

# Neonatal Jaundice



# Neonatal Jaundice - definition

- ▶ Neonatal jaundice is manifested by yellow coloring of the skin, of sclera and mucousa caused by accumulation of bilirubin in the tissues accompanied by the increase in total bilirubin blood of the newborn to 50-70  $\mu\text{mol} / \text{l}$ .
- ▶ Each case must be investigated to exclude an etiology with significant morbidity

# Physiological jaundice

- ▶ Jaundice begins after 36 hours of birth, most often after 48 hours. Jaundice is with indirect bilirubin. Bilirubin after the second day of life don't exceed 262  $\mu\text{mol} / \text{l}$  for in full- term newborn and 210  $\mu\text{mol} / \text{l}$  for premature infants. The clinical status of the newborn is good. The jaundice regression in the newborn takes 7-10 days to in term newborn and 21-28 days to premature infant.
- ▶ This type of jaundice do not require treatment.

# Pathological jaundice

- ▶ Early onset than 36 hours after birth.
- ▶ It is manifested by: Rh- factor and/or ABO incompatibility, hemolytic anemia with Hb lower than 170 g / l at birth, reticulocytes > 8-10, total bilirubin > 65-85  $\mu\text{mol} / \text{l}$  per hour.
- ▶ Is a persistent clinical jaundice in the newborn on pale skin background and with hepato-splenomegaly.
- ▶ Associate Clinical signs: lethargy, eating disorders, neurological disorders.
- ▶ This type of jaundice requires treatment.

# Jaundice in premature newborns

- ▶ Frequently it occurs in about 90% cases. Jaundice of prematurity should be treated at a lower bilirubin levels than full-term infants to avoid complications

# What can be the consequences of a pathological jaundice

- ▶ Rarely large amounts of bilirubin accumulates in the blood and cause brain damage, associated with **hearing loss, mental retardation and behavioral disorders.**

# Clinical signs of nuclear jaundice (kernicterus) independent on the stage

Stage 1 (early step)	Stage 2 (late step)	Stage 3 (chronic step)
Weakness Lethargy Strident cry Weak sucking reflex Hypotonia Poor Moro reflex	Extensor muscles Hypertonicity Opisthotonus Rigidity Bulging fontanel Fever Seizures	Athetosis-partial or complete Ataxia Deafness Medium or severe mental retardation

**ATHETOSIS** is a condition in which abnormal muscle contractions cause involuntary writhing movements. It affects some people with cerebral palsy, impairing speech and hearing loss

# Jaundice ethiology

<24 ore	≥24 ore - 14 zile	≥ 14 zile pentru nn la termen ≥ 21 zile pentru nn prematur
Rh factor incompatibility ABO incompatibility bacterial sepsis specific infection spherocytosis Deficiency of glucose - phosphate dehydrogenase	sepsis Hemolysis cephalhematoma intracranial hemorrhage physiological jaundice breast milk jaundice	conjugated hyperbilirubinemia - Infection (Hepatitis B, TORCH, sepsis) - Congenital malformations (biliary atresia, bile duct cysts, duct stenosis) - Metabolic Diseases (galactosemia, fructose intolerance, alpha-1 antitrypsin deficiency, tyrosinemia, hypothyroidism) Hemolysis breast milk jaundice

# Clinical evaluation

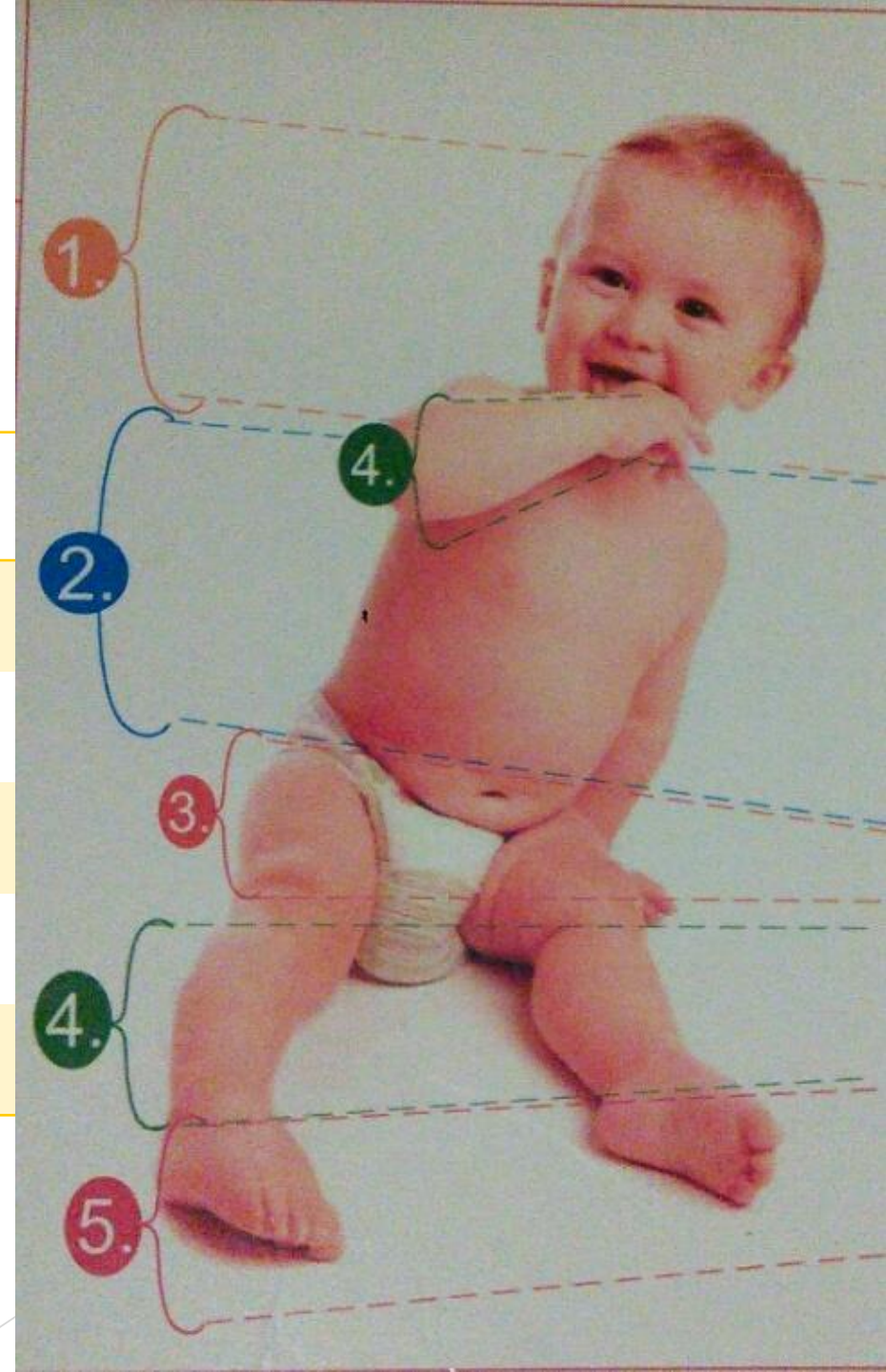
- ▶ Jaundice skin and mucous membranes
- ▶ Pallor
- ▶ Gray-white (acholic stool)
- ▶ Hepatosplenomegaly

# Rules for examination of a child with jaundice

- ▶ Assessment of the jaundice is always daylight
- ▶ The absence of jaundice doesn't mean the absence of jaundice
- ▶ Visual assessment of bilirubin depending on the degree of jaundice can lead to errors, especially in children with more intensely pigmented skin tone
- ▶ Skin discoloration will be assessed in accordance with Kramer diagram to assess cerebrospinal caudal progression and intensity of neonatal jaundice.

# Kramer diagram

Zone	Affected region	Indirect serum bilirubin level, media
1	Head and neck	100
2	Upper part of the trunk	150
3	Lower abdomen	200
4	Arms and legs	250
5	Palms and plants	>250



# Clinical signs suggesting probability of the hemolytic disease

- ▶ Familiar anamnesis
- ▶ Jaundice <24 hours
- ▶ Bilirubin > 85.5  $\mu\text{mol} / \text{hour}$  at birth with growth of 8.5  $\mu\text{mol} / \text{hour}$
- ▶ Pallor
- ▶ Hepatosplenomegaly
- ▶ Erythrocyte hemolysis increases rapidly after 24-48 hours (G6PD)
- ▶ Failure phototherapy

# Laboratory examinations

- ▶ Bilirubin (total and indirect)
- ▶ Blood group and Rh factor of the child
- ▶ Maternal blood group and Rh antibodies screening
- ▶ Peripheral smear for red cell morphology
- ▶ Hematocrit level (Polycythaemia or anemia)
- ▶ The level of serum albumin and bilirubin / albumin ratio in hyperbilirubinemia

Reduce to a minimum loss of blood during collection.

Prevent Dolor syndrome during collection

For the analyzes collecting respect the protective and preventive measures for the nosocomial infection

# The frequency of monitoring serum bilirubin in neonates

Hours of life	1 day		2 day		3 day	
	frequency	tactics	frequency	tactics	frequency	tactics
Visible jaundice	BT		BC		BC	monitoring
85-100	3-5 hours	FT	8-12 hours	FT	8-12 hours	monitoring
120-190	3-4 hours	Consult FT	4-6 hours	Consult FT	6-8 hours	Consult FT
200- 250	2-3 hours	Consult FT	2-4 hours	FT	4-6 hours	Consilium FT
>250		EXT	2-3 hours	Consult FT	3-4 hours	Consilium FT

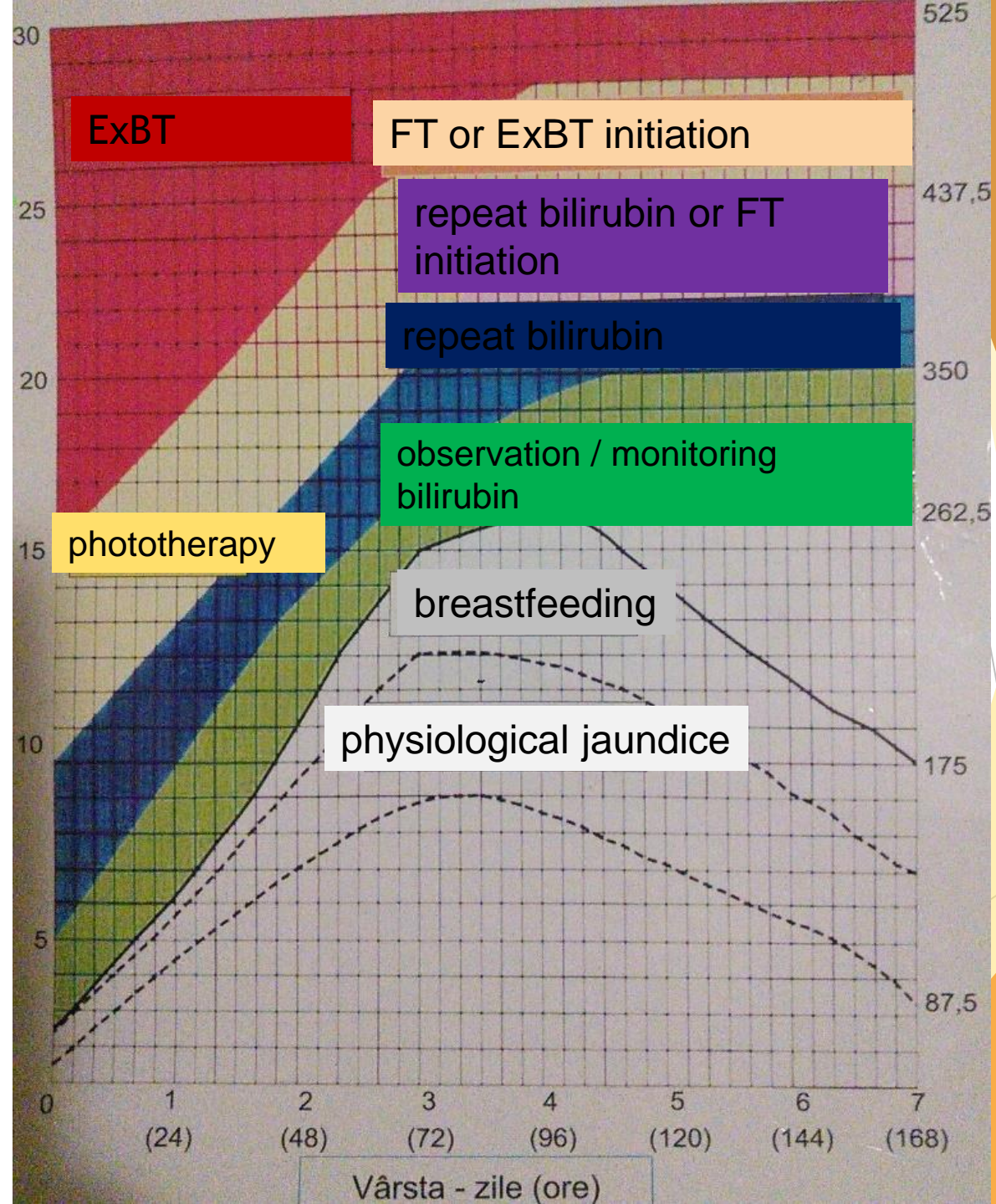
# The frequency of monitoring serum bilirubin in neonates

- ▶ In children with discovered jaundice in the first 2-3 days of life, it is helpful to note the rate of increase in serum bilirubin
- ▶ An increase  $> 8.5 \text{ mcmol / l}$  per hour indicates a rapid hemolysis

# Indications for phototherapy and exchange blood transfusion (mg / dl, mcmol / l)

Age (hours)	It's possible FT	FT	Exchange blood transfusion if intensive FT isn't respond
<24	≥65	≥85	≥100
25-48	12(170)	15 (260)	20 (340)
48-72	15(260)	18 (310)	25 (430)
72	17(290)	20 (340)	25 (430)

# Indications for phototherapy and exchange blood transfusion

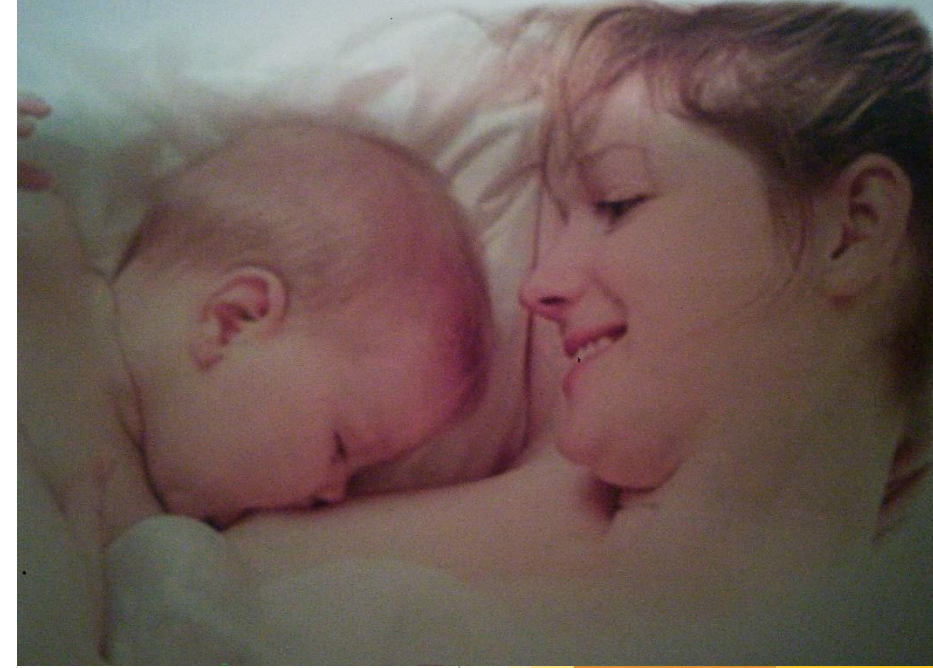


# Complications of phototherapy

- ▶ INCREASED OF INSENSIBLE WATER
- ▶ DEHYDRATION
- ▶ DIARRHEA
- ▶ SKIN RASH
- ▶ NASAL OBSTRUCTION
- ▶ POTENTIAL RETINAL DAMAGE

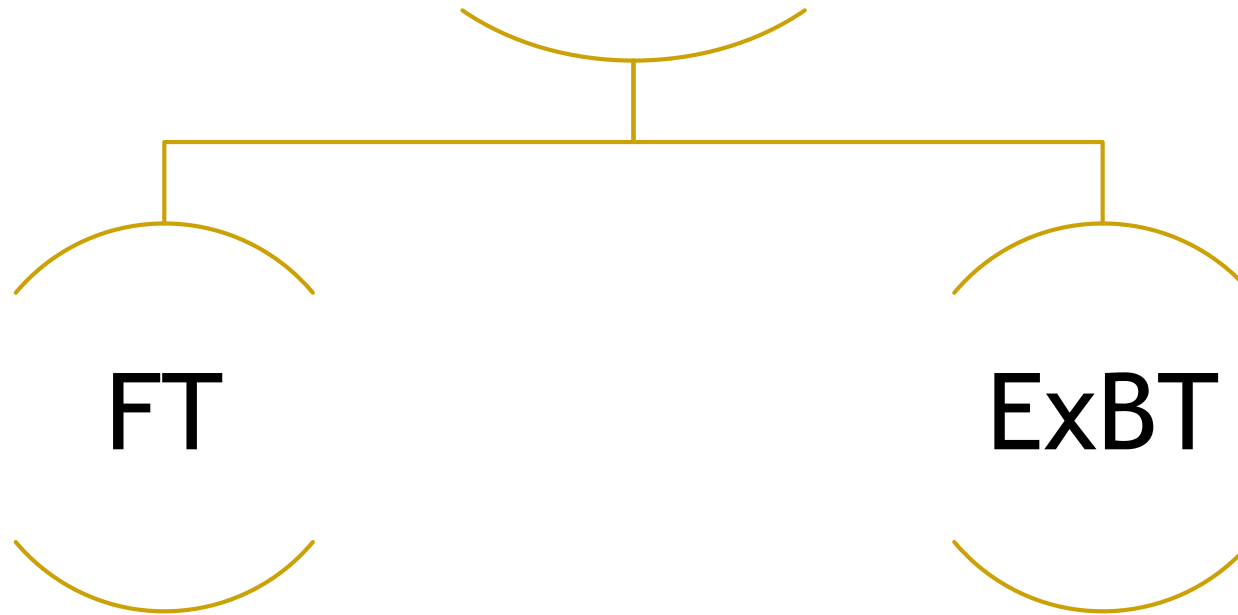
# The 10 principles of jaundice's prevention and management

1. Promote and support successful breastfeeding
2. Develop clinical protocols for jaundice
3. Measure the total serum bilirubin or conjugated bilirubin to a sick child with jaundice in the first 24 hours
4. Recognize Visual jaundice, especially in a child intensely pigmented
5. Interpret level of bilirubin in hours not days
6. Do not treat the near-term newborns (35-37 sg) as a term newborn - these children represent a higher risk of developing hyperbilirubinemia
7. Evaluate systemic all infants with severe risk of hyperbilirubinemia
8. Inform parents about jaundice newborn
9. Include severe jaundice in newborn Program Follow - up
10. At indications treat newborn with phototherapy and / or ExBT



# The neonatal jaundice's treatment

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## ► Intensive phototherapy

- Intensive phototherapy decreases bilirubin level to 15-34  $\mu\text{mol} / \text{l}$  in 4-6 hours
- In case of hydrops, sepsis, asphyxia, severe anemia, the indicated limits should be reduced by 50
- Apply immediately intensive phototherapy in rhesus sensitization to keep bilirubin under 85  $\mu\text{mol} / \text{l}$  in the ABO isoimmunization - to keep bilirubin
  - >120  $\mu\text{mol} / \text{l}$  in the first 12 hours;
  - 170  $\mu\text{mol} / \text{l}$  at 18 hours;
  - 260  $\mu\text{mol} / \text{l}$  at any time post-partum



# Phototherapy technology

- ▶ Place the undressed baby under the lamp
- ▶ Monitorize your child's temperature every 3 hours
- ▶ Monitorize weight daily
- ▶ Protect your child's eyes and genital organs
- ▶ The distance between infant and phototherapy lamp must be 50 cm (where's no other distance specified in the Technical Passport)
- ▶ Duration of phototherapy depends on the bilirubin level (continuous or intermittent light flow)
- ▶ Increase your fluid intake by 10-20% compared to the physiological needs
- ▶ After 12-14 hours after stopping phototherapy check serum bilirubin level

# Phototherapy complications

- ▶ Frequent stools
- ▶ Dehydration
- ▶ Overheating
- ▶ Skin rashes
- ▶ Retinal damage
- ▶ Irritability or lethargy
- ▶ Tanning baby syndrome

# Exchange blood transfusion

- ▶ The formula for calculating the volume required for ExBT (RV)  
$$RV = 2 \text{ CBV (circulating blood volume)} \times M \text{ (body mass) in kg}$$

RV consists of 1 part of red blood cells and 2 parts of plasma
- ▶ In case of Rh factor incompatibility - order red blood cells and plasma of the newborn blood type, Rh negative
- ▶ In case of incompatibility in the ABO system - order red blood cells group 0 (I) and plasma group AB (IV), Rh negative
- ▶ In case of Rh factor and ABO system incompatibility - order red blood cells group 0 (I) and plasma group AB (IV), Rh negative

