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Metabolomics approach to understanding the metabolic regulatory effects on rats under several kinds of stresses

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Stress may trigger systemic biochemical and physiological changes in living organisms, leading to a rapid loss of homeostasis, which might cause further tissue injury and could also be gradually reinstated when stress source was removed. However, such a sophisticated metabolic regulatory process has so far been poorly understood, especially from a holistic view. The series of metabolomics analysis on urine, serum and tissue samples derived from rat models of acute cold stress, forced swimming stress, Chronic Unpredictable Mild Stress (CUMS) and subacute heat stress enables us to visualize significant alterations in metabolite expression patterns as a result of stress-induced metabolic responses and post-stress compensation. The results indicate the mild and acute stress, like cold and forced swimming stress induced metabolic perturbations were reversible and nonspecific, but long-term stress, as subacute heat and chronic, unpredictable mild stress, brought sustained metabolic distributions and caused more injury to other tissues including brain (CUMS) and testicles(heat stress). The differentially expressed metabolites were involved in metabolic regulation and compensation required to restore homeostasis, especially in the epididymis, metabolites with reproductive benefits were found being up-regulated to play a self-protective function in resisting, heat stress and to maintain normal reproductive function. Meanwhile, our study provides a dynamic and systemic approach for the characterization of anti-stress and metabolic protective effects of ginsenosides from the herbal drug named Ginseng.

Biography

Xiaoyan Wang got her PhD in Pharmacology from Shanghai Jiao Tong University and now is an Associate Professor at the Shanghai Center for Systems Biomedicine. She has been engaged in stress related metabolomics and pharmacology study and has published more than 20 papers in reputed journals.

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