TITLE: After 107 years, the time has come to erase the Hasselbalch equation from textbooks!

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ABSTRACT

Acid-base balance is considered a difficult issue but, in fact, this is no longer the case.
The topic was made difficult after Hasselbalch introduced 4 logarithms into the much simpler Henderson's equation.
All the rationale underlying the understanding of Acid-Base Balance and its clinical application was already clearly inherent in Henderson's formula (without logarithms), very useful and sufficient for both teaching and learning.
The normal concentration of hydrogen ions [H^+] in the blood is a crucial element for the preservation of life and must be maintained within a very narrow range, oscillating around 40 nanoEq/Liter $\pm$ 4.
This concentration of hydrogen ions (and therefore the acidity or basicity of the blood) depends, according to the Henderson equation, on the ratio existing between the concentration of carbonic acid (numerator) [H_2CO_3] and that of bicarbonates (denominator) [HCO_3^-], according to a constant K.

$$[H^+] = K\frac{[H_2CO_3]}{[HCO_3^-]}$$

Henderson said as early as 1908: "The most significant and the most conspicious property of blood is the extraordinary ability to neutralize large amounts of acids or bases without losing its neutral reaction".
The real enemies, from which the organism must defend itself, are the hydrogen ions and not the negative logarithms of the hydrogen ion concentration. In the organism, in fact, there are no logarithms of the concentration of hydrogen ions but there are only hydrogen ions, nor does the organism know how to calculate the logarithms.
The Hasselbalch's equation with the 4 logarithms adds nothing to the understanding of this topic and, on the contrary, complicates it and slows down its dissemination.
After 107 years, therefore, without any regrets, it is right to delete the Hasselbalch's equation from textbooks, maintaining, instead, the cornerstone of the Henderson equation, made even more easily understandable in the "humanized" version (Fig. 1).

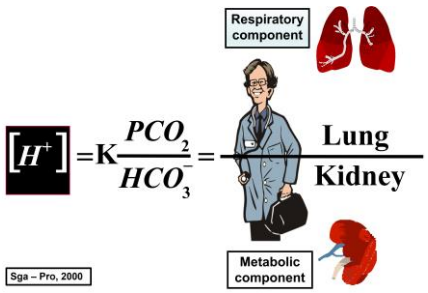

Fig.1 – The Henderson equation, made "humanized".
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BIOGRAPHY

Married with three children, high school diploma.
Past Director of Internal Medicine Department and Chief Internist, Fatebenefratelli Hospital of Benevento-Italy.
Specialist in Internal Medicine and Phthisio-pneumology.
Lover of "complex" scientific topics and "orphans" on the national scene and organizer of dedicated conferences to their disclosure.
Lover of "balance", contrary to logarithms and adversary of Hasselbalch.
Standard bearer of humanistic medicine so-called "old fashioned way", but he moves with the times of "Evidence Based Medicines", although convinced that every sick person is "unique, unrepeatable, evolving, indivisible, in relationship, in search of balance (chemical-physical, psychic and spiritual)".
Speaker throughout Italy, Author of numerous scientific and literary publications (of which three books of poems), lover of the arts in all their facets, lover of history and a philosopher amateur.

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