

## **Nursing 201 – Nursing Care of Special Populations Anatomy and Physiology of Pregnancy**

- Demands are made on the mother by the fetus for nutrition, respiration, excretion, and physiologic adaptation.
- Systems are interdependent, in that a change in one system often potentiates a change in another.

### **Reproductive System**

Most obvious system changes during pregnancy are in the repro system

- **Endocrine Influence:**

#### Hypothalamus-Pituitary-Ovarian Axis

Increased levels of estrogen and progesterone are produced first by the corpus luteum in the ovary until around 12-14 weeks, then by the placenta thereafter in pregnancy.

- suppresses anterior pituitary secretion of FSH and LH
- menstrual cycle ceases
- most experience amenorrhea
- $\leq$  20% have slight painless spotting during early gestation

After implantation the fertilized ovum and the chorionic villi produce hCG

### **Development of the Placenta**

- Endocrine organ

Development of placenta & circulation does not begin until 3<sup>rd</sup> wk of embryonic development.

- 7th week, placenta produces more than 50% of estrogens in maternal circulation
- 10-12 weeks, placenta takes over production of progesterone
- 11th week, placenta produces enough progesterone and estrogen to maintain pregnancy
- hCG levels drop, and the corpus luteum shrinks

### **Structural Changes during Pregnancy**

- **Ovaries**- Cease ovum production
- **Uterus**- Before pregnancy, small semisolid pear-shaped organ. During pregnancy, significant increase in capacity

Enlargement of uterus due to:

Uterine Round Ligaments: Undergo hypertrophy to help support the uterus and keep it midline

Uterine blood flow (UBF):

UBF varies inversely with duration and intensity of uterine contractions

- **Cervix**

Softening and color changes:

Mucosa changes:

Mucus plug formation:

- **Vagina**

Structure changes:

Secretory changes:

- **Breasts**

Changes in size and structure:

- **Metabolic system**

Basal metabolic rate (BMR): increases as well as appetite

Skin requires increase BF to dissipate heat generated by increased metabolism

- **Respiratory System**

↑ oxygen requirements during pregnancy, increased O<sub>2</sub> consumption

↑ tidal volume, i.e. deeper breaths as there is less airway resistance

↑ respiratory minute volume (*volume of air inspired/expired in 1 minute*)

Greater awareness of breathing but only slight difference (increase) in respiratory rate

Breathing changes from abdominal to thoracic- chest breathing

- **Cardiovascular system**

Pregnancy creates a hypervolemic state! There is increase in blood volume of approx 40-50%.

Increased blood volume is a protective mechanism.

Physiologic changes:

Cardiac Output:

Supine Hypotensive Syndrome (Vena Cava Syndrome):

Blood pressure- stays about the same or a little bit lower. Returns to pre-preg level by term.

- **Hematologic changes**

Physiologic anemia of pregnancy – aka pseud anemia- results from increased blood plasma which is greater than the increase in RBC production= State of hemodilution.

WBCs – increases during 2<sup>nd</sup> trimester and peaks at 3<sup>rd</sup>.

Clotting Factors – Pregnancy is a slightly hypercoagulable state! Increase in fibrinogen

- **Gastrointestinal System**

Major change: decrease in peristalsis. Delayed gastric motility and gastric emptying. Delayed gallbladder emptying. Relaxation of the sphincter between esophagus and stomach =heartburn.

- **Renal System**

Structural changes:

- Kidneys become heavier and larger
- Bladder affected by position of uterus
- Ureters dilate due to progesterone

Renal blood flow: increases and there is an increase in GFR

Glycosuria: may see this due to kidneys inability to reabsorb all glucose filtered

Kidneys increase tubular reabsorption to prevent sodium depletion

- **Musculoskeletal System**

Hormonal influences:

Postural changes:

Diastasis Recti – Vertical separation of the rectus abdominis muscle

- **Integumentary System**

Facial Chloasma- mask of pregnancy

Striae- stretch marks

Linea Nigra- pigmented line

- **Immunologic System**

↑ Susceptibility to bacterial & viral infections

Major maternal serum immunoglobulin –

- **Endocrine System**

**Thyroid gland:**

**Pituitary gland:**

Stimulation of **anterior pituitary** prolongs corpus luteal phase in early pregnancy, also responsible for release of prolactin

Stimulation of **posterior pituitary** secretes oxytocin:

Oxytocin:

Stimulation of **anterior pituitary** produces prolactin:

Prolactin:

**Adrenal glands:**

Increase in circulating cortisol which regulates carbohydrate and protein metabolism (increases due to estrogen stimulation)

**Pancreas:** Will be covered in Mrs. Trout's lecture

**Important to know:** In later pregnancy ( $\geq 20$  wks), maternal sensitivity to insulin decreases due to effects of pregnancy hormones – progesterone, estrogen, & human placental lactogen

**Hormone Review**

**Human chorionic gonadotropin (hCG):**

Maintains corpus luteum production of estrogen & progesterone until placenta takes over

Implicated in the cause of morning sickness  
Basis for pregnancy tests

**Estrogen:**

Alteration in vaginal pH and glucose levels  
Increases uterine size and weight, breasts enlarge  
Causes nasopharyngeal edema  
Stimulates increase blood flow to tissues

**Progesterone:**

Inhibits uterine motility, increasing potential for implantation  
Maintains decidual lining  
Relaxes smooth muscle throughout the body  
Contributes to vascular changes  
Relaxes vessels to allow for blood volume expansion  
Decreases pulmonary resistance  
Relaxes renal structures to allow for higher volume  
Development of breast lobes and alveoli in preparation for breast-feeding  
Reduces motility of the gastrointestinal system

**Relaxin:**

Appears to work in conjunction with progesterone  
Quiets uterine muscular activity preventing loss of conceptus  
Inhibits uterine activity during pregnancy  
Softens connective tissue in the cervix  
Relaxes pelvic joints, especially in the sacroiliac and symphysis pubis

**Human placental lactogen (hPL):**

Prepares the body for lactation. Stimulates development of breast and milk production  
Stimulates fetal growth

**Prolactin:**

Secreted by the placenta and the anterior pituitary gland  
Stimulates breast growth, necessary for milk production  
After delivery, prolactin levels diminish in 1 week if not breast-feeding  
Inhibits ovulation during breast feeding by inhibiting release of LH

**Discomforts of Pregnancy**

Fatigue- 1<sup>st</sup> & 3<sup>rd</sup> trimester. Due to hormones, anemia, increased BMR, disrupted sleep.  
TX-REST

Urinary Frequency-

Breast Tenderness- Due to changes from engorgement, milk lobe development. TX-Support Bra

Nausea and Vomiting-

Ptyalism-Increased saliva, cause unknown. TX- Good oral hygiene, lozenges, increase fluids

Food Cravings- Pickles and Ice Cream oh my! If your patient starts wanting to eat mud or laundry detergent, tell the DOCTOR!

Vaginal Discharge-

Nasal Stuffiness & Epistaxis- Edema of the mucosa r/t estrogen. TX- cool mist vaporizer

Heartburn-

Varicose Veins- Due to decreased venous return b/c of gravid uterus. TX- exercise, support hose, avoid standing/sitting for long periods of time, avoid crossing legs.

Constipation-

Hemorrhoids- From pressure of gravid uterus and constipation. TX- Avoid constipation, TUCKS pads, Sitz baths, Ice packs.

Carpal Tunnel Syndrome-

Leg Cramps- Most often at night, unsure why. Maybe pressure on nerves. TX- stretch, massage, walk.

Faintness- Due to blood volume changes. Blood pools in dependent veins, postural hypotension can occur if quick position changes occur or if pt gets too hot. TX-move slow, rest.

Difficulty Sleeping-

Round Ligament Pain- Round ligaments stretch to support uterus as it enlarges. Described as a grabbing sensation in lower abd. TX- heating pad, rest in fetal position, Tylenol.

Ankle Edema-

Headache- due to increased blood volume on cerebral arteries, stress, fatigue. TX- Tylenol, eat, hydrates, rest, cool cloth

*Patient should seek immediate care if: Severe/abnormal HA, increased BP, Blurry vision, Sudden weight gain*

### **Sexuality in Pregnancy**

- Sexuality is a human need

- In a normal pregnancy with no risk factors, there is no indication or need for sexual abstinence
- May have to change sexual positions, may have to reduce number of encounters, may have body changes that make the woman tender in her breasts or perhaps with constant back pain-but do not need to abstain if mother is comfortable.
- Gentle intercourse is ok as long as it's not uncomfortable.
- Couples should communicate fears, wants, needs with each other and the health team
- Pregnant women sometimes have increased needs for touch, cuddling and affection-reassure it's normal.
- Some pregnant women feel like they are unattractive= Need support reassurance from partner
- Sexual intercourse contraindicated for: a partner with risk of STD's, uterine bleeding, history of abortion, history of premature birth, placenta Previa, poor obstetric history or history of premature rupture of membranes
- Encourage couple to only resume sexual intercourse postpartum once cleared by MD.