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Profile of Specific Antibodies to SARS-CoV-2: The First Report

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Highlights

- Profile of specific antibodies to virus in blood can assist diagnosis and reflect disease course.
- The preliminary study explored the dynamic profile of IgM and IgG.
- Serum IgM to SARS-COV-2 last more than a month indicating the prolonged virus replication in infected patients.

Title Page**Title**

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Running Title

Specific Antibodies to SARS-CoV-2

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Dear editors,

A novel coronavirus (COVID-19) epidemic threatens the world.¹⁻² Before this study, some studies reported cases of viral detection by RT-PCR at different timepoints throughout the disease course.³⁻⁴ However, these reports monitored SARS-CoV-2 in the acute phase of infection. Currently no study reported the profile of specific antibodies to SARS-CoV-2 infection. Profile of specific antibodies in patients' blood can assist diagnosis and reflect the disease course. Here, we first studied the profile of IgM and IgG for SARS-CoV-2 from 34 COVID-19 patients.

A total of 34 hospitalized patients (admission date from Feb 1st to Feb 29th, 2020) with confirmed SARS-CoV-2 infection were included in this study. All enrolled patients were confirmed diagnosed of COVID-19 according to the diagnosis and treatment guideline for SARS-CoV-2 from Chinese National Health Committee (Version 5) and the interim guidance from Centers for Disease Control and Prevention.⁵⁻⁶ Blood samples were obtained at different date after onset of symptoms to detect the specific

antibodies to SARS-CoV-2. IgM and IgG were analyzed by chemiluminescent immunoassay according to the manufacturer's protocol (Shenzhen Yahuilong Biotechnology Co., Ltd). All data (test dates and results of IgM and IgG) were collected up to the final follow-up date (March 3rd, 2020).

Details of demographic characteristics and test dates and results of IgM and IgG were list in **Table 1**. Except for two patients (2 days and 3 days after symptoms onset), all included patients had IgM and IgG tests after 2 weeks from symptoms onset. We categorized patients by weeks according to the date of antibodies test after symptoms onset. In week 3 after symptoms onset, all patients were tested positive for IgM and IgG, with the mean value of 322.80AU/ml and 112.40AU/ml (Reference:<10AU/ml) respectively. In week 4, all the results were still positive for IgM and IgG. IgM declined while IgG continued to go up, with the mean value of 147.92AU/ml and 157.01AU/ml respectively. In week 5, however, all patients were positive for IgG, while 2 patients (16.7%) got negative results for IgM. IgM level kept going down to 78.03AU/ml and IgG continued up to 163.56AU/ml. At the end of observation (7 weeks), 2 patients (33.3%) got negative results for IgM, while all patients positive for IgG, with the mean value of 21.83AU/ml and 167.16AU/ml respectively. (**Figure 1**)

Genomic studies have shown that SARS-CoV-2 shared around 80% identity sequencing with SARS-CoV, which caused a global epidemic with 8096 confirmed cases worldwide in 2002-2003. ⁷ Study of case series suggested the viral nucleic acid shedding pattern of patients infected with SARS-CoV-2 is different from SARS-CoV. ³

For SARS-CoV, studies revealed that IgM reached the highest point within 4 weeks and was not detectable on 3 months after onset of symptoms. IgG were persistently detectable up to 24 months. ⁸

Our results suggested that the profile of specific antibodies to SARS-CoV-2 is similar to SARS-CoV. Detectable and continuous high level of IgM indicated the acute phase of infection. Furthermore, IgM last more than a month indicating the prolonged virus replication in SARS-CoV-2 infected patients. IgG responded later than IgM and persisted high in our study, indicating the humoral immune reaction to protect the body against SARS-CoV-2 virus.

The detection and profile of specific antibodies to SARS-CoV-2 will provide valuable information for rapid screening of suspects, assist diagnosis and evaluate the disease course. Furthermore, concentrated IgG antibody may be informative in vaccine development and treatment for SARS-CoV-2.

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Conflict of Interest All authors declare that there are no conflicts of interest.

Informed consent Oral consent was obtained from patients involved before enrollment when data were collected retrospectively.

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Figure 1. Timeline of IgM and IgG Antibodies level to SARS-CoV-2 from the Onset of Symptoms

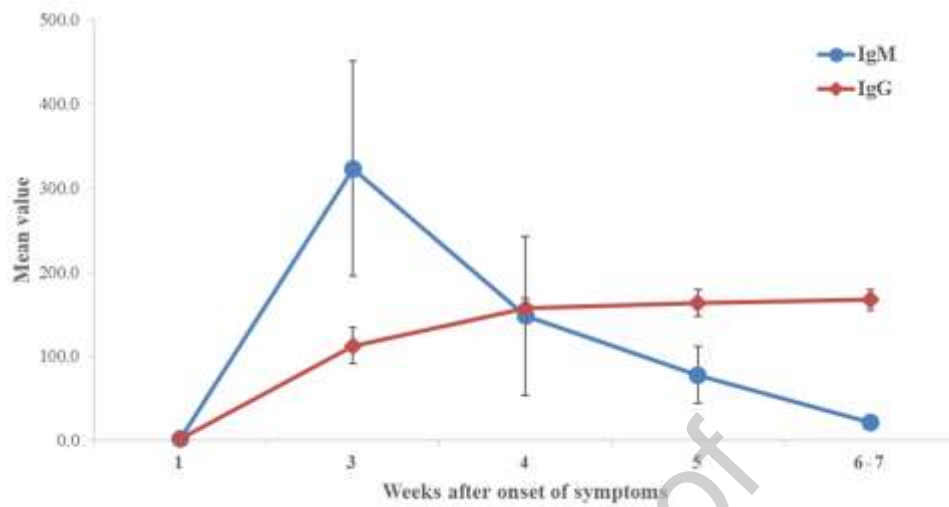


Table 1. Characteristics of demographic and specific antibodies in COVID-19 patients (N=34)

Patients	Age	Gender	IgM AU/ml	IgG AU/ml	Test days, after onset	Week	Mean IgM AU/ml	SEM	Mean IgG AU/ml	SEM
Patient1	82	Female	3.56	2.48	2	1	2.24	1.33	1.96	0.53
Patient2	87	Female	0.91	1.43	3					
Patient3	59	Female	122.73	163.85	14	3	322.80	127.65	112.40	21.43
Patient4	72	Male	924	187.4	14					
Patient5	32	Female	111.78	110.17	16					
Patient6	63	Male	207.39	55.43	17					
Patient7	69	Male	401.19	78.71	17					
Patient8	64	Male	169.72	78.82	21					
Patient9	65	Female	104.77	187.94	22	4	147.92	94.50	157.01	12.40
Patient10	39	Male	16.63	152.88	23					
Patient11	52	Male	89.31	179.18	23					

Patient1 2	49	Male	41.55	128.7	24					
Patient1 3	35	Male	62.5	103.8	27					
Patient1 4	31	Male	11.26	193.8	28					
Patient1 5	58	Femal e	709.3 9	152.5 7	28					
Patient1 6	44	Male	36.57	190.8	30	5	78.03	33.55	163.56	15.9 5
Patient1 7	26	Femal e	14.37	277.9 1	30					
Patient1 8	57	Male	1.65	76.85	30					
Patient1 9	45	Male	35.44	165.2 7	30					
Patient2 0	62	Femal e	3.38	200.9 5	31					
Patient2 1	65	Male	119.3 5	155.2 9	32					
Patient2 2	83	Male	18.95	158.3 2	33					
Patient2 3	43	Male	48.88	73.64	33					
Patient2 4	53	Male	134.2 4	135.5 4	33					
Patient2 5	33	Femal e	54.39	162.0 1	33					
Patient2 6	64	Male	422.7 8	159.3 8	34					
Patient2 7	60	Femal e	46.34	206.7	34					
Patient2 8	73	Male	5.27	134.9 4	36	6-7	21.83	5.72	167.16	12.2 4
Patient2 9	25	Femal e	15.11	179.2 3	36					
Patient3 0	71	Male	36.11	184.5 6	37					
Patient3 1	56	Femal e	34.07	121.0 8	37					
Patient3 2	54	Male	42.28	216.9 6	38					
Patient3 3	47	Male	11.2	176.7 3	38					
Patient3 4	54	Male	8.75	156.5 9	49					

Abbreviations: SEM, standard error of mean. *Reference of IgG and IgM are 10AU/ml