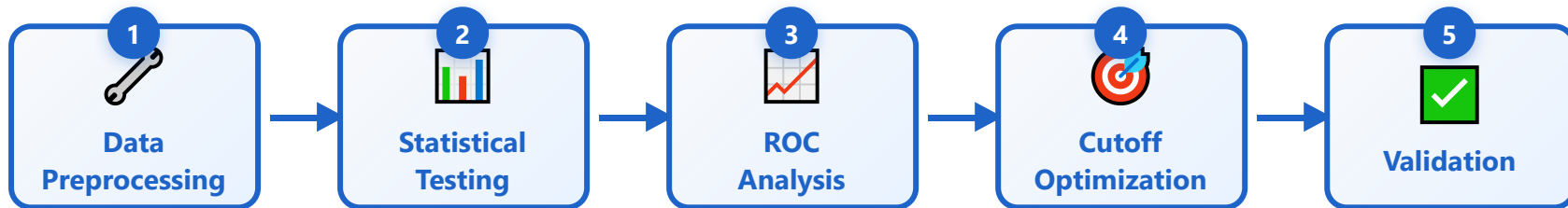




## Hands-on: Biomarker Analysis Pipeline



### Key Steps

- ▶ Normalize and quality control data
- ▶ Feature selection with LASSO/elastic net
- ▶ Statistical comparison (t-test, ANOVA)
- ▶ Multiple testing correction (FDR, Bonferroni)



### Performance Metrics

- ▶ AUC-ROC for discrimination ability
- ▶ Sensitivity, specificity, PPV, NPV
- ▶ Cross-validation for robustness
- ▶ Independent cohort validation