



Gustatory dysfunctions in COVID-19 patients: possible involvement of taste renin-angiotensin system (RAS)

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Cough, fever, and shortness of breath are the most frequent symptoms of the current pandemic of Coronavirus disease (COVID-19). Several observations indicate that also other symptoms may be associated with this infection. Perhaps the most astonishing one is an alteration or even a loss of the sense of taste [1]. This finding is quite unexpected since SARS Coronavirus 2 (SARS-CoV-2), which is responsible for COVID-19, targets preferentially lungs, causing in the worst scenario life-threatening pneumonia. Taste depends on the activity of specialized epithelial cells, the taste cells, located mainly in the tongue mucosa. Thanks to these sensory cells we can recognize sweet, bitter, salty, and sour qualities in food and beverages. Then, what taste has to do with COVID-19? Why taste is impaired in some COVID-19 patients? In pulmonary tissue, SARS-CoV-2 interacts with a membrane protein, Angiotensin Converting Enzyme 2 (ACE-2), to enter the host's cells [2]. ACE-2 degrades angiotensin II, a hormone produced by the systemic renin-angiotensin system (RAS). Recent findings have shown that RAS components as well as ACE-2 are expressed in mouse taste organs [3]. Besides the role of local RAS in modulating the activity of taste cells, the occurrence of ACE-2 in these sensory structures provides a possible explanation for the taste disorders in COVID-19 patients. Namely, SARS-CoV-2 might enter taste cells via ACE-2: as a consequence, the normal functioning of these sensory cells would be disrupted, leading to alterations or loss of taste perception.

Compliance with ethical standards

Conflict of interest The author has no conflicts of interest.

References

- Lechien JR, Chiesa-Estomba CM, De Santi DR, Horoi M, Le Bon SD, Rodriguez A, Dequanter D, Blebic S, El Afia F, Distinguin L, Chekkouri-Idrissi Y, Hans S, Delgado IL, Calvo-Henriquez C, Lavigne P, Falanga C, Barillari MR, Cammaroto G, Khalife M, Leich P, Souchay C, Rossi C, Journe F, Hsieh J, Edjali M, Carlier R, Ris L, Lovato A, De Filippis C, Coppee F, Fakhry N, Ayad T, Saussez S (2020) Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. Eur Arch Otorhinolaryngol. <https://doi.org/10.1007/s00405-020-05965-1> [Epub ahead of print]
- Ceccarelli M, Berretta M, Venanzi Rullo E, Nunnari G, Cacopardo B (2020) Differences and similarities between severe acute respiratory syndrome (SARS)-coronavirus (CoV) and SARS-CoV-2. Would a rose by another name smell as sweet? Eur Rev Med Pharmacol Sci 24:2781–2783. https://doi.org/10.26355/eurrev_202003_20551
- Shigemura N, Takai S, Hirose F, Yoshida R, Sanematsu K, Ninomiya Y (2019) Expression of renin-angiotensin system components in the taste organ of mice. Nutrients 19 11(9):pii: E2251. <https://doi.org/10.3390/nu11092251>

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