

Resphera Insight™ (v2.2)

Introduction

Resphera Insight™ (v2.2) is a clinical-grade proprietary protocol developed to provide ultra-high-resolution taxonomic assignment of 16S rRNA sequences to species-level membership. This computationally intensive procedure maintains the capacity for >99.9% sensitivity and >99.5% diagnostic specificity for hundreds of bacterial pathogens^{†‡}, and in cases of ambiguous membership, predicts an accurate consensus lineage. Resphera Insight is ideal for in-depth clinical microbiology and microbiome studies.

Performance for NHSN pathogens

Evaluated on 540 pathogens from the CDC National Healthcare Safety Network (NHSN), Resphera Insight achieves exceptional sensitivity and diagnostic specificity. Below we highlight some of the species and genera with enhanced performance.

Analysis characteristics	
Phylogenetic markers	16S rRNA only
Sequencing platforms	Sanger, Illumina, Roche/454, Ion Torrent
Purpose	Clinical investigations or research use
Data requirements	De-multiplexed FASTA or FASTQ

Baseline Deliverables

- ✓ Summary of dataset performance (species vs. novel OTUs)
- ✓ Summary tables of taxonomic assignments stratified by sample membership (phyla through species/OTUs)
- ✓ Streamlined tables of identified NHSN pathogens

Boost Results with Resphera Discovery™

For scientific studies with multiple samples, we encourage clients to consider utilizing Resphera Discovery, which directly incorporates the Resphera Insight output into a comprehensive comparative analysis with statistically rigorous results. Resphera Discovery includes:

- Differential abundance analysis at all taxonomic levels
- Alpha- and beta-diversity analysis
- Univariate biomarker discovery
- Hierarchical clustering of taxonomic profiles with heatmap overlay
- Principal coordinate analysis 3D plots of beta-diversity metrics

Taxon	SN/DSP ₃₀₀	SN/DSP ₅₀₀	SN/DSP ₈₀₀	SN/DSP ₁₀₀₀
Species				
<i>Bacteroides fragilis</i>	99.8/96.6	100/100	100/100	100/100
<i>Campylobacter ureolyticus</i>	100/100	100/100	100/100	100/100
<i>Cardiobacterium hominis</i>	100/100	100/100	100/100	100/100
<i>Chlamydomphila pneumoniae</i>	99.9/99.9	100/100	100/100	100/100
<i>Clostridium difficile</i>	99.8/97.4	100/100	100/100	100/100
<i>Clostridium tetani</i>	99.9/96.0	99.9/99.9	100/100	100/100
<i>Finegoldia magna</i>	99.9/99.9	100/100	100/100	100/100
<i>Gardnerella vaginalis</i>	100/100	100/100	100/100	100/100
<i>Helicobacter pylori</i>	99.8/98.8	99.7/99.7	99.8/99.8	100/100
<i>Legionella pneumophila</i>	99.5/88.5	99.6/99.3	100/99.2	100/100
<i>Mycoplasma genitalium</i>	100/99.9	100/100	100/100	100/100
<i>Neisseria gonorrhoeae</i>	97.8/95.1	97.8/97.8	98.9/98.9	100/100
<i>Prevotella disiens</i>	100/100	100/100	100/100	100/100
<i>Propionibacterium acnes</i>	100/100	100/100	100/100	100/100
<i>Salmonella enterica</i>	97.3/61.6	99.6/96.6	100/100	100/100
Genera				
Bacillus	98.5	100	100	100
Campylobacter	100	100	100	100
Escherichia/Shigella	100	100	100	100
Francisella	99.8	100	100	100
Haemophilus	77.6	96	99.9	100
Listeria	100	100	100	100
Staphylococcus	100	100	100	100

SN/DSP: sensitivity (%) and diagnostic specificity (%) achieved for randomly simulated reads of length L with an error rate of 0.5%. Genus-level taxa show DSP averages across all species defined by the NHSN.

[†]In an evaluation with simulated error-prone 16S reads (1,000bp, 1.0% error rate), Resphera Insight™ achieves 99.9% sensitivity and >99.5% diagnostic specificity for 300 CDC NHSN pathogens. Diagnostic specificity per species is dependent on read length and quality, as well as the particular 16S gene region sampled.

[‡]These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.