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Systemic impact of trace elements on human health and diseases: Nutrition, toxicity, and beyond

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The rapid advance in our understanding of how nutritional supplements and environmental metal exposures interact with the genetic milieu of individuals leading to human health disorders, has gained a great momentum in the last decade. This is exemplified by extensive investigations on metals in neurodegenerative diseases, carcinogenesis, developmental disorders, and genetic diseases, etc., from cell models to human subjects, from gene alteration to intact systemic damage, and from traditional animal model study to alternative modeling. For example, Alzheimer's disease, a severe dementia affecting more than 8 million Americans and much larger population worldwide, has been linked to altered homeostasis of trace elements in human body and elevated exposure to toxic metals in environment. The 13th Biennial Conference of *International Society for Trace Element Research in Humans* taking place in Prama Sanur Beach Hotel in Bali, Indonesia, September 22–26, 2019, carried a unique mission to address the dual effect of trace elements or metals, from being nutritious to poisonous, on human health and diseases. The conference brought together 126 researchers and clinicians from academia, hospitals, pharmaceutical and chemical industries, government and non-government organizations, worldwide from 16 countries. The invited plenary speakers and presenters in 12 parallel symposia, 4 selected oral workshops, and 5 poster sessions explored the current state of research and discovery on the molecular and cellular mechanisms of beneficial and harmful effects of trace elements, mammalian and non-mammalian models for metal's health research, in vitro models to assess developmental metal toxicity, as well as observations from human cohort metal studies. Moreover, the conference discussed the beneficial implication of trace elements on the body systems, individual susceptibility, consequential changes, broader worldwide environmental health preventions, and internationally occupational safety promotion. With the venue in a developing country Indonesia, the conference also provided the opportunity to examine the environmental health disparities and metal exposure-related environmental and occupational disorders resulting from rapid industrial development, for better communication, outreach and public engagement. A collection of some of these original works presented in the conference and published in this special issue exhibits a snapshot of this highly successful gathering in trace element research. We sincerely appreciate the governments of Indonesia (Ministry of Health) and the United States (National Institute of Environmental Health Science), U.S. Society of Toxicology, and Universitas Padjadjaran for their heartfelt support to this exciting intellectual exchange. (The 13th ISTERH conference

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