

Uterine Changes

Think of pregnancy as 1,2, 3 trimester.

- Enlargement of uterus due to cell hypertrophy. When you think of a cell as a round cell with nucleus in center...the way the uterus is able to enlarge, the cells elongate (they don't increase in number). There is no other organ in the body that can change shape and grow like the uterus can.
- Thickening of the walls
- Increase in vascular and lymphatic system. Think of the uterus as a "mother organ", in that all the nutrients that enable egg to implant are inside on the endometrial lining. So, we need to have an awesome vascular and lymphatic system in order for the pregnancy to be healthy.
- Height of fundus changes as pregnancy goes along...the change tells us how far along they are. By the time you can feel the fundus at the umbilicus, you are about halfway (20 weeks). Baby "drops" at 40 weeks into the pelvis (will be about two finger-breadths below xiphoid)
- **Formula for calculating due date:**
- If you calculate she's at 20 weeks, but only measures 16..the first thing you should think is that the dates are off. Keep it simple!
 - Look at mom's nutrition and lifestyle habits if you suspect that the baby is small for gestational age.

Cervical Changes

- Development of mucous plug. Serves as a barrier to keep pathogens from migrating up into fundus and affecting fetus. Communication between vagina and uterus is the cervix (only about an inch). If something lives in vagina, it's going to seek out a better environment in the uterus. The plug helps keep this from happening. It is released toward the end of pregnancy (around a week to a day prior to delivery). Losing the plug is a sign that the cervix is softening up.
- Goodell's sign - softening. We examine the cervix to see if she is pregnant...it will feel soft. In a non-pregnant woman it feels like a button.
- Chadwick's sign - bluish-purple discoloration d/t hypervascularization r/t pregnancy.

Vaginal Changes

- Hypertrophy, increased vascularization, hyperplasia due to estrogen. Looks really bright pink d/t blood supply. The hyperplasia due to estrogen causes an overgrowth of cell and enables elasticity of the vagina.
- Increase in secretions, loosening of connective tissue. All of this is d/t hormonal response regulated by anterior and posterior pituitary. Anytime there is an increase in estrogen you have an increase in secretions.

Breast Changes

- Glandular hyperplasia and hypertrophy. Breasts start to enlarge...gain 1-2 pounds of breast tissue on average (1-2 cup sizes).
- Darkened areolae, superficial veins prominent.
- Striae may develop d/t breast tissue stretching.
- Colostrum is secreted usually around 30 weeks.

Respiratory Changes

- Tidal volume increases to meet oxygen demands of the fetus. Body becomes more efficient oxygen machine!
- Oxygen consumption increases
- Breathing changes from abdominal to thoracic. As diaphragm is pushed by an enlarging fetus, there is less lung expansion into abdominal space.
- Vascular congestion of nasal mucosa. When you get hypervascularization in the nose, you get stuffy noses and nose bleeds. Who knew?

Cardiac Changes

The gigantic uterus is sitting on the pelvic vasculature...why doesn't it collapse? In order to accommodate, we have to increase the blood volume and circulating volume.

- Blood volume increases 40 to 45% (with twins it can go up to 60%). This does not increase blood pressure...in fact, many women experience a drop in blood pressure when pregnant. This also increases oxygen carrying capacity of the blood. When mom delivers the baby, she now has a “cushion” so she doesn’t bleed to death.
- Decrease in systemic and pulmonary vascular resistance so blood can get where it needs to go.
- Increase in cardiac output, basically the heart becomes a more efficient pump.

GI Changes

- Nausea and vomiting happens in early pregnancy. Shouldn’t be vomiting after about 14 weeks.
- Hyperemia, softening and bleeding of gums (d/t vascularization)
- Constipation. As uterus enlarges we have a mechanical compression of the colon AND we have a bolus of progesterone (the hormone of relaxation...it’s a smooth muscle relaxant) which causes smooth muscle to relax including GI tract. The woman needs to eat lots and lots of fiber.
 - FYI! The progesterone is systemic...the smooth muscle relaxant is another reason the BP stays low, varicose veins, peripheral edema.
- Heartburn d/t relaxation of sphincter and growth of the fundus.
- Hemorrhoids b/c woman isn’t taking in enough fiber, vasodilation of vascular system, straining.

FYI:

If a non-pregnant person loses 500 ml of blood, it drops Hgb down by 1 and Hct down by 3%

Urinary Changes

- Pressure on bladder causes frequency
- Dilatation of kidneys and ureters
- Increased GFR and renal plasma flow. We pay attention to this to determine if mom is spilling sugar or protein into urine. Increased BP + protein in urine are precursors for pre-eclampsia. Sugar in urine = gestational diabetes.

Skin Changes

- Hyperpigmentation...can’t do anything about it and is d/t genetics. *Linea negra* is the line that goes up the belly from umbilicus to pubis.
- Striae
- Chloasma is the “raccoon mask” on the face. This can also happen with BC pills.
- Vascular spider nevi...little vessels on legs.
- Decreased hair growth or increased...depends on hair cycle.
- Hyperactive sweat and sebaceous glands.

Musculoskeletal Changes

Progesterone also works on ligaments and tendons

- Pelvic joints relax, gets loose. Feels like “hinged together with rubber bands.”
- Center of gravity changes (safety issue). If a woman wears high heels this will make backache worse. Backache is due to attachments of uterus...two of them tie directly into the back.
- Separation of rectus abdominus. These muscles hold you upright and are very important! Babies need to spend all their time on their tummy unless sleeping. This is the only way the baby develops back, neck and abdominal muscles. The rectus abdominus supports the back. In pregnancy, the muscle has to stretch and thin and for some women it separates...that’s called the rectus diastesis. Palpate at umbilicus...walk fingers across abdomen and if they “fall into the ditch” then they have a separation here. Exercise: walk a lot...do side-lying leg raises.

Eye, Cognitive, and Metabolic Changes

- Decreased intraocular pressure d/t vasodilation
- Thickening of cornea
- Reports of decreased attention, concentration, and memory
- Extra water, fat, and protein are stored
- Fats more completely absorbed

Endocrine Changes

- T4 and BMR increase, TSH decreases.
 - If we have a woman with thyroid problems, we have to stay on top of this! If you are hypothyroid, you can produce microcephaly in the fetus leading to permanent brain damage. No bueno. This baby will get on thyroid hormone as soon as born, and mom will be on it also during pregnancy.
- Concentration of parathyroid hormone increases
- Thyrotropin and adrenotropin alter maternal metabolism. Mom uses fat more efficiently and may be hungry a lot.
- Prolactin is responsible for lactation. It is released AFTER delivery of placenta.
- Oxytocin (secreted from pituitary and it causes uterine contractions) and vasopressin are secreted. At some point a bolus of oxytocin is released and this starts labor.
- Increased aldosterone

Physical Symptoms of Pregnancy

- Braxton Hicks contractions...the uterus stretching. Usually go away if get up and walk.
- Increased vaginal discharge and risk of infection. d/t hypervascularity of vagina...the secretions can act as a wick for pathogens.
- Leaking of colostrum, especially if already had a baby.
- Hyperventilation d/t shallow breathing r/t huge fundus.
- Nasal stuffiness and nosebleeds
- Lower extremity edema
- Postural hypotension
- Supine hypotensive syndrome...mom lies on back and presses on vena cava → loss of consciousness/faint. Have mom lie on her left side or sit her up.
- Nausea and vomiting
- Bleeding of gums
- Constipation and hemorrhoids
- Pruritus
- Figure 14-1 Vena caval syndrome. The gravid uterus compresses the vena cava when the woman is supine. This reduces the blood flow returning to the heart and may cause maternal hypotension.
- Physical Symptoms of Pregnancy (cont'd)
- Urinary frequency
- Hyperpigmentation (linea nigra)
- Striae
- Vascular spider nevi
- Decreased rate of hair growth
- Heavy perspiration, night sweats, acne
- Waddling gait
- Backache
- Difficulty wearing contact lenses d/t changes in intraocular pressure.

Presumptive Signs of Pregnancy

- Amenorrhea
- Nausea and vomiting
- Excessive fatigue
- Urinary frequency
- Breast changes
- Quickening (may feel fetal movement)

Probable Signs of Pregnancy

- Changes in the pelvic organs
- Enlargement of the abdomen
- Braxton Hicks contractions can be felt
- Abdominal striae

- Uterine souffle (listen with Dopplar, can hear sound of uterus). This is the mother's pulse in the vasculature of the placenta. This is NOT the fetal heart rate!
- Changes in skin pigmentation
- Hegar's sign, a softening of the isthmus of the uterus, can be determined by the examiner during a vaginal examination. (picture to right)
- Early uterine changes of pregnancy. **A**, Ladin's sign, a soft spot anteriorly in the middle of the uterus near the junction of the body of the uterus and the cervix. (*see picture on bottom*) **B**, Braun von Fernwald's sign, irregular softening and enlargement at the site of implantation. **C**, Piskacek's sign, a tumorlike, asymmetric enlargement (B and C not pictured)
- Ballottement. Can push up on cervix and feel something bob up and down...that is the fetal head.
- Positive pregnancy tests

Positive Signs of Pregnancy

- Auscultation of fetal heartbeat
- Fetal movement (woman can feel it and gets more intense as pregnancy goes on...others can begin to feel it from outside...it eventually becomes uncomfortable for mom.)
- Visualization of the fetus via ultrasound.

Pregnancy Tests (look up each of these in book)

- Hemagglutination-inhibition (HI) test
- Latex agglutination test
- β -subunit radioimmunoassay (RIA)
- Immunoradiometric assay (IRMA)
- Enzyme-linked immunosorbent assay (ELISA)
- Fluoroimmunoassay (FIA)
- Home Pregnancy Tests
 - Enzyme immunoassay tests:
 - False-positive results low
 - False-negative results higher

Mother's Response to Pregnancy

- Ambivalence is very common
- Acceptance
- Introversion
- Mood swings
- Changes in body image can be good or bad. It depends. This is not a reversible change...cervix is changed forever, uterus shrinks but can expand more easily, striae remain, varicose veins may get worse.

Rubin's (1984) Tasks of Pregnancy

- Ensuring safe passage through pregnancy, labor, and birth
- Seeking of acceptance of this child by others
- Seeking of commitment and acceptance of self as mother to the infant (binding-in). Women have to go through the process of seeing themselves as a mother and this needs to happen during pregnancy. If it doesn't, there are probs...will see with substance abusing moms fo sho.
- Learning to give of oneself on behalf of one's child

Father's Response to Pregnancy

- Confused by partner's mood changes
- Feels left out of pregnancy...need to help dad see he is a partner. Moms need to communicate with dads.
- Resents attention given to the woman
- Resents changes in their relationship
- Needs to resolve conflicts about fathering...need to take on mantle of fatherhood.
- Couvade...man experiences things wife is experiencing...abdominal discomfort, constipation, back hurts.

Family Response to Pregnancy (gotta get everybody together on this!)

- Watch for the “I hope this one is a girl/boy” mentality
- Siblings:
 - Rivalry
 - Fear of changing parent relationships
- Grandparents:
 - Closer relationship with expectant couple
 - Increasing support of couple

Cultural Factors

- Identify beliefs, values, and behaviors:
- Ethnic background
- Patterns of decision making
- Religious preferences, language, communication style
- Common etiquette practices
- Expectations of healthcare system

Resources

[OBGYN.Net. The Universe of Women's Health](#)

This website offers information about pregnancy and women's health to medical professionals, women, and parents. Educational offerings and free downloads are also available.

[Clinical Collections](#)

Offered are a collection of articles pertaining to the physiology of pregnancy and embryonic development.

[Merck Manual](#)

The online manual offers information on the physiology of pregnancy.

[Physiology of Pregnancy](#)

The PowerPoint lecture from Tulane University provides information on the physiology of pregnancy, fetal development, and signs and symptoms of pregnancy and includes ultrasound pictures.

[Pregnancy Resource Center](#)

This site offers information about early pregnancy. Included is an online pregnancy test.

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