Stable Isotope Labeling & Metabolic Flux Analysis — Hands-on

Learn how to design and analyse stable isotope labeling experiments for metabolomics and fluxomics. You will work with tracer selection, labeling strategies, LC MS data processing for isotopologues, and core concepts of metabolic flux analysis leading to interpretable biological insights.

Stable Isotope Labeling & Metabolic Flux Analysis

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Tracer Basics & Experimental Design

Stable isotopes and tracer types

13C, 15N and other labels | **uniform versus position specific tracers** | **tracer purity and enrichment**

Designing labeling experiments

steady state versus time course | **choice of substrate and dose** | **sampling times and biological replicates**

Controls, unlabeled baselines and matrix issues

unlabeled and natural abundance controls | medium and background labeling | sample handling for labile metabolites

Session 2

Fee: Rs 11800 Apply Now

LC MS Acquisition & Isotopologue Extraction

Instrument settings for labeled samples

resolution and scan range choices | DDA versus full scan centric runs | dynamic range and saturation issues

Extracting isotopologue intensities

M+0, M+1, M+2… patterns | isotopologue peak picking handling overlapping isotope clusters

Natural abundance correction basics

why correction is required | concept of correction matrices | simple worked examples

Session 3

Fee: Rs 14800 Apply Now

Isotopomer Patterns & Flux Analysis Concepts

From corrected intensities to labeling patterns

fractional enrichment | mass isotopomer distributions (MIDs) | visualizing labeling trajectories

Core ideas of metabolic flux analysis (MFA)

network representation of metabolism | isotopomer balancing concepts | parameter fitting intuition

Connecting labeling readouts to pathway usage

glycolysis versus TCA cycle routing | anaplerosis and shunts | simple two pathway case studies

Session 4

Fee: Rs 18800 Apply Now

Biological Interpretation, Pitfalls & Reporting

Common pitfalls in tracer and flux studies

pooling and scrambling effects | incomplete labeling and turnover | instrument and extraction artefacts

Summarizing flux and labeling results for biology

pathway maps with flux arrows | barplots of enrichment | tables linking fluxes to hypotheses

Documentation, reproducibility and data sharing

recording tracer and design details | storing corrected MIDs and metadata | checklists for manuscripts and collaborators