RAMA UNIVERSITY

www.ramauniversity.ac.in

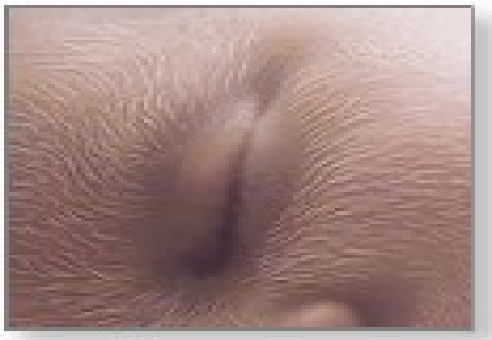
FACULTY OF NURSING

THE NEWBORN

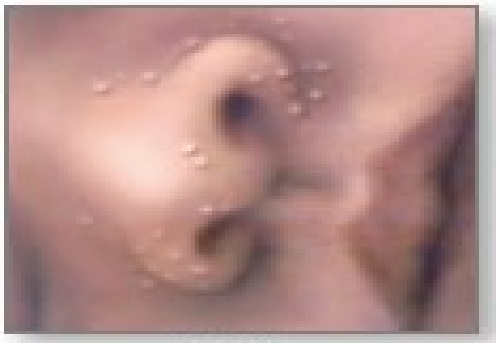
INTRODUCTION

Newborns don't emerge pink and plump. In fact, for the first few weeks, they're really kind of funny looking. When you first lay eyes on your wrinkly, red little conehead, chances are you'll think he's absolutely perfect.

CHARACTERISTICS OF NEWBORN



Lanugo



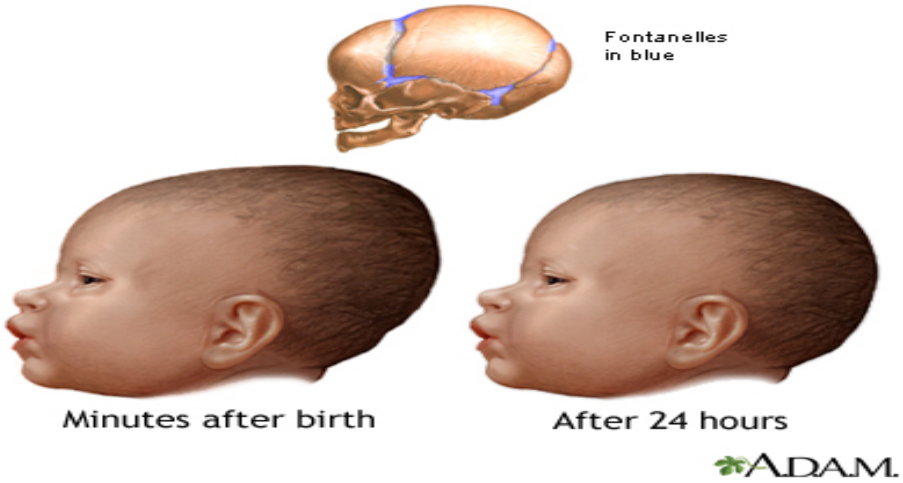
Milia

Mottling

HEIGHT AND WEIGHT

WEIGHT

- Average weight is 2.5 kilogram to 3.5 kilogram.



Head:

If you gave birth vaginally, your baby's head may be elongated or misshapen as a result of his journey through the birth canalThe two soft spots on your baby's head, called fontanels, are areas where the bones of the skull have not yet fused together, which made it possible for baby's head to squeeze through the birth canal.

Hair:

Some babies are born bald; others arrive with a full head of hair. Most newborn hair will fall out, and the hair that replaces it may be totally different in texture and color.

Eyes:

Most Caucasian babies are born with blue eyes that may go through several color changes in the first few months. They usually darken to their final color between 6 and 12 months.

Skin: Underlying blood vessels show through the new delicate skin, giving it a pinkish or reddish tone. Your newborn is wrinkly because she's just spent nine months in fluid and now she's exposed to dry air.

Umbilical Cord:

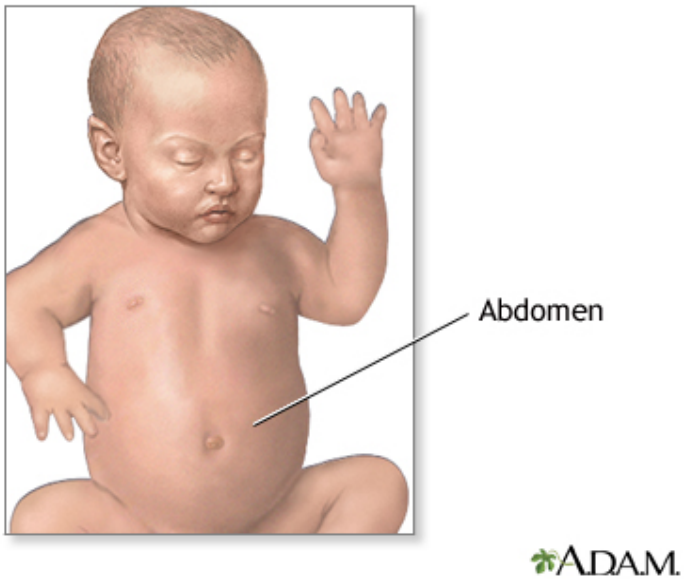
Sticky material will collect at the base of your baby's cord stump. At every diaper change, use a cotton swab to clean it. Fold the top of your baby's diaper so that it falls below the cord

Chest and Breathing –

Your baby's breathing is not like your breathing. Babies take little breaths and use stomach muscles to help breathe. You may even notice short pauses between some breaths. The rate of breathing is 30 to 60 times a minute. This is because their heart rate is rapid at 120 to 160 times a minute.

The breasts of boy and girl babies may look enlarged after birth. The hormones that cross the placenta during the last two weeks before birth cause the breasts to fill with milk

Figure 1: Figure showing enlargement of the right breast with size of 5 × 5 cm and having redness and erythema.



Abdomen

The abdomen may be round or stick out slightly. If there is redness around the umbilical cord or pus-like drainage, call your baby's health care provider immediately.

Genitals

You may notice some swelling around the genitals. Genitals are the sex organs you see outside the body. This happens because the hormones that cross the placenta before birth cause slight enlargement.

The hormones in a girl may cause the baby to have white vaginal drainage. She may also have slight vaginal spotting. This is known as a false period.

Reflexes

Your baby will be born with many reflexes for survival and safety. These reflexes are important and help your health care provider determine if your baby has a healthy nervous system.

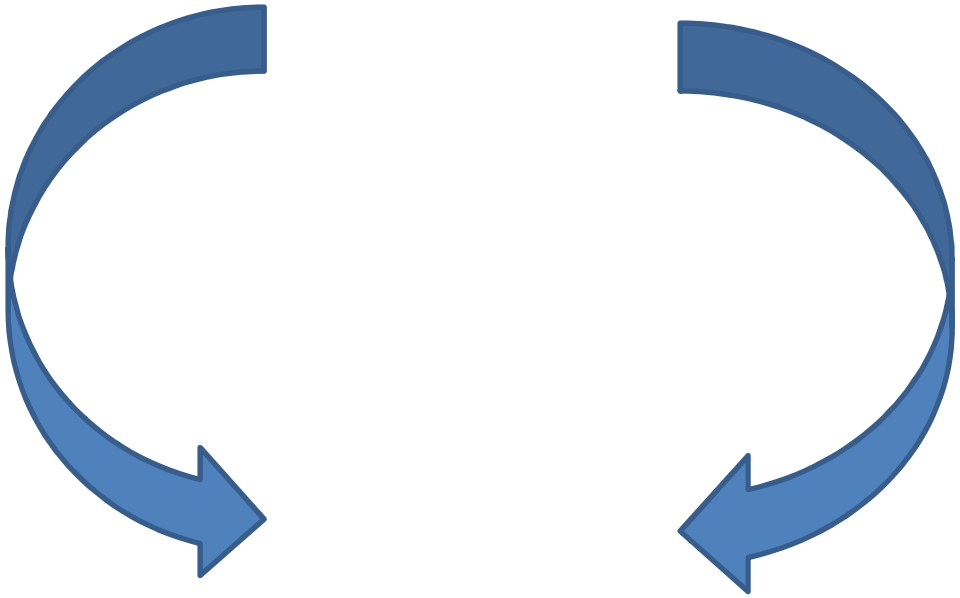
- **Survival Reflexes:**
- **Sucking , Swallowing, , Rooting – this is the reflex that occurs when the cheek or the corner of the mouth is stroked slightly.**
- **Safety Reflexes:**
- **Gag reflex – this is to prevent choking**
- **Cough – to get rid of mucus**

- **Tonic neck reflex – this is when your baby lies in a “fencing” position, also known as tonic neck reflex**
- **Moro reflex – this is when your baby will thrust out both arms when he or she is startled**
- **Grasp reflex – this is very strong at birth. If you place your finger in the palm of your baby’s hand, he or she will grasp very tightly.**

Transition to Extrauterine Life

Newborns undergo profound changes at the moment of birth.

Types of changes



Physiological Adaptations

Behavioral Adaptations

Physiological adaptation

Physiologic adaptations

- The mechanics of birth require a change in the newborn for survival outside the uterus.

- Immediately,respiratory,gas exchange, along with circulatory modification, must be occur to sustain extra uterine life.

- Although the transition usually takes place within the first 6-10 hours of life, many adaptation take weeks to attain full maturity

Anatomic and physiological comparison between newborn and fetus

Respiratory system

fetus :

fluid-filled, high-pressure system cause blood to be shunted from the lungs through the ductus arteriosus to the rest of the body.

Newborn:

Air-filled, low-pressure system encourage blood flow through the lungs for gas exchange; increase o2 content of blood in the lungs contributes to the closing of the ducts arteriosus(becomes a ligament).

Site of gas exchange

Fetus :

Placenta

Newborn :

Lungs

Hepatic portal circulation

Fetus :

Ductus venosus bypasses; maternal liver performs filtering fuction.

Newborn :

Ductus venosus closes(becomes a ligment);hepatic portal circulation begin.

Circulation through the heart

Fetus :

Pressure in the right atrium are greater than in the left,encourging blood flow through the foreman ovale

Newborn :

Pressure in the left atrium are greater than in the right, causing circulation begins.

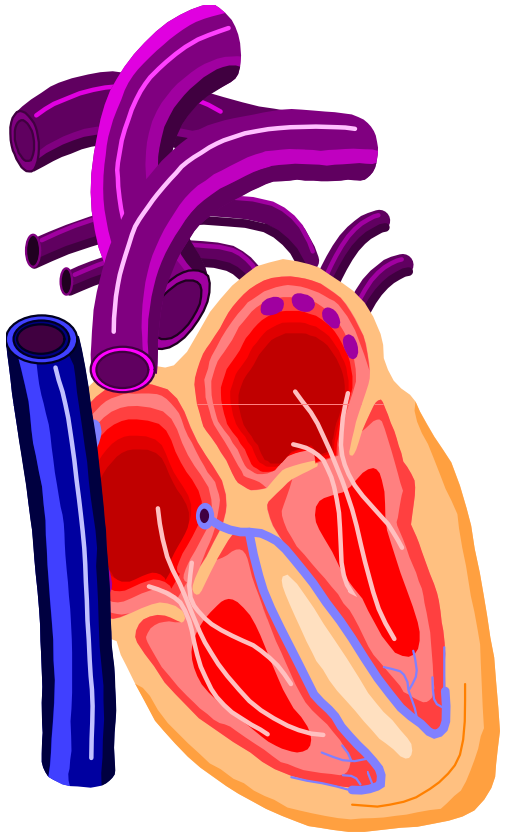
Thermoregulation

Fetus :

Body temperature is maintained by maternal body temperature and the warmth of the intrauterine environment.

Newborn :

Body temperature is maintained through a flexed posture and brown fat

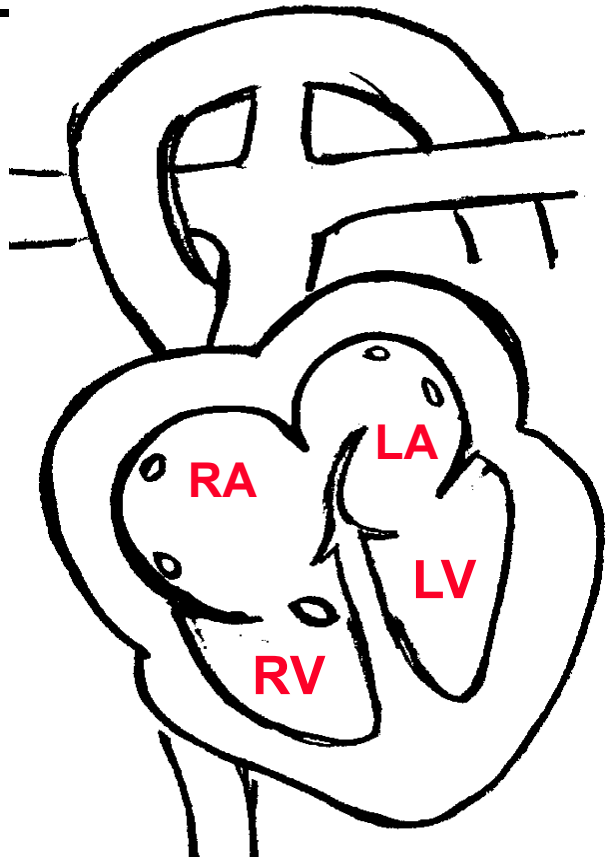


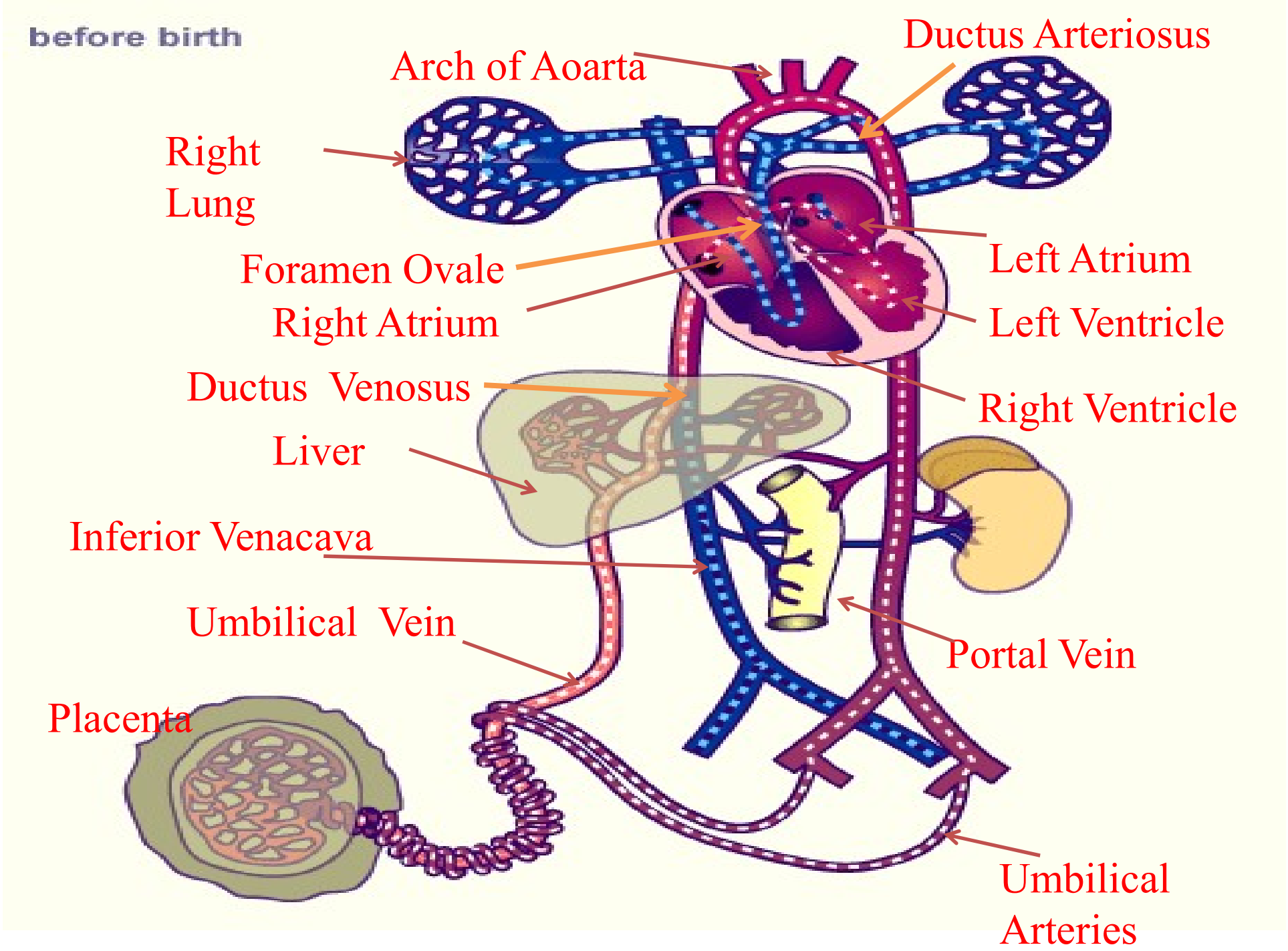
Cardiovascular Changes

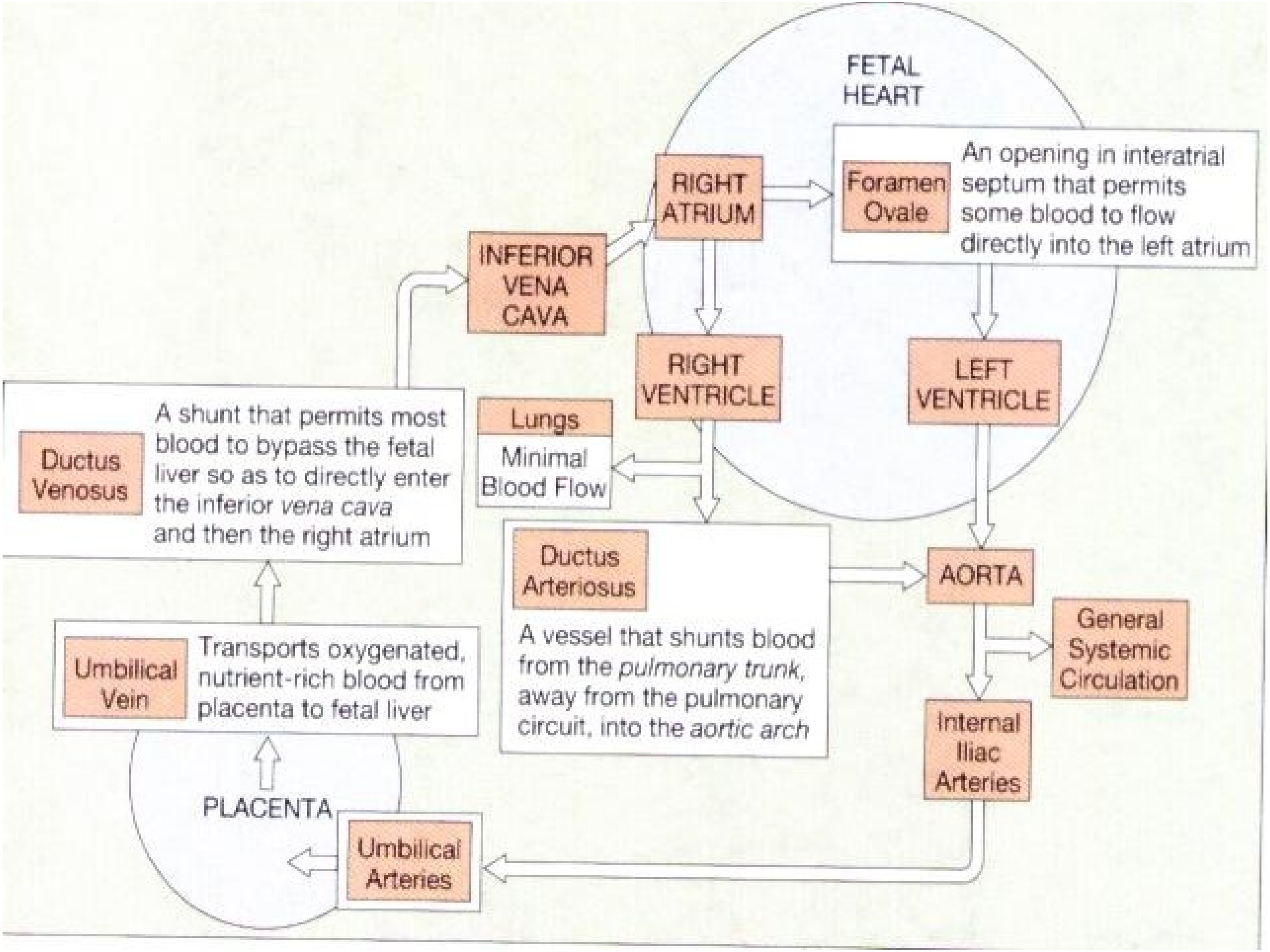
Fetal Circulation

What is the flow of blood through the fetal heart?

1. _____
2. _____
3. _____
4. _____




before birth
Ductus Arteriosus
Arch of Aoarta
Right
Lung
Foramen Ovale
Left Atrium
Right Atrium
Left Ventricle
Ductus Venosus
Right Ventricle
Liver
Inferior Venacava
Umbilical Vein
Portal Vein
Placenta
Umbilical
Arteries


FETAL HEART
RIGHT ATRIUM
Foramen Ovale
An opening in interatrial septum that permits some blood to flow directly into the left atrium
INFERIOR VENA CAVA
RIGHT VENTRICLE
LEFT VENTRICLE
Lungs
Minimal Blood Flow
Ductus Venosus
A shunt that permits most blood to bypass the fetal liver so as to directly enter the inferior *vena cava* and then the right atrium
Ductus Arteriosus
A vessel that shunts blood from the *pulmonary trunk*, away from the pulmonary circuit, into the *aortic arch*
AORTA
General Systemic Circulation
Internal Iliac Arteries
Umbilical Vein
Transports oxygenated, nutrient-rich blood from placenta to fetal liver
PLACENTA
Umbilical Arteries

At birth

- The physical forces of the contractions of labor and birth, mild asphyxia, increased intracranial pressure as a result of cord compression and uterine contraction immediately experienced after birth lead to an increased release in catecholamine that is critical for the changes involved in the transition to extra uterine life.
- The increased level epinephrine and nor epinephrine stimulate increase cardiac output and contractility, surfactant release and promotion of pulmonary fluid clearance

Fetal Structures

- When umbilical cord is clamped-the first breath is taken and the lungs begin to function as a Result
- systemic vascular resistance increase and blood return to the heart via the inferior vena cava decreases.
- With this change there is rapid decrease in pulmonary vascular resistance and increase in pulmonary blood flow.
- The foramen ovale functionally closes with a decrease in pulmonary vascular resistance

- Ductus arteriosus, ductus venosus, umbilical vessels that were vital during fetal life are no longer needed.

- Foramen ovale closes with decrease pulmonary vascular resistance

- Ductus arteriosus closes due to increase of O2 to lungs(close within few hours after birth)
- Ductus venosus close bcoz liver is activated (close within few days after birth) & convert to ligament in extra uterine life.

Changes in the Fetal Circulation after birth

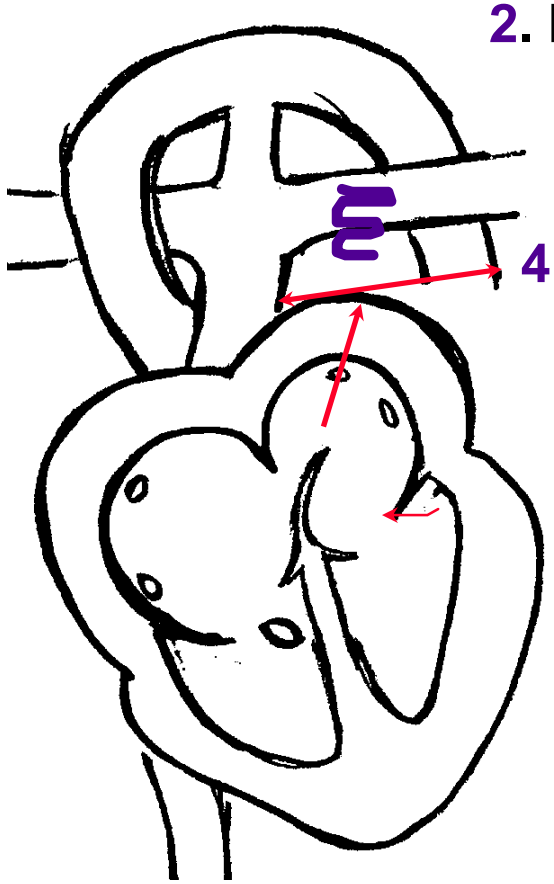
Shunt	Functional closure	Anatomical closure	Remnant
Ductus arteriosus	10 – 96 hrs after birth	2 – 3 wks after birth	Ligamentum arteriosum
Formamen ovale	Within several mins after birth	One year after birth	Fossa ovalis
Ductus venosus	Within several mins after birth	3 – 7 days after birth	Ligamentum venosum

- Umbilical arteries → Umbilical ligaments
- Umbilical vein → Ligamentum teres

Cont.....

3. Ductus Arteriosus begins to constrict

2. Blood flows to the lungs



4. Pressure in the LA increases RT Flow of blood from the lungs

1. Pressure in RA decreases

5. Increase pressure in the LA forces the foramen ovale to close

Heart rate

- first few minutes after birth, HR=120-180 bpm.
- Thereafter begin decrease to average 120-130 pbm.
- cardiac murmurs may be heard during the neonatal period as a result of changing dynamics of the cardiovascular system at birth. So It's normal during first 12 hours at newborn age.

Blood Pressure

- The newborn's average systolic blood pressure is 60 to 80 mmHg and average diastolic blood pressure is 40 to 50 mm Hg.

- Affected by crying movements of newborn.

Blood Volume

- It’s usually estimated to be 80-85 ml\kg of body with the term infant.

- Immediately after birth the total blood volume averages 300ml, but this volume can increase by as much as 100ml, depending upon the length of time the infant is attached to placenta.

Blood Components

- Rbcs newborn life span= 80-10 days
- Hb initially declines as a result of decrease ın neonatal red cell mass (physiological anemia of infancy).
- Leukocytosis is present as a result of birth trauma soon after birth.
- Newborn platelet count and aggregation ability are the same as adult.

Normal Newborn Blood Values

HB: 17-20G-DL

Hematocrit: 52%-63%

platelets: 100.000-300.000IU

Red blood cells : 5.1-5.8

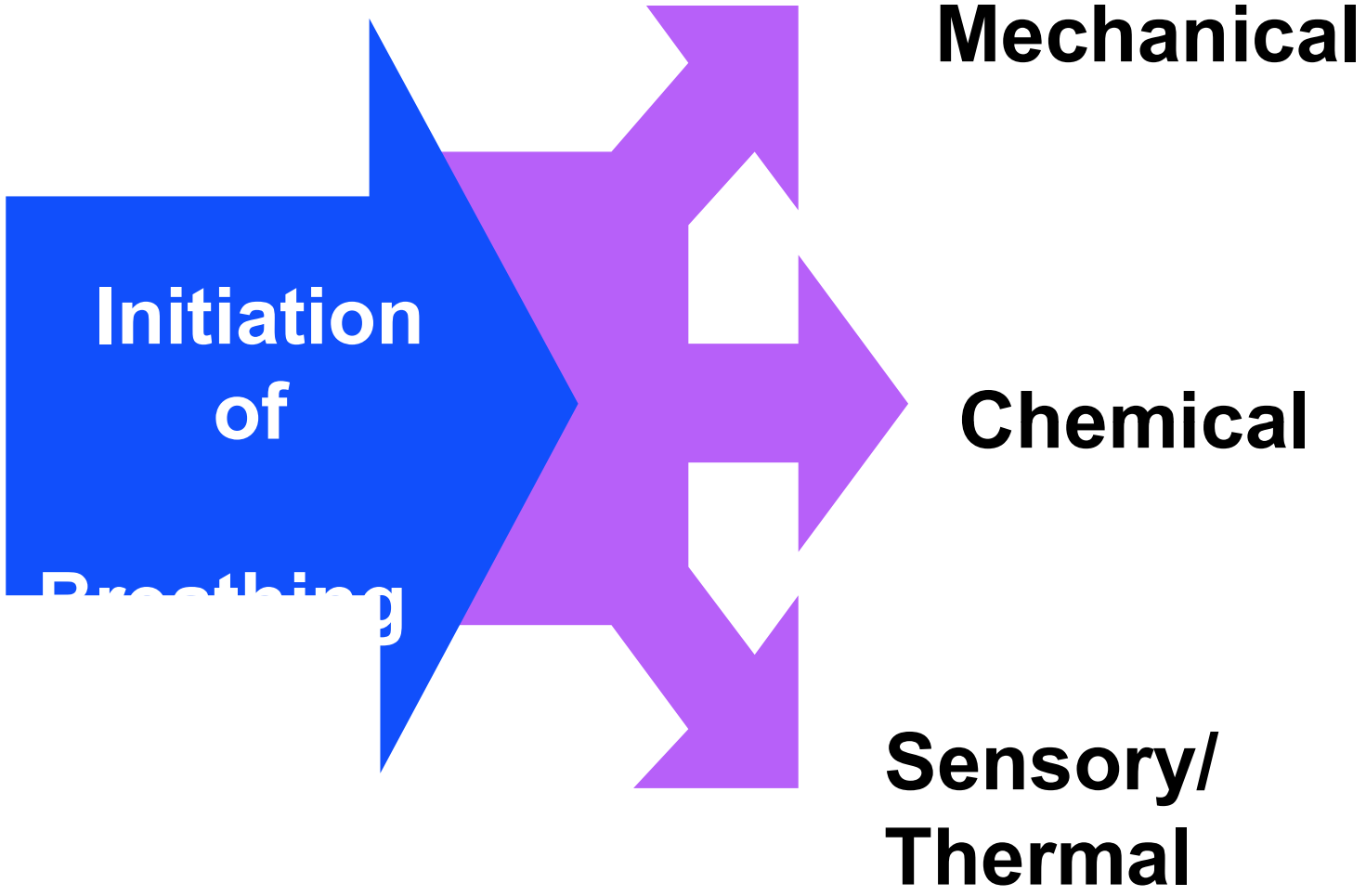
White blood cells: 10-30/mm3

Respiratory Adaptation

- During fetal life, the lungs are expanded with an ultra filtrate of the amniotic fluid. during and after birth, this fluid must be removed and replaced with air.

- passage through the birth canal allows intermittent compression of the thorax, which helps eliminate the fluid in the lungs.

- The first breath of life is a gasp that generates an increase transpulmonary pressure and result in diaphragmatic descent.


Initiation
of
Mechanical
Chemical
Sensory/
Thermal

Chemical Events

1. With cutting of the cord, remove oxygen supply

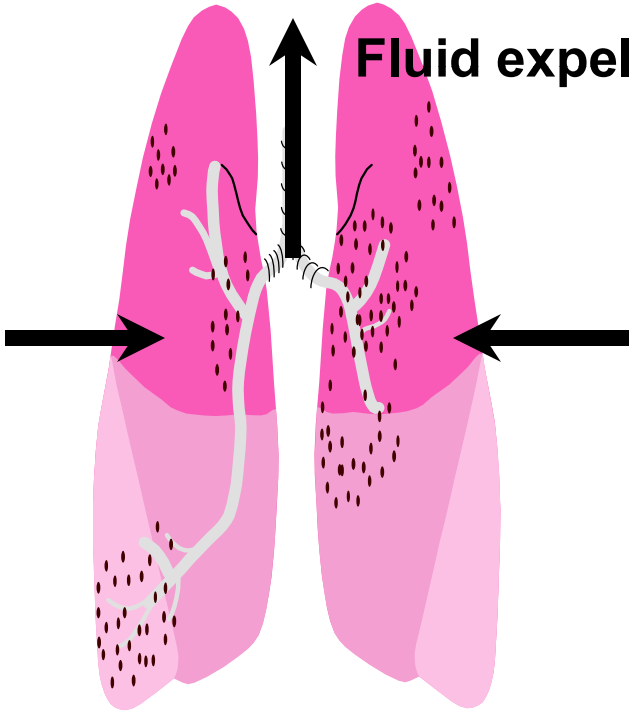
2. Asphyxia occurs

3. ↑CO_2 and ↓ O_2 and ↓ pH = ACIDOSIS

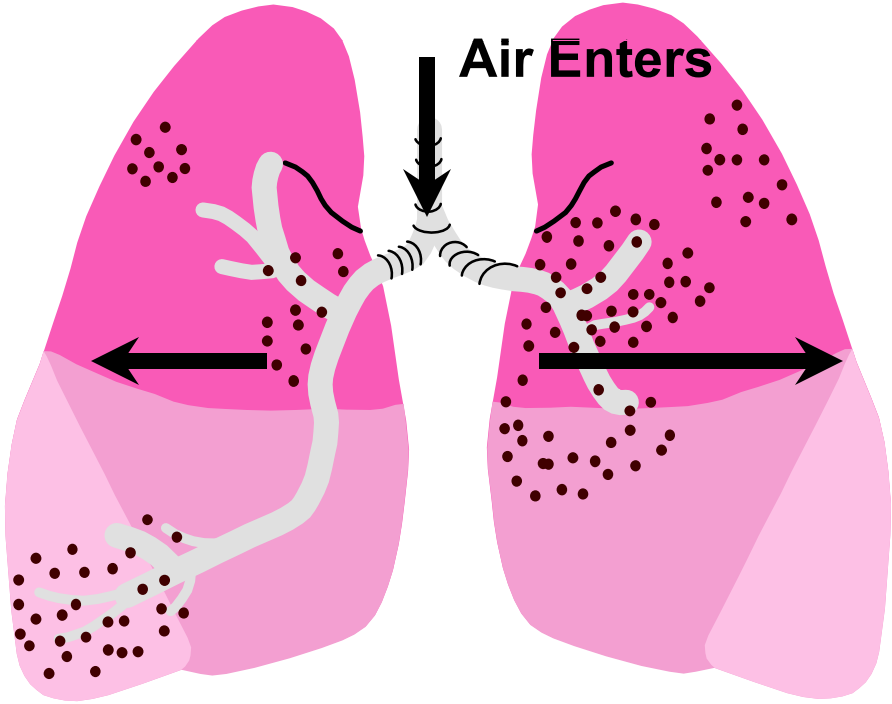
4. Acidosis state- stimulates the respiratory center in the medulla and the chemoreceptor in carotid artery to initiate breathing

Mechanical Events

- As the chest passes through the birth canal the lungs are compressed



- Subsequent recoil of the chest wall produces passive inspiration of air into the lungs



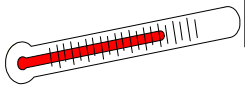
Mechanical Events

- About 60-110 ml. of fluid is squeezed out of the lungs as the chest is compressed

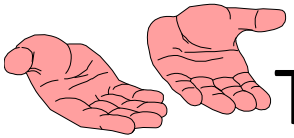
- The remaining fluid evaporates or is reabsorbed by the blood vessels and lymphatics surrounding the lungs.

- When a baby is delivered in a presentation other than vertex, it takes longer for the lungs to rid themselves of the fluid

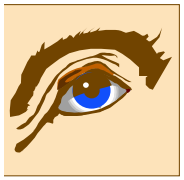
Sensory / Thermal Events



Thermal: the decrease in environmental temperature after delivery is a major stimulus of breathing



Tactile: nerve endings in the skin are stimulated



Visual: change from a dark world to one of light

Auditory: sound in the extra uterine environment stimulates the infant

Respirations

- After respiration are established in the newborn, they are shallow and irregular, ranging from 30 to 60 breaths per minute, with short periods of apnea(less than 15 second).

- In some cases, periodic breathing may occur, which is the cessation of breathing that lasts 5 to 10 seconds without changes in color or HR.

Temperature Regulation

Body Temperature Regulation

Newborn Temperature= 36.5 to 37.5c

Heat loss

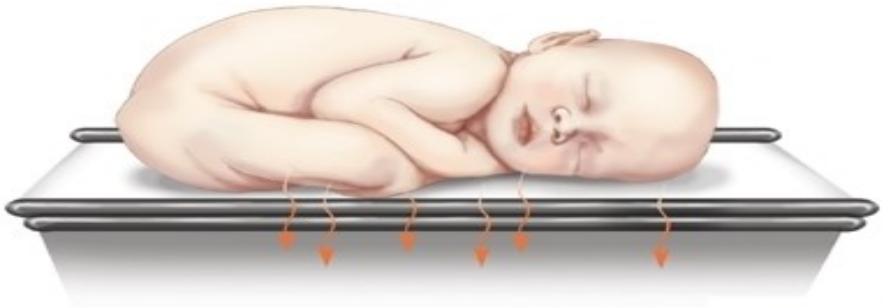
- Newborn have several area that predispose them to heat loss:
- thin skin with blood vessels close to the surface.
- lack of shivering ability to produce heat involuntarily
- limited use of voluntary muscles activity or movement to produce heat.
- large body surface area relative to body weight.

Cont..

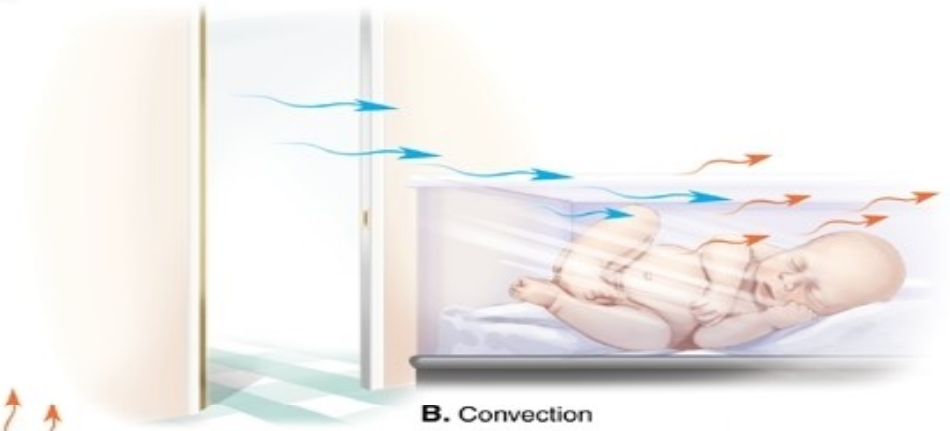
- lack subcutaneous fat, which provide insulation.
- No ability to adjust their own clothing or blankets to achieve warmth.
- Inability to communicate that they are too cold or too warm.
- little ability to conserve heat by changing posture (fetal positions).

Types of Heat Loss

- Conduction- heat loss by contact with cooler surface.
- Convection- warm body to cool air currents.
- Evaporation- water converts to vapor.
- Radiation-heated body to cooler object (no direct contact).



A. Conduction



B. Convection

C. Evaporation

D. Radiation

Heat Production

1. Increase in Muscular activity: shown by crying and restlessness which increases BMR

2. Non-Shivering Thermogenesis. a unique to newborns.

- Uses the infants stores of brown fat.

Non Shivering Thermogenesis

Skin receptors perceive a drop in environmental temperature

Transmit impulses to the central nervous system

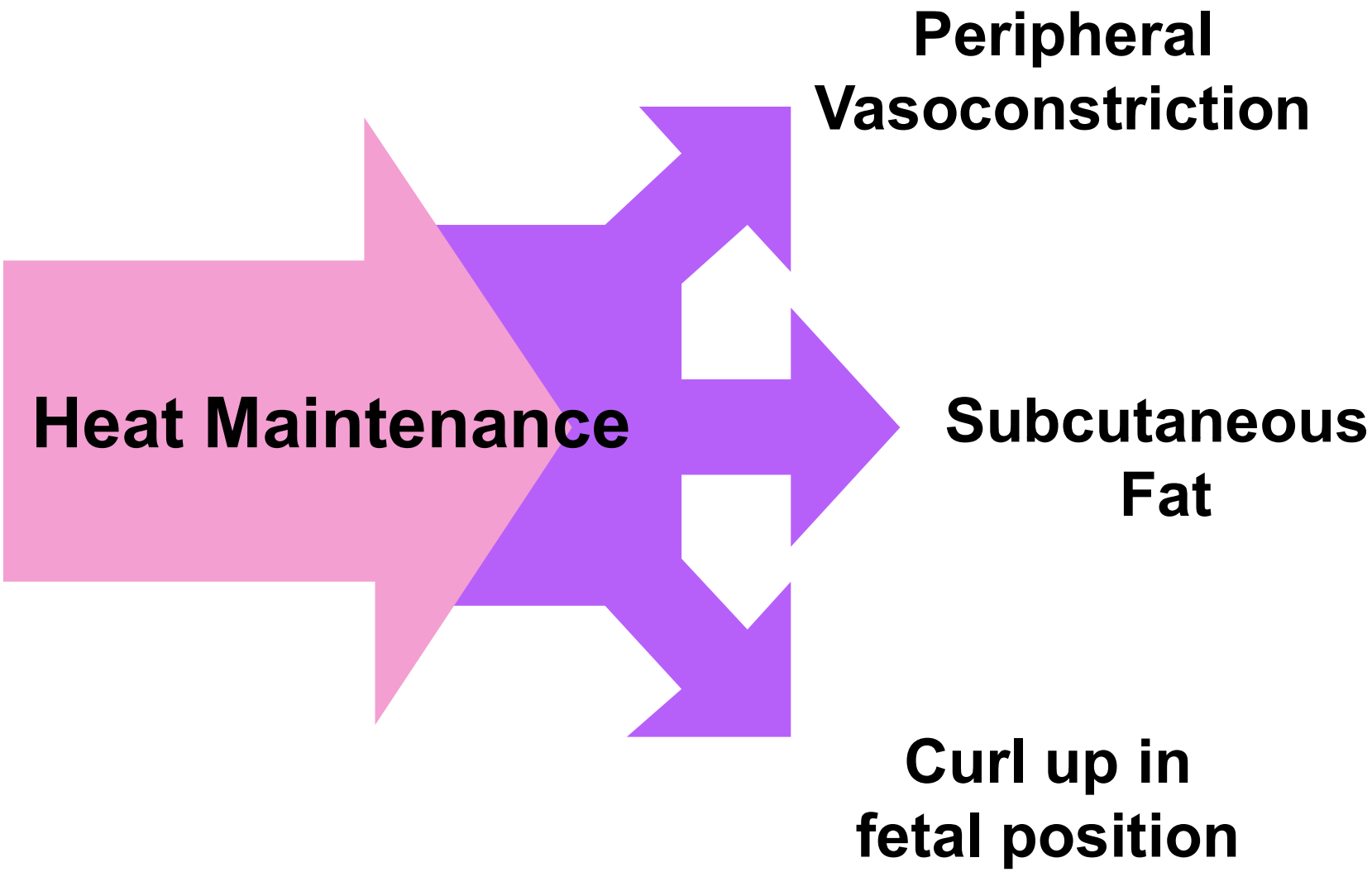
Which stimulates the sympathetic nervous system

Nor epinephrine is released at local nerve endings in the brown fat

Metabolism of brown fat

Release of fatty acids

Release of HEAT!


Heat Maintenance
Peripheral Vasoconstriction
Subcutaneous Fat
Curl up in fetal position

Hepatic Adaptation

Placenta function in fetus = liver function in newborn

- Iron storage
- Carbohydrate metabolism
- Blood coagulation
- Conjunction of bilirubin.

Bilirubin Conjugation

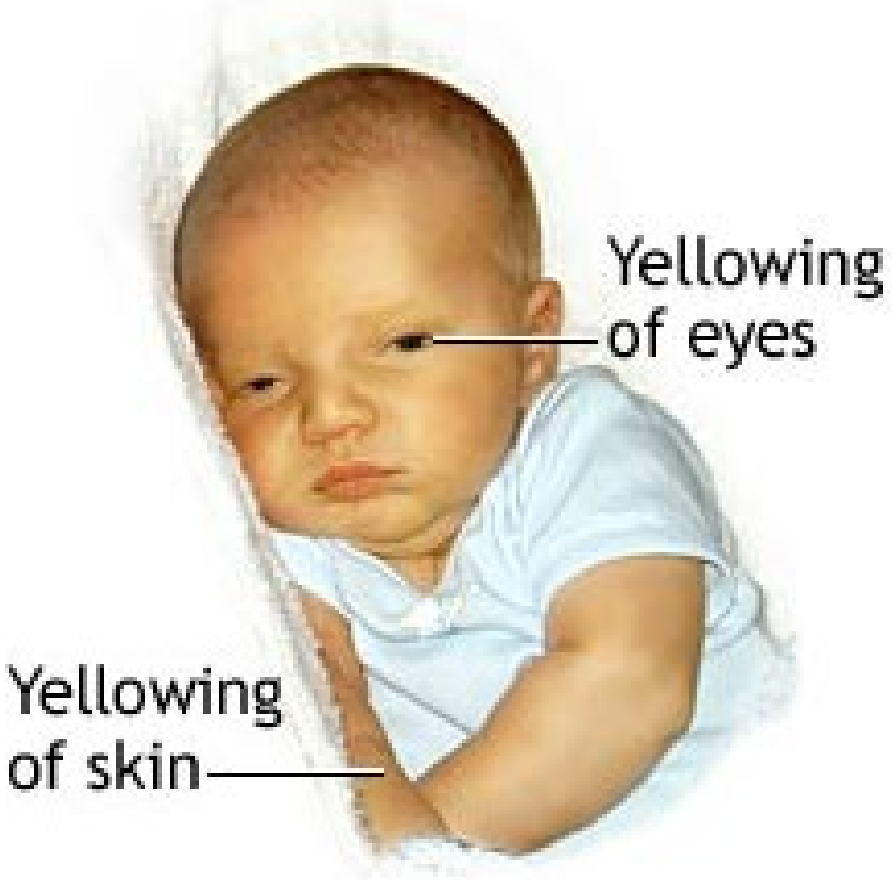
- It’s a yellow to orange bile pigment produced by breakdown of Rbcs.
- Bilirubin normally circulates in plasma, is taken up by liver cells, and is changed to a water-soluble pigment that excreted in the bile.
- This conjugated form of bilirubin is excreted from the liver cells as a constituent of bile.

- Failure of the liver cells to breakdown and excrete bilirubin can cause an increase amount of bilirubin in bloodstream, leading to Jaundice.

- When bilirubin pigment is deposited in the skin and mucous membranes, jaundice typically results.

- jaundice also known as icterus,refers to the yellowing of the skin,sclera,and mucous membranes that result from increase bilirubin blood levels.

Jaundice



Excess bilirubin
in blood

Kernicterus

Bilirubin moves
from bloodstream
into brain tissue

- Coagulation: coagulation factors are under the influence of Vit. K.

- The absence of normal flora needed to synthesize Vit. K results in low levels of vitamin K and creates a transient blood coagulation alteration between the second and fifth day after birth.

- Vitamin K is given prophylactic ally to combat potential clinical bleeding problems

Gastrointestinal Adaptation

- By 36-38 weeks of fetal life, the GI system is fully mature and ready to digest simple carbohydrates, fats, and protein.

- At birth, the ph of stomach contents is mildly acidic, reflecting the ph of the amniotic fluid.

- the gut changes rapidly, depending on what feeding is received

- The capacity of stomach : 30-90ml

Renal adaptation

Intrauterine

- Urine formed in utero and some excreted into the amniotic fluid
- Excretion of wastes is the function of the placenta

Extra uterine

- GFR is low ,decrease ability to excrete drugs
- Limited ability to reabsorb Sodium
- Decreased ability to concentrate urine
- Bladder capacity is 6 - 44 ml
- Void within the first 24 hrs. and should void 6 - 10 times per day

Immunological adaptation

- Active acquired immunity
  - Pregnant woman forms antibodies herself

- Passive acquired immunity
  - Mom passes antibodies to the fetus
  - Lasts from 4-8 months
  - Newborn begins to produce own immunity about 4 weeks of age

- The newborn depends largely on three immunoglobulins for defense mechanism:

1. IgG
2. IgA
3. IgM

integumentary adaptation

- The epidermal barrier begins to develop during mid-gestation and fully develop in 32 weeks of gestation.

- although neonatal epidermis similar to the adult in thickness and lipid compostion.Skin is not complete at birth. It’s less mature the skin function

- Also in newborn, the risk of injury producing break in the skin from tape, monitors and handling is greater than for an adult.

Neurological adaptation

- Myelin develops early on in sensory impulse transmitters.thus,the newborn has an acute sense of hearing, smell, and taste. the newborn's sensory capabilities include :
- Hearing: well developed at birth, responds to noise by turning to sound.
- Taste: ability to distinguish between sweet and sour by 72 hours old.
- Smell: ability to distinguish between mother's breast milk and breast milk from others.
- Touch: sensitivity to pain; responds to tactile stimuli.
- Vision: ability to focus on objects only in close proximity(7-12 inches way)

Behavioral adaptation

First period of Reactivity

- THE first period of reactivity begin and lasts for 30 minute.
- The newborn is alert and moving , appear hungry(movement of eyes, sucking motions; chewing; rooting. respiration and HR are elevated but gradually begin to slow as the next period)
- This period of alertness allows parents to interact with their newborn and to enjoy close contact with their new baby.
- The appearance of sucking and rooting behaviors provides good opportunity for initating breast feeding

Period of Decrease Responsiveness

- At 30-120 minute of age, the newb enters the second stage of transition, that of sleep or decrease in activity.
- Movement are less jerky and less frequent.
- HR&RR decline as the newborn enters the sleep phase.
- Muscle become relaxed, no interest in sucking is shown, here can mother and baby together take rest after labor and birthing experience.

Second Period of Reactivity

- The second period of reactivity begins as the newborn awakens and shows in interest in environmental stimuli.
- this period lasts 2-8 hours in the normal newborn.
- HH&RR increase, motor activity and muscle tone increase.
- Here interaction between mother and newborn during this second period of reactivity is encouraged if the mother has rested and desire it.

SUMMARY

EVALUATION


thank
you