NEWBORN TRANSITION

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Transition Defined

- The period in which a fetus becomes a neonate, becoming an independent organism
- Carried out over hours or days
- Most difficult period in the human life cycle

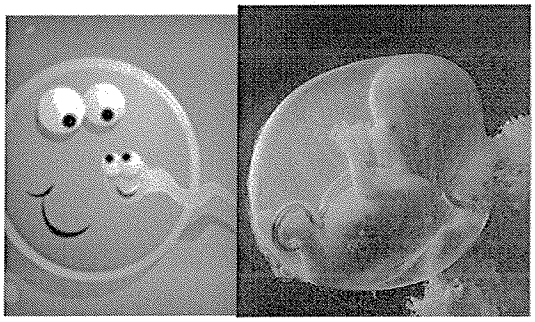
Physiologic Transition

- Most immediate are respiratory and cardiovascular changes
- Each body system goes through a transition cycle
- The successful transition of each system is dependent on the transition of the others

Stages of Transition

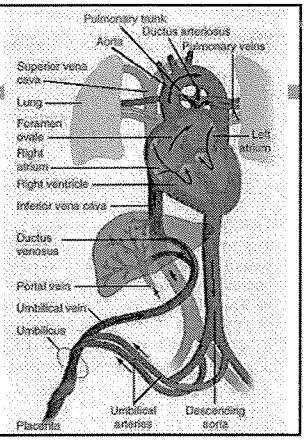
- Triggers of labor
  - Prepare the fetus for birth
- Pressure changes related to loss of amniotic fluid and uterine contractions
- Entrance into the world, exposed to new stimuli
- First breath
- Clamping the cord

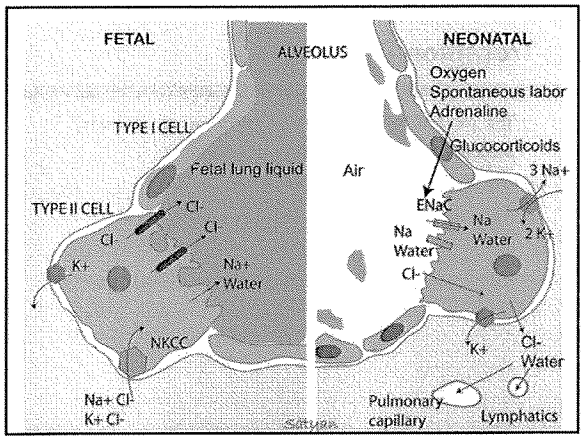
In the beginning . . .



Fetal Circulation

- Lower PaO_2
  - Enters at 30-35 mmHg
  - Leaves at 25 mmHg
- Fetal Hemoglobin (HbF)
- Presence of 3 ducts:
  - Ductus venosus
  - Foramen ovale
  - Ductus arteriosus





Transition of the Cardiovascular System

- Onset of ventilation
- Loss of placental circulation
  - Results in increase in systemic vascular resistance
- Rise in blood oxygen content
  - Causes drop in pulmonary vascular resistance
  - Flow through DA dramatically decreases

The American College of Obstetricians and Gynecologists

WOMEN'S HEALTH CARE PHYSICIANS

COMMITTEE OPINION

Number 543 • December 2012

Committee on Obstetric Practice

This Committee Opinion was developed by the Committee on Obstetric Practice with the assistance of the American Academy of Pediatrics. The American Academy of Pediatrics endorses this document. The Information should not be construed as dictating an exclusive course of treatment or procedure to be followed.

Timing of Umbilical Cord Clamping After Birth

ABSTRACT: The optimal timing for clamping the umbilical cord after birth has been a subject of controversy and debate. Although many randomized controlled trials in term and preterm infants have evaluated the benefits of delayed umbilical cord clamping versus immediate umbilical cord clamping, the ideal timing for cord clamping has yet to be established. Several systematic reviews have suggested that clamping the umbilical cord in all births should be delayed for at least 30–60 seconds, with the infant maintained at or below the level of the placenta because of the associated neonatal benefits, including increased blood volume, reduced need for blood transfusion, decreased incidence of intracranial hemorrhage in preterm infants, and lower frequency of iron deficiency anemia in term infants. Evidence exists to support delayed umbilical cord clamping in preterm infants, when feasible. The single most important clinical benefit for preterm infants is the possibility for a nearly 50% reduction in intraventricular hemorrhage. However, currently, evidence is insufficient to confirm or refute the potential for benefits from delayed umbilical cord clamping in term infants, especially in settings with rich resources.

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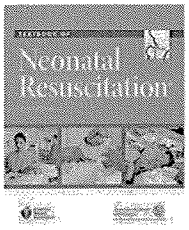
"Evidence exists to support delayed umbilical cord clamping in preterm infants, when feasible. The single most important clinical benefit for preterm infants is the possibility for a nearly 50% reduction in intraventricular hemorrhage. However, currently, evidence is insufficient to confirm or refute the potential for benefits from delayed umbilical cord clamping in term infants, especially in settings with rich resources."

Part 13: Neonatal Resuscitation
2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (Reprint)

The 2015 ILCOR systematic review confirms that DCC is associated with less intraventricular hemorrhage (IVH) of any grade, higher blood pressure and blood volume, less need for transfusion after birth, and less necrotizing enterocolitis . . . The only negative consequence appears to be a slightly increased level of bilirubin, associated with more need for phototherapy. These findings have led to national recommendations that DCC be practiced when possible. DCC for longer than 30 seconds is reasonable for both term and preterm infants who do not require resuscitation at birth

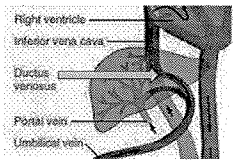
"The current evidence suggests that clamping should be delayed for at least 30 to 60 seconds for most vigorous term and preterm newborns. If cord clamping is delayed, the baby should be placed skin-to-skin on the mother's chest or abdomen, or held securely in a warm, dry towel or blanket."



"If the placental circulation is not intact, such as after a placental abruption, bleeding placental previa, or cord avulsion, the cord should be clamped immediately after birth."

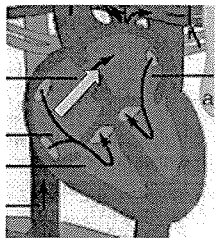
Closure of Ductus Venosus

- In late pregnancy, only ~20% flows through the DV
- Functionally closed within minutes of birth with clamping of the umbilical cord
- Anatomically closed 7-14 days
- Becomes Ligamentum venosus



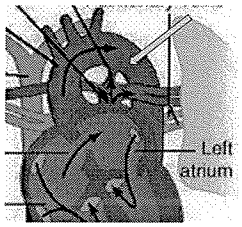
Closure of the Foramen Ovale

- After clamping the cord, left atrial pressure rises above that of right atrial pressure and the flap valve closes
- Anatomically closed by 1 month
- May remain patent in some individuals



Closure of the Ductus Arteriosus

- Flow through the DA reverses due to increasing SVR
- Functionally closed at 12-14 hours of extrauterine life
- Murmur may be auscultated during closure
- Anatomically closed at 2-3 months



Label your Hearts

1. Right Common Carotid
2. Left Common Carotid
3. Right Subclavian
4. Left Subclavian
5. Ductus Arteriosus

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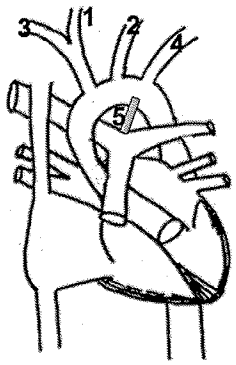
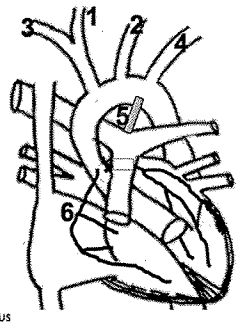


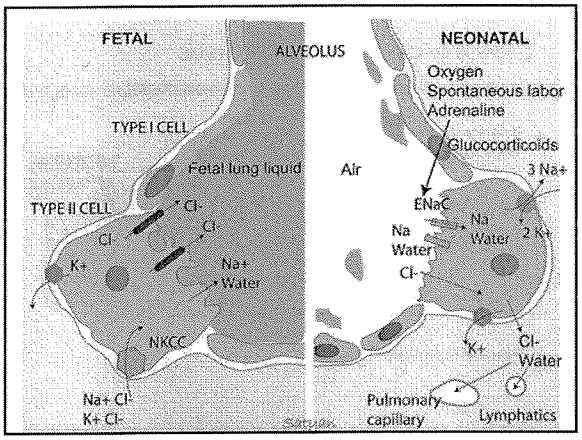
Label your Hearts

1. Right Common Carotid
2. Left Common Carotid
3. Right Subclavian
4. Left Subclavian
5. Ductus Arteriosus
6. Coronary Arteries
   - Most oxygenated blood
   - HR good indicator of O_2 status

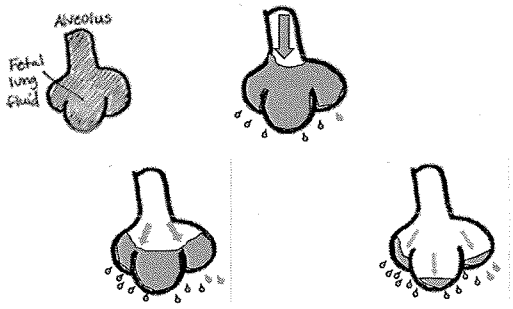


Transition of the Respiratory System

- Thorax markedly depressed in birth canal, expelling fluid as nares are exposed
  - Recoil of chest allows for passive expiration
- First breath is extremely critical in all of transition processes
  - Must occur within seconds of placental separation
  - Interdependent with cardiovascular events
  - Only term, healthy babies can do this well
- Lungs begin absorbing fluid as opposed to secreting fluid
  - Begins in early labor
  - Expedited by increased pulmonary blood flow

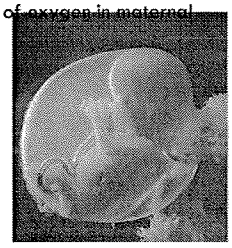


Fetal Lung Fluid Clearance



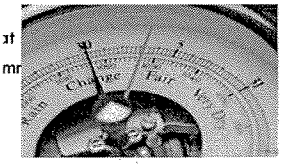
Let's talk about Oxygen . . .

- Where does the fetus get his oxygen from?
- What is the partial pressure of oxygen in maternal mixed venous blood?
  - About 40 mmHg
  - Placenta takes some, fetus gets about 30-35 mmHg
- What is the fetal SpO2?
  - About 60%



Let's talk about Oxygen . . .

- After birth, where does the newborn get his oxy---?
- Wh essure of oxygen in room air?
  - 2
  - A
  - 2



The newborn doesn't necessarily need oxygen . . .