Table I. Shared identical epitope between Ankyrin 1 and SARS-CoV-2 surface glycoprotein

<table>
<thead>
<tr>
<th>Protein</th>
<th>Accession number</th>
<th>Epitope amino acids</th>
<th>Identity percentage, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARS-CoV-2 surface glycoprotein</td>
<td>NCBI ID: YP_009724390-1</td>
<td>752-LLLQY-756</td>
<td>100</td>
</tr>
<tr>
<td>Ankyrin 1</td>
<td>UniProt ID: P16157</td>
<td>323-LLLQY-327</td>
<td></td>
</tr>
</tbody>
</table>

ID, identifier; NCBI, National Center for Biotechnology Information.


Francesca Angileri1,⁎,†
Sébastien Légare2,⁎,†
Antonella Marino Gammazza4,†
Everly Conway de Macario5
Alberto J. L. Macario5,6
Francesco Cappello6,6

1Cancer Research Center of Lyon, Université de Lyon, Université Claude Bernard Lyon 1, INSERM 1052, CNRS 5286, Centre Léon Bérard, Lyon, 2Département d'Informatique de l'ENS, ÉNS, CNRS, Université PSL, 3Centre de recherche Inria de Paris, Paris, France, 4Department of Biomedicine, Neuroscience and Advanced Diagnostics (BND), University of Palermo, Palermo, Italy, 5Department of Microbiology and Immunology, School of Medicine, University of Maryland at Baltimore-Institute of Marine and Environmental Technology (IMET), Baltimore, MD, USA, and 6Euro-Mediterranean Institute of Science and Technology (EMEST), Palermo, Italy.
E-mail: francesco.cappello@unipa.it

⁎These authors contributed equally to the present work.

Keywords: ankyrin 1, autoantibodies, autoimmunity, COVID-19, molecular mimicry, severe acute respiratory syndrome coronavirus 2

First published online 8 June 2020
doi: 10.1111/bjh.16883

References

COVID-19 and ABO blood group: another viewpoint

Li et al.1 have recently published 'Association between ABO blood groups and risk of SARS-CoV-2 pneumonia', an observation already reported a few weeks ago as a MedRxiv preprint by Zhao et al.2 and which had a certain impact in the press.

In both studies, the ABO blood groups distribution of patients with coronavirus disease 2019 (COVID-19) were compared to that of controls from the local populations that showed that blood group A was associated with an increased risk of infection, whereas group O was associated with a decreased risk. Considering this information rather as a working hypothesis, some scientists have called for caution.3

However, as already strongly suggested by others,4 this variable susceptibility to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection could be linked to circulating anti-A antibodies, which could interfere or even inhibit the virus–cell adhesion process.

We had the idea to analyse these important available data series from the anti-A or -B antibodies viewpoint instead of ABO blood group antigens as the authors did.

In fact, considering the largest series of patients with COVID-19 (N = 1888) analysed by Zhao et al.,5 we compared the proportion of those possessing anti-A in their serum (i.e. those of B and O blood groups) and those who...
Correspondence

Table I. Comparison of subjects with/without anti-A antibodies in their serum.

<table>
<thead>
<tr>
<th>RBC blood group</th>
<th>Control, n (%)</th>
<th>COVID-19, n (%)</th>
<th>( \chi^2 )</th>
<th>( P )</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With anti-A</td>
<td>B and O</td>
<td>2170 (58-7)</td>
<td>927 (52-2)</td>
<td>20-74</td>
<td>&lt;0-001</td>
</tr>
<tr>
<td></td>
<td>A and AB</td>
<td>1524 (41-3)</td>
<td>848 (47-8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without anti-A</td>
<td>A</td>
<td>1188 (32-2)</td>
<td>670 (37-7)</td>
<td>19-97</td>
<td>&lt;0-001</td>
</tr>
<tr>
<td></td>
<td>AB</td>
<td>336 (9-1)</td>
<td>178 (10-0)</td>
<td>4-58</td>
<td>0-0323</td>
</tr>
</tbody>
</table>

Table II. Comparison of anti-A from O and from B subjects.

<table>
<thead>
<tr>
<th>RBC blood group</th>
<th>Control, n (%)</th>
<th>COVID-19, n (%)</th>
<th>( \chi^2 )</th>
<th>( P )</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-A from O</td>
<td>O</td>
<td>1250 (57-6)</td>
<td>458 (49-4)</td>
<td>17-64</td>
<td>&lt;0-001</td>
</tr>
<tr>
<td>Anti-A from B</td>
<td>B</td>
<td>920 (42-4)</td>
<td>469 (50-6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

did not (i.e. those of A and AB blood groups) to the control cohort (\( N = 3694 \); Table I).

The results (Table I) indicate that subjects with anti-A in serum (i.e. B and O blood groups) are significantly less represented in the COVID-19 group than those lacking anti-A whatever the group: A and AB (\( P < 0-001 \)), A (\( P < 0-001 \)) or AB (\( P = 0-0323 \)), whereas there was no significant difference versus circulating anti-B (data not shown).

We then wondered if there was a difference between anti-A from O and anti-A from B, and then we compared the supposed protective effect of anti-A from O and from B (Table II).

Whereas both blood group O and B patients possess circulating seric anti-A, it appears and it is statistically highly significant (\( P < 0-001 \)) that O group patients are underrepresented (49-4 % vs. 57-6%), whereas B group patients are, on the contrary, overrepresented (50-6% vs. 42-4%), meaning that anti-A from O is more protective than anti-A from B.

This latter observation is probably related to the fact that the immunoglobulin predominant isotype of anti-B/anti-A is IgM in serum from group A and B individuals, but IgG in O group serum, an already known notion,\(^6\) which has been well documented by flow cytometry.\(^6\)

In conclusion, this way of analysing the data strongly suggests that the presence of anti-A antibodies in serum and more specifically IgG anti-A, should be considered as a factor more significant than the blood group itself, as far as the relationship between COVID-19 susceptibility and ABO blood groups is concerned.

Far from intending to corroborate the authors' conclusions as such, we wanted to show that the resources of immuno-haematology allow several approaches that could perhaps be useful for the disease follow-up.

Christiane Gérard\(^1\)
Gianni Mappipito\(^2\)
Jean-Marc Minon\(^3\)

\(^1\)Blood Transfusion service, Centre Hospitalier Universitaire, University of Liège and \(^2\)Department of Thrombosis-haemostasis and Transfusion, Centre Hospitalier Régional de la citadelle, Liège, Belgium.

E-mail: gerardchristiane@gmail.com

Keywords: antibodies, blood group serology, COVID-19

First published online 8 June 2020
doi: 10.1111/bjh.16884

References


© 2020 British Society for Haematology and John Wiley & Sons Ltd
British Journal of Haematology, 2020, 190, e57-e94