Maternal Adaptation to Pregnancy

Signs of Pregnancy

• Presumptive
  – Subjective signs
  – Most common: amenorrhea or missed period
  – Nausea
  – Fatigue
  – Breast changes
Possible Signs of Pregnancy and Other Potential Causes

• **3–4 weeks+**: Early breast changes
  – Could be caused by oral contraceptives
• **4 weeks+**: Amenorrhea (missed period)
  – Hormonal imbalance, emotional stress, or illness
• **4–14 weeks**: Morning sickness
  – Gastrointestinal disorders, pyrexial illness, etc.
• **6–12 weeks**: Bladder irritability
  – Can be associated with UTI or pelvic tumor
Probable Signs of Pregnancy

- Objective
- Chadwick’s Sign
  - Bluish-purplish color of vagina, cervix, perineum
- Hegar’s Sign
  - Softening of uterine isthmus
- Goodell’s sign
  - Softening of cervix
- Pregnancy test
- Ballottement
Probable Signs of Pregnancy and Other Potential Causes

- **4–12 weeks: Presence of hCG in blood**
  - May be due to hydatidiform mole
- **6–12 weeks: Presence of hCG in urine**
  - May be due to choriocarcinoma
- **8 weeks+: Uterine growth**
  - May be due to tumors
Probable Signs of Pregnancy and Other Potential Causes (cont.)

- **16 weeks:** Braxton Hicks (painless contractions)
  - May be due to upset stomach

- **16–28 weeks:** Ballottement of fetus
  - May be elicited by a tumor
Positive Signs of Pregnancy

• **6 weeks+**
  - Visualization of fetus by ultrasound

• **20–24 weeks+**
  - Fetal heart sounds by fetal stethoscope

• **22 weeks+**
  - Fetal movements palpable by a trained practitioner

• **Late pregnancy**
  - Fetal movements visible
Reproductive Changes

- Structural
- Hormonal
Changes in the Uterus During Pregnancy

- Change in weight and capacity
- Change from almost solid structure to thin, muscular sac
- Change from pear-shape to globular
- Change in location from pelvis to abdominal cavity
- 20% of cardiac output supplies uterus/pelvic cavity alone
Uterine Changes

- Expansion due to muscle cell hypertrophy
- Uterine walls thicken then thin by stretching as fetus grows
- It increases to 20 times its original weight
- 1,000 times its initial capacity
- The amount of its muscle, connective and elastic tissue, blood vessels, and nerves increases
- The uterus softens beginning at the sixth week
- It changes position as it increases in size
- It becomes more contractile
**Uterine Growth**

- Week 12: becomes an abdominal organ
- Week 16: midway between symphysis pubis and umbilicus
- Week 20: fundus is at the umbilicus
- At 40 weeks the uterus occupies most of the abdomen and is crowding the liver.
Changes in Breasts During Pregnancy

- Tenderness in the first few weeks of pregnancy
- Nodularity of breast tissue
- Prominent areola with deepened pigmentation
- Prominent projections of Montgomery’s tubules
Breast Changes

- Tenderness, tingling in first weeks
- Estrogen causes breasts to increase in size
- Prolactin stimulates glandular production; nodularity
- Areolas darken
- Montgomery’s tubercles secretions lubricate nipples
- Stretch marks

During pregnancy

Gestational Age:
- 7 weeks
- 19 weeks
- 31 weeks

Breast Volume:
- 293ml
- 381ml
- 398ml
Changes in Blood During Pregnancy

- Blood volume increases by 40%–50%
- Red blood cell volume increase up to 30%
- Plasma volume increases by 50%
- Hemoglobin changes to 11–12 g/100mL
- Hematocrit decreases
- White blood cell count increases up to 16,000 mm$^3$
Endocrine Changes

- Affect almost every body system
- Pituitary gland enlarges by 135%
  - FSH, LH
- Prolactin—crucial for initiation of lactation
- Oxytocin—labor contractions, letdown, attachment hormone
- Increased need for insulin
- Possible enlargement of thyroid gland
Cardiovascular Changes

- Physical displacement of heart upwards and to the left may cause murmurs
- Increased workload
- BP decreases slightly, especially during 2\textsuperscript{nd} trimester
- Heart rate increases by 10 to 15 beats/minute
- Increased cardiac output increases by 40 -50\% by the 5\textsuperscript{th} week of gestation
- Supine hypotension syndrome: compression of vena cava
  - Prevention: left side-lying
Vena Cava Syndrome
Changes in the Respiratory System During Pregnancy

- Respiratory rate unchanged or increased 2–3 breaths per minute
- Nasal mucosa edematous due to vasocongestion
- Tidal Volume increased to 700 mL
- Oxygen consumption increases by 14%
- Nasal mucous membranes more fragile
- Impaired diaphragmatic excursion
- Loosened ligaments due to influence of progesterone
- Increased anteroposterior and transverse diameters
- Feelings of dyspnea due to pressure of expanding uterus in 3rd trimester
Integumentary Changes During Pregnancy

- **Chloasma (mask of pregnancy)**
  - Brown blotchy areas on the forehead, cheeks, and nose

- **Linea nigra**
  - The skin in the middle of the abdomen may develop a darkened line

- **Striae (stretch marks)**
  - May develop on the abdomen in response to elevated glucocorticoid levels
Musculoskeletal Changes During Pregnancy

- **Lordosis**
  - Increased curvature of the spine
  - Can result in low backache
- **Round ligament pain**
- **Diastasis recti abdominis**
  - Separation of the rectus abdominis muscle
Lordosis

Normal spine  Lordosis of the spine

Exaggerated lumbar curve
Stretched ligaments hurt!
Gastrointestinal Changes During Pregnancy

- Nausea and vomiting
  - Increased levels of hCG
- Ptyalism
  - Increased salivation
- Tender, easily friable gums
- Pyrosis
  - Heartburn
- Constipation
GI Changes

- Nausea and vomiting first trimester
- Increased saliva production
- Tender, swollen gums
- Displacement of organs, slowed gastric emptying: constipation
- Relaxation of lower esophageal sphincter: heartburn
- Progesterone hinders gallbladder contraction. Cholestasis + increased cholesterol = gallstone formation.
Psychological Adaptation to Pregnancy

• **First trimester task**
  – Accept the pregnancy

• **Second trimester task**
  – Accept the baby

• **Third trimester task**
  – Prepare for parenthood
Psychological Adaptation

• First Trimester
  – Accept the pregnancy
  – May have feelings of ambivalence
  – Introverted, focused on self
  – Mood swings and irritability
Psychological Adaptation

• Second Trimester
  – Child gains his own identity
  – May become more extroverted
  – Feels better as nausea and fatigue subside
  – Happy time! Able to relate more to husband
  – Couvade syndrome: partner has morning sickness and weight gain along with the pregnant woman
Psychologic Adaptation

- Third Trimester
  - Nesting
  - Choose a name
  - Fatigue returns
  - Physical discomfort
  - Childbirth classes
  - Toward the end: I’m DONE!
Changing Nutritional Requirements of Pregnancy

• The fetus needs nutrients and energy to build new tissue

• The woman needs nutrients to build her blood volume and maternal stores

• There is an increased demand for energy and for almost every nutrient type

• Most nutrient requirements can be met through careful attention to diet

• There are several nutrients that require supplementation during pregnancy
Vitamin Requirements During Pregnancy

- **Folic Acid (Vitamin B<sub>9</sub>)**
  - Necessary for formation of the nervous system
  - Diet should include at least 400 micrograms of folic acid per day

- **Vitamin A**
  - Too much can be toxic to the fetus
  - Too little can stunt fetal growth and cause impaired dark adaptation and night blindness
Changing Energy Requirements and Weight Gain

- Energy supplied mainly by carbohydrates
- Increased caloric intake of 300 kcal/day
- Recommended weight gain
  - First trimester: 3–4 pounds total
  - Remainder of pregnancy: 1 pound per week
  - Total weight gain: 25–35 pounds for a woman with a normal BMI
Nutrients Needed During Pregnancy and Their Functions

• **Proteins**
  - Growth and repair of fetal tissue, placenta, uterus, breasts, and maternal blood volume

• **Minerals**
  - Prevent deficiencies in the growing fetus and maternal stores
  - Zinc
    • Fetal growth and milk production
Nutrients Needed During Pregnancy and Their Functions (cont.)

• Minerals (cont.)
  – Iron
    • Formation of hemoglobin; essential to the oxygen-carrying capacity of the blood
  – Calcium
    • Nerve cell transmission, muscle contraction, bone building, and blood clotting
  – Phosphorous
    • Calcium metabolism requires a normal amount of phosphorus to build strong bones
Vitamin Requirements During Pregnancy (cont.)

- **Vitamin C**
  - Essential in the formation of collagen, a necessary ingredient to wound healing

- **Vitamin B<sub>6</sub>**
  - Necessary for the healthy development of the fetus’ nervous system

- **Vitamin B<sub>12</sub>**
  - Needed to maintain healthy nerve cells and red blood cells and to form DNA
  - From animal sources only
Special Nutritional Considerations

- Vegetarianism
- Lactose intolerance
- Pica
Vocabulary

- Teratogen, Teratogenic
- Morula
- Blastocyte
- Nidation
- Wharton’s jelly
- Chorion
- Amnion
- Languno
- Gravida
- Fundus
- Trimester
- Intrapartal
- Prenatal
- Perinatal
- Postpartum
- Antepartum
- Hyperemesis gravidarum
- Para
Vocabulary

- Pica
- Primagravida
- Nulligravida
- Multigravida
- Primipara
- Multipara
- Nullipara
- Zygote