

# Menstruation Cycle

- menstruation cycle is parallel to endometrium cycle (ovarian cycle)

Before we start, remember the endometrium has stratum functionalis (w/ its coily arteries) & stratum basalis (w/ its straight arteries)... now lets say menstruation just happened so s. functionalis & its arteries were shed  
So....

## Proliferative phase (estrogen phase)

- days 4-14 (pre ovulatory phase) (lasts 11 days)

most of endometrium was desquamated (due to menstruation) except for thin layer of endometrial stroma, glands, & crypts (s. Basalis). In this phase, under influence of **estrogen**, we have **re-epithelialization**, **proliferation of stromal cells, glands, & crypts** (4-7 days after beginning menses)... endometrium grows **3-5 mm thick**, & glands secrete **thin stringy mucus** to guide the sperm into the uterus.

## Secretory Phase (progestational phase)

- days 15-26 (post-ovulatory) (lasts 12 days)

After ovulation, corpus luteum is secreting a lot of progesterone cause **swelling of glands & secretory development**; & estrogen causing **slight proliferation of endometrium**. Blood supply ↑, glands become more tortuous (coily) excess secretory substances accumulate (**uterine milk**) to aid in implantation

of fertilized ovum & provide nutrients to the trophoblastic cells. Cytoplasm of stromal cells ↑, lipid & glycogen deposits ↑, & endometrium is 5-6 mm thick

## menstruation (shedding phase) (last phase)

- 2 days before end of ovarian cycle

if the egg is not fertilized, corpus luteum stops secreting estrogen & progesterone, so we have necrosis of endometrial blood vessels, vasospasm (from prostaglandins), ↓ nutrients to endometrium, & loss of hormonal stimulation. This causes uterine contractions to expell the tissue (desquamated tissue & blood vessels). 40 ml of blood + 35 ml of serous fluid is lost, but due to fibrinolysin, this blood is non-clotting

\* Leukorrhoea (Leukocyte release) also happens w/ loss of blood & tissue, so uterus is resistant to infection in this phase

## Effects of Estrogen

- primarily → cellular proliferation & growth of sex organ tissue
- proliferation of breast & endometrial stroma/glands, prolif. of glandular tissue of fallopian tubes (↑ ciliated epithelial cells) to transport fertilized ovum to the uterus. Prolif. of ductal tissue & fat deposition of breasts
- stimulates bone growth (by inhibiting osteoclasts) & fusion of long bone epiphyses w/ shaft
- slight ↑ in protein deposition, ↑ metabolic rate (only 1/3 as much as testosterone), ↑ fat deposition

- makes skin soft, smooth, thicker, & more vascular →  
↑ warmth & Bleeding time compared to men
- ↑  $\text{Na}^+$  &  $\text{H}_2\text{O}$  retention in kidneys, & has little effect on hair distribution → affected more by adrenal glands

\* progesterone / prolactin have greater role in growth & function of breast alveoli & lobules compared to estrogen

## Effects of Progesterone

- promotes secretory changes in Luteal phase, ↓ contractions to prevent expulsion of implanted ovum, ↑ secretion of mucus from fallopian tubes to nourish dividing ovum
- prolif. of lobules & alveoli of breast, causing breast to swell due to ↑ secretory development & fluid deposition

## Gonadotropic Hormones

before puberty (male & female) = low levels

After puberty (M & F) = ↑ levels

After menopause = sudden ↑ due to loss of (-) feedback from progesterone & estrogen

Males after 40 = ↑ b/c testosterone is high enough to not produce (-) feedback

## Menopause (40-50 yrs)

- irregular sexual cycle, ovulation fails, & the cycle stops, sudden loss of estrogen causes: hot flashes, fatigue, Anxiety, irritability, psychotic states, dyspnea, ↑ risk of osteoporosis

# Abnormalities

## Hypogonadism ( $\downarrow$ secretion by ovaries)

- poorly formed ovaries, lack of ovaries, genetically abnormal ovaries that secrete the wrong hormones
- if ovaries are absent from birth, or nonfunctional before puberty = female eunuchism

## Hypersecretion (rare)

- occurs from tumors; inhibits gonadotropin production from pituitary, & limits hormone production from ovaries

# Menstruation Disorders

## Amenorrhea (no menses)

- primary: bleeding has never occurred
- 2<sup>nd</sup>ary: bleeding stops due to pregnancy, Emotional / environmental, hypothalamic disease ( $\downarrow$  GnRH), Pituitary disease, ovarian disease

**Menorrhagia**  $\rightarrow$  heavy / prolonged bleeding

**Hypomenorrhea**  $\rightarrow$  scanty flow

**Dysmenorrhea**  $\rightarrow$  painful flow (b/c of  $\uparrow$  prostaglandins)