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Effect of Storage Conditions on Parathyroid Hormone Measurement in ECLIA and LC-MS/MS

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Objectives : Control of serum PTH is crucial for managing CKD (chronic kidney disease), necessitating precise and accurate PTH measurements. However, instability due to pre-analytical conditions poses significant challenges. To address this, we compared Electrochemiluminescence Immunoassay (ECLIA) and liquid chromatography with tandem mass spectrometry (LC-MS/MS) to clarify PTH measurements, focusing on the impact of storage conditions.
Methods : PTH levels in 30 samples from patients with CKD stage 5 were measured using both ECLIA and LC-MS/MS. Samples were stored at -20°C for one month and then thawed for a second measurement.
Results : In a previous study, the coefficient of determination (R^2) between ECLIA and LC-MS/MS was high. However, the percentage difference in PTH was highest, and some cases showed discrepancies around the KDOQI therapeutic range in CKD stage 5, particularly in thawed stored samples. In this study, we focused on samples from CKD stage 5. At baseline, the R^2 between ECLIA and LC-MS/MS was 0.9910, remaining high at 0.9900 after one month. However, notable changes were observed after storage: ECLIA showed a mean delta percent decrease of -8.40% (p-value=0.005), while LC-MS/MS exhibited a larger decline of -11.47% (p-value<0.005). The mean rate of difference between ECLIA and LC-MS/MS measurements was 6.93% between initial and second measurements. (p-value=0.148). When comparing the results of both device, initially 17 cases (56.7%, 17/30) fell within the KDOQI therapeutic range in concordance or both did not. However, after one month, the number of specimens decreased to 12(40%, 12/30).
Conclusions : These findings highlight the significant impact of storage conditions on PTH measurement variability. Specifically, the changes observed after sample storage and thawing underscore the need for standardized pre-analytical procedures to ensure accurate PTH measurements. This is particularly important for effective CKD management, as precise PTH levels are crucial for guiding treatment decisions.