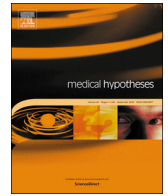




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## Letter to Editors

## Diabetes and severity of COVID-19: What is the link?



## A B S T R A C T

In Diabetes Mellitus the loss of capacity to regulate immunity, the reduction of pulmonary functions and the pro-thrombotic state determine the severity of COVID-19.

Diabetes could be a risk factor for severity in patients with Covid-19. Acute respiratory distress syndrome and Disseminated Intravascular Coagulation usually occur in the second week of the disease, concomitantly with cytokine storm and hypercoagulable state [1].

Diabetes could contribute to the loss of capacity to regulate immunity. The dysfunction of the autonomic nervous system might determine the pro-inflammatory state in diabetic Covid-19 patients, as a result of a dysregulation of the inflammatory reflex, where vagal afferent fibres, receiving sensory inputs from the immune cells, activate vagal efferent fibres, responsible for mitigating macrophage activation [2].

Furthermore, diabetes is associated with structural alterations in the lung, as the thickening of the pulmonary basal laminae and of the alveolar epithelium, concurrent with reduction of DLCO [3]. Other aspects are a higher prevalence of a restrictive spirometry pattern and a decreased respiratory muscle endurance [4]. These abnormalities might worsen conditions associated with increased pulmonary demands, such as respiratory infections [4]. In addition, Diabetic Autonomic Neuropathy could induce functional alterations in the regulation of bronchomotor tone and in the control of ventilation [3].

Finally, diabetes mellitus is considered a pro-thrombotic state in which hyperglycemia and inflammation directly contribute to abnormal platelet activation, higher concentration of fibrinogen and other coagulation factors [5]. Moreover generation of AGEs and ROS leads to an endothelial injury, with an increased levels and structural alterations in von Willebrand factor, that are associated with thrombotic angiopathies [6]. In Covid-19, which may be associated with both venous and arterial thromboembolic disease, due to inflammation, hypoxia, immobilization, and disseminated intravascular coagulation [7], diabetes could further contribute to hypercoagulable state.

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## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.mehy.2020.109923>.

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