

International Conference on

Environmental Toxicology and Pharmacology

February 21-22, 2019 | Paris, France

Metabolomics: A novel tool of Precision Medicine

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Dramatic changes of the environment in the last decades have resulted in nutrient poor food and excessive intake of heavy metals and toxins through air, drinking water and dietary habits. Non-communicable diseases (NCD) which are responsible for almost 70% of global deaths are mainly caused by modifiable risk factors. These include behavioral and metabolic risk factors such as unhealthy diet, tobacco smoke and alcohol. Epigenetic factors have high attributable risks of 80% for most NCD. Precision medicine integrates the individual variability in genes, environment, and lifestyle of each person for the prevention and treatment of disease. Metabolomics, the quantitative and comprehensive evaluation of metabolites, has emerged as a novel and powerful tool in precision medicine. As one of the “omics” technologies, metabolomics has attracted increasing attention for its potency

in identifying unique biomarkers. Metabolites provide a detailed overview of cellular function. Analysis of metabolites gives a precise data of nutritional deficiencies, metabolic imbalances, environmental toxins, microbiome condition, and uncovers underlying genetic predispositions that can be modified through diet, lifestyle, supplements or medications. Gas chromatography/Mass spectrometry methodology has allowed the detection of low quantity molecules in minimum amount of biofluid samples. Critical signs of systemic dysfunction at the molecular level are revealed years before clinical symptoms appear. Thus, through the assessment of the overall health status, early detection of a disease and intervention to restore these deficiencies is feasible.

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