

# Lecture One

Monday, 17 July 2017 1:19 PM

## **Prenatal Development and the Impact of Teratogens**

### Prenatal Periods

- Germinal
- Embryonic
- Fetus

### Germinal - Day One --> Day Fourteen

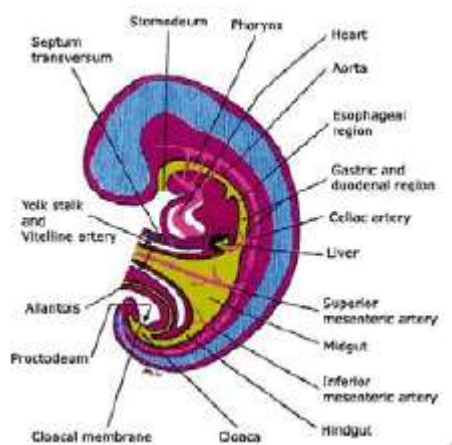


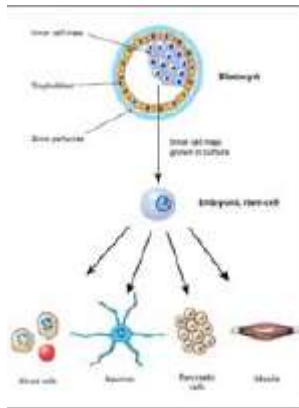
Fertilization: A period of rapid cell replication.

Placenta: Organ made up of tissue from both embryo & mother. Acts as a filter to allow exchange of nutrients, oxygen and waste products; barrier preventing bloodstreams of mother & embryo coming into contact

### Embryonic Period - Week Two --> Week Eight

### Organogenesis





Embryonic disk differentiates into 3 layers:

### Ectoderm

Becomes: central and peripheral nervous system, epidermis, hair, nails, inner ear, nasal cavity and mouth.

### Mesoderm

Becomes: muscle, connective tissue, bone, circulatory and lymphatic systems

### Endoderm

Becomes: the digestive and urinary tracts, lungs, glands, liver & pancreas

How?

- Cell differentiation
- Differential cell proliferation
- Programmed cell death
- Folding of the embryo

Week 5:

- Form is more human like
- Brain and head growth is rapid
- Forelimbs develop with digital ridges
- Heart chambers are forming
- External ear and eyes are forming

Week 6:

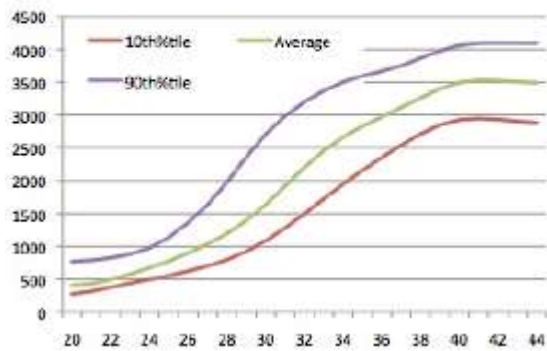
- Facial features are more distinct.
- Short webbed fingers appear
- Heart almost complete.
- Circulation is well established.
- The liver is prominent and producing blood cells.

Week 7-8

- Head is more erect and round
- The eyes are open (eyelids developing)
- Mouth, tongue and palate are complete
- Arms, legs, fingers toes can be seen
- Muscular system develops and movements begin

Foetus - Week Nine --> Week Forty

## Period of rapid growth



## Teratogenic Influences

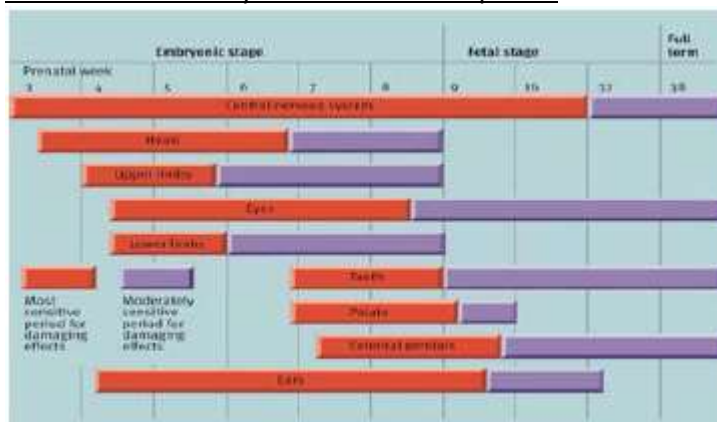
Teratogen: any environmental agent that causes damage during the prenatal period

- infections (e.g., herpes, rubella, syphilis)
- chemicals (cigarette smoke),
- radiation,
- drugs (prescribed/illicit),
- abnormal temperatures

Impact dependent upon time:

- Germinal stage – Generally Fatal
- Embryonic stage –Structural abnormalities
- Foetal stage –Functional abnormalities

## Periods of Sensitivity in Prenatal Development



Other factors influencing impact

- Tissue-specific effects
- Dose level
- Individual difference
- Effect on mother

## Illicit Drugs: Neonatal Abstinence Syndrome

Drugs:

- Amphetamines
- Barbiturates
- Benzodiazepines (diazepam, clonazepam)
- Cocaine
- Marijuana
- Opiates/Narcotics (heroin, methadone, codeine)

Symptoms:

- Blotchy skin colouring (mottling)
- Diarrhea
- Excessive crying or high-pitched crying
- Excessive sucking
- Fever
- Hyperactive reflexes
- Increased muscle tone
- Irritability
- Poor feeding
- Rapid breathing
- Seizures
- Sleep problems
- Slow weight gain
- Stuffy nose, sneezing
- Sweating
- Trembling (tremors)
- Vomiting

Complications:

- Birth defects
- Low birth weight
- Premature birth
- Sudden infant death syndrome (SIDS)

#### Prescribed Drugs

“Is there any chance that you are pregnant?”

“Not recommended for use during pregnancy”

Does the benefit outweigh the risk?

Examples include:

- Tetracycline
- ACE inhibitors
- Lithium (bi-polar disorder)
- Thalidomide

#### Fetal Alcohol Symptoms

Mother consumes alcohol during pregnancy

- No recommended ‘acceptable dose’ due to individual differences in tolerance levels
- Outcomes influenced by time and length of alcohol exposure, as well as dose..

General cognitive impairment

- Mental retardation
- Impaired motor coordination
- Attention, Memory, Language

Physical abnormalities

- Malformed heart, limbs, joints, face
- Smaller brain/head

Behavioural presentation

- Irritability ,seizures, hyperactivity, tremors

What are some of the risk factors? (i.e. why might a woman drink when she is pregnant?)

- Regular drinker prior to pregnancy – 50% more likely to drink when pregnant (HealthCanal, 2013).

- Not intending to fall pregnant, or not aware that pregnant (HealthCanal, 2013).
- Lower education levels (Marchetta et al., 2012).
- Unmarried mothers (Marchetta et al., 2012).
- Mothers aged 35-44yrs (Marchetta et al., 2012).
- Confusion about the drinking guidelines (Anderson, 2013).
- Culture and sub-culture are also likely to be risk factors.

#### Tennessee Solution: Pregnancy Criminalisation Law

What can we do about it?

- Tennessee's solution: Pregnancy Criminalization Law: criminalizes "the illegal use of a narcotic drug while pregnant, if [a woman's] child is born addicted to or harmed by the narcotic drug,".
- Local reporting suggests that the woman, Mallory Loyola, was arrested for exposing her child to amphetamine, which is not a narcotic.
- Consequences: up to 12 months jail

Now you have a deep understanding of:

- Prenatal development
- Teratogens
- As well as practice at policy-brief-style problem solving.