

Blood Gas Analysis [BGA]

BGA at Rest

The blood gas analysis [BGA] is a method to measure the gas distribution [partial pressure] of oxygen, carbon dioxide as well as the pH-value and acid-base balance in the blood.

Patients have seen this method at their lung specialist: firstly, a special balm is applied to the earlobe which stimulates the blood flow. The earlobe becomes hot. This procedure is necessary because actually arterial blood is necessary to determine blood gases precisely. It has been discovered that the increased blood flow [hyperaemisation] caused by the balm yields quite informative results. The painful punctuation of an artery remains an exception. After a short application time one is pricked and the blood is collected in a small tube and then usually put into an analyser. Two statements can be deduced from the blood gas results:

- ▶ How much oxygen enters the blood stream (determined by measuring partial oxygen pressure [paO₂]). This value determines if the patient needs extra oxygen. Insufficient oxygen in the blood is medically referred to as hypoxaemia or as being hypoxaemic.
- ▶ How much carbon dioxide is in the blood (determined by measuring partial carbon dioxide pressure [PaCO₂]). If too much carbon dioxide is retained in the body [retarded] or not breathed out, one speaks of hypercapnia or of being hypercapnic.

The different combinations of not having enough O₂ and having too much CO₂ are assigned to different technical terms. You do not have to know those values by heart or even be able to interpret the results of your blood gas analysis but you should be familiar with both of these terms.

Partial pressures of O ₂ and CO ₂ and classification of gas exchange disorders				
	Normal	Mild	MODERATE	SEVERE
PaO ₂	> 65-70	60-65	55-60	< 55
PaCO ₂	36-44	45-48	49-54	> 55
Terms				
Hypoxia without hypercapnia	Low pa O ₂ at normal and decreased arterial pa CO ₂ .			
Hypoxia with hypercapnia	decreased pa O ₂ and increased (retained) pa CO ₂ . The hypoxia with hypercapnia might be caused in the terminal stage of COPD and of the lump emphysema.			

BGA during exercise

In the course of lung and respiratory disease, gas exchange is increasingly restricted. This leads to a situation in which not enough oxygen can be taken in [hypoxia]. The retaining of CO₂ [hypercapnia] might occur later on. It is important to determine which type occurs at which time and if they only occur during exercise or at rest, as well.

According to this, one undergoes (e.g. on a bicycle ergometer) a BGA at a certain work rate (e.g. 50 watts) and blood is drawn in this situation under stress. Sometimes this exertion is created by walking (e.g. on a treadmill or in a 6-minute walking test). This way, the question can be answered as to whether it is reasonable to take in additional oxygen during exercise or not.