

# Lab Interpretation

4-8-06

## Electrolyte Panel

### Sodium+ (Cation)

- Any time there is an electrolyte panel will always include sodium, potassium, chloride and CO<sub>2</sub>.
- **Hypernatremia – high levels of sodium**
- **Hyponatremia – low levels of sodium**
- **If you are low in sodium, it's likely to be a kidney function problem.**
- **Sodium is involved in the osmotic pressure (not as much as albumin) number one cause of edema after albumin**
- **Elevated sodium can lead to High blood pressure because it plays with the osmotic pressure (Causes edema).**
- **Major cation of extra-cellular fluid.**
- Sodium plays with edema because it screws up your osmotic pressure.
- The test takes venous blood to perform.
- **Normal Sodium level is: 135-146 milliequivalents/liter**
- Aldosterone is a hormone produced by the adrenal gland and causes the kidneys to retain sodium.

### The Test

- Looking for dehydration, high blood pressure, or edema.
- Causes of hyponatremia: **Addison's (opposite of Cushings) disease**, diarrhea, excessive sweating, diuretic administration, or kidney disease) Heart Failure, cirrhosis
- **Addisons (bronzing of skin) hypo-adrenalism (J.F. Kennedy had this, too much wine women and song...)**
- **Cushings hyper-adrenalism**
- Hyponatremia: see notes

### Common Questions

- **RDA 500mg salt** per day should be taken.

### Potassium

- **3.5-5.5 meq/liter**
- **Major cation in intra-cellular fluid (sodium outside the cell)**
- **Hyperkalemia – too much potassium**
- **Hypokalemia – too little potassium**
- Potassium always goes with diuretics. If you are on diuretics, you often need potassium monitoring.
- **Hypokalemia – goes with skipped heartbeats, cardiac arrhythmias.**
- It's a venous specimen
- **Hyperkalemia – is caused by kidney disease.**
- **Hypokalemia – often caused by diuretics.**

- Salt pills are not recommended. However, potassium is the only electrolyte that can normally be affected by excess perspiration.
- Hyperkalemia – excessive dietary intake, renal failure, Addison's disease, hypoadrenism, massive tissue injury, infection, diabetes, dehydration, some NSAID's, beta-blockers, etc
- Hypokalemia can be caused by diarrhea, vomiting, diabetes after you take insulin, diuretics.
- When you have blood drawn you need to be relaxed or your potassium level may be falsely elevated. Hemolyzed RBC's will cause a grossly and falsely elevated blood potassium levels.
- Trauma can cause temporary elevated level of potassium

### Chloride (Anion)

- 95-112 meq/liter
- You would not likely order this by itself
- Mostly extra-cellular. Usually mirrors/follows sodium levels. If they move in opposite directions, there is pathology.
- Venous blood is used.
- Used for prolonged vomiting, diarrhea, weakness, and respiratory distress.
- As long as sodium and chloride follow, you have a physiological issue, if they don't track you have a pathology.
- Hyperchloremia – too much chloride.
- Hypochloremia – too little chloride
- Metabolic acidosis – Hyperchloremia
- Metabolic alkalosis – Hypochloremia

### CO<sub>2</sub>

- PCO<sub>2</sub> refers to blood gases. CO<sub>2</sub> – means the bicarbonate ion being used as a buffer.
- Requires a venous blood sample
- Measures mostly bicarbonate ion in the blood. (H<sub>2</sub>CO<sub>3</sub> – carbonic acid.)
- CO<sub>2</sub> – remember pH/electrolyte balance, the other should remember kidney.
- CO<sub>2</sub> high – body is having problems maintain the electrolyte (pH) balance.
- Drugs can increase and decrease the levels.
- Blood gases are drawn from the artery instead of a vein. (PCO<sub>2</sub> and PO<sub>2</sub>)

### Blood Gasses

It's not in the write up.

- Monitoring PO<sub>2</sub> and PCO<sub>2</sub> as well as the pH
- CO<sub>2</sub> refers to the bicarbonate level (the buffer in the blood). PCO<sub>2</sub> is the partial pressure of the gas in the blood.
- Also called: Arterial Blood Gas or ABG
- They have little clinical value usually for our scope of practice.
- High PCO<sub>2</sub> – your blood is more acidic.
- Low PCO<sub>2</sub> – your blood is more alkaline
- High Bicarbonate your blood is more alkaline.
- Alkaline means high pH, low pH means acidic.

- $O_2$  saturation – A mathematical formula that tells you how much oxygen is bound up with the hemoglobin.
- $HCO_3$  (bicarbonate) – directly related to pH levels.
- Respiratory acidosis/alkalosis – related to lungs
  - Respiratory acidosis – low pH, increased  $PCO_2$
- Metabolic acidosis/alkalosis – generally related to kidneys.
  - Metabolic acidosis – low pH and increased  $PCO_3$
- Almost always uses arterial blood.
- Allen Test – board question. Test for circulation through the wrist. See handouts for how to perform the test. You do the side that has the best circulation.
- Watch out for severe bruising with arterial sticks. Hold for about 5 minutes.
- Used to evaluate oxygenation and acid/base status
- Body pH should be 7.35-7.45
- Pulse oximeter – measures  $O_2$  saturation by monitoring the color of the hemoglobin.