

Clinical evaluation of the Biozek COVID-19 IgG/IgM Rapid Test Cassette in patient sera

Date: 21-8-2020

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1. Introduction

In this study, the test characteristics of the Biozek COVID-19 IgG/IgM Rapid Test Cassette was evaluated in clinical serum samples from 50 patients with PCR proven COVID-19 and 200 PCR negative patients with respiratory symptoms.

2. Adherence to Regulatory Standards

All portions of this study performed at the ISO certified testing facility adhered to the applicable standard operating procedures (SOPs) with any applicable protocol amendments specified in the study report, but was not conducted in compliance with international good laboratory practice (GLP) regulations.

3. Responsible personnel

Study Director

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4. Material and Methods

SARS-CoV-2 serology

The presence of SARS-CoV-2 IgM and IgG antibodies were determined by performing the Biozek COVID-19 IgG/IgM Rapid Test Cassette (Biozek) on serum, following the manufacturer's instructions. Very weak IgM bands were regarded as aspecific, only clear IgM bands were considered positive.

SARS-CoV-2 PCR

The presence of SARS-CoV-2 RNA was determined by performing an in house PCR protocol according to the protocol as provided by the WHO, detecting the E-gene of the virus on respiratory samples of the nasopharynx, oropharynx, sputum of bronchoalveolar lavage fluid (Corman *et al.*, 2020).

Patient serum samples

All serum samples used in this study were routinely collected during treatment by their physician as part of the diagnostic work up. For each serum sample, the days between onset of disease and serum collection was registered.

Samples drawn from 0 to 6 days after disease onset were regarded as early stage samples, from 7 to 13 days as intermediate stage and from 14 days as convalescence. For each patient, age, sex, stage of the disease and disease severity were registered.

Patient groups

PCR positive patients were 75 patients having at least one positive PCR for SARS-CoV-2.

PCR negative patients were 200 patients treated by their physician with respiratory symptoms having a negative SARS-CoV-2 PCR. Patients with diagnosed COVID-19 by chest CT abnormalities typical of COVID-19 (CORADS score 3-5) were excluded, as the negative PCR in these patients was regarded false negative due to a low sensitivity of the PCR in upper respiratory samples in this later stage of the disease. Patients who were hospitalized were considered as having severe disease, non-hospitalized patients were regarded as having mild disease.

5. Results and Discussion

Sensitivity of the Biozek COVID-19 IgG/IgM Rapid Test Cassette

Of the 75 PCR positive patients, including early, intermediate and convalescent stages of infection, a total of 57 patients were IgG positive and 12 patients were IgM positive (appendix 1).

In the convalescent phase (14 days or later after onset of symptoms), 48 of 52 patients were IgG positive (92.3%). The 4 IgG negative PCR positive patients all had mild disease.

Of the severely ill patients, all 14 IgG negative samples were drawn less than 10 days after onset of symptoms. All 11 IgG positive samples were drawn on day 6 or later. No sample drawn later than 10 days was IgG negative, giving an IgG sensitivity of 100% in severely ill patient in the convalescent stage.

Of the mildly ill patients, 45 of 49 PCR positive patients were IgG positive in the convalescent stage of disease, giving an IgG sensitivity in mild disease of 91.8% in the convalescent stage.

Of 75 PCR positive patients, 12 were IgM positive. In the early and intermediate stage, 16 of 23 patients were IgM negative and 7 IgM positive, giving an IgM sensitivity <14 days after onset of 30.4%. The 5 IgM positive patients in the convalescent stage all were IgG positive as well.

Specificity of the Biozek COVID-19 IgG/IgM Rapid Test Cassette

Of the 200 PCR negative samples, all were IgM negative and 1 was IgG positive (appendix 2), giving an overall specificity of 100% for IgM and 99.5% for IgG. It is unknown whether the IgG positive PCR negative patient suffered from COVID-19 earlier, before the PCR sample was taken.

No cross reactivity was found in samples from 11 patients who were infected with non-SARS coronaviruses, that were part of the PCR negative control group.

Conclusion

In conclusion, the Biozek COVID-19 IgG/IgM Rapid Test Cassette was able to detect past infections accurately, with an overall IgG sensitivity of 92.3% in the convalescent phase. The sensitivity depends on the timing of testing and severity of the disease. While past infections can be missed in some cases due to the sensitivity of 91.8% in mild infection, the test has an excellent sensitivity of 100% in this study in severe infections in convalescence.

The high specificity and absence of cross reactivity with other coronaviruses diminishes the chance of false positive results, which is very important when the test is used to determine past infection and possible immunity.

Appendix 1 – Results of individual serum samples from SARS-CoV-2 PCR positive patients tested with Biozek COVID-19 IgG/IgM Rapid Test Cassette

PCR	ID	Severity	Test Subject	Sex	Age	Stage of Disease (days)	Stage of Disease	Biozek Test Outcome IgM	Biozek Test Outcome IgG	Reference PCR used
pos	710938447601	severe	1	M	64	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	200323010801	severe	2	F	69	10	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	710938897201	severe	3	M	58	10	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	710936712401	severe	4	M	70	14	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	710932048201	severe	5	M	76	6	early	n	n	WHO protocol Corman et al. (LDT)
pos	710935147701	severe	6	F	67	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	710920222001	severe	7	M	83	8	intermediate	n	pos	WHO protocol Corman et al. (LDT)
pos	710936703501	severe	8	M	63	3	early	n	n	WHO protocol Corman et al. (LDT)
pos	710936705701	severe	9	M	65	10	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	710936705601	severe	10	M	73	10	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	710938124401	severe	11	M	77	3	early	n	n	WHO protocol Corman et al. (LDT)
pos	200323010601	severe	12	M	48	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	710936260601	severe	13	M	72	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	200322012901	severe	14	F	81	5	early	n	n	WHO protocol Corman et al. (LDT)
pos	200319071701	severe	15	M	34	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	710933707301	severe	16	M	49	2	early	n	n	WHO protocol Corman et al. (LDT)
pos	200322013101	severe	17	F	75	6	early	n	pos	WHO protocol Corman et al. (LDT)
pos	200323010301	severe	18	M	59	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
pos	710936710501	severe	19	M	29	10	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	200312021301	severe	20	M	60	7	intermediate	pos	pos	WHO protocol Corman et al. (LDT)
pos	710935148401	severe	21	F	65	3	early	pos	n	WHO protocol Corman et al. (LDT)
pos	710932187401	severe	22	M	58	2	early	n	n	WHO protocol Corman et al. (LDT)
pos	710935147901	severe	23	F	54	4	early	n	n	WHO protocol Corman et al. (LDT)
pos	200300023101	mild	24	F	44	67	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200318010501	mild	25	F	45	28	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200320050401	mild	26	F	47	46	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200323027101	mild	27	M	31	17	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200323030101	mild	28	M	15	22	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200324047501	mild	29	F	50	24	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200325020001	mild	30	M	64	71	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200327022601	mild	31	F	22	34	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200402020801	mild	32	F	11	14	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200403018401	mild	33	F	33	38	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200404000701	mild	34	M	44	18	convalescence	n	n	WHO protocol Corman et al. (LDT)
pos	200414022701	mild	35	F	51	49	convalescence	n	n	WHO protocol Corman et al. (LDT)
pos	200616032001	mild	36	F	62	56	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200400364001	mild	37	F	58	26	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200400364101	mild	38	F	27	28	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200409045001	mild	39	F	59	0	early	n	pos	WHO protocol Corman et al. (LDT)
pos	200416017701	mild	40	F	54	17	convalescence	n	n	WHO protocol Corman et al. (LDT)
pos	200417010401	mild	41	F	60	35	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200417056401	mild	42	M	26	31	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200417061901	mild	43	F	50	24	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200420018601	mild	44	M	65	22	convalescence	pos	pos	WHO protocol Corman et al. (LDT)
pos	200421011701	mild	45	F	51	14	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200421013601	mild	46	F	39	32	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200423051101	mild	47	F	54	29	convalescence	n	n	WHO protocol Corman et al. (LDT)
pos	200599220701	mild	48	F	61	29	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200499030901	mild	49	F	56	47	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200504010901	mild	50	F	44	33	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200701010301	mild	51	F	77	39	convalescence	pos	pos	WHO protocol Corman et al. (LDT)
pos	200610015801	mild	52	M	76	40	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200599222301	mild	53	F	26	42	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200699248801	mild	54	F	44	48	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200610012701	mild	55	M	50	50	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200604013301	mild	56	M	69	53	convalescence	pos	pos	WHO protocol Corman et al. (LDT)
pos	200526069101	mild	57	F	75	56	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200616032001	mild	58	F	63	56	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200526013901	mild	59	M	28	61	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	711126051001	severe	60	M	73	63	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200619098301	mild	61	F	55	65	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	711368433901	mild	62	F	74	65	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200526062301	mild	63	M	51	71	convalescence	pos	pos	WHO protocol Corman et al. (LDT)
pos	200610012401	mild	64	F	44	71	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200603014201	mild	65	F	46	78	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	711179808801	mild	66	F	54	78	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200619098501	mild	67	M	73	81	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200619031601	mild	68	M	58	82	convalescence	pos	pos	WHO protocol Corman et al. (LDT)
pos	711182496201	mild	69	F	68	84	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200618012201	severe	70	F	89	90	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200622032501	mild	71	F	44	96	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200819003501	mild	72	F	56	104	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200717018801	mild	73	F	78	111	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200720161101	mild	74	F	50	115	convalescence	n	pos	WHO protocol Corman et al. (LDT)
pos	200728012701	mild	75	M	59	117	convalescence	n	pos	WHO protocol Corman et al. (LDT)

Appendix 2 – Results of individual serum samples from SARS-CoV-2 PCR negative patients tested with Biozek COVID-19 IgG/IgM Rapid Test Cassette

PCR	ID	Severity	Test Subject	Sex	Age	Stage of Disease (days)	Stage of Disease	Biozek Test Outcome IgM	Biozek Test Outcome IgG	Reference PCR used
n	190531047801	severe	1	M	17	29	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709382823601	severe	2	F	78	205	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709400315501	severe	3	M	68	142	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709406626001	severe	4	M	40	103	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709574408601	severe	5	M	60	313	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709736631101	severe	6	F	46	15	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	709763323501	severe	7	M	77	206	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	710096211801	severe	8	F	49	82	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	710198585501	severe	9	M	12	81	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	710887936001	severe	10	F	73	48	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	710934956701	severe	11	F	36	0	early	n	n	WHO protocol Corman et al. (LDT)
n	710936097601	severe	12	M	49	0	early	n	n	WHO protocol Corman et al. (LDT)
n	710936717401	severe	13	M	61	0	early	n	n	WHO protocol Corman et al. (LDT)
n	710936217401	severe	14	F	71	0	early	n	n	WHO protocol Corman et al. (LDT)
n	710900896201	severe	15	F	18	3	early	n	n	WHO protocol Corman et al. (LDT)
n	710935342101	severe	16	M	88	0	early	n	n	WHO protocol Corman et al. (LDT)
n	710900896101	severe	17	F	70	1	early	n	n	WHO protocol Corman et al. (LDT)
n	710900895901	severe	18	M	80	1	early	n	n	WHO protocol Corman et al. (LDT)
n	710935091301	severe	19	M	18	0	early	n	n	WHO protocol Corman et al. (LDT)
n	200323010401	severe	20	M	70	3	early	n	n	WHO protocol Corman et al. (LDT)
n	200323010901	severe	21	M	82	-1	early	n	n	WHO protocol Corman et al. (LDT)
n	200508040901	mild	22	F	29	5	early	n	pos	WHO protocol Corman et al. (LDT)
n	711221117601	severe	23	M	60	1	early	n	n	WHO protocol Corman et al. (LDT)
n	711228857501	severe	24	F	87	1	early	n	n	WHO protocol Corman et al. (LDT)
n	711369560001	severe	25	M	79	1	early	n	n	WHO protocol Corman et al. (LDT)
n	200408053502	mild	26	M	62	2	early	n	n	WHO protocol Corman et al. (LDT)
n	200409046701	mild	27	F	70	2	early	n	n	WHO protocol Corman et al. (LDT)
n	200422012001	severe	28	F	77	2	early	n	n	WHO protocol Corman et al. (LDT)
n	200527014701	severe	29	M	46	2	early	n	n	WHO protocol Corman et al. (LDT)
n	710975757701	severe	30	M	71	2	early	n	n	WHO protocol Corman et al. (LDT)
n	710975888201	severe	31	F	67	2	early	n	n	WHO protocol Corman et al. (LDT)
n	711018837901	severe	32	F	69	2	early	n	n	WHO protocol Corman et al. (LDT)
n	711044940801	severe	33	F	68	2	early	n	n	WHO protocol Corman et al. (LDT)
n	200406068501	severe	34	F	89	3	early	n	n	WHO protocol Corman et al. (LDT)
n	200420016101	severe	35	F	72	3	early	n	n	WHO protocol Corman et al. (LDT)
n	200520013301	severe	36	F	52	3	early	n	n	WHO protocol Corman et al. (LDT)
n	710991776701	severe	37	F	51	3	early	n	n	WHO protocol Corman et al. (LDT)
n	711038223501	severe	38	M	29	3	early	n	n	WHO protocol Corman et al. (LDT)
n	711049726901	severe	39	M	38	3	early	n	n	WHO protocol Corman et al. (LDT)
n	711074510601	severe	40	M	88	3	early	n	n	WHO protocol Corman et al. (LDT)
n	200609012801	severe	41	M	63	4	early	n	n	WHO protocol Corman et al. (LDT)
n	200610041401	severe	42	F	82	4	early	n	n	WHO protocol Corman et al. (LDT)
n	200615025501	severe	43	F	78	4	early	n	n	WHO protocol Corman et al. (LDT)
n	711024986401	severe	44	M	86	4	early	n	n	WHO protocol Corman et al. (LDT)
n	711169337601	mild	45	F	17	4	early	n	n	WHO protocol Corman et al. (LDT)
n	711036843201	severe	46	F	79	5	early	n	n	WHO protocol Corman et al. (LDT)
n	711163043001	severe	47	M	64	5	early	n	n	WHO protocol Corman et al. (LDT)
n	711237469401	severe	48	F	87	5	early	n	n	WHO protocol Corman et al. (LDT)
n	200406011301	severe	49	F	44	6	early	n	n	WHO protocol Corman et al. (LDT)
n	200413007901	severe	50	F	74	6	early	n	n	WHO protocol Corman et al. (LDT)
n	200421011201	mild	51	M	34	6	early	n	n	WHO protocol Corman et al. (LDT)
n	200630010401	severe	52	M	31	6	early	n	n	WHO protocol Corman et al. (LDT)
n	200716079601	mild	53	F	52	6	early	n	n	WHO protocol Corman et al. (LDT)
n	711038224201	severe	54	F	79	6	early	n	n	WHO protocol Corman et al. (LDT)
n	711044193801	severe	55	M	53	6	early	n	n	WHO protocol Corman et al. (LDT)
n	200403012901	severe	56	M	86	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200422010501	mild	57	F	30	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200527010901	severe	58	M	54	7	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711221117601	severe	59	M	59	1	early	n	n	WHO protocol Corman et al. (LDT)
n	200618014701	severe	60	M	69	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711014208401	severe	61	M	81	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711134768601	severe	62	F	84	8	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200429050201	severe	63	F	74	9	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200414034201	severe	64	M	58	10	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200511011201	mild	65	F	65	10	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	710996619401	severe	66	M	75	11	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711062921401	mild	67	F	73	11	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711144777801	mild	68	M	44	11	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711326368801	severe	69	M	57	11	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200513014801	mild	70	M	57	12	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	710968622501	severe	71	F	43	12	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711163659301	severe	72	F	88	12	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711170099201	mild	73	M	61	12	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	711156160901	severe	74	M	74	13	intermediate	n	n	WHO protocol Corman et al. (LDT)
n	200417066001	mild	75	M	71	14	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200508062901	mild	76	F	32	14	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200605076301	severe	77	M	64	14	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200619098801	mild	78	F	16	14	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200415012001	mild	79	F	53	15	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711007034401	severe	80	M	77	15	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711209761101	mild	81	F	16	15	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711151846501	severe	82	F	77	16	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200610042101	mild	83	M	65	18	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711074412501	severe	84	F	62	18	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200507054201	mild	85	F	38	19	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200511014501	mild	86	F	18	19	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200619031001	mild	87	M	51	19	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711046982501	mild	88	M	72	20	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711076635201	severe	89	M	89	20	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200417046901	mild	90	F	50	21	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200527013001	mild	91	F	46	21	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200603012601	mild	92	M	85	21	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200702111701	mild	93	M	35	21	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200408041401	mild	94	F	64	22	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	710989189401	severe	95	M	83	22	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200400602401	mild	96	F	60	23	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200407055301	mild	97	F	42	24	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200512013101	mild	98	F	49	24	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	711125304101	severe	99	F	32	24	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	200504014101	mild	100	F	38	25	convalescence	n	n	WHO protocol Corman et al. (LDT)

PCR	ID	Severity	Test Subject	Sex	Age	Stage of Disease (days)	Stage of Disease	Biozek Test Outcome IgM	Biozek Test Outcome IgG	Reference PCR used
n	'200428011401	mild	101	F	33	26	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200599205901	mild	102	F	61	26	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200610015701	mild	103	M	74	26	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711079589201	mild	104	F	57	27	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200400599001	mild	105	F	33	28	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200424055501	mild	106	F	33	28	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200612069801	mild	107	F	19	28	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200519014601	mild	108	F	36	29	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711381230301	mild	109	M	57	29	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200422012401	mild	110	M	28	30	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200424026801	mild	111	F	42	30	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711027825601	mild	112	F	41	30	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200420051201	mild	113	F	27	31	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200731054101	mild	114	M	74	31	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'710987947901	severe	115	M	87	31	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711159273901	mild	116	F	65	31	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200414013101	mild	117	M	64	32	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200429013401	severe	118	F	89	32	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200702029201	mild	119	F	39	32	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711079332201	mild	120	M	31	32	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200526067001	mild	121	F	62	33	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200608102401	mild	122	F	79	33	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200400598701	mild	123	M	34	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200416016704	mild	124	M	62	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513011501	mild	125	F	44	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513055701	mild	126	F	27	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711120911101	mild	127	F	18	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711128223301	severe	128	M	91	34	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200524000801	mild	129	F	66	35	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200529047001	mild	130	F	51	35	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'710968370101	mild	131	M	46	35	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711220297601	mild	132	M	66	35	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200514011701	mild	133	F	55	36	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200604013201	mild	134	F	52	36	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200605014201	mild	135	F	51	37	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200606022601	mild	136	F	61	37	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711089282501	mild	137	F	44	38	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200420017901	mild	138	F	35	39	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200529010801	mild	139	M	77	39	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200515034401	mild	140	F	31	41	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200512057601	mild	141	M	64	42	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200514013601	mild	142	F	45	42	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200599002701	mild	143	F	50	42	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200703018001	mild	144	M	50	42	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200400108701	mild	145	F	90	43	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200518028901	mild	146	F	61	43	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200623011901	mild	147	M	51	43	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200707014701	mild	148	M	56	43	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200608100601	mild	149	F	74	45	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711170830301	mild	150	F	42	45	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200407054504	mild	151	F	33	46	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200707015301	mild	152	F	53	47	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711183660101	mild	153	M	61	48	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711068797901	mild	154	M	62	49	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200610016301	mild	155	F	60	51	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200519015601	mild	156	M	68	53	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513013001	mild	157	M	36	55	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200609010501	mild	158	M	50	56	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200618013001	severe	159	F	91	56	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200717011601	mild	160	F	66	56	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711154475601	mild	161	F	55	56	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200529014301	mild	162	M	73	57	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711251132901	severe	163	F	46	57	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200417056001	mild	164	F	41	58	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513012001	mild	165	F	89	59	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513012101	mild	166	M	87	59	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711047522801	mild	167	M	60	59	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200513012501	mild	168	M	78	60	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711193533501	mild	169	F	42	63	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200526068301	mild	170	F	43	66	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200528067201	mild	171	F	40	66	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200814000401	mild	172	F	84	66	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'711107560201	severe	173	F	60	67	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200519066001	mild	174	M	56	68	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200720094001	mild	175	F	58	71	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200499190101	mild	176	F	52	72	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200604014301	mild	177	M	28	73	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200617013801	mild	178	F	60	76	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200617012801	mild	179	F	45	77	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200703013701	mild	180	M	49	78	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200525015901	mild	181	M	57	84	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200529012601	mild	182	F	46	84	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200721073201	mild	183	M	45	84	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200727036101	mild	184	F	49	84	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200616014401	mild	185	F	37	86	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200609015501	mild	186	F	34	87	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200623011501	mild	187	F	48	88	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200626049801	mild	188	F	46	90	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200417050501	mild	189	F	36	92	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200417054201	mild	190	F	41	92	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200622035101	mild	191	M	36	95	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200609010601	mild	192	F	50	97	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200619099101	mild	193	F	54	98	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200723013501	mild	194	M	66	104	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200701013401	mild	195	F	22	109	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200713085201	mild	196	F	34	115	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200708013301	mild	197	F	73	119	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200723013201	mild	198	F	51	136	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200818003701	mild	199	F	35	140	convalescence	n	n	WHO protocol Corman et al. (LDT)
n	'200820003201	mild	200	F	73	164	convalescence	n	n	WHO protocol Corman et al. (LDT)