

Pathology and Laboratory Medicine Memorandum

To: Physicians and Health Service Directors, Central Zone
From: Manal Elnenaie. Head Division of Medical Biochemistry
Date: May 25, 2022
Subject: **Clinical Utilizations of Trace Metals**

Trace metal testing for Nova Scotia Health (NSH) is a costly referred out test that must go through a pre-approval process. In liaison with Drs. Nancy Murphy and Caitlin Wolfe from the IWK Regional Poison Centre, the following are recommendations in terms of appropriate test utilization and sample requirements, and relevant challenges in test interpretations:

Arsenic Toxicity

- Utilization: This element is known to be quite high in well water throughout Nova Scotia. Individuals suspected of arsenic exposure should have their water system tested and remediated if necessary. Testing arsenic level for patients who don't present with symptoms of arsenic toxicity is not recommended. Testing for arsenic can be considered for individuals who are clinically suspected of arsenic toxicity.
- Sample requirement: **Random urine** for initial screening; a 24-hour urine collection is the gold standard and will be recommended if further, confirmatory testing is required. Blood is not the sample of choice for suspected chronic exposure to arsenic.

Lead, Copper, Mercury, and Manganese Toxicity

- Utilization: Toxicity from these trace metals is rare in Nova Scotia outside of industrial or other known acute exposures. It is not recommended to test these elements if water contamination is suspected and/or in asymptomatic patients. Of note, mercury released from dental amalgams and from consumption of commercial seafood is not significantly correlated with a high body burden or toxicity.
- Sample requirements: **Whole blood** collected in BD 6.0 ml K2-EDTA Royal Blue Vacutainer is the preferred sample type.

Chromium and Cobalt Levels Following Orthopedic Arthroplasty

- Utilization: For patients with orthopedic implants made of cobalt-chromium alloys, annual follow-up of levels is recommended for the first five years to assess the function of implants and monitor potential adverse health effects of elevated metal ion blood levels.
- Sample requirements: **Whole blood** collected in BD 6.0 ml K2-EDTA Royal Blue Vacutainer is the preferred sample type; urine is not acceptable.

Zinc, copper, chromium, selenium, manganese levels for potential nutritional deficiency

- Utilization: Specific populations, including the severely malnourished, patients with high enteral losses and those on long-term parenteral nutrition therapy require trace element monitoring. Testing of these trace metals in patients who are at low risk for nutritional deficiency is not recommended since empirical supplementation is far more clinically and economically effective.
- Sample requirements: **Plasma** collected in BD 6.0 ml K2-EDTA Royal Blue Vacutainer is the preferred sample type if nutritional assessment is deemed clinically essential.

Challenges in sample collections and interpretation of trace metal results

- Laboratory samples for trace element are difficult to collect, handle, and are extremely susceptible to contamination.
 - Patients should avoid gadolinium- or iodine-containing contrast media for 4 days prior to collection for most trace- metal testing.
 - Consumption of seafood before arsenic testing should be avoided for 5 days prior to collecting samples for arsenic testing to avoid false elevations, as seafood generally contains the nontoxic form of arsenic.
 - Since accurate 24hr urine collection is quite challenging for patients, requests for trace metal testing in this sample type should be limited to confirmation of diagnoses, and treatment guidance but not screening.
- Results of trace elements in general must be interpreted with caution as some are affected by inflammatory states. For example, it has been reported that copper is a positive acute-phase reactant while chromium, manganese, selenium, and zinc are negative acute-phase reactants.

For Questions/ concerns, please contact:

Dr. Amy Lou

902- 473- 1528

Amy.Lou@nshealth.ca

For discussing specific cases when testing may be warranted, please contact:

The IWK Regional Poison Centre 902-470-8161

(Dr. Nancy Murphy or Dr. Caitlin Wolfe)