Microbiome GWAS, Host Genetics & Environmental Covariates — Hands-on

Learn how to design and interpret microbiome GWAS that connect community features with host genetics and environmental covariates. This module covers microbiome phenotypes for GWAS, cohort and covariate design, population structure and relatedness handling, association models and interpretation of results in clinical, environmental and One Health settings.

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Phenotypes, Cohorts & Covariates

Microbiome traits as GWAS phenotypes

relative abundance and log ratio traits | **alpha and beta diversity summaries** | **enterotypes and community state types overview**

Cohort design and metadata for microbiome GWAS

sample size and power thinking (concept level)

recruitment, inclusion criteria and stratification
recording diet, medication and lifestyle factors

Host genotype data and basic QC concepts

SNP arrays and imputed genotypes overview
sample and marker QC at high level
linking genotype IDs with microbiome samples

Session 2
Fee: Rs 11800 Apply Now

Microbiome GWAS Workflow & Association Models

Preparing microbiome phenotypes for GWAS

transformations for compositional data
adjusting for sequencing depth and batch
residualising traits on covariates overview

Association models at concept level

linear models for quantitative traits
linear mixed model ideas for relatedness
basic logistic models for binary traits overview

Multiple testing, inflation and visual checks

genome wide significance thresholds
QQ plots and lambda GC ideas
Manhattan plot interpretation

Session 3
Fee: Rs 14800 Apply Now

Host Genetics, Environment & Interaction Models

Population structure, ancestry and relatedness

principal components as covariates
kinship matrices at concept level
avoiding confounding in microbiome GWAS

Environmental covariates and interaction terms

diet, medication and lifestyle variables **host by environment interaction ideas** **basic mediation and pathway style thinking**

Summarising and interpreting microbiome GWAS hits

mapping variants to genes and regions **linking host loci, taxa and pathways** **replication, sensitivity and reporting ideas**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Microbiome GWAS Story

Designing a simple microbiome GWAS analysis

guided theory plus practical

From phenotype and covariates to association results

build one phenotype and covariate set **run a basic association model** **produce Manhattan and QQ style plots**

Deliverables: figures, tables and short narrative for a host microbiome question

summary of top variants and loci **tables linking loci, taxa and pathways** **brief report suitable for methods or results sections**