HUMAN DEVELOPMENT

Human development begins at the moment of the conception, when the nucleus of the sperm fuses with the nucleus of the egg. This occurs in the Fallopian tubes (oviduct) and is called **fertilization**. A fertilized egg is called a **zygote**. In humans, this results in a cell with 46 chromosomes. Prenatal development is divided into different stages. A summary of these important development stages follow.

★Prenatal Development

Early embryonic development

a. Cells undergo mitosis, giving rise to smaller cells during the period called cleavage
b. The developing offspring is moved to the uterus, where it becomes implanted in the endometrium.

Embryonic stage

a. This stage extends from the second through the eighth week.
b. It is characterized by development of the placenta and the main body structures.
c. The placenta membrane consists of epithelium of chorionic villi and the epithelium of capillaries inside villi.
    1. Oxygen and nutrients diffuse from the maternal blood through the membrane and into fetal blood.
    2. Carbon dioxide and another wastes diffuses from the fetal blood through the membrane and into fetal blood.
    3. Fluid filled amnion develops around the embryo.
    4. By the beginning of the eighth week, the embryo is recognizable as a human and is called fetus.

Fetal Stage

a. This stage extends from the end of the eight week and continues until birth.
b. Existing structures grow and mature. Only a few new parts appear.
c. Blood is carried between the placenta and the fetus by umbilical vessels.

★Development of cells layers

Ectoderm develops into the epidermis, including hair and nails; nervous system; epithelial tissue of the nose, mouth and anus; enamel of the teeth.

Mesoderm develops into the muscles, skeleton, and the ducts of the excretory and reproductive systems, circulatory system, kidneys, gonads, dermis, and connective tissue.

Endoderm develops into the liver, pancreas, digestive tract, and respiratory system.

⋆ Development during the first three months

At the end of four weeks – size is about 3/16 inch (5mm)

a. Heart is formed and beating
b. Backbone is formed
c. The eyes, nose, and ears are beginning to form.
d. All organs are developed.
e. Beginning buds of arms and legs appear.

At the end of eight weeks – size about 1 $^{1}/_{2}$ inches (4 cm)

a. The face and features are forming; eyelids fused.
b. Limbs beginning to show distinct divisions into arms, elbows, forearms, hands, thighs, knees, lower legs, and feet.
c. Muscle and bones develop.
d. Skeleton developed with cartilage and bones

At the end of twelve weeks – size is about 3 inches long (8 cm)

a. Weighs about 1 ounce.
b. Jaws, cheeks, and nasal bones developed.
c. Fetal digestive system has signs of activity.
d. Tooth sockets and buds forming the jaw-bones.
e. Vocal cords develop.
f. Liver pours bile into intestines.
g. Characteristics of sex emerge.

⋆ Changes in Mother

Hormonal changes during pregnancy – Placental tissue produces high concentrations of estrogen and progesterone.

a. Estrogen and oresterone maintain the uterine wall.
b. Progesterone causes uterine contractions to be suppressed.
c. Estrogen causes enlargement of the vagina and relaxation of the ligaments that hold the pelvic joins together.

Maternal body changes during pregnancy

a. The uterus enlarges greatly
b. The woman's blood volume, cardiac output, breathing rate, and urine production increases.

The birth process

a. Secretion of progesterone decreases because it inhibits contractions.
b. The posterior pituitary gland releases oxytocin.
c. Uterine muscles are stimulated to contract and labor begins.
d. Following the birth of the infant, placental tissues are expelled.