Physiology of Human Development (MCB 135E)

Midterm I
October 3, 1997

Your Name: _____ Your Primary Sex Organ: _____

Multiple Choice (30 points) Circle the correct answer.

1. The hormone primarily responsible for inducing proliferation of the endometrium during the first half of the ovulatory cycle is:

   A. Progesterone
   B. Estrogen
   C. Inhibin
   D. Testosterone

2. The most important hormone synthesized by the interstitial cells of Leydig is:

   A. Testosterone
   B. Alpha-binding protein
   C. Inhibin
   D. Progesterone

3. Rupture of the mature follicle during ovulation is mediated by:

   A. A surge in luteinizing hormone (LH)
   B. A steady increase in progesterone
   C. Atresia of neighboring follicles
   D. An abrupt decrease in follicle stimulating hormone (FSH)

4. Spermatogenesis and spermiogenesis occurs in the:

   A. Lining of the seminiferous tubules
   B. Interstitial spaces among the tubules
   C. Epidydimis
   D. Ejaculatory ducts

5. Phenylketonuria:

   A. results in increased urinary excretion of metabolites of the amino acid phenylalanine
   B. is due to a deficiency of the enzyme tyrosine hydroxylase
   C. is associated with disturbances of other amino acid metabolic pathways (tryptophan, tyrosine)
   D. all of the above

NAME_____

6. At the time of implantation the future embryo consists of:

   A. Two cells produced by the first mitosis
   B. A solid ball of 16 cells (morula)
   C. A hollow ball with an inner cell mass (blastocyst)
   D. A three-layer disc (gastrula)

7. The trophoblast of the blastocyst:

   A. Is the inner cell mass, which develops into the embryo
   B. Is the outer layer of cells, which develops into the placenta
   C. Is an intermediate layer of cells, which develops into the amniotic sac
   D. Is the fluid that fills the inner cavity

8. The embryo escapes rejection as foreign tissue by the mother's immune system primarily because:

   A. Embryonic cells express HLA-G, a special self-recognition protein with a low degree of genetic variation, as opposed to the normal MHC-I proteins, which have a high degree of variation.
   B. Immune responses in the endometirum are completely suppressed by the action of progesterone.
   C. Embryonic cells are genetically identical to maternal cells.
   D. Fetal and maternal cells are never in direct contact.

9. The primary function of human chorionic gonadotropin secreted by the placenta is to:

   A. Prevent involution of the corpus luteum at the end of the menstrual cycle, and also stimulate its production of estrogen and progesterone.
   B. Suppress contractions of the muscular wall of the uterus until the 40th week.
   C. Increase the mother's appetite to ensure an adequate supply of nutrients to the fetus.
   D. Stimulate development of the breasts and induce lactation.

10. Most of the female reproductive tract is derived from the:

   A. Wolffian (mesonephric) duct
   B. Germ cells
   C. Mullerian (paramesonephric) duct
   D. Allantois

NAME_____

True or False (20 points) Circle the correct answer.

1. T F Male germ cells (spermatogonia) retain the capacity to replenish themselves throughout life.

2. T F Most female germ cells (oogonia) die in the ovary without being released during ovulation.

3. T F Myelination of neuronal axons normally is complete before birth of the fetus.

4. T F The fetal brain must rely on anaerobic glycolysis for a significant portion of its energy needs.

5. T F REM sleep may be a potent source of internal stimulation necessary for proper development of the brain.

6. T F Estrogen synthesis in the placenta depends on intermediates supplied by both the mother and fetus.

7. T F Neuronal overproduction followed by widespread apoptotic neuronal death is an important theme in the development of the nervous system.

8. T F Thyroid hormone is critical for proper development of the nervous system in utero, and much less so after birth.

9. T F Fetal and maternal blood are thoroughly mixed in the placenta to ensure adequate delivery of nutrients to the fetus.

10. T F The neural tube forms from a deepening groove in the ectodermal layer of the embryo.

NAME_____

Matching I (7 points)

Match the primitive CNS structures with a corresponding adult structure. More than one adult structure may match to a single primitive structure, and not all adult structures may have a match.

1.	telencephalon	A.	adrenal medulla
2.	diencephalon	B.	cerellum and pons
3.	mesencephalon	C.	midbrain
4.	myelencephalon	D.	thalamus
5.	caudal segment of neural tube	E.	medulla
6.	neural crest cells	F.	spinal cord
7.	metencephalon	G.	cerebral hemispheres

Matching II (3 points)

Match the syndrome with the symptoms.

1.	fetal alcohol syndrome	A.	underdeveloped external genitalia, eunichoid body proportions
2.	cretinism	B.	prenatal and postnatal growth retardation, mental retardation, facial abnormalities
3.	Klinefelter's syndrome	C.	postnatal mental retardation, skeletal abnormalities

NAME_____

Short Answer (20 points)

Answer the following questions in 10 - 20 words:

1. What biochemical event initiates differentiation of early gonads into testes around the seventh embryonal week?

2. What causes female pseudohermaphroditism?

3. Where is the foramen ovale and what is its function?

4. Where is the ductus venosus and what is its function?

NAME_____

Essay I (10 points)

The fetus develops in an environment that is relatively low in oxygen compared to that after birth. Discuss two non-anatomical adaptations that help ensure adequate delivery of oxygen to fetal tissues.

Essay II (10 points)

Define "plasticity" in the context of growth and development, and give two examples that demonstrate plasticity.