

Neonatal Blood Gas Analysis

Anesthetic Pearls: Anesthetic Concerns and Analysis of Neonatal Blood Gas

The neonatal period reflects the first 30 days of life and has various alterations in the oxygen carrying moieties. Blood gases are helpful in determining the adequacy of respiratory function of the baby (oxygenation and ventilation) as well as the acid / base balance. Routine blood gases can be performed from arterial, venous, or capillary (heel prick) specimens.

	Umbilical Artery (In utero)	Umbilical Vein (In utero)	Neonatal Artery (60 min post-delivery)	Neonatal Artery (24 hrs post-delivery)
pH	7.28 – 7.32	7.30 – 7.35	7.30 – 7.36	7.33 – 7.40
PaCO₂, mmHg	45 – 52	32 – 42	32 – 40	30 – 36
PaO₂, mmHg	15 – 25	30 – 42	50 – 70	65 – 85

Pre-term infant is defined as:

- Less than 36 weeks EGA
- Less than 2500 gm

Pre-term infant has a PaO₂ that is normally lower than that of term infants and therefore small changes in PaO₂ can cause large changes in oxygen saturation and oxygen content.

After 5 – 10 days, the blood gases of term and pre-term infants approach approximate equal values.

Goal of PaO₂

- Term infant 50 to 70 mmHg
- Preterm infant 30 to 40 mmHg

Causes of Hypoxia in the Newborn

1. Low Cardiac Output (Shock)

- Hypovolemia
 - Fetal-to-maternal transfusion (acute)
- Sepsis
 - Group B hemolytic streptococcal infection
- Cardiac disorders
 - Obstructive left heart lesions
 - Cardiomyopathies
 - Arrhythmias

2. Low SaO₂ (Hypoxemia)

- Lung disease
 - Respiratory distress syndrome
 - Sepsis
 - Persistent pulmonary hypertension
 - Diaphragmatic hernia
- Congenital heart disease with right-to-left shunt
 - Transposition of the great vessel
 - Pulmonary atresia

3. Low Hemoglobin (Anemia)

- Fetal-to-maternal transfusion, chronic twin-to-twin transfusion
- Hemolysis (Isoimmunization)
- Excessive blood drawing

