Prenatal Development:

What are the three embryonic germ layers?

Endoderm- endocrine system

Ectoderm- nervous system

Mesoderm- reproductive system

How do the Anterior Pituitary and Posterior Pituitary develop?

Anterior Pituitary- develops from roof of mouth, gives rise to Rathke's pouch

Posterior Pituitary- develops from floor of brain

In what way is the male reproductive tract differentiated?

XY= Y chromosome contains SRY gene which undergoes transcription and translation to become the SRY protein. SRY protein stimulates development of male repro tract

How does sexual differentiation in the female occur?

XX= no Y chromosome, no SRY gene, no testes, no AMH

- Wolffian vs. Mullerian Ducts

Wolffian/Mesonephric Ducts (MALE)- develops into ductus deferens and epididymis

Mullerian/Paramesonephric Ducts (FEMALE)- develops into cervix, uterus, oviducts, and parts of cranial vagina

- Surge vs. Tonic Hypothalamus

Female- alpha fetoprotein binds to estrogen and prevents it from entering the brain. The hypothalamus is "feminized" and the surge center develops

Male- testosterone freely enters the brain because alpha fetoprotein doesn't bind to it. Testosterone is aromatized into estradiol and the male brain is "defeminized" and the surge center does not develop

Cell Type	Function/Ability
Totipotent	Have the ability to form all cell types of the conceptus
Pluripotent	Have the ability to form several types of cells in all three germ layers but not the whole organism
Multipotent	Have the ability to form a limited range of cells and tissues appropriate to their location

Puberty:

How does puberty occur? (overnight or months)

A slow progression over long periods of time

What determines if a female has reached puberty?

- Age at 1st estrus(standing heat)
    - Shows outward expression of sexual behavior especially in the presence of a male
- Age at 1st ovulation
    - Manual or visual validation is required by palpation of the ovary
- Age at which pregnancy can be supported without deleterious effects
    - Female must cross "metabolic threshold" before attaining pregnancy

What determines if a male has reached puberty?

- Behavior expression
    - Mounting and erection
- Age at 1st ejaculation

    - Coordinate development of nerves, specific muscles and glands
- Age when spermatozoa appear
- Age when threshold of spermatozoa is reached
    - Minimum # of spermatozoa to achieve pregnancy

How does GnRH drive puberty attainment?

1. Ability to make enough GnRH
2. Secrete GnRH at the correct frequency

What are the four things puberty is dependent upon?

1. Body size and "fatness"

A. Repro is considered non-vital and is the 1st process to go without proper nutrition

2. Genetics
   a. kisspeptin
3. Social cues
   a. enhanced onset of puberty when female are housed together or exposed to a male
4. Environmental changes
   a. Seasonal breeders

How is GnRH different before and after puberty?

Prepubertal- low frequency GnRH pulses, insufficient stimulation of surge center

Postpubertal- higher frequency GnRH pulses, above threshold concentrations to stimulate surge center

What neurohormone signals for GnRH to be released? How does it work?

Kisspeptin- blood fatty acids, leptin, and blood glucose stimulate kisspeptin neurons to interact with GnRH neurons to release GnRH

What is the difference between positive and negative feedback?

Positive- action of hormone continues with stimulus

Negative- action of hormone stops due to decrease in stimulus