£1.6 million study aims to understand why COVID-19 vaccines can lead to rare instances of blood clotting with low platelets

**£1.6 million study reveals how COVID-19 vaccines could lead to blood clotting**

A new programme of work led by the University of Liverpool is seeking to understand the very rare, but very serious, condition of blood clotting with low platelets in the general population, in COVID-19 infection, and potentially following vaccination.

The vast majority of people who experience a side effect from COVID-19 vaccination have  only mild reactions lasting for two or three days. However, in March 2021 reports of small numbers of people being admitted to hospital predominantly after the AZ vaccine with what could potentially be a very rare side effect of vaccination began to emerge. These people had blood clots in the major veins in the brain, abdomen, or elsewhere in the body, but at the same time a low level of platelets – which are responsible for clotting – in the blood.

The researchers, from eleven different institutions, supported by a wide range of collaborators within the NHS and national agencies, will work together to study the mechanisms underlying the occurrence of blood clots with low platelets – known as thrombotic thrombocytopenia syndrome (TTS).  This project is supported by the National Institute for Health Research and backed by £1.6 million of government funding from the Vaccine Taskforce.

[Chief Investigator Professor Sir Munir Pirmohamed](https://www.liverpool.ac.uk/systems-molecular-and-integrative-biology/staff/munir-pirmohamed/) said: “The combination of blood clots with low platelet levels is very rare, and although it has been reported previously - including before the pandemic - the clusters of cases were unusual and an association with the vaccines was suggested. It is important to note that the vast majority of individuals given the vaccine do not develop TTS - but between 1 in 100,000 and 1 in a million do. We do not yet understand why a vaccine that is safe for almost everyone can cause TTS in particular individuals.

“Our research will help understand why COVID-19 vaccines can lead to TTS in rare cases.”

The researchers and doctors from across the UK will combine expertise in many different areas to understand the biology behind TTS and develop solutions to prevent and treat TTS.  This will involve using information in electronic health records to understand underlying diseases, vaccine safety and effectiveness, explore how the immune system and the genes controlling the immune system respond to viral infection and vaccination, understand how and why blood clots form and the effectiveness of treatments for people who suffer these rare blood clots.

They will work with people who have recovered, or are recovering from TTS, and their families to make sure that their voice is heard.

The project will:

* Investigate how common TTS was: before COVID-19; in those who have been vaccinated against COVID-19 and in those suffering from COVID-19.
* Understand why a very small number of those vaccinated against COVID-19, and also those with COVID-19 itself, develop blood clotting disorders.
* Investigate the changes in the body that lead to the unique combination of blood clots and low platelet count seen in TTS.

Professor Andy Ustianowski, NIHR Clinical Lead for the COVID-19 Vaccination Programme and Joint National Infection Specialty Lead, said: “The benefit of COVID-19 vaccines still far outweighsthe risks, but it’s important we understand more about the biology behind TTS and why COVID-19 vaccines can lead to it in these rare cases.

“This research is vital to help find some answers to prevent and treat TTS, and further improve the safety of current and future vaccines.”

Dr June Raine, MHRA Chief Executive said: “We welcome this important study. Whilst reports of blood clots together with low levels of platelets are extremely rare, understanding more about what has caused this very rare condition will allow us to further improve the safety of COVID 19 vaccines.

“We ask those who suspect they have experienced any side effect linked with their COVID-19 vaccine to report it to the Coronavirus Yellow Card website. This provides vital safety information needed to carry out our work.”

The project partners include: Barts Health NHS Trust, the University of Birmingham, the University of Bristol, British Heart Foundation Data Science Centre led by Health Data Research UK, the University of Cambridge, Cardiff University, University College London, the University of Edinburgh, Queen Mary University of London and the UK Health Security Agency.