

## Chapter 29: Development, Growth, Aging, and Genetics

### I. Prenatal Development

#### A. General

1. The prenatal period is the time from \_\_\_\_\_ until \_\_\_\_\_
2. Define each of the three prenatal periods:
  - a. Germinal Period \_\_\_\_\_  
\_\_\_\_\_
  - b. Embryonic Period \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - c. Fetal Period \_\_\_\_\_  
\_\_\_\_\_
3. How does the medical community calculate clinical age? \_\_\_\_\_  
\_\_\_\_\_
  - a. Embryologists describe the timing of developmental events in terms of \_\_\_\_\_
  - b. What is the time difference between these two approaches? \_\_\_\_\_

#### B. Fertilization

1. What is fertilization? \_\_\_\_\_  
\_\_\_\_\_
2. The corona radiata is a \_\_\_\_\_ to the \_\_\_\_\_
  - a. Action of the flagella propel \_\_\_\_\_
3. The zona pellucida is an \_\_\_\_\_ composed mostly of \_\_\_\_\_
  - a. It is located between the \_\_\_\_\_ & the \_\_\_\_\_
  - b. What is ZP3? \_\_\_\_\_
  - c. What happens when a sperm cell binds to ZP3? \_\_\_\_\_  
\_\_\_\_\_
1. This process is called \_\_\_\_\_
4. The first sperm cell through the zona pellucida attaches to \_\_\_\_\_  
on the outer surface of the \_\_\_\_\_

- a. The attachment causes \_\_\_\_\_  
within \_\_\_\_\_
  - b. Prevents additional sperm from \_\_\_\_\_
  - c. The depolarization is called \_\_\_\_\_
5. Depolarization causes a series of events including:
- a. Intracellular \_\_\_\_\_
  - b. Causes the exocytosis of \_\_\_\_\_ and \_\_\_\_\_ molecules
    1. What are cortical granules? \_\_\_\_\_
  - c. Causes the oocyte to \_\_\_\_\_
  - d. Zona pellucida denatures and \_\_\_\_\_
    1. ZP3 is inactivated and no \_\_\_\_\_
  - e. This reaction is called \_\_\_\_\_
6. What is the perivitelline space? \_\_\_\_\_  
\_\_\_\_\_
7. Entrance of a sperm cell into the oocyte stimulates \_\_\_\_\_  
\_\_\_\_\_ and the \_\_\_\_\_ formed
- a. What is the female pronucleus? \_\_\_\_\_
8. When the male pronucleus and female pronucleus fuse together:
- a. Completes the process of \_\_\_\_\_
  - b. Restores the \_\_\_\_\_
  - c. What is a zygote? \_\_\_\_\_
- C. Early Cell Division
1. The cells of the dividing embryonic mass are referred to as \_\_\_\_\_
    - a. What does that mean? \_\_\_\_\_  
\_\_\_\_\_
- D. Morula and Blastocyst
1. When does the dividing embryonic mass become a morula? \_\_\_\_\_  
\_\_\_\_\_
  2. Three or four days after ovulation, the morula consists of \_\_\_\_\_
    - a. Near this time, \_\_\_\_\_ cavity called \_\_\_\_\_  
begins to appear \_\_\_\_\_

3. The blastocyst is a \_\_\_\_\_
  - a. The blastocoel is surrounded by a single layer of cells the \_\_\_\_\_
  - b. At one end of the blastocyst the cells are \_\_\_\_\_
    1. The thickened area is called the \_\_\_\_\_  
and is the tissue \_\_\_\_\_
  - c. What does the trophoblast form? \_\_\_\_\_

#### E. Implantation of the Blastocyst and Development of the Placenta

1. All of the events of the early germinal phase occur as the embryonic mass moves through the \_\_\_\_\_
2. About 7 days after fertilization the \_\_\_\_\_ to the uterine wall, usually in the area of \_\_\_\_\_ and begins \_\_\_\_\_
  - a. What is implantation? \_\_\_\_\_
3. Two populations of \_\_\_\_\_ develop and form the embryonic portion of the \_\_\_\_\_
  - a. Cytotrophoblast is a \_\_\_\_\_ trophoblast cells
  - b. Syncytiotrophoblast is a \_\_\_\_\_ or \_\_\_\_\_ cell
4. The cytotrophoblast remains \_\_\_\_\_ and the syncytiotrophoblast invades the \_\_\_\_\_
5. The syncytiotrophoblast is \_\_\_\_\_, which means \_\_\_\_\_  
\_\_\_\_\_
6. As the syncytiotrophoblast encounters maternal blood vessels:
  - a. Surrounds them and \_\_\_\_\_
  - b. Forming \_\_\_\_\_ called \_\_\_\_\_
  - c. Maternal blood circulates \_\_\_\_\_
7. Cords of cytotrophoblast surround the syncytiotrophoblast and lacunae:
  - a. Fingers called \_\_\_\_\_ branch from \_\_\_\_\_  
\_\_\_\_\_ and protrude into the lacunae
  - b. What is the chorion? \_\_\_\_\_
  - c. Embryonic blood vessels follow \_\_\_\_\_
8. In the mature placenta the \_\_\_\_\_ disappears

- a. Embryonic blood supply is separated from maternal blood supply by only:
    1. Embryonic \_\_\_\_\_
    2. \_\_\_\_\_
    3. Thin layer of \_\_\_\_\_
- F. Formation of the Germ Layers
1. After implantation a new cavity forms called the \_\_\_\_\_
    - a. The cavity forms inside the \_\_\_\_\_
    - b. The cavity is surrounded by a layer of cells called \_\_\_\_\_  
or \_\_\_\_\_
  2. Formation of the amniotic cavity causes a part of the \_\_\_\_\_ nearest the \_\_\_\_\_ to separate as a \_\_\_\_\_ called the \_\_\_\_\_
  3. The embryonic disk is composed of two layers of cells:
    - a. Ectoderm \_\_\_\_\_
    - b. Endoderm \_\_\_\_\_
  4. The yolk sac forms \_\_\_\_\_ from the \_\_\_\_\_
  5. Eventually the amniotic sac enlarges \_\_\_\_\_ providing it with \_\_\_\_\_
  6. About 13 or 14 days after fertilization, the embryonic disk becomes \_\_\_\_\_
    - a. Proliferating cells of the \_\_\_\_\_ migrate toward the \_\_\_\_\_ and the \_\_\_\_\_ of the disk, forming a \_\_\_\_\_ called \_\_\_\_\_
    - b. Some ectoderm cells:
      1. Leave \_\_\_\_\_
      2. Migrate through \_\_\_\_\_
      3. Emerge \_\_\_\_\_ as a new germ layer \_\_\_\_\_
  7. The three germ layers \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ are \_\_\_\_\_
    - a. All tissues \_\_\_\_\_
  8. What is the notochord? \_\_\_\_\_

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## G. Neural Tube and Neural Crest Formation

1. About 18 days after fertilization the ectoderm near the \_\_\_\_\_ of the primitive streak forms a thickened \_\_\_\_\_
  - a. The lateral edges of the neural plate begin to \_\_\_\_\_
    1. The edges are called \_\_\_\_\_
    2. The low area between the edges is called \_\_\_\_\_
  - b. The underlying notochord stimulates \_\_\_\_\_
  - c. The crests of the neural fold \_\_\_\_\_ and fuse into a \_\_\_\_\_ which is completely closed by \_\_\_\_\_
    1. The neural tube becomes the \_\_\_\_\_
    2. Cells of the neural tube are called \_\_\_\_\_
2. As the neural folds come together and fuse \_\_\_\_\_ all along \_\_\_\_\_
  - a. These cells are called \_\_\_\_\_
3. Neural crest cells migrate \_\_\_\_\_ to become:
  - a. Part of the \_\_\_\_\_ and the \_\_\_\_\_
  - b. Migrate laterally to just below the \_\_\_\_\_ where they become \_\_\_\_\_
4. Neural crest cells can become other structures in the head, including:
  - a. Contribute to \_\_\_\_\_
  - b. Dentin of \_\_\_\_\_
  - c. Few small \_\_\_\_\_
  - d. General \_\_\_\_\_
5. The term mesenchyme refers to \_\_\_\_\_

## H. Somite Formation

1. As the neural tube develops, the \_\_\_\_\_ immediately adjacent to the tube forms \_\_\_\_\_ called \_\_\_\_\_
2. Somitomes are indistinct \_\_\_\_\_ that develop in \_\_\_\_\_

3. The somites and somitomeres eventually give rise to:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

4. Most of the head muscles are derived from \_\_\_\_\_

#### I. Formation of the Gut and Body Cavities

1. At the same time the neural tube is forming, the embryo is becoming a tube along the \_\_\_\_\_

2. The \_\_\_\_\_ & \_\_\_\_\_ develop as the \_\_\_\_\_ & \_\_\_\_\_ ends of the yolk sac separate from \_\_\_\_\_

- a. This is the beginning of the \_\_\_\_\_
- b. The developing \_\_\_\_\_ pinches off as a tube but remains attached in the center to the yolk sac by \_\_\_\_\_

3. The foregut and hindgut are in close relationship to overlying \_\_\_\_\_

- a. Foregut forms \_\_\_\_\_ that opens to form \_\_\_\_\_
- b. Hindgut forms \_\_\_\_\_ that opens to form \_\_\_\_\_ and \_\_\_\_\_

4. Numerous evaginations occur along the early digestive tract that become:

- |          |          |
|----------|----------|
| a. _____ | d. _____ |
| b. _____ | e. _____ |
| c. _____ | f. _____ |

5. Solid bars of tissue called \_\_\_\_\_ form along the \_\_\_\_\_ and the sides of the foregut expand as \_\_\_\_\_ between \_\_\_\_\_

- a. The central expanded foregut is called \_\_\_\_\_
- b. The pockets along both sides are called \_\_\_\_\_

6. Adult derivatives of the pharyngeal pouches include:

- |          |          |
|----------|----------|
| a. _____ | c. _____ |
| b. _____ | d. _____ |

7. At the same time, a series of isolated \_\_\_\_\_ starts to form within the \_\_\_\_\_, beginning development of \_\_\_\_\_ or \_\_\_\_\_

- a. The most cranial group of cavities \_\_\_\_\_ & \_\_\_\_\_ to form the \_\_\_\_\_
  - b. The celomic cavity extends \_\_\_\_\_ as the
    1. \_\_\_\_\_
    2. \_\_\_\_\_
  - c. Initially all three cavities are \_\_\_\_\_
- J. Limb Bud Development
1. Arms and legs first appear as \_\_\_\_\_ at about \_\_\_\_\_
  2. What is the apical ectodermal ridge? \_\_\_\_\_
    - a. It develops on \_\_\_\_\_ of each limb bud and \_\_\_\_\_
  3. As the buds elongate, limb tissues are laid down in a \_\_\_\_\_ sequence
- K. Development of the Face
1. Fusion of five embryonic structures occurs in development of the face:
    - a. Frontonasal process forms \_\_\_\_\_
    - b. Two maxillary processes form \_\_\_\_\_
    - c. Two mandibular processes form \_\_\_\_\_
  2. Nasal placodes develop at the \_\_\_\_\_ of the \_\_\_\_\_
    - a. Become the \_\_\_\_\_
  3. As the brain enlarges and the face matures:
    - a. Nasal placodes approach \_\_\_\_\_
    - b. Medial edges \_\_\_\_\_
    - c. This is between the \_\_\_\_\_ that fuses with them to form the \_\_\_\_\_ known as the \_\_\_\_\_
  4. The lateral edges of the \_\_\_\_\_ fuse with the \_\_\_\_\_ to close off \_\_\_\_\_
    - a. The inferior margins of the \_\_\_\_\_ fuse with the superior margins of the \_\_\_\_\_ to decrease the \_\_\_\_\_
  5. By about day 50 all processes result in a \_\_\_\_\_
  6. The roof of the mouth, known as the \_\_\_\_\_

- a. Begins to form as \_\_\_\_\_
- b. Swing \_\_\_\_\_ and begin to \_\_\_\_\_  
\_\_\_\_\_ at about \_\_\_\_\_
- c. Fusion is not complete until about \_\_\_\_\_
- d. If the secondary palate does not fuse, a \_\_\_\_\_ in the  
\_\_\_\_\_ results, called a \_\_\_\_\_

## L. Development of the Organ Systems

What is the period of organogenesis? \_\_\_\_\_

### 1. Skin

- a. What is the epidermis derived from? \_\_\_\_\_
- b. What is the dermis derived from? \_\_\_\_\_ or \_\_\_\_\_
- c. What structures develop from the epidermis?
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
- d. Melanocytes and sensory receptors are derived from \_\_\_\_\_

### 2. Skeleton

- a. The bones of the face develop from \_\_\_\_\_
- b. Somite-derived or somitomere-derived mesoderm forms:
  1. Rest of \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
- c. The appendicular skeleton develops from \_\_\_\_\_

### 3. Muscle

- a. What are myoblasts? \_\_\_\_\_
- b. Myoblasts migrate from somites or somitomers to \_\_\_\_\_
- c. What are myotubes? \_\_\_\_\_  
\_\_\_\_\_
1. Myotubes enlarge to become \_\_\_\_\_
- d. Shortly after myotubes form \_\_\_\_\_
- e. The total number of muscle fibers is \_\_\_\_\_  
and remains \_\_\_\_\_
- f. What causes muscle enlargement after birth? \_\_\_\_\_



#### 4. Nervous System

- a. The nervous system is derived from \_\_\_\_\_ & \_\_\_\_\_
- b. Neural tube closure begins in the \_\_\_\_\_ and proceeds into the \_\_\_\_\_ and \_\_\_\_\_
- c. Soon after the neural tube has closed, the part that becomes the brain begins to \_\_\_\_\_
- d. The central cavity of the neural tube becomes:
  1. \_\_\_\_\_ in the brain
  2. \_\_\_\_\_ in the spinal cord
- e. Neuron cell bodies within the neural tube become:
  1. Somatic \_\_\_\_\_
  2. Preganglionic \_\_\_\_\_
- f. Neural crest cells become:
  1. \_\_\_\_\_ neurons
  2. Postganglionic \_\_\_\_\_

#### 5. Special Senses

- a. The olfactory bulb and nerve develop as \_\_\_\_\_ from \_\_\_\_\_
- b. The eyes develop as \_\_\_\_\_ from \_\_\_\_\_
  1. Each evagination elongates to form an \_\_\_\_\_
  2. The optic vesicle develops at the \_\_\_\_\_
  3. At the side of the head the optic vesicle stimulates the \_\_\_\_\_
- c. The sensory part of the ear appears as an \_\_\_\_\_ or \_\_\_\_\_ that invaginates and \_\_\_\_\_

#### 6. Endocrine System

- a. The posterior pituitary forms \_\_\_\_\_
- b. The anterior pituitary develops from \_\_\_\_\_ in the roof of \_\_\_\_\_ and grows \_\_\_\_\_
- c. The thyroid gland originates as \_\_\_\_\_

- d. The parathyroid glands are derived from the \_\_\_\_\_ & \_\_\_\_\_  
 \_\_\_\_\_ migrate \_\_\_\_\_
- e. The adrenal medulla arises from \_\_\_\_\_  
 1. Consists of specialized \_\_\_\_\_
- f. The adrenal cortex is derived from \_\_\_\_\_
- g. The pancreas originates as \_\_\_\_\_ from the  
 \_\_\_\_\_ which come together to \_\_\_\_\_
7. Circulatory System
- a. The heart develops from \_\_\_\_\_ which fuse into a  
 \_\_\_\_\_
- b. Blood vessels form from \_\_\_\_\_ on the surface of the  
 \_\_\_\_\_ and \_\_\_\_\_  
 1. What are blood islands? \_\_\_\_\_ that become  
 a. \_\_\_\_\_ on the outside  
 b. \_\_\_\_\_ on the inside  
 2. The islands fuse to form the \_\_\_\_\_
- c. A series of dilations appear along the length of the primitive heart tube:  
 1. Sinus venosus \_\_\_\_\_  
 2. Single \_\_\_\_\_  
 3. Single \_\_\_\_\_  
 4. Bulbus cordis \_\_\_\_\_
- d. The elongating heart, confined within the \_\_\_\_\_, becomes  
 bent into a loop, the apex is the \_\_\_\_\_  
 1. The atrium and ventricle \_\_\_\_\_  
 2. The right part of the sinus venosus becomes \_\_\_\_\_  
 3. Bulbus cordis is absorbed into \_\_\_\_\_  
 4. Sinus venosus initiates \_\_\_\_\_  
 a. Later part of the sinus venosus becomes the \_\_\_\_\_
- e. The single ventricle is divided into \_\_\_\_\_ when an  
 \_\_\_\_\_ develops

- f. The interatrial septum is formed from:
1. \_\_\_\_\_
  2. \_\_\_\_\_
- g. What is the foramen ovale? \_\_\_\_\_
1. What does it allow? \_\_\_\_\_
8. Respiratory System
- a. The lungs begin to develop as a \_\_\_\_\_  
from the \_\_\_\_\_ in the region of the \_\_\_\_\_
    1. The evagination branches to form \_\_\_\_\_  - b. The lung buds elongate and branch:
    1. First forming \_\_\_\_\_
    2. Then forming \_\_\_\_\_
    3. Branching continues until, by the end of \_\_\_\_\_ about  
\_\_\_\_\_ occurred
    4. Branching continues after birth until about \_\_\_\_\_  
\_\_\_\_\_
9. Urinary System
- a. The kidneys develop from \_\_\_\_\_ located between the  
\_\_\_\_\_ and the \_\_\_\_\_
  - b. About 21 days after fertilization, mesoderm in the \_\_\_\_\_ region  
differentiates into \_\_\_\_\_
  - c. The pronephros consists of a \_\_\_\_\_ and \_\_\_\_\_  
connecting the duct to the \_\_\_\_\_
    1. Probably not functional and soon \_\_\_\_\_  - d. The mesonephros is a \_\_\_\_\_ in the embryo
    1. It consists of:
      - a. Duct which is a \_\_\_\_\_
      - b. Number of \_\_\_\_\_
        1. One end of each tubule opens into the \_\_\_\_\_
        2. The other end forms a \_\_\_\_\_
  - e. As the mesonephros is developing the caudal end of the \_\_\_\_\_

begins to \_\_\_\_\_ to form the \_\_\_\_\_

1. This is the common junction of the \_\_\_\_\_, \_\_\_\_\_, & \_\_\_\_\_ systems

f. The cloaca is divided into two parts by the \_\_\_\_\_:

1. Digestive part called \_\_\_\_\_
2. Urogenital part called \_\_\_\_\_

g. The cloaca has two tubes associated with it:

1. \_\_\_\_\_
2. \_\_\_\_\_
  - a. A blind tube extending into the \_\_\_\_\_
  - b. The part of the allantois nearest the cloaca \_\_\_\_\_ to form \_\_\_\_\_
  - c. The remainder \_\_\_\_\_

h. The mesonephric duct extends \_\_\_\_\_ as it develops and eventually joins the \_\_\_\_\_

1. At the point of junction, another tube begins to form called \_\_\_\_\_
  - a. The distal end \_\_\_\_\_ & \_\_\_\_\_ to form the \_\_\_\_\_ of the adult kidney called \_\_\_\_\_
2. The metanephros takes over the function of the \_\_\_\_\_

## 10. Reproductive System

- a. The male and female gonads appear as \_\_\_\_\_ along the \_\_\_\_\_
- b. The primordial germ cells, destined to become \_\_\_\_\_ or \_\_\_\_\_
  1. Form on the \_\_\_\_\_
  2. Migrate \_\_\_\_\_
  3. Enter \_\_\_\_\_
- c. The female ovaries originate high in the abdomen and \_\_\_\_\_ to a position \_\_\_\_\_
- d. As the male testes descend and reach the \_\_\_\_\_ wall
  1. A pair of tunnels called \_\_\_\_\_ form through the

- \_\_\_\_\_
2. The testes pass through the \_\_\_\_\_
    - a. Leaving the \_\_\_\_\_
    - b. Coming to lie within the \_\_\_\_\_
  3. Descent begins about \_\_\_\_\_
  4. Testes enter the \_\_\_\_\_ about \_\_\_\_\_
  - e. Paramesonephric ducts begin to develop \_\_\_\_\_ and grow \_\_\_\_\_ where they \_\_\_\_\_
  - f. Testosterone secreted by the fetal \_\_\_\_\_ causes the \_\_\_\_\_ duct system to \_\_\_\_\_ & \_\_\_\_\_ into
    - a. \_\_\_\_\_
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
  - g. Testes also secrete \_\_\_\_\_ hormone which causes the \_\_\_\_\_ to degenerate
  - h. If neither testosterone or müllerian-inhibiting hormone is secreted:
    1. The mesonephric duct system \_\_\_\_\_
    2. Paramesonephric system develops into \_\_\_\_\_, \_\_\_\_\_, and part of the \_\_\_\_\_
  - i. An enlargement called the \_\_\_\_\_ develops in the groin
    1. Urogenital folds develop on \_\_\_\_\_
    2. Labioscrotal swellings develop \_\_\_\_\_
    3. Urethral groove develops along the \_\_\_\_\_
  - j. In the male, under the influence of dihydrotestosterone:
    1. The \_\_\_\_\_ & \_\_\_\_\_ close over the \_\_\_\_\_ & the \_\_\_\_\_ to form \_\_\_\_\_
      - a. If the closure does not \_\_\_\_\_ results in a defect called \_\_\_\_\_
    2. The testes move into the \_\_\_\_\_ which become the \_\_\_\_\_

- k. In the female, in the absence of testosterone:
1. Genital tubercle becomes the \_\_\_\_\_
  2. Urethral groove \_\_\_\_\_
  3. Urogenital folds \_\_\_\_\_
  4. The urethra opens \_\_\_\_\_ to the \_\_\_\_\_ but \_\_\_\_\_ to the \_\_\_\_\_
  5. Urogenital folds become \_\_\_\_\_
  6. Labioscrotal folds become \_\_\_\_\_
- M. Growth of the Fetus
1. When does the embryo become a fetus? \_\_\_\_\_
    - a. In the embryo most of the organ systems are \_\_\_\_\_
    - b. In the fetus the organs \_\_\_\_\_
    - c. Most morphological changes occur \_\_\_\_\_
    - d. The fetal period is primarily a \_\_\_\_\_
  2. What is lanugo? \_\_\_\_\_
  3. What is vernix caseosa? \_\_\_\_\_
    - a. Functionally the vernix caseosa protects the fetus from \_\_\_\_\_  
\_\_\_\_\_ formed by \_\_\_\_\_  
from \_\_\_\_\_
  4. Subcutaneous fat accumulates in the \_\_\_\_\_ & \_\_\_\_\_
    - a. Provides a \_\_\_\_\_
    - b. Helps \_\_\_\_\_
    - c. Aids the baby in \_\_\_\_\_ by \_\_\_\_\_ &  
\_\_\_\_\_ the cheeks so \_\_\_\_\_  
can be developed in \_\_\_\_\_
  5. Peak body growth occurs \_\_\_\_\_
    - a. As placental \_\_\_\_\_ and \_\_\_\_\_ limits are approached  
the growth rate \_\_\_\_\_
    - b. Growth of the placenta essentially stops at \_\_\_\_\_  
restricting \_\_\_\_\_
  6. At about 38 weeks of development \_\_\_\_\_

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## II. Parturition

What is parturition? \_\_\_\_\_

### A. Late Gestation

1. Near the end of pregnancy the uterus becomes \_\_\_\_\_

a. Usually exhibits \_\_\_\_\_ that become \_\_\_\_\_ and \_\_\_\_\_ until parturition is initiated

b. Amniotic sac \_\_\_\_\_

c. Amniotic fluid flows \_\_\_\_\_

### B. Labor

1. First Stage

a. Begins with the onset of \_\_\_\_\_ and extends until the \_\_\_\_\_

b. Normally the head of the fetus is in \_\_\_\_\_

1. The head acts as a wedge, forcing the \_\_\_\_\_

2. Second Stage

a. Lasts from the time of \_\_\_\_\_ until the \_\_\_\_\_

b. Contractions of \_\_\_\_\_ assist the \_\_\_\_\_

c. Contractions generate enough pressure to \_\_\_\_\_

1. Blood flow to the fetus \_\_\_\_\_

2. During periods of relaxation \_\_\_\_\_

3. Third Stage

a. Involves the \_\_\_\_\_

b. Contractions of the uterus cause \_\_\_\_\_

c. Some bleeding occurs because of \_\_\_\_\_

d. Bleeding normally is restricted \_\_\_\_\_

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4. Once the placenta has been removed, blood levels of \_\_\_\_\_ & \_\_\_\_\_ fall \_\_\_\_\_
5. Following parturition:
  - a. Uterus becomes much \_\_\_\_\_
  - b. Cell of the uterus \_\_\_\_\_ & many \_\_\_\_\_
  - c. Vaginal discharge persists for 1 week or more composed of:
    1. Small \_\_\_\_\_
    2. Degenerating \_\_\_\_\_
6. The precise signal that triggers parturition is unknown but factors include:
  - a. Progesterone levels \_\_\_\_\_
    1. Progesterone has \_\_\_\_\_
  - b. Near the end of pregnancy \_\_\_\_\_ rapidly increase
    1. Excitatory influence of \_\_\_\_\_ overcomes the \_\_\_\_\_
  - c. The adrenal glands of the fetus are greatly \_\_\_\_\_
    1. The anterior pituitary of the fetus increases the secretion rate of \_\_\_\_\_ due to stress of:
      - a. Confined \_\_\_\_\_
      - b. Limited \_\_\_\_\_ resulting from a more \_\_\_\_\_ than size of \_\_\_\_\_
    2. ACTH causes the fetal adrenal cortex to produce \_\_\_\_\_ which travel to the \_\_\_\_\_ where they:
      - a. Decrease \_\_\_\_\_
      - b. Increase \_\_\_\_\_
      - c. Initiate synthesis of \_\_\_\_\_ which strongly \_\_\_\_\_
  - d. Stretch of the uterine cervix initiates \_\_\_\_\_ that cause \_\_\_\_\_ to be released from \_\_\_\_\_
    1. Oxytocin stimulates \_\_\_\_\_
    2. Which move the fetus \_\_\_\_\_



3. Causing \_\_\_\_\_ and release of more oxytocin
  - a. This establishes a \_\_\_\_\_ in which stretch \_\_\_\_\_ & oxytocin \_\_\_\_\_
  - b. When does the positive-feedback system stop? \_\_\_\_\_  
\_\_\_\_\_
- e. Progesterone inhibits \_\_\_\_\_ so the decreased \_\_\_\_\_ can support increased \_\_\_\_\_
- f. Estrogen makes the uterus \_\_\_\_\_ by increasing the synthesis of \_\_\_\_\_
- g. Oxytocin may also stimulate \_\_\_\_\_
- h. All of these events support \_\_\_\_\_ which results in parturition

### III. The Newborn

#### A. Respiratory and Circulatory Changes

1. Expansion of the lungs at birth:
  - a. Reduces the resistance to \_\_\_\_\_
  - b. Resulting in increased \_\_\_\_\_
  - c. More blood flows from right \_\_\_\_\_ and into \_\_\_\_\_
    1. Less blood flows from \_\_\_\_\_ to \_\_\_\_\_ through \_\_\_\_\_
  - d. An increased volume of blood \_\_\_\_\_
  - e. Which increases the \_\_\_\_\_
  - f. Increased \_\_\_\_\_ & decreased \_\_\_\_\_ forces blood against \_\_\_\_\_ causing \_\_\_\_\_
    1. This functionally completes the separation \_\_\_\_\_  
\_\_\_\_\_
    2. What does the foramen ovale become? \_\_\_\_\_
2. Ductus Arteriosus
  - a. What two vessels does the ductus arteriosus connect in the fetus?
    1. \_\_\_\_\_
    2. \_\_\_\_\_

- b. How long after birth does the ductus arteriosus close? \_\_\_\_\_
- c. The closure occurs because of \_\_\_\_\_  
\_\_\_\_\_
- d. The ductus arteriosus is replaced with connective tissue and is known as the \_\_\_\_\_
3. Placental Blood Vessels
- a. During fetal life:
1. Fetal blood passes to the placenta through \_\_\_\_\_  
from the \_\_\_\_\_
  2. Fetal blood returns from the placenta through \_\_\_\_\_
    - a. Blood passes through the liver via the \_\_\_\_\_
    - b. Which joins the \_\_\_\_\_
- b. When the umbilical cord is tied and cut:
1. No more blood flows through the \_\_\_\_\_  
and they \_\_\_\_\_
  2. The remnant of the umbilical vein becomes the \_\_\_\_\_  
\_\_\_\_\_ or \_\_\_\_\_ of the liver
  3. The ductus venosus becomes the \_\_\_\_\_
- B. Digestive Changes
1. What is meconium? \_\_\_\_\_
  2. Meconium consists of:
    - a. Amniotic \_\_\_\_\_
    - b. Cells \_\_\_\_\_
    - c. Mucus \_\_\_\_\_
    - d. \_\_\_\_\_ from the liver
  3. What is stomach pH at birth? \_\_\_\_\_ Why? \_\_\_\_\_
  4. Maximum stomach acidity is reached at \_\_\_\_\_
    - a. Over the next 10-30 days the pH \_\_\_\_\_
  5. The neonatal liver is \_\_\_\_\_
    - a. Lacks adequate amounts of the enzyme \_\_\_\_\_  
\_\_\_\_\_

1. This enzyme system usually develops within \_\_\_\_\_
- b. The lack of this enzyme system can cause \_\_\_\_\_
6. What is the newborn capable of digesting at birth? \_\_\_\_\_
  - a. Which organ is sufficiently mature for a milk diet? \_\_\_\_\_
7. The digestive system gradually develops the ability to digest more solid foods over the \_\_\_\_\_
8. Amylase secretion remains low until \_\_\_\_\_
9. Lactase activity in the small intestine is \_\_\_\_\_ but \_\_\_\_\_
  - a. Lactose activity is lost in \_\_\_\_\_

### C. Apgar Scores

1. Apgar scores are an assessment of the newborn's \_\_\_\_\_
2. The acronym "Apgar" stands for:
  - a. a \_\_\_\_\_
  - b. p \_\_\_\_\_
  - c. g \_\_\_\_\_
  - d. a \_\_\_\_\_
  - e. r \_\_\_\_\_
3. Each characteristic is rated on a scale of \_\_\_\_\_
  - a. 2 denotes \_\_\_\_\_
  - b. 1 denotes \_\_\_\_\_
  - c. 0 denotes \_\_\_\_\_
4. What is considered a normal Apgar score? \_\_\_\_\_

## IV. Lactation

### A. During Pregnancy

1. High concentration and continuous presence of \_\_\_\_\_ and \_\_\_\_\_ cause \_\_\_\_\_
  - a. Ducts grow and \_\_\_\_\_
  - b. Additional \_\_\_\_\_
2. Which hormone is primarily responsible for breast growth during pregnancy?

- \_\_\_\_\_
3. Progesterone causes development of \_\_\_\_\_
    - a. Which enlarge but \_\_\_\_\_
  4. The other hormones involved in breast development include:
    - a. \_\_\_\_\_
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
    - d. \_\_\_\_\_
    - e. \_\_\_\_\_
  5. The placenta secretes \_\_\_\_\_ and \_\_\_\_\_ that help support breast development
  6. Prolactin
    - a. Where is prolactin produced? \_\_\_\_\_
    - b. Prolactin is the hormone responsible for \_\_\_\_\_
    - c. Before parturition, high levels of estrogen stimulate \_\_\_\_\_
    - d. Milk production is inhibited during pregnancy because \_\_\_\_\_
    - e. After parturition, \_\_\_\_\_, \_\_\_\_\_, & \_\_\_\_\_ levels \_\_\_\_\_
      1. With lower \_\_\_\_\_ & \_\_\_\_\_ levels, \_\_\_\_\_ stimulates \_\_\_\_\_
    - f. Despite a decrease in \_\_\_\_\_ a reflex response produces \_\_\_\_\_
      1. During suckling, \_\_\_\_\_ of the breasts:
        - a. Initiates \_\_\_\_\_
        - b. That reach \_\_\_\_\_
          1. Causing the secretion of \_\_\_\_\_
          2. Inhibiting the release of \_\_\_\_\_
      2. Therefore, prolactin levels \_\_\_\_\_ and \_\_\_\_\_
  7. What is colostrum? \_\_\_\_\_
    - a. When is colostrum secreted? \_\_\_\_\_

8. In addition to nutrients, colostrum and milk contain \_\_\_\_\_
  - a. Help protect the nursing baby \_\_\_\_\_
9. If nursing stops, within a few days the ability to produce \_\_\_\_\_ and \_\_\_\_\_
10. Because it takes time to produce milk:
  - a. Nursing causes an increase in \_\_\_\_\_
  - b. Results in production of milk to be used in \_\_\_\_\_
11. Stored milk is released during nursing as a result of a reflex response:
  - a. Mechanical \_\_\_\_\_
  - b. Cause the release of \_\_\_\_\_ from the \_\_\_\_\_
  - c. Which stimulates \_\_\_\_\_
  - d. Milk is then \_\_\_\_\_ from the breasts in a process \_\_\_\_\_
12. Higher brain centers can stimulate \_\_\_\_\_
  - a. Hearing an infant cry \_\_\_\_\_

## V. First Year After Birth

### A. Central Nervous System

1. The brain is still developing and \_\_\_\_\_
2. It is estimated that the total \_\_\_\_\_ is present in the CNS at birth
  - a. Subsequent \_\_\_\_\_ and \_\_\_\_\_ of the brain involve:
    1. Addition of new \_\_\_\_\_
      - a. Some of which form \_\_\_\_\_
    2. Addition of new \_\_\_\_\_
      - a. Which may continue \_\_\_\_\_

## VI. Life Stages

### A. List the life stages from fertilization to death:

1. \_\_\_\_\_
2. \_\_\_\_\_

3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

## VII. Aging

### A. Cell Proliferation

1. During early development cells proliferate \_\_\_\_\_  
then the process \_\_\_\_\_
2. Many cells of the body continue to \_\_\_\_\_  
replacing \_\_\_\_\_ or \_\_\_\_\_
3. Many other cells cease to \_\_\_\_\_  
and dead cells are \_\_\_\_\_
  - a. After the number of neurons reaches a peak at \_\_\_\_\_
    1. Numbers begin to \_\_\_\_\_
      - a. Loss is most rapid \_\_\_\_\_
      - b. Later \_\_\_\_\_

### B. Mitochondrial DNA

1. Mitochondrial DNA function \_\_\_\_\_ with age
2. If the decline in function reaches a threshold \_\_\_\_\_  
\_\_\_\_\_ & the tissue or organ may \_\_\_\_\_
3. Can result in premature \_\_\_\_\_

### C. Physical Plasticity

1. What is physical plasticity? \_\_\_\_\_
2. The physical plasticity of young embryonic tissues results from the presence:
  - a. Large amounts of \_\_\_\_\_
  - b. Relatively small amounts of \_\_\_\_\_
  - c. Collagen and other related proteins are not \_\_\_\_\_
    1. Thus tissues are \_\_\_\_\_

3. As the individual ages \_\_\_\_\_ cross-links form between \_\_\_\_\_ rendering the tissues
  - a. More \_\_\_\_\_
  - b. Less \_\_\_\_\_
4. One of the first structures to exhibit pathologic changes as a result of increased rigidity is \_\_\_\_\_
5. Structures with reduced functional ability, due to loss of elasticity, include:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_
  - e. \_\_\_\_\_

#### D. Muscle Tissue

1. Mature muscle cells don't normally \_\_\_\_\_
  - a. Total number of skeletal and cardiac muscle fibers \_\_\_\_\_
2. The strength of skeletal muscle reaches a peak between \_\_\_\_\_ and \_\_\_\_\_
3. The macromolecules of muscle undergo \_\_\_\_\_ and render the muscle \_\_\_\_\_
  - a. A good exercise program can \_\_\_\_\_
4. The heart loses \_\_\_\_\_ & \_\_\_\_\_
  - a. Total cardiac output \_\_\_\_\_
    1. Results in less \_\_\_\_\_ & fewer \_\_\_\_\_ reaching cells in tissues contributing to \_\_\_\_\_
    2. May result in decreased blood flow to \_\_\_\_\_
      - a. Contributes to a decrease in \_\_\_\_\_

#### E. Blood Vessels

1. What is atherosclerosis? \_\_\_\_\_  
\_\_\_\_\_
  - a. When these deposits are calcified or fibrotic it results in \_\_\_\_\_
2. Arteriosclerosis interferes with \_\_\_\_\_
  - a. What is a thrombus? \_\_\_\_\_
  - b. What is an embolus? \_\_\_\_\_
3. Atherosclerosis is more likely to occur in people with \_\_\_\_\_

## F. Free Radicals

1. What is a free radical? \_\_\_\_\_
2. A free radical can \_\_\_\_\_ with & \_\_\_\_\_ the structure of molecules that are \_\_\_\_\_
3. Free radicals are produced as \_\_\_\_\_ and introduced to the body \_\_\_\_\_
4. Damage by free radicals may \_\_\_\_\_
5. Antioxidants can donate \_\_\_\_\_ to \_\_\_\_\_ without themselves \_\_\_\_\_

## G. Immune System

1. The aging immune system:
  - a. Loses \_\_\_\_\_
  - b. Becomes \_\_\_\_\_
2. Autoimmune changes add to \_\_\_\_\_ and may be responsible for such things as:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
3. T lymphocytes tend to lose \_\_\_\_\_ and cannot \_\_\_\_\_
  - a. This may be one reason that \_\_\_\_\_

## VIII. Death

### A. Definitions

1. Death was once defined as the loss of \_\_\_\_\_ & \_\_\_\_\_
2. Modern definitions of death are based on the \_\_\_\_\_  
\_\_\_\_\_
3. Brain death, a widely accepted indication of death in humans, is defined as:
  - a. Irreparable \_\_\_\_\_ manifested clinically by the:
    1. Absence of \_\_\_\_\_
    2. Absence of \_\_\_\_\_ &



3. Isoelectric (flat) \_\_\_\_\_ in  
the absence of known \_\_\_\_\_

## IX. Genetics

### A. Chromosomes

1. Deoxyribonucleic acid (DNA) is the \_\_\_\_\_ of cells & is responsible for \_\_\_\_\_
2. DNA molecules and \_\_\_\_\_ become visible during \_\_\_\_\_ as densely stained bodies called \_\_\_\_\_
3. How many chromosomes are in a somatic cell?  
\_\_\_\_\_ pairs of chromosomes or \_\_\_\_\_ total chromosomes
4. How many chromosomes are in a gamete? \_\_\_\_\_
5. What is a somatic cell? \_\_\_\_\_
6. What is a gamete? \_\_\_\_\_
7. What is a karyotype? \_\_\_\_\_
8. The 23 pairs of chromosomes are divided into two groups:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
9. In terms of sex chromosomes in each somatic cell:
  - a. A normal female has \_\_\_\_\_
  - b. A normal male has \_\_\_\_\_
10. Gametes are derived from \_\_\_\_\_ by \_\_\_\_\_
  - a. The somatic cells \_\_\_\_\_
  - b. Why is meiosis called a reduction division? \_\_\_\_\_  
\_\_\_\_\_
11. When a sperm cell and an oocyte fuse \_\_\_\_\_ each contributes \_\_\_\_\_
12. During meiosis, the chromosomes are distributed in such a way that each gamete receives \_\_\_\_\_
13. What are homologous chromosomes? \_\_\_\_\_  
\_\_\_\_\_

14. When all the possible combinations of sperm cells with oocytes are considered how many babies should be female? \_\_\_\_\_

## B. Genes

1. Each gene is a \_\_\_\_\_
2. Each gene occupies a \_\_\_\_\_
3. The genes occupying the same locus on homologous chromosomes are called \_\_\_\_\_
4. What does homozygous mean? \_\_\_\_\_  
\_\_\_\_\_
5. What does heterozygous mean? \_\_\_\_\_  
\_\_\_\_\_
6. Structural genes are those DNA sequences that \_\_\_\_\_  
\_\_\_\_\_
7. Regulatory genes are segments of DNA involved in \_\_\_\_\_  
\_\_\_\_\_
8. What is a genome? \_\_\_\_\_
9. Essentially a random distribution of genes is received from each parent in a process called \_\_\_\_\_
  - a. What are linked genes? \_\_\_\_\_
  - b. Sets of linked genes can be broken up when homologous chromosomes exchange genetic information by \_\_\_\_\_
10. What is nondisjunction? \_\_\_\_\_  
\_\_\_\_\_
  - a. What is aneuploidy? \_\_\_\_\_
11. Dominant and Recessive Genes
  - a. A trait that is expressed and masks another form of the trait is said to be \_\_\_\_\_
  - b. The trait that is masked and unseen in a heterozygous individual is said to be \_\_\_\_\_
  - c. The actual set of alleles that a person has for a given trait is \_\_\_\_\_
  - d. The person's appearance is called \_\_\_\_\_

- e. The recessive trait is expressed when \_\_\_\_\_
- f. What is a Punnett square used for? \_\_\_\_\_  
\_\_\_\_\_
- g. What is a carrier? \_\_\_\_\_  
\_\_\_\_\_
12. Sex-Linked Traits
- a. Traits affected by genes on the sex chromosomes are \_\_\_\_\_
1. X-linked means \_\_\_\_\_
2. Y-Linked means \_\_\_\_\_
- b. Most sex-linked traits are \_\_\_\_\_ because \_\_\_\_\_
13. Other Types of Gene Expression
- a. If the dominant gene does not completely mask the effects of the recessive gene, it is called \_\_\_\_\_
- b. What is codominance? \_\_\_\_\_  
\_\_\_\_\_
- c. Polygenic traits are \_\_\_\_\_  
\_\_\_\_\_

### C. Genetic Disorders

1. Genetic disorders are caused by \_\_\_\_\_  
\_\_\_\_\_
2. What are congenital disorders? \_\_\_\_\_  
\_\_\_\_\_
3. What are teratogens? \_\_\_\_\_
4. A mutation is a change in a gene that usually involves \_\_\_\_\_  
\_\_\_\_\_
5. What are mutagens? \_\_\_\_\_
6. Cancer is a \_\_\_\_\_
- a. What are oncogenes? \_\_\_\_\_
7. Many oncogenes are actually control genes involved in regulating \_\_\_\_\_  
\_\_\_\_\_

8. A change in an oncogene or in the \_\_\_\_\_ of an oncogene can result in \_\_\_\_\_ and the \_\_\_\_\_
9. What are tumor suppression genes? \_\_\_\_\_
10. Cancer may occur when a mutation:
- Activates \_\_\_\_\_ or
  - Inactivates \_\_\_\_\_
  - An accumulation of several mutations is \_\_\_\_\_
11. What is a carcinogen? \_\_\_\_\_
12. What is genetic susceptibility? \_\_\_\_\_
- a. Genetic susceptibility is also known as \_\_\_\_\_

#### D. Genetic Counseling

1. Genetic counseling includes:
- Predicting the possible results of \_\_\_\_\_
  - Talking to parents or prospective parents about \_\_\_\_\_
2. What is a pedigree? \_\_\_\_\_
3. Information for a pedigree might be based on:
- Phenotypes of \_\_\_\_\_
  - Karyotype taken from \_\_\_\_\_
  - Amount of a \_\_\_\_\_
4. If a fetus is suspected to have a genetic abnormality, fetal cells can be tested by:
- Amniocentesis which \_\_\_\_\_
  - Chorionic villus sampling which \_\_\_\_\_