



BIOPROCESSING, BIO-MANUFACTURING AND METABOLIC ENGINEERING

GAIN GREATER PREDICTABILITY, CONTROL AND QUALITY

COST PRESSURES, PRODUCTION DEMAND, COMPETITION AND REGULATORY REQUIREMENTS PRESENT SUBSTANTIAL CHALLENGES IN BIOPROCESSING, BIO-MANUFACTURING AND METABOLIC ENGINEERING. THERE IS A CRITICAL NEED FOR NEW APPROACHES, TOOLS, TECHNOLOGIES AND INSIGHTS TO SUPPORT THESE DEMANDS.

Process Development and Improvement with Metabolomics

Metabolomics, or comprehensive biochemical profiling, creates a biochemical view of a system by identifying, quantifying, tracking, and mapping each metabolite present. Metabolomics provides unique biological insight into cellular processes with application across the bioprocess lifecycle. By enabling the development, implementation, and execution of robust and reproducible processes, metabolomics can improve results while reducing costs.

- **Process Development** — Guide development of the production process including strain design and selection, media and feed strategy development, scale-up, and transfer
- **Process Improvement** — Refine conditions and components to optimize the production process, reduce variability, and improve product quality attributes
- **Process Characterization** — Assess raw material and batch characteristics and understand process and product quality changes
- **Process Monitoring** — Identify biomarker predictors of process performance and product quality to enhance monitoring capabilities

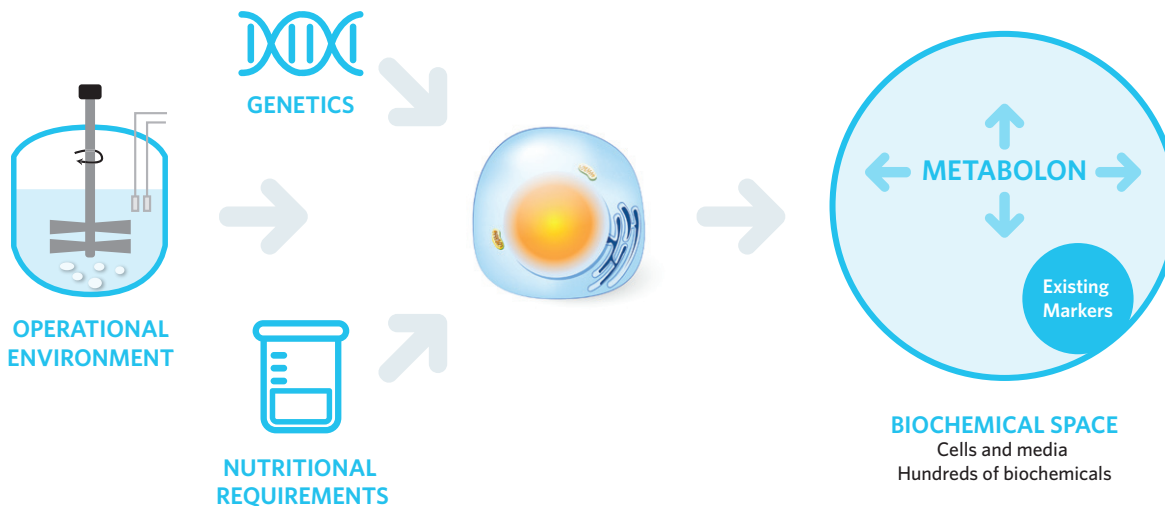
Metabolomics also extends design of experiment (DOE), quality by design (QbD), and process analytical technology (PAT) efforts through comprehensive biochemical assessment of the biological system.

**METABOLON'S SERVICES
GENERATE KNOWLEDGE
AND PROVIDE ACTIONABLE
INSIGHTS TO ENHANCE
PROCESS UNDERSTANDING
AND CONTROL.**

APPLICATION AREAS:

- Biopharmaceuticals
 - Biofuels
 - Bio-based chemicals
 - Bioengineering
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THE POWER OF METABOLOMICS IN THE BIOPROCESS



An Ideal Tool

Metabolomics is an ideal tool for assessing factors that influence the bioprocess such as genetics, operational environments, and nutritional requirements.

Metabolon's technology provides a broad and informative assessment of biochemical space, expanding the avenues for optimizing production systems beyond conventional technologies.

Supported Sample Types (not limited to):

- Mammalian
- Bacterial
- Yeast
- Algae
- Plant
- Insect
- Fungi

From our initial consultation to the delivery of results, the entire process of working with Metabolon is designed to empower informed decision making so you can move forward with confidence. In addition to discrete projects, Metabolon also offers continuous optimization programs that incorporate your strategic aims.

Bioprocess Studies

Metabolon is a leader in bioprocess metabolomics, for the biopharmaceutical, bioengineering, biofuel, and bio-based chemical industries with publications including:

Gao, Y., Ray, S., Dai, S., Ivanov, A. R., Abu-Absi, N. R., Lewis, A. M., Karger, B. L. (2016). Combined metabolomics and proteomics reveals hypoxia as a cause of lower productivity on scale-up to a 5000-liter CHO bioprocess. *Biotechnology Journal*, 11(9), 1190-1200.

Gupta, A. J. et al. Chemometric analysis of soy protein hydrolysates used in animal cell culture for IgG production - An untargeted metabolomics approach. *Process Biochemistry* 49, 309-317 (2014).

Fu, Z. et al. Exometabolome analysis reveals hypoxia at the up-scaling of a *Saccharomyces cerevisiae* high-cell density fed-batch biopharmaceutical process. *Microbial Cell Factories* 13, 32 (2014).

Luo, J. et al. Comparative metabolite analysis to understand lactate metabolism shift in Chinese hamster ovary cell culture process. *Biotechnology and Bioengineering* 109, 146-156 (2012).

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