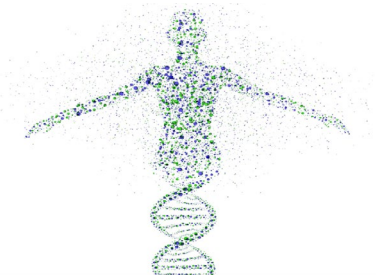
Ion AmpliSeq Microbiome Health Research Assay



The Ion AmpliSeq™ Microbiome Health Research Assay (MHRA) is a next-generation sequencing (NGS) assay that allows for cost-effective yet comprehensive profiling of microbial diversity of the human gut microbiome. This assay offers increased resolution and specificity of species-level detection compared with traditional 16S rRNA sequencing for key organisms associated with immunological conditions like cancer, diabetes and autoimmune diseases, gastrointestinal (GI) disorders, and infectious disease research, such as SARS-CoV-2.

Most commercially available 16S panels target anywhere from two to four hypervariable (HV) regions of the 16S rRNA gene, while the panel included with the MHRA targets eight out of the nine HV regions for highly comprehensive and sensitive microbial profiling research.

Combined with a set of high-resolution markers for increased species-level identification and fully integrated data analysis tools, a complete end-to-end solution is available to help simplify your research.

- **Targeted sequencing**—with comprehensive content that has 100% sensitivity and specificity at a species level at standard thresholds
- **Panel targeting 8 out of 9 HV regions**—the most comprehensive 16S rRNA gene panel
- **Species-level resolution**—detection of 73 key bacterial species associated with research in immuno-oncology as well as immunological and GI disorders

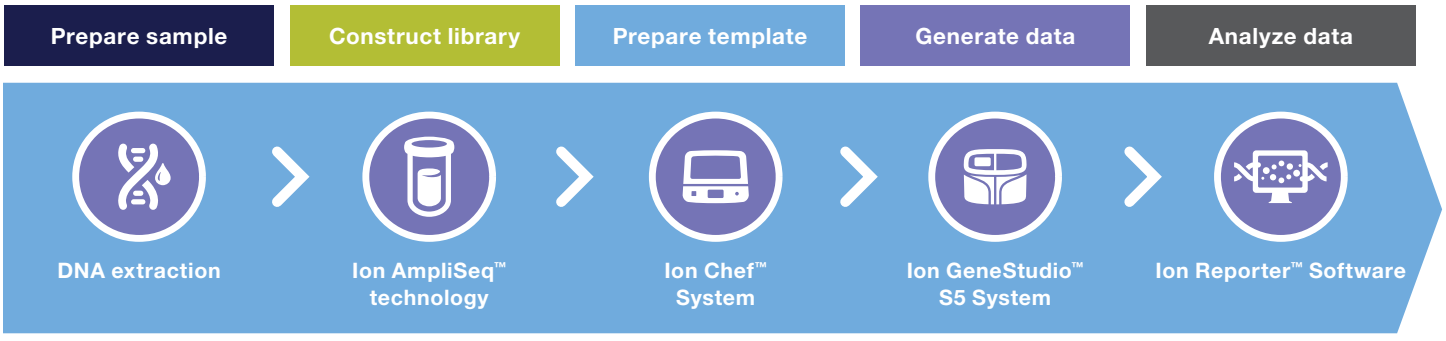


Figure 1. Workflow using the Ion AmpliSeq Microbiome Health Research Assay.

ThermoFisher SCIENTIFIC

While shotgun metagenomics offers higher functional resolution, it is more costly and time-consuming, and requires more complex bioinformatics tools. The MHRA offers a cost-effective solution with species-level specificity to interrogate the presence of a curated list of 73 bacterial species (next page) with strong scientific evidence to be implicated in immuno-oncology (I-O) response, gut health, and autoimmunity, as well as response to infection (Figure 2). This highly curated species-specific panel allows for 100% specificity and sensitivity.

The MHRA also offers a complete end-to-end solution with a validated Ion Reporter Software analysis workflow that is optimized for microbiome health research, allowing for multi-sample analysis and visualization, such as heatmap, PCoA, relative abundance, and diversity visualization (Figure 3). The analysis uses up-to-date reference databases such as the curated SILVA database, the Applied Biosystems™ MicroSeq™ database, Greengenes, and NCBI.

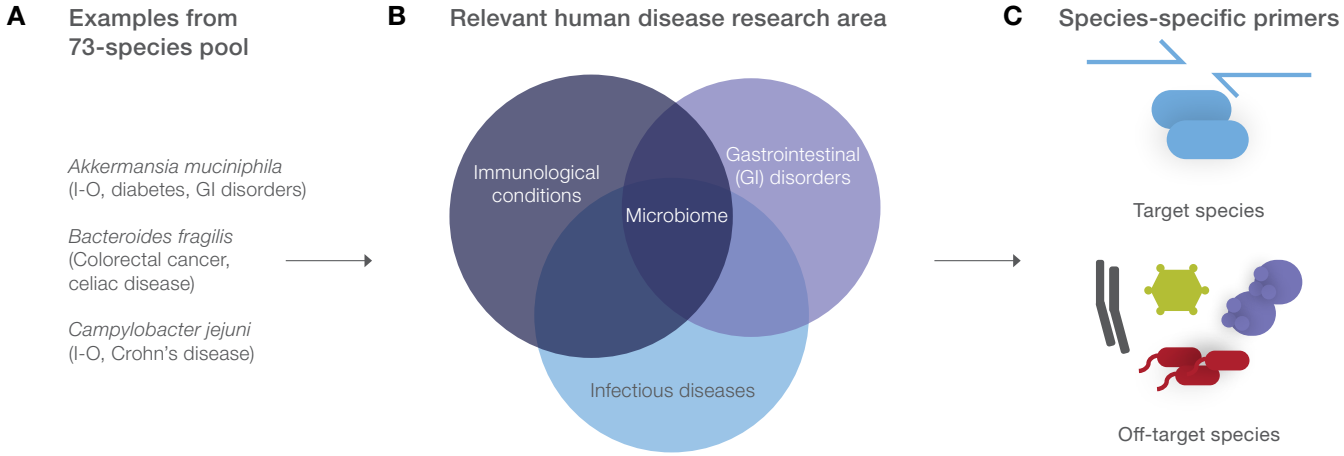


Figure 2. Target species pool for species relevant to human disease research. (A) To increase assay sensitivity and specificity to key species in human health, we selected 73 species from the literature [1–3] pertinent to research areas including **(B)** Immunological conditions, GI disorders, and infectious diseases. **(C)** We generated our target species pool using proprietary software to identify unique genomic targets and primers for the relevant species, resulting in a highly specific panel.

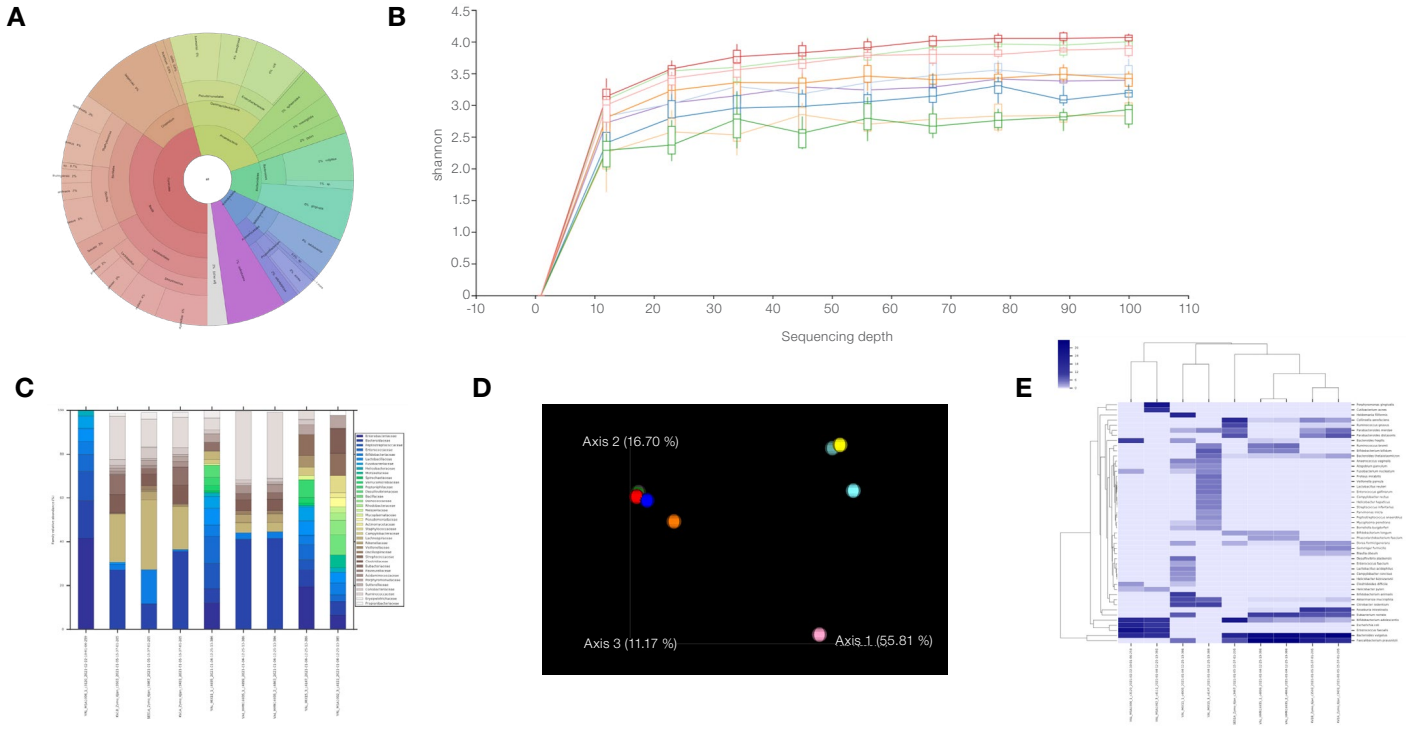


Figure 3. Ion Reporter visualization tools. (A) Relative abundance (Krona plots). **(B)** Diversity metrics. **(C)** Stacked bar plots. **(D)** PCoA plots. **(E)** Interactive taxonomy viewer.

ion torrent

List of species

Species			
Akkermansia muciniphila	*Campylobacter rectus*	*Gardnerella vaginalis*	*Parvimonas micra*
Anaerococcus vaginalis	*Chlamydia pneumoniae*	*Gemmiger formicilis*	*Peptostreptococcus anaerobius*
Atopobium parvulum	*Chlamydia trachomatis*	*Helicobacter bilis*	*Peptostreptococcus stomatis*
Bacteroides fragilis	*Citrobacter rodentium*	*Helicobacter bizzozeronii*	*Phascolarctobacterium faecium*
Bacteroides nordii	*Cloacibacillus porcorum*	*Helicobacter hepaticus*	*Porphyromonas gingivalis*
Bacteroides thetaiotaomicron	*Clostridium difficile*	*Helicobacter pylori*	*Prevotella copri*
Bacteroides vulgatus	*Collinsella aerofaciens*	*Holdemania filiformis*	*Prevotella histicola*
Barnesiella intestinihominis	*Collinsella stercoris*	*Klebsiella pneumoniae*	*Propionibacterium acnes (Cutibacterium acnes)*
Bifidobacterium adolescentis	*Desulfovibrio alaskensis*	*Lactobacillus acidophilus*	*Proteus mirabilis*
Bifidobacterium animalis	*Dorea formicigenerans*	*Lactobacillus delbrueckii*	*Roseburia intestinalis*
Bifidobacterium bifidum	*Enterococcus faecalis*	*Lactobacillus johnsonii*	*Ruminococcus bromii*
Bifidobacterium longum	*Enterococcus faecium*	*Lactobacillus murinus*	*Ruminococcus gnavus*
Blautia obeum	*Enterococcus gallinarum*	*Lactobacillus reuteri*	*Slackia exigua*
Borrelia burgdorferi	*Enterococcus hirae*	*Lactobacillus rhamnosus*	*Streptococcus gallolyticus*
Campylobacter concisus	*Escherichia coli*	*Lactococcus lactis*	*Streptococcus infantarius*
Campylobacter curvus	*Eubacterium limosum*	*Mycoplasma fermentans*	*Veillonella parvula*
Campylobacter gracilis	*Eubacterium rectale*	*Mycoplasma penetrans*	
Campylobacter hominis	*Faecalibacterium prausnitzii*	*Parabacteroides distasonis*	
Campylobacter jejuni	*Fusobacterium nucleatum*	*Parabacteroides merdae*	

Ordering information

Product	Quantity	Cat. No.
Ion AmpliSeq Microbiome Health Research Kit, Library Only bundle[1]	48 samples (Manual Library)	A46495
Ion AmpliSeq Microbiome Health Research Kit, Ion 540 bundle[2]	256 samples (Manual Library)—32 samples/Ion 540 Chip	A46496
Ion AmpliSeq Microbiome Health Research Kit, Ion 550 bundle[2]	384 samples (Manual Library)—48 samples/Ion 550 Chip	A46497

1. Library prep reagents only.

2. Library prep, templating, and sequencing reagents.

References

1. Routy B et al. (2018) Gut microbiome influences efficacy of PD-1–based immunotherapy against epithelial tumors. *Science* 359:91-97.
2. Matson V et al. (2018) The commensal microbiome is associated with anti–PD-1 efficacy in metastatic melanoma patients. *Science* 359:104-108.
3. Gopalakrishnan V et al. (2018) Gut microbiome modulates response to anti–PD-1 immunotherapy in melanoma patients. *Science* 359:97–103.
4. Baruch et al. (2021) Fecal microbiota transplant promotes response in immunotherapy-refractory melanoma patients. *Science* 371, 602–609.
5. Mazzarelli et al. (2021) 16S rRNA gene sequencing of rectal swab in patients affected by COVID-19. *PLoS ONE* 16(2): e0247041.

Find out more at **thermofisher.com/ngsmicrobiome**

ThermoFisher SCIENTIFIC