

## NMR Metabolomics

### 1H NMR Profiling

- Non-destructive analysis
- All proton-containing metabolites
- Quantitative without standards

### 2D NMR Experiments

- COSY, TOCSY, HSQC
- Enhanced resolution
- Structure elucidation

### Quantification

- Direct concentration measurement
- Internal standard (TSP, DSS)
- No ionization bias

### Sample Requirements

- Larger sample volumes than MS
- Buffer composition matters
- Lower sensitivity