Underfilling of tubes leads to a higher proportion of blood aspirated with high velocity and relevant elevations in LD. This finding should be considered in cases of clinically implausible elevated LD activities" Neuwinger et al (2019).

Abstract:

Background: Lactate dehydrogenase (LD) activity is routinely monitored for therapeutic risk stratification of malignant diseases, but is also prone to preanalytical influences.

Methods: We systematically analyzed the impact of defined preanalytical conditions on the hemolysis-susceptible parameters LD, potassium (K) and hemolysis index in vacuum blood collection tubes (serum , heparin plasma). Blood was collected by venipuncture from healthy volunteers. Tubes were either filled or underfilled to approximately 50%, then processed directly or stored at room temperature for 4 h. Potassium (K), sodium (Na), chloride (Cl), LD, creatine kinase (CK), total cholesterol, and indices for hemolysis, icterus, and lipemia were analyzed. Filling velocity was determined in a subset of tubes. Findings in healthy volunteers were reconfirmed in an in-patient cohort (n = 74,751) that was analyzed for plasma yield and LD data distribution.

Results: LD activity was higher in HP compared to SE. Underfilling led to higher LD values (SE: +21.6%; HP: +28.3%), K (SE: +4.2%; HP: +5.3%), and hemolysis index (SE: +260.8%; HP: +210.0%), while other analytes remained largely unchanged. Filling velocity of tubes was approximately 3-fold higher in the first half compared to the second half in both HP and SE collection tubes. Importantly, plasma yield also inversely correlated with LD in routine patients. By calculating reference limits, the lowest plasma yield quartile of the patient cohort displayed LD values clearly exceeding current reference recommendations.

Conclusions: Underfilling of tubes leads to a higher proportion of blood aspirated with high velocity and relevant elevations in LD. This finding should be considered in cases of clinically implausible elevated LD activities.

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Reference:

Neuwinger, N., Meyer Zum Büschenfelde, D., Tauber, R. and Kappert, K. (2019) Underfilling of vacuum blood collection tubes leads to increased lactate dehydrogenase activity in serum and heparin plasma samples. Clinical chemistry and laboratory medicine. October 30th. doi: 10.1515/cclm-2019-0616. .