

Stable Isotope Tracing & Metabolic Flux Analysis (¹³C MFA) — Hands-on

Move from static metabolite levels to dynamic pathway fluxes. This module introduces stable isotope tracer concepts, ¹³C labeling strategies, isotopologue patterns, natural abundance correction, and entry level metabolic flux analysis so that you can design realistic tracer studies and extract quantitative pathway information from LC-MS or GC-MS data.

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Session 1

Fee: Rs 8800 [Apply Now](#)

Tracer Concepts & ¹³C MFA Experimental Design

Why use stable isotopes and what questions ¹³C MFA can answer

[turnover vs pool size](#) [pathway contribution ideas](#) [flux vs abundance thinking](#)

Common tracers and labeling strategies for ¹³C studies

[U-¹³C glucose and glutamine concepts](#) [single vs](#)

multiple tracers | steady state vs pulse chase designs

Practical experimental considerations for tracer studies

labeling time and sampling plan | medium formulation
and background carbon | QC, replicates and viability
checks

Session 2

Fee: Rs 11800 | Apply Now

Isotopologues, MID Patterns & Abundance Correction

From LC–MS / GC–MS peaks to isotopologue distributions

M+0, M+1, M+2 pattern ideas | mass resolution and
overlap concepts | building mass isotopomer
distributions (MID)

Natural abundance and isotopic impurity correction (concepts)

why raw labeling can be misleading | correction matrix
intuition | intro to software assisted correction

Expressing labeling patterns in useful summary metrics

fractional enrichment | average labeling or mole
percent labeled | linking MID changes to pathway
hypotheses

Session 3

Fee: Rs 14800 | Apply Now

Metabolic Flux Analysis Models & Fitting Concepts

From pathways to flux models for ¹³C MFA

stoichiometric network sketches | reversible vs
irreversible reactions | atom transitions and mapping
ideas

EMU style thinking and simulation of labeling patterns (high

level)

elementary metabolite units concept **reducing model complexity** **simulated vs observed MID comparison**

Flux fitting, identifiability and uncertainty at a conceptual level

objective functions and residuals **confidence intervals for fluxes (idea)** **what can and cannot be concluded**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Simple ¹³C MFA Pathway Story

Interpreting labeling for a small central carbon pathway segment

Theory + Practical

Constructing a simple flux scenario consistent with MID data

qualitative flux diagrams **explaining major label routes** **noting alternative interpretations**

Deliverables: tracer design sheet, MID summary & pathway narrative

experiment and tracer design summary (PDF/HTML) **corrected MID and enrichment table (CSV/TSV)** **short ¹³C MFA interpretation note**