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Title: Post-donation COVID-19 identification in blood donors

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The coronavirus disease 19 (COVID-19) outbreak, which was characterized as a pandemic on 11 March 2020 by the WHO, started in December 2019 with the emergence of pneumonia cases of unknown cause in Wuhan, Hubei, China [1]. SARS-CoV-2, the causative agent of COVID-19, are enveloped, non-segmented, single stranded positive sense RNA viruses and are classified as a sister clade to the prototype human and bat severe acute respiratory syndrome coronaviruses (SARS-CoVs) of the species *Severe acute respiratory syndrome-related coronavirus* [2]. So far, no respiratory virus, including SARS-CoV and the Middle East Respiratory Syndrome (MERS)-CoV, has been confirmed as transfusion-transmissible [3,4]. Huang C et al reported that among the first 41 cases of COVID-19 admitted to hospitals in Wuhan, SARS-CoV-2 RNAemia was detected in six patients (15%) [1]. This is consistent with reports from the Middle East and Korea that viral RNA is detected in about 30% of MERS-CoV cases at the time of diagnosis [5,6]. Presence of SARS-CoV-2 RNA in blood during the pre-symptomatic period or asymptomatic infections remains to be established.

As of 12 March 2020, 217,271 SARS-CoV-2 RNA tests have been performed and 7,869 COVID-19 cases have been identified in Korea, among which 66 patients have died (0.84%) [7]. The Korean Red Cross Blood Services (KRCBS) collects about 2.6 million units annually and covers 94% of the national blood supply. To minimize transfusion transmission of infectious diseases, one-month deferral of donors with a history of overseas travel and obtaining post-donation information were already in place before the COVID-19 outbreak occurred. During the early phase of the outbreak, to mitigate the theoretical risk of transfusion-transmission of SARS-CoV-2 via blood donation from pre-symptomatic COVID-19 cases, precautionary measures already in place were enhanced and donors were requested to report any illness or close contact with a confirmed case prior to donation, or being classified as a suspect case or diagnosed as COVID-19 after donation. With nearly 0.02% of the population being diagnosed as COVID-19, we anticipated that it would be only a matter of time to find COVID-19 cases among recent blood donors.

As of 12 March 2020, seven donors were identified as COVID-19 confirmed cases after blood donation (Table 1). Six donations were whole blood donations that were processed into multiple components and one donation was for source plasma intended for fractionation. As soon as the KRCBS was informed, blood products in inventory were put on hold and those that had been issued to hospitals were retrieved. The source plasma unit was also recalled. Given the short shelf life of platelets, all six platelet units were transfused to six patients. Three red blood cell units had also been transfused to three recipients. One patient died due to causes unrelated to COVID-19. The eight other recipients have not developed any symptoms related to COVID-19 19 to 29 days after receiving labile blood products.

The KRCBS keeps repository samples of all blood donations for ten years. Once COVID-19 cases were identified, repository samples from the COVID-19 cases who donated whole blood were sent to the Korea Centers for Disease Control & Prevention (KCDC) for further investigation and all tested negative for SARS-CoV-2 RNA. Since all repository samples of the COVID-19 donors tested negative for SARS-CoV-2 RNA, the Korean health authorities decided not to perform further investigation in recipients. Independent from the health authority's decision, three recipients were tested for SARS-CoV-2 RNA in nasopharyngeal samples and all tested negative; antibody testing was not done (personal communication).

In conclusion, no recipients of platelets or red blood cell transfusions from donors diagnosed with SARS-CoV-2 infection following donation developed COVID-19 related symptoms or tested positive for SARS-CoV-2 RNA. Therefore, transfusion transmission of SARS-CoV-2 to recipients did not occur. Even though transfusion to these nine

recipients all occurred before the donors developed symptoms or were diagnosed as COVID-19, to prevent blood products being transfused at the earliest possible moment, it is optimal if for blood services to receive the details of all confirmed COVID-19 cases from their health authorities and not solely rely on post-donation information provided by blood donors. As of 9 March 2020, the KRCBS is receiving the list of all COVID-19 cases identified in Korea for cross referencing to donors to trace recipients or recall any blood products not transfused and to apply a three-month deferral for future donations.

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Table 1. Characteristics of donors identified as COVID-19 post-donation and details of transfusion recipients^a

No	Type of donation	Date of donation	Date of symptom onset	Date of COVID-19 diagnosis	Date of post-donation information	Results of SARS-CoV-2 RNA test on donor repository samples	Date of transfusion	Date & results of SARS-CoV-2 RNA test on recipients' nasopharyngeal samples
1	Whole blood	10 Feb 2020	14 Feb 2020 (fever)	21 Feb 2020	26 Feb 2020	negative	13 Feb 2020, PLT	27 Feb 2020, negative
							12 Feb 2020, RBC	10 Mar 2020, negative
2	Whole blood	10 Feb 2020	unknown	25 Feb 2020	26 Feb 2020	negative	12 Feb 2020, PLT	Not done
3	Whole blood	10 Feb 2020	20 Feb 2020 (sore throat)	26 Feb 2020	28 Feb 2020	negative	12 Feb 2020, PLT	unknown
							21 Feb 2020, RBC	24 Feb 2020, negative 27 Feb 2020, negative
4	Whole blood	13 Feb 2020	unknown	22 Feb 2020	25 Feb 2020	negative	14 Feb 2020, PLT	Not done
							21 Feb 2020, RBC	Not done
5	Whole blood	18 Feb 2020	asymptomatic	24 Feb 2020	28 Feb 2020	negative	20 Feb 2020, PLT	Not done
6	Whole blood	20 Feb 2020	23 Feb 2020 (cough)	26 Feb 2020	27 Feb 2020	negative	22 Feb 2020, PLT	5 Mar 2020, negative
7	Source plasma	12 Feb 2020	16 Feb 2020 (nasal stuffiness)	26 Feb 2020	26 Feb 2020	Not done	Quarantined	-

^aAll recipients developed no symptoms related to COVID-19. The recipient who received red blood cells from case No. 1 died on 24 February 2020 due to causes unrelated to COVID-19.