تأثير هرمون الشيروksen على الدورة الخلوية المنوية
في الأرانب

سناء نصار، منيرًا فهمي، جلال عبد القادر، عبد مصطفى جابر

جرعت ثلاث مجموعات من الأرانب بالبلد (كل مجموعة مكونة من 13،
1 أرنب على الترتيب) بثلاث جرعات من هرمون الشيروksen (50، 130،
500 مجم/كم من وزن الجسم) عن طريق الفم على الترتيب. ذبحت الأرانب بعد 3 أيام من بداية التجربة. وصفت شرائح من أنسجة
الخصية بصحبة باص وقد حسب كل من نسبة خلايا سارتونلي للدورة الخلوية
المنوية وعدد خلايا ليدج وقطر الأنابيب المنوية.

ثبت إحصائيًا أن الجرعة الأولى غير مؤثرة. بينما الجرعة الثانية
والثالثة أثرت على خلايا سارتونلي. وانقسام وتمييز خلايا الأسر ماتوجونيا
والإسبرما توسيت والاسبرماتيد. وزيادة فسيولوجية في عدد خلايا ليدج.
EFFECT OF THYROXINE ON NORMAL SPERMATOGENIC CELL CYCLE IN RABBIT
(With 5 Tables)

By
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(Received at 7/7/1985)

SUMMARY

Three doses of thyroxine 6.5, 13, 19.5 mg/Kg body weight were given orally to three groups of Baladi rabbits, each group was 13, 11, 10 rabbits respectively. Five rabbits were used as control. The animals were slaughtered after 12 days. Testicular tissue sections were stained by P.A.S. The Sertoli cell ratio of the spermatogenic cell cycle, the number of Leydig cells and the diameter of seminiferous tubules were calculated. The first dose was statistically non significant. The seconed and third doses proportionally stimulated Sertoli cell, the division and differentiation of spermatogonia, spermatocyte and spermatid. Physiological hyperplasia of Leydig cell was prominent.

INTRODUCTION

The relation between thyroid hormone and testicular function was based on clinical data and attempts to improve male fertility with thyroid hormone.

The data was still conflicting. Mild dose of thyroxine was harmful to sperm (FARRIS and COLTON, 1956). Small doses of thyroxine improved subfertile rabbit (MAQSOOD, 1951). Still the exact site or action of thyroid hormone on the testis is unknown.

The aim of this work was to study the effect of thyroid therapy on the different stages of spermatogenic cell cycle and Leydig cell in order to clarify the nature and site of thyroxine effect on testicular structure.

MATERIALS and METHOD

Thirty nine adult Baladi male rabbits of about 11/2 : 2 Kg body weight were classified into four groups.

Group 1 : included five rabbits kept as control.
Group 2 : included 13 rabbits, which were given 6.5 mg/Kg body weight thyroid hormone.
Group 3 : included 11 rabbits, which were given 13.0 mg/Kg body weight thyroid hormone.
Group 4 : included 10 rabbits, which were given 19.5 mg/Kg body weight thyroid hormone.

Thyroxine was given orally in water daily for 12 days. At the end of the experiment the animals of all groups were slaughtered.

Testicular samples from both testicles were fixed in Bours, embedded in paraffin. Serial sections were stained by P.A.S. stain.

Differential count for all cells occupying whole cross section of ten rounded semineferous tubules representing different stages of the cycle, and their Sertoli cell ratio were calculated according to SWIESTRA and FOOTE (1963).

The diameter of 10 cross - section of semineferous tubules were measured for each case. Also number of Leydig cells in 10 intetubular clusters were calculated for each animal.

The difference between groups were analysed statistically according to SNEDECOR (1964).

RESULTS

First dose : There was significant increase in Sertoli cell number and spermatid type c. The Sertoli cell ratio was increased for spermatogonia, but it was decreased for total spermatocytes and spermatids.

The number of Leydig cells and diameter of semineferous tubules increased but statistically proved to be non significant (Tables 1 & 3).

Second dose : There was significant increase in Sertoli cell number, total spermatogonia and spermatids.

The increased total number of spermatogonia was due to significant increase in the types of spermatogonia. Spermatocyte cell number non significantly increased. The diplotene form only significantly increased. For spermatids, total number and type C were significantly increased.

Sertoli cell ratio for total spermatogonia was increased specially type B spermatogonia. For spermatocytes, it was decreased specially the ratio of early stages (Zygote and Pachytene), but it was increased in advanced stages (diplotene). Sertoli cell ratio for total spermatids was increased specially for type C and D spermatids.

Leydig cells significantly increased. The diameter of semineferous tubules was increased but non significantly (Tables 1, 2 & 4).

Third dose : The number of Sertoli cells significantly increased. Also the spermatogonia particulary its B type. The total number of spermatocytes non significantly decreased. Its pachytene form was significantly decreased and diplotene increased. Total number of spermatids significantly increased specially type D spermatid.

Sertoli cell ratio of total spermatogonia was increased. Sertoli cell ratio of type A decreased and that of B type increased. Sertoli cell ratio of total spermatocyte decreased mostly in zygote and pachytene while that of Diplotene was increased. Sertoli cell ratio of spermatids was increased specially type C.

The number of Leydig cells significantly increased. Also the diameter of semineferous tubules was significantly increased (Tables 1, 2 & 5).
THYROID AND SPERMATOGENIC CELL CYCLE

DISCUSSION

The presented data had proved that the dosage in hormonal therapy is influential. Thyroid hormone has an augmental effect on the interstitial cells and the spermatogenic cell cycle. 6.5 mg/Kg body weight was statistically non-effective. The standerd stimulating effect was recorded within the second dose 13.0 mg/Kg body weight and proportionally increased within the third dose 19.5 mg/Kg body weight.

The stimulating effect of the thyroid involved Sertoli cell, spermatogonia, spermatocytes and spermatid. The effect was highly prominent on the interstitial Leydig cells.

Sertoli cell number was increased proportionally from the second to the third dose. The spermatogonial division was augmented as Sertoli cell ratio increased proportionally.

Although the Sertoli cell ratio of the spermatocyte decreased proportionally to the second and third dose. This decrease was explained on the basis of rapid differentiation to spermatid rather than suppressive effect on spermatocytes.

This fact is judged by the increased Sertoli number of total spermatid which result from the spermatocyte pool. The spermatid differentiation was also increased.

The Leydig cell responded by hyperplasia to thyroxine injection. 13 mg/Kg thyroxine caused double increase and 19.5 mg/Kg caused double and half increase in Leydig cells as compare with normal. Similar results were demonstrated by EL-SHERRY, EL-NAGGAR and NASSAR, 1980, that thyroxine injection in summer stress caused Leydig cell hyperplasia.

The interstitial cells secrete testicular and circulating androgens (RONALD, SWERDLOFF and DAVID, 1981). Testicular androgens are essential for normal spermatogenesis (GERE and RICHARD, 1981).

Improvement in Sertoli cell ratio of spermatogenic cell cycle and its differentiation under thyroxine stimulation, indirectly proved a good level of testicular androgens secreted by the hyperplastic Leydig cells. In addition, the increased diameter of seminiferous tubules was another testicular index for improved testicular function as whole under thyroid injection.

The mode and site of action of thyroxine on testis is a matter of controversy in literature. The following proposals are included. Thyroxine may affect gonadal function due to its action on metabolic processes in all body tissues (BARKER and SCHWARTZ, 1953). Levels of circulating thyroid hormones may affect secretion rates of the gonadotrophic hormones which control testicular function (CHU, 1944). Thyroxine may have modulating effects on the sensitivity of testis to gonadotrophic hormones (MEITES and CHANDRASHAKER, 1949) or it had direct effects on testes (HARA, 1963). In addition, thyroxine may affect responses to androgens (TONNOSN, GOMES and VAN DEMARK, 1970).

Our data visualized much more the role of thyroid therapy on interstitial cells and their androgens.

REFERENCES


<table>
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Average mean number for cell's that serial and diameter or seminiferous tubules for control rabbits and dose of

Table 1

**THYROID AND SPERMATOGENIC CELL CYCLE**

19
**TABLE (2):** Average number of cells, their Sertoli ratio and diameter of seminiferous tubules in control normal rabbits.

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Sertoli cell Type</th>
<th>Spermatogonia Type</th>
<th>Total Spermatogonia</th>
<th>Spermatocytes</th>
<th>Total Spermatoocyte</th>
<th>Spermatids Type</th>
<th>Total Spermatids</th>
<th>Leydig cell</th>
<th>Diameter of seminiferous tubules in μm</th>
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* : S.E. : Standard error.

**TABLE (3):** Average number of cells, their Sertoli ratio and diameter of seminiferous tubules in rabbits treated with 6.5 Ugm thyroxine/Kg body weight for 12 days.

<table>
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<th>Spermatogonia Type</th>
<th>Total Spermatogonia</th>
<th>Spermatocytes</th>
<th>Total Spermatoocyte</th>
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<th>Total Spermatids</th>
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* : (P < 0.5).

S.E. : Standard error.
TABLE (4): Average number of cells, their section ratio and diameter of somaticinnuous tissues in embryos treated with 1/50 ltrm Tyrode/Pls body weight for 12 days.

<table>
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Table (5): Somaticinnuous cell cycle.

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**THYROIDINE AND SPERMATOGENIC CELL CYCLE**

66