You need to be able to:

- describe **spermatogenesis** (How is sperm made?)
- describe the anatomy of a sperm
- describe the parts and function of semen and the glands that contribute to it

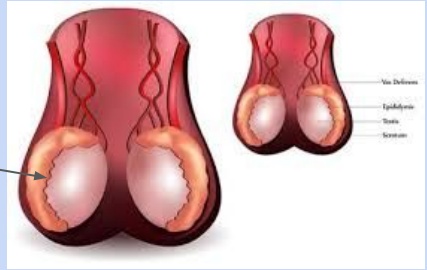
How is sperm made?

Spermatogenesis -- process by which male gametogonia (spermatogonia) develop into mature spermatozoa (sperm)

One of the undifferentiated male germ cells giving rise to sperm.

• Testes function to produce sperm and testosterone.

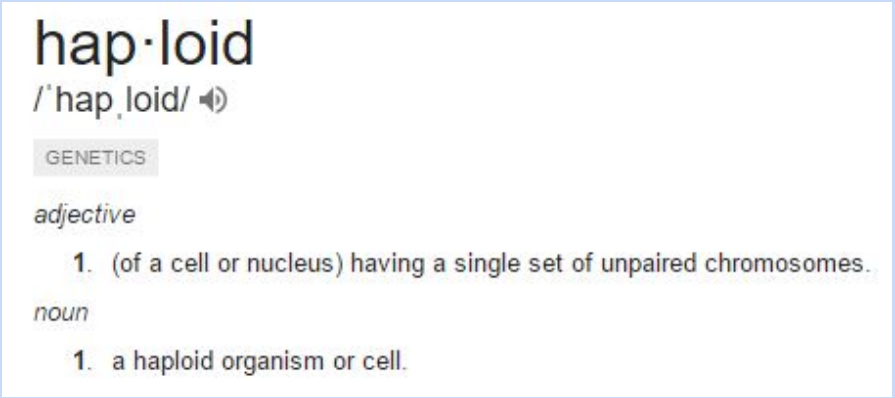
• 300 million sperm are produced daily (--ve feedback exists)
(*will go over in later slide*)



Spermatogenesis is the process in which spermatozoa are produced from spermatogonial stem cells by way of mitosis and meiosis. The initial cells in this pathway are called spermatogonia, which yield primary spermatocytes by mitosis.

- Each sperm has 23 chromosomes (haploid), BUT each Human cell contains 46 (diploid).

Other 23 are from where?



hap·loid

/ˈhapˌloid/

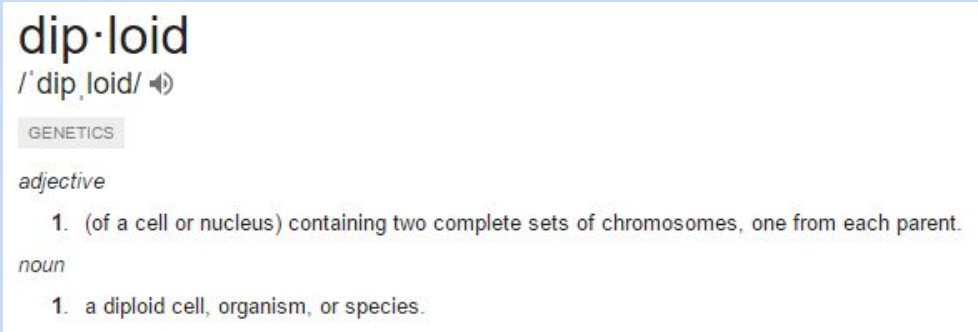
GENETICS

adjective

1. (of a cell or nucleus) having a single set of unpaired chromosomes.

noun

1. a haploid organism or cell.



dip·loid

/ˈdipˌloid/

GENETICS

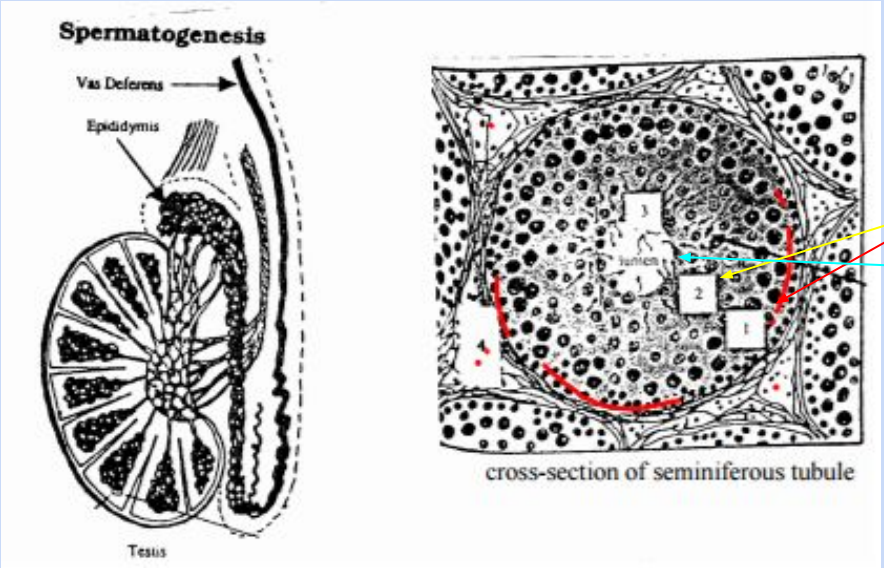
adjective

1. (of a cell or nucleus) containing two complete sets of chromosomes, one from each parent.

noun

1. a diploid cell, organism, or species.

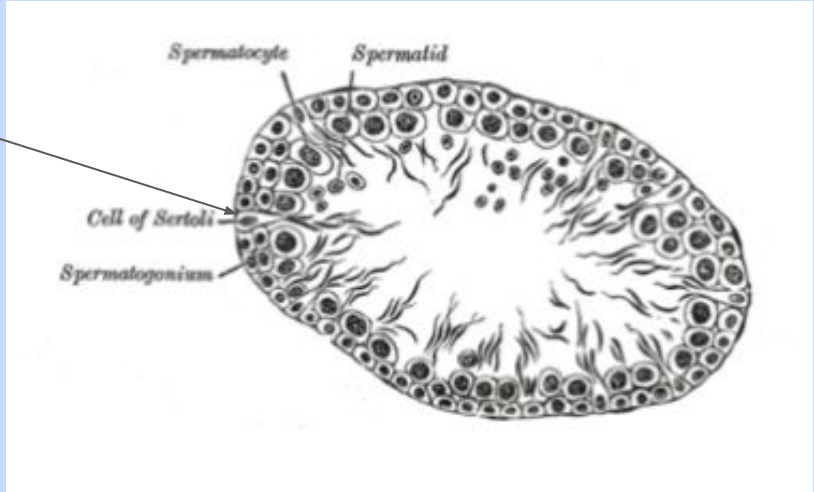
- Sperm is produced in the **seminiferous tubules** (tightly packed) within pie slice- like regions of the testes:



- semineferous tubules are lined with sperm -producing cells **spermatogonia**
- spermatogonia divide to form **spermacytes** (spermatocyte)
- spermacytes differentiate into **spermatids** (immature sperm cells)
- it takes 9 to 10 weeks for the spermatocytes to differentiate into sperm cells

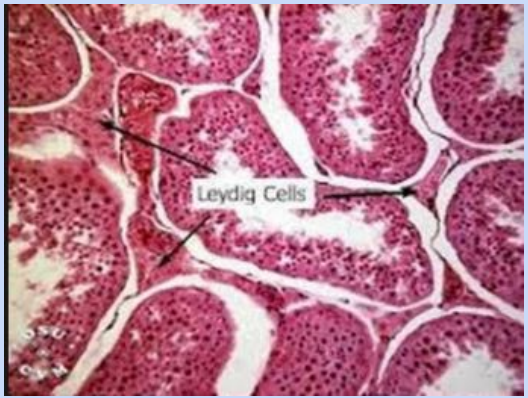
Sertoli cells -- specialized cells that line the seminiferous tubules

- nourish the developing sperm
- produce **inhibin** (--ve feedback to FSH released from APG)
- destroy mutated or damaged sperm



Interstitial Cells of Leydig -- produce testosterone

- located outside the seminiferous tubules
- respond to LH and produce testosterone



Be familiar with this diagram.

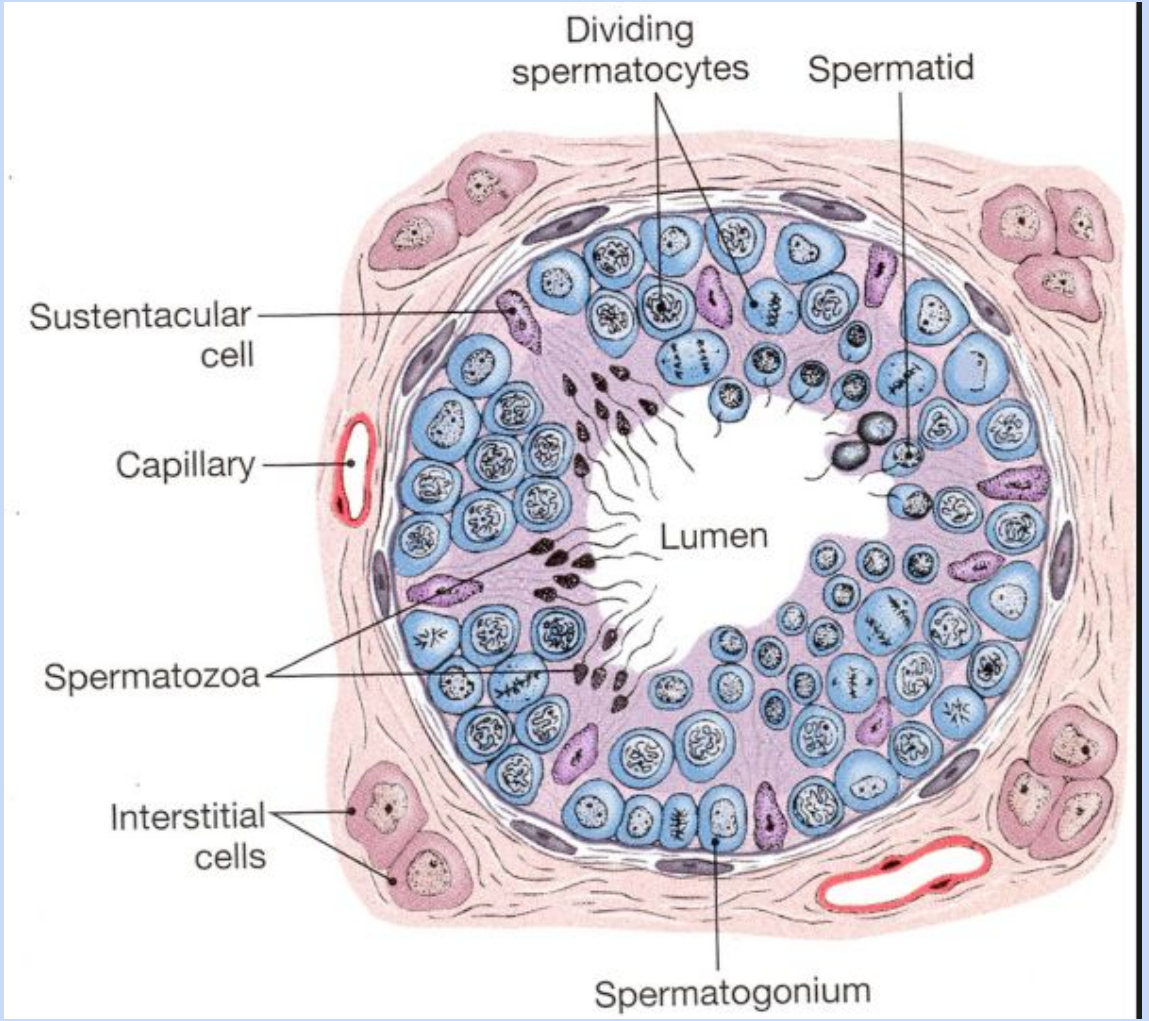
Do you know what it is?

If you had to point it out on the male reproductive system, could you?

Can you you use it to explain spermatogenesis?

What is the role if the interstitial cells?

Differentiate between *spermatid*, *spermatogonium, and spermatozoa.*



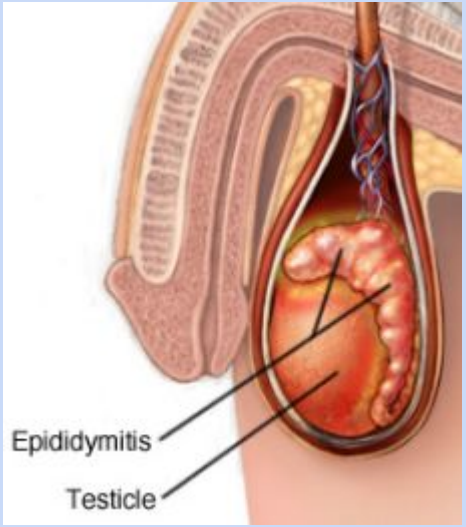
Epididymis

• a compact coiled tube attached to the outer edge of the testis

• sperm cells are produced in the testes but are **stored**, and **mature** in the epididymis

• sperm cells in the epididymis begin swimming motions within four days

• defective sperm cells are destroyed by the immune system during their time in the epididymis



1) *Flagelle* - for mobility (swim)

2) *Mitochondria* - Energy generator (consumes fructose)

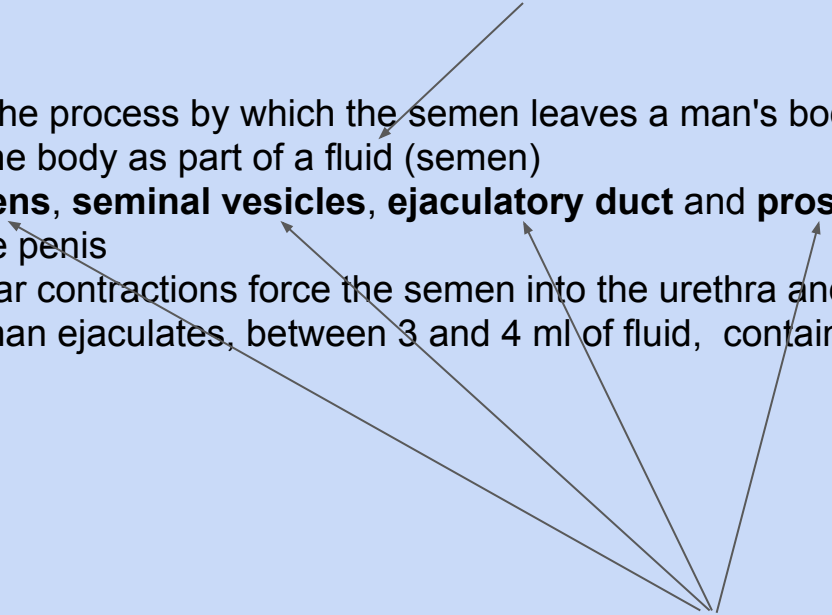
3) *Nucleus* - contains the 23 chromosomes

4) *Acrosome* - contains an enzyme - hyalrilidase digests the cell membrane of the egg once 1 sperm enters all others are repelled

Provides a swimming medium.

Seminal Fluid

- ejaculation is the process by which the semen leaves a man's body via the penis
- sperm leave the body as part of a fluid (semen)
- the **vas deferens**, **seminal vesicles**, **ejaculatory duct** and **prostate gland** contract, forcing the semen to the base of the penis
- strong muscular contractions force the semen into the urethra and out of the penis
- every time a man ejaculates, between 3 and 4 ml of fluid, containing about 500 million sperm cells are released



You should know where these are!!

Assists movement of sperm.

Seminal fluids are released from three glands

1. **seminal vesicles** -- contain fructose and prostaglandins

• fructose provides a source of energy from the sperm cell
• prostaglandins act as a chemical signal inside the female, triggering the rhythmic contraction of smooth muscle along the reproductive tract

2. **prostate gland -** - secretes an alkaline buffer that protects sperm cells against the acidic environment of the vagina (neutralizes the pH so that the sperm can survive)

3. **Cowper's (bulbourethral) gland -** - secretes mucus -rich fluids prior to ejaculation
• protect the sperm cells from the acids found in the urethra associated with the passage of urine
• may assist in sperm movement

Sperm cells can exist for many weeks in the epididymis.

Lifespan is reduced when they come in contact with the various fluids in the semen.

At body temperature they will live only 24 to 72 hours.

Erection

• penis contains erectile tissue that surrounds the males urethra

• highly vascularized spongy tissue

• excitement causes the arterioles entering the erectile tissue on the top of the penis (**corpus cavernosum**) to dilate at the same time that the venuoles leaving the corpus cavernosum constrict

• erectile tissue becomes engorged with blood and under severe pressure

• the urethra is within the softer tissue (**corpus spongiosum**)

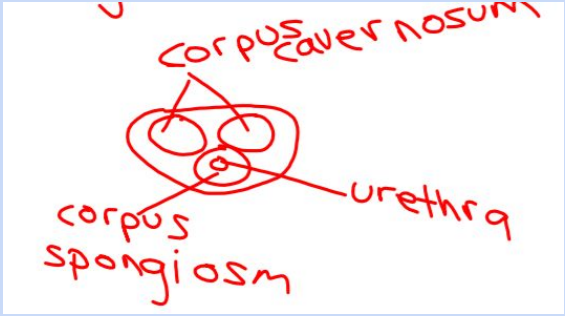
• distal end of penis has a loose skin called foreskin (**prepuce**)

• erections controlled by the **parasympathetic nervous** system

• erection is a reflex response

• the **sympathetic nervous** system speeds up or excites body functions and is responsible for the orgasm

Calms and relaxes most body functions in order to promote increased flow to the penis.



Therefore males with spinal injuries can still get erections.

- ★ Can you name each part and state its function?
- ★ Can you identify which parts contribute to semen and what part they contribute?
- ★ Can you describe spermatogenesis and indicate on the diagram where it occurs?