

VirusHunter™

Multiplex Virus Panel (MVP) Assay for SARS-CoV-2 and Influenza A/B Detection

Highlights

- **Get Results Fast**
Sample to result in ~2 hours.
- **High Throughput**
Process up to 384 samples using a single plate of Atom chips.
- **Gold Standard for Detection**
RT-PCR is the gold standard for nucleic acid detection for identification of viruses. The VirusHunter™ MVP assay combines fast cycling "rapid" RT-PCR with incredibly accurate and sensitive detection using ATOM™ DNA Chips.

Proven Technology with an Innovative Twist

Sequencing by hybridization exploits classic microarray capture technology with newer, smaller, more accurate chips. Achieve incredible sensitivity of just 125 copies per mL of SARS-CoV-2 using this sequencing technology.

Input

Use with upper respiratory (such as nasopharyngeal or oropharyngeal swab) samples in viral transport medium. Extraction-free point of care testing may be possible with different swab buffers (1).

Throughput

Atom™ DNA chips are available in 8, 24, 48, 96, and 384-chip formats on 384-well plates to enable processing at your desired scale.

Reduce False Negatives

ATOM™ chips contain 8 probes per base queried for each RT-PCR product, making the chips an incredibly sensitive and accurate detection method. For SARS-CoV-2, the limit of detection (125 copies per mL) is the lowest of any test on the market (2). Detection of Influenza A and B gives patients with symptoms a better answer about the cause of their illness.

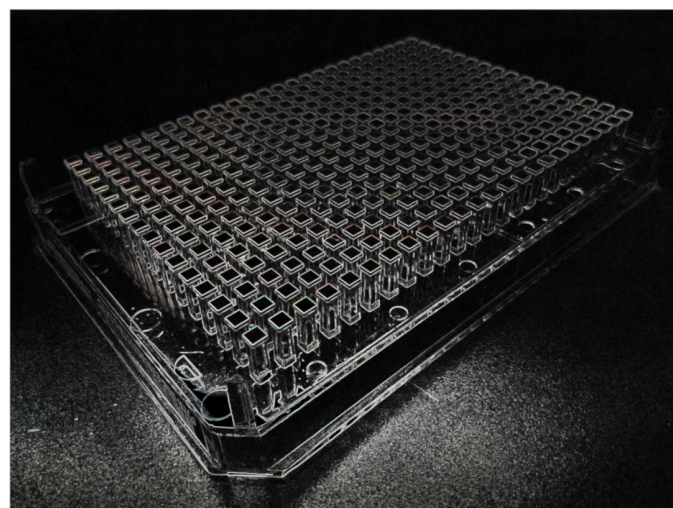


Figure 1: ATOM™ DNA Sequencing chips arranged on a 384-chip plate

Introduction

ATOM™ chips are microscale 1mm x 1mm DNA sequencing chips with 4µm feature pitches. Each chip contains identifying sequences for 56 pathogens, 16 antibiotic resistance genes, and 6 controls, making it possible to design a simple assay that interrogates any combination of these sequences.

The VirusHunter MVP™ Assay uses rapid RT-PCR to amplify sequences from SARS-CoV-2 (two targets), Influenza A, Influenza B, and Human (control) RNA. Those targets are detected using capture based sequencing technology; ATOM™ chips contain 8 probes for each probe queried, producing the fastest and most accurate results. The workflow is simple and the results are trustworthy.

Table 1: The Detection Limits for VirusHunter™ MVP Targets

SARS-CoV-2	125 copies per mL
Influenza A	0.01-0.05 TCID ₅₀ /mL
Influenza B	0.005-0.01 TCID ₅₀ /mL

Workflow

Go from sample to result in ~2 hours with the VirusHunter™ MVP Assay. Complete the sequencing workflow in six simple steps:

Nucleic acid extraction (45 minutes)*
 Rapid RT-PCR (45 minutes)
 Hybridization (15 minutes)
 Staining (7 min)
 Scanning (30 seconds per chip)
 Data Processing (10 seconds per chip)

*Nucleic acid extraction may not be required for point-of-care testing.

Simple, Intuitive Scanning

Setting up the Summit™ scanner takes under a minute per plate. The workflow is simple and intuitive. VirusHunter™ software outputs FASTA and FASTQ files for target sequences, aligns the sequence to the reference, and creates a variant output file.

Advance your PCR

Rapid RT-PCR, sometimes referred to as "VPCR" for its "V" shaped thermal profile (3), uses the time spent ramping between temperatures for annealing and extension instead of holding at each temperature. This dramatically improves PCR speed without compromising results.

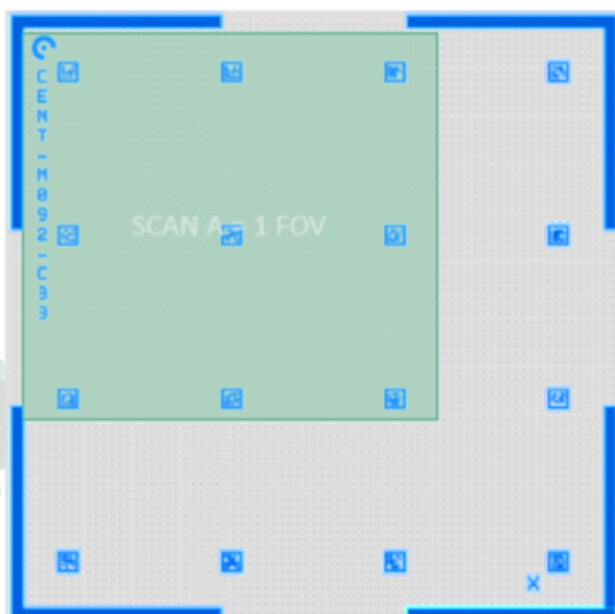


Figure 2: The layout of ATOM™ chips. Only a single image (green) is required to capture around 50% of the features on the ATOM™ chip or all of 28,684 critical features for the VirusHunter™ MVP Assay.

Table 2: Assay Specifications

Species Details	SARS-CoV-2, Influenza A and B, Human
System Compatibility	Summit™ Scanners Equipped with VirusHunter™ Software
Technology	Rapid RT-PCR, Sequencing
Method	Targeted RNA Sequencing
Species Category	Virus, Human
Nucleic Acid Type	RNA

Table 3: Identifying sequences available on ATOM™ chips.

Viral Pathogens (35)

Influenza A H1N1	Human adenovirus F
Influenza A H3N2	Human metapneumovirus
Influenza A H5N1	Human parainfluenza Type 1
Influenza A H7N9	Human parainfluenza Type 2
Influenza A H9N2	Human parainfluenza Type 3
Influenza B	Human parainfluenza Type 4
Influenza C	Human Rhinovirus A
Influenza D	Human Rhinovirus B
Coronavirus SARS-CoV2	Human Rhinovirus C
Coronavirus 229E	Human RSV A
Coronavirus OC43	Human RSV B
Coronavirus HKU1	Primate bocaparvovirus 1
Coronavirus NL63	Primate bocaparvovirus 2
Human adenovirus A	Human enterovirus C
Human adenovirus B	Human parechovirus
Human adenovirus C	Human polyomavirus 3
Human adenovirus D	Human polyomavirus 4
Human adenovirus E	

Pathogenic Bacteria (21)

Acinetobacter calcoaceticus-baumannii complex	Legionella pneumophila
Bordetella parapertussis	Moraxella catarrhalis
Bordetella pertussis	Mycoplasma pneumoniae
Chlamydia pneumoniae	Proteus spp.
Enterobacter cloacae complex	Pseudomonas aeruginosa
Escherichia coli	Serratia marcescens
Haemophilus influenzae	Staphylococcus aureus
Klebsiella aerogenes	Staphylococcus epidermidis
Klebsiella oxytoca	Streptococcus agalactiae
Klebsiella pneumoniae group	Streptococcus pneumoniae
	Streptococcus pyogenes

Bacterial Antibiotic-Resistance (16)

MecA	CTX-M group 8
MecC	CTX-M group 9
KPC	MREJ-1
NMD1	MREJ-2
OXA-48-Like	MREJ-3
VIM	MREJ-4
CTX-M group I	MREJ-5
CTX-M group II	MREJ-6

Controls(6)

Human ApoE rs429358	Arabidopsis thaliana TIM
Human ApoE rs7412	Arabidopsis thaliana NAC1
Human RPP30	MS2 Phage

Summary

The VirusHunter™ MVP Assay breaks sequencing barriers by enabling, faster, more sensitive multiplex virus detection, which in turn enables visionary scientists to study, monitor, and change outcomes during a world-wide pandemic. The VirusHunter™ system provides the precision to answer the most important questions scientists are asking today about SARS-CoV-2 and Influenza.

Learn More

To learn more about the VirusHunter™ MVP Assay, visit www.centrilliontech.com/virushunter.

References

1. Smyrlaki, I. et al. Massive and rapid COVID-19 testing is feasible by extraction-free SARS-CoV-2 RT-qPCR. medRxiv (2020).
2. Health, C. for D. and R. SARS-CoV-2 Reference Panel Comparative Data. FDA (2020).
3. Chen, R. et al. Polymerase Chain Reaction using “V” Shape Thermal Cycling Program. Theranostics 9, 1572–1579 (2019)



Figure 3: The Summit™ Scanner