Bretscheider solution induced urine metabolomics alteration in cardiac surgery patients

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The discovery of Bretschneider’s Histidine-tryptophan-ketoglutarate (HTK) cardioplegia solution had been one of major advancements in cardiac surgery to offer myocardial protection. However, metabolic alteration of these additives in the whole body has not been systematically investigated. Using non-targeted mass spectrometry-based method, the deep urinary metabolome may provide a systemic view of metabolic shifts in patients receiving HTK. Prospective urine samples were collected from 100 patients underwent cardiac surgery and the metabolomic changes were profiled by a high-performance chemical isotope labeling Liquid Chromatography (LC-MS) method. Over 14642 metabolites were quantified using differential 13C-/12C-dansyl labeling LC-MS, which targeting the amine/phenol submetabolome from the urine specimens. We identified 285 significantly differential metabolites (fold change more than 5) and assembled several potential metabolic pathway map derived from dys-regulated metabolite hits. Our data indicated an up-expressed histidine metabolism with subsequent increased glutamine/glutamate metabolism, altered purine and pyrimidine metabolism and up-expressed vitamin B6 metabolism in patients receiving HTK. Such information provides solid evidence outlining the shift in metabolic pathways and establishes a basis for further study regarding the key mechanisms of HTK solution in organ protection or potential harm.

Biography
Ya-Ju Hsieh has her expertise in mass spectrometry of metabolomics and proteomics analysis. Her study is major in using quantitative metabolomics profiling approaches to investigate urine samples of cardio surgery patients with or without cardioplegia treatment.

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