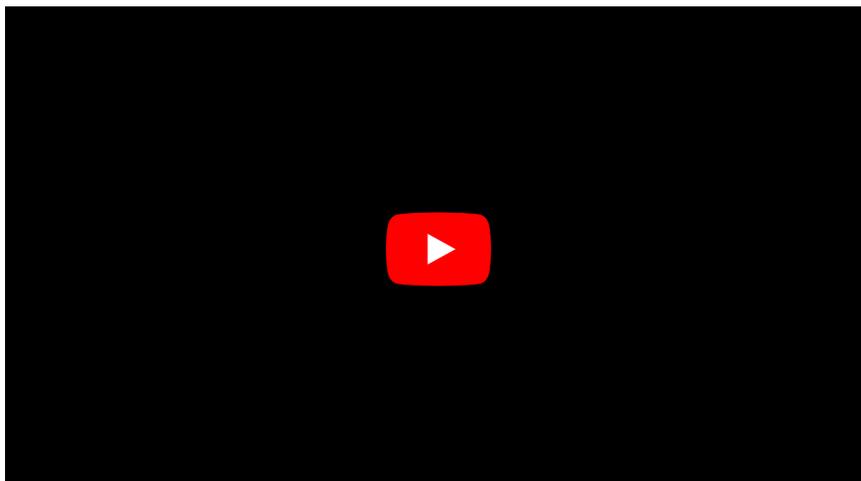


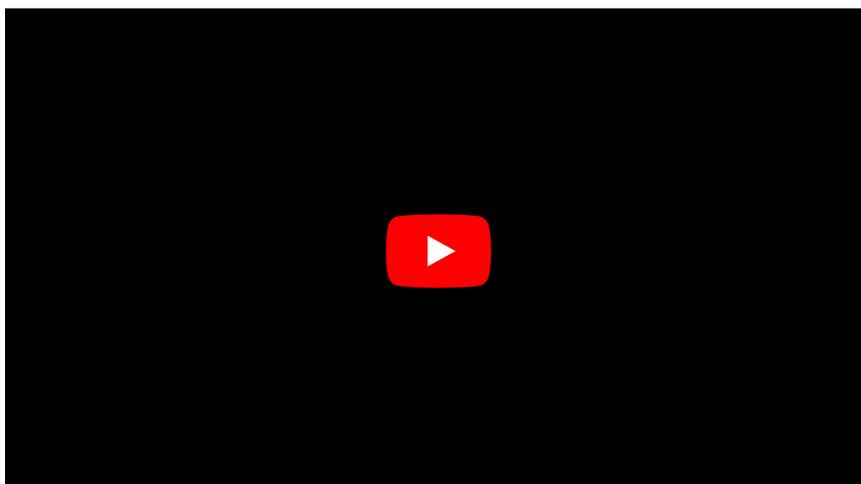
Examination of Blood Gases

ABB cases:



Blood gas analysis, more specifically arterial blood gas (ABG) analysis, measures the content of oxygen, carbon dioxide, bicarbonate as well as the acidity (pH) of arterial blood. Fancier machines can also determine electrolyte, glucose, bilirubin, Hb, oxyHb, carboxyHb, metHb and lactate levels as well.

ABG:



This is an important test as it evaluates how well the lungs are taking up oxygen and eliminating carbon dioxide. An ABG can also assess lung and kidney function in the maintenance of blood pH in acid-base homeostasis. Most often, blood gas studies are employed to analyze respiratory diseases, respiratory therapy (oxygen), kidney function, metabolic disorders or other lung conditions.

As there are a wide variety of results and combination of results from various readings, evaluation of the tests often involves nomograms and further calculation.

Protocol

1. Blood is drawn most often from the radial artery. Theoretically blood may be taken from any artery (brachial, femoral). If an existing arterial line is already installed, use it, as arterial blood drawing is not as fun for the patient or the phlebotomist as say venous drawing.
2. The syringe collecting the blood is laden with heparin to prevent coagulation. As the blood is collected the phlebotomist must be sure that no air bubbles are present in the sample. The syringe is then sealed and taken to a blood gas analyzer which aspirates the syringe and runs whole blood through a chamber equipped with an ion selective electrode (i.e. the selectivity can be adjusted for specific measurements).
3. pH is assessed by comparing a potential generated at the tip of the electrode with a reference potential. The resulting voltage is proportional to the hydrogen ion concentration $[H^+]$.
4. pCO_2 is also measured using a pH electrode tip covered by a semi-permeable membrane that is selective for CO_2 . The CO_2 binds with water in the free space between the membrane and the electrode and produces an

amount of hydrogen ions that is proportional to the content of CO₂ in the blood sample (pCO₂). Since the voltmeter is actually measuring hydrogen ion content, it is calibrated as reading pCO₂.

5. pO₂, similarly to pCO₂, is measured by employing a selectively permeable membrane that allows it to pass through and bind to water in a phosphate buffer on the other side. The amount that passes through is equivalent to the pO₂ in the blood sample
6. Finally the blood sample is disposed of, the machine washes out the blood and results are displayed and evaluated.

Normal parameters

Normal blood gas values are as follows:

(PaO₂): 75–100 mmHg **Below 60 mmHg oxygen must be supplied!!!**

(PaCO₂): 35–45 mmHg

- If high = respiratory acidosis f.e. from hypoventilation;
- If low = respiratory alkalosis f.e. from hyperventilation

Oxygen content (O₂CT): 15–23%

Oxygen saturation (SaO₂): 94–100%

Bicarbonate (HCO₃): 22–26 mmol/liter

- If low = metabolic acidosis (ketoacidosis, lactic acidosis, renal failure) – check ion gap for differential.
- If high = metabolic alkalosis (hyperaldosteronism, hypokalemia, vomiting).

pH: 7.35–7.45

Links

Related articles

- Tests for the Acid-base Balance Status
- Blood Cell Examination

Sources