

Chapter 2

Biological Beginnings- Prenatal Development

Handouts for this Chapter

- NY Times article- The Mysterious Tree of a Newborn's Life

The basis of human development

- All cells in the body have 46 chromosomes, arranged in 23 pairs (except for the sperm and egg)

Mitosis- process in which cells reproduce, the cell's nucleus duplicates itself & the cell divides. Also, 2 new cells are formed with 23 pairs of chromosomes.

Meiosis- a cell from testes and a cell from the ovaries (egg and sperm-gametes) duplicate their chromosomes and then divide twice (4 cells are formed)

Fertilization- egg and sperm join to create a single cell (a zygote)

In the zygote- 23 unpaired chromosomes from egg and 23 from sperm combine to form one set of 23 paired chromosomes.

So... each parent contributes half genetically to the offspring.

Google: Conception Picture Slideshow

Dominant-Recessive genes

Dominant gene- always exerts its effects/ it overrides the influence of the other gene

Recessive gene- only exerts its influence if the two genes of a pair are recessive.

Ex: the recessive gene for blue eyes will show in offspring if both parents have that recessive gene (or are carriers)

Prenatal development

Conception- occurs when a single sperm cells fuses with an ovum (egg) in the fallopian tube. Also called fertilization.

3 main periods:

1. Germinal
2. Embryonic
3. Fetal

Germinal period

- Takes place in first 2 weeks after conception
- Includes creation of the zygote, cell division (mitosis), and attachment to the uterine wall

Embryonic period

- Occurs from 2 to 8 weeks after conception
- Organs start to appear
- Mass of cells is now called an embryo
- Three layers of cells form:

Endoderm- inner layer which become digestive and respiratory systems

Ectoderm- outermost which become the nervous system, skin parts

Mesoderm- middle layer which becomes bones, muscles, circulatory system, etc.

Some Videos

Inside Pregnancy

- https://www.youtube.com/results?search_query=inside+pregnancy+weeks+1+to+9&sm=1
- <https://www.youtube.com/watch?v=sivegxcp2Bk>

More on embryonic period

- Life support for embryo develops
- Three components:

Amnion- contains clear fluid in which embryo floats (shock proof)

Umbilical cord- contains two arteries and vein and connects baby to placenta

Placenta- group of tissues which pass along nutrients, oxygen, water to fetus.

The fetal period

- 2 months to birth
- At 3 months, face, forehead, chin, etc are distinguishable
- By 5th month-mother can feel movement, can distinguish sex organs
- By end of 7th month-fetus weighs approx 3 lbs and is considered viable.
- During 8th and 9 month- fatty tissue develops, kidney, heart and lungs develop further.

Trimesters

- Another way to divide prenatal development
- Germinal and embryonic period occur during the first trimester
- Viability occurs at the beginning of third trimester
- Developing baby is more susceptible to toxins during first trimester.

Prenatal testing

Ultrasound-noninvasive, rely on high frequency sound waves to detect heart beat, transformed into a visual representation of inner structures (can detect structural abnormalities)

Amniocentesis- between 15th and 18th week of pregnancy, a sample of amniotic fluid is taken and tested for disorders (chromosome & metabolic)/ can bring 1 in 200 miscarriages

Blood screening- during 16th-18th week, can detect spina bifida and down syndrome

Infertility

- Can be due to the male or female
- Woman may not be ovulating, may be producing damaged eggs, fallopian tube may be blocked
- Men may produce too few sperm or they may have mobility issues
- Hormone treatment could be helpful or IVF

Hazards to prenatal development

Prescription/ non prescription drugs

Psychoactive drugs

Incompatible blood types

Maternal diseases

Maternal poor nutrition

Maternal age

Environmental factors

Paternal factors

Teratogens

- Any agent that can cause a birth defect
- Three factors related to how damaging a teratogen can be:
 1. Dose-the greater the dose, the more damage
 2. Time of exposure-embryonic period is most vulnerable (when organs are being formed).
 3. Genetic susceptibility- linked to genetic make up of mother and baby.

Prescription/non prescription drugs

- Most harmful prescription are antibiotics, antidepressants, certain synthetic hormones, and Accutane
- Most harmful non-prescription- aspirin and diet pills

Let's watch Video on Thalidomide-

http://www.nytimes.com/2013/09/23/booming/the-death-and-afterlife-of-thalidomide.html?action=click&module=Search®ion=searchResults%230&version=&url=http%3A%2F%2Fquery.nytimes.com%2Fsearch%2Fsite%2Fsearch%2F%3Faction%3Dclick%26region%3DMasthead%26pgtype%3DHomepage%26module%3DSearchSubmit%26contentCollection%3DHomepage%26t%3Dgry743%23%2Feffects+of+thalidomide&_r=1

Psychoactive drugs

- Caffeine- risk of fetal death if more than two cups per day
- Alcohol- (FAS)
- Nicotine- preterm births and low birth weight, SIDS
- Cocaine- (reduced birth weight and length, higher excitability, slower reflexes, learning disabilities)
- Marijuana- related to deficits in memory & information processing
- Methamphetamine- (speeds up nervous system, high infant mortality)
- Heroin- babies are born addicted, tremors, irritability

Maternal Diet

- Obesity can cause still births
- Malnourishment can lead to malformation of fetus
- Lack of folic acid-can be related to spina bifida
- Eating fish (ex; sushi)-can have toxins, mercury which easily goes across the placenta and can lead to nervous system problems

Maternal age

- Adolescent mothers and over age 35 are at risk
- Higher mortality rate from teenage mothers-due to immaturity of reproductive system, own health care and education.
- Women over age 35-run risk of down syndrome child

Stages of Birth

- Occurs in three stages:
 1. Uterine contractions are 15-20 minutes, cervix begins to open. (longest stage)
 2. baby starts to enter the birth canal, contractions are more rapid and intense,
 3. Afterbirth- placenta, umbilical cord are detached.

Let's watch A Walk to the Beautiful- PBS NOVA documentary <http://www.pbs.org/wqbh/nova/body/a-walk-to-beautiful.html>

Methods of childbirth

- Medication
- Natural
- Cesarean
 - a. medical procedure done in higher risk situations.
 - b. baby is breech (buttocks are first to emerge)
 - C. when baby's head is too large, baby is lying crossways

Apgar scale

- Used to assess the health of newborns at **one** and **five** minutes after birth.
- Evaluates things such as the following: breathing effort, heart rate, body color
- Newborns are given a score for each area (either a 0,1, or 2)
- It identifies high risk infants

Infants at risk

Low birth weight- These infants weight less than 5.5 lbs.- poverty, drug use can cause this.

Preterm infants- those born three weeks or more before pregnancy reached full term (38 weeks typically full term), can be due to increased maternal age, increased stress, mother's illness, etc.

Forms/ importance of bonding

Kangaroo care- a way of holding an infant so that there is skin to skin contact, helps with preterm infants to stabilize breathing and to give more touch time with mom.

- Harder for mothers who had cesarean delivery to bond with their infants immediately.