La Medicina del Lavoro

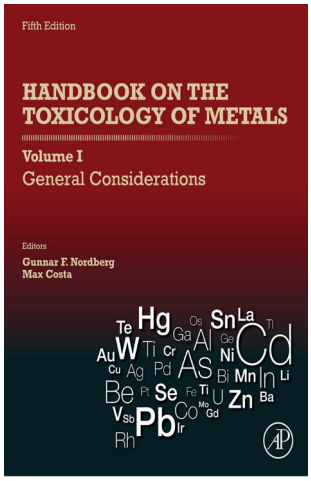
Book review

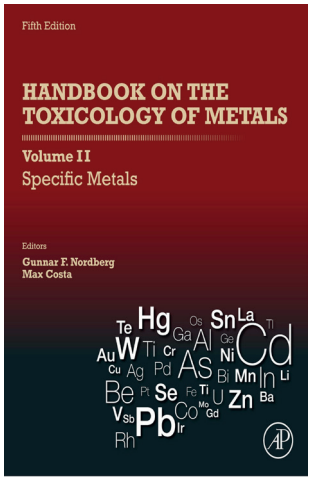
Med Lav 2022; 113 (6): e2022053

# Nordberg G F, & Costa M. (Eds.). *Handbook on the toxicology of metals; volume I: general considerations* (5th ed.). Academic Press/Elsevier Amsterdam, Boston, 2022, pp. 796.

# Nordberg G F, & Costa M. (Eds.). *Handbook on the toxicology of metals; volume II: specific metals* (5th ed.). Elsevier, London, 2022, pp. 1011.

**Available as an eBook (ISBN: 9780128232934) and with hardcover (ISBN: 9780128232927)**




The *Handbook on the toxicology of metals*, now in its fifth edition, is a reference source of information for physicians, toxicologists, and engineers concerned with environmental and occupational health. Gunnar Nordberg, emeritus professor of Umeå University (Umeå, Sweden), has been among this book's editors since its first edition in 1979. Max Costa – Professor of the NYU School of Medicine (New York, USA) – is the co-editor of this new updated edition. As in previous editions, the *Handbook* is a comprehensive review of the effects on biological systems from metallic elements and their compounds, including the vast array of advancements made since the last edition. There are several new chapters, two on new metallic elements not covered by previous editions, and several chapters on general considerations. All chapters are updated, and the latest edition includes evidence of a newly recognized indium-related occupational disease and several new connections between metal exposures and illnesses. This up-to-date reference book provides easy access to basic toxicological concepts and critical aspects of metallic compounds' toxicology.

*Handbook on the toxicology of metals, fifth edition, volume I: general considerations* (30 chapters, 796 pp.) gives an overview and covers topics of general importance, including reviews of various health effects of trace metals, covering toxic effects in humans, along with discussions about the toxic impact of animals and biological systems in vitro when relevant. The book has been systematically updated with the latest advances in technology. As a multidisciplinary resource that integrates both human and environmental toxicology, the book is a comprehensive and valuable reference for toxicologists, physicians, pharmacologists, and environmental scientists in environmental, occupational, and public health.

Volume I comprises 30 chapters on general considerations such as the toxicity of metal nanoparticles, metals in food and metals, and air pollution (new chapter), as well as the toxicity of metals to various organ systems with new chapters on Respiratory effects and The Skin. It further includes considerations on the Ecotoxicology of Metals, describing sources, transport, and effects in the ecosystem. Other chapters in this volume focus on human health effects, both the beneficial effects of essential metals and the adverse effects of toxic metals in

occupational and general environments. While the exposure has decreased for a few metals with recognized toxicity, for example, lead in the general environment, there is increased exposure to less studied metals. Considerable further increases in world production of several metals will occur in the next decades because of the demand by the transition to a fossil-free society required to halt climate change.

In recent times, increasing human exposures have occurred to metallic nanoparticles used for various purposes, including medical applications. Exposures also occur as chelates for MRI enhancement and releases from implanted medical devices, increasingly used for several medical purposes. Regardless of the source of human exposure, it is helpful to employ biological monitoring to get a quantitative estimate. Large programs are presently in place in some countries, monitoring large population groups' blood and urine concentrations of metals and other chemicals.

*Handbook on the toxicology of metals, fifth edition, volume II: specific metals*, (38 chapters, 1052 pp.) provides complete coverage of 38 individual metallic elements and their compounds. This volume emphasizes toxic effects in humans, along with discussions on the toxic effects of animals and biological systems in vitro when relevant.

Volume II reviews 38 specific metals and their compounds in separate chapters. Added new chapters are those on Osmium and Gadolinium, the latter metal involved in inducing the potentially life-threatening disease Nephrogenic Systemic Fibrosis when given to patients with impaired renal function as a chelate for enhancing Magnetic Resonance Imaging (MRI) procedures.

Clinically diagnosed occupational metal poisonings are rare in high-income countries. An exception is the recent recognition in the electronics industry in Japan and the USA of severe interstitial lung disease with alveolar proteinosis, sometimes leading to death, named Indium Lung Disease (ILD) or Indium lung, described in the chapter on Indium. Airborne, poorly soluble indium compounds such as indium tin oxide cause this disease. Chronic poisoning by mercury vapor with erethism, tremor, and other symptoms frequently occurs in artisanal small-scale gold mining in low – and lower-middle-income countries. According to estimates, under these circumstances, 1-2 million disease-adjusted life years (DALYs) are lost due to mercury poisoning, which also causes poisoning cases due to arsenic, lead, and cadmium.

In the general environment, widespread exposure to drinking water contaminated by inorganic arsenic occurs in several countries. Estimates for the situation in Bangladesh state thousands of deaths and more than a hundred thousand DALYs per year. From a worldwide perspective, estimates indicate one million illnesses, 56,000 deaths, and more than 9 million DALYs to be due to exposure to food-borne arsenic, methylmercury, lead, and cadmium.

These poisoning cases and other adverse health effects from too high exposures to toxic metals are in addition to global estimates of several hundred thousand deaths and millions of DALYs from zinc and iron deficiency. There is a need for intensified efforts in risk assessment and prevention, the subject of specific chapters in the *Handbook*.

All chapters have been written and peer-reviewed by experts – 116 contributors and 54 reviewers – which accounts for some inhomogeneity. The large number of collaborators involved as contributors and reviewers also testify to the efforts made to provide the best possible information quality in a field in continuous evolution, together with our ability to measure trace amounts of contaminants and the effects of their interactions with biological systems.

**Antonio Mutti,**
Editor in Chief