

HEMOLYSIS, LIPEMIA AND BILIRUBINEMIA: WHAT IMPACT ON VITAMINS A, E, K, B6, B9, B12, C, BETACAROTENE AND HOMOCYSTEINE CONCENTRATIONS?

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BACKGROUND-AIM: Pre-analytical errors as hemolysis, bilirubinemia or lipemia could affect the measurements of vitamins concentrations. We evaluated the impact of these interferences on vitamins, betacarotene and homocysteine concentrations.

METHODS: Heparinized plasma (vitamins A, E, C and betacarotene), EDTA plasma (vitamins B6 and homocysteine) or serum (vitamins K, B9 and B12) were spiked with various concentrations of Intralipide® emulsion, bilirubin or hemoglobin. Indices of hemolysis (H), icterus (I) and lactescence (L) of spiked plasma or serum were assessed on Architect C16000 analyzer. Measurements of vitamins A, E, B6, K, C, betacarotene and homocysteine were performed by high-pressure liquid chromatography using in house methods, Chromsystems (B6) or Biorad kits (homocysteine). Measurements of vitamins B9 and B12 were performed on Architect 12000 analyzer. The impact of interference was considered significant when the percent of concentration's variation of spiked vs unspiked plasma or serum exceeded the repeatability coefficient of variation of the measurement technique.

RESULTS: Major variations observed for vitamins and homocysteine concentrations were due to hemolysis especially for vitamins B9 and C. Hemolysis impacts negatively vitamin C concentrations (-11 to -19% (H-index: 0.4-0.8g/L), -34% (H-index> 2g/L), -47 to -54% (H-index> 3g/L)), vitamin A concentrations (-4% (H-index> 2g/L), -9 to -14% (H-index> 3g/L)), vitamins E and B12 concentrations (-6 to -11% and -8 to -13% respectively for H-index> 3g/L). Hemolysis impacts positively vitamin B9 concentrations (51% to 103% (H-index: 0.4-0.8g/L), 203% (H-index> 2g/L), 388% (H-index> 3g/L)), vitamin B6 and homocysteine concentrations (7 to 13% and 5 to 6% respectively for H-index> 3g/L). Lipemia only affects betacarotene concentrations with a decrease by -13% (L-index> 5 mmol/L). Icterus only affects vitamin B6 and homocysteine concentrations (+17 to +35% (I-index> 25Opmol/L) and +13% (I-index> 125pmol/L) respectively).

None of the tested interferences affect the vitamin K concentrations.

CONCLUSION: Take into account the aspect of plasma or serum for vitamins, betacarotene and homocysteine measurements should be a necessary step of the laboratory quality approach allowing avoiding clinical misinterpretation.