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Risk assessment and management of Taiwan residents exposed to arsenic associated with rice consumption

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Rice and rice products are staple foods in Asia. Rice grains may accumulate excess arsenic (As) when exposed to As-contaminated soil. Therefore, it is important to assess potential human health risks through daily rice consumption. This study aims to perform dietary As risk assessment to estimate the probability of As from contaminated soils entering local residents. Field investigations were conducted in paddy rice fields in central Taiwan to determine the correlation between As levels in soil and in brown rice. The ingestion rate of rice of local residents was also investigated. A probabilistic risk assessment was then employed to estimate carcinogenic and non-carcinogenic risks of Taiwan residents via rice consumption. The result showed that the mean total As concentration in soil was 44.96 mg kg^{-1}, which was a little lower than the local risk-based limit of As for soil used for food crop production (60 mg kg^{-1}). The total daily intakes of inorganic As from rice consumption were 0.0002 and 0.0011 mg kg^{-1} day^{-1} for the 50th and 95th percentiles, respectively. The assessment results show that the predicted 50th and 95th percentile for target cancer risks (TRs) were respectively 0.0003 and 0.0016, both markedly higher than the acceptable target cancer risk of 10^{-4}-10^{-6}. To manage the health risk of local residents due to the ingestion of inorganic As from rice, our results suggested that the regulation standard of As in farmland soil should be set below 15 mg kg^{-1}.

Biography

Bo-Ching Chen has completed his PhD at the age of 32 years from National Taiwan University. He is the full Professor of Master Program of Green Technology for Sustanablity, and the Dean of College of Science and Technology, Nanhua University, Taiwan. He has published more than 40 papers in reputed journals.

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