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Risk factors

Can blood type alter covid-19 risk?

Blood type may affect whether you catch the coronavirus or the severity of your symptoms

Graham Lawton

YOU may have heard that your blood type can protect you against covid-19, or make you more vulnerable. The science suggests that it can do both, a bit, but researchers say that it is too soon to make decisions about personal risk based on your blood group.

The idea that blood type might affect susceptibility to infection by the coronavirus that causes covid-19 began circulating in March after a team led by Jiao Zhao at the Southern University of Science and Technology in China posted preliminary results online.

The team’s starting point was the fact that susceptibility to the SARS coronavirus is affected by blood group, with type O blood more protective against catching it. Other viruses are also blood-group dependent: people with type A blood have been found to be more susceptible to hepatitis B and HIV.

The Chinese team blood-typed 2173 people in hospital with covid-19. They found more in blood group A and fewer in blood group O than in the general population, suggesting type A was associated with a higher risk of infection and type O with lower risk.

Michael Zietz and Nicholas Tatonetti at Columbia University Irving Medical Center in New York found a similar pattern, but only among patients whose blood type was rhesus positive (see “What is a blood type?”, right).

The earlier work on the SARS virus had shown that protection enjoyed by people with type O blood was due to them already having protective antibodies, which may have been a response to immunogenic molecules, or antigens, from other pathogens. These antibodies stopped the SARS virus latching onto a cell receptor called ACE2, which it uses to break into human cells.

Those antibodies seen in people with type O blood appear to have been elicited by antigens very similar to those on type A blood cells. This could explain why people in the type A blood group don’t have these antibodies: even if they had been exposed to the same pathogens as those people with type O blood, their immune systems would recognise the antigens as “self”.

Given the biological similarity of the SARS virus and the novel coronavirus, both teams of researchers speculate that the same mechanism is behind the protective effect. However, susceptibility to infection doesn’t necessarily equate to risk of getting seriously ill.

“There are two separate questions,” says Anahita Dua at Massachusetts General Hospital. “Number one, is blood type related to susceptibility to the virus? The second question is, once you’ve got it, does your blood type make you have a worse outcome?” On the second question, the evidence is “all over the place”, she says, and mostly in non-peer-reviewed research. The New York team, for example, found no association.

Last month, an international collaboration published a peer-reviewed study of 1590 people from Italy and Spain who had gone into respiratory failure while being treated for covid-19 (NEJM, doi.org/gg2pqx). Genome scans showed two variants associated with the severity of their disease.

One was a cluster of six genes with several possible links to the disease, including genes that regulate ACE2; the other was the ABO blood group system. The result is “striking”, says Mark Caulfield at the William Harvey Research Institute in the UK, but needs to be replicated.

The latest research by Dua’s group hasn’t helped to clear up the confusion. They analysed medical data from thousands of people with covid-19 in the Boston area (Annals of Hematology, doi.org/gg4sc7). “We looked at blood type and severe disease and death, and we found no association,” says her colleague Christopher Latz. However, says Dua, the possibility cannot be ruled out and, if it is real, would be a useful tool in assessing patients’ prognoses. “But more research is needed to come to a thorough conclusion,” says Latz.

What is a blood type?

There are two main blood groupings in humans, called ABO and rhesus. Both are genetically determined. The ABO system has three gene variants known as alleles: A, B and O. Each of us inherits two, one from each parent. A and B are dominant and O is recessive, so people who inherit two Os are blood group O and everybody else is either A (AA or AO), B (BB or BO) or AB.

Rhesus is similar, but has only two alleles, Rh+ (dominant) and Rh- (recessive). The groupings are independent of each other so somebody who is A can be either rhesus positive or rhesus negative, for example.

Blood types are expressed as molecules on the surface of red blood cells. There are four types of these molecules: O, A, B and Rh+. Rh- is simply the absence of Rh+. Everybody has the O type regardless of their blood group, which is why O-negative blood can be transfused into anyone. But the wrong blood type – say, somebody who is O or B being given type A blood – will provoke a violent immune response.

Blood vials in a Dutch lab being tested for coronavirus antibodies

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