Metabolomics and its applications in plant biotechnology.

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Description

Metabolomics is a large study of small molecules commonly known as metabolites in cells, bio fluids, tissues, or organisms. Collectively, these small molecules and their interactions within the biological system are known as metabolomes. Metabolomics is an objective lens for investigating the complex nature of the relationship between physiology and external events and conditions and measuring its response to disorders such as disease-related disorders. Metabolomics is currently being used to study a variety of human illnesses, improve their diagnosis and prevention, and develop better treatment strategies. In addition, metabolomics research is being conducted in areas such as toxicology and pharmacology, plant breeding and plant biotechnology. A unique aspect of metabolomics in comic technology including genomics, epigenome, transcriptomics, and proteomics is that metabolite measurements occur within an individual and are retroactive and comprehensive in health-related biological processes.

One of the most important uses of metabolomics in the study of human disease is tumor biology. Tumor cells are highly proliferative, have high transcription and translation rates, and have high energy requirements, so they have special metabolic requirements compared to normal cells and often lose many regulatory functions. Therefore, one of the biggest challenges in medicine is the use of metabolomics to predict the development of tumor cells. Preclinical analysis first discovered putative metabolic biomarkers for assessing the effectiveness of cancer detection and / or cancer treatment, followed by these biomarkers in bio fluids (blood, urine, prostate secretion, etc.). Currently, various metabolites that function as markers for various tumor processes and other diseases have been identified and proposed. However, in most cases, the combination of metabolomics and other genomic and / or proteomics techniques is very helpful in both cancer prevention and diagnosis.

Plant metabolites are involved in many resistance and stress responses and also contribute to the color, taste, aroma and aroma of fruits and flowers. As mentioned earlier, the biochemical phenotype of an organism is the end result of the interaction between genotype and environmental stimuli. However, it is also regulated by intracellular physiological fluctuations that are part of homeostasis. Therefore, simultaneous identification and quantification of metabolites is required to understand the dynamics of metabolites, analyze the flow of metabolic pathways, and decipher the role of each metabolite in response to various stimuli. The challenge of metabolomics is to find changes in biochemical signaling pathways and metabolic networks that may correlate with the physiological and developmental phenotypes of cells, tissues, or organisms. Spermine leads to an increase in the metabolite lycopene, prolongs the life of vines and improves the quality of juice and nutrients.

Several metabolomics resources and metabolite databases are available. The Human Metabolome Database is an electronic database that contains information about metabolites found in humans. This database contains chemical, clinical, and biochemical data that links known metabolites to multiple genes and proteins. This database is heterogeneous and contains information on the structure, spectrum and biological role of metabolites. In the field of plant biotechnology, metabolomics, along with genomic and proteomics research, has identified new genes or genes with new functions. In this area, metabolomics is becoming more important in assessing transgenic plants, food quality, disease resistance, herbicides or salt tolerance. In addition, systems biology integration is a great strategy for discovering enzymes involved in unknown metabolic pathways. In addition, metabolomics applied to plant research is of great importance in efforts to improve human health.

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