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LETTER TO THE EDITOR

The protective effect of O blood type against SARS-CoV-2 infection

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ABO antigens, which are ubiquitously expressed on the surface of human cells and tissues, have been implied in a wide array of diseases, first of all cardiovascular disorders [1,2]. Recent evidence has suggested a relationship between the ABO blood group and the susceptibility of developing severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [3,4]. In particular, it has been hypothesized that individuals belonging to O blood type are less susceptible to SARS-CoV-2 infection than those belonging to non-O blood groups [4]. The reason for this phenomenon could reside in the presence in O blood group subjects of IgG anti-A isoagglutinins which would prevent the binding of SARS-CoV-2 to its receptor thereby inhibiting the virus entry into the targeted human cells [5]. To verify the protective effect of O blood type against SARS-CoV-2 infection, we have compared the ABO blood group distribution of all donors of convalescent plasma (CP) with that of healthy uninfected periodic volunteer blood donors. During the period between 25 March 2020 and 22 June 2020, 447 consecutive CP donors were enrolled at the University Hospital of Pavia and the City Hospital of Mantova, Lombardy region, Italy. All CP donors were of Caucasian origin and were recovered (clinical resolution of symptoms from at least 14 days with two consecutive negative SARS-CoV-2 RT-PCR nasal swabs) from coronavirus disease 2019 (COVID-19). These subjects were compared with an historical series of 16 911 healthy blood donors from the same geographical area (Table 1, upper section). The two analytical population were comparable in terms of age, whereas as expected an extra representation of males was observed in CP donors. Indeed, in accordance with the Italian transfusion law for the prevention of transfusion-related acute lung injury (TRALI), only nulliparous women can donate CP. The prevalence of O blood type in CP donors was significantly lower than that observed in healthy blood donors of Mantua and Pavia (Table 1). According to these data, the relative risk (and 95% confidence interval) of having experienced SARS-CoV-2 infection in O blood type subjects is estimated as 0·74 (0·6–0·90), thus suggesting the protective role of O blood type towards SARS-CoV-2 contraction. When considering in CP donors the clinical course of the disease, O blood type did not appear as a modulator of the severity of COVID-19 (Table 1 bottom section). Interestingly, considering O and B blood groups together and comparing them with the other blood types, the O blood type-related protective effect disappeared (Table 1). This finding could be in contrast with the hypothesized anti-SARS-CoV-2 activity of anti-A isoagglutinins, which are

Table 1 Comparison of characteristics of observed samples.

Characteristics	CP donors	Healthy blood donors	*P value*[b]
Number	447	16 911	
Mean age (y, ±SD)	47·7±12·1	47·1 ±14·3	0·41
N Males/Females	385/62	10 321/6590	
%Males	86·1	61·0	<0·0001
ABO blood group			
O	162 (36·2%)	7,375 (43·6%)	0·002[c,d]
Non-O	285 (63·8%)	9,536 (56·4%)	
A	207 (46·3%)	7,209 (42·6%)	
B	54 (12·1%)	1,620 (9·6%)	
AB	24 (5·4%)	707 (4·2%)	

	O blood type	Non-O blood type	*P value*[c]
O vs. non-O blood type comparisons in CP donors			
Asymptomatic COVID-19[a]	5/162 (3·1%)	6/285 (2·1%)	0·51
Non-severe COVID-19[a]	145/162 (89·5%)	259/285 (90·8%)	0·63
Severe COVID-19[a]	12/162 (7·4%)	20/285 (7·1%)	0·87

CP, convalescent plasma; SD, standard deviation; y, years.
[a]Patients with SARS-CoV-2 pneumonia requiring hospitalization with mechanical (invasive or not invasive) respiratory support. All the other cases were classified as non-severe.
[b]CP donors vs. healthy blood donors.
[c]O blood type versus non-O blood type.
[d]O and B blood types versus other blood types: $P = 0·06$.

present also in B group individuals. However, the neutralizing effect could be a characteristic of anti-A isoagglutinins belonging to IgG class (predominant in O blood type individuals) and not of those belonging to IgM class (predominant in B blood group subjects).

In conclusion, we documented for the first time the association between ABO blood type and COVID-19 in a homogeneous population of CP donors recovered from SARS-CoV-2 infection, having O blood type subjects a reduced predisposition to become infected.

Conflict of interest

The authors declare no conflict of interests.

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