

Hypothesis: Long COVID Olfactory Dysfunction can be exacerbated by Dysautonomia generated by Vertebral Subluxation

Charles S Masarsky

Narrative: In a departure from the usual phoenix-like ability of olfaction to recover after trauma or infection, long COVID victims frequently suffer such disturbances as anosmia, hyposmia, and parosmia long after acute infection has abated. Recent research has implicated dysautonomia leading to a hyperinflammatory state of the nasal mucosa as a likely causative or aggravating factor.

This paper proposes the following hypothesis: Long COVID olfactory dysfunction can be exacerbated by dysautonomia generated by vertebral subluxation.

Evidence is presented from autonomic neuroanatomy, subluxation neurobiology, and case reports in preliminary support of the hypothesis. Methods to further test the hypothesis and implications for inter-professional cooperation are discussed.

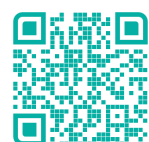
Indexing terms: Chiropractic; subluxation; olfaction; olfactory dysfunction; long COVID; anosmia; dysautonomia; rhinitis.

Introduction

Like a physiological phoenix, the neurons of the olfactory nerve can be regenerated after they are destroyed by trauma or infection. This is made possible by stem cells, globose basal cells, closely embedded with the neurons of the olfactory epithelium.

The loss of these stem cells has been implicated as a major culprit in olfactory dysfunction during acute COVID-19 infection. That the repopulation of the olfactory mucosa with globose basal cells can remain incomplete long after the acute phase is suggested by the fact that as many as ten percent of long

... subluxation-generated dysautonomia affecting the olfactory mucosa would most likely arise from cervical and upper thoracic levels ...'



COVID victims are afflicted by anosmia, hyposmia, or parosmia according to recent estimates. (Kim et al, 2024)

The responses of patients in a 2023 case series suggest an important role for inflammation in general and rhinitis in particular in this delayed mucosal recovery. Stellate ganglion blocks have been shown to bring about restoration of olfactory function in some long COVID victims. (Kalava et al 2023) The investigators suggest that olfactory dysfunction in these patients was exacerbated by excessive sympathetic stimulation to the nasal mucosa, leading to a hyper-inflammatory state. Stellate ganglion block is hypothesised to reduce this sympathetic stimulation, allowing inflammatory responses to return to normal, with resulting restoration of basal stem cells.

Nasal inflammation due to dysautonomia takes on additional significance considering a 2026 paper. In a retrospective study of the medical records of 118 million patients a statistically significant increased risk of allergic rhinitis and chronic rhino-sinusitis was found in COVID-19 survivors with three months of follow up. (Olbrich et al, 2026) Long COVID rhinitis exacerbated by dysautonomia would create what amounts to a perfect storm, plausibly suppressing the replacement of globose basal cells.

Kalava et al mention several possible causes of this and similar forms of dysautonomia, including infection, diabetic neuropathy, obesity, and alcoholism. Absent from this discussion is the possibility of somato-autonomic disturbance due to aberrant vertebral mechanics, the vertebral subluxation complex. With this in mind, the following is offered:

Hypothesis: Long COVID olfactory dysfunction can be exacerbated by dysautonomia generated by vertebral subluxation.

Subluxation and Olfactory Dysautonomia

Within the Chiropractic profession the idea that vertebral subluxation can generate dysautonomia has usually enjoyed broad acceptance. In 1996, the Association of Chiropractic Colleges affirmed the long-standing chiropractic tenet that subluxation can ‘... *compromise neural integrity and may influence organ system function and general health*’. (ACC, 1996) By implication, this statement clearly points to the possibility of dysautonomia generated by subluxation.

Of the multiple mechanisms for subluxation-generated dysautonomia several bear discussion here. Compression or distraction of spinal nerve roots within the intervertebral foramen could disturb the presynaptic fibres of sympathetic pathways. At some spinal levels in some individuals, the vulnerability of spinal nerve roots to this disturbance may be increased by the presence of transforaminal ligaments partially closing the foraminal ‘windows’. (Masarsky, 2025)

The aberrant motion and/or position of vertebra caused by subluxation would tend to stress the adjacent tissues, including the ligament connecting the anterior surfaces of lamina of adjacent

vertebra, the ligamentum flavum. Resultant buckling or swelling of the ligamentum flavum has been shown to result in compression of the dorsal root ganglion. (Giles, 1994) The afferent neurons within this ganglion include those that serve the visceral sensorium. Therefore, disturbance of these neurons could distort autonomic efferent output.

The formation of osteophytes in response to the aberrant mechanics of a subluxated spinal motion segment could plausibly result in dysautonomia. Interference with spinal nerve roots when osteophytes grow into the intervertebral foramen is one mechanism by which osteophytes can disturb autonomic function. Furthermore, when osteophytes project in an anterolateral direction, they can penetrate the para-vertebral sympathetic chain. (Giles, 1992)

The existence of connective tissue bridges between cervical extra-spinal structures and the cervical dura mater has been noted since the 1990s. (Hack et al, 1995 and Mitchell et al, 1998) Cervical subluxation would be expected to disturb these myodural bridges with resultant disturbance to the dura mater. The connection between dural disturbance and dysautonomia is widely appreciated. (Henderson, 2015)

Autonomic innervation to the nasal mucosa is primarily via the sympathetic nervous system. Presynaptic sympathetic fibres emerging with the upper four or five thoracic spinal nerves enter the cervical sympathetic chain. They synapse primarily within the superior cervical sympathetic ganglion. Postsynaptic axons innervate the nasal mucosa. Therefore, subluxation-generated dysautonomia affecting the olfactory mucosa would most likely arise from cervical and upper thoracic levels.

Chiropractic adjustments and Long COVID Olfactory Dysfunction

Clinical vignette 1

In the early days of the COVID-19 pandemic (May, 2020) a middle-aged executive presented with a chief complaint of back pain. (Masarsky, 2021) The pain originated when she over-reached to flush the toilet. While Chiropractic intervention focused on lumbar subluxations, adjustments were also indicated and performed at C1 and T2.

Although her chief complaint was not olfactory in nature, she made parenthetical mention of having recently recovered from a COVID-19 infection, which also afflicted other members of her household. Her residual symptoms included loss of her sense of smell, anosmia.

When she was about to leave, she took a bit of hand sanitiser and was surprised that she could smell its fragrance. On her return visit two days later, she mentioned that she was able to smell garlic at her family's dinner table the previous evening. This experience prompted a call for subjects to more systematically study the influence of Chiropractic care on long COVID signs and symptoms.

Clinical vignette 2

A 58-year-old real estate agent responded to our call for subjects. (Masarsky and Todres-Masarsky, 2022) Her long COVID manifestations included hyposmia. On a scale of olfactory sensitivity developed by Gupta et al, she rated her sense of smell at '1' where '5' is a completely normal sense of smell. (Gupta et al, 2013) She mentioned that aromas seemed to be less intense when she inspired through the right nostril than the left. On physical examination, Weber test was consistent with a mild conductive hearing loss in the right ear, suggesting the possibility of right sided ear-nose-throat congestion.

In addition to hyposmia, she also suffered from parosmia. This manifested itself as a transient 'house on fire' aroma, without any actual fire present. She was unable to identify a pattern or trigger for these parosmia episodes.

Intervention at her first visit included adjustments of C1 and the right first rib. On her second visit three days later, the patient reported the ability to definitively smell the aroma of bread at the dinner table.

After ten Chiropractic visits over a period of six weeks, she rated her sense of smell as 2 - 3 on the previously mentioned Gupta et al scale. Weber test was now negative. Her occasional parosmia episodes continued, but the 'house on fire' aroma had evolved into a less disturbing 'burnt popcorn' aroma. She reported restoration of her ability to smell several odours, including a litter box, mildew, garlic, tobacco, eucalyptus, and grass. The adjustments during this time included various cervical, thoracic, lumbar, and cranial levels according to the findings of the treating chiropractor.

Clinical vignette 3

A 66-year-old retired military officer with a history of two COVID-19 infections presented with multiple long COVID manifestations. (Masarsky CS and Todres-Masarsky M, 2025) Regarding his sense of smell, he stated he had some loss after his first infection, which had not completely recovered. Currently he rated his sense of smell as '3' on the previously mentioned Gupta et al scale. He also described one to two parosmia episodes per week, with each episode lasting several hours. During these episodes he perceived a 'dumpster smell' unrelated to the presence of garbage in his vicinity.

Chiropractic adjustments varied from visit to visit based on the treating Chiropractor's findings. All adjustments included at least one cervical level. After twelve visits over a five-week period, the patient noted his sense of smell was now almost normal, almost '5' out of '5' on the Gupta et al scale. The frequency of his 'dumpster' parosmia episodes had been decreasing during this period of care.

Clinical discussion

Chiropractic care for all three cases summarised above included cervical adjustments and often involved upper thoracic adjustments, the vertebral levels most closely associated with sympathetic innervation of the nasal mucosa.

The asymmetry of olfaction reported by the real estate agent (aromas were less intense in the right nostril than the left) was consistent with the presence of a positive Weber test. The unilateral conductive hearing loss suggested by the positive Weber test could indicate a generalised ear-nose-throat congestion. Such congestion could have been aggravated by rhinitis. That the resolution of the Weber test coincided with olfactory improvement further suggests the linkage between auditory and olfactory dysfunction in this patient. It also suggests the aggravation of long COVID auditory and olfactory dysfunction was aggravated by cervical and thoracic vertebral subluxation.

Testing the hypothesis.

While the findings of the cases published to date plausibly point to aggravation of long COVID olfactory dysfunction by the dysautonomia of vertebral subluxation, robust support for the hypothesis requires more evidence.

One approach would be to note the presence or absence of outcomes related to dysautonomia that exhibit covariance with olfactory dysfunction. Useful clinical signs would be those closely associated with sympathetic innervation from cervical and/or upper thoracic vertebral levels.

Such signs could include facial thermography, pupillometry, facial sweat gland activity, and heart rate variability. Symptoms related to these levels of sympathetic innervation could include salivary gland activity (dry mouth or excessive salivation), changes in light sensitivity (aversion to bright light or difficulty seeing in dim light), and changes in tear production (dry eye or excessive tearing). If improvement in these signs/symptoms and olfactory function covary with signs of vertebral subluxation and/or reduction of these signs and symptoms under chiropractic care, such evidence would be supportive of the hypothesis.

Practical implication of the hypothesis

Inter-professional cooperation on behalf of the long COVID patient could be encouraged by wide dissemination of easily applied examination measures that suggest the presence of cervical and/or thoracic subluxation. For example, a medical practitioner examining a patient with long COVID anosmia could notice restriction in cervical flexion/extension or significant asymmetry in cervical rotation/lateral flexion. This could prompt a referral for Chiropractic co-management of this patient. On the other side of the coin, a Chiropractic practitioner caring for a patient with long COVID olfactory dysfunction would be better equipped to explain the rationale for care to others in the patient's health care team.

Adjuncts to Chiropractic care commonly include measures to counter hyperinflammatory states. Such adjunctive measures are within the common domain health care practice in general. Therefore, these interventions can serve as a further arena of inter-professional cooperation.

Practices to counter hyperinflammatory states take on increased importance for patients with olfactory dysfunction related to vertebrogenic dysautonomia. These include yogic and meditation techniques such as alternate nostril breathing, dietary advice to limit animal fat and emphasise fruits/vegetables/whole grains, regular exercise, and laughter. Such measures take on additional significance for a patient with olfactory loss related to a hyperinflammatory state.

Additional adjuncts to support the Chiropractic adjustment of cervical and thoracic subluxation are also common in chiropractic practice. These would include range of motion exercises for the relevant regions of the spine, postural advice, and consideration of the patient's bed and pillow, among other factors. Again, these take on additional significance if nasal inflammation is related to vertebrogenic dysautonomia.

Charles S Masarsky

DC

Northern Virginia Community College

Private practice of Chiropractic, Vienna VA

viennachiropractic@verizon.net

Cite: Masarsky CS. The Wide-Angle Lens. Hypothesis: Long COVID Olfactory Dysfunction can be exacerbated by Dysautonomia generated by Vertebral Subluxation. Asia-Pac Chiropr J. 2026;7.2. <https://www.apcj.site/MasarskyOlfactory.pdf>

Acknowledgement

The author gratefully acknowledges the late Marion Todres-Masarsky, DC. Her comments on an early draft of this paper significantly strengthened the final product. Her role in refining this manuscript was the last of her many contributions to the Chiropractic professional literature.

About the author

Dr Charles Masarsky has been in the private practice of chiropractic with Dr. Marion Todres-Masarsky since 1983. Their office is located in Vienna, Virginia, USA in the suburbs of Washington, DC. He also offers continuing education programs for chiropractic colleges and associations and teaches at George Mason University

(Fairfax, Virginia). For information about his practice or his CE programs, please e-mail viennachiropractic@verizon.net.

Citations for Dr Masarsky's published papers are available at his website under 'about the doctors': www.viennachiropractic.com.

Dr Masarsky writes this frequent feature in the *Journal* called 'The Wide Angle Lens' in which he takes a broader than usual perspective on one issue or another, and has contributed much on clinical aspects of COVID.

Also by this author

Masarsky CS. The Wide-Angle Lens. Hypothesis: Cranial Suture Complexity is influenced by Sensory Innervation. *Asia-Pac Chiropr J.* 2026;6.3. www.apcj.net/papers-issue-6-3/#MasarskySutureComplexity

Masarsky CS. The Wide-Angle Lens: Transforaminal Ligaments, Unanswered questions. *Asia-Pac Chiropr J.* 2025;6.2. www.apcj.net/papers-issue-6-2/#MasarskyTransforaminalLigaments

Masarsky CS. Hypothesis: Chiropractic adjustments reduce the risk of stroke in Long COVID. *Asia-Pac Chiropr J.* 2025;6.1. www.apcj.net/papers-issue-6-1/#MasarskyLongCOVIDHypothesis

Masarsky CS, Todres-Masarsky M. Long COVID with Obstructive Sleep Apnea: A case report. *Asia-Pac Chiropr J.* 2025;6.1. www.apcj.net/papers-issue-6-1/#MasarskySleepApnea

Masarsky CS. Respiratory RCTs: What Are We Missing? [The wide-angle lens]. *Asia-Pac Chiropr J.* 2025;5.3. www.apcj.net/papers-issue-5-3/#MasarskyRespiratoryRCTs

Masarsky CS, Todres-Masarsky M. Long COVID with Parosmia and Exertional Malaise: A case report. *Asia-Pac Chiropr J.* 2025;5.4. www.apcj.net/papers-issue-5-4/#MasarskyLongCOVID

Masarsky CS, Todres-Masarsky M. Long Haul COVID-19 and Subluxation: A case report. *Asia-Pac Chiropr J.* 2022;2.6. apcj.net/papers-issue-2-6/#MasarskyLongCovid

Masarsky CS, Todres-Masarsky M. Long COVID Hyposmia/Parosmia and subluxation: A case report. *Asia-Pac Chiropr J.* 2022;3.2. apcj.net/Papers-Issue-3-2/#MasarskyHyposmia.

Masarsky CS, Todres-Masarsky M. Long COVID: A Risk Factor for Scoliosis Incidence and Exacerbation? [Hypothesis] *Asia-Pac Chiropr J.* 2023;3.3. apcj.net/Papers-Issue-3-3/#MasarskyLongCovidScoliosis.

Masarsky CS, Todres-Masarsky M. Long COVID Pharyngitis, Possible Glossopharyngeal Neuralgia, and Subluxation: A case report URL *Asia-Pac Chiropr J.* 2023;4.1. apcj.net/Papers-Issue-4-1#MasarskyTodreaMasarskyLongCovid

For others, search 'Masarsky' at apcj.net or go to www.viennachiropractic.com.

Bibliography

ACC. Issues in Chiropractic. Position Paper #1: The ACC Chiropractic Paradigm: Association of Chiropractic Colleges, July, 1996.

Giles LGF. Paraspinal Autonomic Ganglion Distortion Due to Vertebral Osteophytosis: A Cause of Vertebrogenic Autonomic Syndromes? *J Manipulative Physiol Ther*, 1992; 15: 551-555.

Giles LFG. A Histological Investigation of the Human Lower Lumbar Intervertebral Canal (Foramen) Dimensions. *J Manipulative Physiol Ther*, 1994; 17:4.

Gupta N, Singh PP, Goyal A, Bhatia D. Assessment of Olfaction Using the "I-Smell" Test in an Indian Population: A Pilot Study. *Indian J Otolaryngol Head Neck Surg*, 2013; 65(1): 6-11. Full text: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3585564/>

Hack GD, Koritzer RT, Robinson WL, Hallgren RC, Greenman PE. Anatomic Relation between the Rectus Capitis Posterior Minor Muscle and the Dura Mater. *Spine*, 1995; 20(23): 2484-2485. https://journals.lww.com/spinejournal/abstract/1995/12000/anatomic_relation_between_the_rectus_capitis.3.aspx

Henderson FC. Dysautonomia – A co-morbidity or consequence of craniocervical instability and ventral brainstem compression? In: Batzdorf U, Henderson FC. 2015 CSF Colloquium Proceedings: Mechanisms and Pathophysiology of Headache in the Population of Patients with Chiari Malformation and Hypermobility Connective Tissue Disorders. Chiari and Syringomyelia Foundation, New York, 2019. <https://sa1s3.patientpop.com/assets/docs/243375.pdf>

Kalava A, Benyahia SA, Tico Calzada R, Staat CM. Efficacy of Stellate Ganglion Block in Treating Long-Term COVID-19-Related Olfactory and Gustatory Dysfunction: A Case Series. *Cureus*. 2023 Jun 25;15(6):e40929. doi: 10.7759/cureus.40929.

Kim S, Finlay JB, Ko T, Goldstein BJ. Long-term olfactory loss post-COVID-19: Pathobiology and potential therapeutic strategies. *World J Otorhinolaryngol Head Neck Surg*. 2024 Mar 21;10(2):148-155. DOI 10.1002/wjo2.165.

Masarsky CS. The wide-angle lens: The post-pandemic research era. *Asia-Pac Chiropr J*. 2021;1.4. URL www.apcj.net/papers-issue-2-1/#MasarskyLongHaulers

Masarsky CS. The Wide-Angle Lens: Transforaminal Ligaments, Unanswered questions. *Asia-Pac Chiropr J*; 2025;6.2. https://www.apcj.net/site_files/4725/upload_files/Masarsky%20Transforaminal%20Ligaments.pdf?dl=1

Masarsky CS, Todres-Masarsky M. Long COVID Hyposmia/Parosmia and Subluxation: A Case Report. *Asia-Pac Chiropr J*, 2022; 3:2. Full text: [Papers Issue 3-2 | Asia-Pacific Chiropractic Journal \(apcj.net\)](http://www.apcj.net/papers-issue-3-2/#MasarskyLongCOVID)

Masarsky CS, Todres-Masarsky M. Long COVID with Parosmia and Exertional Malaise: A case report. *Asia-Pac Chiropr J*. 2025;5.4. www.apcj.net/papers-issue-5-4/#MasarskyLongCOVID

Mitchell BS, Humphreys BK, O'Sullivan E. Attachments of the Ligamentum Nuchae to Cervical Posterior Dura and the Lateral Part of the Occipital Bone. *J Manipulative Physiol Ther*, 1998; 21(3): 145-148. Abstract: [http://www.ncbi.nlm.nih.gov/pubmed?term=\(\(nuchal%20ligament\)%20AND%20dura%20mater\)%20AND%20J%20Manipulative%20Physiol%20Ther](http://www.ncbi.nlm.nih.gov/pubmed?term=((nuchal%20ligament)%20AND%20dura%20mater)%20AND%20J%20Manipulative%20Physiol%20Ther)

Olbrich H, Preuß SL, Kridin K, Hernandez G, Thaçi D, Ludwig RJ, Curman P. COVID-19 infection raises respiratory type 2 inflammatory disease risk, whereas vaccination is protective. *J Allergy Clin Immunol*. 2026 Feb;157(2):517-524. DOI 10.1016/j.jaci.2025.07.030.