Ferrara 26 maggio 2017

# Nuovo Nato e Neonato Emogasanalisi

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# Take Home Messages

## Nel Neonato

Equilibrio Acido base come punta dell'iceberg per :

- Patologie perinatali (ipossia)
- Patologie acute (respiratorie, metaboliche ecc)
- Patologie più tardive (infezioni ecc)

ACOG

Committee on Obstetric Practice

*Reaffirmed 2010*

# Committee Opinion

Number 348, November 2006

# Umbilical Cord Blood Gas and Acid-Base Analysis

*ABSTRACT: Umbilical cord blood gas and acid-base assessment are the most objective determinations of the fetal metabolic condition at the moment of birth. Moderate and severe newborn encephalopathy, respiratory complications, and composite complication scores increase with an umbilical arterial base deficit of 12–16 mmol/L. Moderate or severe newborn complications occur in 10% of neonates who have this level of acidemia and the rate increases to 40% in neonates who have an umbilical arterial base deficit greater than 16 mmol/L at birth. Immediately after the delivery of the neonate, a segment of umbilical cord should be double-clamped, divided, and placed on the delivery table. Physicians should attempt to obtain venous and arterial cord blood samples in circumstances of cesarean delivery for fetal compromise, low 5-minute Apgar score, severe growth restriction, abnormal fetal heart rate tracing, maternal thyroid disease, intrapartum fever, or multifetal gestation.*

# Obiettivi: EAB perinatale

- INTRODUZIONE:
  - Entità problema
  - Unità feto-placentare;
- FISIOLOGIA:
  - Parametri pH, $pCO_2$, BE e $HCO_3$ ,Lattato,
  - Modifiche in base Età G. (EAB), modalità parto
  - Significato
  - Prelievo
- VALIDITA' tests (parametri)

# INTRODUZIONE:

# Entità del problema

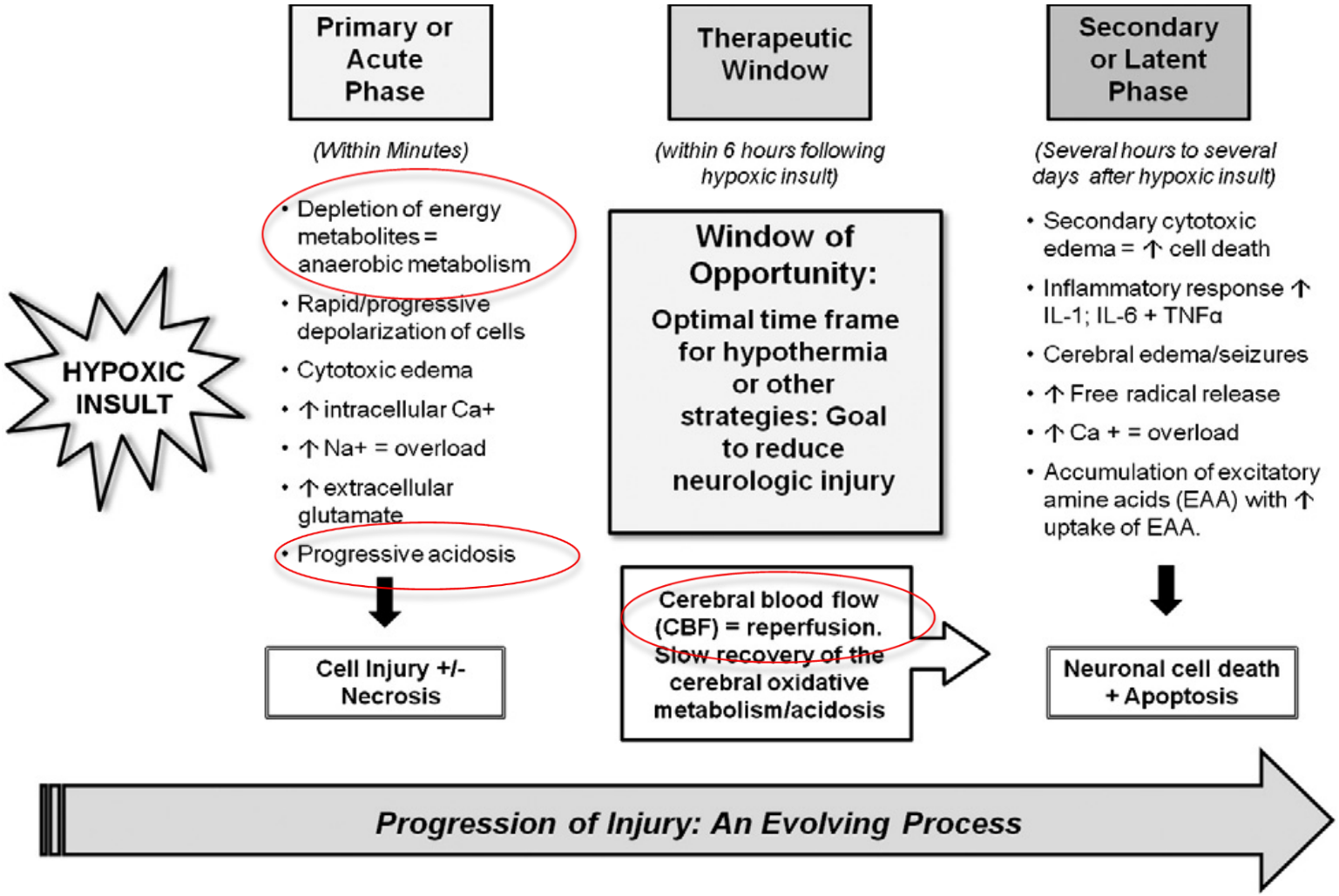
- L'incidenza di asfissia intrapartum è di circa 3-5/1000 nati vivi; l'incidenza di encefalopatia ipossico-ischemica moderata o severa è di circa **0,5-1/1000 nati vivi**.

- L'encefalopatia ipossico-ischemica è una delle maggiori cause di morte neonatale e disabilità neurologica nel bambino

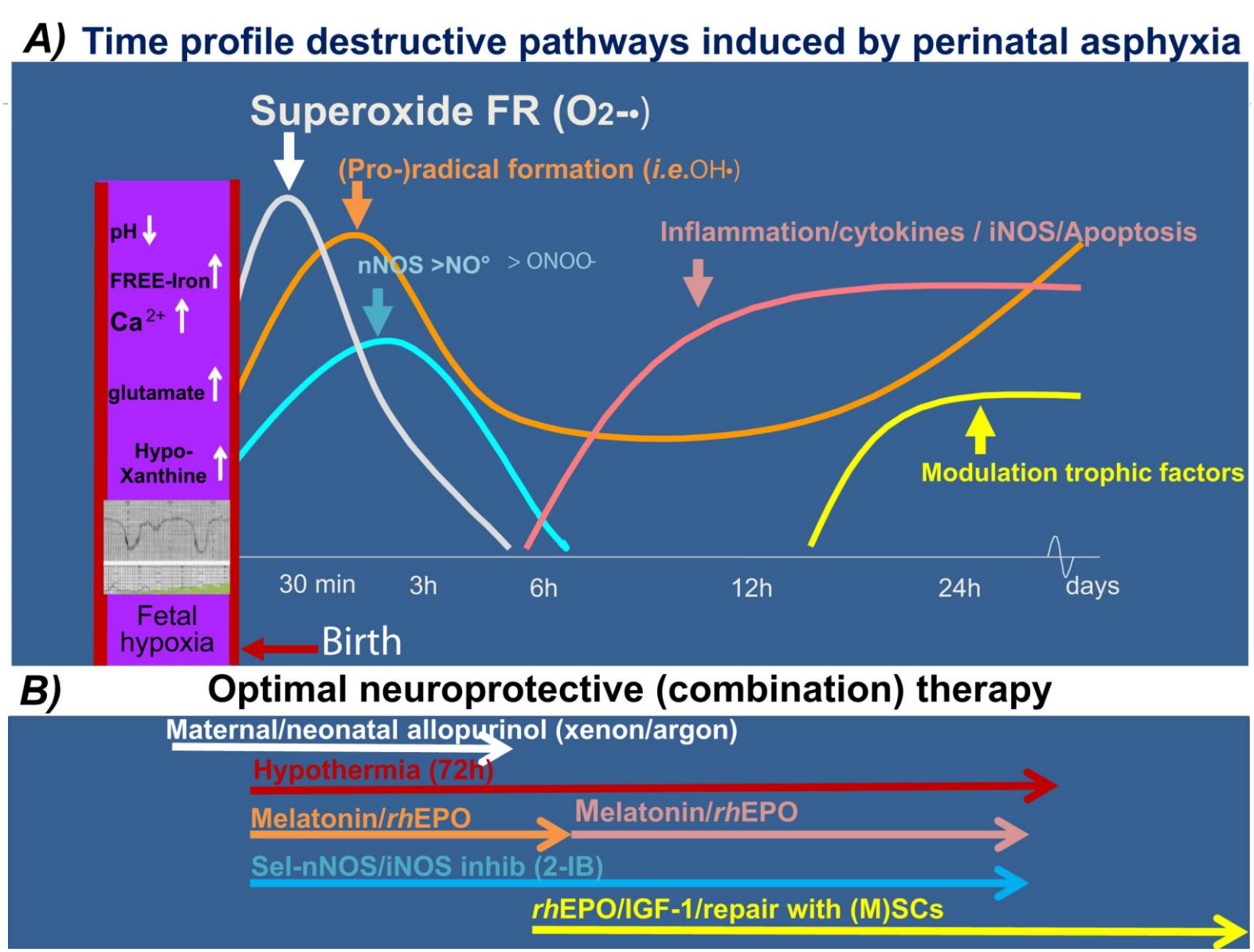
- L'EEI di grado moderato o severo è gravata da una **mortalità** compresa tra il 10 ed il 60%; tra i sopravvissuti il 25% sviluppa **sequele** neurologiche

Iniziali MECCANISMI DI COMPENSO (aumento FC e vasocostrizione periferica)

Depressione cardiocircolatoria, danno ischemico
DISFUNZIONE MULTIORGANO



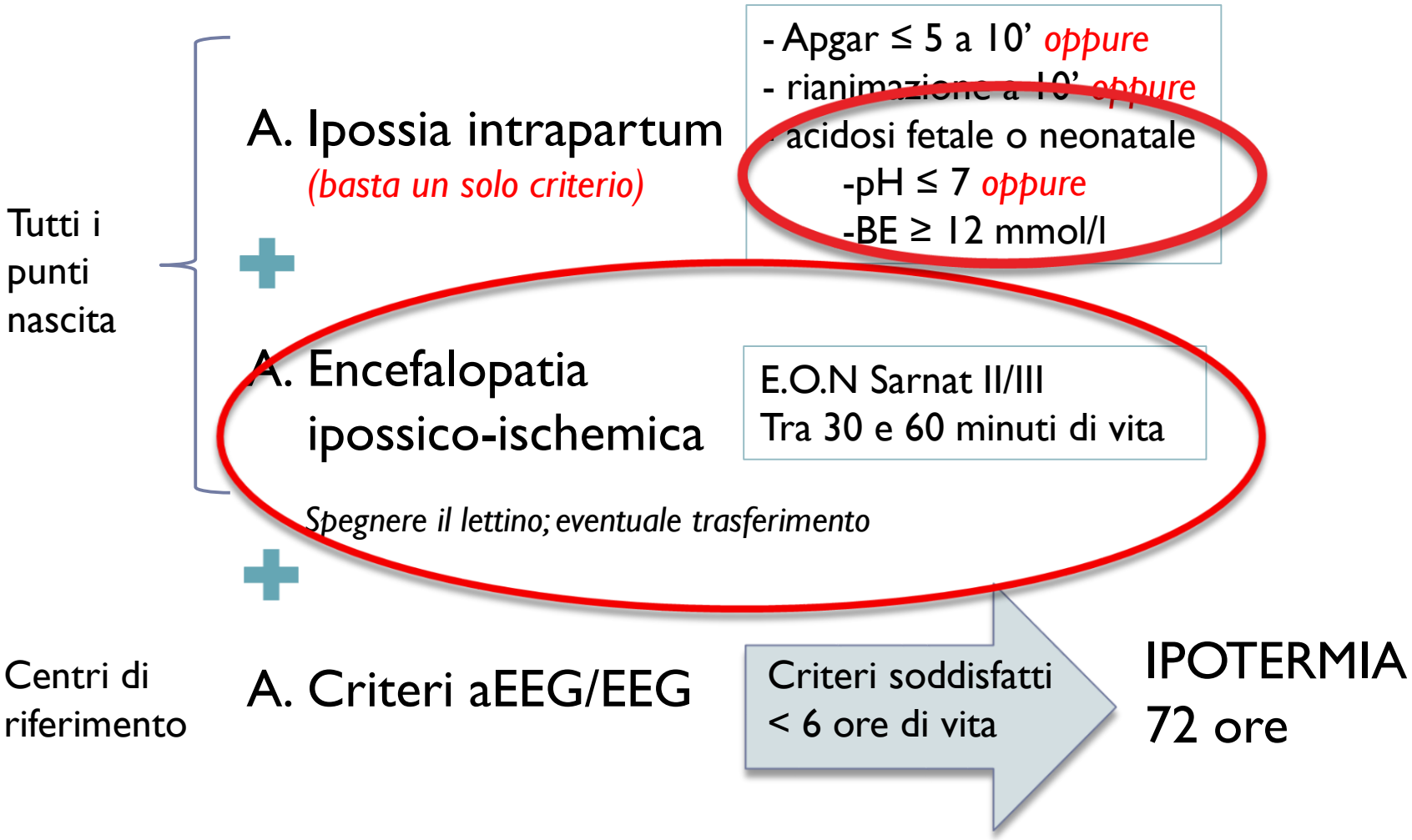

Newnam, DeLoach. Newborn & Infant Nursing Reviews, September 2011


A) Time profile destructive pathways induced by perinatal asphyxia
Superoxide FR (O2-•)
(Pro-)radical formation (i.e.OH•)
nNOS >NO° > ONOO-
Inflammation/cytokines / iNOS/Apoptosis
Modulation trophic factors
pH
FREE-Iron
Ca 2+
glutamate
Hypo-Xanthine
Fetal hypoxia
30 min
3h
6h
12h
24h
days
Birth
B) Optimal neuroprotective (combination) therapy
Maternal/neonatal allopurinol (xenon/argon)
Hypothermia (72h)
Melatonin/rhEPO
Melatonin/rhEPO
Sel-nNOS/iNOS inhib (2-IB)
rhEPO/IGF-1/repair with (M)SCs

# TRATTAMENTO IPOTERMICO

## Criteri di inclusione

# Neonati di EG ≥ 35 settimane e peso ≥ 1800 g che abbiano meno di 6 ore di vita.

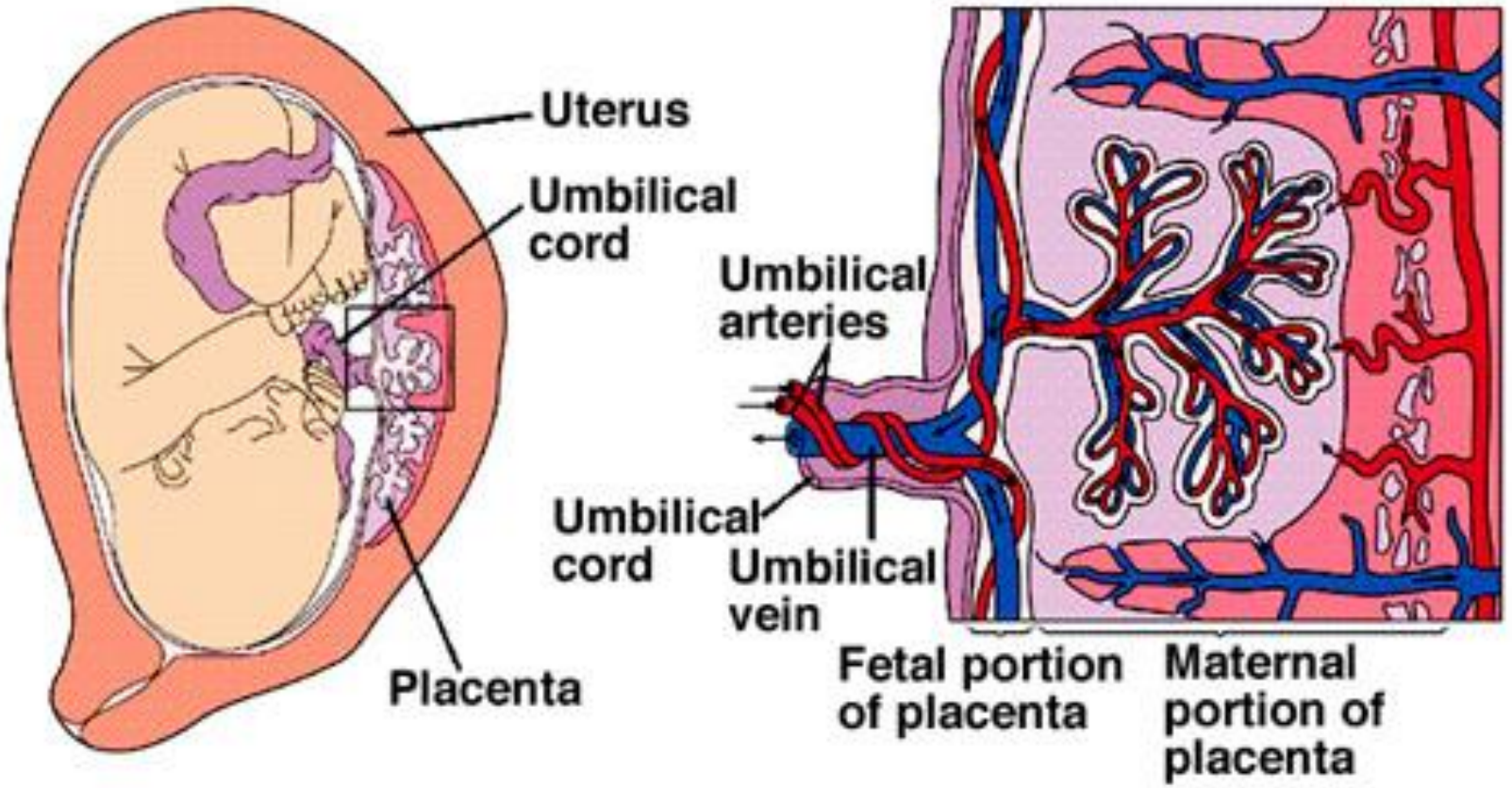


# Criterio A: ipossia intrapartum

- APGAR
  - Item per esteso; tabella in cartella
  - **Extended** (se a 5' <7 continuare ogni 5 min fino a che >7 o fino a 20 minuti; ***a 10 min correla con morbilità***)
  - Apgar intubato: se non respira da solo respiratorio 0!!
- EAB
  - ACOG/ AAP 2006 e2010 parti a rischio;
  - NICE parti a rischio
  - Thorp 1999: a tutti → gold standard per valutare funzione utero-placentare (audit di tutti i casi con acidosi per migliorare la pratica clinica)

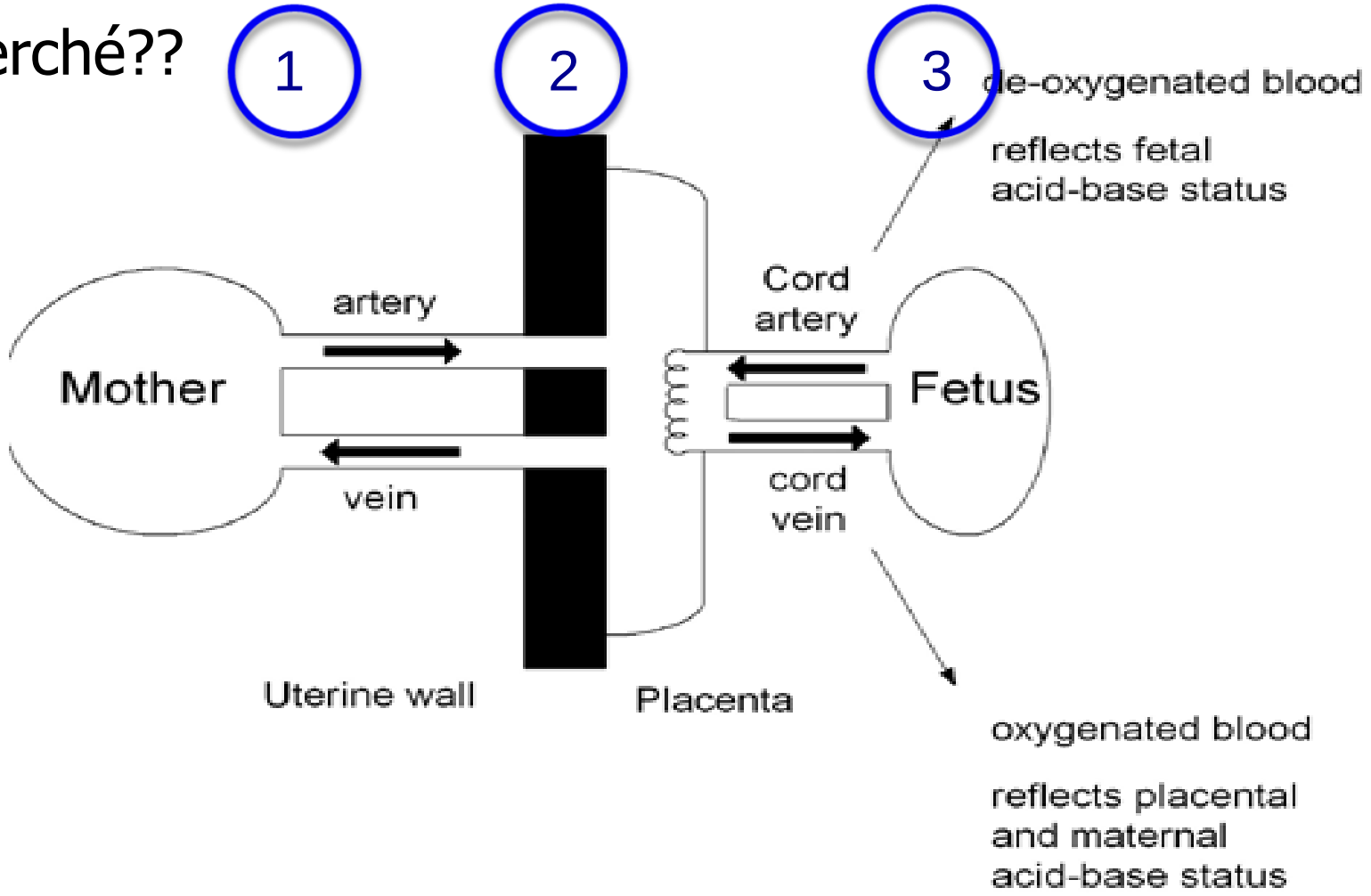
# Unità Feto-Plcentare

# The Placenta and the Umbilical Cord



# Criterio A: Cord blood Analysis

Perché??

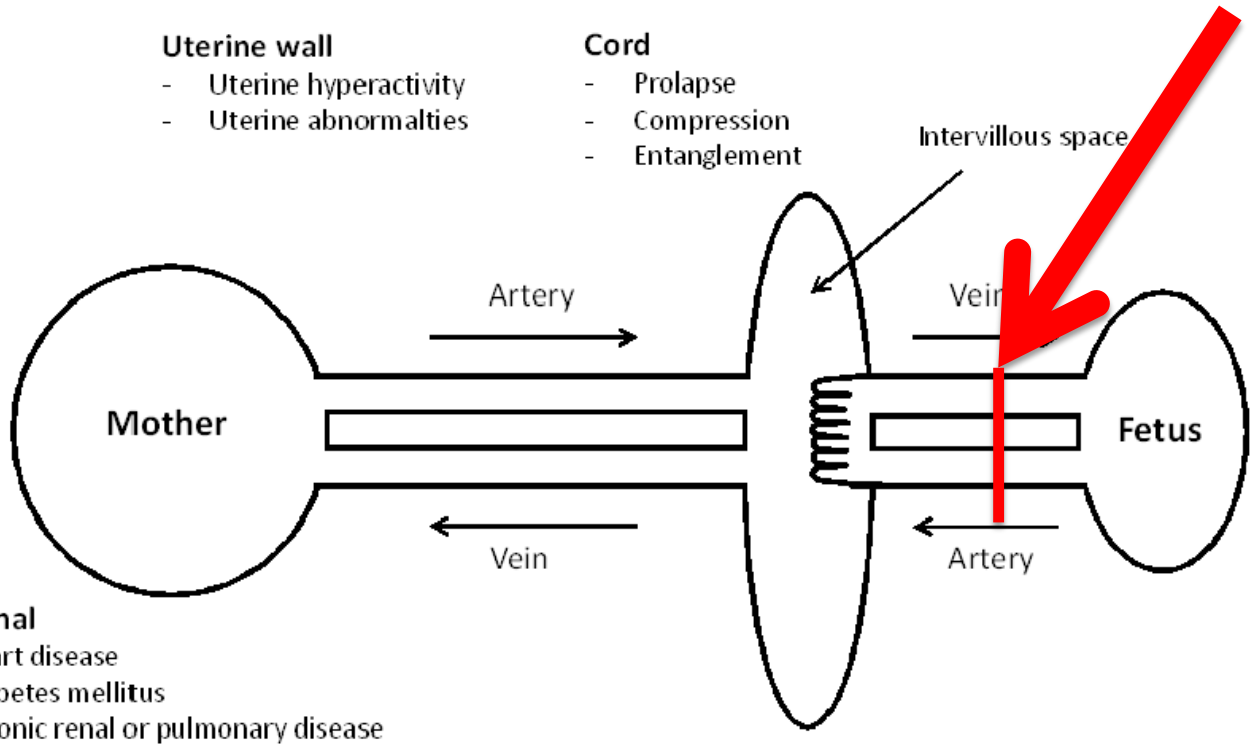


# Cord Blood Analysis

# Criterio A: Cord blood Analysis

**Uterine wall**
- Uterine hyperactivity
- Uterine abnormalties

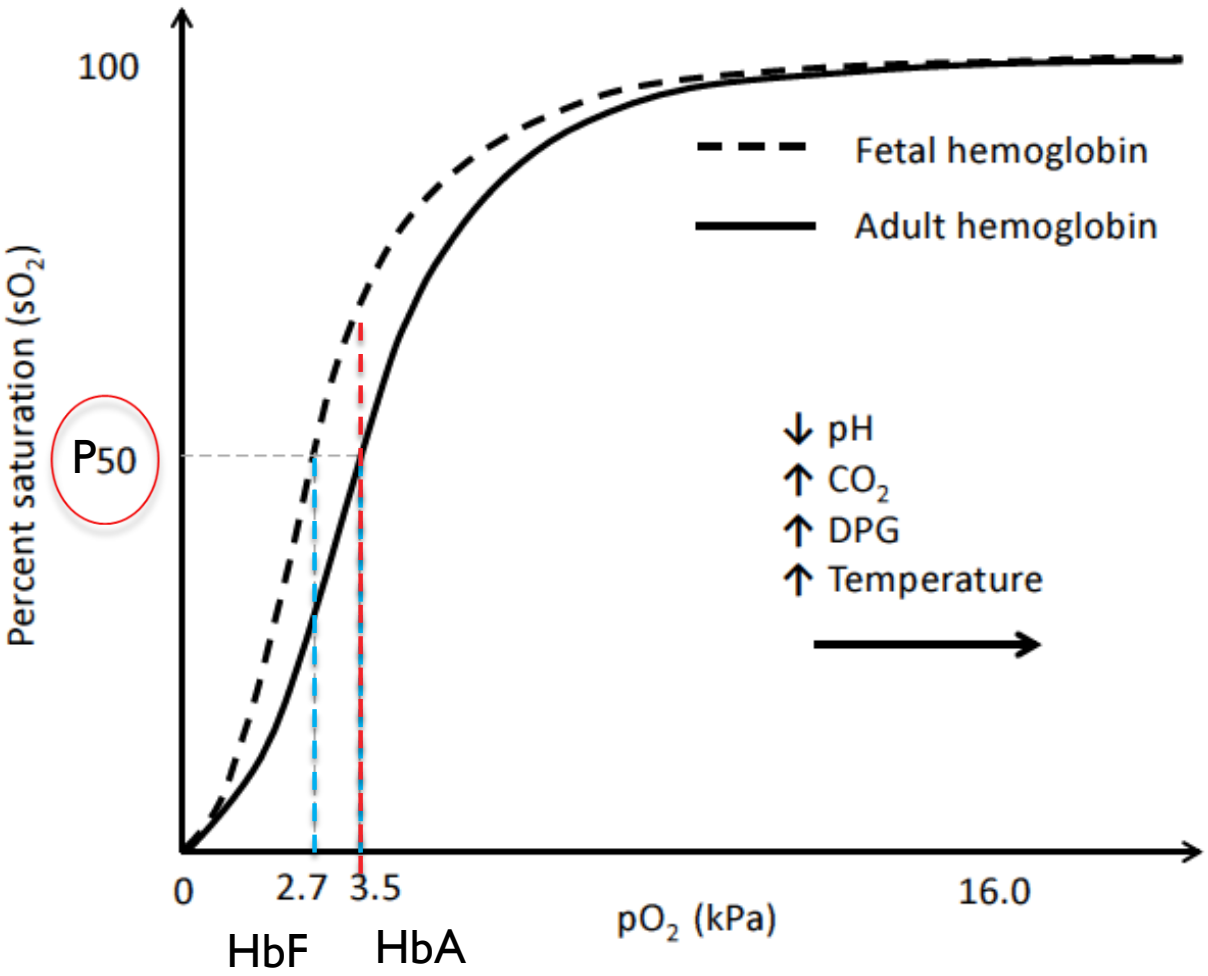
**Cord**
- Prolapse
- Compression
- Entanglement



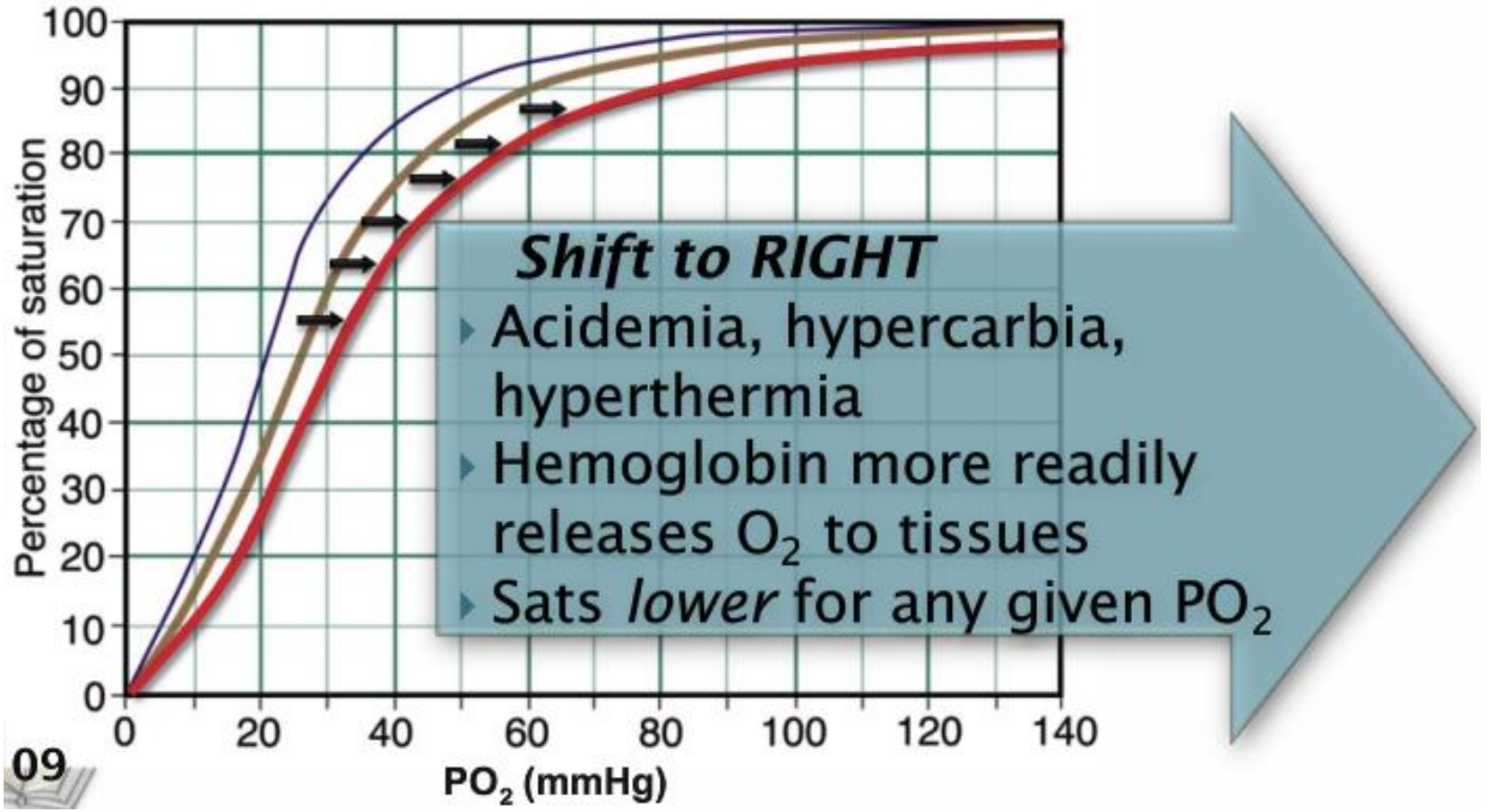

**Maternal**
- Heart disease
- Diabetes mellitus
- Chronic renal or pulmonary disease
- Prolonged labor
- Severe infection
- Hypoventilation, hypercapnia
- Severe anemia
- Hypotension, placental hypoperfusion
- Hypertension, placental lesions
- Regional anesthesia

**Placenta**
- Poor placentation
- Premature separation

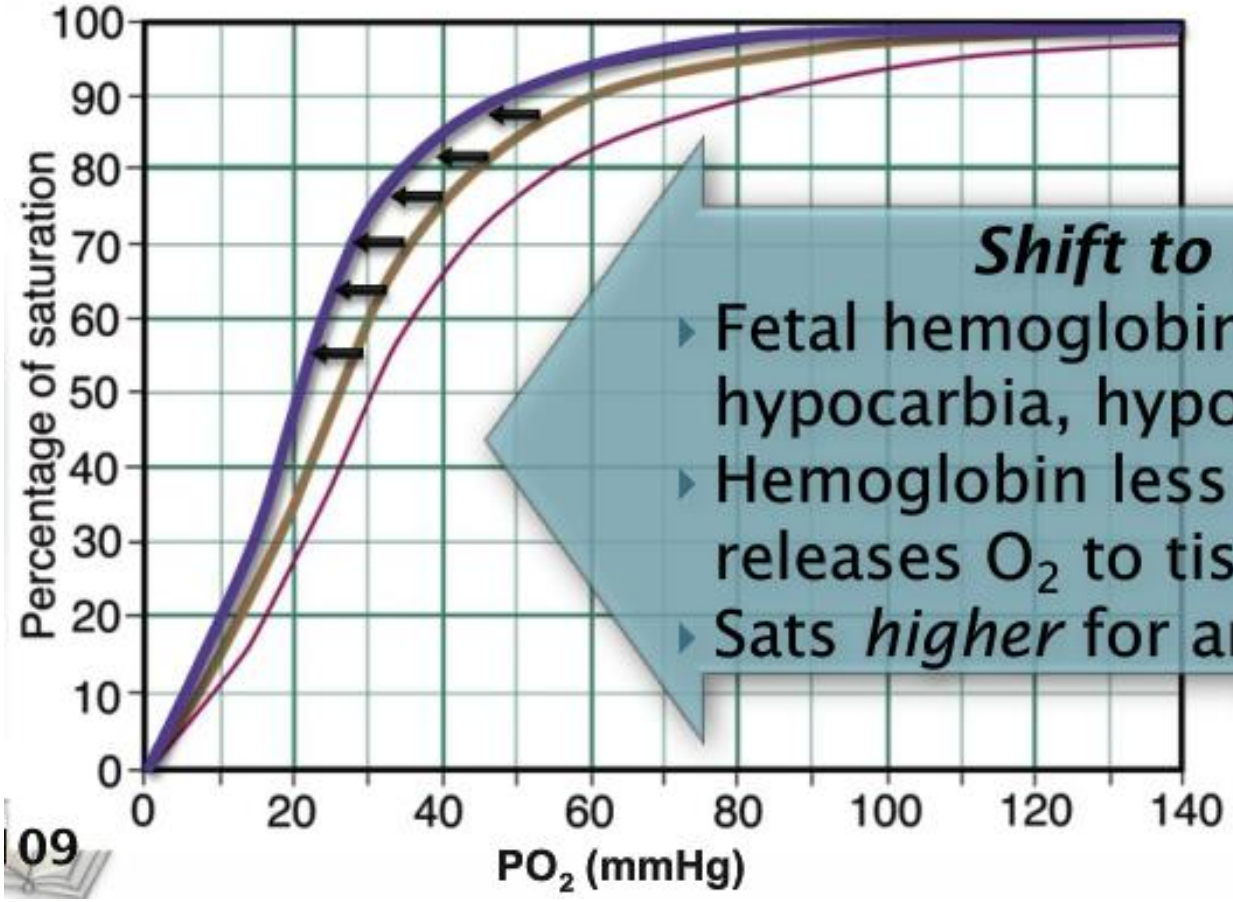
**Fetal**
- Gestational age
- Anemia
- Infection
- Myocardial depression
- Breech presentation


100
Percent saturation ($sO_2$)
P50
Fetal hemoglobin
Adult hemoglobin
↓ pH
↑ $CO_2$
↑ DPG
↑ Temperature
0
2.7
3.5
16.0
$pO_2$ (kPa)
HbF
HbA

# $O_2$– Hemoglobin Dissociation Curve



# $O_2$– Hemoglobin Dissociation Curve




***Shift to LEFT***

- Fetal hemoglobin, alkalemia, hypocarbia, hypothermia
- Hemoglobin less easily releases $O_2$ to tissues
- Sats *higher* for any given $PO_2$

09

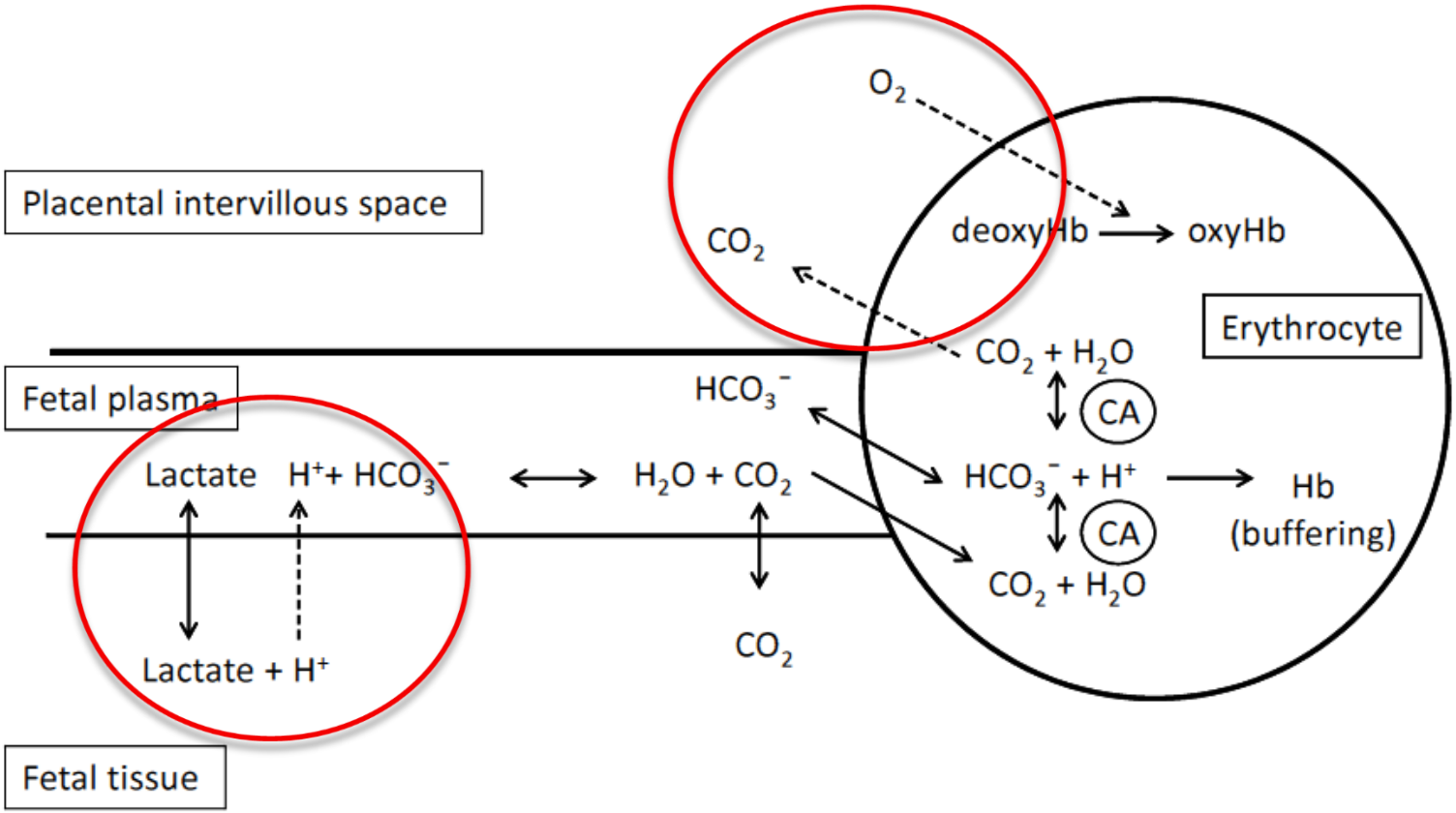



**Figure 4.** The main transport principles of $CO_2$, $O_2$, and $H^+$ in the feto-placental unit. CA denotes carbonic anhydrase. Modified from Despopoulos and Silbernagl (Despopoulos & Silbernagl, 1991).

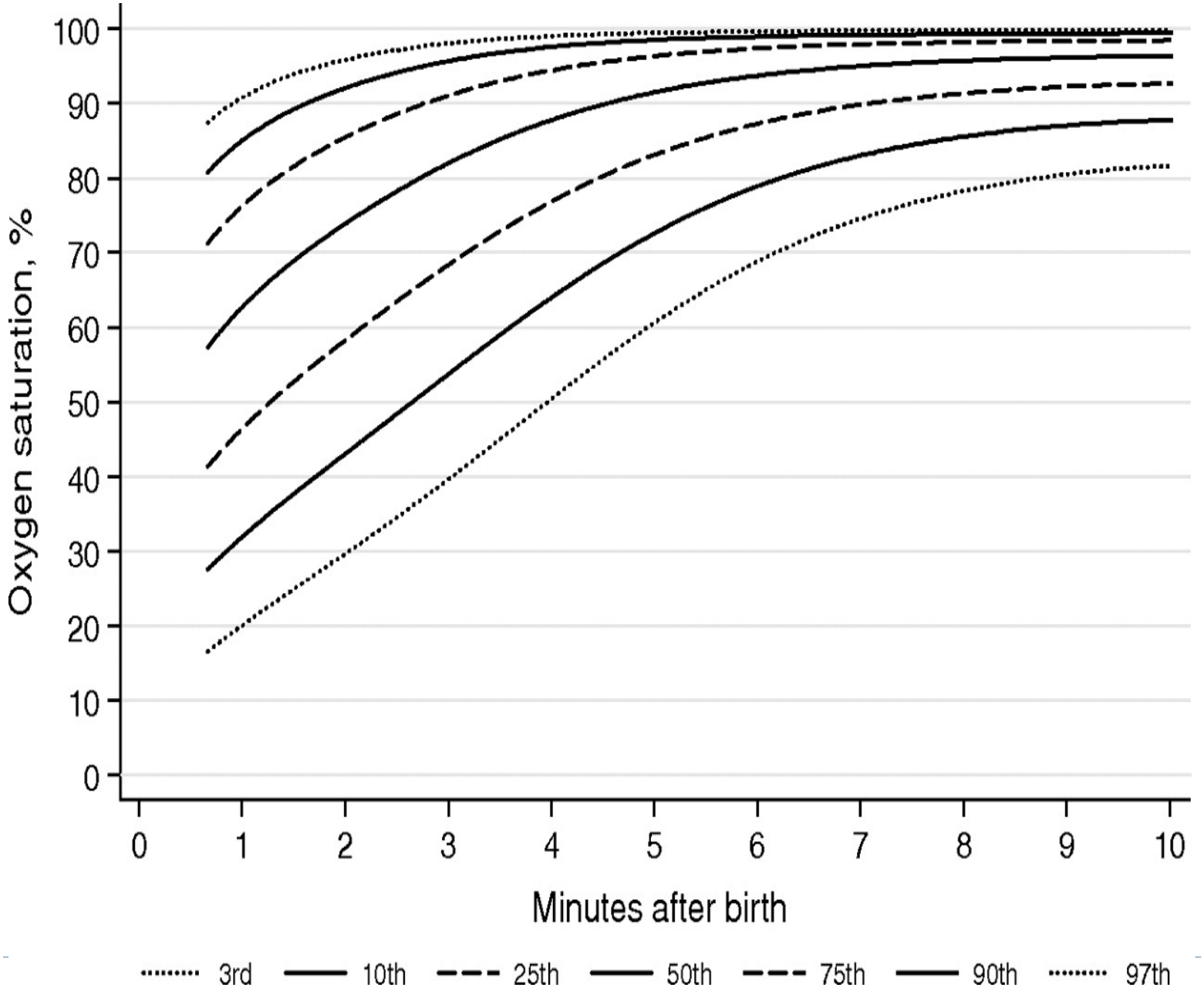
# Criterio A: Cord blood Analysis

## Quando?

Physicians should attempt to obtain ***venous and arterial*** cord blood samples in the following situations:

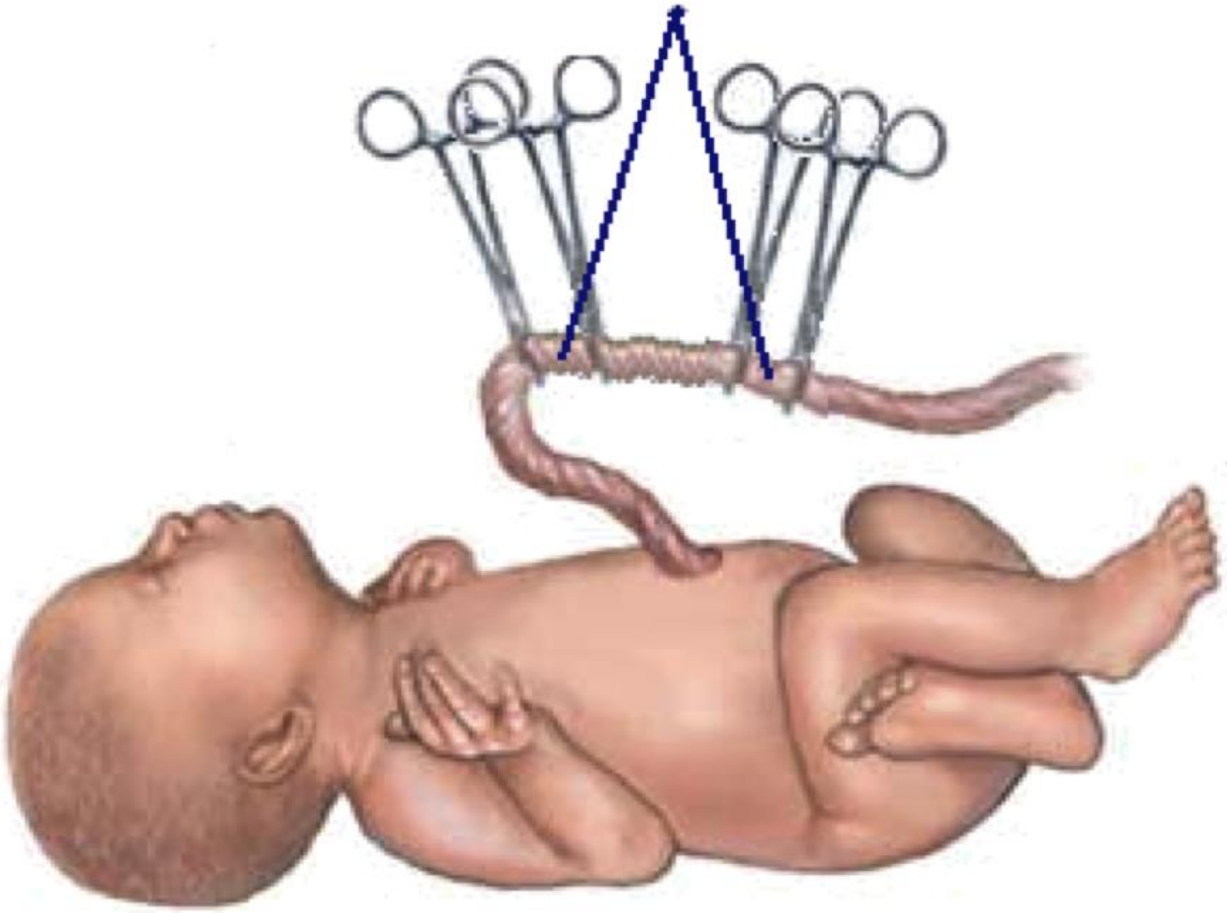
- Cesarean delivery for fetal compromise
- Low 5-minute Apgar score
- Severe growth restriction
- Abnormal fetal heart rate tracing
- Maternal thyroid disease
- Intrapartum fever
- Multifetal gestations

Dawson Pediatrics 2010



# Criterio A: Cord blood Analysis

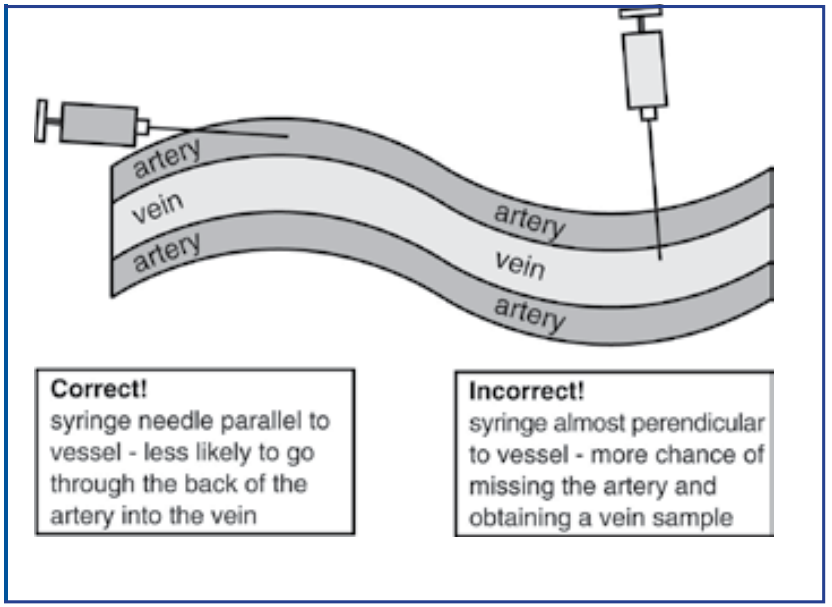
Come?



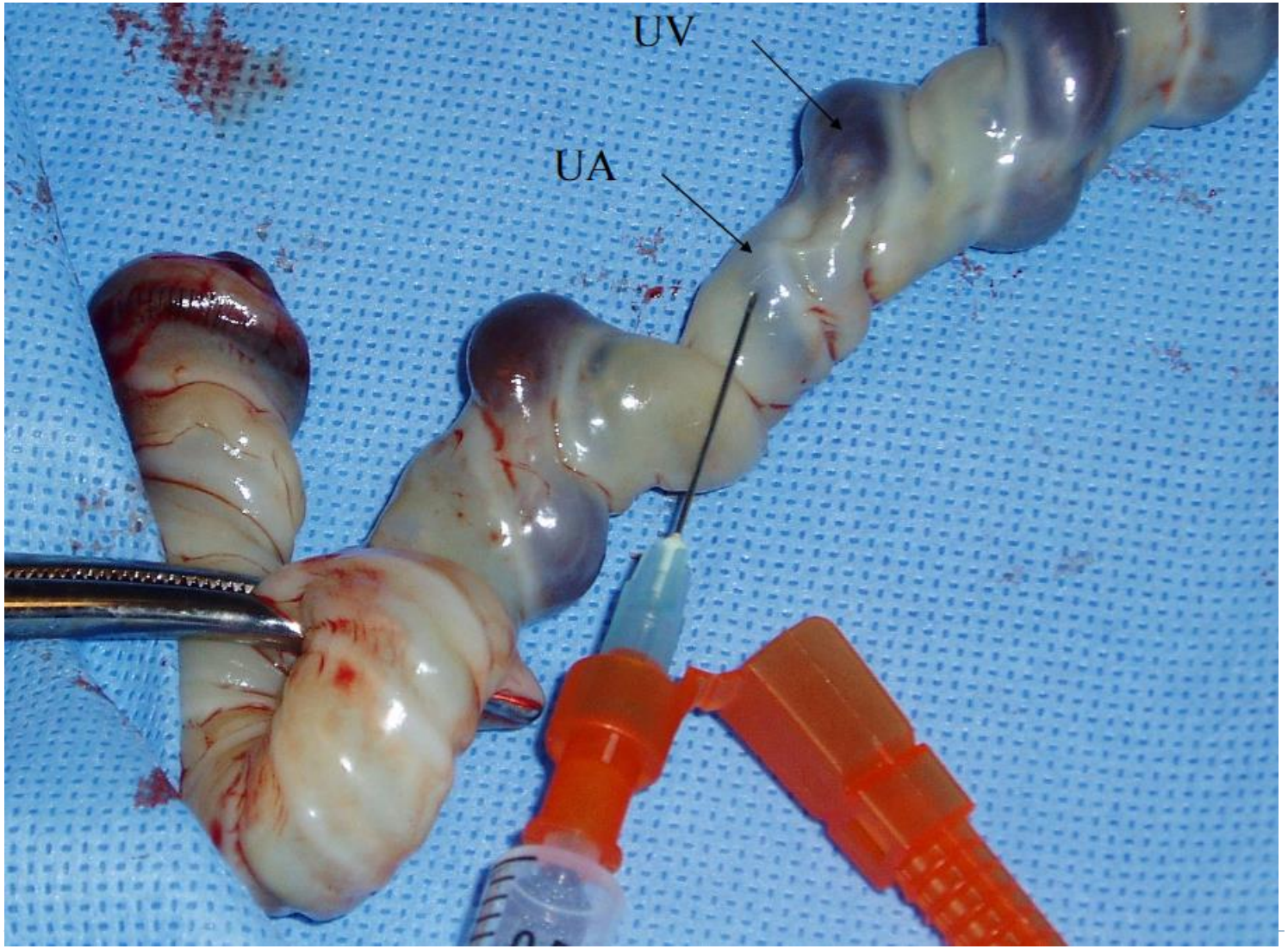
# Criterio A: Cord blood Analysis

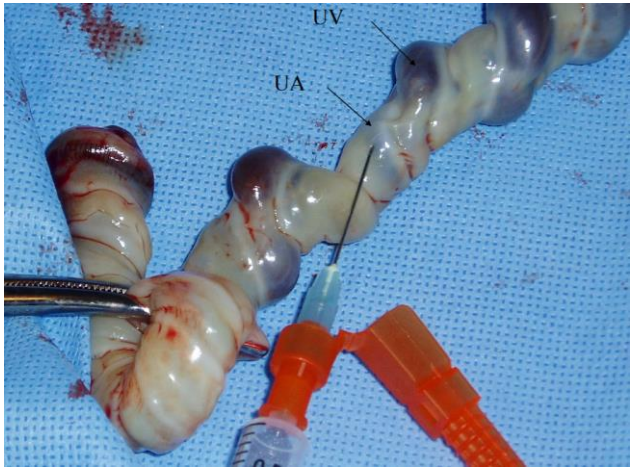
How should it be collected and stored?

- 10 to 20 cm section of cord double clamped and put on **ice**
- Assessed accurately up to 60min, pH fall 0.05 at 30 min, 0.087 at 60 min, and 0.112 at 90 min.
- Sample via cord artery, although "paired" venous sample recommended (artery < 0.09 venous)



# Prima Arteria e poi Vena



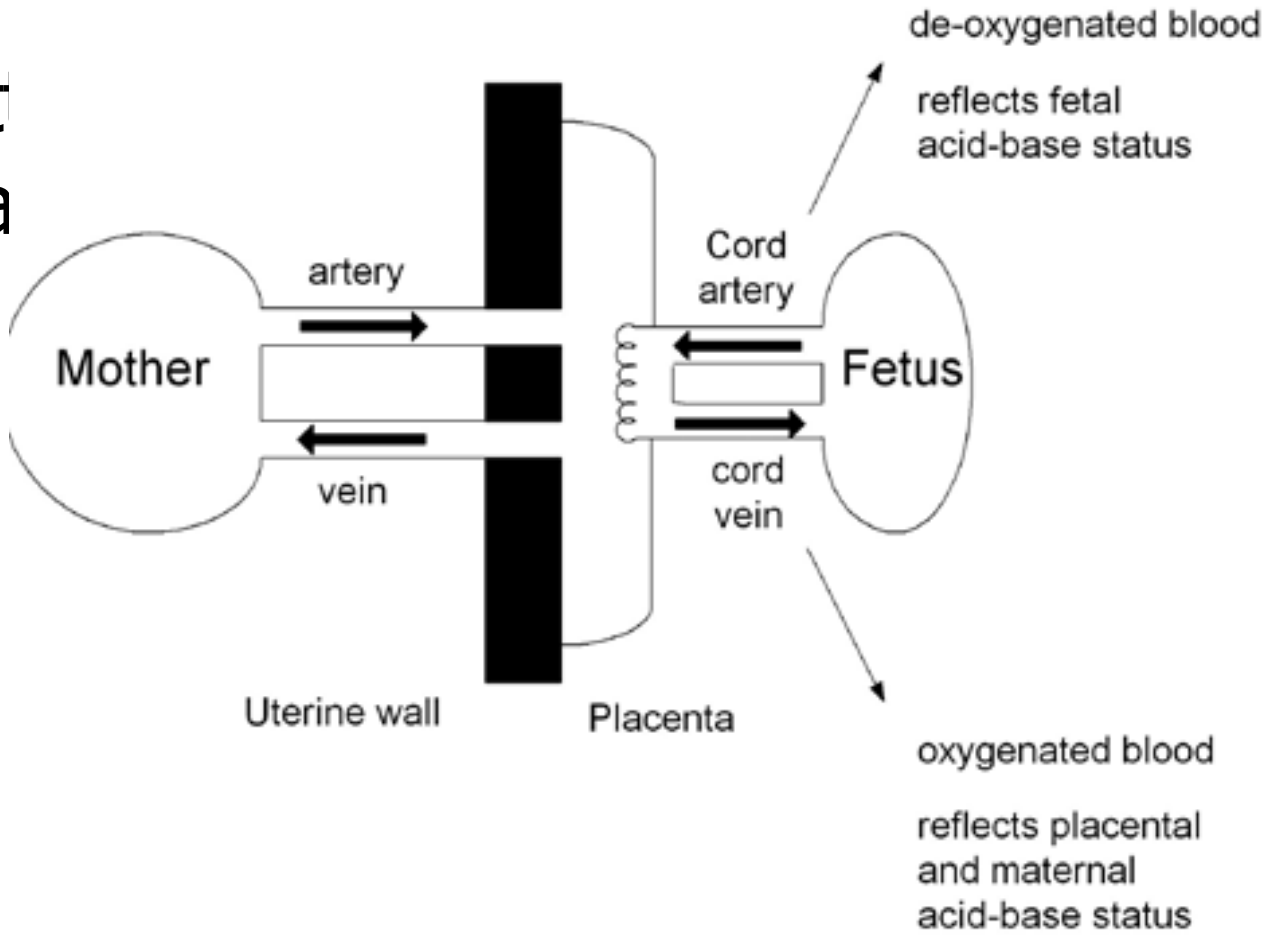



- Always draw two samples
- From different but closely adjacent blood vessels
- One inevitably will be the artery
- The big easy-to-draw-from is vessel is always the vein
- The differences in PCO2 (**always higher in the artery**) and pH (**always lower in the artery**) will indicate from which vessel the samples were obtained, regardless of how the sample may be erroneously labeled

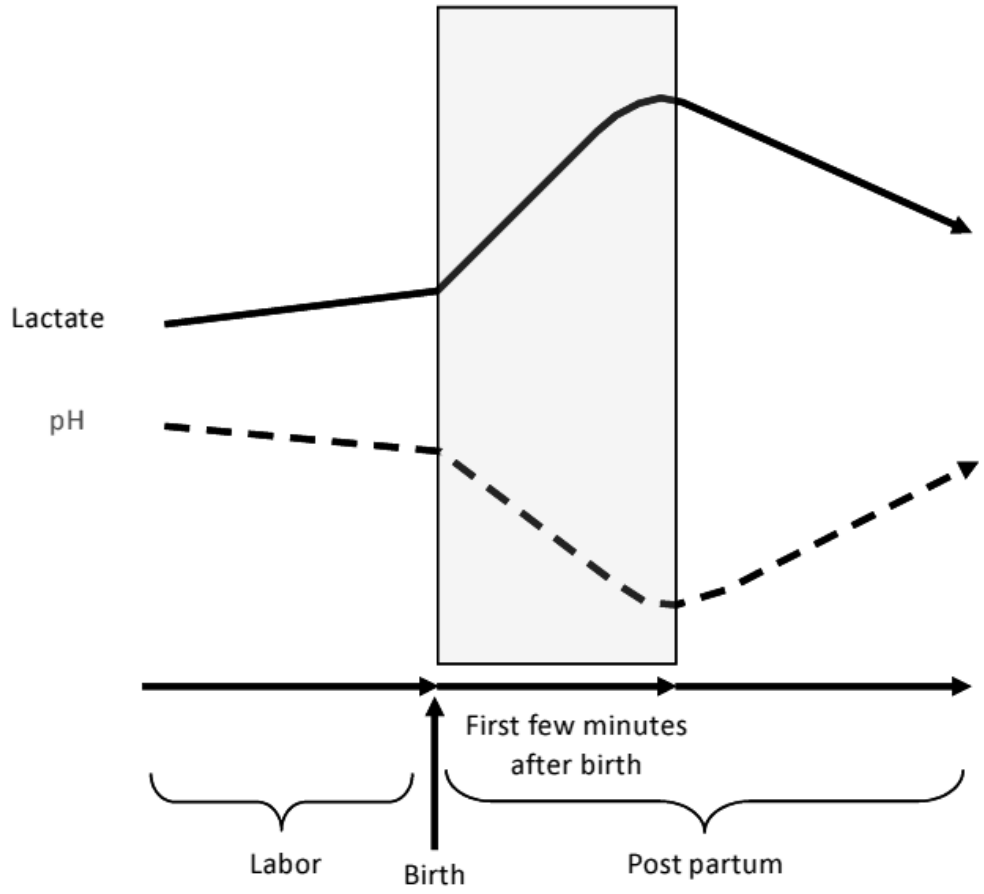
# Criterio A: Cord blood Analysis

Ot
sia

- ❑
- ❑



## Pitfalls in Interpreting Umbilical Cord Blood Gases and Lactate at Birth



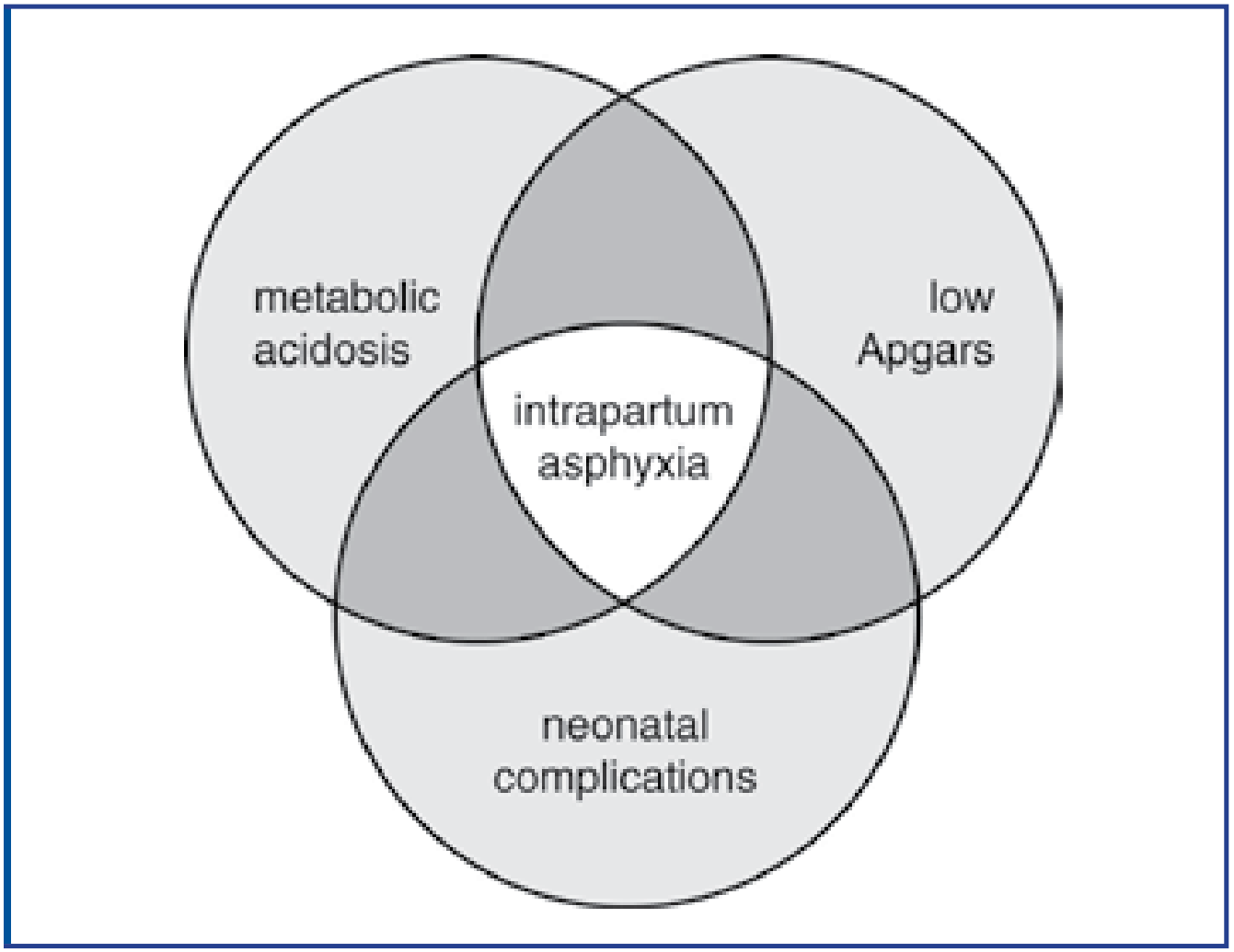

Hidden acidosis

# Criterio A: Cord blood Analysis

Cosa guardare?

- pH
- pCO2
- pO2
- BE
- Lattato

Valori normali??


metabolic
acidosis
low
Apgars
intrapartum
asphyxia
neonatal
complications

## Reference range for umbilical artery blood gas values in preterm newborns

| Umbilical arterial blood | Mean | 5th to 95th percentile |
|---|---|---|
| pH | 7.28 | 7.14 to 7.4 |
| $PCO_2$ (mmHg) | 50.2 | 32 to 69.2 |
| $HCO_3$ (mEq/L) | 22.4 | 16 to 27.1 |
| Base excess (mEq/L) | −2.5 | −7.6 to 1.3 |

Values represent findings from umbilical artery cord blood analysis after vaginal delivery of 1015 unselected preterm infants delivered at Shands Hospital, University of Florida, 1992-1993.

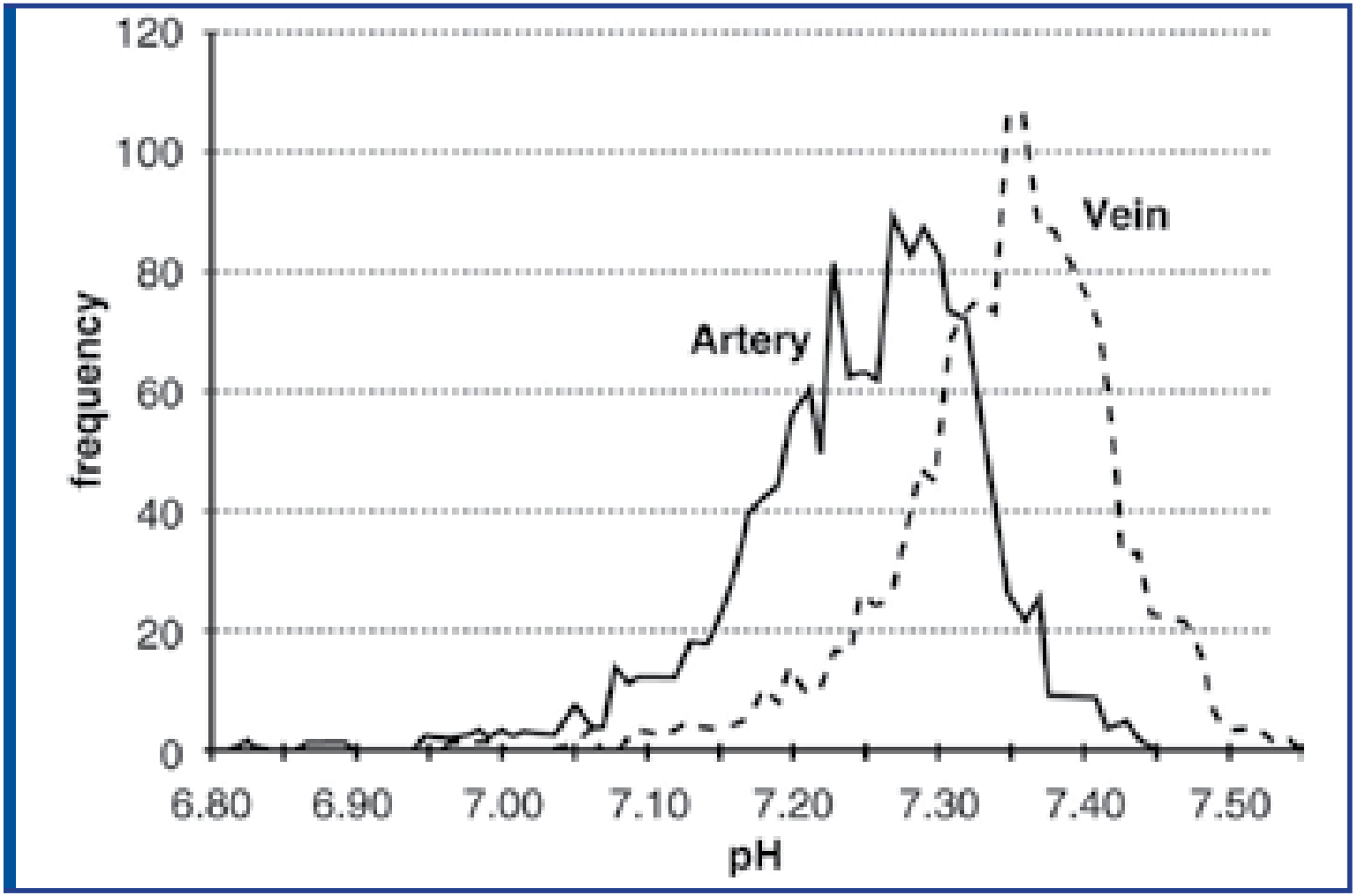
*Data from: Riley RJ, Johnson JWC. Collecting and analyzing cord blood gases. Clin Obstet Gynecol 1993; 36:13.*

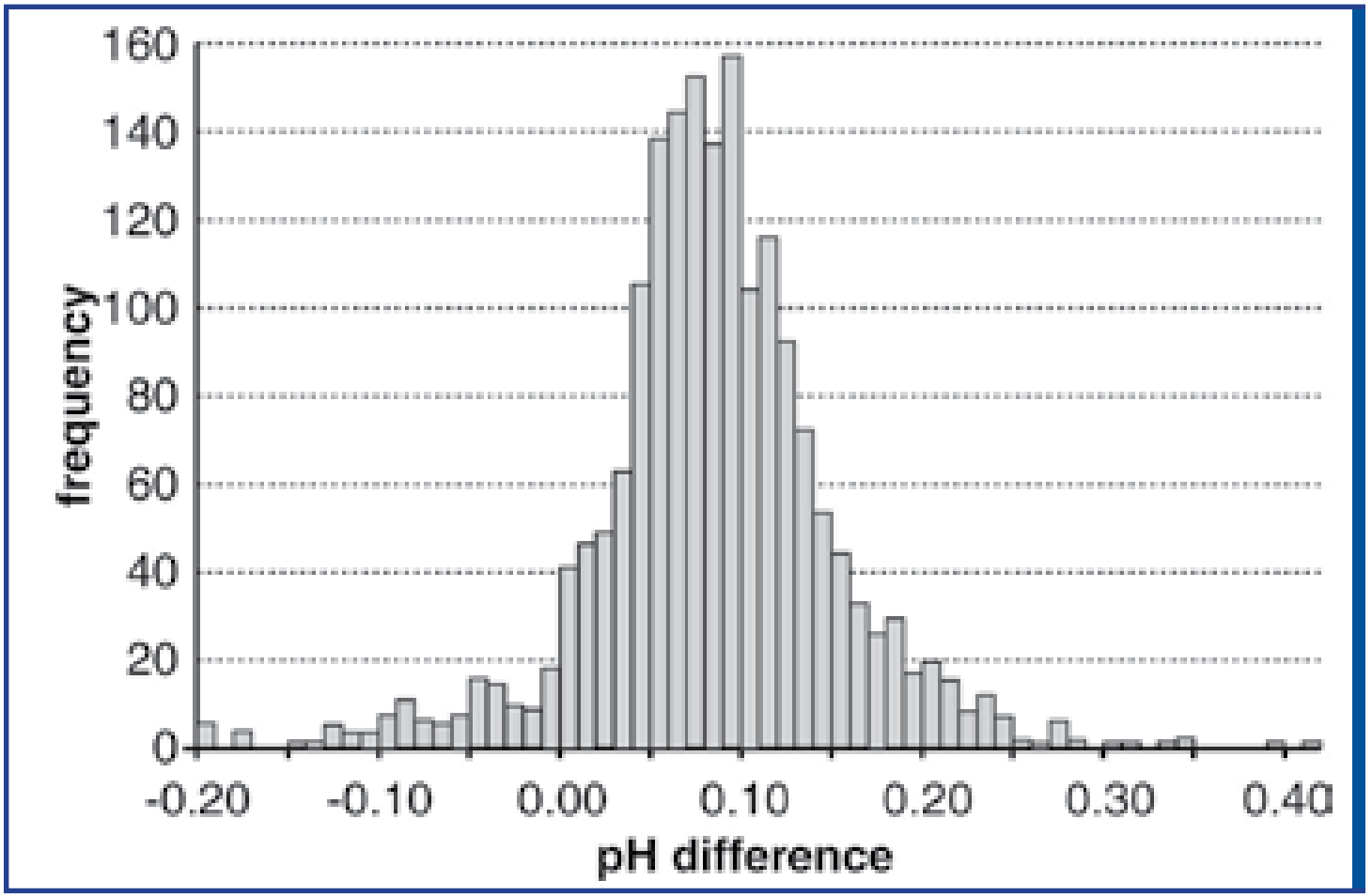
## Reference range for umbilical artery blood gas values in term newborns

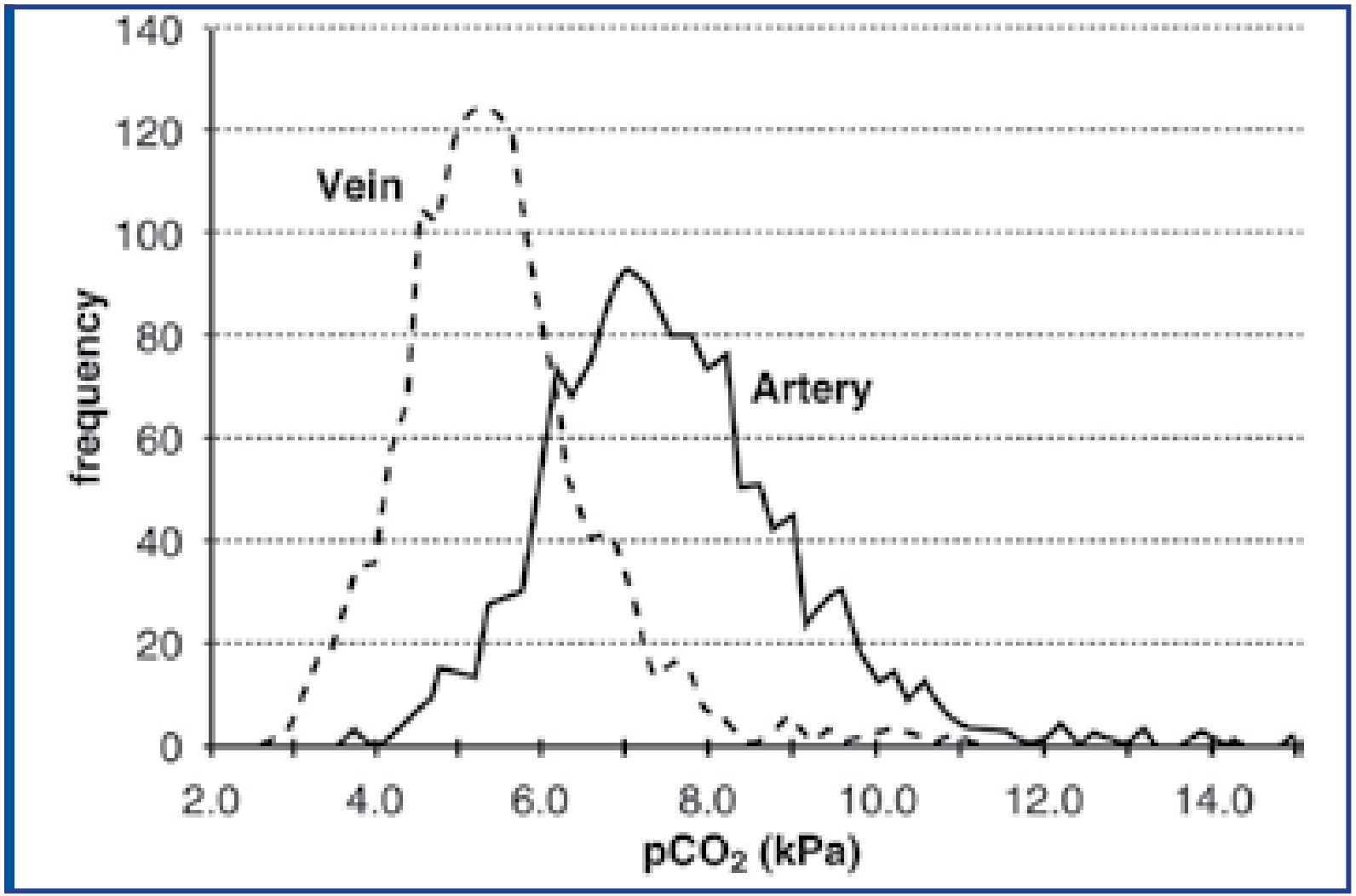
| Umbilical arterial blood | Mean | 5th to 95th percentile |
|---|---|---|
| pH | 7.27 | 7.15 to 7.38 |
| $PCO_2$ (mmHg) | 50.3 | 32 to 68 |
| $HCO_3$ (mEq/L) | 22 | 15.4 to 26.8 |
| Base excess (mEq/L) | −2.7 | −8.1 to 0.9 |

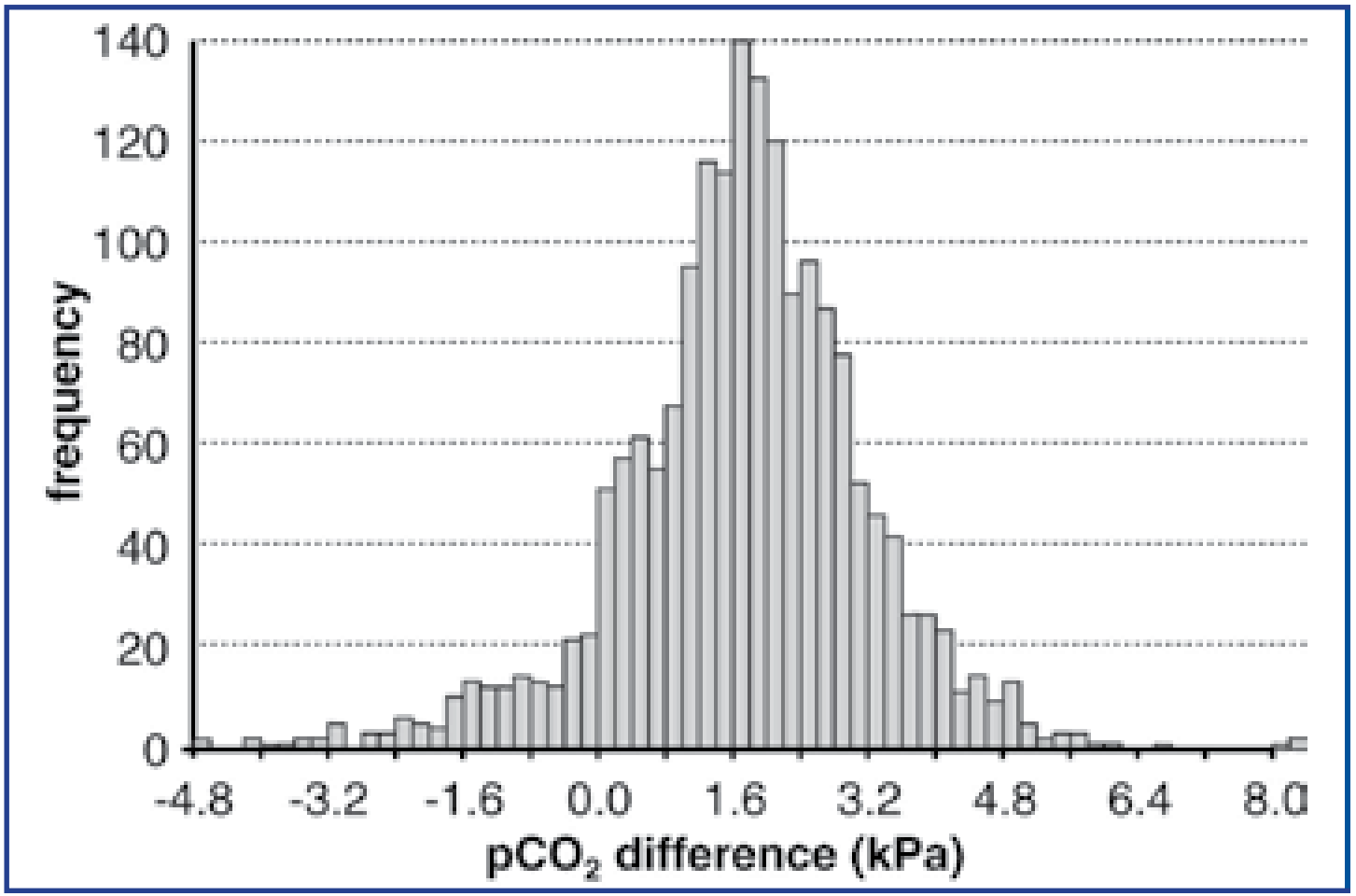
Values represent findings from umbilical artery cord blood analysis after vaginal delivery of 3522 unselected term infants delivered at Shands Hospital, University of Florida, 1992-1993.

*Data from: Riley RJ, Johnson JWC. Collecting and analyzing cord blood gases. Clin Obstet Gynecol 1993; 36:13.*

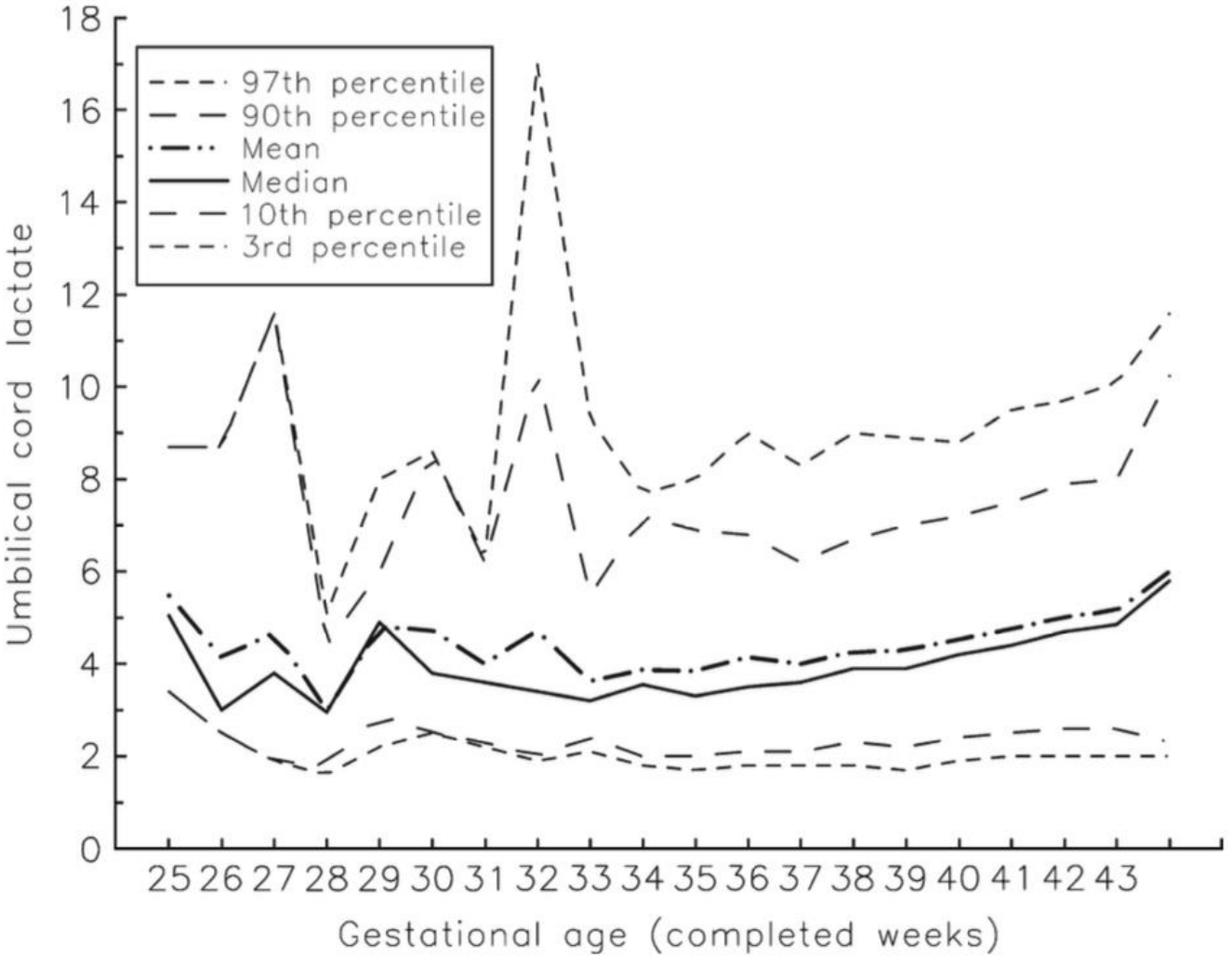

120
100
80
60
40
20
0
frequency
Artery
Vein
6.80
6.90
7.00
7.10
7.20
7.30
7.40
7.50
pH


160
140
120
100
80
60
40
20
0
frequency
-0.20
-0.10
0.00
0.10
0.20
0.30
0.40
pH difference


140
120
100
80
60
40
20
0
frequency
Vein
Artery
2.0
4.0
6.0
8.0
10.0
12.0
14.0
pCO2 (kPa)


140
120
100
80
60
40
20
0
frequency
-4.8
-3.2
-1.6
0.0
1.6
3.2
4.8
6.4
8.0
pCO2 difference (kPa)

# Lactate concentration in umbilical cord blood is gestational age-dependent: a population-based study of 17 867 newborns




BJOG. 2008 May;115(6):704-9

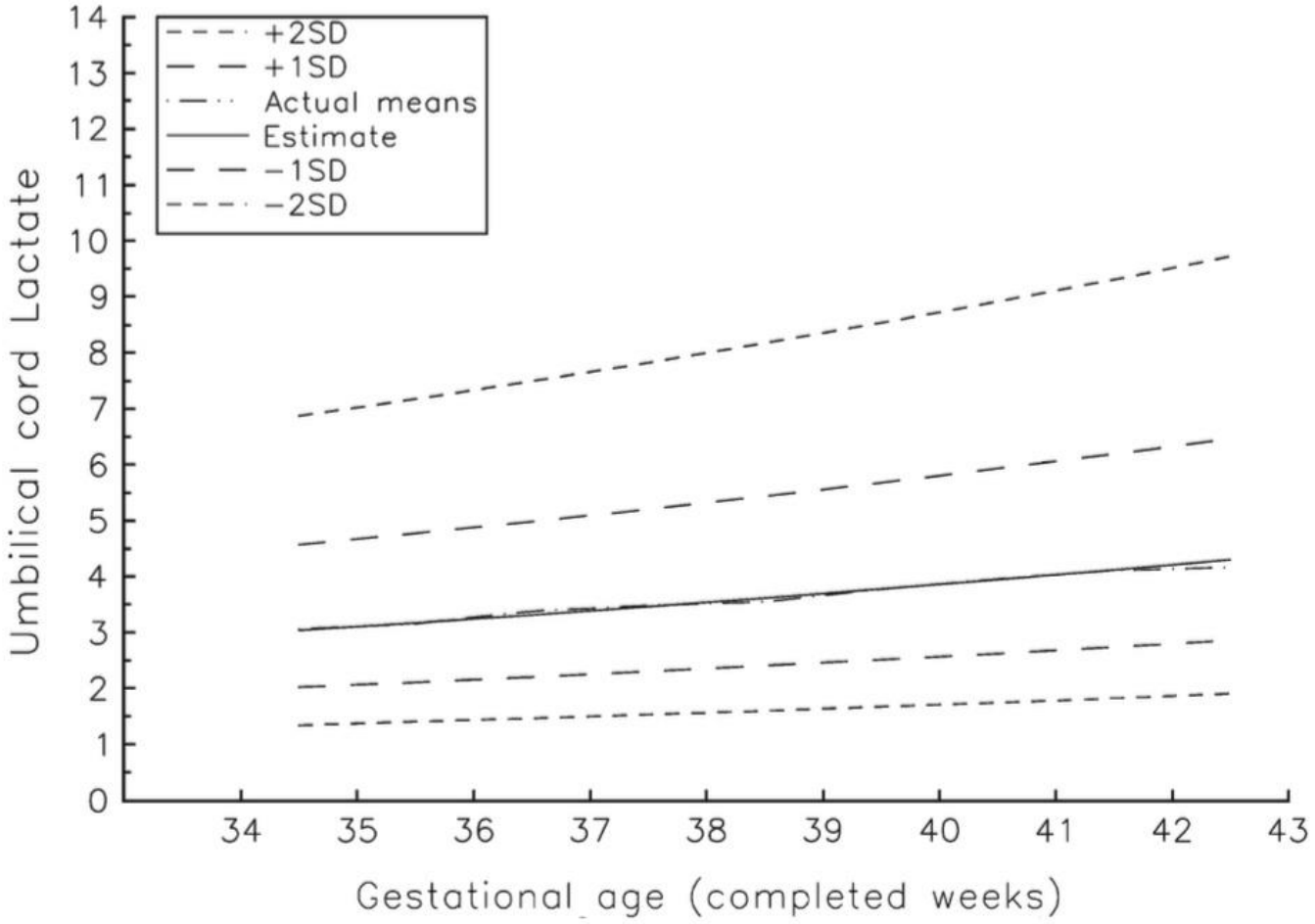



**Figure 3.** Reference values for umbilical cord venous plasma lactate

BJOG. 2008 May;115(6):704-9

# Interpretazione: fattori di errore

- Prolonged storage

- *Algorithm and fluid compartment for BD calculation*

**Sampling** → **Analysis** → **Interpretation of results**

- *Delayed sampling*
- Venous , arterial or mixed sample
- Same vessel twice
- Incorrect labeling

- Incorrect input information
- Air bubbles
- Inhomogenous sample
- Coagulation
- Hemolysis
- Measurement imprecision

- *Arterio-venous gradient*
- *Decimal rounding and further calculations*

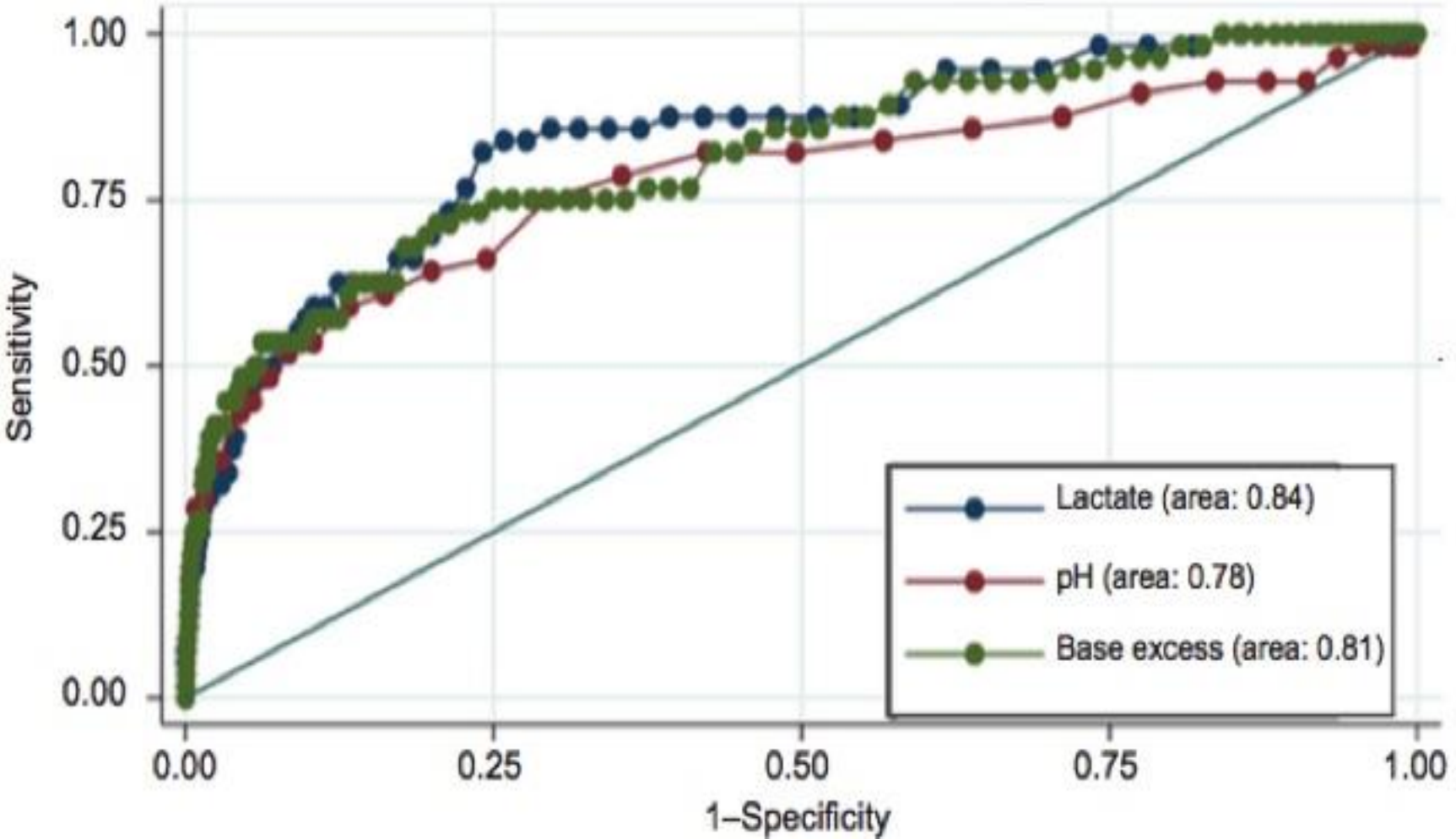
**Ipossia ??**

| | | Predicted condition | |
|---|---|---|---|
| | Total population | Predicted Condition positive | Predicted Condition negative |
| True condition | condition positive<br>Sensibilità | **True positive** | **False Negative**<br>(Type II error) |
| | condition negative<br>Specificità | **False Positive**<br>(Type I error) | **True negative** |
| | Accuracy (ACC) = $\frac{\Sigma \text{ True positive} + \Sigma \text{ True negative}}{\Sigma \text{ Total population}}$ | Positive predictive value (PPV), Precision = $\frac{\Sigma \text{ True positive}}{\Sigma \text{ Test outcome positive}}$ | False omission rate (FOR) = $\frac{\Sigma \text{ False negative}}{\Sigma \text{ Test outcome negative}}$ |
| | | False discovery rate (FDR) = $\frac{\Sigma \text{ False positive}}{\Sigma \text{ Test outcome positive}}$ | Negative predictive value (NPV) = $\frac{\Sigma \text{ True negative}}{\Sigma \text{ Test outcome negative}}$ |

*Original Research*

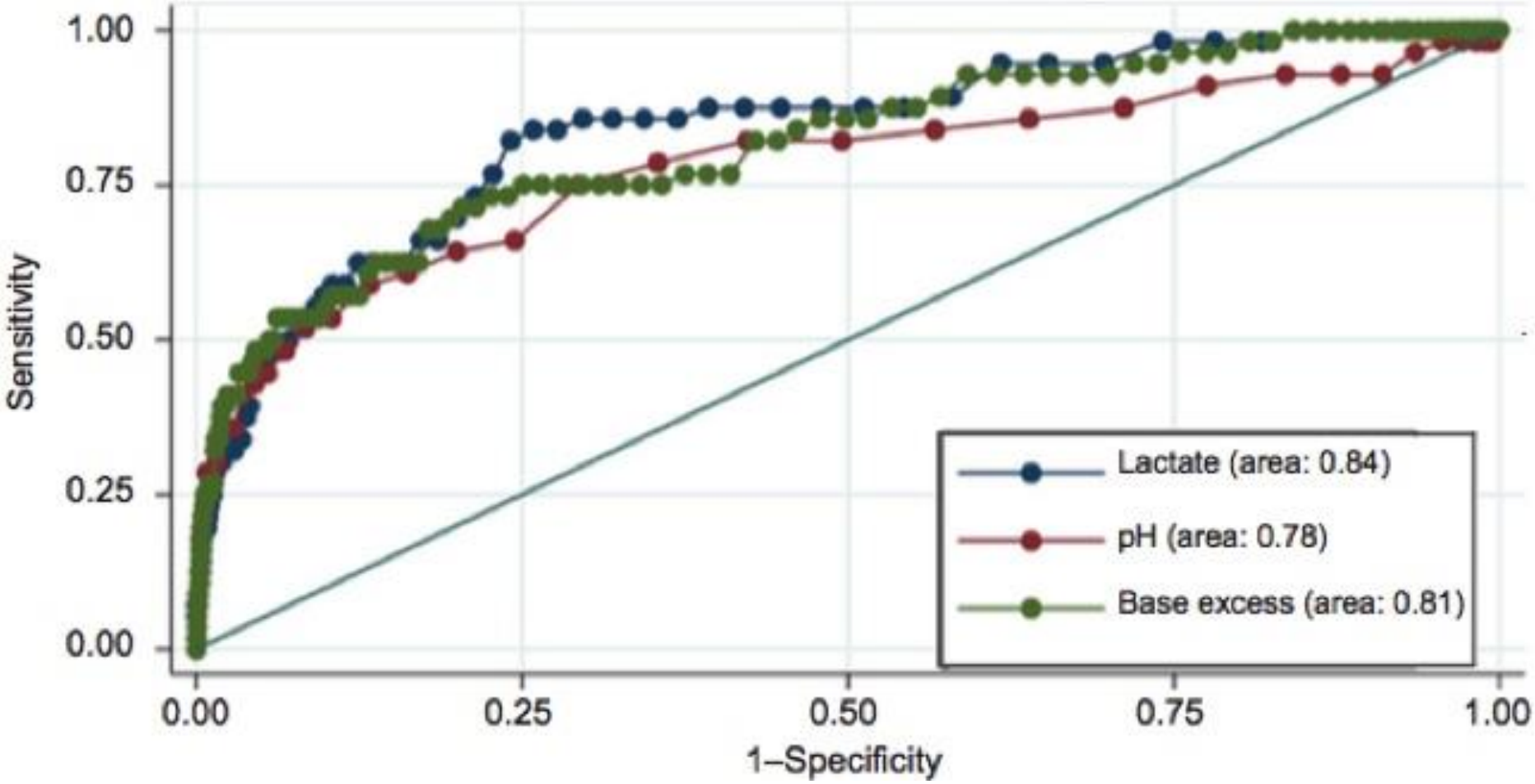
Obstet Gynecol 2014;124:756–61

# Umbilical Cord Arterial Lactate Compared With pH for Predicting Neonatal Morbidity at Term



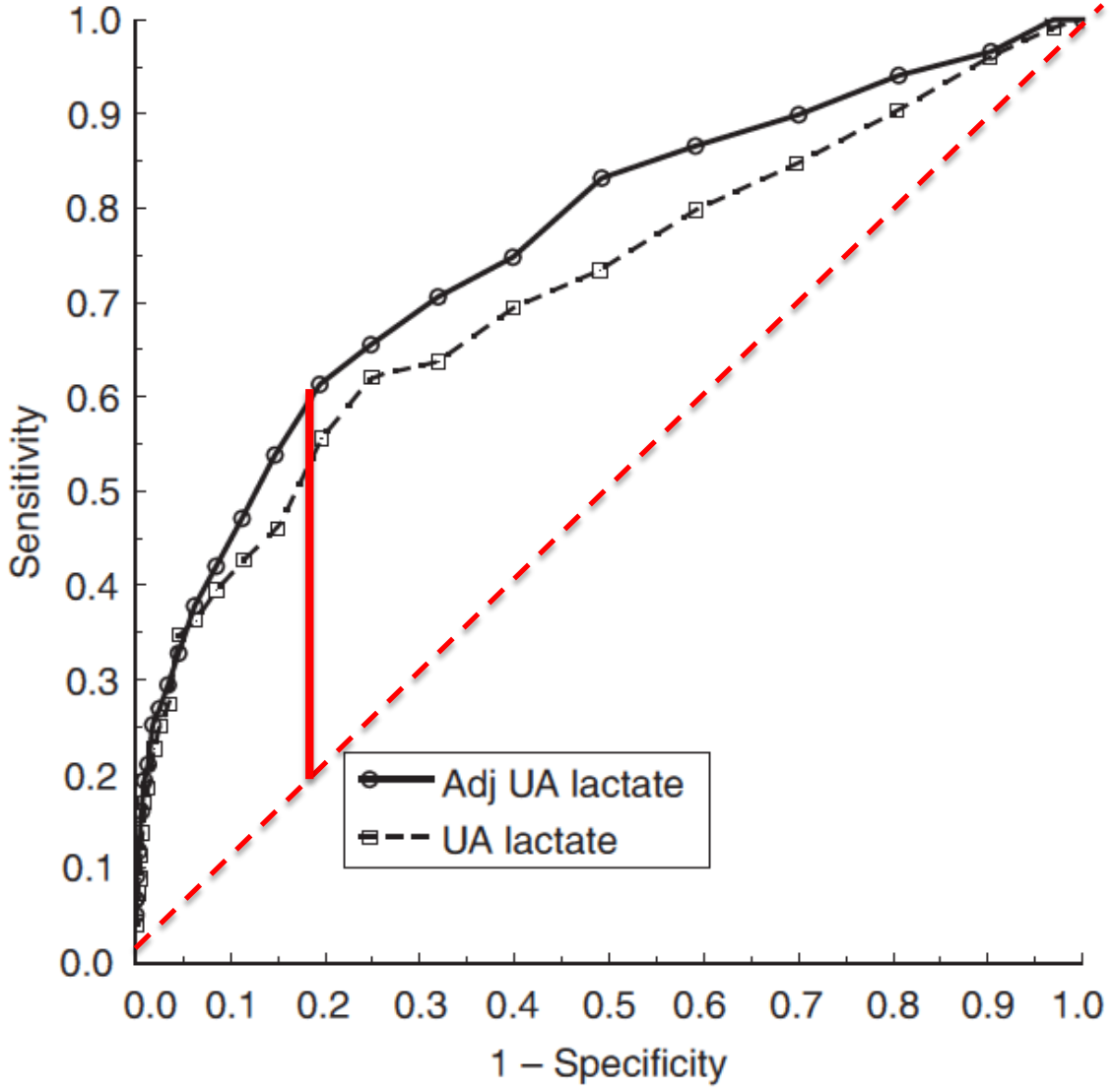
# Umbilical Cord Venous Lactate for Predicting Arterial Lactic Acidemia and Neonatal Morbidity at Term

Obstet Gynecol 2016;127:674–80)



# Relation between umbilical cord blood pH, base deficit, lactate, 5-minute Apgar score and development of hypoxic ischemic encephalopathy

NANA WIBERG




*Acta Obstetricia et Gynecologica*. 2010; 89: 1263–1269

# Umbilical Cord Blood Gas and Lactate Levels as a Marker of Birth Asphyxia in Neonates with Particular Reference to Resource Limited Countries

- There is enough evidence to suggest ***that lactate is a better parameter for determining fetal compromise in the perinatal period***.
- Its relative ease of sampling from umbilical cord and totally fetal origin makes it a useful tool to prediction of birth asphyxia in neonates.
- cord blood gas analysis with arterial cord lactate levels is the gold standard assessment of utero-placental function and fetal oxygenation/acid-base status at birth.

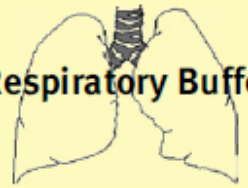
Pak Pediatr J 2013; **37(4):** 197-203

**LIMITATIONS** — Fetal blood gas analysis has some limitations that should be considered when interpreting results.

- ***The cord blood pH*** value alone does not distinguish between a primary fetal or placental disorder.
- Considering ***maternal health status*** and each blood gas value can help define the primary pathologic process.
- ***Fetal pH and blood gases*** do not necessarily reflect asphyxial events that occurred remote from delivery or localized ischemia and infarction.
- ***pH, base deficit, and lactate levels*** are only metabolic surrogate markers for key clinical outcomes, including neonatal morbidity, neonatal mortality, and long-term neurodevelopment.

# Neonato

# Neonato



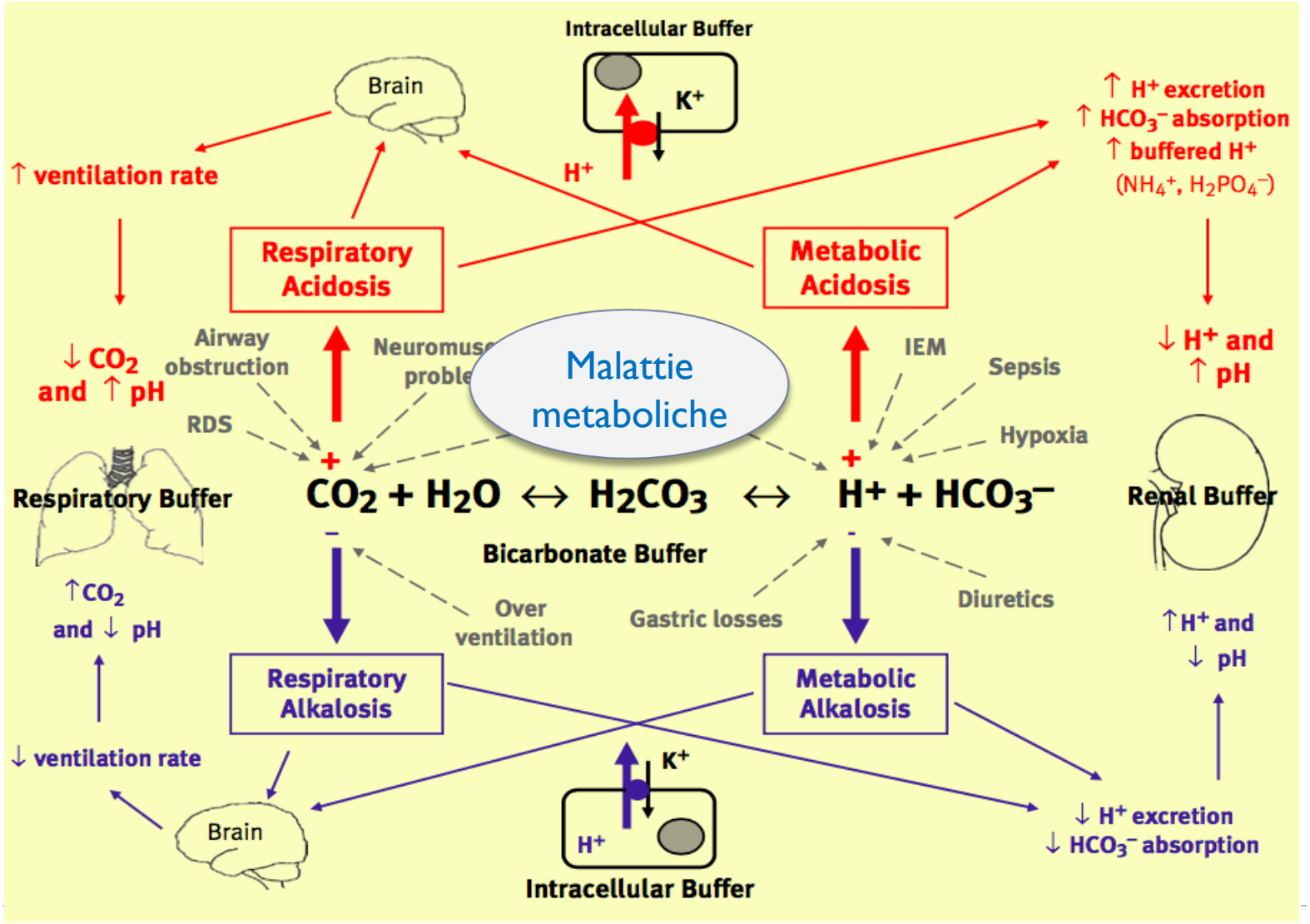
Respiratory Buffer

$$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$$

Bicarbonate Buffer

Renal Buffer

# Neonato


Intracellular Buffer
Brain
K+
H+
↑ ventilation rate
↑ H+ excretion
↑ HCO3− absorption
↑ buffered H+
(NH4+, H2PO4−)
Respiratory Acidosis
Metabolic Acidosis
↓ CO2 and ↑ pH
Airway obstruction
Neuromus
proble
Malattie metaboliche
IEM
Sepsis
↓ H+ and ↑ pH
RDS
Hypoxia
Respiratory Buffer
CO2 + H2O ↔ H2CO3 ↔ H+ + HCO3−
Renal Buffer
Bicarbonate Buffer
↑CO2 and ↓ pH
Over ventilation
Gastric losses
Diuretics
↑H+ and ↓ pH
Respiratory Alkalosis
Metabolic Alkalosis
↓ ventilation rate
Brain
K+
H+
↓ H+ excretion
↓ HCO3− absorption
Intracellular Buffer

# Take Home Messages

## Nel Neonato

Equilibrio Acido base è spesso la punta dell'iceberg e/o elemento di allerta per :

- Patologie perinatali (ipossia)
- Patologie acute (respiratorie, metaboliche ecc)
- Patologie più tardive (infezioni ecc)

# Fortunatamente la maggior parte ……

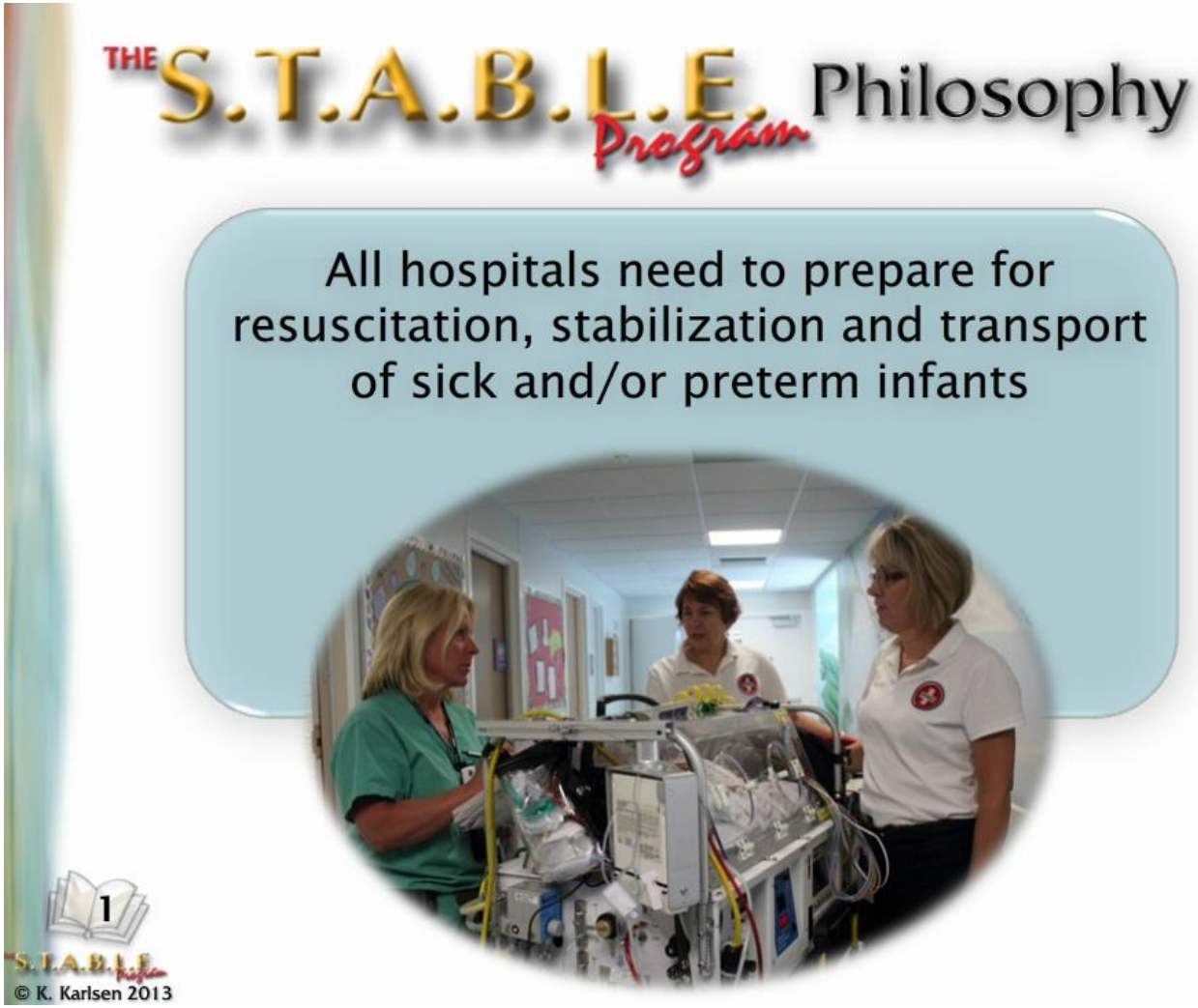
# Stabilizzazione e trasporto

- Nuovo nato a rischio per Ipotermia???
- Assistenza in sala parto (NALS)
- Stabilizzazione ➡ S.T.A.B.L.E
- Ipotermia passiva ?
- Contatto Centro riferimento
- Modalità di Trasporto

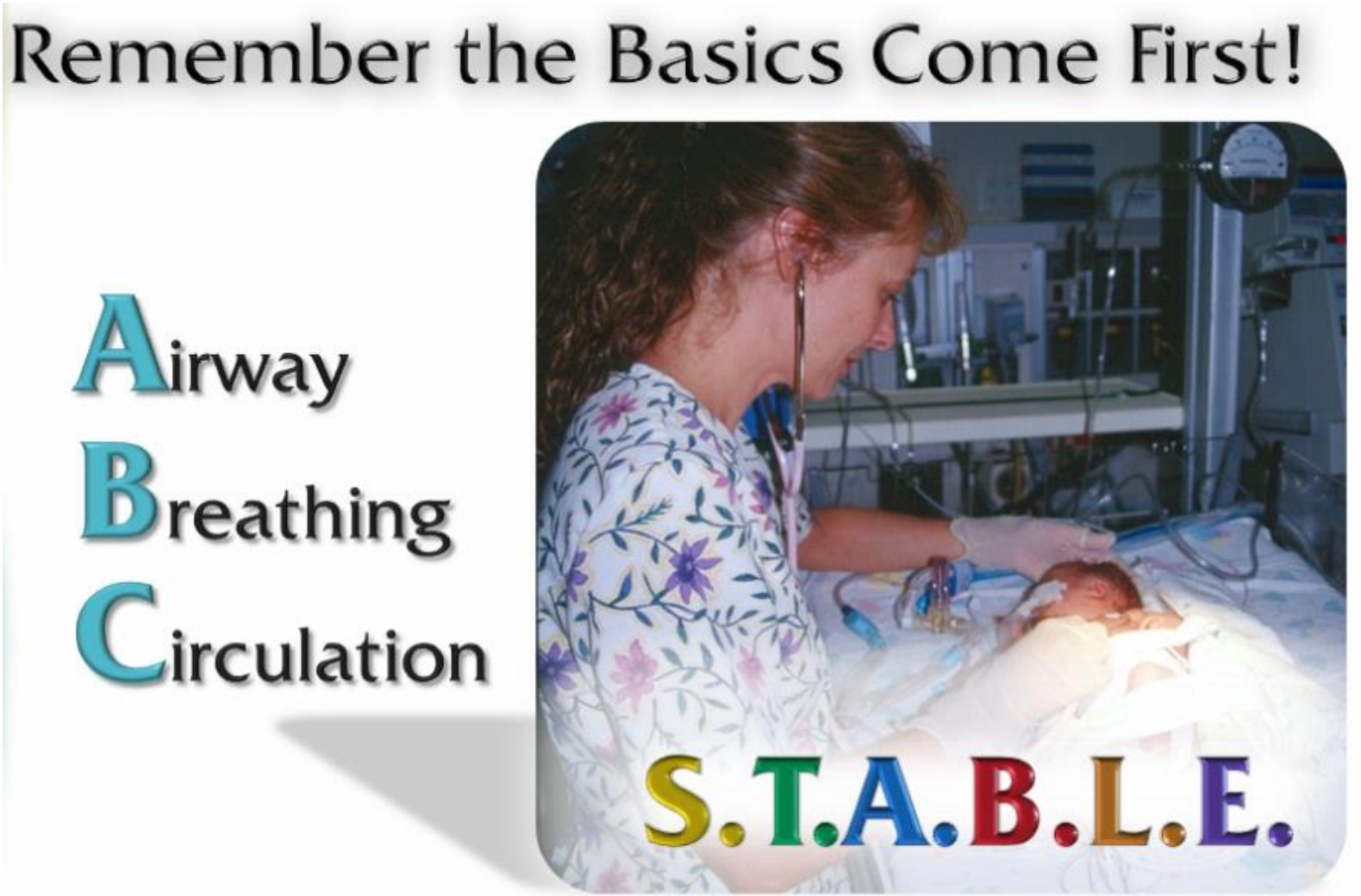
# Stabilizzazione e trasporto

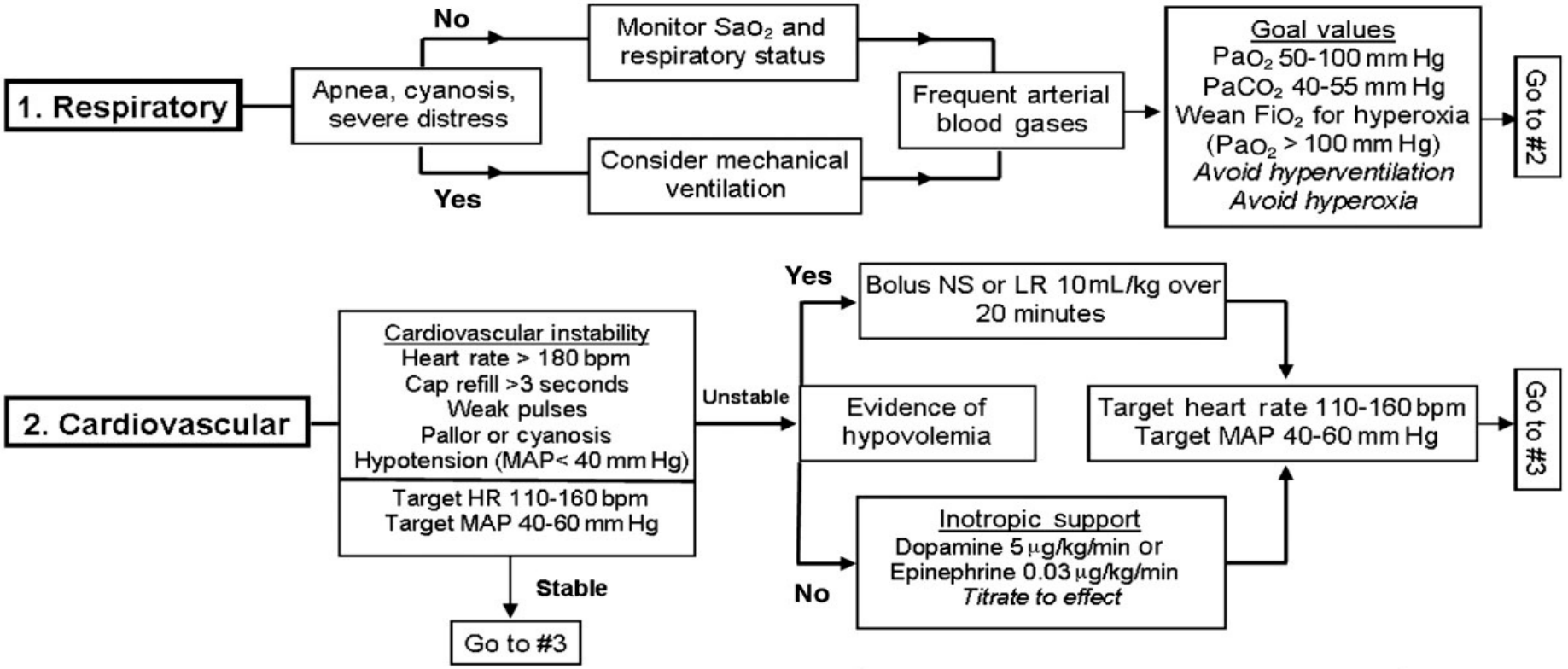
- Fattori di rischio presenti?
- Come è il nuovo nato?
- Potrebbe essere candidato all'Ipotermia?
- Check-list cose da fare:
  - Temperatura
  - Monitoraggio assistenza in sala parto
  - Stabilizzazione
  - Preparazione al trasporto
  - Attuazione del trasporto

# Stabilizzazione e trasporto



# Stabilizzazione e trasporto






RACCOMANDAZIONI PER L'ASSISTENZA AL NEONATO CON ENCEFALOPATIA IPOSSICO-ISCHEMICA CANDIDATO AL TRATTAMENTO IPOTERMICO G.Ancora, G.Pomero, F.Ferrari SIN

***Respiratory Rate < 30 per minute – Bradypnea***

- If labored, may be sign of exhaustion
- Apnea → frequency, duration, heart rate, $O_2$ saturation, self-resolved vs stimulation required
- Gasping
  - ⚠ Ominous sign of impending cardio-respiratory arrest!
    - Provide immediate positive pressure ventilation (PPV)
    - If heart rate not rising, proceed with endotracheal intubation

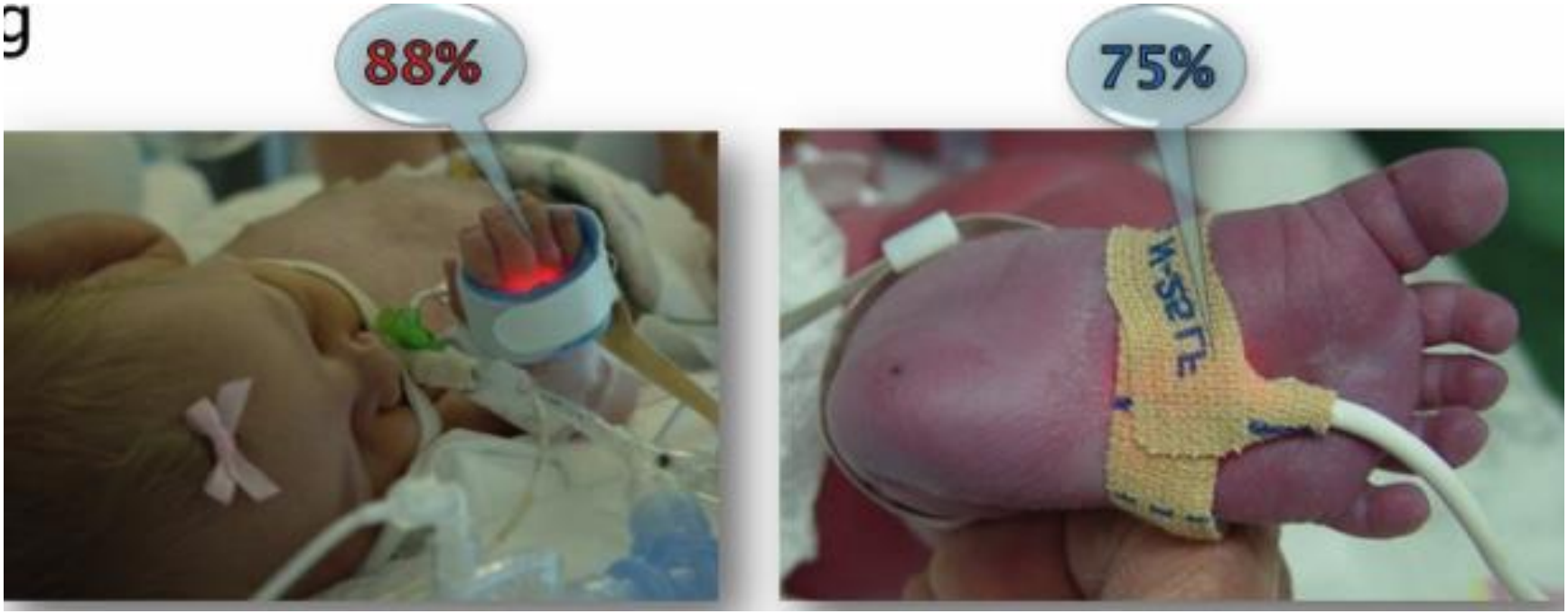
# Positive Pressure Ventilation (PPV)

- Indications
  - Apnea
  - Inadequate breathing effort
  - Bradycardia
  - Hypoxemia not responsive to supplemental $O_2$

⚠ *GASPING → signifies extremely critical state* should be treated as apnea → provide PPV → assess need for intubation

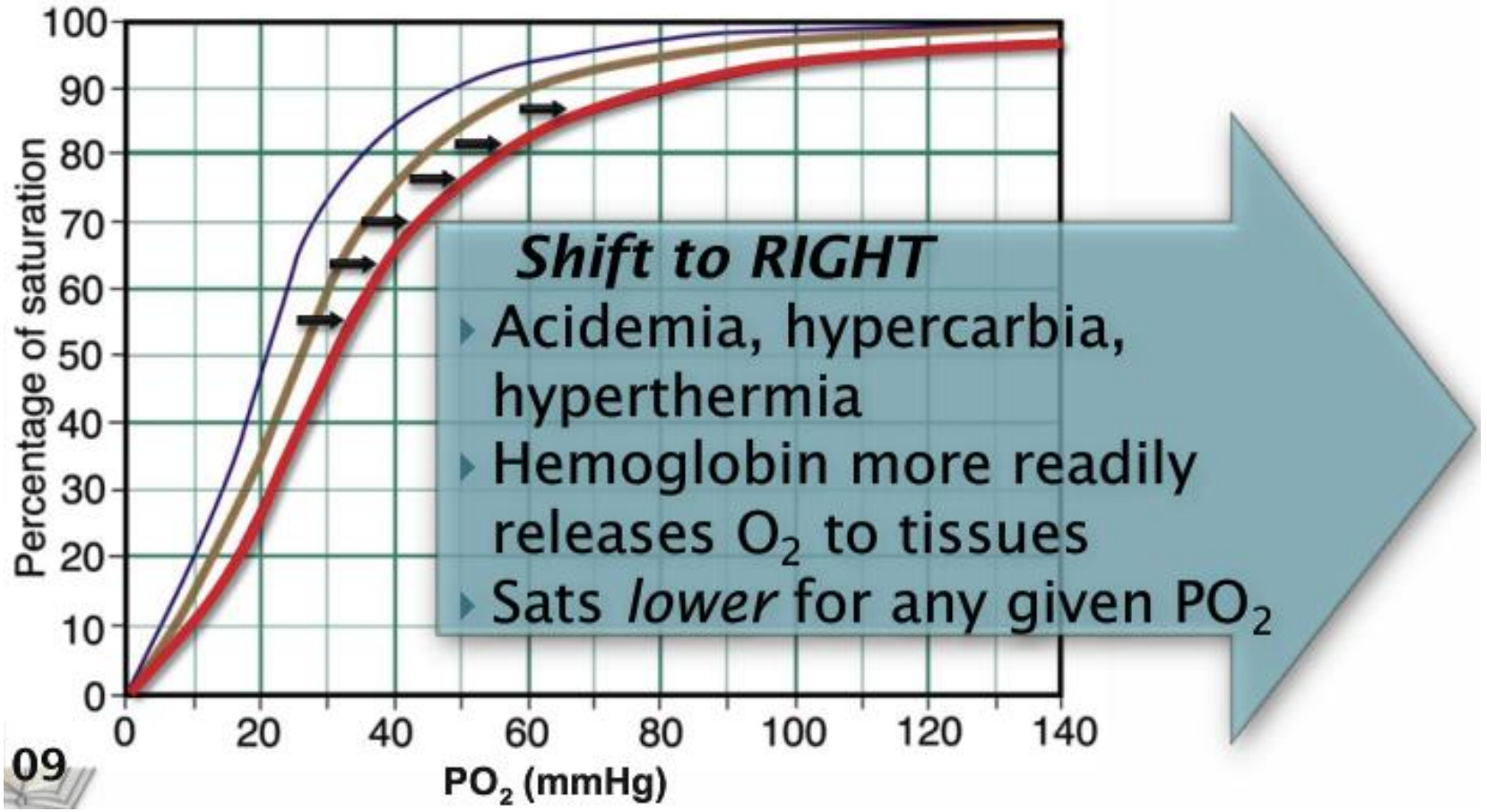
130

# Pre e Post duttale

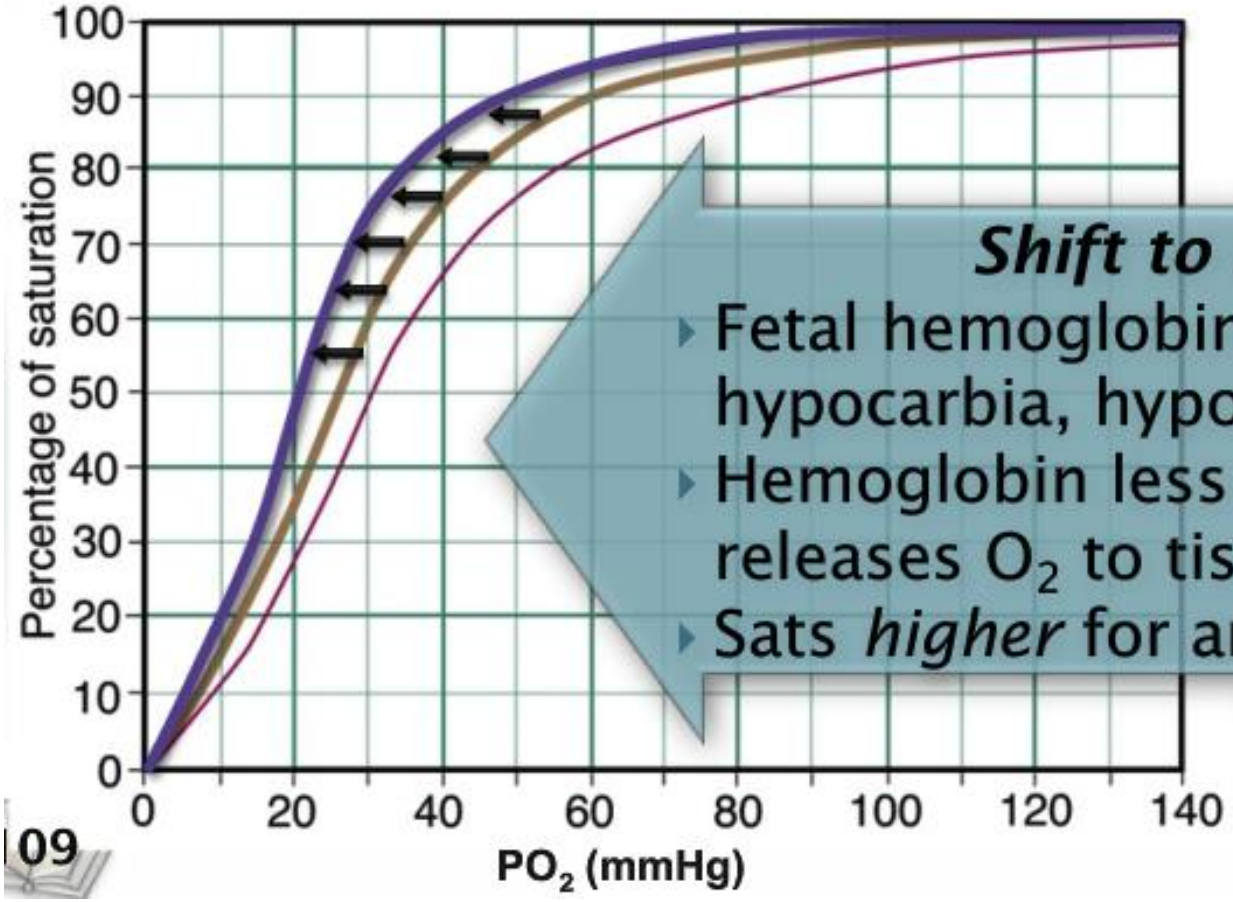



RACCOMANDAZIONI PER L'ASSISTENZA AL NEONATO CON ENCEFALOPATIA IPOSSICOISCHEMICA CANDIDATO AL TRATTAMENTO IPOTERMICO G.Ancora, G.Pomero, F.Ferrari SIN

# $O_2$– Hemoglobin Dissociation Curve



# $O_2$– Hemoglobin Dissociation Curve

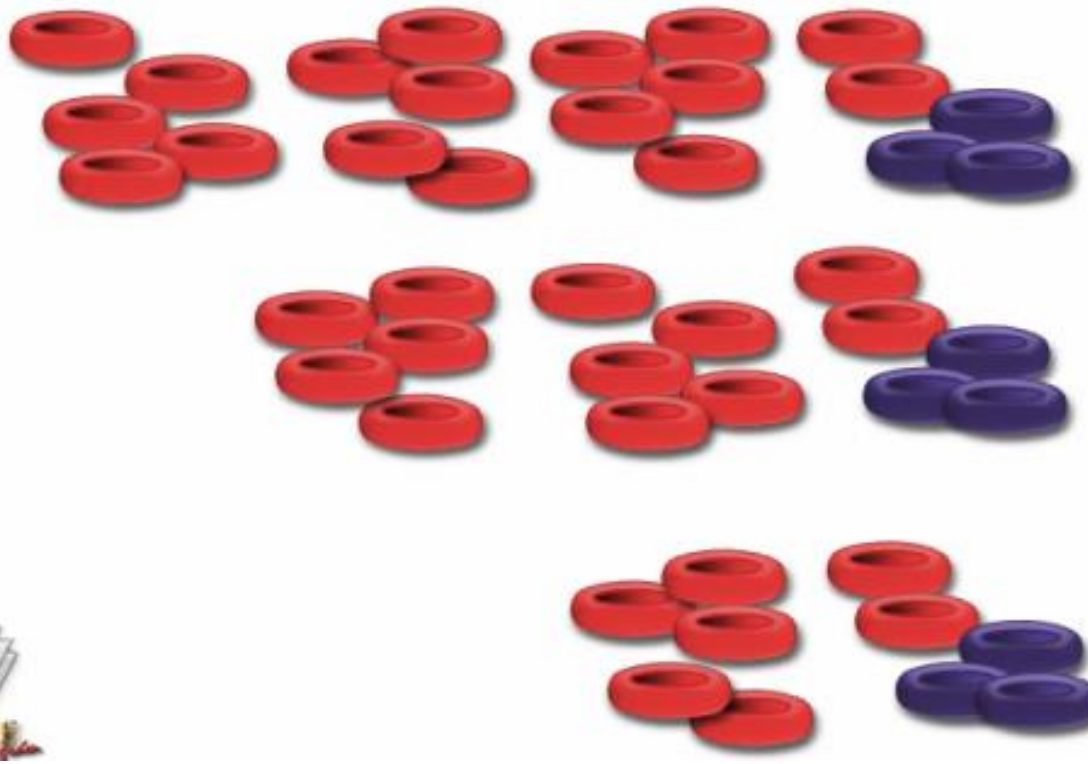



***Shift to LEFT***

- Fetal hemoglobin, alkalemia, hypocarbia, hypothermia
- Hemoglobin less easily releases $O_2$ to tissues
- Sats *higher* for any given $PO_2$

09

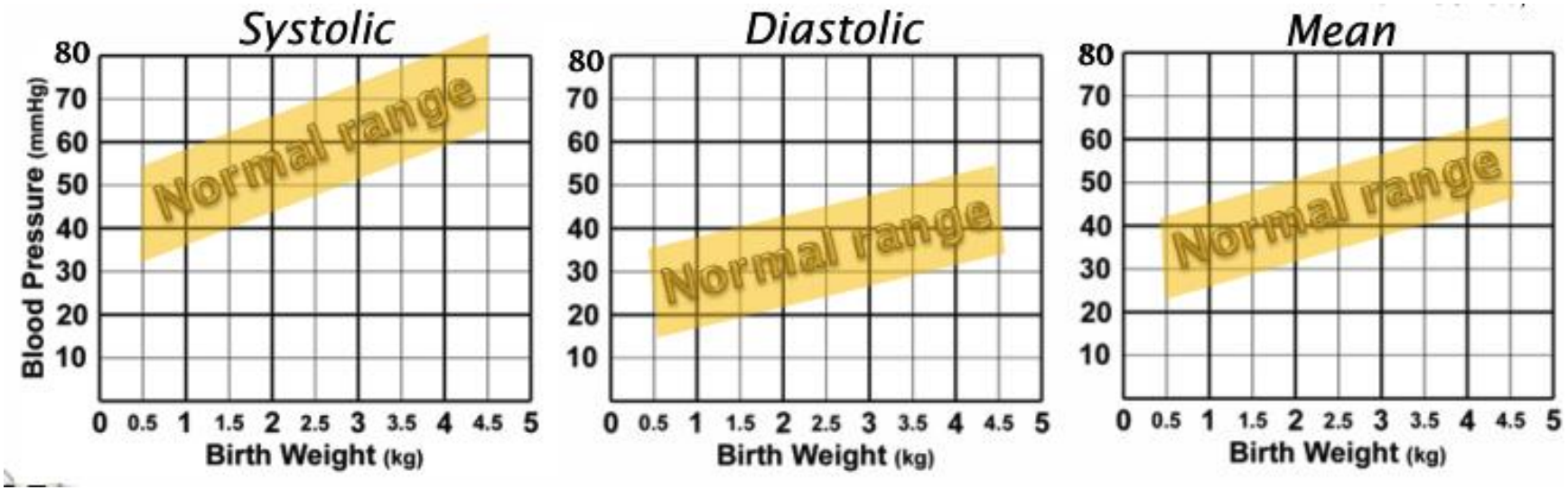
- Cyanosis is visible with 3 – 5 gm/dL ***reduced*** hemoglobin



Hb = 20 gm/dL
Hct = 60%
$O_2$Sat = 85%

Hb = 15 gm/dL
Hct = 45%
$O_2$Sat = 80%

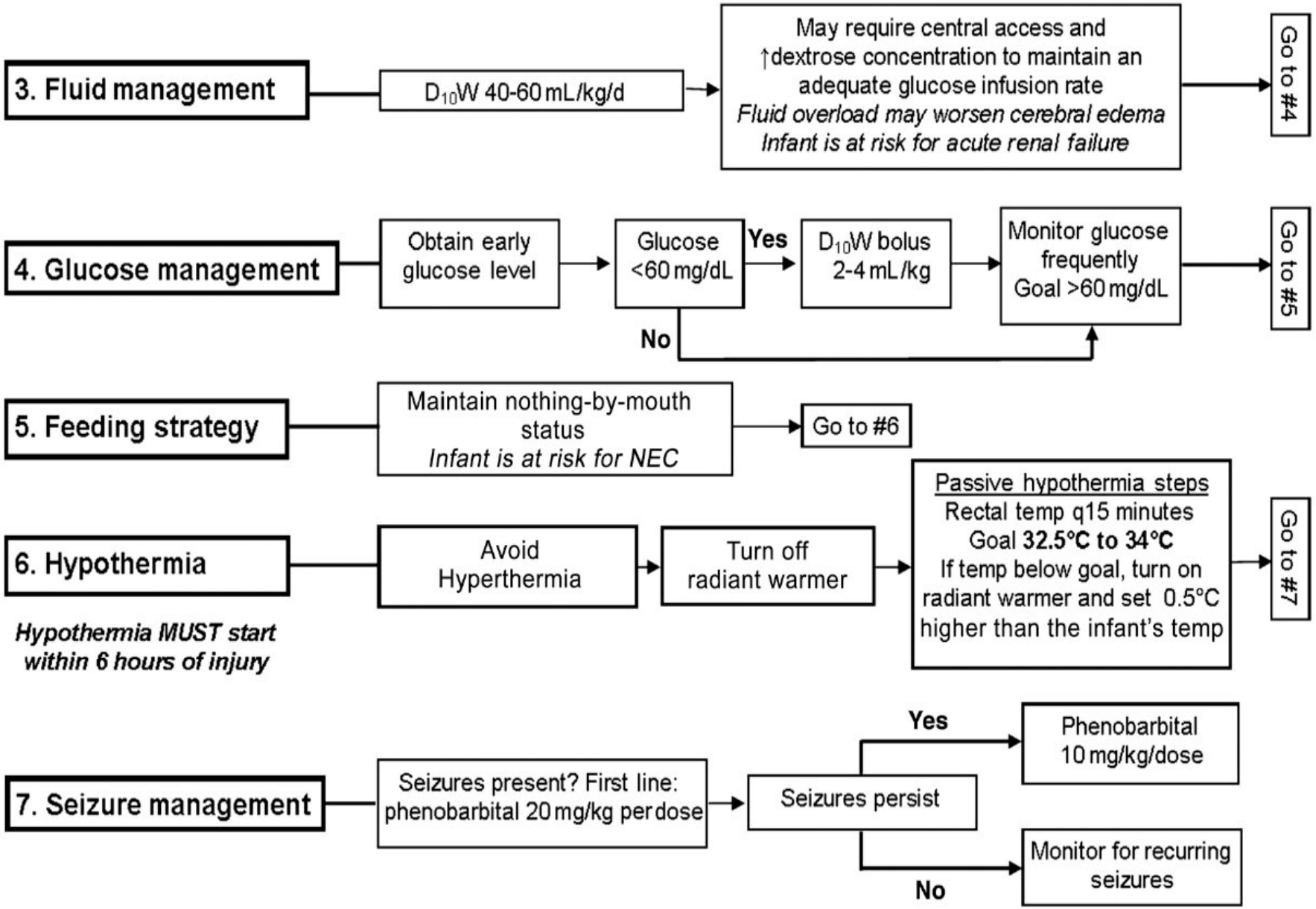
Hb = 10 gm/dL
Hct = 30%
$O_2$Sat = 70%


Systolic
Diastolic
Mean
Blood Pressure (mmHg)
80
70
60
50
40
30
20
10
Normal range
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Birth Weight (kg)

# Blood Pressure • Key Points

BLOOD PRESSURE

- Organ dysfunction results from inadequate perfusion and oxygenation
- Evaluate for underlying problems and treat aggressively
- Base decision to treat with volume and/or medications on physical assessment and history, not just blood pressure


3. Fluid management
D10W 40-60 mL/kg/d
May require central access and
↑dextrose concentration to maintain an
adequate glucose infusion rate
Fluid overload may worsen cerebral edema
Infant is at risk for acute renal failure
Go to #4
4. Glucose management
Obtain early glucose level
Glucose <60 mg/dL
Yes
D10W bolus 2-4 mL/kg
Monitor glucose frequently
Goal >60 mg/dL
Go to #5
No
5. Feeding strategy
Maintain nothing-by-mouth status
Infant is at risk for NEC
Go to #6
6. Hypothermia
Hypothermia MUST start within 6 hours of injury
Avoid Hyperthermia
Turn off radiant warmer
Passive hypothermia steps
Rectal temp q15 minutes
Goal 32.5°C to 34°C
If temp below goal, turn on radiant warmer and set 0.5°C higher than the infant's temp
Go to #7
7. Seizure management
Seizures present? First line: phenobarbital 20 mg/kg per dose
Seizures persist
Yes
Phenobarbital 10 mg/kg/dose
No
Monitor for recurring seizures

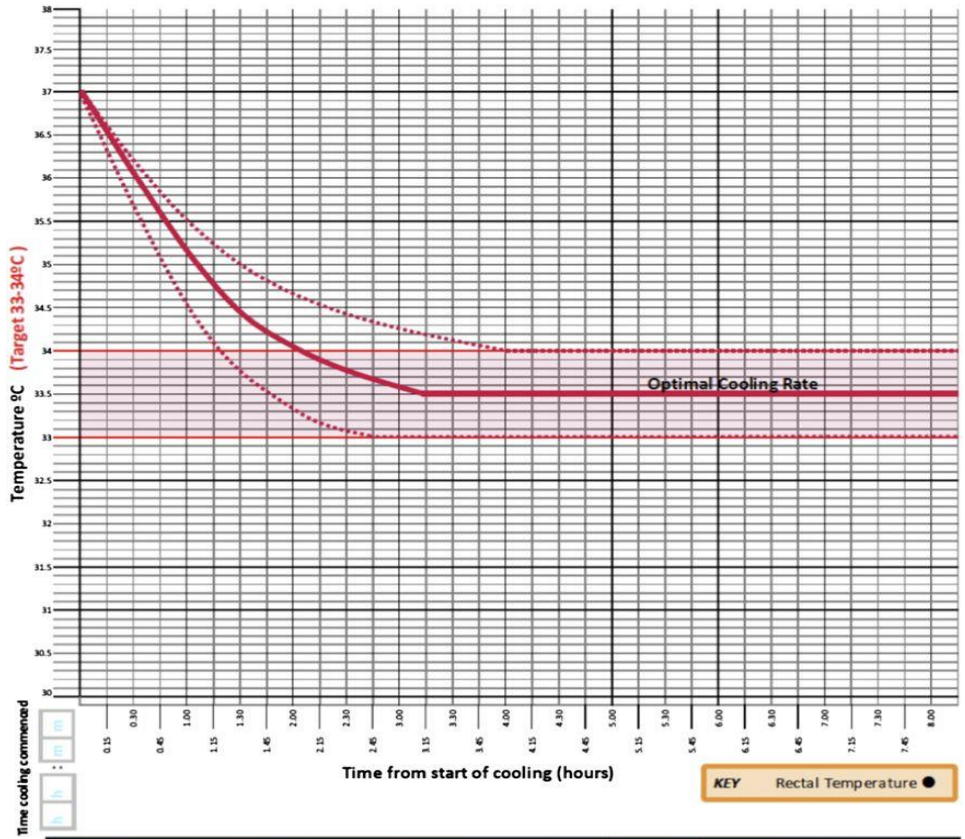
# Stabilizzazione e trasporto

**Neuroprotection Care Pathway** (NCP-1)
**Diagnosis & Initial Management of HIE**

Surname:
First names:
Date of Birth:
Hospital no.:
(use hospital identification label)

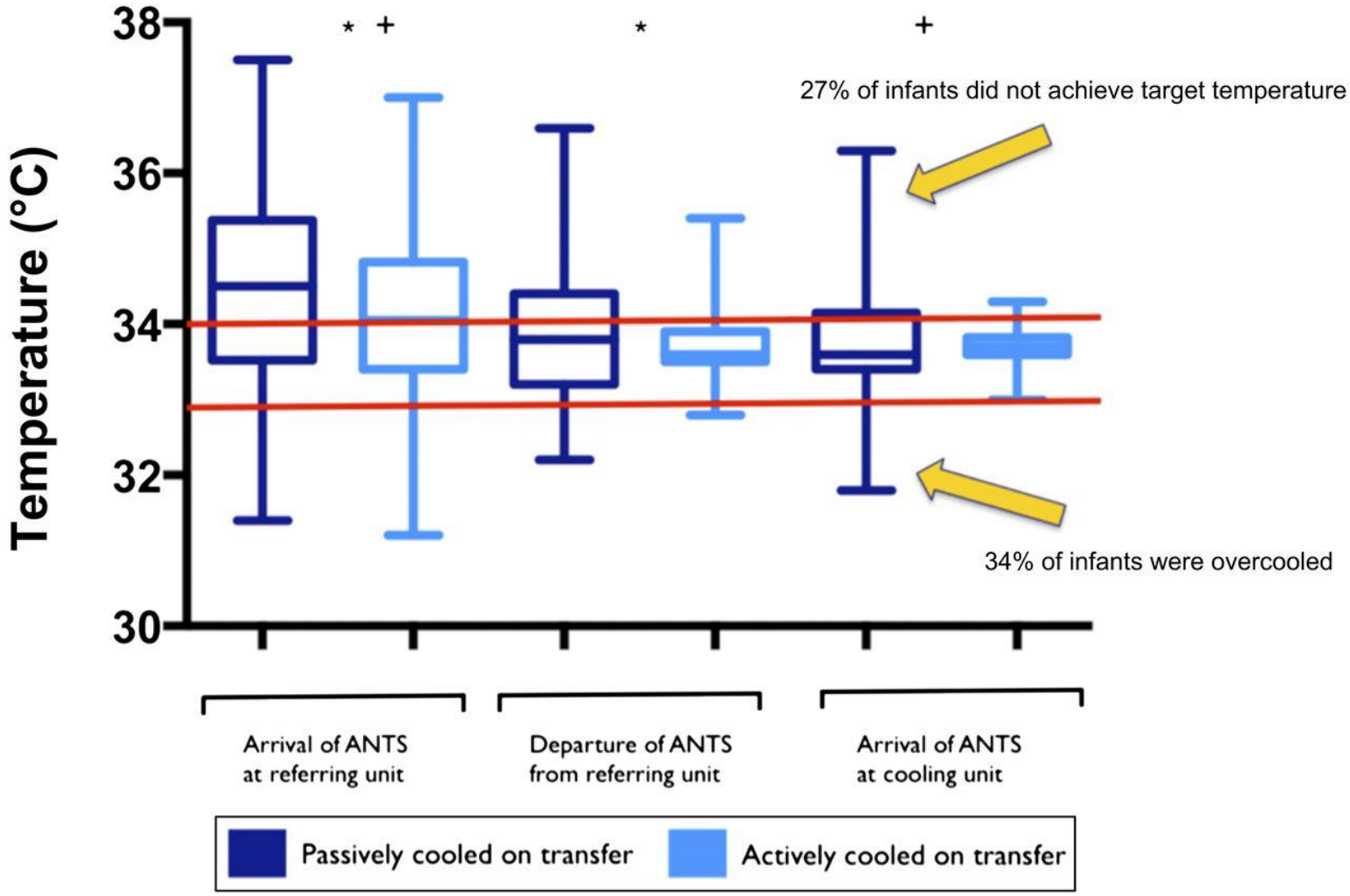
NHS No.

*RECTAL TEMPERATURE MONITORING CHART*

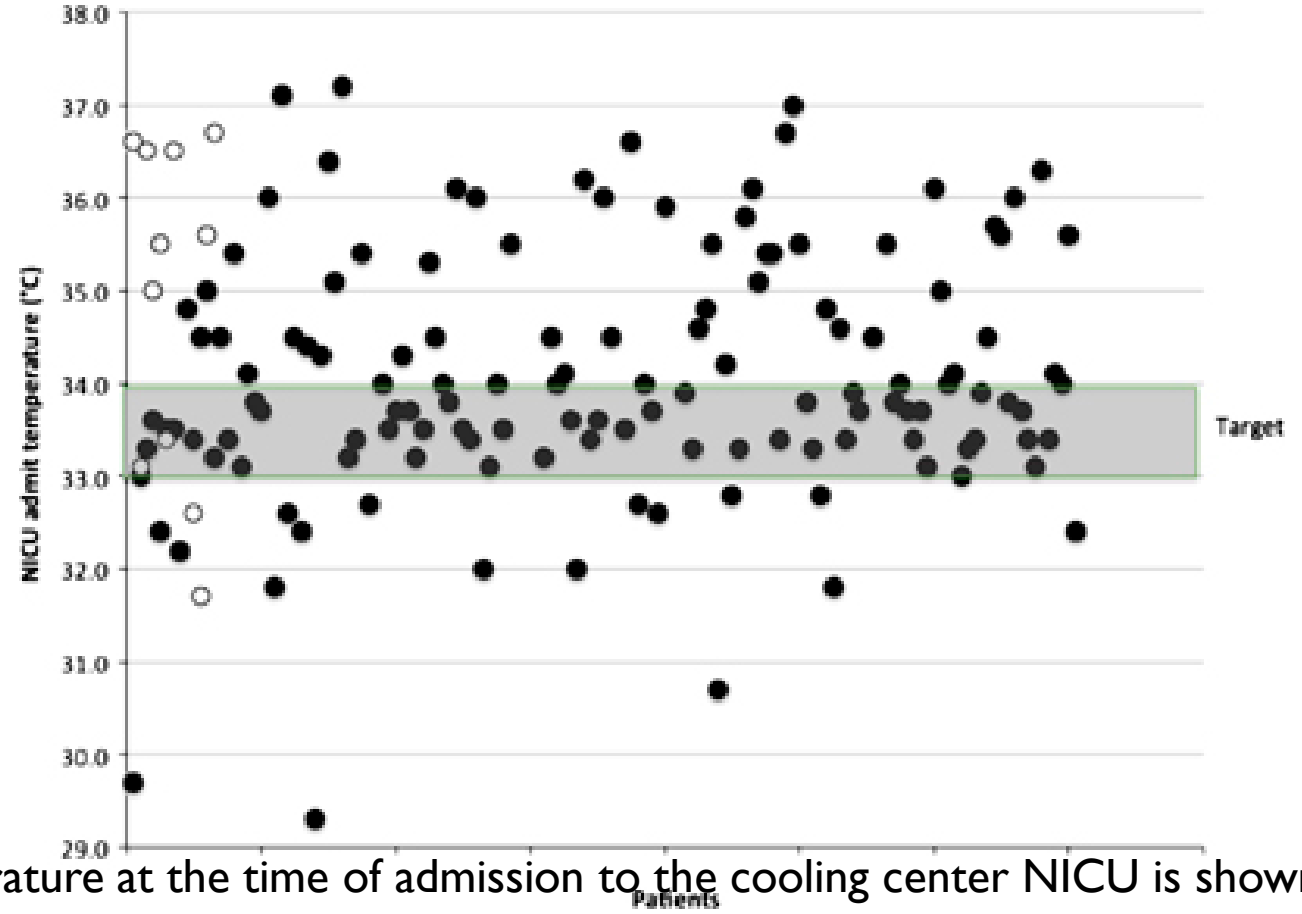



| ACTIONS TAKEN TO ACHIEVE TEMPERATURE CONTROL | TIME | Sign/date |
|---|---|---|
| **CAUTION** from 34°C to avoid hypothermia (hat on, incubator to minimum) | | |
| | | |
| | | |
| | | |

# Stabilizzazione e trasporto



# Stabilizzazione e trasporto




temperature at the time of admission to the cooling center NICU is shown for the 142 infants who were cooled in transport. Group 1 (n=131), outborns cooled before transport, are shown with filled-in solid circles and Group 2 (n=11), outborns cooled after arrival of the transport team, are shown with open circles

# Stabilizzazione e trasporto

## Pre-Transport Stabilization

- Neonatal transport team goal → transport a well stabilized infant
  - Reduces possibility of adverse events which may lead to poor outcomes

# Stabilizzazione e trasporto

## Hypoxic Ischemic Encephalopathy

***Resuscitation and stabilization factors associated with worsened neurologic outcomes***

- Hyperthermia
  - *Prevent* hyperthermia at all times
  - *Treat* fever quickly
- Hypoglycemia → low glucose is not uncommon
  - *Be vigilant! Evaluate glucose often*
  - Aggressively treat with $D_{10}W$ bolus if low
  - Maintain the blood sugar 50 – 110 mg/dL (2.8 – 6 mmol/L)

85

# Gestione del neonato durante l'ipotermia

Personale medico e infermieristico specializzato

# Monitoraggio durante ipotermia

- valutazione **peso, diuresi, bilancio liquidi** ogni 8-12 ore; **MEF**
- **parametri vitali**: FC,FR, Sa02;
- monitoraggio continuo della **temperatura rettale e cutanea**
- monitoraggio **PA** cruenta o rilevazione incruenta ogni 2 ore;
- **ecocardiografia**; **ECG quotidiano**; enzimi cardiaci
- valutazione della **cute** e dei decubiti (adiponecrosi);
- **monitoraggio laboratoristico** (PCR, emocromo, emocoltura, coagulazione, creatininemia, azotemia, elettroliti, troponine) N.B minore specificità PCR, piastrinopenia, alterazioni coagulazione.
- Sedoanalgesia; attenzione all'accumulo; ridotto metabolismo
- Doppia terapia antibiotica

# Monitoraggio

- **EON** 30-60 minuti; 6-24 ore; 3^, 7^ giornata, II settimana , dimissione
- **ecografia cerebrale** entro le prime 24 ore, ripetuta con ecodoppler ogni 48 ore nella prima settimana e poi su indicazione specifica;
- registrazione in continuo dell'**aEEG** durante trattamento (ipotermia e riscaldamento);
- **EEG** durante e a termine ipotermia, poi a una settimana

# Monitoraggio durante riscaldamento

Dopo 72 ore di trattamento ipotermico, ritornare a temperatura normale

- incrementi di **0,5°/ora; in almeno 4 ore**; evitare il rapido incremento della temperatura;
- monitorare attentamente i segni vitali e la pressione arteriosa: **rischio di ipotensione**;
- la temperatura rettale del neonato va attentamente controllata per almeno altre 4 ore per evitare un eccessivo riscaldamento.
- **NB. E'possibile l'insorgenza di convulsioni durante il riscaldamento.**

# Monitoraggio: follow up

- RM encefalo: il timing consigliato per la RM convenzionale è 7-10 giorni e comunque almeno entro il primo mese di vita, da anticipare a 4-6 giorni se associata alla diffusion

- follow-up-psicomotorio e neurosensoriale con l'ausilio di una scala di sviluppo (Griffith's o Bayley) almeno fino a 2-3 anni da proseguire ove possibile fino all'età scolare.

# Neonati di EG ≥ 35 settimane e peso ≥ 1800 g che abbiano meno di 6 ore di vita.

Tutti i punti nascita

A. Ipossia intrapartum
*(basta un solo criterio)*

- Apgar ≤ 5 a 10' *oppure*
- rianimazione a 10' *oppure*
- acidosi fetale o neonatale
  - -pH ≤ 7 *oppure*
  - -BE ≥ 12 mmol/l

+

A. Encefalopatia ipossico-ischemica

E.O.N Sarnat II/III
Tra 30 e 60 minuti di vita

*Spegnere il lettino; eventuale trasferimento*

+

Centri di riferimento

A. Criteri aEEG/EEG

Criteri soddisfatti
< 6 ore di vita

IPOTERMIA
72 ore

# SINTESI

Anamnesi/ necessità di rianimazione/ clinica

- EAB entro 1 ora
- OSSIGENO: serve?
- SCHEDA SARNAT 30-60'

Criteri A e B soddisfatti?
Dubbi??

✓ Spegnere lettino e iniziare monitoraggio temperatura
✓Allertare centro di riferimento (confronto video?)

DECISIONE ENTRO 1 ORA!
✓Stabilizzazione
Ventilazione? Accesso venoso; glicemia
✓Gestione temperatura
✓Raccogliere anamnesi
✓Gruppo mamma firmato