ANSWERS TO CHAPTER 20

CONTENT LEARNING ACTIVITY

Prenatal Development
- A. 1. Germinal period; 2. Embryonic period; 3. Fetal period
- B. 1. Clinical age; 2. Developmental age
- C. 1. Capacitation; 2. Secondary oocyte; 3. 23; 4. Fertilization; 5. Zygote
- D. 1. Blastocyst; 2. Blastocele; 3. Inner cell mass; 4. Trophoblast

Implantation of the Blastocyst and Development of the Placenta
- A. 1. Implantation; 2. Chorion; 3. Placenta; 4. Chorionic villi; 5. Lacunae; 6. Umbilical cord; 7. Human chorionic gonadotropin (HCG)
- B. 1. Amniotic cavity; 2. Embryonic disk; 3. Endoderm; 4. Yolk sac; 5. Primitive streak; 6. Mesoderm; 7. Notochord

Neural Tube and Neural Crest Formation

1. Neural plate; 2. Neural folds; 3. Neural groove; 4. Neural tube; 5. Neuroectoderm; 6. Neural crest cells

Formation of the General Body Structure
- A. 1. Limb buds; 2. Organogenesis; 3. Interventricular septum; 4. Foramen ovale
- B. 1. Fetal; 2. Embryonic; 3. Fetal; 4. Lanugo; 5. Vernix caseosa; 6. Fat; 7. Placenta

Parturition
- A. 1. First stage of labor; 2. Second stage of labor; 3. Third stage of labor
- B. 1. Progesterone; 2. Estrogen, Oxytocin, Prostaglandins; 3. ACTH

The Newborn
- A. 1. Foramen ovale; 2. Ductus arteriosus; 3. Umbilical arteries and vein; 4. Ductus venosus
- B. 1. Surfactant; 2. Meconium; 3. Lactase; 4. Colostrum; 5. Prolactin; 6. Oxytocin

The First Year Following Birth

1. Twelve months; 2. Six weeks; 3. Five months; 4. Eight months

Life Stages

1. Neonatal; 2. Infant; 3. Childhood; 4. Adolescence; 5. Adult

Aging

1. Collagen; 2. Decrease; 3. Heart; 4. Filtration; 5. Atherosclerosis; 6. Arteriosclerosis; 7. Thrombosis; 8. Embolus; 9. Cellular aging; 10. Free radical; 11. Autoimmunity; 12. Stress

Genetics
- A. 1. Chromosomes; 2. Somatic cells; 3. Gametes; 4. Meiosis
- B. 1. 23 pairs; 2. one pair; 3. 22 pairs
- C. 1. Homologous; 2. Gene; 3. Alleles; 4. Homozygous; 5. Heterozygous; 6. Genome
- D. 1. Linked; 2. Crossing over; 3. Down syndrome (Trisomy 21)
- E. 1. Recessive; 2. Genotype; 3. Phenotype
- F. 1. Carrier; 2. X-linked
- G. 1. Incomplete dominance; 2. Codominance; 3. Polygenic traits
- H. 1. Cancer; 2. Oncogenes; 3. Carcinogens; 4. Genetic susceptibility (genetic predisposition); 5. Genetic counseling; 6. Pedigree

QUICK RECALL

1. Zygote, blastocyst, embryonic disk, primitive streak, mesoderm
2. Ectoderm, endoderm, and mesoderm.
3. Three germ layers —Germinal period, Organogenesis—embryonic period, Growth and maturation of organ systems—fetal period.
4. Oxytocin, prostaglandins, estrogen and progesterone.
5. Closing of foramen ovale; closing of ductus arteriosus and ductus venosus; cessation of blood flow through the umbilical arteries and veins.
6. Germinal, embryonic, fetal, neonatal, infant, childhood, adolescence, adult.
7. Damage to or death of nondividing cells, loss of elasticity because of cross-linking of collagen fibers, loss of cell numbers, loss of cardiac function, resulting in loss of kidney filtration, atherosclerosis and arteriosclerosis, degenerative organ changes, cellular aging, immune system changes, and lack of ability to adjust to stress.

WORD PARTS

1. prenatal; neonate
2. neonate
3. blastocyst; blastocele; trophoblast
4. blastocyst
5. blastocele
6. mesoderm

MASTERY LEARNING ACTIVITY

1. D. Most organ development takes place in the embryonic period (second to eighth week). The germ layers develop in the germinal period (first two weeks), and growth and maturation occur in the fetal period (the last seven months).

2. D. Fertilization of the oocyte produces a zygote, which divides and develops into the blastocyst. After implantation of the blastocyst, further division produces the amniotic cavity and forms the embryonic disk.

3. A. The placenta develops from the trophoblast. Trophoblast cells protrude into cavities (lacunae) formed within maternal blood vessels in the lining of the uterus. However, there is no mixing of maternal and fetal blood.

4. A. The embryo develops from the inner cell mass. The placenta and embryonic membranes develop from the trophoblast.

5. B. The brain, spinal cord, and nerves develop from ectoderm.

6. C. The neural plate rises to form the neural folds, which come together to form the neural tube.

7. A. Most of the organ systems are formed during the embryonic period, and the fetal period is a time of growth and maturation of those organ systems. There is a tremendous growth in length and weight during the fetal period. The fetus is covered with fine hair called lanugo and a waxy coat of epithelial cells called vernix caseosa.

8. D. Progesterone has an inhibitory effect on uterine muscle contraction. All of the other hormones listed stimulate uterine muscle contraction.

9. B. The foramen ovale is an opening through the interatrial septum that normally closes after birth because of pressure changes within the heart chambers. The ductus arteriosus connects the aorta and pulmonary trunk in the fetus, the ductus venosus bypasses the sinusoids in the liver, and the umbilical arteries and veins travel to and from the placenta.

10. D. Prolactin is the hormone that stimulates milk production.

11. C. The germinal period is the first 14 days after fertilization, the embryonic period is 14-56 days, the fetal period is 56 days after fertilization to birth, and neonate is birth to one month after birth.

12. E. All of the factors listed are causes of aging.

13. B. Gametes, or sex cells, are produced by meiosis. Each gamete, whether sperm cell or oocyte, contains 23 unpaired chromosomes, half the number of chromosomes contained in a somatic cell. Of the 23 unpaired chromosomes in a gamete, one is an X or a Y chromosome.

14. D. A gene is a certain portion of a DNA molecule that we consider to be the fundamental unit of heredity. Many genes are located on each chromosome.

15. B. Dd is heterozygous. DD or dd are homozygous genotypes.

16. C. A heterozygous genotype produces a normal phenotype (assuming that the dominant gene is the "normal" one), even though there is an abnormal gene present. Therefore, the person does not show the trait, even though they possess a gene for that trait.

17. A. Because she has two genes for albinism, there is not a normal skin color gene present to mask the trait, and she is an albino. She will pass a gene for albinism to her children. Albinism is evident at birth because there is never any melanin produced; it is not a trait that develops later in life.

18. E. Height and skin color are examples of traits determined by multiple genes on different chromosomes. Polygenic traits are characterized by having a great amount of variability.

19. C. All of their daughters will be carriers, and all of their sons will be color-blind. All of the X chromosomes in oocytes produced by the mother will contain the gene for color-blindness. If a sperm cell with the X chromosome fertilizes the oocyte, the individual will be a carrier female. If a sperm cell with the Y chromosome fertilizes the oocyte, the individual will be a color-blind male.

20. B. Because both parents are heterozygous, there is a one in four chance that a homozygous albino individual will be produced.

FINAL CHALLENGES

1. During the time of formation of the organ systems (first 2 months of development), the individual is most susceptible to damage. About 50% develop congenital malformations if the infection occurs in the first month, 25% in the second month, and 10% if the infection occurs later in the pregnancy.

2. Suckling one breast stimulates the release of oxytocin from the posterior pituitary. Once the oxytocin is in the blood, it travels to both breasts, not just the breast being suckled, and causes milk letdown in both.

3. Nerve impulses produced in the nipples by suckling travel to the hypothalamus and repress GnRH. GnRH is responsible for stimulating secretion of both FSH and LH, which are necessary for the ovarian (and uterine) cycle. Despite continual lactation, the ovarian and uterine cycles eventually resume. Because ovulation precedes menstruation, relying on lactation to prevent pregnancy is unreliable.

4. The presence of a Y chromosome makes the individual genetically a male, regardless of the number of X chromosomes present.