

Preface

Diet is the main source of trace elements, and exposure to dietary trace elements has a direct impact on the health of hundreds of millions worldwide. Insufficient intake of essential trace elements is a global issue. Deficiencies of iron, zinc, iodine, and selenium result in millions of people being affected by various diseases, with very serious consequences in those countries where malnutrition is widespread. On the other hand, the impact of toxic element species such as inorganic arsenic and methylmercury on entire populations has come to the fore again as a priority for both the scientific community and health authorities. The presence of trace elements in feeds, either as contaminants or as nutritional or zootechnical additives, and their transfer across the food chain to humans also raises questions within the scientific community and regulators.

Different facets of trace elements, from essentiality to toxicity, were addressed throughout the 3rd International IUPAC Symposium on Trace Elements in Food (TEF-3). The meeting was organized by the Istituto Superiore di Sanità and held on 1–3 April 2009 in Rome, Italy. The objective was to gather experts with different backgrounds to discuss all aspects of trace elements in food in relation to human health, with special emphasis on biological effects of elements. The main topics included essentiality, toxicity, bioaccessibility, bioavailability, speciation, sources and transfer in the food chain, effects of processing, food and feed fortification, supplementation, international legislation and standards, analytical developments, analytical quality assurance and reference materials. In accordance with practice in previous events of this series (Warsaw, 2000, and Brussels, 2004), TEF-3 provided a forum for the exchange of new ideas and experiences in trace element research, and a basis for influencing policy, advisory practice, and risk-management tools to protect public health.

Over 200 participants, representing some 40 countries, joined the event. In addition to the 15 invited lectures, delegates from Europe, Asia, Africa, North and South America enriched this edition with 20 oral and about 130 poster contributions. TEF-3 actually resulted in a lively interdisciplinary symposium on current and emerging research and development efforts.

Special emphasis was placed on the following topics:

- analytical techniques for element speciation studies in food and food supplements
- reliability and quality control of analytical data on trace elements in foodstuffs
- detection, characterization, and potential health risks of inorganic nanoparticles
- arsenic speciation and toxicology
- gender differences in susceptibility to toxic trace elements in food
- exposure assessment of toxic element species
- assessment of risks and benefits of the organic forms of trace elements as feed additives
- metabolism of metal(loid)s by intestinal microorganisms
- absorption and metabolism of iron, zinc, and other essential elements
- use of stable isotopes to study trace mineral metabolism
- selenium and iodine speciation and biological effects

Advancements in the above-mentioned areas were discussed, and special attention was paid to the means in order to prevent adverse health effects on those individuals and populations most vulnerable to trace-element inadequacies, excesses, or imbalances.

The following collection of papers based upon authoritative lectures presented at TEF-3 addresses many of the topics discussed during the symposium. Overall, it provides an excellent overview of the state of the art in the area of trace elements in food and sheds light on future challenges and subjects of research.

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