

Acid-Base Tutorial

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Acid-Base Tutorial Home Page



Must it be so complicated?

When you first study clinical acid-base balance, this is the natural question. It is partly explained by a series of [Topsy Turvy Decisions](#) made by some of our eminent forbears. The object of this website is to explain this history and make acid-base balance as simple as possible.



"What do I need to know?" The

[Bird's Eye View](#) after this paragraph may help you. Notice that you easily understand the concepts and you do so with out knowing numerical values for [PCO₂](#), [pH](#), or [Base Excess](#). This is important because, in an emergency, you may have to treat a patient without knowing these laboratory values anyway:

News Flash:

[Animated Napkins by Grog](#) is now open. Modeled on our popular [Animated Knots by Grog](#) it uses the same animation technique.



The Bird's Eye-View, Two Components:



Respiratory: When breathing is inadequate carbon dioxide ([respiratory acid](#)) accumulates. The extra CO₂ molecules combine with water to form [carbonic acid](#) which contributes to an acid pH. The [treatment](#), if all else fails, is to lower the PCO₂ by breathing for the patient using a ventilator.



Metabolic When normal metabolism is impaired - [acid forms](#), e.g., poor blood supply stops oxidative metabolism and lactic acid forms. This acid is not respiratory so, by definition, it is "[metabolic acid](#)." If severe, the patient may be in shock and require [treatment](#), possibly by neutralizing this excess acid with [bicarbonate](#), possibly by allowing time for excretion/metabolism.



That's it! The whole of acid-base balance in six sentences. As you explore this site, keep this bird's eye-view in mind. We will also have to deal with low levels of metabolic and respiratory acid (alkalosis) - but this initial overview helps to keep the subject in focus.

Why do we care?



[Variations in pH or PCO₂](#) used to be viewed as though they were the causes of pathology. Experiments by [Xu et al](#) have shown, however, that very low pH and very high PCO₂ may both be well tolerated when circulation and oxygenation are maintained. The implication is that abnormal levels of PCO₂ or pH are best used as indicators of serious trouble, but not as causes themselves.

Getting Started



[Physiology](#) and [history](#) are both good places to start for most people. Alternatively, use the [Index](#) to select the topic that interests you most.

Interactive Acid-Base Diagram



[An interactive acid-base diagram](#) is a major feature of this website. It allows numerical values to be visualized on an interactive diagram and simultaneously provides continuous text interpretation. The diagram operates in several modes allowing recognition of classical zones as well as self testing.

Computing Techniques



[The mathematics and programming](#) underlying the interactive diagrams and equations are described on separate pages. This site employs Java, Javascript, and Pop-Ups. To get the best out of this website, these must be active. If you have trouble with any combinations of computer and browser please [Contact Me](#).

Feedback



[Please Contact me:](#) I appreciate receiving your feedback. If you have ideas comments or suggestions, or if you find errors or spelling mistakes, please let me know. Thank you.

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About the Author:

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Please visit his other teaching websites: [Animated Knots](#), [Magic Squares](#), and [Stereio Art](#).