**GENERAL CHARACTERISTICS OF A NORMAL NEWBORN**

**APPEARANCE**

A normal newborn at term weighs about 2.5-4 kgs with a crown to heel length of 50 cms.

The occiptitofrontal diameter is 32-36 cm

Generally the heal of a newborn is a quarter of the body size, the abdomen is prominent

The term baby will lie in a ﬂexed position with the head in the midline or turned slightly to one side. The hands are ﬂexed, with the thumb lying beneath the fingers in a fist

**PHYSIOLOGY OF THE NEWBORN**

**THE SKIN**

In a newborn the skin has a number of roles:

Temperature regulation because of the stored fats under the skin

Infection prevention by acting as a mechanical barrier

Reflecting the baby’s well being. The colour of the skin is generally considered a reﬂection of good health

**CHARACTERISTICS OF A NEWBORNS’S SKIN**

At birth the newborn’s skin is sterile but when exposed to air it becomes colonized with bacteria which produce a skin pH of 4.9 from the initial pH at birth which is 6.4. This low pH creates an acid mantle which protects the skin against infection.

Newborns has vernix caseosa which is a complex mixture of proteins and fatty acids . It has antimicrobial properties therefore should be allowed to absorb into the skin.

Post term babies have a cracked and dry skin which peels within a few days exposing a newly perfect skin. Therefore you are not supposed to apply anything on that skin.

The umbilical stump is rapidly colonized, necroses and dries off by process of dry gangrene within 7-15 days. The cord is a route of entry for most microorganisms such as eschelichia coli form stool contamination therefore you must observe for sins of contamination in the surrounding skin known as umbilical flare.

The baby is covered with hair known as lanugo.

The colour of the skin depends on the baby’s ethnicity with a Mongolian spot at the sacral area

A mature baby has plentiful of skin creases on the palms of his hand and soles of his feet, nails are fully formed and adherent to the tips of the fingers or extending beyond.

Hair is soft and silky

Ear cartilage is well formed

Sebaceous glands are present but not active in the first days.

The vasoconstriction reflexes are underdeveloped therefore the vasoconstrictor mechanism responsible for temperature regulation is inefficient.

The infant is susceptible to sunburns because of poor melanin pigment production

**Birth marks**

Newborns have vascular birthmarks found at birth . vascular proliferations I the skin will resolve and involute in time.

The marks include

1. Salmon patch hemangioma whereby superficial capillaries blanche on pressure.
2. Strawberry hemangioma red benign on the orfices
3. Cavernous hemangioma invades vascular tissues leaving a blue discolouration on the skin

Other vasculature malformations on the skin do not involute therefore they remain such as:

1. Port wine stain- red purple markings
2. Pigmented birthmarks such as Mongolianblue spot,pigmented naevi and milia also known as milk spots

**RESPIRATORY SYSTEM**

For every newborn the respiratory system is one of the important systems to consider. It is developmentally incomplete at birth with narrow peripheral lumen predisposing the baby to airway obstruction. Growth of the new alveoli continues for several years.

The mucous membranes are very delicate and more prone to trauma and bruising especially the vocal cords.

The newborn has a short neck and poorly supported tongue hence they may supper from partial airway obstruction when placed in supine position.

The baby has plentiful of respiratory secretions therefore you will need to aspirate them.

Normal baby has a respiratory rate of 40-60 breaths per minute but should not exceed 60bpmand an erratic breathing pattern with shallow and irregular patterns interchanged with brief 10-15 seconds period of apnoea .

The baby’s breathing pattern is affected during sleep and waking. Something important to note is that babies are obligatory nose breathers and cannot transition to mouth breathing incase of an obstruction automatically.

The baby has a lusting cry to evoke response from his attendants and when they are breathing they develop transient cyanosis and an altered pressure gradient during the first days of life and may lead to opening of the right to left shunt.

**CARDIOVASCULAR SYSTEM**

At birth the child has a heart rate of 110-160 beats per minute and fluctuates as per respiratory function, activity and sleep state.

At birth the cord should not be clamped immediately so that to allow oxygenated blood to be transferred from the placenta to the baby for about 5 minutes. As a result of this delay the total circulating blood in the newborn may exceed the normal of 89-90ml/kg. this also helps to ward off neonatal deficiency anaemia.

Newborns are known to have very high hemoglobin levels of 18-22g/dl and a high number of circulating red blood cells about 5-7\*10^12/L

This excess RBC means that there will be increased rate of RBC breakdown causing physiological jaundice.

Newborns have a type of hemoglobin known as HBF which is formed from 36 wks gestation and is not completed until 1-2 years of life.

The newborn has also an elevated white blood cell count which then drops to normal levels later.

They usually have mild cyanosis due to sluggish blood flow to the periphery.

The blood pressure fluctuates between 50-55/25-30 mmhg upto 80/50 mmhg in the first 10 days of life.

Physiological immaturity if the liver results in low production of liver enzymes known as glucronyl transferase for conjugatrion of bilirubin. This together with high levels of RBC breakdown results in transient jaundice within 3-5 days.

RBCs are broken down in the liver and predisposes the newborn to jaundice. The newborn has immature blood clotting system because there is no passage of mother’s coagulation factors across the placenta.

Vitamin K is poorly transferred between the mother and the baby and also present in very low amounts in breast milk. Together with a delayed colonization of the gastrointestinal system by bacteria which synthesize vitamin k the newborn has low vitamin K.

Therefore they have a deficient in vitamin K dependent factors of clotting…II (prothrombin) ,VII,IX,X. This inhibits their blood clotting ability. Vitamin K can be administered at birth .

**THERMOREGULATION**

Temperature regulation is inefficient at birth due to the prematurity of the hypothalamus therefore the baby is at risk of hypothermia when exposed to cold

The baby is unable to shiver and during cold they maintain a flexed fetal posture increase respiratory rate and heart rate. These activities increase calories consumption and may lead to hypoglycemia

Their normal body temperature is 35.5 degrees to 37.3 degrees celcius

A normal healthy clothed term baby will maintain this body temperature satisfactory provided the environment temperature is sustained between 18 -21 degrees celcius. Hypethermia may occur when the baby is exposed to radiant heat source

**RENAL SYSTEM**

At term the newborn’s kidneys are functional but have a limited workload and functionally immature.

About 20% of babies will pass urine in the birthing room and this should be noted. Ninety per cent will void by 24 hours of age and 99% by 48 hours.

The rate of urine formation varies from 0.05 to 5.0 ml/kg/hour at all gestational ages with a range of 25–300 ml/kg/day. The commonest cause of initial delay or decreased urine production
is inadequate perfusion of the kidney.

Added to this, the kidneys are immature and the glomerular filtration rate is low, but mature within the first month of life.

They have a low glomerular filtration rate and tubular reabsorption rate therefore the infant is not able to concentrate or dilute urine in response to a variable stimuli.

Due to this they have a very narrow margin between homeostasis and fluid overload or underload. They are at risk of nephrotoxicity because they cannot excrete drugs effectively.

They pass urine within 24 hours of delivery and the urine is dilute, straw colored, odorless, Cloudiness caused by mucus and urates may be present until fluid intake is increased. The urate present will cause urine to appear pink which is insignificant

**THE GASTROINTESTINAL SYSTEM**

This system is structurally complete but functionally immature in terms of its functions. The teeth are buried in the gums and the enzyme ptyalin production is low.

The mucous membrane of the mouth is pink and moist.

The tongue may be coated with milk plaques,

The bay has a coordinated sucking and swallowing reflexes at birth.

The stomach has a total capacity of 15-30 mls which increases in the first few weeks.

The newborn has a weak cardiac sphincter therefore predisposing them to regurgitation and posseting.

The acidity of the stomach is the same as in adult at birth but by the 10th day they develop achlorhydric without acid therefore they are at risk of infections from the mouth.

Gastric emptying is normally 2.5-3 hours.

The baby has diminished ability to digest compound carbohydrates and fat due to a deficiency in enzyme amylase and lipase. The GIT is sterile at birth but becomes colonized with bacteria within few hours of delivery.

The bowel sounds are present within the first few hours after delivery.

Feeding is accompanied by a reflex to empty the bowels.

When milk enters the stomach, a gastrocolic reﬂex results in the opening of the ileocaecal valve. The contents of the ileum pass into the large intestine and rapid peristalsis means that feeding is often accompanied by reﬂex emptying of the bowel.

The meconium present in the large intestine from 16 weeks gestation is passed within 24 hours after birth and completely excreted within 48-72 hours. It contains biles and fatty acids which are mixed with mucus.

The consistency and frequency of stools will help to reflect the type of feeding of the newborn.

Digested breast milk produces a loose bright yellow and inoffensive acid stools. The baby may pass 8-10 stools a day.

The stools of formula fed newborns are pale on colour, semiformed, less acidic and have a more offensive smell.

In cases of GIT bleeding they may pass melena stools

Glycogen stores are rapidly depleted so early therefore feeding is necessary. Feeding stimulated the liver to function and colonization of the gastrointestinal system with bacteria that help in vitamin K synthesis

Weight loss is normal in the first few days but more than 10% body weight loss is abnormal and
requires investigation. Most babies regain their birth weight in 7–10 days, thereafter gaining weight at a rate of 150–200 g per week.

**REPRODUCTIVE SYSTEM**

All babies whether female and male have a nodule of the breast around the nipple.

In boys the testicles are descended into the scrotum which appears to have ruggae.

Urethral meatus is open at the tip of the penis and prepuse is adherent to the glans.

In girls born at term the labia majora cover the labia minora. The hymen and the clitoris is disproportionately large.

In both sexes, withdrawal of maternal oestrogens results in transient breast engorgement, sometimes accompanied by a milky secretion around the 5th day.

Girls may develop pseudo-menstruation, a blood-stained discharge in the nappy, for the same reason. Both findings are insignificant but can be concerning for parents and an appropriate explanation should dispel any anxieties