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LETTER TO THE EDITOR

Gustatory dysfunctions in COVID-19

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Dear Editor,

We thank Dr Bigiani [1] for this letter entitled "Gustatory dysfunctions in COVID-19 patients: possible involvement of taste renin-angiotensin system (RAS)" which is related to our paper [2]. Based on an experimental study reporting expression of Angiotensin Converting Enzyme-2 (ACE2) in taste organs of mouse, the author thinks that ACE2 could have a key role in the development of taste dysfunction in COVID-19 patients. Overall, the letter highlights the importance to consider gustatory impairment in COVID-19 patients.

Since the outbreak of the pandemic, a particular attention has been paid to loss of smell, leaving out, in many studies, gustatory dysfunction. However, in clinical practice, COVID-19 patients report a significant impact of gustatory dysfunction in their quality of life. They typically report that things "tasted like cardboard". As proposed by Dr Bigiani, we believe that gustatory dysfunction, defined as the impairment of salty, sweet, bitter and sour, could be related to the virus spread into the nerve ending of the taste buds of the oral cavity. Pure taste disorders are rare and represent only 5% of specialized smell and taste consultation [3]. Upper respiratory tract infection is one of the most frequent suspected etiology in these cases, but remains largely under investigated [3]. In the particular case of COVID-19, ACE2 receptors has been identified in the oral cavity in humans with high expression level in the tongue [4], supporting the hypothesis that viral infection and inflammatory response may lead to disruption of saliva composition, normal taste transduction or the continuous renewal of taste buds [5].

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Moreover, the virus is known to present a neurotropism, which may contribute to olfactory and gustatory dysfunction [6] and some neurological manifestations [7]. It could be possible that central lesions, caused by propagation of the virus through the olfactory pathways, lead to taste dysfunction. There is many overlapping brain areas between taste and olfactory system. One of them is the frontobasal regions, which is close to the olfactory bulbs that also express ACE2 receptors in their vascular pericytes. Inflammatory damage to this region may alter both senses, namely taste and olfactory function. The neurological damage caused by the virus is also supported by the findings of our last study, in which 20% of COVID-19 patients with anosmia did not recover within 2-month following the onset of olfactory dysfunction [8]. The lack of recovery of both taste and smell after weeks or months may support the occurrence of neurological damage due to extensive inflammation in these regions. Currently, there are few studies investigating the assessment of taste with electrophysiological or psychophysical tools. The prevalence of self-reported taste dysfunction, defined as altered perception of salty, sweet, bitter or/and sour, could reach 56.4% of patients [9]. However, we are aware that self-reported taste dysfunction might be unreliable and could be often confounded with loss of aroma perception, which is normally detected by the olfactory system. In contrast, patients who report having an intact sense of taste, usually do not have a deficit in taste function [10]. Despite the clear need for formal testing rather than self-reporting, we could hypothesize that at least half of the patients with COVID-19 should have an intact gustatory function.

The letter of Dr Bigiani and the current patient-reported outcome questionnaire findings of the literature [10, 11] support the need to conduct future studies using at least psychophysical or electrophysiological taste evaluation by using Taste strips or electrogustometry [12] in COVID-19. The study of recovery rate of gustatory function is still important and has to be considered in these studies according to the substantial number of patients who report this issue in clinical practice. Future studies have to be carefully designed to discriminate smell, taste and altered aroma perception, which may be confounded by a large number of patients.

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Compliance with ethical standards

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