

دراسة تأثير المناعة الايجابية ضد مصل الافراس الحوامل على الكفاءة التناسلية لذكور خنازير غينيا

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الملخص

تناول البحث تأثير حقن ذكور خنازير غينيا بمصل الافراس الحوامل على السلوك الجنسى والخصائص الهستولوجية لخصية هذه الحيوانات وتم حقن ١٥ من هذه الحيوانات بجرعتين متباعدتين. بينهما ٢١ يوم ثم ذبح اثنان منها بعد ١٠ و ٢٠ و ٣٠ و ٤٠ و ٥٤ يوم .

وتبين من الدراسة حدوث ضمور تام بعد الحقن في خلايا الخصية فيما عدا طبقة واحدة ثم بدأت الخصية في استعادة وظائفها الطبيعية من تكوين الحيوانات المنوية والهرمون الذكرى بعد الحقن .
ب ٢٠ يوم .

وبستخلص من هذا البحث انه يمكن اجراء عقم مؤقت في الذكور بواسطة احداث مناعة ايجابية ضد مصل الافراس الحوامل وذلك كوسيلة لتنظيم النسل في الجنس البشرى كما يمكن تطبيق ذلك على ذكور الحيوانات التى تستخدم في التعرف على الاناث في فترة الشبق .

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EFFECT OF ACTIVE IMMUNIZATION WITH PREGNANT MARE SERUM (PMS) ON THE REPRODUCTIVE PERFORMANCE OF MALE GUINEA PIGS

(with 8 figures)

By

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SUMMARY

Active immunization of a dult male guinea pigs with pregnant mare serum (PMS) resulted in a temporary decrease in libido and degeneration of the seminiferous tubules. This study suggests that temporary sterility may result from active immunization with PMS.

The development of antibodies to gonadotrophic hormones has complicated the hormonal therapy in human as well as in veterinary practice. LAURENCE and ICHIKAWA (1969) have demonstrated that immunization of cycling female rats either passively with rabbit anti-bovine LH sera or actively with adjuvants resulted in an impairment of the rat's oestrous cycle and its ability to mate and reproduce. The reproductive performance of female rats and rabbits was impaired after active immunization with ovine FSH (TALAAT and LAURENCE, 1969).

PINEDA, LUEKER, FAULKNER and HOPWOOD (1967), WAKA-BAYASHI and TAMAOKI (1966) and QUADRI, HEBERS and SPIES (1966) have all indicated that atrophy of the testes occurs after immunologic insult with anti LH sera. Also impairment of testicular function after active immunization with LH in male rats and rabbits have been reported by TALAAT and LAURENCE (1971).

The injection of testicular homogenate could produce a state of aspermatogenesis in guinea pigs (MAHMOUD, 1968) and in Syrian hamster (CEFALI, ALONZO and VERMIGLIO 1970).

The present work aims to study the effect of active immunization with PMS on both libido and spermatogenesis of male guinea pigs.

MATERIALS AND METHODS

Fifteen normal adult male guinea pigs weighing between 300 — 350 g were used in this experiment. Ten of these were actively immunized with PMS (Antex Leo) * according to the following schedule :—

One ampule containing 1500 i.u. FSH was dissolved in 30 ml sterile saline. Equal volumes of the solution and complete Freund's adjuvant (Difco) ** were mixed thoroughly. One ml of the mixture was injected in the male guinea pig as the Scheme described by MIDGLEY (1969). The other 5 animals served as control, each received injections of Freund's adjuvant with equal volume of saline without antigen.

Two animals from the treated group and one from the control were sacrificed after 10, 20, 30, 40 and 54 days from the second injection. The testes and epididymis were taken, fixed in formalin, sectioned at 5—7 microns and stained with Haematoxylin and Eosin. Haemagglutination was done in the serum obtained from sacrificed animals using synthetized sheep red cells which was modified by PMS hormone at a level of 40 i.u. per ml.

RESULTS

Sexual behaviour :

Directly after injection, the animals showed depression, lowered appetite and difficult movement with complete loss of sexual desire for 3 days. Both sexual desire as well as general health conditions were improved with time. The animals returned to their normal sexual desire after 15 days from the last injection.

Serological results :

A gradual increase in the level of antibodies was observed after the second injection, where it reached its peak 30 days from the second injection, then it began to decline gradually till 40 days. It showed a slight increase at 54 days after the last injection.

* Leo Pharmaceutical Products Ballerup Denmark.

** Difco Laboratories, Detroit Michigan, U.S.A.

Histological findings :

After 10, days in comparison to the control (Fig. 1), nearly all the seminiferous tubules were azospermic and lined with a single layer of spermatogonia and short sertoli cells (Fig. 2). The reti testis exhibited degenerated spermatogenic cells and macrophages (Fig. 3). In comparison with the control (Fig. 4), the epididymis became azospermic and contained macrophages (Fig. 5). Sporadic vacuolation was observed in the interstitial cells in some islets.

After 20 days, the seminiferous tubules presented usually two spermatogenic cell layers with many mitotic figures. The interstitial blood capillaries were widely dilated and filled with blood (Fig. 6).

Thirty days after injection, the spermatocytes could be easily demonstrated specially in the peripheral tubules (Fig. 7). Active hyperaemia was less marked and the interstitial cells showed less vacuolated cytoplasm than those sacrificed 20 days after treatment. After 40 days, spermatogenesis was more marked in the peripheral tubules than the central ones in which multinuclear cells were observed (Fig. 8).

After 54 days, all the steps of the spermatogenic cycle could be observed in nearly all the seminiferous tubules. The interstitial cells were histologically normal.

DISCUSSION

It has been assumed that FSH acts in the male predominantly on spermatogenic activity in the seminiferous tubules, (GREEP and FEVOLD, 1937; GREEP, VAN DYKE and CHAW, 1942 and SIMPSON, 1961).

On the other hand, the dominant role of LH in the male is to maintain the metabolic activity of the interstitial tissue leading to the production of androgenic hormones (GREEP, FEVOLD and HISAW 1936).

The reduced sexual desire of male guinea pigs in the present study may be attributed to the pain resulting from injection in the foot pads. Moreover, the PMS is not antigenically pure FSH and contain a lesser amount of LH, the antibodies against which may be responsible for the vacuolation of the interstitial cells seen in histological sections with a subsequent lowering of the androgenic level in the body. The conclusion of TALAAT and LAURENCE (1971) that LH is responsible for maintaining the androgenic function of the interstitial cells supports this explanation.

The regenerative process noticed after 20 days from the second injection in both the seminiferous tubules and interstitial cells paralleled the expression of sexual desire. Such period in which the animal expresses his sexual desire in absence of spermatozoa in both the seminiferous tubules and epididymis may be used as a mean of contraception in human practice.

In veterinary practice, such a method may be used also for production of temporary sterility in male animal which are used as teaser for detection of oestrus females.

However, further study on the effect of active immunization with pure FSH on the testicular function is needed.

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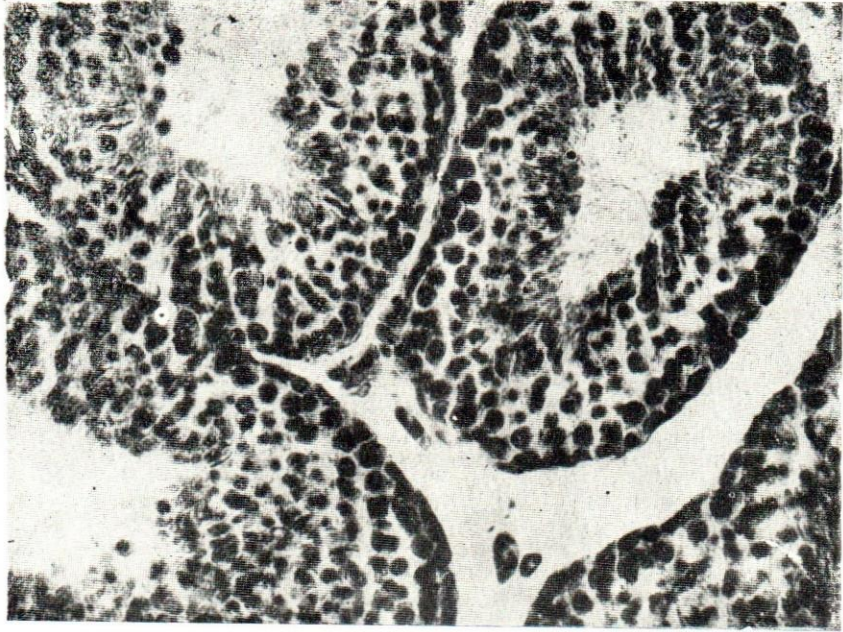


Fig. 1. $\times 250$ Testis of adjuvant control Guinea pig showing complete spermatogenesis and normal interstitial tissue.



Fig. 2. $\times 25$ Azospermic seminiferous tubules lined with a single layer of spermatogonia.



Fig. 3. $\times 250$ Reti-testis containing degenerating spermatogenic cells and macrophages.

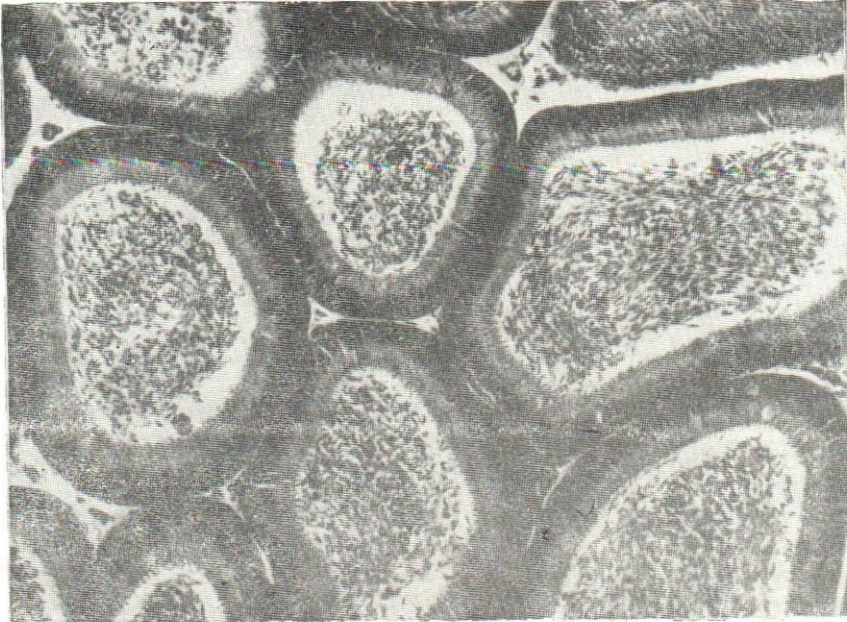


Fig. 4. $\times 250$ Tail of the epididymis of the control animal containing spermatozoa

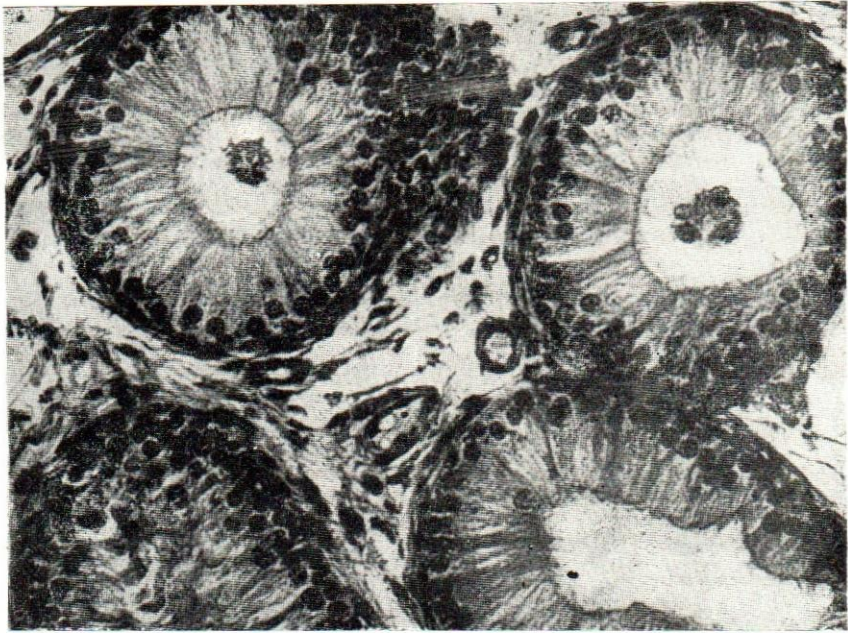


Fig. 5. $\times 250$ Head of epididymis of injected animal azospermic and contain amrcrophages.

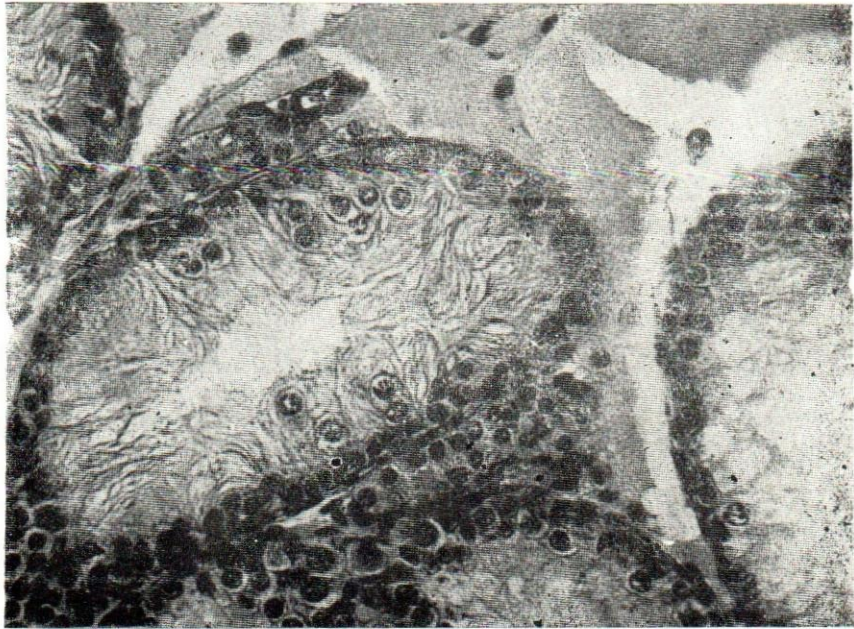


Fig. 6. $\times 250$ Active hyperaemia and seminiferous tubules contain two cell layers

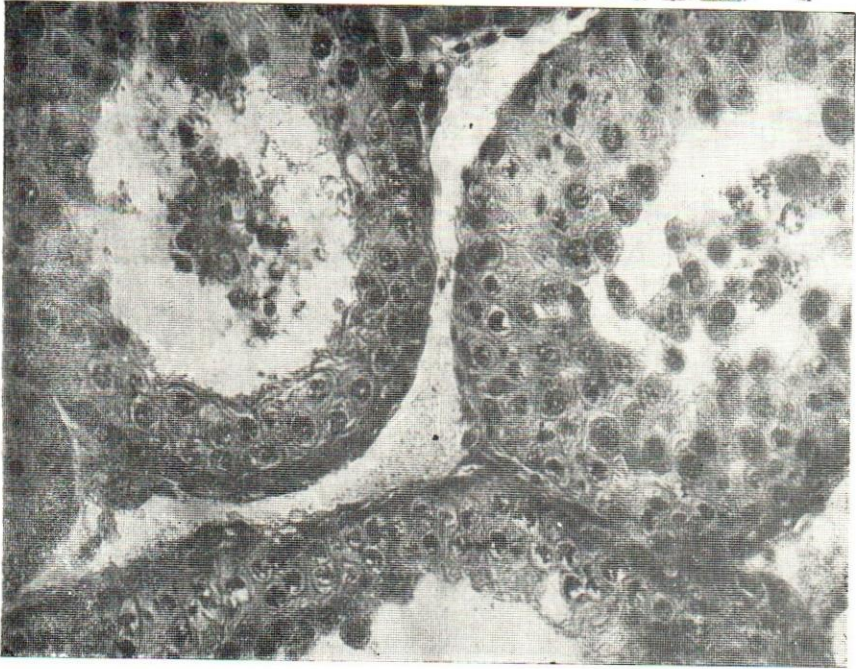


Fig. 7. $\times 250$ Illustrates the presence of spermatocytes in the seminiferous tubules.

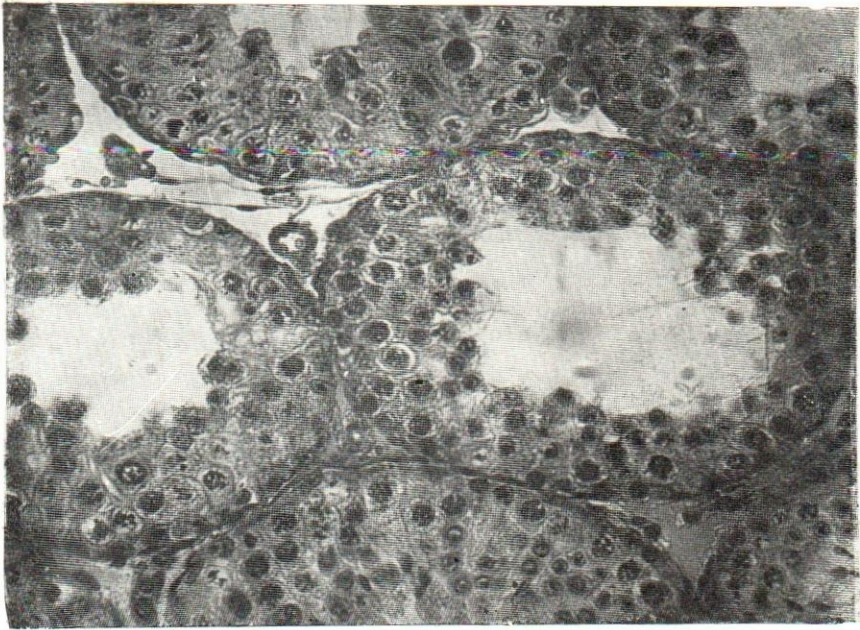


Fig. 8. $\times 250$ Testis showing more marked spermatogenic activity.