Muscle weakness and exercise (in)tolerance in Long-COVID patients: mechanistic bases and predictive biomarkers - CODICE -20228M8BMN

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Long-term health consequences of COVID-19 remain unknown, but reports suggest that prolonged symptom duration and limitations in functioning are common among hospitalized as well as non-hospitalized adults and children. The spectrum of long-lasting symptoms is wide and varies from mild discomfort to severe adverse effects on physical, cognitive, and psychosocial health, with important wider implications on functioning, including employment and school attendance. Some of the most reported symptoms are fatigue, weakness, and exercise intolerance, which persist even in non-hospitalized patients with COVID-19 mild disease for several months after recovery.

With millions of people affected by COVID-19, even a small percentage developing the Long-COVID condition will result in a detrimental effect on society and public health, with many people in need of long-term follow-up, management, and support. This project will provide functional and molecular biomarkers associated with fatigue and exercise intolerance in Long-COVID patients. This will help to monitor people after infection with the SARS-CoV-2 virus identifying those at risk of long-term problems. In addition, the understanding of the mechanisms underlying functional impairment in Long-COVID condition has implications for developing intervention strategies to counteract and limit the clinical consequences, leading to improved quality of life for many patients and decreased cost for the National Health Systems. The possibility of obtaining molecular parameters is also important because they offer a fast and an unbiased method for diagnosis and prognosis. In particular, the combination of data derived from metabolomics and miRNomics depicts a more defined picture of the mechanisms involved in Long-COVID functional impairment. Furthermore, they will be very helpful for monitoring changes in Long-COVID phenotypes. Of interest will also be the possibility of using serum molecular determinants to avoid the invasiveness of muscle biopsies and use the parameters indicated by a less invasive and easy-to-use matrix like serum. Long-COVID management would highly benefit from unbiased molecular biomarkers. Often, the individual response to intervention strategies is highly variable and sometimes unpredictable, due to the absence of a standardized way to assess which model would best suit which patient. Since biomarkers can identify and quantify the molecular components produced during biological processes, they have become an essential tool for phenotyping patients. Specifically, they can map molecular pathways altered in Long-COVID, thus having a key role in monitoring treatment response. Such a personalized approach will prompt an optimal use of healthcare resources.