



This book is devoted to the toxicology of metals and metalloids as well as their compounds and the risks these metals pose on human health.

Abstract:

Metal Ions in Life Sciences

This volume of the 'Metal Ions in Life Sciences' series focuses on the effect of metals and metalloids on human health. It opens with three general chapters, beginning with the aim to understand combined effects of metal co-exposure in ecotoxicology. Indeed, it is a particular challenge to assess the potential of deleterious biological effects occurring from environmental exposure, including work place, food and water supply, to metal mixtures. Therefore, Chapters 2 and 3 are devoted to the risk assessment of metals and metalloids for humans and the underlying principles. Considering that a variety of health risks exist, agencies have provided health-based guidance values to prevent the occurrence of adverse health effects in humans, though it is clear that in the future new and innovative interdisciplinary approaches and shared technologies between consortia are needed.

Chapters 2 through 11 describe and summarise how metal ions, metal compounds, and metalloids affect the pulmonary and cardiovascular systems, the gastrointestinal system including the liver, the kidney, the haematological system, the immune system, skin and eyes, and the neurological system as well as human reproduction and development. Indeed, many metal ions and their compounds (As, Cd, Cr, Cu, Hg, Li, Ni, Pb, V) exert a wide variety of adverse effects including their influence on male and female subfertility or fertility, on abortions, malformations, birth defects, and developmental effects, which occur mainly in the central nervous system.

Are cadmium and other heavy metal compounds acting as endocrine disrupters? This question is addressed in Chapter 12: The realisation that cadmium compounds and other heavy metals are capable of activating the estrogen receptor has not only spawned extensive research, but has also raised concerns about their role as risk factors in hormone-related cancers and other endocrine disorders. Indeed, despite existing inconsistencies, the available evidence forces the conclusion that cadmium and certain other heavy metals should be regarded as estrogen mimicks.

The two terminating Chapters 13 and 14 are devoted to the genotoxicity of metal ions and their role in human cancer development. Special attention is paid to the underlying chemical mechanisms and in Chapter 13 the genotoxicity of metal ions is defined as the damage to cellular DNA with genetic consequences. Chapter 14 focuses on metallic agents that are known to be human carcinogens, that is, on arsenic, beryllium, cadmium, chromium(VI), nickel, and their compounds. It covers further probable and possible human metallic carcinogens, like inorganic lead compounds, cisplatin (cis-diamminedichloroplatinum(II)), indium phosphide, and certain cobalt compounds; potential mechanisms of metal carcinogenesis are discussed.

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