Chapter 28
Pregnancy and Human Development
Preeclampsia-Eclampsia Syndrome

• Symptoms – Hypertension and proteinuria caused by vascular spasms – decreased blood flow in fetus

• Classifications
  – Mild – systolic increase of >30 mmHg or diastolic of >15 mmHg.
  – Severe = Eclampsia – convulsive state

• Treatment – bed rest, high protein diet, reduced sodium (?), Calcium and Mag supplements, drugs for hypertension and sedatives – if severe give Mag sulfate

• Believed due to immunological abnormalities
  • Correlated with number of fetal cells that enter maternal circulation
Lactation

• Production of milk by the mammary glands
• Toward the end of pregnancy
  – Placental estrogens, progesterone, and lactogen stimulate the hypothalamus to release prolactin-releasing factors (PRFs)
  – Anterior pituitary releases prolactin
Lactation

• Colostrum
  – Yellowish secretion rich in vitamin A, protein, minerals, and IgA antibodies
  – Released the first 2–3 days
  – Followed by true milk production

• Suckling initiates a positive feedback mechanism

• Oxytocin causes the letdown reflex
Figure 28.19  Milk production and the positive feedback mechanism of the milk let-down reflex.

Start

Stimulation of mechanoreceptors in nipples by suckling infant sends afferent impulses to the hypothalamus.

Hypothalamus releases prolactin releasing factors (PRF) to portal circulation.

Hypothalamus sends efferent impulses to the posterior pituitary where oxytocin is stored.

Anterior pituitary secretes prolactin to blood.

Oxytocin is released from the posterior pituitary and stimulates myoepithelial cells of breasts to contract.

Prolactin targets mammary glands of breasts.

Let-down reflex. Milk is ejected through ducts of nipples.

↑ Milk production

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Advantages of Breast Milk

• Fats and iron are easily absorbed; amino acids more easily metabolized, compared with cow’s milk
• Beneficial chemicals: IgA, complement, lysozyme, interferon, and lactoperoxidase
• Interleukins and prostaglandins prevent overzealous inflammatory responses
• Natural laxative effect helps eliminate bile-rich meconium, helping to prevent physiological jaundice
• Encourages bacterial colonization of the large intestine
Development of Fetal Circulation

• First blood cells arise in the yolk sac
• By the end of the third week
  – Embryo has a system of paired vessels
  – Vessels forming the heart have fused
Figure 28.13 Circulation in fetus and newborn.

Fetus
- Aortic arch
- Superior vena cava
- Ductus arteriosus
- Ligamentum arteriosum
- Pulmonary artery
- Pulmonary veins
- Heart
- Lung
- Foramen ovale
- Fossa ovale
- Liver
- Ductus venosus
- Ligamentum venosum
- Hepatic portal vein
- Umbilical vein
- Ligamentum teres
- Inferior vena cava
- Umbilicus
- Abdominal aorta
- Common iliac artery
- Umbilical arteries
- Medial umbilical ligaments
- Urinary bladder
- Umbilical cord
- Placenta

Newborn
- High oxygenation
- Moderate oxygenation
- Low oxygenation
- Very low oxygenation

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Congenital Heart Defects

• Patent ductus arteriosus – duct does not close which leads to increase pulmonary BP
• Atrial septal defect – foramen ovale does not close which leads to poor oxygenation of blood
• Coarctation of aorta – aorta is constricted which leads to increase workload on heart
• Tetralogy of Fallot – multiple defects
(a) **Ventricular septal defect.** The superior part of the inter-ventricular septum fails to form, allowing blood to mix between the two ventricles. More blood is shunted from left to right because the left ventricle is stronger.

(b) **Coarctation of the aorta.** A part of the aorta is narrowed, increasing the workload of the left ventricle.

(c) **Tetralogy of Fallot.** Multiple defects (tetra = four): (1) Pulmonary trunk too narrow and pulmonary valve stenosed, resulting in (2) hypertrophied right ventricle; (3) ventricular septal defect; (4) aorta opens from both ventricles.
Neural Tube Defects

• Anencephaly – lack of cerebrum and parts of brain stem

Spina bifida – incomplete formation of lamina and spinous processes – prevented by taking folic acid

And........

• Idiopathic Respiratory Distress Syndrome
Estrogen from placenta
Induces oxytocin receptors on uterus

Oxytocin from fetus and mother’s posterior pituitary
Stimulates uterus to contract
Stimulates placenta to make Prostaglandins
Stimulate more vigorous contractions of uterus

Positive feedback
(a) Dilation (early)

- Umbilical cord
- Placenta
- Uterus
- Cervix
- Vagina
Figure 28.18b: Pubic symphysis and Sacrum in (b) Dilation (late).
(c) Expulsion

Perineum
(d) Placental
Complications with Placenta

- Placenta previa – placenta partially covers opening to cervix
- Placenta abruptio – placenta separates from uterine wall prematurely
Menopause

- Ovulation and menses cease entirely
- Without sufficient estrogen, reproductive organs and breasts atrophy
  - Irritability and depression result
  - Skin blood vessels undergo intense vasodilation (hot flashes occur)
  - Gradual thinning of the skin and bone loss
- Males have no equivalent to menopause
“Juno, honey, it’s because doctors are sadists and like to watch lesser people scream!”

In 2007, Juno and Knocked Up, two movies about unexpected pregnancies, raked in over $300 million at the box office combined.

Who knew that unplanned parenthood could be so much fun?