

PROJECT

Tutor's Name	Prof.ssa Sofia Pavanello
Cotutor's Name	Dr.ssa Manuela Campisi

1) Project title

Long COVID-19 asymptomatic or pauci-symptomatic and biological aging

2) Abstract (max 500 words)

The clinical picture of the overt COVID-19 disease has now been described and some information is available on consequences of the disease based on the follow-up of the first patients. However, it is not known whether for those who have had asymptomatic or pauci-symptomatic infection, that did not require hospitalization, there are consequences on health and biological aging. The majority of healthcare professionals who test positive for SARS-CoV-2 fall into the two categories of asymptomatic or pauci-symptomatic. They represent a useful group for monitoring any consequences of the infection that didn't result in a full-blown and serious clinical picture.

In this study we aim at investigating three main questions:

1) How many asymptomatic and pauci-symptomatic individuals get long term effects of COVID-19 and who is most at risk?

2) What is the underlying biology of long COVID with particular attention to the biological aging?

To answer to the first question in our study we will identify occupational, environmental and lifestyle factors that may contribute to infection and interact with medical conditions, immunological profile and genetic susceptibility to influence and modulate SARS-CoV-2 infection.

To answer to the second question we will evaluate: biological age [measuring telomere length (TL) and DNA methylation Age (DNAmAge)], in target tissues of the SARS-COV-2 infection, i.e. lung and nasal epithelium, and at systemic level (i.e. blood), pulmonary function, cardiac assessment, immunological profile and work ability.

Study population will consist of healthcare workers of the University–Padova Hospital resulted positive for SARS-CoV-2 molecular swab [during the first wave (February -May, 2020) and during the second wave of the SARS-CoV-2 outbreak (October 2020 - January 2021)]. This cohort will be compared with a positive control group that consist of patients (at least n=20 matched by age and gender) hospitalized for severe COVID-19 and followed by the Respiratory medicine Unit of DCTV.

Results of the present project could lead to the identification of the most vulnerable workers and those at higher risk for medium-long term sequelae of COVID-19 infection, with the final aim to address them to a tailored prevention, rehabilitation and return to work program.

Results on biological age in the primary target organ (i.e. lung and nasal cells) and at a systemic level (i.e., blood) in SARS-CoV-2 infection will open new pathways for research on disease treatment and in the COVID-19 consequences in the medium-long term.

Understanding the role of multiple single nucleotide polymorphisms ACE2, TMPRSS2 and of the novel target polymorphic TRPV1 receptor in COVID-19 susceptibility will be the key to design not only preventive but also therapeutic strategies in SARS-CoV-2 infection.

Furthermore, we will apply artificial intelligence and machine learning to analyze data in order to create a system that supports interactive clinical decision in the field of long-term management and biology of COVID-19.