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Spermatogenesis

Introduction

The testes — also called testicles — are two oval-shaped organs in the male reproductive system. They're contained in a sac of skin called the scrotum. The scrotum hangs outside the body in the front of the pelvic region near the upper thighs. Structures within the testes are important for the production and storage of sperm until they're mature enough for ejaculation. The testes also produce a hormone called testosterone. This hormone is responsible for sex drive, fertility, and the development of muscle and bone mass.

The adult mammalian testis performs two important functions;

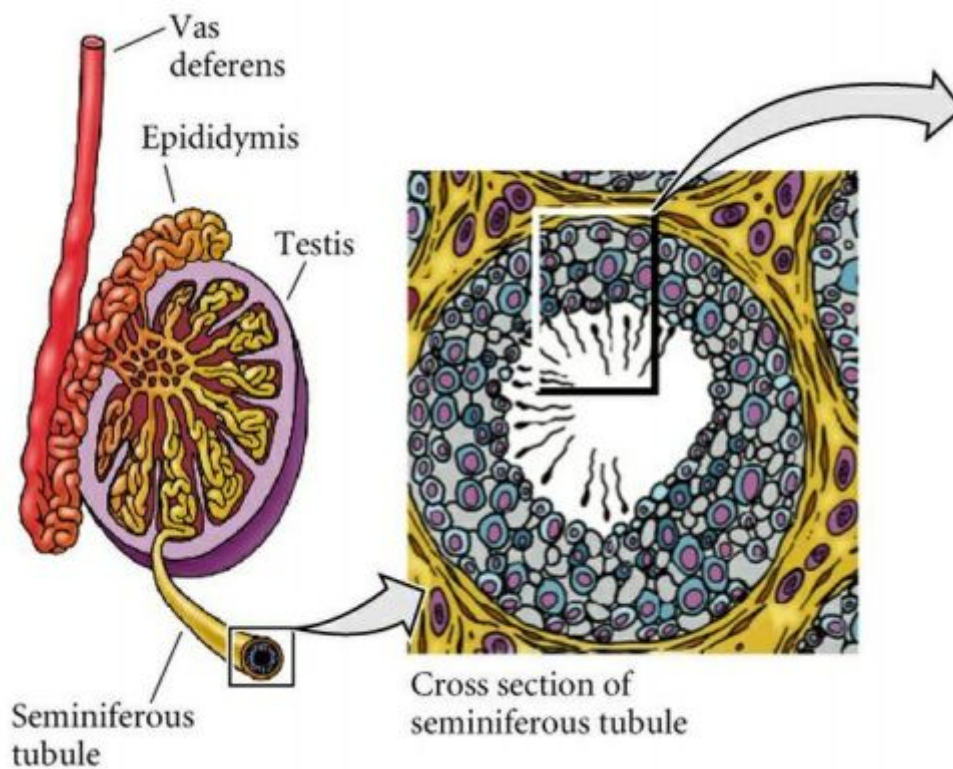
1. Spermatogenesis
2. Male sex hormone production.

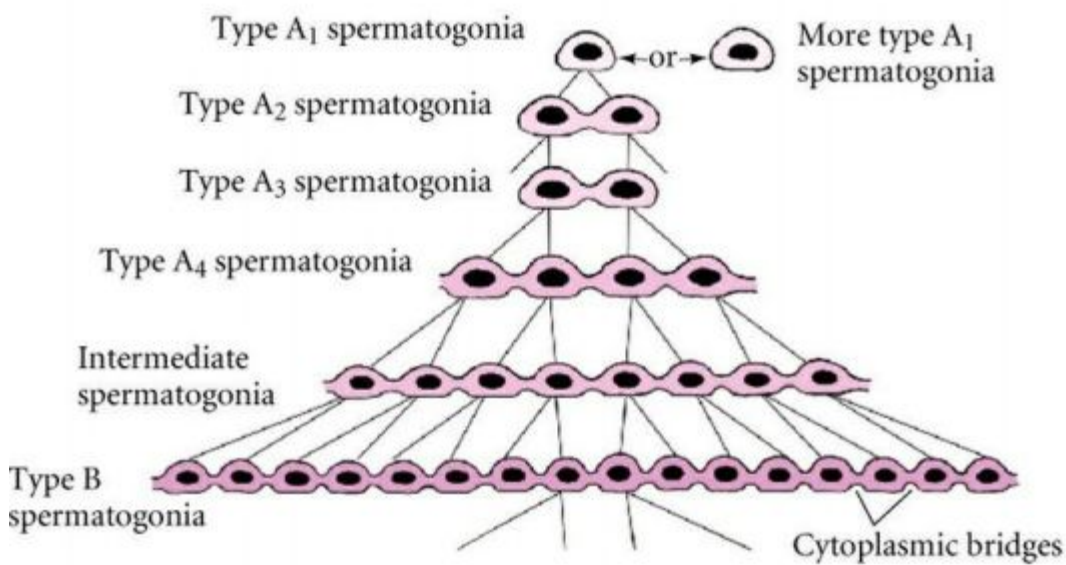
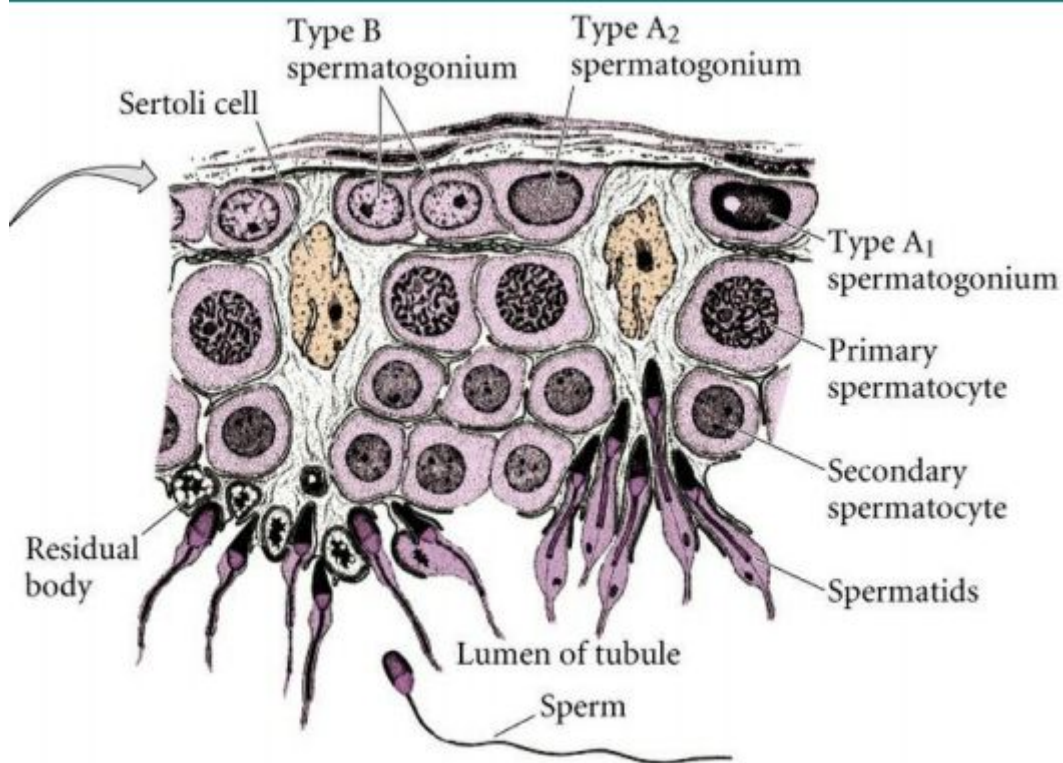
The process of morphological and functional differentiation of type A spermatogonia into the haploid male gamete, the spermatozoon, is termed spermatogenesis.

Morphology of the adult testis

Each testis is covered with a thick fibrous capsule, the tunica albuginea. The thick infolding of the tunica albuginea at the posterior margin of the testis forms the mediastinum of the testis. Connective tissue septae originate from the mediastinum and pass into the interior of the testis, and subdivide it into several lobules. Within these lobules lie the convoluted folds of the seminiferous tubule. The space surrounding the seminiferous folds is occupied by the interstitial tissue. The seminiferous tubules form coiled loops that terminate at both ends into the rete testes located within the mediastinum. Spermatozoa and testicular fluid produced within the seminiferous tubule pass through the rete testes into the ductuli efferentes and epididymis. Histologically, the adult testis can be divided into two compartments, a seminiferous tubular compartment and an interstitial compartment. The tubular compartment consists of an outer layer (s) of peritubular myoid cells and an inner layer of seminiferous epithelium separated by an intermediate layer of acellular matrix or basement membrane. The interstitial compartment consists of Leydig cells, immune cells (macrophages and lymphocytes),

and fibroblasts. In addition, it also contains blood and lymph vessels, nerves, and loose connective tissue. The tubular and interstitial compartments of the testis perform the defined functions of spermatogenesis and steroidogenesis, respectively.





Spermatogonial stem cells located close to the basement membrane of the seminiferous tubules. The mitotic division in spermatogonial stem cells produces two types of cells. Type A Spermatogonia cells replenish the stem cells, and type B cells differentiate into primary spermatocytes. One Type B spermatogonium will produce 2 primary spermatocytes. The primary spermatocyte divides meiotically (Meiosis I) into two secondary spermatocytes; each secondary spermatocyte divides into two equal haploid spermatids by Meiosis II. The spermatids

are transformed into spermatozoa (sperm) by the process of **spermiogenesis**. Spermiogenesis is the final stage of spermatogenesis, which sees the maturation of spermatids into mature spermatozoa. The spermatid is a more or less circular cell containing a nucleus, Golgi apparatus, centriole and mitochondria. All these components take part in forming the spermatozoon. **Spermiation** is the process by which mature spermatids are released from Sertoli cells into the seminiferous tubule lumen prior to their passage to the epididymis.

