

## **Project 1.7 Specific immune signatures of T cells as biomarkers of the post-COVID Syndrome and predictors of long-term health dysfunctions and possible therapeutic interventions**

**Supervisor:** Katarzyna Piwocka PhD, DSc; [k.piwocka@nencki.edu.pl](mailto:k.piwocka@nencki.edu.pl)

**Laboratory:** Laboratory of Cytometry

**www:** [www.nencki.edu.pl](http://www.nencki.edu.pl) <https://piwocka-lab.nencki.edu.pl/>

### **Background:**

Many COVID-19 convalescents who recovered from infection, including the mild one, still experience severe symptoms that last even longer than 3 months. Recently, WHO defined criteria for post-COVID Syndrome and presented a list of symptoms, which include respiratory and circulatory problems, chronic fatigue, neurological symptoms, such as taste and smell problems, cognitive dysfunctions (“brain fog”), depression, metabolic disorders as well as blood clotting and thrombotic complications. All those symptoms can severely affect health and life. The cause of the post-COVID Syndrome is still not clear, however broad-spectrum of clinical manifestations associated with the involvement of multiple organs indicates a systemic illness, and immune system deregulation and dysfunctions are proposed as one of the major contributors. Understanding mechanisms, identification of prognostic and diagnostic markers, also to predict the possible severe health problems to implement adequate treatment, is absolutely critical and urgent for the future perspective of the post-COVID era.

### **Aim:**

We hypothesize that the specific immune signatures might be related to different symptoms of the post-COVID Syndrome, appearing after either mild or severe SARS-CoV-2 infection. This might be a potential biomarker of the post-COVID Syndrome, but also can serve as predictor of long-term post-COVID health dysfunctions, which seem to depend on the immune system dysfunction. In this project advanced multiparameter flow cytometry analysis of immune cells, together with unsupervised cluster bioinformatics analysis will be used. Moreover, big data analysis of open repositories including genome screen will be utilized. Studies include collaboration with national and international scientific and medical institutions.

### **Requirements:**

- high motivation, curiosity and passion for research,
- accomplished master degree in biology, biotechnology, medical studies or related,
- bioinformatics skills, including flow cytometry data analysis (FLOJo, SPICE, R packages), unsupervised/supervised machine learning, dimensionality reduction method,
- experience with open databases,
- experience in unsupervised analysis of multiparameter flow cytometry data will be big advantage,
- experience in laboratory work in the area of cellular/molecular biology/immunology,
- research achievements (publication, abstracts, presentations etc),
- good English skills

We suggest that interested candidates contact the principal investigator, dr. hab. Katarzyna Piwocka, before submitting the documents, in order to discuss the detailed aspects of the research