

## **Foundations to Child Development: Lecture 3**

### **September 20/13 – PSYC2500**

#### **Essay:**

- due Nov 18; 10 pages; 1-2 pages intro; 5-6 analysis; 1 page conclusion (on CuLearn)

SciShow Epigenetics – look up on YouTube

#### **Eye colour, skin colour**

- polygenetic – 8 genes involved, all dealing w/melanin
- no longer a single gene transmission
- the dominant-recessive gene is no longer valid

#### **Chapter 3: Prenatal Development, Birth and the Newborn**

##### **1 – from conception to birth**

##### **2 – influences on prenatal development**

##### **3 – happy birthday (in text)**

##### **4 – the newborn**

Period of the zygote:

- egg fertilized by sperm; for first 2 weeks it will grow very rapidly; implanted in the wall of the uterus
- if there are difficulties during the pregnancy, usually women will automatically abort: miscarriage, or become pregnant w/o knowing they are pregnant

#### **Prenatal structures:**

- the mother has to communicate nutrients to embryo and carry back waste
- placenta allows communication of blood of mom to the foetus; transmits nutrients
- blood vessels from the umbilical cord are of a special shape called a villi (the blood vessel is elongated and folds onto itself; the function of the shape is to optimize the intake of nutrients and output of oxygen. The villi is in the placenta.)
- umbilical cord feeds the prenatal embryo and foetus; the foetus is located in the amniotic sac and is filled with amniotic fluid. Together it's called the amnion. Starts developing in the embryonic stage.
- the blood flow may differ for twins and may be the source of differences in monozygotic twins

#### **Period of the Fetus:**

- period of when all the organs become functional
- basic structures in place
- after 3<sup>rd</sup> month, genital organs developed
- fetal movements after 4<sup>th</sup> months
- when fetal movements appear, the foetus twitches – uncoordinated movements
- the movements play a role – cartilage rather than bones if move
- by 7<sup>th</sup> month, auditory system is fully in place; can hear the outside world through mom's organs

#### **Influences on Prenatal Development:**

##### **2 Influences on Prenatal Development**

- what should a pregnant woman do while she's pregnant in order to optimize her health during pregnancy?

## General Risk Factors

- Nutrition
- Mother's age
- immediately after conception, when the **neuro tube is being formed, the organism is vulnerable to a deficiency in folic acid**
- if she is deficient, there is a chance **the neuro tube will not form completely and the fetus might be subject to spina bifida**
- nutrition can have an impact on the developing embryo
- in terms of policy: **educate women, put folic acid in the food we eat (vitamin B supplements in bread or flour)**
- severe malnutrition: if woman is malnourished during pregnancy, does that have consequences on the growing organism?
- nutrition can have important consequences on the growing fetus
- women born with all their eggs; eggs age w/us
- **after 30 years of age, that starts to be old**
- **at age 40, risk of having babies w/Down Syndrome**

## Paternal Age:

- some evidence that it may have effect on genome
- some evidence on stress – if living under strong periods of stress, might have influences on genome too
- some evidence shows that **career women who want to procreate may not nourish themselves as well as they can**
- may be at greater risk of miscarriages or difficulty conceiving

**Teratogens** – refers to environmental agents that can affect the developing genome; can be a virus that can affect the developing zygote or fetus

- **diseases:** (ex: HIV affects the developing fetus but can also be transmitted during delivery); gestational diabetes (not diabetic, just during pregnancy diabetic) – puts the child at risk for diabetes; rubella and syphilis;
- **drugs:** thalidomide (during third trimester can have morning sickness) – developed drug in 50s and tested it on animals – found that it affects the fetus; nicotine; aspirin
- **environmental hazards:** mercury (if we have fish in contaminated water) which is a heavy metal that stays in the body; cleaning products

Some systems are more vulnerable at specific times. The embryonic period (1<sup>st</sup> trimester) is the most vulnerable period because of the most growth

- not all genomes affected by same teratogen
- not all teratogens have same impact on same organ (some on cognitive, others on other limbs)
- dosage: 1 cig per day as opposed to 1 pack per day, slows down heart rhythm and embryo of fetus

## Prenatal Diagnosis and Treatment

### Diagnosis;

- ultrasound (see textbook) – allows, through projections of sound, you to see an image of the fetus; allows you to see the gender later on; also a level of resolution you can get; if down syndrome baby, can get highest resolution
- amniocentesis (in sac are cells from the fetus's skin that has been lost in the amniotic sac – can determine whether there truly is down syndrome.)

- and chorionic villus sampling

The impact of teratogens does not need to be immediate (might be observed only when child goes to school.)

### **Assessing the Newborn:**

- the newborn's reflexes
- use the APGAR scale – the lower the APGAR score, the lower the risk on the child. Has proven to be a useful tool. If the mother wants the baby on her stomach, they will respect that.
- Neonatal Behavioural Assessment Scale (NBAS) – created by physician called **Barry Brazelton** (to Youtube) \*\* administering different sections of NBAS to children
  - the newborn is born w/some reflexes
  - tend to disappear w/in the first year of life
  - if they don't disappear in time, can also be indicative of potential neurological effects

**Reflexes** – vestiges of our evolution? Advantages to survival if able to grasp while falling, orient towards where food is coming from

- do they serve as a reflex for initial learning? Reflexes ways for child to learn about the world; as they disappear, child will take control of motor behaviour to interact w/the world

**Palmar grasp reflex** – lost over the first 3 months; baby grasps finger in its hand; loses after it's able to walk

**Moro reflex** – when baby is on its back, extends arms outwards and upwards; often disappeared by 5<sup>th</sup> month

**Asymmetric tonic reflex** – lost by the 6<sup>th</sup> month in most babies

### **Newborn states (text)**

#### **four primary states:**

- alert inactivity (look unfocused; awake but not moving)
- waking activity (moving)
- crying (period with most crying is 6<sup>th</sup> to 11<sup>th</sup> week)
- sleeping (initially it is a 4-hour cycle, then 5 hours of sleep after the first 3 months)

### **SIDS**

- sudden infant death syndrome
- usually happens during 1st or 3rd month of age but can happen during 1<sup>st</sup> year
- occurs rarely
- in the 70s, started noticing that many of the infants who were dying of SIDS were sleeping on their stomach; huge education campaign saying put your baby to sleep on their back. Have noticed, over the 20 year span, that the incidents of SIDS has decreased by 50%. can also see weaker necks because parents can overdo it and make baby sleep on the back all the time.

### **Perception and Learning in the Newborn**

- newborns can:
  - see, hear, taste, smell and feel (at some level)

### **Chapter 4:**

- Growth and Health

1. Physical Growth: see text book
2. Challenges to Healthy Growth
3. The Developing Nervous System

**Malnutrition:**

- doesn't seem to be an issue in Canada, but in impoverished areas, might be an issue

**Obesity:**

- excess weight gain; can effect children as young as 2; national epidemic in Canada as well as the States; increased risk of diabetes; type 2 diabetes increased in risk even though it used to be a risk factor in seniors; want to intervene;

**Disease:**

- 10 million children under the age of 5 dying every year, mostly in developing countries  
- top 5 killers (all preventable): pneumonia, diarrhea, measles, malaria, malnutrition

**Accidents:**

ex: firearm accidents one of the leading causes of accidents in the states

**The Developing Nervous System**

- organization of the mature brain
- cortex is the top layer of the brain; made up of neurons principally; divided into hemispheres
- connections growing in frontal cortex all the way into adolescence and adulthood
- visual cortex at the back of the head (occipital lobe)
- temporal lobes at side
- auditory system

**What makes a neuron a neuron are the dendrites and the axon.** Dendrites are like the branches of a tree; communicate electrical energy through neurons. Dendrites are very important to development because the bulk of the growth we see in the cortex is dendrites becoming more branch-like. The axon varies in length. Some cells will specialize in becoming neurons, but neurons themselves will specialize.

**Myelin sheath** – a fatty substance that covers the axon to do 2 things: **speeds up communication of electrical information and influences that electrical information to pass onto the next axon over**

**Initially, axons don't have a myelin sheath.** Axons never touch each other, but they're close to each other – that physical location is called the synapse \* key feature of synapse: don't touch each other.

**Neurotransmitter (a chemical)** – like a key; opens up the axons of the next neuron and allow the electrical information to come in.