Micro Trace Minerals Laboratory
35+ years of clinical & environmental laboratory diagnostics

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MTM Newsletter **N° 14 - June 2015**

Laboratory News

Toxic Metals (Excerpt from OSHA)

Excerpt from OSHA (Occupational Safety and Health Administration, Washington DC Toxic metals, including "heavy metals," are individual metals and metal compounds that negatively affect people's health. They may build up in biological systems and become a significant health hazard.

Following are OSHA statements:

Arsenic
Common sources of exposure to higher-than-average levels of arsenic include near or in hazardous waste sites and areas with high levels naturally occurring in soil, rocks, and water. Exposure to high levels of arsenic can cause death.

Beryllium
Elemental beryllium has a wide variety of applications. Occupational exposure most often occurs in mining, extraction, and in the processing of alloy metals containing beryllium. Beryllium can cause sensitization, lung and skin disease in a significant percentage of exposed workers.

Cadmium
Cadmium is an extremely toxic metal commonly found in industrial workplaces, particularly where any ore is being processed or smelted. Several deaths from acute exposure have occurred among welders who have unsuspectingly welded on cadmium-containing alloys or with silver solders.

Hexavalent Chromium
Calcium chromate, chromium trioxide, lead chromate, strontium chromate, and zinc chromate are known human carcinogens. An increase in the incidence of lung cancer has been observed among workers in industries that produce chromate and manufacture pigments containing chromate.

Lead
Occupational exposure to lead is one of the most prevalent overexposures. Industries with high potential exposures include construction work, most smelter operations, radiator repair shops, and firing ranges.

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Mercury

Common sources of mercury exposure include mining, production, and transportation of mercury, as well as mining and refining of gold and silver ores. High mercury exposure results in permanent nervous system and kidney damage.

Provocation test - General information

1. If we want to compare a patient's repeated provocation test results, it helps to instruct the patient to keep a constant liquid intake and, if the same chelation agent and protocol is used again, the same urine collection time should be followed.
2. For DMSA oral, the urine collection time is 3 to 4 hours, during which time the patient drinks two cups of water (one cup equals 200-250ml).
3. For DMPS iv, the urine collection time is 1hr, during which the patient drinks 1 cup of water.
4. After urine collection is finished, the patient should consume plenty of water to adequately flush the renal system.
5. The urine creatinine value as shown on the urine report provides information about the patient's fluid consumption. A low urine crea values signals a high fluid intake, a urine crea value of 1.5g/l or over indicates dehydration or renal stress.
6. Dehydration causes the urine to be more concentrated, but since the urine crea value is used as a mathematical factor to convert metal test values to mg/g crea or mcg/g crea, a high urine crea value down regulates results.
7. This conversion factor, based on the urine creatinine value, considers diuresis effects.

   Example 1:
   The urine report of Patient A, 28y shows a silver (Ag) concentration of 2.683µg/l.
   The Urine crea-value is **0.32g/L**
   = Ag Urine concentration of 2.683µg/l/0.32g/L
   CF (Creatinine factor = 24/(28-(Age*0.2)) = 24/(28-5.6) = 1.0714
   A (Excretion) = C/(Crea*CF)
   2.683/(0.32*1.0714) = 2.683/0.343 = **7.822µg/g Crea**

   Example 2:
   The urine report of Patient B, 28y shows a silver (Ag) concentration of 2.683µg/l.
   The Urine crea-value is **1.90g/L**
   = Ag Urine concentration of 2.683µg/l/1.90/L
   CF (Creatinine factor = 24/(28-(Age*0.2)) = 24/(28-5.6) = 1.0714
   A (Excretion) = C/(Crea*CF)
   2.683/(1.90*1.0714) = 2.683/2.035 = **1.318µg/g Crea**

   The conversion to urine creatinine allows a more accurate assessment of the analysis results.

8. Alternatively, we could report test values in mg/L or mcg/L, but to do this, the total volume of the urine collected must be accurate.

Baseline urine reference ranges

We use the ranges as given by the environmental agencies (EPA, UBA). For those elements not listed, we have statistically developed our own, following current laboratory rules and regulations. Every other year, we re-evaluate ranges, and as of July 1, 2015, we will adjust (downward) urine baseline ranges for Barium, Strontium, Vanadium and Tin.

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- **Quality assessment for Blood, Hair and Urine**

At present, the only Quality Assessment Scheme for Elemental Testing in Hair is performed at the Centre de Toxicologie (INSPQ), Quebec, Canada. We are participating in the multielemental test and have passed all tests perfectly.

We had also a near 100% success rate for quality assessment for blood and urine.

Medical Workshops and Conferences

- **International Conferences & Workshops 2015**

10/10/2015	**Toxicology Workshop for Beginner** **(Applied for Accreditation by German Medical Board)** Nuremberg, Germany (German)

Details under:
http://www.microtraceminerals.com/en/workshops

Studies and Analyses

- **Environmental research project, Relevance for obesity and Alzheimer's disease**

Our Participation in the Environmental Research Project with Prof. Lilian Calderón-Garcidueñas, University Montana, USA

Titel:
Mexico City normal weight children exposed to high concentrations of ambient PM2.5 show high blood leptin and endothelin-1, vitamin D deficiency, and food reward hormone dysregulation versus low pollution controls. Relevance for obesity and Alzheimer disease. Environmental Research 140(2015) 579–592

The study can be viewed or downloaded here:
http://www.microtraceminerals.com/en/metals-and-disease-research/obesity

Contact us for more information. We would be happy if we can help you and your patients.

We wish you a wonderful summer.

Your

E.Blaurock-Busch and Team