

APPLICATION NOTE

CoViDiag®: HD diagnostic device for COVID-19 serological testing and immune status characterization

Understanding life.

innobiochips



KEY POINT

Multiplex ELISA test for the serodetection of SARS-CoV2 antibodies

HIGH DEFINITION FOR HIGHER PERFORMANCES

5 antigens tested in one test (anti-N, anti S1, anti-S1-RBD, anti-S1-NTD, anti-S2) to increase diagnostic performances :

Sensitivity
98,2%

Specificity
99%

EASE OF USE

Same protocole as an ELISA, Standard lab equipment, Quick visual interpretation

FLEXIBILITY

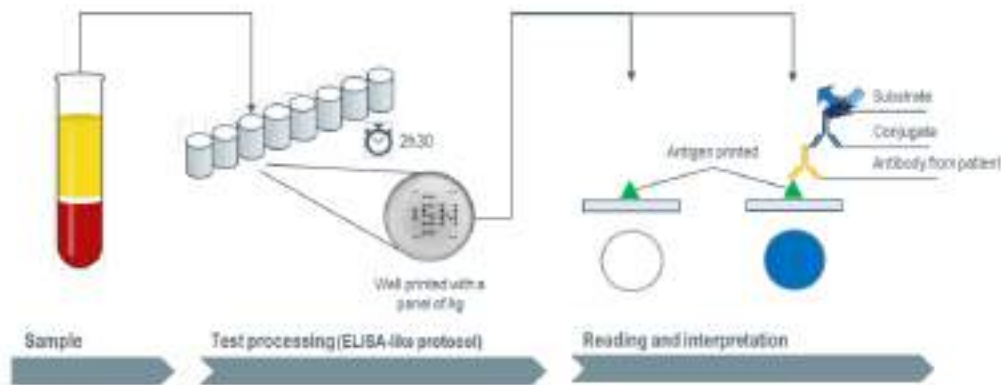
IgG, IgA or IgM detection



MATERIALS AND METHODS

MATERIAL

- CoViDiag kits
- Blood plasma or sera samples
- Precision micropipettes with suitable tips
- Distilled or deionized water
- Microplate washer (optional)
- Microplate shaker & incubator (optional)
- Colorimetric biochips reader (recommended)



METHODS

The whole process has been performed according to the IFU. Samples were diluted at 1:100 in diluent buffer (DB_CVD). Plates were incubated 1 h at 37°C on a microplate shaker at 300 rpm. After 3 washing cycles (WB_CVD), conjugate (CA_CVD) was diluted at 6:1000 in diluent buffer (DB_CVD) and added, followed by 1 h incubation at 37°C. After 3 washing cycles, substrate (SU_CVD) was incubated at room temperature for 15 min. The wells were rinsed and dried 15 min at 37°C before pictures acquisition.

Understanding life.

innobiochips

MAPPING

HOW TO READ RESULTS

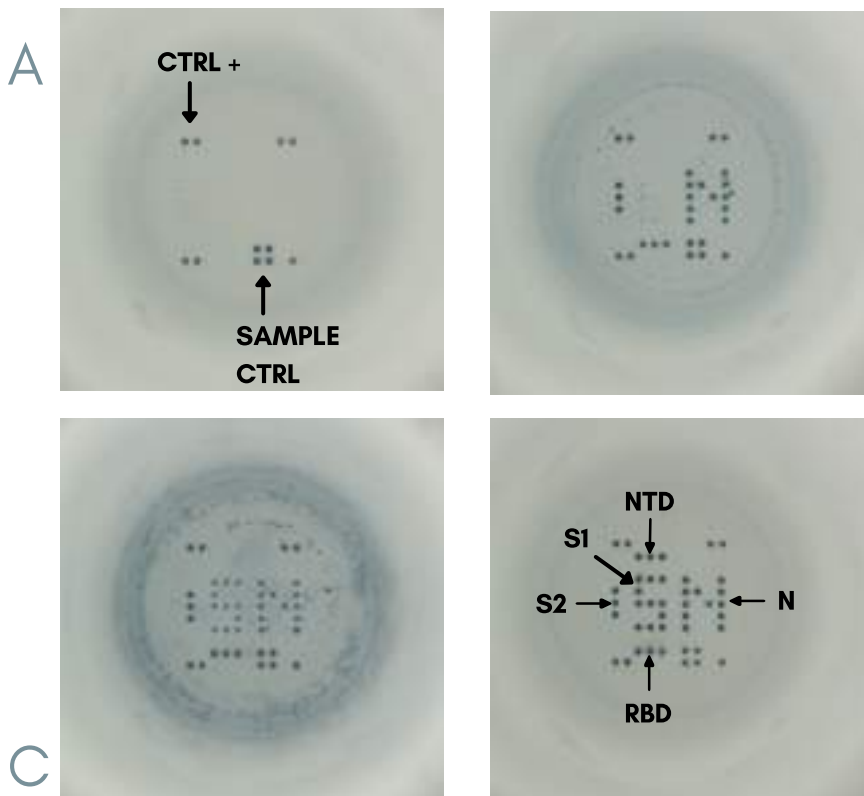
Corner spots CTRL + and the square SAMPLE CTRL are positive controls ensuring the technical validation of the process (fig. 1). For negative samples, controls enables to conclude the test as a true negative (fig.2-A).

For positives samples, letters shapes are clearly visible according to the position of the printed antigens. Figures 2B show the presence of anti-N Ab only in the patient's blood sample. Figure 2C and 2D show a set of various specific antibodies in other samples.

Visual interpretation checks for the presence of the "N" and/or "S" letters at the bottom of the well to identify the sample as positive.

CTRL +	CTRL +									CTRL -	CTRL -
		NTD	NTD	NTD							
		S1	S1	S1		N				N	
S2		S1				N	M			N	
S2		S1	S1	S1		N			N	N	
S2				S1		N				N	
		S1	S1	S1		N				N	
		RBD	RBD	RBD		SAMPLE CTRL	SAMPLE CTRL				
CTRL +	CTRL +					SAMPLE CTRL	SAMPLE CTRL			CTRL -	CTRL -

Figure 1 - CoViDiag chips mapping



In order to confirm visual checking, pictures were acquired with a dedicated reader and analyzed using a software and interpretation algorithm. Depending of signal acquired on pictures and antigens giving signals, algorithm is able to identify a sample as "POSITIVE", "BORDERLINE" or "NEGATIVE". Index were calculated in order to assess quantity of each antibodies. Calibration can be used. They enable users to quantify the antibodies

Figure 2 - Pictures of wells after samples testing acquired with a biochips reader (A to D). Images A is related to negative samples. Images B, C, and D are related to positives samples.

Understanding life.

innobiochips

PERFORMANCE

IMPROVED SENSITIVITY THANKS TO THE COMBINATION OF ANTIGENS

Each of the N, S1, S1-RBD or S2 antigens has, individually, a sensitivity between 76,6% (S1-RBD) and 93,4% (N) for sample collected more than 20 days after PCR.

Days	(n)	N	S1	S2	S1-RBD	CoViDiag
0-9	122	53,3%	27,0%	51,6%	26,2%	60,7%
10-19	64	81,3%	67,2%	81,3%	37,5%	93,8%
>20	320	93,4%	82,8%	90,3%	76,6%	99,1%
Overall	506	83,2%	67,8%	80,4%	59,5%	90,1%

Table 1: Proportion of patients identified as positive for each antigen or overall

The CoViDiag test offers the opportunity to combine the detection of antibodies for 5 SARS-CoV2 antigens. The improved sensitivity was 98.2% for CoViDiag (n=377/3840). For serums collected between 0-9 days, sensitivity reaches 60.7% while for serums collected between 10 and 19 days reaches 93.8% and 99.1% for samples collected after 20 days.

ANTIGEN COMBINATION OFFERED BY COVIDIAG TACKLE STANDARD TEST

Previous assessments showed that the sensitivity for each antigen was close to the sensitivities presented by the conventional tests on the market. The antigens combination enhance performances of the whole test.

Days after PCR	0-9	10-19	20-49	>50	Overall	Overall >10
Anti-S1/S2 test	(n) 95	25	73	20	213	118
	%Pos 41,1%	84,0%	94,5%	75,0%	68,5%	90,7%
Anti-S1 test	(n) 20	8	67	166	261	241
	%Pos 45,0%	75,0%	92,5%	91,0%	87,7%	91,3%
Anti-N test	(n) 20	8	67	166	261	241
	%Pos 65,0%	87,5%	95,5%	84,9%	86,2%	88,0%
CovidIag	(n) 122	64	150	170	506	384
	%Pos 60,7%	93,8%	98,7%	98,2%	90,1%	98,2%

Table 2: Sensitivity compared between several routine serological anti SARS-CoV2 tests and CoViDiag

From the total cohort tested (n=506), 86% of the samples had a signal above the cut off on more than 2 antigens. It is important to note that 10% of the samples are positive for only one antigen. This explain that standard tests have a limited sensitivity and may present false negative results. The antigen combination offered by CoViDiag is the only alternative to overcome the weaknesses of standard tests.

Understanding life.

innobiochips

PRODUCT RANGE

COVIDIAG PRODUCTS :

96-tests kits Siryus CoViDiag **CE-IVD** for **IgG** detection

Ref : #2001

96-tests kits Siryus CoViDiag **RUO** for **IgG** detection

Ref : #2002

96-tests kits Siryus CoViDiag **RUO** for **IgA** detection

Ref : #2004

96-tests kits Siryus CoViDiag **RUO** for **IgM** detection

Ref : #2005

COVIDIAG + PRODUCTS :

96-tests kits Siryus CoViDiag + Multi Variants **RUO** for **IgG** detection

Ref : #2006

96-tests kits Siryus CoViDiag + Multi Variants **RUO** for **IgA** detection

Ref : #2007

96-tests kits Siryus CoViDiag + Multi Variants **RUO** for **IgM** detection

Ref : #2008



Understanding life.

innobiochips