

Summary of Scientific Report – Stage III

In the context of the COVID-19 pandemic, it has been observed that a major complication arising from SARS-CoV-2 infection is thrombosis (especially venous thrombosis), although the link between the two conditions has not yet been fully elucidated. The Post-COVID syndrome affects over 65 million people globally. Post-COVID patients, like those suffering from acute COVID-19 infection, are predisposed to thrombotic conditions. Therefore, it is essential to understand the mechanisms causing thrombosis in these patients. Building on the expertise and results obtained during the VWF-dependent platelet 'priming' potentiates novel leukocyte interactions and mediates NETosis under flow doctoral research conducted at Imperial College London (2020), the aim of this postdoctoral project is to investigate the phenotype of platelets and neutrophils in COVID-19 patients to better understand their connection with thrombosis. The results from this project could elucidate the mechanisms involved in associated thrombosis and Post-COVID syndrome.

To achieve this goal, in this stage of the project, 21 samples from COVID-19 patients were analyzed. These samples underwent phenotypic analysis using the Western blotting method to test the hypothesis that COVID-19 patients exhibit hyperactivity at the level of platelets and/or leukocytes. Additionally, samples from COVID-19 patients were sequenced to analyze the presence of a genotype-phenotype correlation. Although initially only the analysis of the rs2288904-A polymorphism of the SLC44A2 gene was planned, we also sequenced other genes of interest associated with an increased risk of thrombosis – VWF, ADAMTS13, ITGA2, ITGB3, FGG. In this stage, the pre-existing university database was also studied, analyzing biomedical data related to comorbidities, blood markers, the genome of the SARS-CoV-2 virus, the severity of COVID-19, and the presence of a thrombotic episode for the selected patients, with the aim of finding potential correlations.

In accordance with the project implementation plan, all planned activities have been carried out, and the anticipated outcomes for this stage of the project have been fully achieved. These include the Scientific Report (this report), a presentation at a scientific event ("Predisposition to Thrombosis in COVID-19 and Post-COVID Syndrome" at the National Conference "The Importance of Multidisciplinarity in Medicine: Innovative and Integrative Approaches in Ensuring Successful Medical Practice," November 23-25, 2023), and the project's website (<http://plincovt.usv.ro/>). Additionally, I have been invited to present at a webinar organized by the International Society on Thrombosis and Haemostasis (ISTH) with the paper "Thrombosis beyond acute COVID-19 – Thrombogenicity in Post-COVID-19 Syndrome" (November 2023). Two review articles have been published in Q1-indexed ISI journals – "Frontiers in Immunology" ("The knowns and unknowns of Long COVID-19: from mechanisms to therapeutical approaches") and "International Journal of Molecular Science (IJMS)" ("Molecular Mechanisms Involved in the Occurrence and Progression of Long COVID and Associated Analysis Techniques").