Applied Metabolomics Services Section Home

History

The history of applied metabolomics is intricately tied to the evolution of analytical chemistry, biochemistry, and the exploration of metabolic pathways. While the concept of metabolism and its study dates back centuries, the formal understanding of metabolites and their applications began to take shape in the latter half of the 20th century.

One of the earliest milestones in the study of metabolism was the discovery of glycolysis, a central metabolic pathway, by Gustav Embden, Otto Meyerhof, and Jakub Karol Parnas in the early 20th century. Their work laid the foundation for understanding how cells extract energy from nutrients.

The advent of nuclear magnetic resonance (NMR) spectroscopy and gas chromatography-mass spectrometry (GC-MS) in the mid-20th century marked a turning point in metabolite analysis. These technologies allowed for the identification and quantification of a wide range of metabolites, paving the way for the field of metabolomics.

Albert Lehninger

Renowned biochemist who contributed to our understanding of cellular respiration and metabolic pathways.

2.

Sir Hans Krebs

Discovered the citric acid cycle (Krebs cycle), a central component of cellular metabolism.

4.

Gary Siuzdak

Pioneered mass spectrometry-based metabolomics and its applications.

Industrial Applications of Applied Metabolomics

The impact of applied metabolomics spans across diverse industries:

1.

Pharmaceuticals

Accelerating drug discovery, target identification, and drug metabolism studies.

3.

Agriculture

Enhancing crop yield, quality, and stress resistance through metabolite profiling.

5.

Biotechnology

Optimizing microbial and cell cultures for biofuel and bioproduct production.

7.

Clinical Research

Exploring metabolic alterations in various diseases and conditions.

9.

Neuroscience

Investigating metabolic changes in neurological disorders.

11.

Metabolic Engineering

Designing and optimizing metabolic pathways for biotechnological applications.

13.

Microbiome Studies

Analyzing metabolic interactions between host and microbiota.

15.

Pharmacometabolomics

Predicting drug responses and adverse effects using metabolite patterns.

17.

Environmental Microbiology

Studying microbial metabolism in various ecosystems.

19.

Biomedical Research

Understanding disease mechanisms and metabolic dysregulation.

Precision Medicine

Using metabolic profiles for personalized disease diagnosis and treatment.

2.

Microbiome-Metabolome Interactions

Understanding the role of the microbiome in host metabolism.

4.

Drug Development

Accelerating drug discovery through metabolomics-driven target identification.

6.

Neurodegenerative Disease Biomarkers

Discovering metabolic changes associated with neurodegeneration.

8.

Metabolomics in Aging Research

Investigating metabolic changes associated with aging.

10.

Environmental Health Assessment

Monitoring pollutant effects on organisms through metabolomics.

12.

Metabolomics in Drug Safety

Predicting drug-induced toxicity through metabolic profiling.

14.

Nutrigenomics Advancements

Integrating metabolomics and genomics for personalized nutrition.

16.

Phenome-Metabolome Associations

Investigating links between phenotypic traits and metabolite profiles.

18.

Metabolomics in Infectious Disease

Identifying metabolic changes in response to infections.

20.