NORMAL VALUES & DEFINITIONS

PH

- Refers to hydrogen ion (H+) levels, hence the ‘H’ in pH. H+ levels are important because a lack of (deficit) or too much (excess) will kill you if the patient is acidic or alkalotic.
- One confusing point about pH is that it is an INVERSE ratio, which means the more the pH H+ present, the lower the pH and vice versa.

Acid

- Can be driven away if H+ can separate (dissociate) hydrogen from its ion, so the hydrogen is not positive and therefore no longer an acid.
- Acids are end products of metabolism and must be buffered or excreted to achieve a normal pH.

Base

- Unlike Acids, bases can accept a H+ and bond with hydrogen. They are all negative and like to ‘buffer’ body acids.

Base excess/

- Base deficit

- Represents an increase or decrease in the amount of base compared with the amount of acids present.

HCO3-

- Concentration of hydrogen carbonate in blood. Used to determine along with pH and CO2 source of acid base imbalance.

pH

- 7.35 - 7.45

Hb

- 35-40mmhg

V ALUE

- 41-57 mmhg

Arterial oxygen tension. In other words 2 2

- 24-28mmol/L

O2

- 90-100 mmhg

CO2

- 35-45 mmhg

O2

- 50-55 mmhg

aAO2

- 85 - 20mmol/L

Lactic Acid

- 15mmol/L

Hb

- 180g/L

Right Shift (Acidosis)

- Shift of the curve to right decreases affinity - meaning that the Hb isn’t as able to carry oxygen.
- The ODC shows us what changes the affinity of blood for oxygen.

Left Shift (Alkalosis)

- Shift of the curve to the left increases affinity - meaning that the Hb is very able to carry oxygen.

ACIDOSIS

- Hypoxaemia (caused by heart failure)
- Metabolic acidosis
- Respiratory acidosis
- Compensated by increased ventilation and CO2 excretion
- Plasma protiens.

METABOLIC ALKALOSIS

- Pneumonia
- Prolonged vomiting
- • Renal failure (unable to excrete acids or H+)

ACID-METABOLIC

- Hypokalaemia (H+ (an acid) excreted to maintain electrolyte balance)
- GI suctioning (acid loss)

ACID-RESPIRATORY

- Sedatives/sedation/opiates

RESPIRATORY ALKALOSIS

- Hyperventilation
- Increased temperature and CO2 levels which is then converted to an acid (H+) as the body tries compensate by excreting acids via the kidneys.

OXYHAEMOGLOBIN DISSOCIATION CURVE (ODC)

- pH is still abnormal, and the ‘other’ value is abnormal in an attempt to help normalise the pH.
- The pH is usually around 7.42.
- The curve should always be checked by a medical officer, and any changes to treatments are applied.

ABG...EASY AS 1,2,3

3 STEPS TO ABG INTERPRETATION

1. What is the pH? Is it alkalotic (7.50) or acidic (7.40)?
- If the problem is in the lungs (respiratory) the pH will be heading in the opposite direction of the pH.
- For example respiratory acidosis (pH will be low - pHi < 7.32) and the CO2 will be high (pCO2 = 50mmhg - NCAs Standing Rule = 40mmhg).
- For example metabolic alkalosis the pH will be high (pH > 7.45) and the CO2 will be low (pCO2 = 25mmhg - NCAs Standing Rule = 36mmhg).

2. What’s happening with the respiratory system (CO2) and the metabolic systems (HCO3-)?
- • If the problem is in the lungs (respiratory) the pH will be heading in the opposite direction of the pH.
- For example respiratory acidosis the pH will be low and the CO2 will be high as the body tries to compensate by excreting acids via the kidneys.
- For example metabolic alkalosis the pH will be high and the CO2 will be low as the body tries to compensate by excreting acids via the kidneys.

3. In there any (any) compensation occurring?

- • Partial compensation (pHi remains the same while the other value changes)
- • Full compensation (both values change)
- • No compensation (pHi = 7.42)

WHAT CAUSES THESE CHANGES?

TREATMENT GOALS/GUIDELINES

OXHYHAEMOGLOBIN DISSOCIATION CURVE (ODC)

- The pH is usually around 7.42.
- The curve should always be checked by a medical officer, and any changes to treatments are applied.

A person's blood samples are taken every two hours, and any test ordered for the laboratory. When the test results are ready, they are reported to the laboratory by the laboratory. The laboratory results are then sent to the doctor who ordered the test. The doctor will then determine the appropriate treatment for the patient.

‘OTHER’ VALUES OFTEN OVERLOOKED

Anion gap - This value is used in sodium and potassium. It is found in the plasma by calculating the difference between the cation count and the anion count. If the anion gap is high, it may indicate a metabolic acidosis or alkalosis.

OXYGEN SATURATION

- pH - oxygen tension at 50% saturation on O2C. This is used to reflect the affinity of Hb for oxygen.
- 90-100 mmhg

Hb - Hemoglobin.

- This shows how much well blood cells there are in a sample of blood. It's how washed down (or not) the blood was.

MIXED VENOUS BLOOD GAS VALUES

<table>
<thead>
<tr>
<th>NAME</th>
<th>DEFINITION</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.35 - 7.45</td>
<td></td>
</tr>
<tr>
<td>HCO3-</td>
<td>22-26mmol/L</td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>35-45 mmhg</td>
<td></td>
</tr>
<tr>
<td>O2</td>
<td>90-100 mmhg</td>
<td></td>
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</table>

Mixed venous gases measures oxygen left in the blood as it returns to the heart (right side) after it has been pumped around the body supply ing cells with oxygen.

The body normally extracts 22% of available oxygen and leaves 75% in reserve in times of stress or illness.

The heart above shows where our subservient central locations are in the superior vena cava, it is here we take venous blood samples. Samples from the pulmonary artery are however, more accurate and can only be performed if the patient has a Pj catheter.