Human Reproductive Systems

Asexual and Sexual Reproduction

- Humans undergo sexual reproduction
  - The union of 2 gametes to form a zygote
- Human body cells have 46 chromosomes (23 pairs)
- Sex cells have 23 chromosomes

Male Reproductive system

- The ultimate goal in life is to reproduce
- The organs, glands, and hormones of the male reproductive system are very important in meeting this goal.
- The male gonads: Testes

Main function

- Produce sperm, the male sex cells, and deliver the sperm to the female

Sperm Formation

- Sperm production takes place in the testes which are located in the scrotum.
- Scrotum-The sac that contains the testes and is suspended directly behind the penis.
- Sperm are produced continuously throughout life
- 100 million sperm/mL of semen

Testes

- Before birth the testes form in the abdomen and descend eventually into the scrotum
- Sperm only develop in temperatures about 3 degrees lower then body temp.
- Muscles help maintain the proper temperature.
- Each teste has a fine network of highly coiled tubes where sperm are produced by meiosis of the cells that line the tubes
- A male can produce about 300 million mature sperm each day of his life.

Sperm Structure

- Head portion-contains nucleus and genetic info
- Cap- contains enzyme to penetrate the egg
- Mitochondrial mid piece for power
- Tail for locomotion
- Sperm can live for 48 hours inside the female reproductive tract.

Sperm Movement:

1. Immature sperm leaves the testes and goes into the epididymis
2. Sperm complete maturation inside the epididymis
3. Sperm released from the epididymis into the vas-deferens where they are stored.
4. Peristaltic contractions in the vas-deferens cause sperm to move along to the urethra

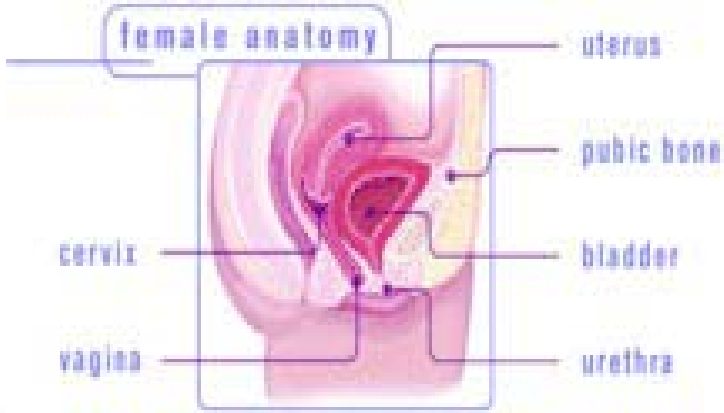
Helpful sperm fluids

- As sperm travels from the testes they mix with several different fluids.
  - The seminal vesicles
    - A pair of glands located at the base of the bladder
    - They secrete the mucous like fluid into the vas-deferens.
    - Rich in fructose for energy

Sperm Fluid continued

- Prostate gland
  - Single doughnut-shaped lies beneath the bladder
  - Secretes alkaline fluid to help sperm move and survive
- Bilbourethral
  - Located beneath prostate
  - Secretes clear sticky alkaline fluid to protect sperm from acidic environment of the vagina
- Semen-The sum product of all fluids with sperm

Female Anatomy



Main function

- Produce eggs which are the female sex organs
- Provide an environment in which the fertilized egg can develop
- Female gonads: Ovaries

Female Vocab

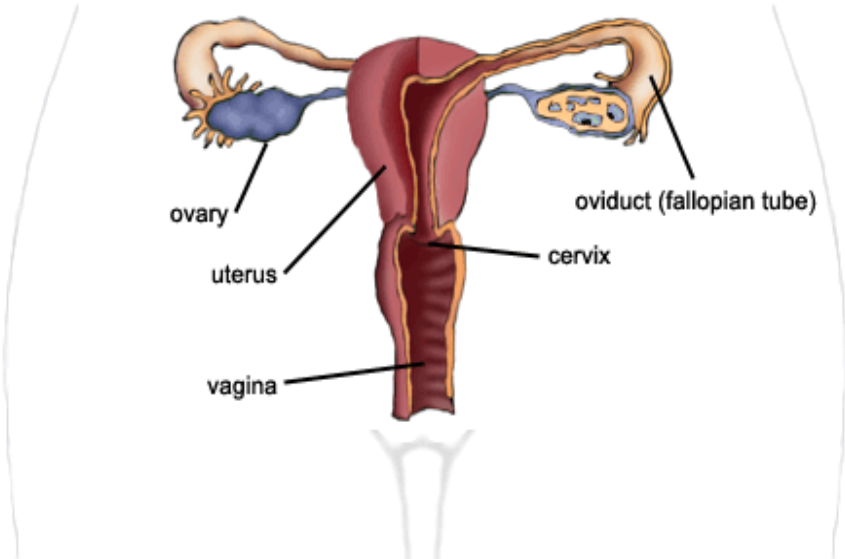
- Ovaries-Where the eggs are produced
- Oviduct-Transports the egg to the uterus
- Uterus-Where the egg develops in between the bladder and the rectum
    - Three layers
        1. Outer-connective tissue
        2. Thick muscular inner layer
        3. Inner lining-endometrium
- Cervix-opening of the uterus
- Where the child comes out

Egg Production

- At birth a female has her life supply of eggs.
  - About two million of these
  - Resting phase waiting for puberty

Eggs are released

- Once a month an egg is released
- Egg ruptures through the ovary wall
- Ovulation-400 eggs during the menstrual cycle
- Fertilization occurs in the oviduct
- One follicle per-month


ovary
uterus
vagina
oviduct (fallopian tube)
cervix

Hormonal Control

Control of Activity and Development of the Reproductive System

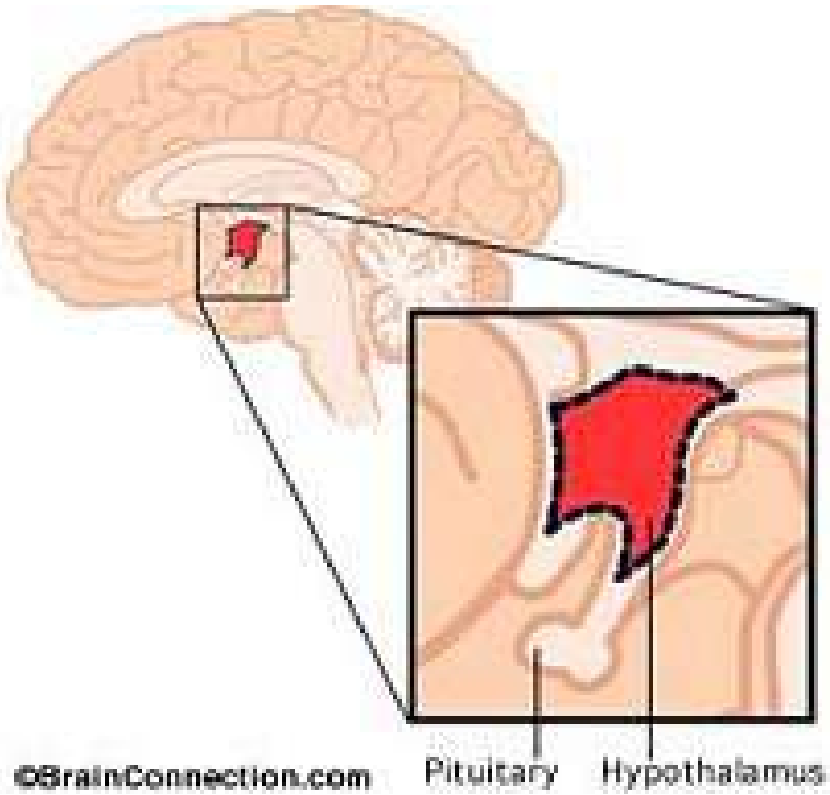
Hormones and Male Puberty

- **Puberty**-The time when secondary sex characteristics begin to develop so that the potential for sexual reproduction is reached
- Occurs in the early to middle of the teen years of development.
- Controlled by sex hormones secreted by the **endocrine system**

Hormones and Male Puberty

- Onset of puberty
  - Hypothalamus interacts with pituitary gland.
  - Hypothalamus releases hormone causing pituitary to release two hormones
    - Follicle-stimulating hormone (FSH)
    - Luteinizing hormone (LH)

    *Released into the bloodstream and to the testes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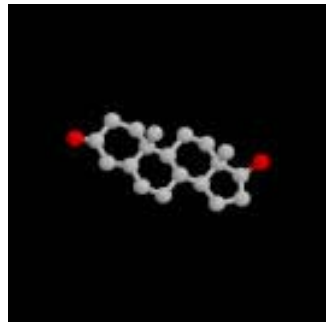
Pituitary
Hypothalamus

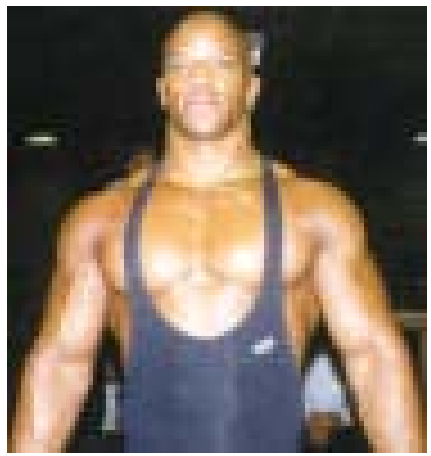
FSH and LH

- FSH
  - Cause the production of sperm cells
- LH
  - Causes the production of testosterone which influences sperm production

Testosterone



- A steroid hormone
- Responsible for the growth and development of secondary sexual characteristics
  - Growth and maintenance of male sex organs
  - Production of sperm
  - Body hair
  - Muscle mass
  - Deepening of the voice
  - Aggressive behavior



Hormone Regulation

- Regulated by a Negative Feedback Loop

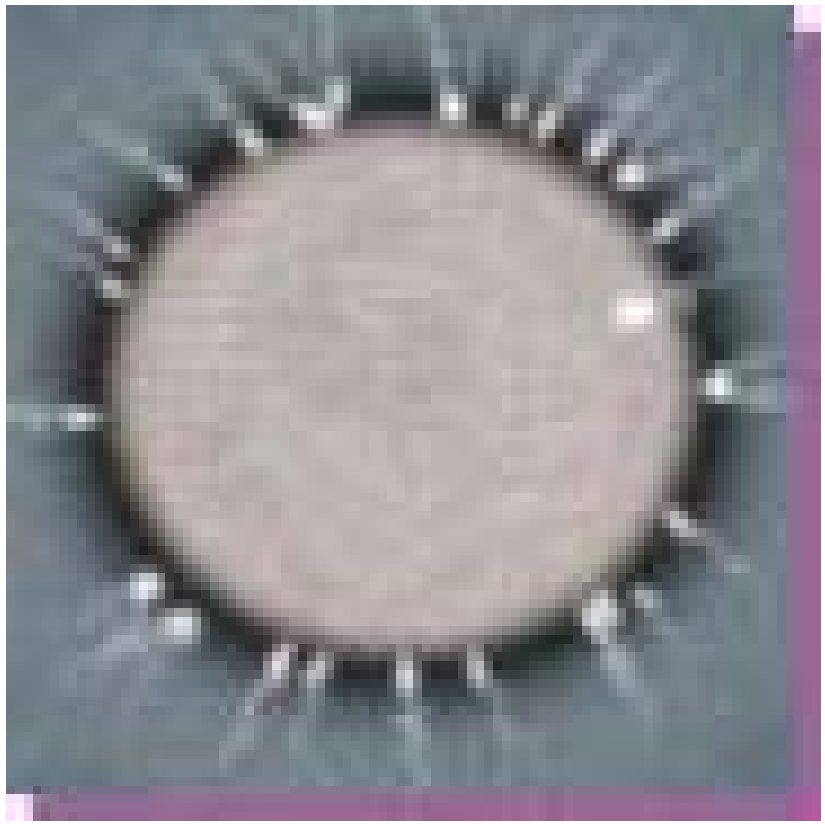
1. Testosterone levels in the blood increase or sperm levels increase
2. Production of FSH and LH is inhibited or decreased
3. Drop in testosterone or sperm cause an increase in FSH and LH

   Example: Thermostat

Female Regulation

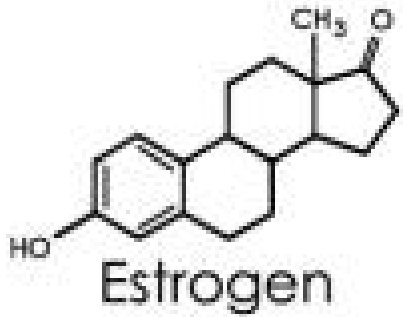
- Hormones kick in during the Follicular phase of the menstrual cycle

1. Egg releases estrogen stimulating endometrial development
2. Lining thickens
3. Increase in estrogen slows FSH and LH production



Female Regulation Continued

4. Estrogen peaks causing LH to peak at mid-cycle
5. Follicle ruptures and triggers
6. LH stimulated corpus luteum to produce progesterone and estrogen for an egg to live
7. Progesterone inhibits LH

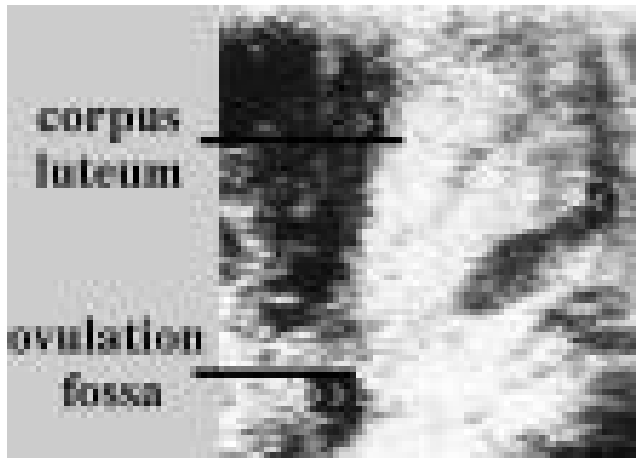


Estrogen

No Fertilization

High levels of progesterone and estrogen cause hypothalamus to inhibit FSH and LH

Corpus luteum dies off and is shed during the flow phase



Menstrual Cycle

- Menstruation: endometrium deteriorates and sluffs off (1-5 days)
- Post Menstrual: levels of estrogen increase (days 6-13 or 14)
  - Ovulation (around day 14 or 15)
- Premenstrual: endometrium builds up (days 15-27)

Fertilization

- If the egg and sperm contact each other they WILL fertilize
- Some animals can self fertilize (they have both male and female sex cells)
- Artificial insemination: test tube babies
- Artificial parthenogenesis: takes the egg and produces a zygote without the sperm
- Endometrium secrets a fluid rich in nutrients for a zygote!

Histogenesis/Organogenesis

- Development of tissues and organs
  - Week 3: 2 layers of the embryonic disc
  - Week 8: functioning heart
  - Month 4: organs are formed and growing

Childbirth

- 280 day gestation period: 36-40 weeks

1. Uterus begins to contract; cervix dilates, amniotic sac ruptures
2. Delivery: child forced head first (usually) into vagina and through cervix
3. After birth: placenta is expelled