage. The shape and number of lobules compared between one week and two week castrated albino rat showed that the cell become low columnar and non secretory. The castrated testosterone injected rat showed reappearance of cellular feature as in adults control. This indicates the importance of testosterone for normal functioning of prostate and restoration of prostatic fluid for healthy spermatozoa production.

Key word: **Physiological conditions, Albino Rat.**

Introduction

A number of bio-chemical processes of prostate gland in rat are regulated by testosterone. Testosterone is reduced to dihidrotestosterone (Anderson & Liao, 1968) which can bind with high affinity to a cytoplasmic receptor (Fang and Liao, 1969) capable of interacting with chromatin in the nuclear lutenizing hormone releasing (LH-RH) used for the tratmen of steroid dependent tumors, such as prostate and breast cancers Parmer *et al.* (1985) Mann *et al.* (1986) and Soloway (1989). Debruyne (1989) recent reports have also decribed the presence of LHRH like peptide in human prostate cancer, and human prostate cell lines Qayum *et al.* (1990). Although the activities of numerous enzymes in the prostate are stimulated by testosterone, it has not been established whether this is due to enzyme synthesis, or the hormone modulates other factors that affect enzyme activity. Prostate chormatin responds to DHT-receptor. Prostate at the acceptor sites, reflects the major area of influence.

Prostate chromatin influence respond with alteration in the activity of RNA polymerase. Androgen dependent protein synthesis in the rat ventral prostate is believed to be mediated by the androgen receptor in the prostate Fang and Liao 1969). We report here histological changes in the prostate cell and tubular arrangment in normal prostate castrated and testosterone treated, and castrated rat. The ultimate aim is to see the indispensibility of testosterone for the normal functioning of prostate which provides favourable environment for normal spermatogenesis (Waxman (1987) and Griffiths et al. (1989).

Material and Methods

The animal used were Sprauge Dawely male rats. They were kept under standared laboratory conditions, and were fed with commercial feed and water ed-libitum. Testosterone propionate ampules were obtained from merk, sharp and D.C Dohem (50 mg/ml). The animal were castrated through the scrotal routes, under ether anesthesia. Androgen treatment consisted of daily injections subcutaneously of one ml of testosterone propionate in olive oil per animal. Rats were killed by cervical dislocation at day 7 and day 15, and were castrated. The prostates were removed and ice chilled. the prostate tissues were fixed in Bouins fixative, and processed for histology. Sections were cut at 8 mll on rotary microtome and were stained with Harris hematoxylin and eosin.

Results:

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Results:

The prostate was examined histologically. Prostate is a glandular tissue surrounding the urethera at the site where it emerges from the bladder. The prostate is surrounded by a thin connective tissue capsule containing smooth muscles. The gland as a whole is composed of secretory channles, smooth muscles and fibrous tissues. The tubulo alveolary glands of the prostate consist of infolding of the epithelium to accommodate the secretion, required during storage of prostatic fluid. The secretory portions of the gland are linked with collumnar epithelium supperimposed on a few flattened cells (fig. 2). The lamellar bodies take eosin stain and appear dark, that is prostatic concentration. The prostate fluid contributes to the seminal fluid. In immature 15 day rats the cell of prostate were slightly stained, the tubules have no infoldings (fig. 1). In adult prostate tall columnar epithelium cell were seen (fig. 2). The luminan space was filled with luminar fluid. In one week as well as in two weeks castrated rats (fig. 3) the size of the glands were decreased. The lobules of the prostate shrink markedly in size. The size of the cell become low cuboidal, nonsecretory (fig. 4). When testosterone was injected after one week and two weeks the size of the gland was increased the shape of the cell became columnar (fig.5-6), tubular infolding increased, compact and highly secretary.

Legends to Figures



Fig: 1 Immature Rat.

a = cuboidal non sectetory cells.

b = prominent & space free of fluid.

c = Luminal & space free of fluid.



Fig: 2 Adult Rat.

a =columnar cells, highly compact & secretory.

b = nucleus is darkly stained

c = luminal space show fluid.

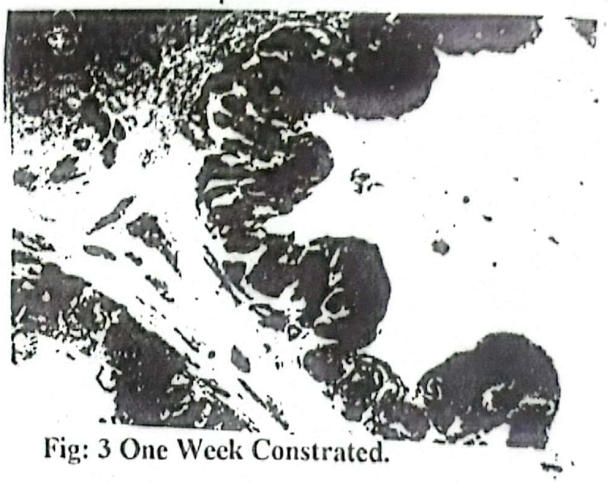


Fig: 3 One Week Constrated.

a = Cells become low cuboidal & non secretory

b = luminal fluid absent.

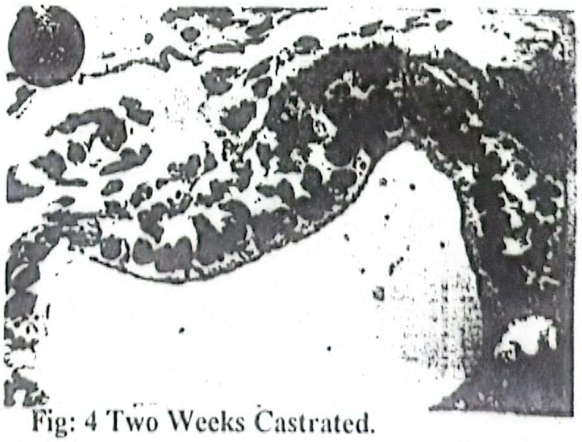


Fig: 4 Two Weeks Castrated.

a = Low cuboidal non secretory cells.

b = convoluted lubules with out fluid.

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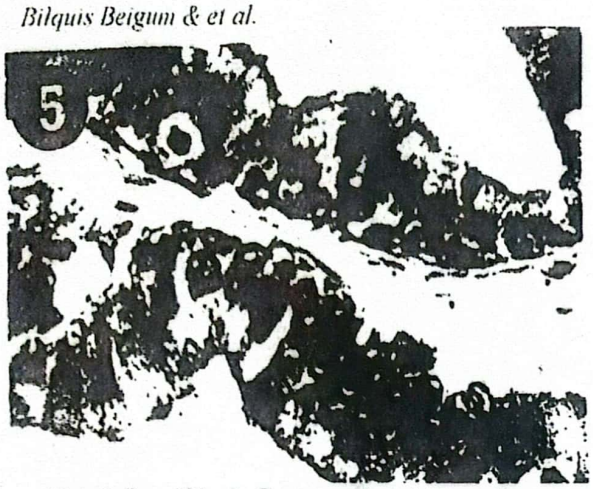


Fig: 5 One Week Castrated and Testoterone injected for one week.

a = Cells become columnar and secretory.

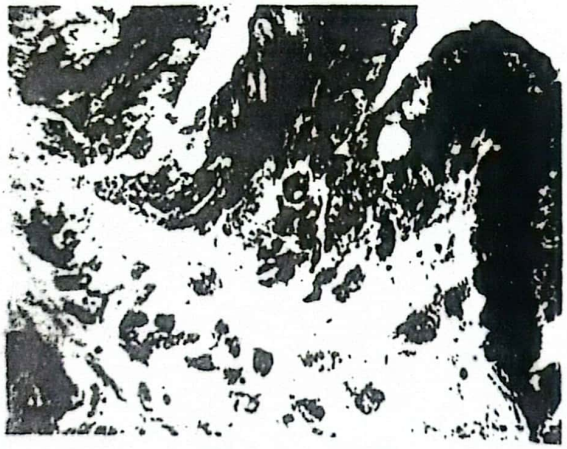


Fig: 6 Castrated Rat Injected Testostone for Two Weeks.

a = cells become highly compact columnar and the tubules become convoluted to accomodate distention for resection of fluid.

Discussion

Prostate secretion due to neutralization of the acid reaction, activate spermatozoa. Hormone dependent proteins have been reported by a number of workers in different tissues. Micheal *et al.* (1975) have administrerd estrogens to ovariectomized rats and analyzed cytosol proteins. Joshi *et al,* (1980) have shown progesterone dependent proteins in human endometrium. Liang *et al.* (1976) have shown that androgens effect in initiation of protein synthesis in the ventral prostate of rat. Liao *et al.* (1980) have reported two protein synthesis in the ventral prostate of the rat. And reported two proteins which are stimulated by androgen in rat ventral prostrate. Carter *et al.* (1981) have also shown by two dimetional polyacrylamide gel electrophoresis that some of the proteins of prostate are under adrogen control in rat. Parker *et al.* (1978) have shown three major testosterone dependent proteins. Their amount decreased after castration of rat. Our results also agree with this. After testosterone injection the histological comparison shows that the epithelial cells of prostate glandular tubules change their shape gradually as from low cuboidal to high columnar cells depending on gradual maturity of the prostate. Mature state cells are full of prostatic fluid and the Luman also contains prostatic fluid. Nucleus is also slightly visible, nucleoli is diminished. In immature state the cell are low cuboidal and nonsecretory, with clear nucleus and nucleoli, but in castrated rat the shape of the cells changes from columnar to low cuboidal the size of the gland also decreases morpholgicaly as the gland is deprived of prostate fluid source. In two week castrated rats, the prostatic fluid is much less as the cells were deprived of stimulator. In an other set of experiments when the castrated animals were injected with testosterone, the shape and structure of epithelial cells was restored. The secreting cell shape becomes large columnar. It is therefore clear that testosterone effects the prostate fluid health and keeps the shape, size and pattern of glandular arrangement of prostate.

The importance of doing this exercise is to find out histolgical presence of testosterone, concerned with fertility. Prostatic fluid biochemically neutralizes the acidic reaction, and it activates the spermatozoa, the lack of fluid decreases the normal functions and ultimately is one of the reason for infertitity. Absence of testosterone not only inactivates spermatozoa, but it also changes the morphology and histology of prostate. The effect of castration on prostate LHRH production and metabolism causes the decrease of various prostate functions and decrease of

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LHRH synthesis, our cell study of immature rat prostate also agrees with the results of Nasrin *et al.* (1993), here the cell development and metabllic production was reduced. Our data shows prostate tissue atrophy after castration, and thus indicates that testosterone or other testicular hormones decrease, which ultimately effect the physiology of prostate. We have studied the effect of castration on prostate, testosterone therapy in castrated, and histological changes in different stages, our study, the effect of castration on prostate, agrees with study of Nasrin *et al.* (1993) that the development involution, and pathological disorders of prostate gland are largely dependent on testicular function. Many prostate tumors are endrogen dependent and chemical or surgical castration is important means of treatment of prostate cancer. Anderson et al, (1968). Korjut *et al.* (1991). Debruyne. (1989), Waxman. (1987), Griffiths *et al.* (1989).

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