CYREX Laboratories

CLINICAL SPECIFICATIONS

MIXED HEAVY METALS

Chemical Found In:

Mixed Heavy Metals (Nickel, Cobalt, Cadmium, Lead, Arsenic) are ubiquitous compounds found in soil, drinking water and food supply, and are not fully avoidable. However, certain exposures can be limited or controlled. These include the exposure of Heavy Metals from manufactured goods, cigarette smoke, paints, gasoline, and some food containers and cookware. Arsenic is absorbed by all plants, but is more concentrated in leafy vegetables, rice, apple and grape juice, and seafood.

Sources:

Nickel
https://www.epa.gov/sites/production/files/2016-09/documents/nickle-compounds.pdf

Cobalt
https://www.epa.gov/sites/production/files/2016-09/documents/cobalt-compounds.pdf

Cadmium
https://www.epa.gov/sites/production/files/2016-09/documents/cadmium-compounds.pdf

Lead
https://www.epa.gov/sites/production/files/2016-09/documents/lead-compounds.pdf

Arsenic
https://www.epa.gov/sites/production/files/2016-09/documents/arsenic-compounds.pdf

Known Cross-Reactions: Nickel with Palladium[1]

Clinical Significance:

The detection of antibodies to Mixed Heavy Metals (Nickel, Cobalt, Cadmium, Lead, Arsenic) bound to human protein in serum indicates a breakdown in immunological tolerance and induction of chemical intolerance. Heavy Metals or their metabolites can bind to human tissue proteins and form neo-antigens. These new antigens are comprised of the haptenic chemical plus the tissue antigen. The formation of neo-antigens initiates an immune response which may result in antibody production against the chemical and the human tissue. Continued exposure to the chemical and the subsequent production of antibodies against various tissue antigens, may result in autoimmune reactivity.

Persons with antibodies to Heavy Metals bound to human protein in serum should remove or limit exposure to the substances where reasonably controllable.

References:

1. Büdinger and Hertl. Immunologic mechanisms in hypersensitivity reactions to metal ions: an overview. Allergy, 2000; 55:108-115.
2. Carey, et al. Immune modulation by cadmium and lead in the acute reporter antigen–popliteal lymph node assay. Toxicologic Sci, 2006; 91(1):113–122.
3. Järup . Hazards of heavy metal contamination. Br Med Bulletin, 2003; 68:167–182.
4. Seldén, et al. Exposure to cobalt chromium dust and lung disorders in dental technicians. Thorax, 1995; 50:769-772.
5. Thierse, et al. Metal-protein complex-mediated transport and delivery of Ni2 to TCR/MHC contact sites in nickel-specific human T cell activation. J Immunology, 2004; 172:1926–1934.
6. WHO. Lead. Environmental Health Criteria, vol. 165. Geneva: World Health Organization,1995.
7. Xu, et al. Effect of co-exposure to nickel and particulate matter on insulin resistance and mitochondrial dysfunction in a mouse model. Particle Fibre Toxicol, 2012; 9:40.