

## LETTERS TO THE EDITOR

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## Unexpected phenomenon of hyperthyroidism as a probable cause of cardiovascular complications in elderly post-COVID-19 patients without prior thyroid pathology

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel RNA beta-coronavirus which causes the coronavirus disease-19 (COVID-19). According to the latest data cardiovascular complications of COVID-19 in patients without prior cardiovascular disease include acute cardiac injury or myocarditis, heart failure, arrhythmias, and acute coronary syndromes.<sup>1</sup> The recent data presented at the European Society of Cardiology (ESC 2020) Congress showed that patients with COVID-19 tended to have a high mortality and cardiovascular complications.<sup>2</sup>

Considering the above facts, we would like to offer a few cases for discussion. The observed patients underwent non severe COVID-19, complicated by polysegmental pneumonia, one month before admission to the cardiology department. In all patients the disease proceeded with a normal oxygen saturation level and without oxygen support need. The treatment of COVID-19 was carried out according to the existing protocols, the appointment of steroids was not required. By the time to admission PCR test for the virus RNA SARS-CoV-2 test was negative. Previously, they had no thyroid pathology, and the estimation of hyperthyroidism was an unexpected finding.

The first case is represented by a 79-year-old man with chronic ischemic heart disease had a history of acute myocardial infarction and coronary stenting. He was admitted to the cardiology department with paroxysm of atrial fibrillation, the right bundle branch full block and suspected pulmonary embolism. An unexpected finding was the detection of thyroid-stimulating hormone in a titer of 0.0003 U/mL, the result was double-checked.

The second case is represented by a 68-year-old woman was admitted to the cardiology department with paroxysmal atrial fibrillation. She subsequently suffered sudden cardiac arrest. Posthumously, the result of thyroid-stimulating hormone determination was obtained - 0.00005 U/mL. The third case is represented by a 72-year woman with persistent atrial fibrillation was admitted for correction of the rhythm and heart rate. She also had a

low level of thyroid-stimulating hormone (0.00004 U/mL). An ultrasound examination of the thyroid gland was performed to all mentioned patients, which confirmed the absence of thyroid gland structure changes.

These findings suggest that post COVID-19 elderly patients may favor the development of hyperthyroidism. Thus, above patients are united by age, rhythm disorders and hyperthyroidism in the long-term period after COVID-19 undergoing and the absence of previous thyroid pathology.

The observed cases led to further analysis of the recent literature concerning the potential pathogenetic mechanisms of hyperthyroidism in post COVID-19.

As known patients with severe COVID-19 might have a cytokine storm characterized by hyperactivity of Th1/Th17 immune response with increased production of pro-inflammatory cytokines.<sup>3</sup> The cytokine response in COVID-19 seems to resemble the immune activation that accompanies inflammatory thyroid diseases.<sup>4</sup> Alterations of thyroid function and structure were reported in patients with COVID-19, but the mechanisms are still unknown whether a similar involvement may occur also during post COVID-19 period.<sup>5</sup> The observed hyperthyroidism in the examined patients may also be associated with the use of amiodarone. Perhaps, given these mechanisms, the heart rate control strategy is more rational in these patients, which requires further research.

Based on review of recent articles on the pathophysiology of SARS-CoV-2 infection in the pituitary-thyroid axis and our own observations, we suggest routine assessment of thyroid function in the postponed COVID-19 elderly patients with cardiovascular pathology, as they frequently demonstrate thyrotoxicosis in the long term. These findings are important to diagnose and adapt treatment in these patients.

An understanding of the pathophysiological involvement of thyroid gland in post-COVID-19 elderly patients may cause correct appropriate management of thyroid dysfunctions, in particular thyrotoxicosis and arrhythmias in post-COVID-19 period. Future prospective studies are needed to improve clinical knowledge and optimize the management of cardiovascular complications in post-COVID-19 elderly patients.

Olexandr KURYATA<sup>1</sup>, Oksana SIRENKO<sup>1\*</sup>,  
Olena GAVVA<sup>2</sup>, Dmytro CHVORA<sup>3</sup>

<sup>1</sup>State Establishment "Dnipropetrovsk Medical Academy of Health Ministry of Ukraine," the Department of Internal Medicine 2, Dnipro, Ukraine; <sup>2</sup>Dnipropetrovsk Regional Hospital after Mechnicov, COVID-19 Department, Dnipro, Ukraine; <sup>3</sup>Dnipropetrovsk Regional Hospital after Mechnicov, Department of Cardiology, Dnipro, Ukraine

\*Corresponding author: Oksana Sirenko, State Establishment "Dnipropetrovsk Medical Academy of Health Ministry of Ukraine," the Department of Internal Medicine 2, Dnipro, Ver-nadsky str. 9, 49044 Ukraine. E-mail oksanasirenko@i.ua

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## Italian Health System stressed by COVID-19: the need for a change

On March 21, colleagues of Bergamo of the Giovanni XXIII Hospital, who are going to face the COVID-19 outbreak wrote a contribution titled "At the Epicenter

of the COVID-19 Pandemic and Humanitarian Crises in Italy: Changing Perspectives on Preparation and Mitigation" on *NEJM Catalyst*.<sup>1</sup> Colleagues have highlighted that a community-centered care is needed for preventing the further epidemic outbreaks. The concept of a community-centered health care would imply that non-critical patients would be not cared at emergencies and at the hospitals. All Italian physicians could agree with this key-point (even before the COVID-19 time) and, among all, us. However, the community-centered health care is not in line with Italian people perspectives of health. Italian people are aware that their health is preserved by the State without direct charge for them. This causes an overuse of hospital settings and emergencies, as they are free, quick, and perceived by patients as better than the in-office and general practitioners' care. For example, on March 29, I wanted to discharge a pregnant woman from the hospital. She was admitted for suspected preterm delivery some days before. I counseled her on harms of unnecessary hospital stay, as preterm delivery was not onset. She was worried to go home, in spite of risk of in-hospital SARS-CoV-2 contagion (and, of course, in spite of risk of immobility complications and antimicrobial resistant bacteria colonization). Briefly, I was unable to discharge her. As Italian citizens aim to be cared at the hospitals, several small hospitals were displaced in Italy to allow easy hospital access. Hospitals are not linked in a network and make redundant care. This is the patient-centered health care model reported by Nacoti *et al.*<sup>1</sup> The patient-centered health care is wanted by politic regional governance of Italian Health System. Lack of regional expertise reported by Nacoti *et al.*<sup>1</sup> is also explained by politic regional governance. Additionally, regional governance impacts with Italian central laws, posing barriers to improve quick acts for containing and caring the infected and non-infected patients. Therefore, the Italian Health System is locked and trapped in its people perspectives. Changes of Italian people perspectives and changes of Italian law should be mandatory for Italian Health System improvement.

Ugo INDRACCOLO<sup>1</sup> \*, Piergiorgio FEDELI<sup>2</sup>

<sup>1</sup>Maternal-Infantile Department, Alto Tevere Hospital, ASL 1 Umbria, Città di Castello, Perugia, Italy;  
<sup>2</sup>School of Law, Section of Legal Medicine, University of Camerino, Camerino, Macerata, Italy

\*Corresponding author: Ugo Indraccolo, Maternal-Infantile Department, Alto Tevere Hospital, ASL 1 Umbria, Via Paolo Veronese 2/c, 06024 Gubbio, Perugia, Italy.  
E-mail: [ugo.indraccolo@libero.it](mailto:ugo.indraccolo@libero.it)

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