Analyzing Multi-omics in Microbiome R&D for Translational Clinical Research

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Power and Sample Size in Microbiome Studies

- **Dirichlet-multinomial distribution** is a parametric model for microbiome data.

- **Classical statistics** for metagenomics:
  - Power/sample size
  - Hypothesis testing
  - Confidence intervals
  - Effect size
  - Time series

- Statistics for FDA/EMA applications and efficient experimental design.
Multi-Omics Data Framework

- **RLQ analysis**
  - extension of co-inertia analysis
  - searches for Q/R combinations of maximal co-variance
  - weighted by the abundances of species in samples (L)

- **Translational goal**
  - How do the genes of the bacteria impact the molecular markers?
  - Can the microbiome be manipulated in order to change Q to change R to impact health outcomes?

\[ \text{L} \rightarrow \text{Q} \rightarrow \text{R} \rightarrow \text{Clinical Outcome} \]
RLQ Analysis (Exploratory)
4\textsuperscript{th} Corner Analysis (Statistical)
Taxa Selection
What We Sell

- Revenues generated by
  - Development contracts
  - Cloud-based platform
  - One-off analytics contracts

SEQUENCING
- Data acquisition

IT
- Data management, bioinformatics, RDP, etc.

BIORANKINGS
- Hypothesis testing and translational clinical research

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