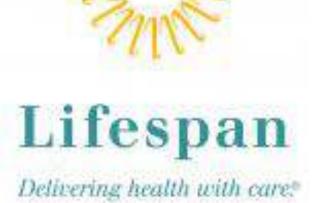
Evaluation of a Next-Generation Sequencing Metagenomics Assay to Detect and Quantify DNA Viruses in Plasma from Transplant Patients





Background

Viral infections are major causes of morbidity and mortality in solid organ and hematopoietic stem cell transplant patients

Cytomegalovirus (CMV), Epstein–Barr virus (EBV) and BK virus (BKV) are among the most common infections after allogeneic transplantations and are individually tested using qPCR assays

Metagenomics based on shotgun next generation sequencing allows an unbiased approach for the detection of nearly all potential pathogens in a single assay

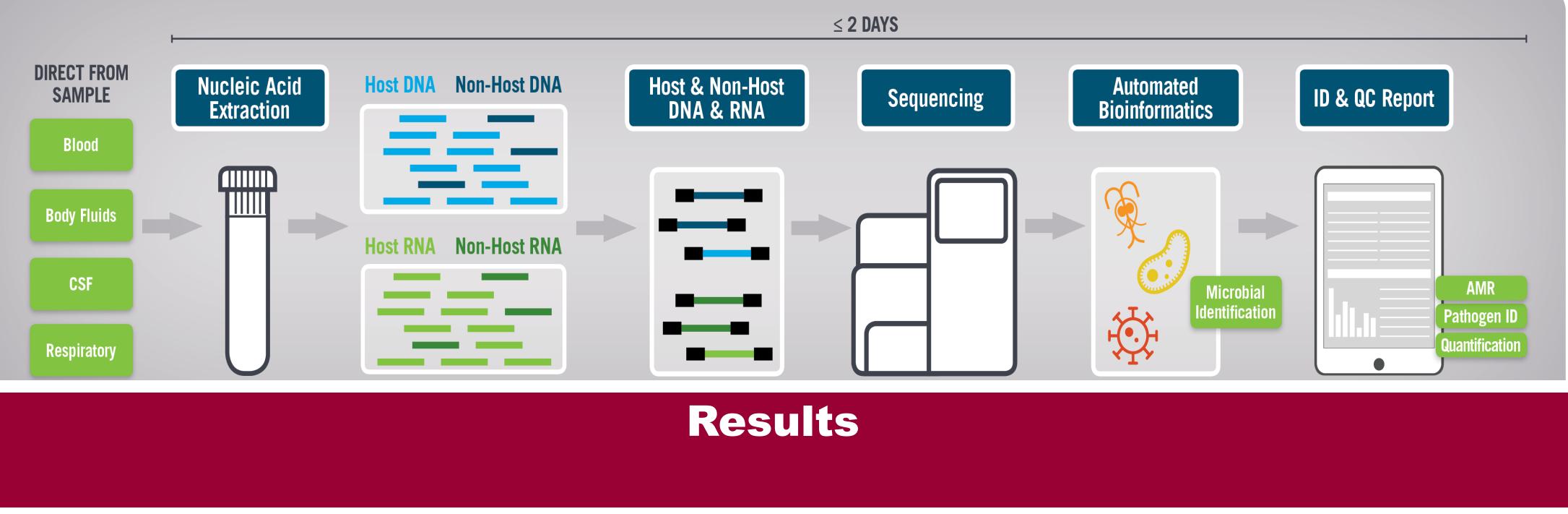
The Galileo Pathogen Solution (GPS, Arc Bio, LLC) RUO assay is a sample to result metagenomic pipeline designed to simultaneously detect and quantify 10 DNA viruses (CMV, EBV, BKV, HAdV, JCV, HSV-1, HSV-2, VZV, HHV-6 A and HHV-6 B) and to qualitatively detect B19 and TTV

The objective of the study was to evaluate the performance characteristics of the GPS assay by comparing with standard of care qPCR assays using viremic plasma from transplant patients

Materials & Methods

- The performance of the GPS assay was evaluated for linear dynamic range using a calibration panel that consists of 11 viruses (CMV, EBV, BKV, HAdV, JCV, HSV-1, HSV-2, VZV, HHV6 A and B, B19; Arc Bio, LLC) at 100,000 IU or cp/mL, 10,000 IU or cp/mL, 5000 IU or cp/mL, 1000 IU or cp/mL and a negative plasma matrix tested in quadruplicate
- Retrospective and prospective residual viremic plasma samples, n=47 (CMV= 29, BKV=17, HSV1-1) obtained for routine clinical testing were evaluated in the pilot study using beta reagents and software
- Total nucleic acid was extracted from 0.4 mL of plasma using the EZ1 DSP Virus kit (QIAGEN), followed by DNA library preparation with pathogen enrichment/human background depletion, sequencing (NextSeq® 500, Illumina®), and automated data analysis
- Four controls (positive external control, high control, low control and a negative matrix control) were included along with patient samples
- Sequencing reads were filtered based on sequence quality and queried against a curated selection of references
- Additional viruses were confirmed using qPCR assays including artus EBV and BKV (Qiagen) and RealStar® HHV-6 and JCV PCR Kits (Altona) on Rotor-Gene Q MDx platform (QIAGEN)

Fig 1: Workflow of Galileo Pathogen Solution (GPS) assay

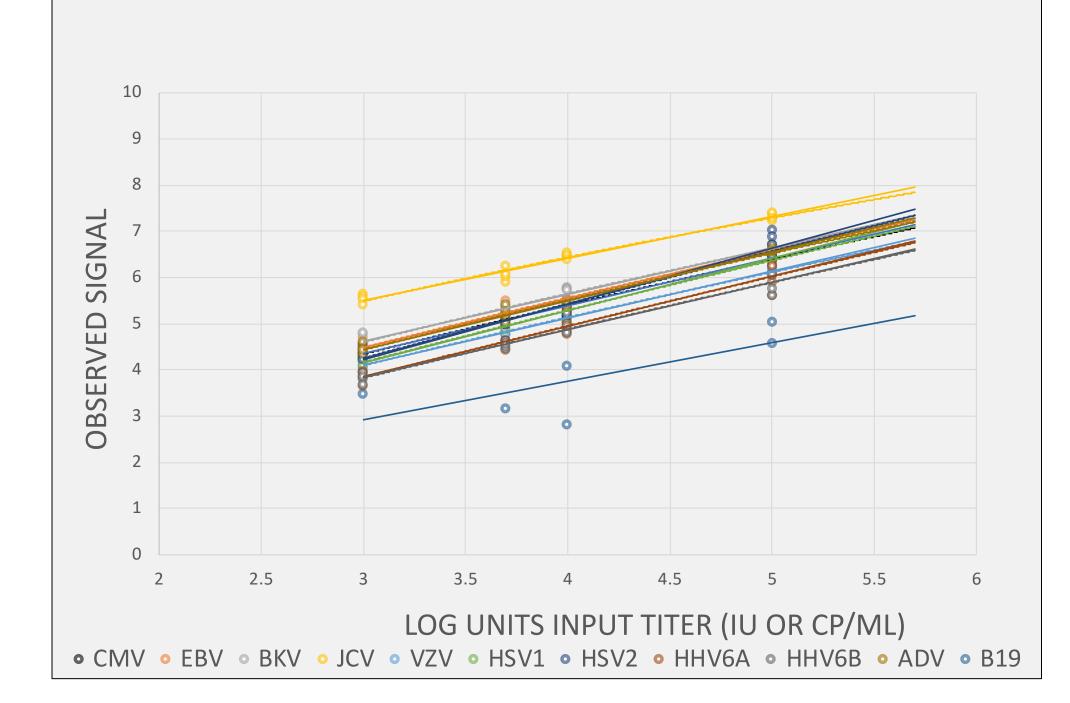


- With an average depth of 34 million paired-end reads, the calibration panel was found to be linear with a 100% sensitivity with the exception of B19 which is only qualitatively detected by the assay
- The 47 residual clinical samples tested had an 100% agreement in detecting viruses and were accurately quantified using the standard curve generated from the calibration panel with viral loads ranging from 1.15-6.82 log10 IU/mL or cp/mL
- The mean difference between the GPS and CMV Qiagen Artus assay was 0.02 \log_{10} IU/mL (SD±0.32 \log_{10} IU/mL); mean difference between the GPS and CMV Abbott Real-time assay was 0.44 $log_{10}IU/mL$ (SD±0.32 $log_{10}IU/mL$); mean difference between the GPS and BKV Qiagen Artus assay was -0.31 log10cp/mL (SD \pm 0.36 log10cp/mL)
- The automated Galileo Analytics bioinformatics tool detected and quantified virus(es) with an average time of 30-45 minutes/sample

Table 1: Summary of the coefficient of correlation and slope values for each virus from linear range evaluation

Virus	Percent of replicates with recovered signal	R ²	Slope	Intercept
CMV	100.0	0.99	1.03	1.26
EBV	100.0	0.97	1.06	1.31
BKV	100.0	0.97	1.01	1.59
JCV	100.0	0.98	0.91	2.78
VZV	100.0	0.99	1.02	1.06
HSV1	100.0	0.95	1.13	0.76
HSV2	100.0	0.95	1.21	0.61
HHV6A	100.0	0.93	1.09	0.60
HHV6B	100.0	0.96	1.03	0.77
ADV	100.0	0.98	1.06	1.28
B19	37.5	0.57	0.83	0.42





Soya S. Sam¹, Ralph Rogers², Gregory J. Tsongalis³, Colleen S. Kraft⁴, Angela M. Caliendo² ¹The Miriam Hospital, Providence, RI; ²Warren Alpert School of Medicine, Brown University, Providence, RI; ³Dartmouth-Hitchcock Medical Center and Geisel School of Medicine at Dartmouth, Lebanon, NH; ⁴Emory University School of Medicine, Atlanta, GA

Figure 2: Viral signal as a function of titer prediction for all viruses and replicates

	ction and quanting real-time assays		viv sampies	by GP5 and (Jagen	Figure for the
						7.00
CMV	GPS assa		al-time	Log10		6.50
Sample II			10 IU/mL)	difference		6.00
ES1	4.61		4.40	0.21	_	0.00
ES2	4.53		4.54	0.01	_	5.50
ES3	6.82		6.52	0.3		5.00
ES4	3.62		3.34	0.28		
ES5	5.24		4.94	0.3		4.50
ES6	4.10		3.85	0.25		00 00 00 00 00 00 00 00 00 00 00 00 00
ES7	3.90		3.85	0.05		<u>6</u> 60 2 50
ES8	3.91		3.66	0.25		0) 3.50 C
ES9	3.80			0.18	-	3.00
			3.62			2.50
ES10	3.64		3.45	0.19	-	
SOS15	4.34		4.46	0.11	-	2.00 2
SOS16	5.08		5.29	0.21	_	Ζ
SOS17	2.19		3.32	1.13		2.00
SOS18	3.86		4.00	0.14		
SOS19	5.49		5.49	0		1.50
SOS20	5.42		5.36	0.06		
SOS21	4.92		4.92	0		<u>الم</u> 1.00
SOS22	4.12		4.16	0.04		
SOS23	4.67		4.55	0.12		<u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>
SOS24	4.50		4.67	0.12		Artus Artus
					-	n Ar
SOS29	3.03		2.40	0.63	-	0.00 Giagen
SOS30	2.27		2.42	0.15	-	
SOS31	6.12		5.85	0.27	-	<mark>က</mark> ္က-0.50
SOS33	4.16		3.48	0.68	_	U
SOS34	3.88		3.15	0.73		-1.00
SOS35	3.35		2.80	0.55		
SOS37	3.71		3.27	0.44		-1.50
SOS38 SOS65	3.64		2.86	0.78	-	Figure
	4.97 ction and quanti		5.00 KV samples		_	analys 6.50
gen Artus	_		-	-		6.00
BKV	GPS assay	Rea	-time	Log10		5.50
ample ID	(Log10 cp/mL		cp/mL)	difference		<mark>لو</mark> 5.00
SOS43	2.18		.32	0.14		
SOS44	3.13		.35	0.78		6 6 4 .50
SOS45	2.66		.82	0.16		<mark>ა</mark> ს ს 1.00
SOS46	3.12		.98	0.14		
SOS47	3.90		.27	0.37		3.50
SOS48	4.53		.81	0.28		3.00
SOS49	4.77		.18	0.41		
SOS50	5.26		.86	0.60		2.50
SOS51	5.76		.12	0.36		2.00
SOS52	5.80		.27	0.47		
SOS57	4.41		.02	0.61		
SOS58	4.31		.64	0.33		
SOS59	5.87		.38	0.51		Ē
SOS60	3.62		.22	0.60		cp/ml
SOS61	4.79		.23	0.44		
SOS63	2.12		.16	0.04		
SOS66	2.12		.97	0.81		en Artus
					_	-S-Qiage
ie 4: Dete	ction of addition	-				
	EBV BKV 9 3	CMV VZ 2 3	v ннv 5	-6 A/B JC 14	V HAdV 3	B-19 I
Virus Iumber of	0					
	0 0					
lumber of					Conc	clusio

15/ADDUU	real-time assag	ys		ples by GPS ar			for t	ure : the
							7	7.00 -
CMV	GPS as	-	Real-time	J			6	6.50 -
Sample II			(Log10 IU/m		e		6	6.00 -
ES1	4.61		4.40	0.21			0	1.00
ES2	4.53		4.54	0.01			5	5.50
ES3	6.82		6.52	0.3			5	5.00
ES4	3.62		3.34	0.28				
ES5	5.24		4.94	0.3				1.50
ES6	4.10		3.85	0.25				1.00
ES7	3.90		3.85	0.05				4.00 3.50
ES8	3.91		3.66	0.25			GPo	,
ES9	3.80		3.62	0.18			3	3.00
ES10	3.64		3.45	0.10			2	2.50
SOS15	4.34		4.46	0.11			2	2.00 2
SOS16	5.08		5.29	0.21				-
SOS17	2.19		3.32	1.13			2	2.00
SOS18	3.86		4.00	0.14				
SOS19	5.49		5.49	0			1	1.50
SOS20	5.42		5.36	0.06				
SOS21	4.92		4.92	0			m/l	1.00
SOS22	4.12		4.16	0.04				
SOS23	4.67		4.55	0.12			log ₁₀	0.50
SOS24	4.50		4.67	0.17			Artus	5.00
SOS29	3.03		2.40	0.63			en Al	0 00
							Qiagen	0.00
SOS30	2.27		2.42	0.15				
SOS31	6.12		5.85	0.27			ი ე-(ე	0.50
SOS33	4.16		3.48	0.68			Ŭ	
SOS34	3.88		3.15	0.73			_1	1.00
SOS35	3.35		2.80	0.55				
<u>SOS37</u>	3.71		3.27	0.44			_^	1.50
SOS38 SOS65	<u>3.64</u> 4.97		<u>2.86</u> 5.00	0.78			Figu	ire
				ples by GPS ar	nd		anal	l ysi 6.50
igen Artus	-							6.00
BKV	CPS accar		Real-time					
Sample ID	GPS assay			Log10) differenc	•		, m	5.50 5.00
SOS43	(Log10 cp/m 2.18	I L) (Log10 cp/mL 2.32	<u>0.14</u>	E			
SOS43	3.13		2.32	0.74				4.50
SOS45	2.66		2.82	0.16				4.00
SOS45 SOS46	3.12		2.98	0.10			<u>ل</u> ک	4.00
SOS40 SOS47	3.90		4.27	0.14			Ş	3.50
SOS48	4.53		4.81	0.37			Ç	3.00
SOS49	4.77		5.18	0.20				
SOS50	5.26		5.86	0.60			2	2.50
SOS51	5.76		6.12	0.36			2	2.00
SOS51 SOS52	5.80		6.27	0.30				
SOS52 SOS57	4.41		5.02	0.47				
SOS58	4.31		4.64	0.01				
SOS59	5.87		6.38	0.51				٦
SOS60	3.62		4.22	0.60				cp/ml
SOS61	4.79		5.23	0.00				log ₁₀
SOS63	2.12		2.16	0.04				
SOS66	2.12		2.10	0.81				en Artus
50500	2.10		2.97	0.81				S-Qiagen
			-	ssay from the s	-	-		Ċ
/irus Number of	EBV BKV 9 3	CMV 2	VZV 3	HHV-6 A/B 5		HAdV 3	B-19	ł
		<u> </u>	•	~			'	
amples								
ampies					C	onc	lusi	0

	real-time assay		mples by GPS and	d Qiagen Figure 3 for the
				7.00 -
CMV Sample II	GPS ass C (Log10 IU/			6.50 -
ES1	4.61	4.40	0.21	6.00 -
ES2	4.53	4.54	0.01	5.50 -
ES3	6.82	6.52	0.3	5.00
ES4	3.62	3.34	0.28	5.00 -
ES5	5.24	4.94	0.20	
ES6	4.10	3.85	0.25	
ES7	3.90	3.85	0.25	4.00 - ວິ ວິ 3.50 -
				ග 3.50 - පු
ES8	3.91	3.66	0.25	
ES9	3.80	3.62	0.18	2.50 -
ES10	3.64	3.45	0.19	
SOS15	4.34	4.46	0.11	2.00 - 2.00
SOS16	5.08	5.29	0.21	
SOS17	2.19	3.32	1.13	2.00 -
SOS18	3.86	4.00	0.14	
SOS19	5.49	5.49	0	1.50
SOS20	5.42	5.36	0.06	
SOS21	4.92	4.92	0	1.00 ·
SOS22	4.12	4.16	0.04	
SOS23	4.67	4.55	0.12	
SOS24	4.50	4.67	0.17	Artus
SOS29	3.03	2.40	0.63	0.00 - 2
SOS30	2.27	2.42	0.15	2
SOS31	6.12	5.85	0.27	0.50
SOS33	4.16	3.48	0.68	Ū
SOS34	3.88	3.15	0.73	-1.00
SOS35	3.35	2.80	0.55	
SOS37	3.71	3.27	0.44	-1.50
SOS38 SOS65	<u>3.64</u> 4.97	<u>2.86</u> 5.00	0.78	- Figure 4
BKV	GPS assay		Log10	6.00 5.50
Sample ID	(Log10 cp/ml			<u>E</u> <u>6</u> 5.00
SOS43	2.18	2.32	0.14	<u> </u>
SOS44	3.13	2.35	0.78	<u>د</u> 4.00 ۲.00 ۲.00
SOS45 SOS46	<u>2.66</u> 3.12	2.82 2.98	0.16	7 4.00
SOS40 SOS47	3.12	4.27	0.14	3.50
SOS47	4.53	4.27	0.37	3.00
SOS49	4.77	5.18	0.20	
00010		5.86	0.60	2.50
SOS50	$\mathbf{i}_{\mathbf{z}}$	6.12	0.36	2.00
SOS50 SOS51	<u> </u>		0.47	2.
SOS50 SOS51 SOS52	5.20 5.76 5.80	6.27	0.47	
SOS51	5.76		0.47	2
SOS51 SOS52	5.76 5.80	6.27		
SOS51 SOS52 SOS57	5.76 5.80 4.41	6.27 5.02	0.61	2
SOS51 SOS52 SOS57 SOS58	5.76 5.80 4.41 4.31	6.27 5.02 4.64	0.61 0.33	cb/ul
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61	5.76 5.80 4.41 4.31 5.87 3.62 4.79	6.27 5.02 4.64 6.38 4.22 5.23	0.61 0.33 0.51 0.60 0.44	log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12	6.27 5.02 4.64 6.38 4.22 5.23 2.16	0.61 0.33 0.51 0.60 0.44 0.04	vrtus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61	5.76 5.80 4.41 4.31 5.87 3.62 4.79	6.27 5.02 4.64 6.38 4.22 5.23	0.61 0.33 0.51 0.60 0.44	Artus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12	6.27 5.02 4.64 6.38 4.22 5.23 2.16	0.61 0.33 0.51 0.60 0.44 0.04	Artus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS63 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81	S-Qiagen Artus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS63 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16	6.27 5.02 4.64 6.38 4.22 5.23 2.16	0.61 0.33 0.51 0.60 0.44 0.04 0.81	S-Qiagen Artus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS63 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81	GPS-Olagen Artus log ₁₀ cp/ml
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedCVHAdVB-19
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 nal viruses by GPS CMV VZV	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedCVHAdVB-19
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 nal viruses by GPS CMV VZV	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedCVHAdVB-19H4312
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 nal viruses by GPS CMV VZV	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedB-19H4312
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 nal viruses by GPS CMV VZV	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedB-19H4312
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS63 SOS66 SOS66	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 ction of addition	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 nal viruses by GPS CMV VZV	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81	Imples analyzedB-19H4312
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 Virus Virus	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16 EBV BKV 9 3	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 Nal viruses by GPS CMVVZV 2 3	0.61 0.33 0.51 0.60 0.44 0.04 0.81 AHV-6 A/B J 5 1	mples analyzed CV HAdV B-19 H 4 3 1 2
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 Virus Virus Virus The finding	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16 EBV BKV 9 3	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 Nal viruses by GPS CMVVZV 2 3	0.61 0.33 0.51 0.60 0.44 0.04 0.81 AHV-6 A/B J 5 1	mples analyzed CV HAdV B-19 H 4 3 1 2
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 SOS66 Virus Virus Virus	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.97 A Solution 4.64 6.38 5.23 2.97 A Solution 4.64 5.27 5.23 5.25 5.23 5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	0.61 0.33 0.51 0.60 0.44 0.04 0.81 HHV-6 A/B J 5 1	Imples analyzed CV HAdV B-19 4 3 1 2 Conclusion Simultaneously detect and
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 SOS66 Virus Virus Virus	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.16 2.97 A Solution 4.64 6.38 4.22 5.23 2.97 A Solution 4.64 6.38 5.23 2.97 A Solution 4.64 5.27 5.23 5.25 5.23 5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	0.61 0.33 0.51 0.60 0.44 0.04 0.81 HHV-6 A/B J 5 1	Imples analyzed CV HAdV B-19 4 3 1 2 Conclusion Simultaneously detect and
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 Virus Virus Vumber of amples	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16	6.275.024.646.384.225.232.162.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81 HHV-6 A/B J 5 1 5 1	mples analyzed $\frac{V}{4}$ $\frac{HAdV}{3}$ $\frac{B-19}{1}$ $\frac{H}{4}$ $\frac{HAdV}{3}$ $\frac{B-19}{1}$ $\frac{H}{2}$ COnclusion a simultaneously detect and ected (VZV, HAdV, B-19, H3
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 Virus Virus Vumber of amples	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.12 2.16	6.275.024.646.384.225.232.162.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81 0.81 HHV-6 A/B J 5 1 5 1	Imples analyzed CV HAdV B-19 4 3 1 2 Conclusion Simultaneously detect and
SOS51 SOS52 SOS57 SOS58 SOS59 SOS60 SOS61 SOS63 SOS66 SOS66 Virus Virus Vumber of samples	5.76 5.80 4.41 4.31 5.87 3.62 4.79 2.12 2.16 EBV BKV 9 3 s of this pilot students of controls of the set of controls of co	6.27 5.02 4.64 6.38 4.22 5.23 2.16 2.97	0.61 0.33 0.51 0.60 0.44 0.04 0.81	Imples analyzed CV HAdV B-19 H 4 3 1 2 Conclusion Simultaneously detect and ected (VZV, HAdV, B-19, H

Results

quantify multiple viruses in transplant patients with results that are

SV-1 and 2 and TTV)

assess its use as a diagnostic tool for transplant recipients

on from a single blood draw, ability to use the metagenomics data for antiviral nich may circumvent challenges seen with qPCR and diverse viruses such as

Acknowledgements

