

The new born and family

**Adjustment to extra uterine
life**

Immediate new born and family Adjustment to extra uterine life:



- The most important physiological change required from the neonate after birth is the transition from fetal/placental circulation to independent respiration.
- The first 24 hours of life are very critical because respiratory distress or circulatory failure can occur rapidly with little warning.
- Changes in the various organs/systems that lead to the adjustment to extra uterine life include:

Respiratory system:

First respiration is initiated by:

1. Chemical factors: after clamping the umbilical cord O_2 decrease, CO_2 increase and PH decrease, these changes in the blood initiate impulses that excite the respiratory center in the medulla.

2. Thermal stimulus: this is due to sudden chilling of the infant after delivery the transfer from the warm uterus to the cooler atmosphere excite sensory impulses in the skin that are transmitted to the respiratory center.

What occurs during the first breath?

- The air entering into the lungs with the first breath is faced with the surface tension of the fluid in the lungs & the alveoli, this fluid is absorbed via the lymphatic system & pulmonary capillaries and part of it is removed by the labor force

- If delivery was by cesarean section the lungs will not be compressed to help in removing the fluid within them & suctioning has to be done.
- The presence of surfactant helps in reducing the surface tension in the alveoli & without this substance the recoiling characteristic of the lungs will permit any air exchange to take place.

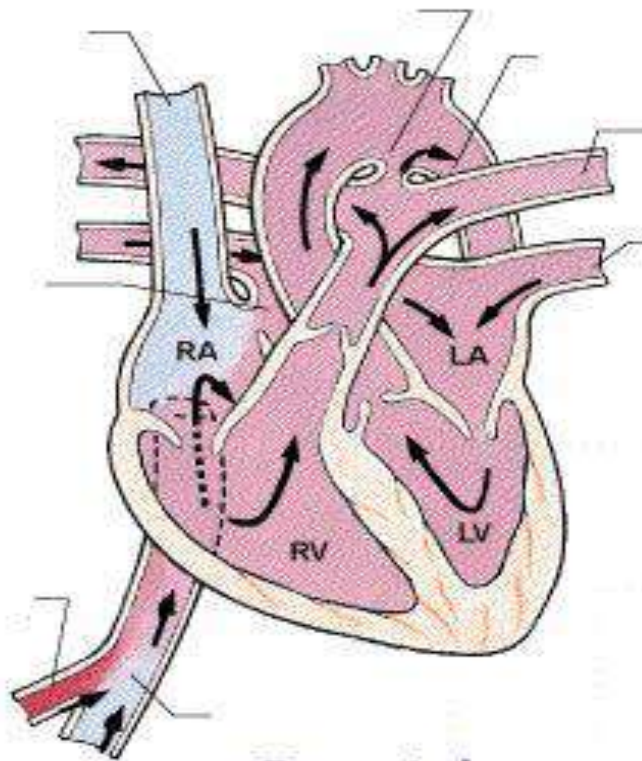
Circulatory system:

Anatomy Reviews Changes in Circulation at Birth (Ch. 34)

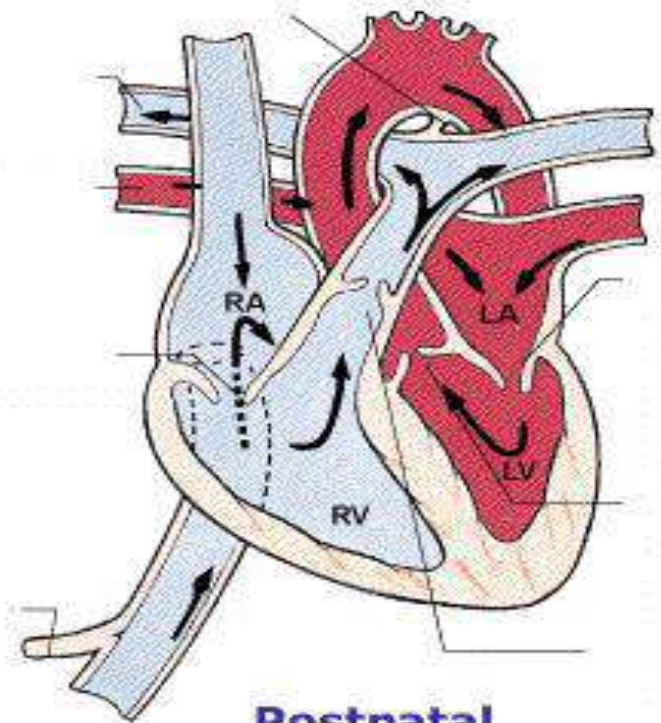
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- Tricuspid valve
- Ligamentum arteriosus
- Pulmonary artery
- Aortic valve
- Patent ductus arteriosus
- Descending aorta
- Foramen ovale
- Superior vena cava
- Ductus venosus
- Inferior vena cava
- Pulmonary vein
- Mitral valve
- Ligamentum teres
- Pulmonic valve



Prenatal Circulation



Postnatal Circulation

- **Initiation of respiration allows blood to flow through the lungs leading to changes in the circulation which are due to the changes in the lungs, heart and major blood vessels.**

The changes are gradual and include:

- **Closure of Foramen Ovali (closes functionally soon after birth)**
- **Closure of Ductus Arteriosus (closes functionally by 4th day of life)**
- **Closure of Ductus Venosus, clamed (extension of the umbilical cord)**

- The expansion of the lungs causes the pulmonary vessels to dilate decreasing the vascular resistance in the lungs so the pulmonary blood flow increase, so the pressure in the Rt atrium, Rt ventricle & pulmonary artery decrease.
- The most important primary factor controlling ductal closure is the high concentration of Oxygen level in the blood.

Secondary factors are:

- Decrease in endogenous prostaglandin and acidosis
- Murmur may be present because these changes are gradual and cyanosis may occur during crying or straining

Physiological status of other systems:

- **Thermoregulation:** It is very important after establishment of respiration, the newborn's heat production is adequate but there are factors that predispose to heat loss are:
 - Large surface area; this is compensated for by the flexed position which is the usual position of the newborn
 - The thin layer of subcutaneous fat

Newborns lose heat by four separate mechanisms:

a. convection: الحمل الحراري the Flowing of heat from the newborn's body surface to cooler surrounding air.

b. conduction: التوصيل is the transfer of body heat to a cooler solid object in contact with a baby.

c. radiation: الإشعاع is the transfer of body heat to a cooler solid object not in contact with the baby,

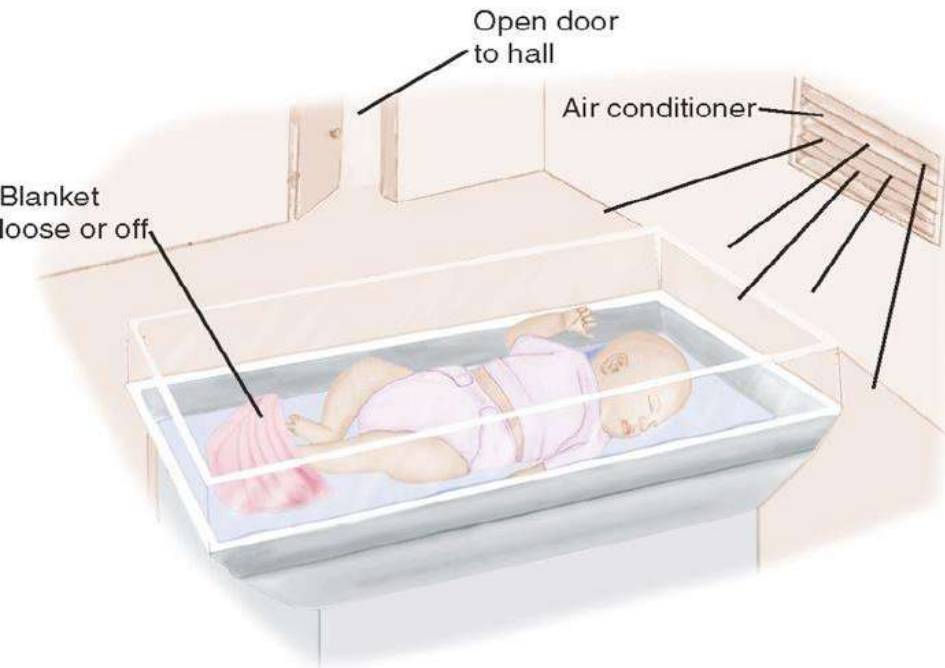
d. evaporation: التبخر is loss of heat through conversion of a liquid to a vapor.



Evaporation can occur during birth or bathing from moisture on skin, as a result of wet linens or clothes, and from insensible water loss.



Conduction occurs when the infant comes in contact with cold objects or surfaces such as a scale, a circumcision restraint board, cold hands, or a stethoscope.



Convection occurs when drafts come from open doors, air conditioning, or even air currents created by people moving about.



Heat is lost by radiation when the infant is near cold surfaces. Thus, heat is lost from the infant's body to the sides of the crib or incubator and to the outside walls and windows.

Hemopoietic system:

The blood volume depends on the time of clamping of the umbilical cord, which may increase 100 ml if it is closed after the cessation of pulsation in the cord. Blood volume in the full term newborn is 80-85ml/kg (total is 300ml)

Hemoglobin level averages 17 to 18 g/100 mL of blood . The Hematocrit is between 45% and 50%.

- **Fluid & electrolyte balance: at term total body fluid is 73% (adult 58%). The infant has higher ratio of extra cellular fluid than the adult and also higher level of total body sodium & chloride and lower level of potassium, magnesium& phosphate.**

- The infant's rate of metabolism is twice as great in relation to body weight than the adult so twice as much acid is formed that may lead to acidosis.

Gastrointestinal system:

- Enzymes are adequate to handle proteins and simple sugar
- Deficient production of pancreatic amylase impairs utilization of complex carbohydrate also decreased lipase limits absorption of fat high saturated fatty acids.

- The Liver is the most immature organ in the gastrointestinal system, the reduction of Glucuronyl transferase affects the conjugation of bilirubin with Glucuronic acid which contribute to the physiologic jaundice of the newborn.

- Deficient formation of plasma proteins causes edema
- Prothrombin & other coagulation factors are low
- Less amount of glycogen is stored leading to hypoglycemia which is prevented by early breast feeding

- Saliva is produced adequately by 2-3 months
- Stomach capacity is 90ml
- The intestine is relatively longer with big number of secretory glands and large absorption surface.
- The peristaltic waves are rapid in the intestines but slow in the esophagus & with the relaxed cardiac sphincter regurgitation is common.

- Progressive change in the stooling pattern is sign of properly functioning G I system
- Meconium is passed within the 1st 36 hours – transitional stools 3rd day after feeding then milk stools 4th day
- In breast fed infants stools are yellow-golden & frequent (6 times/day)
- In formula fed infants stools are pale yellow-light brown firm offensive (1-3 times / day).

Renal system:

- Concentration ability is diminished, total urine volume 200-300ml by 1st week.
- Bladder volume is 15ml about 20 voiding/day. Urine is colorless, odorless. Specific gravity: 1.020. The newborn should void within 1st 24hrs after birth.

Integumentary system:

- The epidermis & the dermis are loosely bound so blister will develop if the plaster tape is removed rapidly.
- Sebaceous glands are active during fetal life, vernex caseosa (white cheesy cream like substance) covers most of the skin of the newborn & mainly skin folds

- Plugging of the sebaceous glands leads to Milia; white spots over the nose & chin
- - Eccrine sweat glands active & produce sweat in response to heat or emotional stimuli in the newborn retention of sweat leads to miliaria. These glands start functioning at 34weeks of gestation. The amount of sweat is used to assess pain in the newborn.
- Apocrine glands are not active until puberty.

Musculoskeletal system:

- It contains cartilage more than ossified bone. The process of ossification is rapid during infancy.
- The muscular system is almost completely formed at birth & growth in muscles is by hypertrophy rather than hyperplasia of the cells

Neuromuscular System

Mature newborns demonstrate neuromuscular function by moving their extremities, attempting to control head movement, exhibiting a strong cry, and demonstrating newborn reflexes.

Limpness (Flaccidity) or total absence of a muscular response to manipulation is never normal and suggests narcosis, shock, or cerebral injury.

APPEARANCE OF A NEWBORN

Skin:

Color

Most term newborns have a ruddy complexion because of the increased concentration of red blood cells in blood vessels and a decrease in the amount of subcutaneous fat, which makes the blood vessels more visible.

Cyanosis : Generalized mottling of the skin is common. Acrocyanosis is a normal phenomenon in the 1st 24 to 48 hours after birth;

Hyperbilirubinemia : Hyperbilirubinemia leads to jaundice, or yellowing of the skin. This occurs on the second or third day of life in about 50% of all newborns, as a result of a breakdown of fetal red blood cells (physiologic jaundice).

If the level rises to more than 10 to 12 mg/100 mL, the treatment which is usually considered is: Phototherapy

Harlequin Sign : Occasionally, because of immature circulation, a newborn who has been lying on his or her side appears red on the dependent side of the body and pale on the upper side.

Birthmarks

Mongolian Spots:

Mongolian spots are collections of pigment cells (Melanocyte) that appear as gray patches across the sacrum or buttocks and possibly on the arms and legs

Mongolian spot



Milia



Vernex caseosa is :a white, cream cheese–like substance that serves as a skin lubricant in utero. Usually, it is noticeable on a term newborn’s skin, at least in the skin folds, at birth.

During the 1st bath of vernex is washed away slightly the bath is done when the newborn’s body temperature stabilize.

Lanugo :is the fine, downy hair that covers a newborn’s shoulders, back, and upper arms.

Desquamation : Within 24 hours after birth, the skin of most newborns has become extremely dry. The dryness is particularly evident on the palms of the hands and soles of the feet.

Milia All newborn sebaceous glands are immature. At least one pin-point white papule (a plugged or unopened sebaceous gland) can be found on the cheek or across the bridge of the nose of almost every newborn.

Head

A newborn's head appears disproportionately large because it is about one fourth of the total body length; The forehead of a newborn is large and prominent.

Molding

The part of the infant's head that engaged the cervix (usually the vertex) molds to fit the cervix contours during labor.

The head will restore to its normal shape within a few days after birth.

Nursing care of a newborn and family in the post-partum period

Period newborns are usually kept in either a birthing room or a transitional nursery for optimal safety in the first few hours of life.

- * Initial Feeding
- * Bathing
- * Sleeping Position
- * Diaper Area Care
- * Umbilical care
- * Metabolic Screening Tests
- * Vitamin K Administration
- * Circumcision

Apgar score assessment of the new born

SIGN	SCORE 0	SCORE 1	SCORE 2
Activity	Flaccid	Some flexion	Well flexed
Pulse	Absent	<100 per minute	>100 per minute
Grimace	No response	Grimace	Cough or sneeze
Appearance	Pale/Blue	Blue extremities	Completely pink
Respiration	Absent	Weak	Good cry

- **Apgar score interpretation:**
- (1-4) High Risk
- (5-7) Moderate Risk
- (7-8) Small Risk.
- (10) Normal
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Thank you for listening

