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Editorial

Calcium in Health: Update on Measurement Methods

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EDITORIAL

Calcium is involved in many physiological functions commonly measured in clinical practice. Concentration alterations could have serious clinical consequences. Calcium is found in several forms in the organism, the free form of calcium, the ionized form, plays a determining role in the human body. Total calcium is mostly measured for clinical monitoring but represents both of free and bound albumin calcium although only ionized calcium is active and could influence some disorders such as thyroid dysfunction, endocrinology metabolism, kidney dysfunction and cardiovascular outcomes. However, its measurement still remains limited by technical, analytical and financial constraints. An ionized calcium measurement requires some strict pre analytical considerations to avoid clinically significant variations and should be analyzed 1 hour after sampling [1]. Moreover Clinical Laboratory Standards Institute (CLSI) guidelines requires that use of whole blood specimens should be preferred than plasma [2].

Regarding these limitations, many formulas have been developed to estimate the ionized calcium value by total calcium. These formulas use blood parameters more easily measurable (total calcium, albumin, and proteins) than ionized calcium. Although these equations have some limitation highlighted in the literature, their use remains extremely common in clinical practice. Indeed, by their ease of use, the usefulness of such equations is indisputable in many situations of the clinician daily practice. We recently studied concordance of literature formulas to ionized calcium on samples with simultaneous measurements of ionized calcium, total calcium, albumin and pH [3,4]. Our patients were sub grouped according to their e GFR, albumin levels and pH and ionized calcium was used as a reference to determine agreement rate with total calcium and albumin-adjusted calcium by literature formulas (Payne, Clase, Jain and Ride felt) [5-8].We found high rates of discordance between estimated calcium and true calcium status especially in population with low albumin levels and pH abnormalities (until 84 % of discordance) [4]. Our results indicate that the main component influence free calcium estimation by total calcium measurements is the pH suggesting that estimation formulas should include pH.

As pH influences calcium albumin linkage, it involvement on estimation by albumin is obvious. However, pH measurements need pre analytical and analytical consideration equal to ionized calcium measurements. So including pH in estimation formula is the non-sense. Finally, routine ionized calcium measurement rather than estimation by albumin especially for some populations should be preferred such as patients with

kidney failure, cancer, in intensive care unit, to avoid any misclassification and improve patients monitoring.

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