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MRI Evaluation of the Olfactory Clefts in Patients with SARS-CoV-2 Infection Revealed an Unexpected Mechanism for Olfactory Function Loss

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Dear Editor,

We read with great interest the recent letter by Galougahi et al., which described a patient presenting with isolated anosmia secondary to SARS-CoV-2 infection that was confirmed by the polymerase chain reaction (1). There is now strong evidence that olfactory function loss might be observed in patients with SARS-CoV-2 infection, and in some cases, might even constitute the main symptom (2,3). Galougahi et al. provide the second magnetic resonance imaging (MRI) report of the olfactory bulbs in a patient infected by SARS-CoV-2 presenting with a sudden onset of olfactory function loss without nasal obstruction (1). They found normal olfactory bulbs and tracts with no sign of nasal congestion. However, we were confused by their interpretation of the MRI since a bilateral obstruction of the olfactory clefts, below the olfactory bulbs, is observed, as has been described in our first report (3).

The olfactory clefts are two narrow vertical passages at the upper part of the nasal cavities and constitute a crucial pathway for airborne odorant molecules to the olfactory mucosa (4). Biopsies of the olfactory clefts revealed the presence of an olfactory epithelium, which contains the olfactory sensory neurons that express odor receptors (5). Then, the axons of the olfactory sensory neurons cross the cribriform plate to terminate into the olfactory bulbs (5).

The pathophysiology of olfactory function loss in patients with SARS-Cov-2 infection remains unclear. Recently, it has been demonstrated that ACE2 proteins, which are targeted by SARS-CoV-2, are express in the olfactory epithelium and not in the olfactory sensory neurons, suggesting the olfactory epithelium as the putative entry site of SARS-CoV-2 (6). Based on their neurotropic potential, coronaviruses could also invade the olfactory axons through the cribriform plate, leading to structural damages to the olfactory sensory neurons (7). We believe that the most plausible explanation for this inflammatory obstruction of the olfactory cleft might be the result of the interaction between SARS-CoV2 and ACE2 protein expressed by the olfactory epithelium. This finding could probably explain the short time to recovery exhibited by most patients (8). We also found, at this stage of the disease, no morphological anomalies of the olfactory bulbs. Yet, they might be slightly impaired and too subtle to be detected on MRI, thus we cannot exclude totally this hypothesis.

Further prospective studies with follow-up are warranted to assess the central olfactory pathways in patients with SARS-CoV-2 infection presenting with olfactory function loss.

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