

PRENATAL DEVELOPMENT

I. PRENATAL DEVELOPMENT

A. Conception

1. Every 28 days an ovum is released from a woman's ovary and remains viable for approximately 24 hours.
2. Once released into the vaginal canal, sperm remain viable for up to 6 days.
3. Conception takes place in the fallopian tube where sperm and ovum unite to form the zygote.
4. Most conceptions result from intercourse on the day of or 2 days preceding ovulation.

B. The Period of the Zygote

1. The period of the zygote lasts about 2 weeks, from fertilization until the cell mass drifts out of the fallopian tubes and attaches itself to the uterine wall.
2. By the fourth day, 60 to 70 cells exist that form a hollow, fluid-filled ball called a blastocyst.
3. The embryonic disk (the cells on the inside) will become the new organism; the outer ring will provide protective covering.
4. Implantation
 - a. Implantation occurs sometime between the seventh and ninth day when the blastocyst burrows deep into the lining of the uterus.
 - b. The amnion is a membrane that encloses the developing organism in amniotic fluid. The fluid functions as a cushion and temperature regulator.
 - c. The yolk sac produces blood cells until the liver, spleen, and bone marrow mature enough to take over this function.
 - d. As many as 30 percent of zygotes do not make it through this phase.
5. The Placenta and Umbilical Cord
 - a. The chorion, a protective membrane, develops around the amnion by the end of the second week.
 - b. The placenta is a special organ that permits food and oxygen to reach the zygote and waste products to be carried away.
 - c. The umbilical cord connects the placenta to the developing organism.

C. The Period of the Embryo

1. The period of the embryo lasts from implantation through the eighth week of pregnancy.
2. The most rapid prenatal changes take place during these six weeks as the groundwork for all body structures and internal organs is begun.
3. Last Half of the First Month
 - a. During the third week, the embryonic disk folds over to form three cell layers:
 - 1) ectoderm-becomes the nervous system and skin
 - 2) mesoderm-from which will develop muscles, skeleton, circulatory system, and other internal organs
 - 3) endoderm-becomes the digestive system, lungs, urinary tract, and glands
 - b. The nervous system develops fastest in the beginning. The neural tube is a primitive spinal cord that forms when the ectoderm folds over.
4. The Second Month
 - a. Rapid development of body parts and systems continues. The embryo's posture becomes more upright.

b. The embryo can move, and it responds to touch, especially in the mouth area and on the soles of the feet.

D. The Period of the Fetus

1. The period of the fetus is the "growth and finishing" phase that lasts until the end of pregnancy.

2. The Third Month

a. The organs, muscles, and nervous system organize and connect.

b. By the twelfth week, the external genitals are well-formed, and the sex of the fetus can be determined using ultrasound.

c. Trimesters are the three equal time periods in the prenatal period, each of which lasts three months.

3. The Second Trimester

a. By the middle of the second trimester (which lasts from 13 to 24 weeks), the fetus has grown large enough that the mother can feel its movements.

b. Vernix is a white cheese like substance that covers the fetus and protects its skin from becoming chapped in the amniotic fluid.

c. Lanugo is a white downy hair that also covers the fetus and helps the vernix stick to the skin.

d. At the end of the second trimester, all the brain's neurons have been produced. The fetus can now be both stimulated and irritated by sounds and light.

4. The Third Trimester

a. The age of viability, between 22 and 26 weeks, is the age at which the fetus can first survive if born early.

b. The brain continues to make great strides during the last three months. The cerebral cortex enlarges and the fetus spends more time awake. The fetus is also more responsive to external stimulation.

c. The fetus moves less often, because of reduced space and greater ability to inhibit behavior.

d. A layer of fat develops under the skin to assist with temperature regulation.

e. In the last weeks, most fetuses move into an upside-down position.

II. PRENATAL ENVIRONMENTAL INFLUENCES

A. Teratogens

1. A teratogen is any environmental agent that causes damage during the prenatal period.

a. Larger doses of teratogens over longer time periods usually have more negative effects.

b. The genetic makeup of the mother and developing organism may enable or hinder their ability to withstand harmful environments.

c. The presence of several negative factors at once can worsen the impact of a single harmful agent.

d. The effects of teratogens vary with the organism's age at the time of exposure.

1) A part of the body is in a sensitive period when it is undergoing rapid development; it is especially vulnerable to its surroundings during that time.

2) The embryonic period is the time when serious defects are most likely to occur, since the foundations for all body parts are being laid down.

e. The effects of teratogens may have psychological consequences. These effects may be harder to identify than physical damage, and may not show up until later in development.

2. Prescription and Nonprescription Drugs

a. Thalidomide, a sedative used in the 1960's, caused severe limb deformations in embryos when taken by mothers between the fourth to sixth week after conception.

b. Repeated use of aspirin is linked to low birth weight, infant death around the time of birth, poorer motor development, and lower intelligence scores in early childhood.

c. Heavy caffeine intake is associated with prematurity, miscarriage, and newborn withdrawal symptoms, such as irritability and vomiting.

3. Illegal Drugs

a. Babies born to users of cocaine, heroin, or methadone are at risk for prematurity, low birth weight, physical defects, breathing problems, and death. In addition, these infants are often born drug-addicted.

b. Evidence suggests that prenatal exposure to cocaine has lasting difficulties. These include genital, urinary tract, kidney, and heart deformities, as well as brain seizures.

c. Babies born to mothers who smoke crack are worst off in terms of low birth weight and central nervous system damage.

d. Fathers may contribute to these negative effects as cocaine may attach itself to sperm and cause birth defects.

e. It is difficult to isolate the precise impact of cocaine, because users often take several drugs and engage in other high-risk behaviors.

f. Mixed findings regarding the links between marijuana use and low birth weight or prematurity have been documented.

4. Tobacco

a. Effects of smoking during pregnancy include low birth weight and increased chances of prematurity, impaired breathing during sleep, miscarriage, and infant death.

b. The nicotine in cigarettes causes the placenta to grow abnormally-the transfer of nutrients is reduced and the fetus gains weight poorly.

c. Smoking raises the concentration of carbon monoxide in the bloodstreams of both mother and fetus-carbon monoxide displaces oxygen from red blood cells.

d. Passive smoking is also related to low birth weight, infant death, and possible long-term impairments.

5. Alcohol

a. Fetal alcohol syndrome (FAS) is the set of defects that results when women consume large amounts of alcohol during most or all of pregnancy. Symptoms include mental retardation, slow physical growth, and facial abnormalities.

b. Fetal alcohol effects (FAE) is the condition of children who display some, but not all, of the defects of FAS. Usually the mothers drank alcohol in smaller quantities during pregnancy.

c. Alcohol interferes with cell duplication and migration in the primitive neural tube.

d. Alcohol also requires large quantities of oxygen to metabolize, which draws oxygen away from the developing embryo or fetus.

6. Hormones

a. If the quantity or timing of hormone release is off, defects of the genitals and other organs can occur.

b. Diethylstilbestrol (DES) is a synthetic hormone widely used between 1945 and 1970 to prevent miscarriages.

c. Daughters of mothers who used DES have high rates of vaginal cancer and uterine malformations.

d. Sons of mothers who used DES have increased risk of genital abnormalities and cancer of the testes.

7. Radiation

a. Radiation exposure can cause miscarriage, slow physical growth, an underdeveloped brain, and malformations of the skeleton and eyes.

b. Low-level radiation can increase the risk of childhood cancer.

8. Environmental Pollution

a. Mercury exposure is linked to mental retardation, abnormal speech, difficulty in chewing and swallowing, and uncoordinated movements.

b. High levels of lead exposure are linked to prematurity, low birth weight, brain damage, and a wide variety of physical defects.

c. Babies exposed to polychlorinated-biphenyls (PCBs) have problems including lower than average birth weight, smaller heads (possible brain damage) and less interest in their surroundings. Later developmental problems include memory and learning difficulties.

9. Maternal Disease

a. Certain diseases during pregnancy can cause miscarriage and birth defects.

b. Rubella (three-day or German measles) can cause a wide variety of abnormalities, especially when it occurs during the embryonic period.

c. Acquired immune deficiency syndrome (AIDS), a disease that destroys the immune system, is infecting increasing numbers of newborn babies.

d. Toxoplasmosis is a parasitic disease caused by eating undercooked or raw meat or contact with the feces of infected cats. During the first trimester, it leads to eye and brain damage.

B. Other Maternal Factors

1. Exercise

a. In healthy, physically fit women, regular exercise is related to increased birth weight.

b. Since the growing fetus places some strain on the back, abdominal, pelvic, and thigh muscles, exercises that strengthen these areas are particularly helpful.

2. Nutrition

a. Autopsies of malnourished babies who died at or shortly after birth reveal fewer brain cells, a lower brain weight, and abnormal brain organization.

b. Prenatal malnutrition can damage the immune system and the structure of organs, including the pancreas, liver, and blood vessels.

c. Successful intervention after birth must not only provide nutrients, but must also break the cycle of strained and apathetic mother-baby interactions.

3. Emotional Stress

a. Intense stress during pregnancy is associated with a higher miscarriage rate, prematurity, low birth weight, respiratory illness, and physical defects.

b. When a mother experiences fear and anxiety, blood supply increases to the brain, heart, and limbs resulting in decreased blood supply to the uterus. Stress hormones also cross the placenta.

c. Risks are greatly reduced when mothers have supportive significant others whom they can turn to for emotional support.

4. Rh Blood Incompatibility

a. The Rh factor is a protein that, when present in the fetus's blood but not in the mother's, can cause the mother to build up antibodies which can return to the fetus's system and destroy red blood cells.

b. Rh blood incompatibility can result in mental retardation, heart muscle damage, and infant death. The danger increases with each additional pregnancy.

5. Maternal Age and Previous Births

a. Women who delay having children until their thirties or forties face a greater risk of infertility, miscarriage, and babies born with chromosomal defects.

b. For women without serious health difficulties, those in their forties do not experience more prenatal problems than those in their twenties.

c. No relationship has been found between number of previous births and prenatal problems.

d. A teenager's body is physically capable of supporting a pregnancy. However, problems arise when adolescents do not have access to medical care or are afraid to seek it.

C. The Importance of Prenatal Health Care

1. Regular prenatal checkups help ensure the health of the mother and fetus.

2. Toxemia is an illness of the last half of pregnancy in which the mother's blood pressure increases and her face, hands, and feet swell. If untreated, it can cause convulsions in the mother and death of the fetus.

3. Lack of health insurance, psychological stress, demands of taking care of other young children, lack of transportation, ambivalence about the pregnancy, and family crises can deter mothers from obtaining prenatal care.

III. PREPARING FOR PARENTHOOD

A. Seeking Information

1. Reading books and talking to doctors about pregnancy and childbirth promote parental adjustment.

2. Information about an unfamiliar event can make it less threatening.

B. The Baby Becomes a Reality

1. The gradual changing of the mother's body makes the baby a current reality.

2. Fathers and siblings can share the reality of the baby by seeing the fetus through ultrasound images and by feeling the fetal movements when touching the mother's abdomen.

C. Models of Effective Parenthood

1. Expectant parents who have good relationships with their own parents already have positive parental models to emulate.

2. It is possible for prospective parents to rely on other sources in developing an optimistic view of themselves as parents.

D. Practical Concerns

1. Culture affects how long pregnant women continue employment and other activities.

2. American mothers often work and travel until the end of their pregnancies.

3. In contrast, Japanese mothers change their daily schedules almost immediately because they believe it is necessary to protect the health of the baby.

E. The Parental Relationship

1. Evidence indicates that pregnancy adds to rather than subtracts from family conflict if a marriage is in danger of falling apart.

2. Pregnancy changes role assignments and expectations for both the expectant mothers and fathers.

3. When a marriage is based on love and respect, parents are well equipped to face the challenges of pregnancy.