Quadrant II – Transcript and Related Materials

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Unit: 01 - Introduction to Human Development

Module Name: Prenatal Development.

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Notes

Prenatal Development

- Prenatal development begins with fertilization and ends with birth, lasting between 38 and 40 weeks.
- It can be divided into three periods: Germinal, Embryonic, and Fetal.

Germinal Period

- First two weeks after conception
- It includes- creation of fertilized egg, called a zygote, cell division, and attachment of zygote to uterine wall.
- The one-celled zygote duplicates and multiplies.Rapid cell division continues throughout the germinal period.
- Soon after the 16-cell stage, differentiation (their specialization for different tasks) begins.

- As the cells take on distinct characteristics and gravitate toward particular locations.
- About a week after conception, the group of cells, called the blastocyst forms which consists of an inner mass of cells that will eventually develop into the embryo.
- And the trophoblast, an outer layer of cells that later provides nutrition and support for the embryo.
- Implantation - the attachment of the zygote to the uterine wall, takes place about 11 to 15 days after conception.

Embryonic Period

- Lasts from two to eight weeks after conception.
- During this period, the rate of cell differentiation intensifies, support systems for cells form, and organs appear.
- The mass of cells is now called an embryo.
- In the embryo three layers of cells form.
- The embryo's endoderm is the inner layer of cells, which will develop into the digestive and respiratory systems.
- The mesoderm is the middle layer, which will become the circulatory system, bones, muscles, excretory system, and reproductive system.
- Ectoderm is the outermost layer, which will become the nervous system and brain, sensory receptors (ears, nose, and eyes), and skin parts (hair and nails).
- Every body part eventually develops from these three layers.
- As the embryo's three layers form, life-support systems for the embryo develop rapidly.
- These life-support systems include:
- Amnion, Umbilical Cord, Placenta.
- The amnion is like a bag and contains a clear fluid in which the developing embryo floats.

- The amniotic fluid provides a temperature and humidity controlled, as well as shockproof environment to the developing organism.
- The umbilical cord contains two arteries and one vein, and connects the baby to the placenta.
- The placenta consists of a disk-shaped group of tissues in which small blood vessels from the mother and the offspring intertwine but do not join.
- Very small molecules—oxygen, water, salt, food from the mother's blood, as well as carbon dioxide and digestive wastes from the fetus's blood—pass back and forth between the mother and embryo / fetus.
- Large molecules cannot pass through the placental wall.
- These include red blood cells and harmful substances, such as most bacteria and maternal wastes.
- A thin line (called the *primitive streak) appears down the middle of* the embryo; it will become the neural tube 22 days after conception and eventually develop into the central nervous system (the brain and spinal column).
- The head appears in the fourth week, as eyes, ears, nose, and mouth start to form.
- Also in the fourth week, a minuscule blood vessel that will become the heart begins to pulsate.
- By the fifth week, buds that will become arms and legs emerge. The upper arms and then forearms, palms, and webbed fingers grow.
- Legs, knees, feet, and webbed toes are apparent a few days later, each having the beginning of a skeletal structure.
- At the end of the eighth week after conception, the embryo weighs just 1/30 of an ounce (1 gram) and is about 1 inch long.
- It has all the basic organs and body parts (except sex organs) of a human being.

Fetal Period- From the Ninth Week Until Birth

- By the end of the third month, the sex organs may be visible via ultrasound.
- The 3-month-old fetus weighs about 3 ounces (87 grams) and is about 3 inches long.

The Middle Three Months

- The heartbeat becomes stronger.
- Digestive and excretory systems develop.
- Fingernails, toenails, and buds for teeth form.
- And hair grows including eyelashes.
- The brain increases about six times in size and develops many new neurons *and synapses.*
- Brain development occurs in every prenatal month, but these middle three months may be the most crucial.
- The entire central nervous system becomes responsive beginning to regulate basic body functions such as breathing and sucking.
- Advances in neurological functioning allow the fetus to reach the age of viability, when a preterm newborn can survive.

The Final Three Months

- The lungs begin to expand and contract, and breathing muscles are exercised as the fetus swallows and spits out amniotic fluid.
- The valves of the heart go through a final maturation, as do the arteries and veins throughout the body.
- The fetus is active, moving its arms and legs, opening and closing its mouth, and moving its head.
- The fetus usually gains at least 4½ pounds in the third trimester, increasing to almost 7½ pounds at birth.