

Feb 20, 2024

CLINICAL BIOCHEMISTRY

Discontinuation of Reporting Albumin corrected Calcium

Date effective: March 4th, 2024

Background Information:

Albumin correction of total calcium is a historical practice that has been widely used in management of patient with impaired calcium homeostasis, however the agreement between albumin corrected calcium and ionized calcium levels in patients with hypoalbuminemia can be poor, and thus misleading. In patients with low albumin levels, uncorrected total calcium is a reliable predictor of true calcium level, agreeing with ionized calcium. Current literature does not support the practice of using corrected calcium equations. The Payne's corrected calcium equation assumes a constant relationship between albumin and calcium binding throughout all serum-albumin concentrations, however, at lower albumin concentration more calcium ions bind to each available gram of albumin. Thus, Payne's assumption results in an overestimation of the total serum calcium after correction. Total serum calcium assays more accurately reflect both the change in albumin binding that occurs with alterations in albumin concentration and the unchanged free calcium ions.

Abnormal low total calcium results can be confirmed as required by direct ionized calcium determination in patients with questionable normal total calcium (borderline low) who are symptomatic for hypocalcemia. Patients with elevated total calcium DO NOT need any confirmation by ionized calcium levels and they should be considered hypercalcemic.

Change in Test Procedure:

Effective March 4th 2024, the auto-calculation of corrected calcium will be discontinued.

System Improvements/Patient Impact:

Preventing an incorrect diagnosis of hypercalcemia or normocalcemia in patients with hypoalbuminemia.

Reminder related to specimen types for total calcium and ionized calcium:

Ionized calcium cannot be ordered as an add-on test on an already drawn sample (plasma). Plasma is not a suitable sample type for measurement of ionized calcium.

Ionized calcium can either be measured:

- 1) In whole blood by blood gas analyzer (check with your local respiratory team – site dependent); or
- 2) In serum by the Biochemistry Laboratory at Health Sciences Centre or St. Boniface Hospital. Serum sample is suitable for measurement of ionized calcium and it is required to be kept anaerobically. Thus, if there is a need to measure ionized calcium, a separate collection is required. Please refer to [Lab Information Manual \(sbgh.mb.ca\)](http://sbgh.mb.ca) for details regarding the appropriate collection device.

For monitoring purposes, please continue to use the same methodology.

Resources

For complete test information, please consult the [Shared Health Lab Information Manual](#)

References:

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- Payne RB. Clinical interpretation of population-specific adjusted calcium values. Ann Clin Biochem. 2022 Sep;59(5):381-382.
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- Steen O, Clase C, Don-Wauchope A. Corrected calcium formula in routine clinical use does not accurately reflect ionized calcium in hospital patients. Canad J Gen Int Med. 2016;11(3):14-21.
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