


CME/SAM SARS-CoV-2 asymptomatic and symptomatic patients and risk for transfusion transmission

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KEY IDEAS

- Oral swabs, sputum, and blood samples from 18 asymptomatic and symptomatic patients with SARS-CoV-2 infection were examined using RT-PCR testing in order to assess the risk of transfusion-related transmission.
- In asymptomatic patients as well as patients with flu-like symptoms and fever, no SARS-CoV-2 RNA could be detected in the blood or serum despite a clearly positive result in all throat swabs.
- As patients with symptoms of infectious disease will not be admitted to blood donation, the risk for transfusion transmission of SARS-CoV-2 seems to be negligible.

(Covid-19) can be transmitted through blood and how long SARS-CoV-2 positive patients with minimal symptoms have to be deferred from blood donation.

PATIENTS AND METHODS

We report on molecular detection of SARS-CoV-2 in 18 patients, 2 of whom were infected in China and evacuated to Germany on February 1.⁵ In 16 patients, the transmission in Germany is most likely.⁶ Information on the patient population was published elsewhere^{5,6} and SARS-CoV-2 testing targeting the E and RNA-dependent RNA polymerase gene was performed as previously described by Corman et al.⁷ In patients with minor symptoms, laboratory tests were carried out during the two-week quarantine period, in those with severe symptoms, tests were done during inpatient treatment.

As of March 2020, the SARS-CoV-2 pandemic that originated in Wuhan, Hubei Province, China, is quickly spreading in many countries of the world.

Huang et al.¹ reported RNAemia in 6 of 41 symptomatic Wuhan patients (15%) with laboratory-confirmed SARS-CoV2 infection. Zhang et al.² showed for 15 Wuhan patients diagnosed with viral pneumonia caused by SARS-CoV-2 that shedding may occur through multiple routes (respiratory, fecal-oral, or body fluids); 6 out of the 15 patients (40%) were blood positives. In addition, Kim et al.³ reported on intermittently positive blood RT-PCR (real-time reverse transcription polymerase chain reaction) results in 2 SARS-CoV-2 patients in South Korea with mild and moderate symptoms.

In Germany, blood donors have to be at least 18 years old and should not be older than 65 years of age. In addition, volunteers will not be admitted to blood donation if they show signs and symptoms of an infection (e.g., fever, flu-like symptoms). With these requirements and the additional donor screening, a high national safety standard with regard to the prevention of transfusion-related viral infections has been achieved in recent years.⁴

However, with respect to the safety of blood donation, the questions arise whether Corona virus disease 2019

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TABLE 1. Molecular detection of SARS-CoV-2 in 18 patients with asymptomatic or symptomatic infection

Patient*	Age	Oral swab†/ sputum		Blood‡		Number of tests performed	Whole blood qRT-PCR Ct	Serum qRT-PCR Ct	Plasma qRT-PCR Ct	No symptoms		Symptoms§		Art. ventilation ARDS +/-
		qRT-PCR Ct	Minimum value (max. Viral load)	Number of tests performed	qRT-PCR Ct					Asymptomatic +/-	Flu-like +/-	Fever +/-	Pneumonia +/-	
01	x		30.10			1		1 x neg.		+	-	-	-	-
02	x		24.39			7	4 x neg.	3 x neg.		+	-	-	-	-
03	x		30.25			7	4 x neg.	3 x neg.		-	-	-	-	-
04	x		32.13			6		6 x neg.		-	+	-	-	-
05	x		31.67			7		7 x neg.		-	+	-	-	-
06	x		20.06			1		1 x neg.		-	+	-	-	-
07	x		24.14			2		2 x neg.		-	+	-	-	-
08	x		27.21			1		1 x neg.		-	+	-	-	-
09	x		28.46			7		7 x neg.		-	+	-	-	-
10	x		17.44			1		1 x neg.		-	+	-	-	-
11	x		15.35			5	2x neg.	3 x neg.		-	+	+	-	-
12	x		37.32			8		8 x neg.		-	+	+	-	-
13	x		31.05			1		1 x neg.		-	+	+	-	-
14	x		28.43			2	1x neg.	1 x neg.		-	+	+	-	-
15	x		39.1			3		2 x neg.		-	+	+	-	-
16	x		34.8			2		4 x neg.		-	+	+	+	-
17	x		pos.¶			8		4 x neg.		-	+	+	+	-
18	x		22.6			8		4 x neg.		-	+	+	+	+

* Sixteen patients infected in Germany, two patients infected in China.

† Minimum value (max. Viral load).

‡ RNA-NAT-test, method of RdRP (RNA-dependent RNA polymerase gene)-Gene testing according to Corman et al.⁶

§ Symptoms at the time of testing.

|| Mild rash on chest and legs, minimal inflammation on throat examination; afebrile and normal vital signs during hospital observation.⁴

¶ SARS-CoV-2 RNA (23,600 copies/mL) was only detected in sputum from the lower respiratory tract.

** Low level detection of SARS-CoV-2 RNA (179 copies/mL) in one plasma sample.

+ = present; - = absent; qRT-PCR = quantitative reverse transcriptase polymerase chain reaction; Ct = cycle threshold; ARDS = acute respiratory distress syndrome.

RESULTS

Twelve of the 18 patients were males and six were females. Three patients were asymptomatic, seven presented with flu-like symptoms, five had flu-like symptoms as well as fever, two suffered from pneumonia, and one patient needed artificial respiration because of acute respiratory distress syndrome (ARDS) (Table 1). Three of the 18 patients fulfilled the requirements for blood donation in Germany. Whereas oral swabs or sputum from the lower respiratory tract were tested RT-PCR positive in all patients, RNAemia was only detected in one out of eight serum/plasma samples taken from the patient with ARDS.

DISCUSSION

We presented data on 18 SARS-CoV-2 infected patients, 3 patients without specific symptoms and 15 with symptoms of different severity. SARS-CoV-2 genomes were only detected in 1 of 77 blood samples examined. The patient with RNAemia suffered from ARDS and was artificially ventilated in an intensive care unit. In asymptomatic patients who are eligible for blood donation as well as patients with flu-like symptoms and fever, no SARS-CoV-2 RNA could be detected in the blood or serum despite a clearly positive result in all throat swabs.

Our findings are in line with published data⁸ and confirm that SARS-CoV-2 infection may go without noticeable manifestation of clinical symptoms. Furthermore, Chen et al.⁹ detected SARS-CoV-2 genome in the blood of 6 out of 57 Chinese patients and found RNAemia to be associated with a more severe clinical picture. In addition, detectable serum SARS-CoV-2 RNAemia was found to be closely linked to an elevated interleukin 6 (IL-6) level in critically ill Covid-19 patients.¹⁰

Since there is currently no recognized external standardization of the SARS-CoV-2 RT-PCR methods, a direct comparison of the results of Chinese and German studies is not possible. Of note, RNAemia is not equivalent to infectiousness, i.e., despite the presence of RNA it is unknown whether blood can harbor intact viruses that are able to infect tissues and, when transfused, can cause hematogenous transmission.

Hitherto, similarly to the other two coronaviruses that have emerged over the past 20 years (SARS, the Severe Acute Respiratory Syndrome Coronavirus^{11,12} and MERS-CoV, causing Middle East Respiratory Syndrome,¹³ no hematogenous transmissions have been documented for SARS-CoV-2.

Due to a lack of evidence indicating a risk for transfusion transmission of SARS-CoV-2, the American Association of Blood Banks (AABB), the Food and Drug Association (FDA), and the Centers for Disease Control and Prevention (CDC) are not recommending any action by blood

collection establishments at this time (March 3, 2020).¹⁴ Our data support this recommendation.

CONCLUSION

Among 18 patients with RT-PCR confirmed SARS-CoV-2 infection included in our study only one critically ill individual had RNAemia. Based on these limited data, there is no measurable risk for SARS-CoV-2 transmission through blood components in asymptomatic SARS-CoV-2 infected individuals. As no cases of transmission due to transfusion of blood products have been reported for SARS, MERS-CoV, and SARS-CoV-2, and considering that patients with symptoms of infectious disease will not be admitted to blood donation in Germany, the risk for transfusion transmission of SARS-CoV-2 is supposed to be negligible. However, well-powered studies are needed to further evaluate the potential risk of hematogenous transmission and to determine the appropriate referral time for blood donation of recovered SARS-CoV-2 patients.

CONFLICT OF INTEREST

The authors have disclosed no conflicts of interest.

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