

Novel Graphical ABG Interpretation Method

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ABSTRACT

The advancement in the innovations of blood gas analyzers that has occurred in the last decades has not brought a respective advance in the field of diagnosis. There are only few graphical visualization tools available for Arterial blood Gas (ABG) interpretation. The bicarbonate (HCO_3) concentration is a variable parameter highly influenced by the changes in the concentration of carbon-dioxide (pCO_2). This is solved by measuring Standard bicarbonate (Std HCO_3). The deviation between these two values denotes the respiratory influence.

A novel four quadrant graphical tool was developed using Standard Base Excess (SBE) and the ratio ($\text{HCO}_3 - \text{Std HCO}_3$) / carbonic acid values in the two axes to analyze the various acid-base disturbances. The SBE is positive for metabolic alkalosis and negative for metabolic acidosis. The ratio ($\text{HCO}_3 - \text{Std HCO}_3$) / carbonic acid is greater positive for respiratory acidosis and greater negative for respiratory alkalosis. This ratio may not clearly differentiate the different higher levels of pCO_2 values and this can be rectified by using ($\text{pCO}_2 - 40$ mm of Hg) values in the third axis. Each acid base disorder will occupy any of the four quadrants and the normal ABG analysis reports will be seen around the center of the graph. The net changes in total pH are due to both the changes in respiratory and non-respiratory (metabolic) component affecting the pH. A similar 4 quadrant graph method can be developed using non-respiratory (metabolic) component [ΔNRpH] in x axis and changes in respiratory component [ΔRpH] in y axis for better understanding and correlation. This novel four-quadrant graph method may guide to interpret the different acid-base disorders quickly and easily.

Keywords: Novel ABG interpretation, Four quadrant graph

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