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From Arsenic Trioxide to Silver Nanoparticle and Chromium: My Environmental Toxicology Journey during the Past 15 Years

Autophagy is a mechanism of cellular self-consumption for recycling of intracellular "cargo" such as damaged proteins and organelles. Basal autophagy helps maintain homeostasis, while additional autophagy is induced in response to many different forms of stress including nutrient, oxygen and growth factor deprivation and chemo/radio therapeutics. Autophagic defects have been implicated in various diseases and health states, including neurodegeneration, aging, infection and cancer. However, the role of autophagy in cancer and environmental toxicology is quite complicated and controversial. Thus, I am enthusiastic in exploring whether autophagy acts as a pro-survival or pro-death player in toxic response of environmental toxicants or cancer therapy. My colleagues and I recently discovered several regulatory modes and functions of autophagy. Firstly, we found that a combination of irradiation and arsenic trioxide (ATO) could be a potential therapeutic strategy for the treatment of malignant cancers through the induction of both autophagy and apoptosis. Secondly, we uncovered that autophagy activation is a key player in the cellular response against nano-toxicity, in which endoplasmic reticulum (ER) stress caused by misfolded protein aggregation was involved in regulating the autophagic process. Currently, I am focusing to explore the roles of ER stress triggered autophagy in contributing to the enhanced immune response of nanoparticles in an Cr^{+6} triggered allergic contact dermatitis animal model. By revealing the regulation pathways of autophagy in skin hypersensitivity, our research may help to the development of novel and effective preventive strategy to combat allergic contact dermatitis.

Biography

Ying-Jan Wang, Ph.D., graduated from Department of Biochemistry and Molecular Biology, College of Medicine, National Taiwan University, Taipei, Taiwan. Currently he is working as a distinguished professor in Department of Environmental and Occupational Health, National Cheng Kung University, Tainan, Taiwan. The major research focus of his laboratory is to understand the molecular mechanisms responsible for environmental toxicants-triggered toxicity, chromium hypersensitivity and carcinogenesis/cancer therapy. He is specially interested in elucidating the role of autophagy in regulating diverse biological processes, such as proliferation, programmed cell death, inflammation, thereby contribute to cytotoxicity, dermatitis and/or cancer therapy.