Aspirin Poisoning and Blood pH

- <u>Aspirin</u> poisoning can occur rapidly after taking a single high dose or develop gradually after taking lower doses for a long time. In **gradual** <u>aspirin</u> poisoning, symptoms develop over days or weeks. The most common symptoms are
 - Drowsiness
 - Subtle confusion
 - Hallucinations

Light-headedness, rapid breathing, shortness of breath, fever, dehydration, low blood pressure, a low oxygen level in the blood (hypoxia), a buildup of lactic acid in the blood (lactic acidosis), fluid in the lungs (pulmonary edema), seizures, and brain swelling can develop.

Gradual <u>aspirin</u> poisoning can develop unintentionally if people take normal or slightly higher than normal doses of aspirin for a long time. Adults, many of them older, can develop poisoning gradually after several weeks of use.

- Symptoms may include ringing in the ears, nausea, vomiting, drowsiness, confusion, and rapid breathing.
- The diagnosis is based on blood tests and the person's symptoms. Salicylate is the same as aspirin.
- Treatment involves giving activated charcoal by mouth or stomach tube, giving fluids and bicarbonate by vein, and, for severe poisoning, undergoing <u>hemodialysis</u>.

Acute aspirin or salicylates overdose or poisoning can cause initial respiratory alkalosis though metabolic acidosis ensues thereafter. The acid-base, fluid, and electrolyte abnormalities observed in salicylate toxicity can be grouped into three broad phases:

- **Phase I** is characterized by hyperventilation resulting from direct respiratory center stimulation, leading to respiratory alkalosis. Potassium and sodium bicarbonate are excreted in the urine. This phase may last as long as 12 hours.^[10]
- **Phase II** is characterized by dehydration, hypokalemia, and progressive metabolic acidosis. This phase may begin 4–6 hours after ingestion in a young infant^[11] or 24 hours or more after ingestion in an adolescent or adult.^[10]

The pH of blood refers to how acidic it is. Changes to blood pH can signal underlying medical issues, including metabolic acidosis, respiratory acidosis, metabolic alkalosis, and respiratory alkalosis. The pH scale, otherwise known as the acid-base scale, runs from 0 to 14. It measures <u>how acidic</u> a solution of a substance in water is. For example, pure water has a pH of 7. Solutions with a low pH have a high concentration of hydrogen ions and are acidic. Solutions with a high pH have a lower concentration of hydrogen ions and are acidic. The pH scale is a compact scale, and small changes in pH represent big leaps in acidity. This article will look at what the normal pH level of blood is and what can cause the pH level to move outside of this range. It will also examine what can happen to the body if blood pH levels go above or below the normal range.

The pH of blood in the arteries should be between 7.35 and 7.45 for the body's metabolic processes and other systems to work well. These processes produce acids, so the body has a complex system of feedback and regulation to maintain healthy pH levels. Much of the acid made in the body is carbonic acid. This forms when carbon dioxide combines with water. Carbon dioxide occurs within the tissues of the body due to the process of respiration. The lungs and the kidneys are the two main organs that regulate the pH of the blood, often at the same time. There are also chemical buffering mechanisms throughout the body's cells. The lungs can help regulate blood pH rapidly through the process of exhaling carbon dioxide, sometimes producing changes within seconds. For example, when someone exercises, they produce more carbon dioxide, so they breathe faster to prevent the blood from becoming too acidic. The kidneys regulate the pH of the blood by excreting acids in urine. They also produce and regulate bicarbonate, which increases blood pH. These changes take longer than those that occur due to breathing, potentially taking hours or days. Certain situations and medical conditions can mean that the body is unable to keep blood pH within the healthy range. The pH of the blood can change in both directions. Acidosis occurs when the blood is too acidic, with a pH below 7.35. Alkalosis occurs when the blood is not acidic enough, with a pH above 7.45. There are four main ways in which blood pH can change:

- Metabolic acidosis: This occurs due to reduced bicarbonate or increased acid levels.
- Respiratory acidosis: This occurs when the body removes less carbon dioxide than usual.
- Metabolic alkalosis: This occurs due to increased bicarbonate or reduced acid levels.
- Respiratory alkalosis: This occurs when the body removes more carbon dioxide than usual.

To restore blood pH levels to a healthy range, it is important to identify and treat the underlying issue that has caused the change.

Some symptoms of acidosis include:

- headache
- confusion
- <u>tiredness</u>
- lethargy and sleepiness
- coughing and shortness of breath
- an uneven or increased heart rate
- stomach upset or feeling sick
- muscle seizures or weakness
- unconsciousness and <u>coma</u>

Symptoms of alkalosis include:

- confusion and lightheadedness
- shaky hands
- numbness or tingling in the feet, hands, or face
- muscle twitches or spasms
- vomiting or nausea
- coma