Platelets found to be involved in coagulation and host defense, possibly also in case of coronavirus

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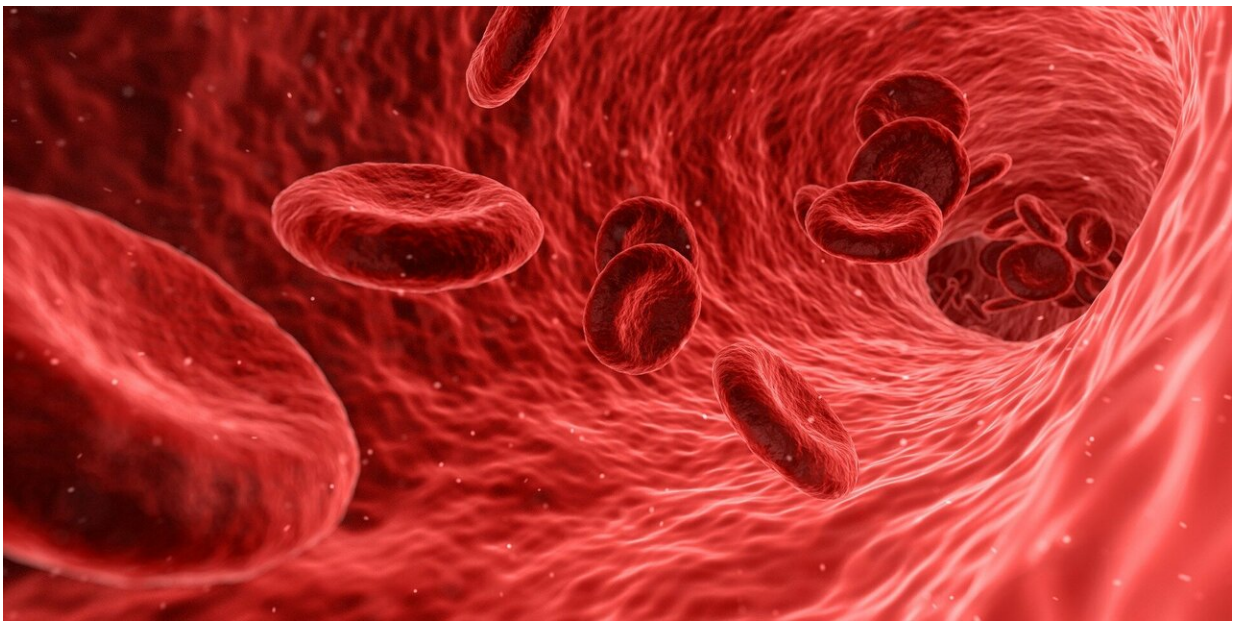

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Platelets are involved in blood coagulation and the development of thrombosis. Researchers from Utrecht University, UMC Utrecht, and Erasmus MC have now discovered that they also play a role in the immune system: They appear to be indispensable in protecting the respiratory system against pathogens. "In patients with flu, the platelets absorb virus particles from the lungs, after which they return to the

bloodstream," says lead researcher Erhard van der Vries. This insight is also important for research into coagulation and acute cardiovascular problems in COVID-19 patients, such as strokes and blood clots in the pulmonary vessels.

The researchers investigated how platelets absorb virus particles. That process appears to depend on the binding of flu viruses to sugar molecules on the blood platelets. Their research shows a direct relationship between the degree of virus binding and the severity of the flu: the stronger the virus binds to the blood platelets, the more severe the flu.

This discovery also explains why a respiratory infection such as influenza or COVID-19 can lead to acute platelet loss (thrombocytopenia). The role of platelets in infections with a flu virus was not previously known. This knowledge may also have consequences for research into coagulation problems and acute cardiovascular problems in COVID-19 patients, such as blood clots in the pulmonary vessels or strokes.

Key role

That there is a relationship between respiratory tract infections and acute cardiovascular events was already known. For example, the weekly mortality rate linked to cardiovascular events shows a seasonal pattern, which coincides with the annual flu season. Conversely, elderly people who get the flu shot are 20 percent less likely to end up in hospital because of cardiovascular events or a stroke. The researchers expect to see the same relationship in COVID-19 patients. The double function of blood platelets—in blood coagulation and in the immune system—may play a key role in this.

Van der Vries says, "We know from international research that the flu

shot greatly reduces the risk of acute cardiovascular diseases, such as strokes. The mechanism behind this was hitherto unknown. This research shows that an early immune response of platelets plays an important role during the flu. However, the same immune response can also lead to complications in certain situations. This seems to be the case, for example, in COVID-19 patients, where the immune response can also lead to a pulmonary embolism, causing patients to end up in the ICU. We now want to investigate this further in animals and humans with a multidisciplinary team of virologists, hematologists and immunologists."

Blood tests

The role of platelets in the immune system requires further investigation. An important question that the researchers still hope to answer is when platelets end up in the lungs during the flu, where they then go and how they share their collected virological information with other immune cells. Hospitals can also specifically look at the relationship between respiratory tract infections and platelet information from blood tests. This data may possibly help in the diagnosis of pneumonia.

The findings of this research may also contribute to the development of new therapies for acute cardiovascular problems and the prediction of complications in respiratory tract infections. In the long term, they may also help in the development of better vaccination strategies.

More information: Erhard van der Vries et al. Influenza-induced thrombocytopenia is subtype and sialoglycan receptor dependent and increases with virus pathogenicity - Platelets mediate influenza clearance. *Blood Advances* (2020). DOI: 10.1182/bloodadvances.2020001640