Histological changes in testicular tissue with age

Ilham M. Mahmood
Department of Anatomy,College of Medicine, University of Tikrit ,Tikrit .Iraq.
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Abstract:

To study the histological changes of the testis as a result of a aging. *Methods:* thirty Sprague-Dawley rats aged from one day to 18 months were grouped in to six groups(five per each), testis were removed after killing and sectioned to study the changes. *Results*: At 3 and 6 months aged the testis shows a optimum maturation, changes strated at 12 months aged and represented in the figure of hypospermatogenesis,diminution in the thickness of the epithelium and germ cell, desquamation, maturational arrest and changes in the blood vessels. *Conclusion:* hypospermatogenesis start to apper at 12 months age in rat and reach to their peak at 24 months.

Introduction

The effect of aging on the mammalian male reproductive organs has been principally analyzed in the testis. Spermatogenesis and steroidogenesis decrease with old age and it has been shown that apoptosis increases with age producing an accelerated germ cell loss(1). This changes were related to the fall in androgen levels and/or to the increase in oxidative stress in the tissue. In the epididymal epithelium, some segment-specific changes occur at the histological and biochemical levels. These changes include some features which are characteristic of ageing, such as accumulation of lipofuscin granules, a notorious increase in the thickness of the basement membrane, changes in the number of halo cells, and also modifications in the junctional complexes between epithelial cell(2). In addition, changes in the expression of genes related to oxidative stress in the epididymis due to age have also been described. Male accessory sex glands also experience changes due to aging: the secretary activity of the ventral prostate decreases and in the prostatic cells, supra and paranuclear pleio morphic lysosomes can be observed(3). In many mammals, aging of the male leads to a decrease in the number spermatogenic cells and, thus, decreased daily sperm production. In both humans and rodents, aging-related atrophy of the seminiferous tubules begins focally; atrophic tubules are often observed adjacent to tubules exhibiting normal spermatogenesis (4,5). This focal atrophy suggests that aging-related changes in the seminiferous epithelium are intrinsic to the testis and are not due to a decline in extrinsic factors that regulate testis function, such as serum levels of gonadotropic hormones. In rodents, the atrophy of the seminiferous epithelium is primarily due to loss of spermatogenic cells, as aged rats develop Sertoli cell-enriched tubules (6). In aged humans, atrophy results from a decrease both in numbers of Sertoli cells and in numbers of compacted spermatids per Sertoli cell (7,8). The specific loss of germ cells in both humans and rodents could be due to aging-related changes intrinsic to germ cells. The loss ofgerm cells could result in part or completely from a decreased ability of Sertoli cells to support germcell survival and differentiation. Such aging-related changes in Sertoli cell function might be reflected in specific alterations in the steady state levels ofparticular Sertoli cell transcripts. morphologically normal, partially regressed (contained fewer spermatogenic cells than a normal tubule), and fully regressed (contained no spermatogenic cells).

Leyding cell disappear from the adult human testis as a function of increasing age, but the fate of the lost cells is unknown. Leyding cells are through to appear in the pubertal testis by differentiation from mesnechymal cells resembling fibroblasts(8).Similar undifferentiated cells are found in the adult human testis, raising the possibility that leyding cells disappear by dedifferentiation back into interstitial cells resembling fibroblast. If the loss of leyding cells in aging testes results from dedifferentiation rather than from cell death and dissolution, then the population of other interstitial cells might be expected to increase with age(9,10). This possibility has been examined in a series of men between 20 and 76year of age who were known to have experienced a significant age-related decline in their leyding cell population(11). The present study investigated the effects of aging on the testis interstitium in Sprague Dawley rats.

Materials and Methods

Thirty male rats were grouped in to six group one day, 3 months,6,12 18 and 24 months (five animal per each). These groups were maintained at a constant temperature between 25-28C. Animals had access to water ad libitum freely. The experiment were done in the animal house College of Medicine ,University of Tikrit . After killing of rat, testis were removed, weighted and fixed. Representative samples were chosen, dehydrated, immersed in toluene and processed according to (12). Sections (5um) were stained with haematoxylin-eosin and examined under light microscope

Results In testis of 1-day old-rats, the seminiferous cords and the interstitium were quite distinct, and each seminiferous cord was surrounded by several layers of concentrically arranged spindle-shaped cells Fig(1).

Fig(2,3) represented the section in the testis of 3 and 6 age groups rat. These figures shows that testis tissues were reach to their maturity, the spermatogenesis and maturation were fully developed. The epithelial lining was completely developed with active spermatogenesis process.

The changes in the testis tissue were began at 12 months age as shown in fig.(4,5).The figures shows a slight hypospermatogenesis and this manifested by a diminution in the thickness of seminiferous epithelium and the presence of desquamation.

The picture in 18 months age group clearly different. Fig.6 shows diminution in the thickness of the epithelium and in the germ cell number. A Maturational arrest with

clear diminution in the thickness of the epithelium, a low number of spermatogonia, spermatocytes and spermatids. Desquamation was associated with hypospermatogenesis. Blood vessels of the testis interstitium in 18-month-old rats frequently showed partial and complete occlusion of their lumen and thickening of vessel walls.

At 24 months old the majority of tubules were fully regressed(fig.7)at times normal tubules undergoing complete spermatogenesis appeared directly adjacent to regressed tubules. The regressed tubules contained few germ cells and there were many more intercellular spaces than at 18 months. Sertoli cell made up the majority of cells in the fuly regressed seminiferous tubules. The setoli cell nuclei were present at all levels of the epithelium

Discussion

Several general changes take place in the body as it ages: hearing and vision decline, muscle strength lessens, soft tissues such as skin and blood vessels become less flexible, and there is an overall decline in body tone. Although the exact causes of aging remain unknown, scientists are learning a great deal about the aging process and the mechanisms that drive it(13). Some of the most promising research on the aging process focuses on the microscopic changes that occur in all living cells as organisms age. Scientists have been searching for the underlying cause, known as the senescent factor (SF), of why cells stop dividing and thus age. Aging is the process by which cell gradually reach to their optimum function then start to decline .there is no clear line between adult stage and aged exists .the present

study show that the cell become active gradually with age .At six months appear in their maximum development then to the degeneration of cells start in 12-month old group and become more progressive and significant at aging 24 month old group. Aging lead to decrease in the size of test and their decrees to alteration and dysfunction of this cell components of these test . There was a progressive dysfunction of leydig cells. Aging in the spermatogenic process was manifested by changes in seminiferous tubule diameter and disqumation process tubules in elderly men diminution in the number of cell was lead to significant increase in the size of the tubular lumen the same finding was reported by many others(14).The present study demonstrated many changes in the components of the testis of rats with aging. Modifications in the blood vessels and the occurrence of abundant collagen fibers in the interstitial space could possibly contribute to the reduced testosterone secretory capacity per Leydig cell with advancing in age. The observed Leydig cell hyperplasia could be suggested as a compensatory effort to maintain the normal androgen status of the aged rat, which is rather successful at 6 months but unsuccessful at 18 months. This investigation further revealed that these characteristic changes in the aged testis interstitium at 24 months are also present to some extent at 6 months of age in Sprague Dawley rats, suggesting that aging of the testis in this strain of rats commences early in life.

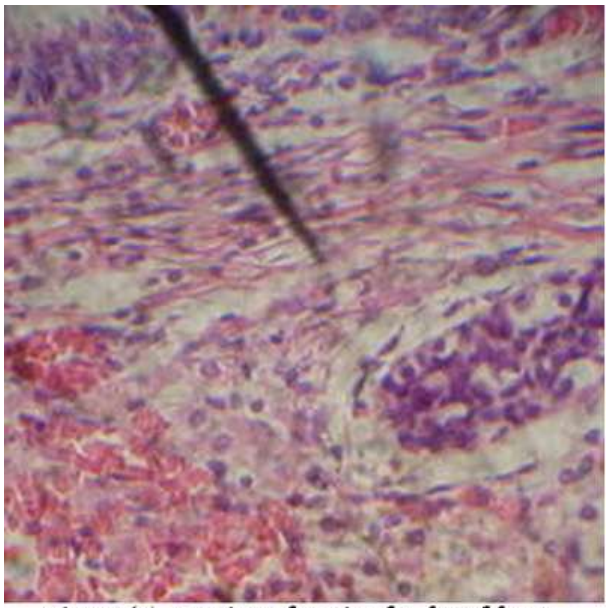


Figure (1) . Section of testis of 1 day old-rats. (40x).

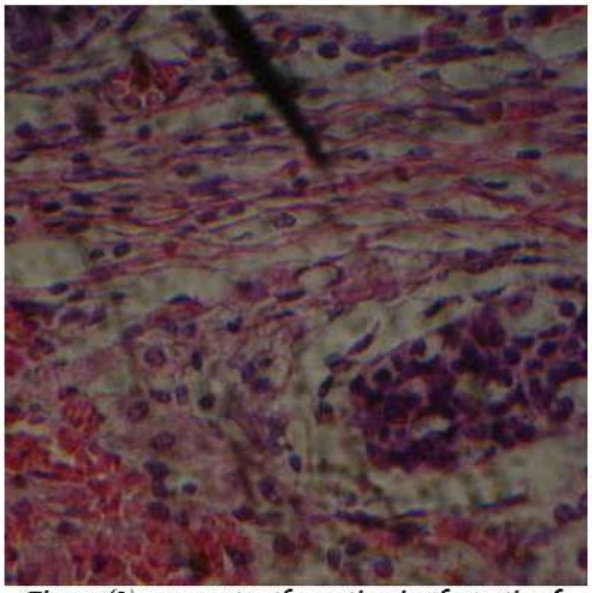


Figure (2) representes the section in the testis of 3 months age rat (40x).

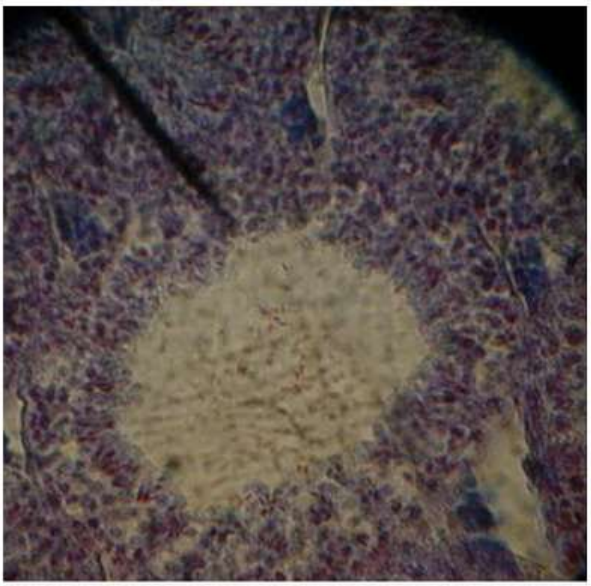


Figure (3) representes the section in the testis of 6 months age rat (40x).

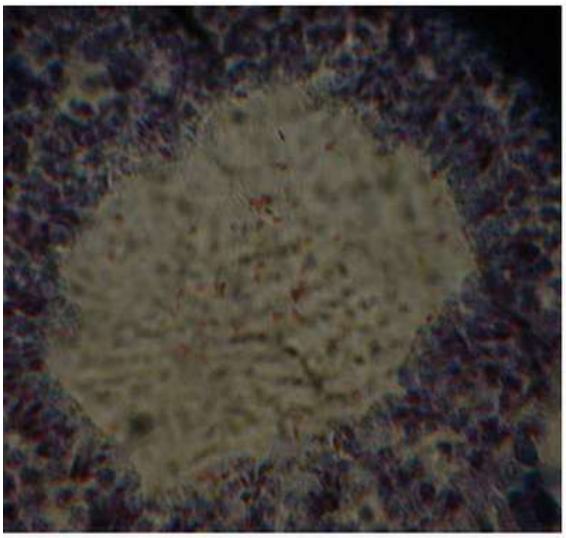
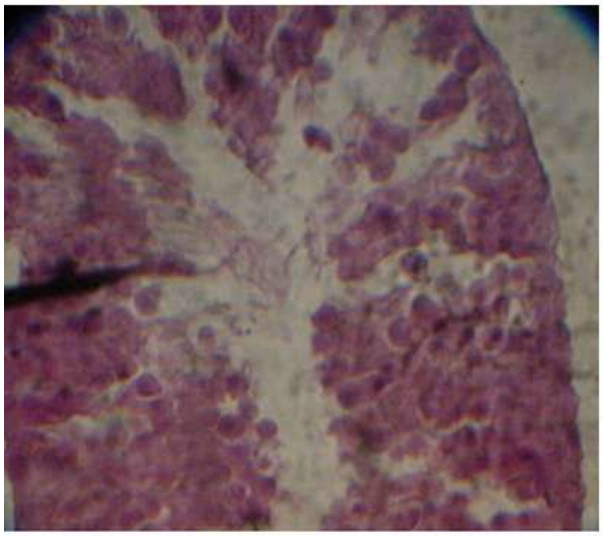


Figure (4) section in the testis of 12 months age rat (40x).



Figure(5) Section of testis of 12 months age

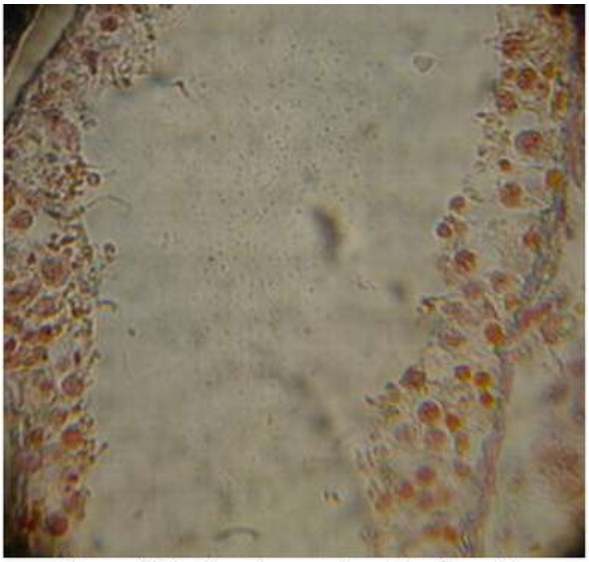
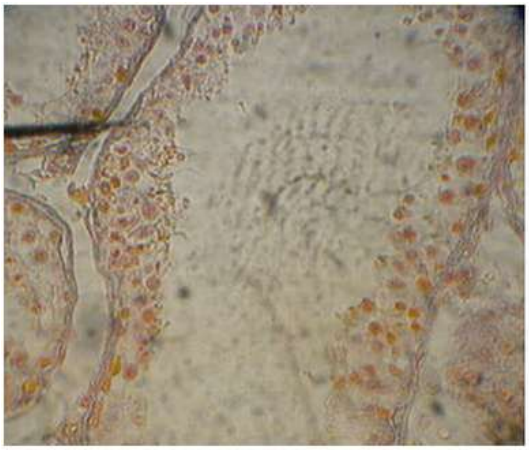


Figure (6) Section shows maturational arrest at 18 months age (40 x).



Figure(7) Section shows hypospermatogenesis at 24 months age

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التغيرات الحاصلة في خصية الجرذ نتيجة العمر

الهام مجيد محمود

فرع التشريح ، كلية الطب ، جامعة تكريت ، تكريت ، العراق

الخلاصة:

الغرض من الدراسة:لدراسة التغيرات النسيجية التي تحدث في الخصية لدى الجرذان مع العمر. العمل تضمن ثلاثون جرذا قسمت إلى ستة مجاميع وبأعمار واحد يوم، ثلاث أشهر، ستة أشهر، اثنا عشر شهرا وثمانية عشر شهرا لقد تم ازلة الخصية بعد قتل الجرذ وتم تقطيع وصبغ الخصية لدراسة التغيرات المصاحبة للعمر.النتائج: أظهرت المقاطع النسيجية إن الخصية تكون بقمة نشاطها عند عمر ثلاث وستة أشهر وتبدأ التغيرات تظهر بعمر اثنا عشر شهرا وتصل أقصى مداها بعمر ثمانية عشر شهر