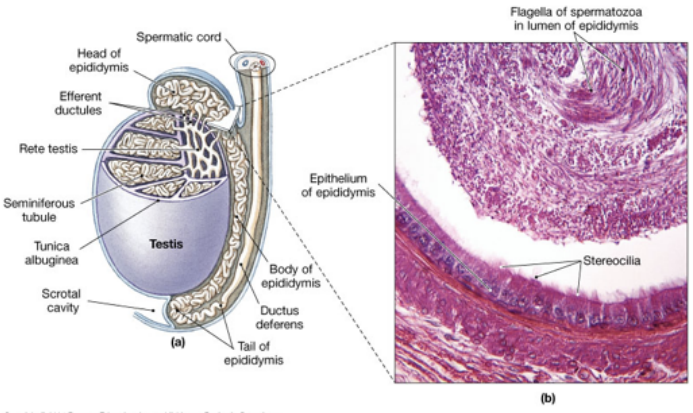
BIO 2402 - Human Anatomy & Physiology
Week 13

Hi everyone! This week we are going to be looking at the first part of the reproductive system, focusing on the male reproductive organs. The anatomy of this chapter is primarily memorization and word association, so I have arranged the information in a way that should be conducive to that. Spermatogenesis is very conceptual, I have condensed the information into comprehensive steps to help you break down the concept. Let me know if you have any questions!

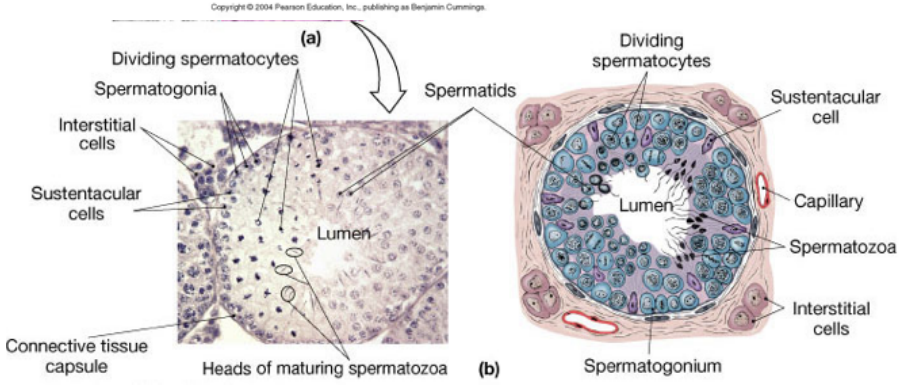
Remember that the Tutoring Center offers free individual and group tutoring for this class. Our Group Tutoring sessions will be every Wednesday from 6:00-7:00 PM CST. You can reserve a spot at https://baylor.edu/tutoring.

KEY TERMS: androgen-binding protein,testosterone, spermatogonium, primary spermatocyte, secondary spermatocyte

1. Male primary sexual characteristics
   a. Male
      i. Testes (gonads)
         1. Tunica vaginalis: derived from parietal peritoneum
         2. Tunica Albuginea: deep to vaginalis
            a. Divided into lobules
               i. Contains seminiferous tubules
                  1. Sustentacular/Nurse/Sertoli Cells created blood-testis-barrier
                     a. Secrete *androgen-binding protein [ABP]* which concentrates testosterone w/in the tubules.
                     b. Secretes *inhibin* when sperm count is too high.
                  2. Interstitial/Leydig Cells
                     a. Secrete *testosterone*
                     b. Histocompatibility Y-antigen causes differentiation during 6th week of development



      ii. Scrotum
         1. Subcutaneous tissue w/smooth muscle



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a. Dartos muscle → smooth muscle
b. Cremaster muscle → smooth muscle

iii. Epididymis
1. Mucosa, ciliated, pseudostratified epithelium
2. Holds immature sperm

iv. Vas Deferens/Ductus Deferens
1. Ampulla ---> Ejaculatory Duct
2. Smooth muscles create peristaltic waves during ejaculation

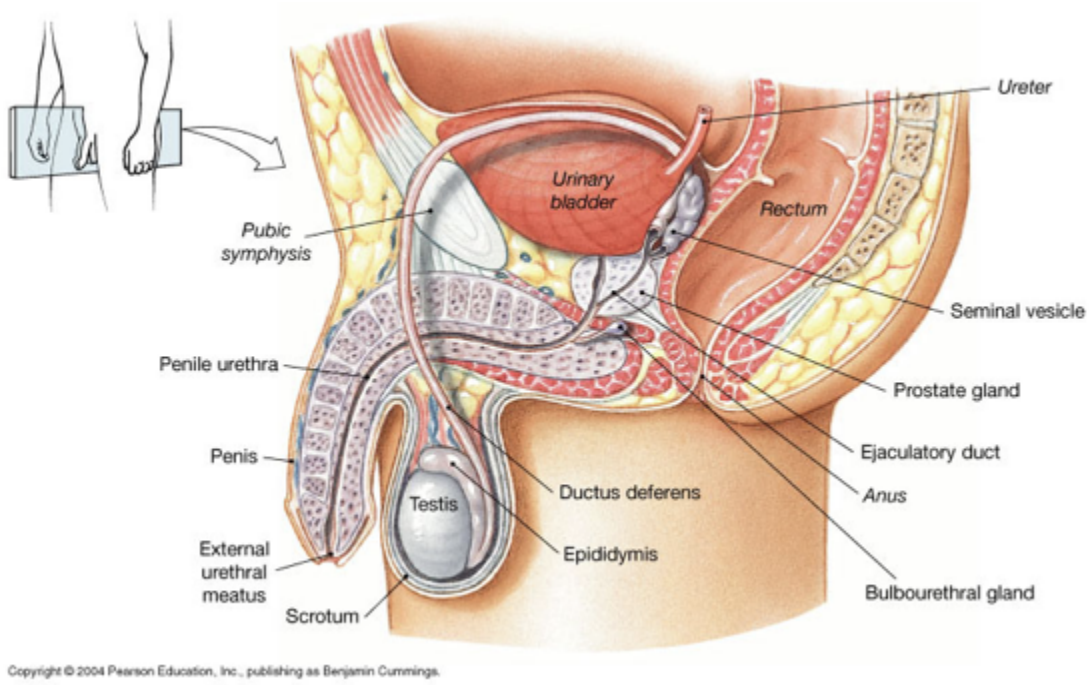
v. Urethra
1. Prostatic
2. Membranous
3. Penile/Spongy

vi. Seminal Vesicles
1. Viscous fluid which mixes w/sperm
a. Fructose, prostaglandins, fibrinogen, alkaline substances

vii. Prostate Gland
1. Surrounds urethra
a. Secretes clotting factors, plasminogen, & motility-enhancing chemicals

viii. Bulbourethral/Cowper's Glands
1. Secrete alkaline fluid

ix. Penis
1. Erectile tissue/trabecular muscle
a. Corpus cavernosa (dorsal) & spongiosum (ventral)



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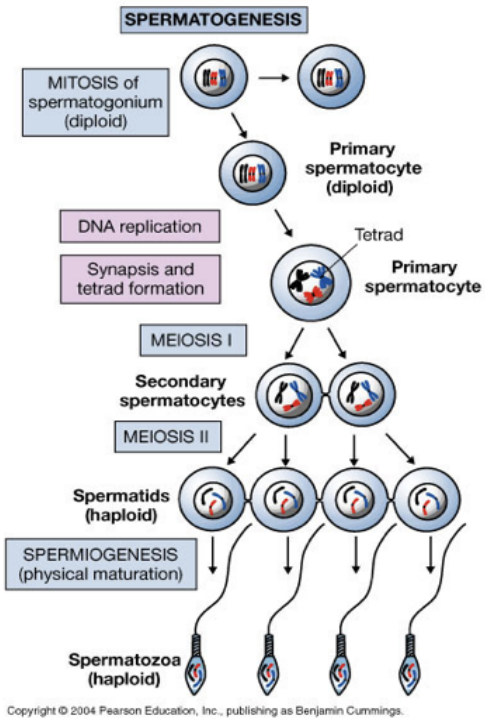
Lastly, I want to talk about the production of male gametes, which is called spermatogenesis. Spermatids are formed through meiosis, so I have outlined each step below. This is the biggest concept of the male reproductive system, so make sure you spend time getting comfortable with it.
I am also including a link to a youtube video from the tutoring center that covers meiosis, please watch it to help your understanding of the topic.

Stages of Meiosis

Meiosis 1
Interphase:
Interphase has three sections, G1, S, and G2. In G1, the cell is known as a **spermatogonium**. It is a 2N cell with 46 unreplicated chromosomes. During S phase, the spermatogonium doubles its DNA. The DNA then compresses into 46 replicated chromosomes, and the cell enters G2 phase and is known as a **primary spermatocyte** (2N).



Prophase 1:
The nuclear membrane of the primary spermatocyte disintegrates, and all the replicated chromosomes form **tetrads**, which are two replicated chromosomes synapsed together. In addition, **crossing over** occurs, where genetic information is swapped over the synapses of a tetrad.
Metaphase 1:
The tetrads line up along the middle of the cell randomly. This random assortment is called **independent assortment**.
Anaphase 1:
Spindle fibers split the tetrads into their respective replicated chromosomes and bring them to the opposite sites of the cell. This is known as the **law of segregation**.
Telophase 1/Cytokinesis:
The primary spermatocyte splits into its daughter cells, two identical **secondary spermatocytes**, which are 1N cells with 23 replicated chromosomes. Each daughter cell will then go through meiosis 2.

Meiosis 2
Prophase 2:
No specific event occurs.
Metaphase 2:
The replicated chromosomes line up along the middle of the cell.
Anaphase 2:
Spindle fibers split the replicated chromosomes in half into sister chromosomes and bring them to the opposite sides of the cell.
Telophase 2/Cytokinesis:

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The secondary spermatocytes split into two identical daughter cells called **spermatids**. These are 1N cells with 23 unreplicated chromosomes. Spermatogenesis yields four spermatids for every spermatogonium.