

Evaluation of Olfactory function in COVID-19

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Recent data have reported the presence of Sars-Cov-2 in the brain and cerebrospinal fluid of patients, providing an explanation of the clinical finding that affected individuals might experience neurological symptoms (1, 2). One of the most striking and recurrent neurological signs is persistent loss of smell and taste, whose severity is predictive of the infection clinical outcome (). Although, little is known about how the virus causes persistent anosmia, the olfactory system has been demonstrated to constitute a way of access for the virus to the brain, with electron microscopy identification of viral particles across multiple CNS areas receiving olfactory innervation. Our aim is to validate anosmia as an early symptom of Covid-19 infection and to correlate the extent of olfactory sensitivity loss with the severity of global clinical manifestations. The rationale is supported by our preliminary data on the frequency of smell/taste loss in severe COVID-19 by objective testing (3), demonstrating that 95% of patients were affected by smell dysfunction, while 47% were affected by taste dysfunction. Furthermore, the majority of CoViD-19 patients report severe anosmia and the severity of the olfactory impairment correlate with symptom onset and hospitalization. This suggests that hyposmia, severe hyposmia, and anosmia may relate directly to infection severity and neurological damage. Patient evaluation is in collaboration with the University of Chieti ("Ss. Annunziata" Hospital) and Versilia Hospital as in our preliminary report (4). Control groups (CoViD- 19 negative) include either positive controls (subjects affected by chronic inflammatory diseases) or negative controls (healthy subjects). The test consists in a logarithmic scale of n-butanol to assess by positive answer: normosmia, hyposmia, severe hyposmia or anosmia. The white odorless vial is the test's negative control. Gustatory test consists in a disposable homemade two-item suprathreshold taste test (0.5 g/ml sucrose and 0.5 g/ml sodium chloride). The expected findings will help in identifying the covid-19 related olfactory/taste impairment as a potential central nervous system function biomarker.

1. Meinhardt J, Radke J, Dittmayer C, Franz J, et al. Olfactory transmucosal SARS-CoV-2 invasion as a port of central nervous system entry in individuals with COVID-19. *Nature neuroscience*. 2020.
2. Pezzini A, Padovani A. Lifting the mask on neurological manifestations of COVID-19. *Nature reviews. Neurology*. 2020;16(11):636-644.
3. Mazzatenta A. et al. *Oncotarget*. 2016; 7: 19193 19200
4. Mazzatenta A., et al. Smell and Taste in Severe CoViD-19: Self-Reported vs. Testing *Frontiers in Medicine* VOL.7, 2020 p.753, DOI=10.3389/fmed.2020.589409