RESPIRATORY

In uterus, the umbilical cord contains 2 arteries that carry deoxygenated blood from the fetus to the placenta and one umbilical vein that supplies the embryo with oxygen and nutrients from the maternal blood supply via the placenta. A short circuit exists between the pulmonary trunk & the aorta. Most of the blood that does reach the right ventricle flows through the ductus venousus & enters the systemic circuit rather than flowing through the pulmonary arteries. Prior to birth, the lungs are collapsed & most blood bypasses the pulmonary circuit completely.
At birth, lung compression in Normal delivery spills the intrapulmonary fluid out and reduces the pressure of lungs. Decreasing in pulmonary pressure (Positive atmosphere pressure and negative thoracic pressure) allow the air flows inside the lungs and initiates the involuntary first breath
After birth, the umbilical arteries & vein constrict as the fetal circulatory system is interrupted. Increased aortic pressure & decreased venous pressure, increased systemic pressure & decreased pulmonary pressure & closure of the foramen ovale, the ductus arteriousus, & ductus veousus are newborn's respiration adaptation after birth.

GASTROINTESTINAL

Baby's gastrointestinal tract does not fully function until after birth. In late pregnancy, the baby produces meconium (newborn's first stool). In some cases, baby passes meconium while still inside the uterus

HEMATOPOIETIC

At birth blood flows from the placenta to the neonate, and the neonate has a greater number of erythrocytes & higher hemoglobin & hematocrit levels than adults. Fetus Hb is HbF (has greater capacity to bond w/ O2).
During the later period of pregnancy, HbF is slowly replaced by adult Hb (Hb A).
At birth, after initiation of normal respiration the neonate's O2 saturation rises, causing an inhibition in the secretion of erythropoietin.
During the first 12 hours after birth the **Leukocyte** count remains elevated

PHYSIOLOGICAL TRANSITION OF THE NEWBORN

IMMUNOLOGICAL

Placenta protects the fetus against most of mother's body microorganisms.
Newborn receives some antibodies from the mother through the umbilical cord (IgG).
IgA which is an important immunoglobulin, secrets in breast's milk and protects the baby against respiratory & gastrointestinal infections.
The immune system begins to develop after birth and continues to mature through the first few years of life.

CARDIOVASCULAR

In uterus, fetal blood flows to the placenta through a pair of umbilical arteries. The umbilical vein drains into the **ductus venosus** (A vascular connection to an intricate network of veins within the liver). The ductus venosus collects blood from the vein of the liver & from the umbilical vein, and then empties into inferior vena cava
At birth, when the placental connection is broken, blood flow ceases along the umbilical vessels, & they soon degenerate (then they remain throughout life as fibrous cord).
After birth, the infant takes the first breath, inflating the lungs & expanding the pulmonary blood vessels. Blood rushes into the pulmonary vessels, & the resulting pressure changes at the heart close the **foramen ovale**. (The foramen ovale allows blood to pass from the right atrium to the left atrium before birth).
After birth once the umbilical cord is clamped, placental blood flow ceases & there is an increase in the systemic blood pressure & vascular resistance. At this point, the lungs oxygenate the blood & the increased Pao2 stimulates the closure of the **ductus arteriosus**.

HEPATIC

Fetus receives required glucose by way of the placenta, & fetus liver stores glucose as glycogen
After delivery liver releases glycogen as a source of glucose to the brain & other vital organs
Liver produces all other blood cells after birth, breaking down waste products, produces protein and helps to break down bilirubin

THERMOGENIC

In pregnancy, amniotic sac and amniotic fluid keep temperature of the inside uterus appropriate for the fetus

After birth, increasing basal metabolism, muscle activity help to generate heat for prevention of heat loss, however exposure to low environment temperature causes an increase in oxygen consumption & increase rate of metabolism (may lead to cold stress)

Peripheral vasoconstriction conserves heat

BAT, brown adipose tissue or brown fat, prevents NB from cold stress

After birth, supporting thermoregulation allows the NB to have a successful transition from intrauterine to extrauterine life

GENITOURINARY

Baby's kidneys begin producing urine by 9-12 weeks into the pregnancy.

After birth, the newborn urinate within the first 24 hours of life.

The kidneys become able to maintain the body's fluid & electrolyte balance

PSYCHOSOCIAL

In the first 30 minutes to 2 hours after birth, NB is very alert & moves around energetically while taking in the new surroundings.

Muscle tone & motor activity ↑, body temperature ↓, bowel sounds tends to be absent, & there is minimal saliva production

This first period of reactivity is an opportune time for the mother to initiate breastfeeding

INTEGUMENTARY

In pregnancy: skin is protected by the amniotic sac and fluid. Skin is more translucent and thin with progressive thickening and development of fibrils connecting the dermis & epidermis.

After birth: skin is the largest organ which is sensitive, fragile, with a neutral pH on the surface, lower lipid content & higher water content when compared with adults. Becomes the protective barrier between the body & the environment. It limits the loss of water, prevents absorption of harmful agents, protects thermoregulation and fat storage, & protects against physical trauma. Skin development is not complete at birth

NEUROLOGIC

In pregnancy: Development follows cephalocaudal (Head-to-toe) and proximal-distal (center-to-outside) patterns

Myelin develops early on in sensory impulse transmitters-→ acute sense of hearing, smell, & taste.

Hearing—well developed at birth, responds to noise by turning to sound.

Taste--ability to distinguish between sweet & 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-incomplete at birth ability to focus only on close objects (8 to 10 inches away) with visual acuity of 10/140; can track objects in midline and beyond. Ability to fix, follow, and be alert is indicative of an intact CNS

Reflexes: involuntary muscular response to a sensory stimulus. Include the respiratory, circulatory, thermoregulatory, & musculoskeletal system.

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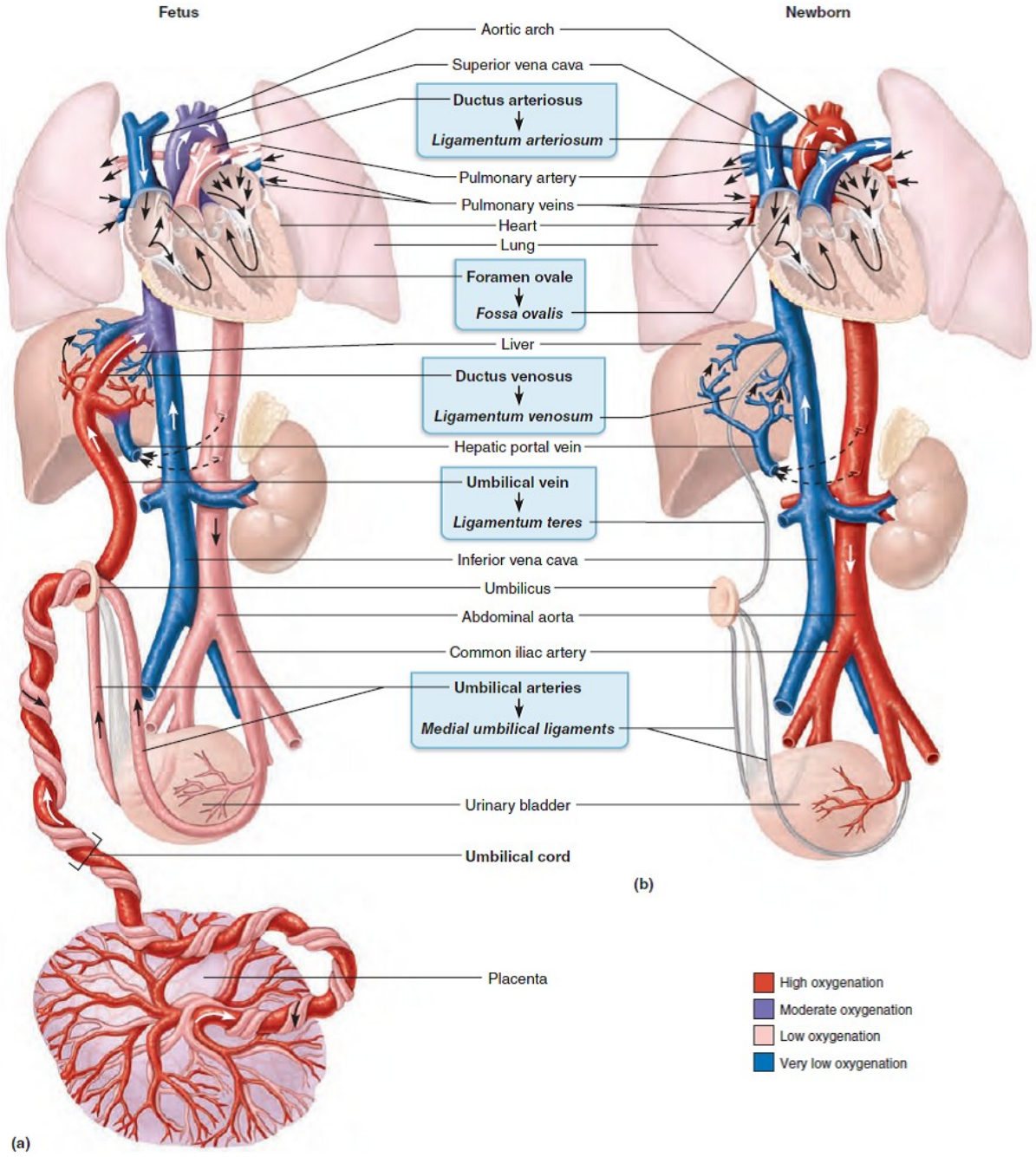
Fetus
Newborn
Aortic arch
Superior vena cava
Ductus arteriosus
Ligamentum arteriosum
Pulmonary artery
Pulmonary veins
Heart
Lung
Foramen ovale
Fossa ovalis
Liver
Ductus venosus
Ligamentum venosum
Hepatic portal vein
Umbilical vein
Ligamentum teres
Inferior vena cava
Umbilicus
Abdominal aorta
Common iliac artery
Umbilical arteries
Medial umbilical ligaments
Urinary bladder
Umbilical cord
Placenta
(a)
(b)
High oxygenation
Moderate oxygenation
Low oxygenation
Very low oxygenation