

Roles and potential symptoms with sensitization of the cranial nerves

by Eli Denham, DPT, FCAMPT, IFOMPT

* denotes reported migraine symptom

Nerve	Type	Role	Symptom of Sensitization
Olfactory	Sensory	Smell	*Altered Smell (3), Olfactory Hallucinations (1,2)
Optic	Sensory	Vision	*Auras (6), Loss of Vision (5)
Oculomotor	Motor	Eye movement, Pupil constriction	*Photosensitivity (6) (painful iris contraction), Motor Sensitivity, Poor Eye Mobility (7,8)
Trochlear	Motor	Eye movement	*Painful Eye Motion (7, 8), Motor Sensitivity
Trigeminal	Sensory	Sensation of Face	*Face and head pain (6), Allodynia (6,9), Paresthesia (6,9), Altered Sensation (6,9)
	Motor	Muscles of Mastication	*Motor Sensitivity, TMD (10)
Abducens	Motor	Eye movement	*Motor Sensitivity (7,8)
Facial	Sensory	Taste, Sensation of mouth	*Altered Taste, Osmophobia (11)
	Motor	Muscles of face	*Motor Dysfunction, Facial Pain (6)
	Autonomic	Parasympathetic fibers to the submandibular gland, Sublingual glands, Nasal mucosa, Lacrimal gland	*Excessive saliva production, *Runny nose, *Teary eyes (12,13,14)
Vestibulocochlear	Sensory	Hearing and Balance	*Phonophobia (6), Vestibular Migraine (Disequilibrium, Nystagmus, Motion sickness, Nausea) (15)
Glossopharyngeal	Sensory	Visceral sensory, Sensory to ear drum, Pharynx tongue	*Visceral Allodynia (cramps), Nausea (16), Altered taste (11), Throat pain, Chest pain (16,17,18), Ear pain (21)
	Motor	Branchial motor, Visceral motor	*Motor Sensitivity, Problems swallowing (16, 17, 18), Nausea (6)
Vagus	Sensory	Inner ear, Viscera	*Ear pain (21), Nausea (6)
	Motor	Palate, Throat, Viscera	*Motor Sensitivity, (16, 17, 18), Nausea (6)
	Autonomic	Heart, Lung, Digestive system	Autonomic dysfunction (6, 24, 25)
Accessory Nerve	Motor	Trapezius, SCM	*Motor Sensitivity, Pain referral (26, 6, 27)
Hypoglossal	Motor	Tongue	*Motor sensitivity, Tongue Dysfunction and Dysarthria (28, 16, 17, 18)
Motor Sensitivity		Painful weak contraction, Referred pain, Tone, Hypersensitive to Palpation	

Sources

1. Wolberg F, Dewey M, Ziegler. Olfactory Hallucination in Migraine. *Arch Neurol*. 1982;39(6):382.
2. Fuller G, Guiloff R. Migrainous olfactory hallucinations. *J Neurol Neurosurg Psychiatry*. 1987; 50(12): 1688–1690.
3. Andrea M, Harriott T, Schwedt J. Migraine is Associated With Altered Processing of Sensory Stimuli. *Current Pain and Headache Reports*. 2014, 18:458.
4. Lee A, Brazis P, Miller N. Posterior Ischemic Optic Neuropathy Associated With Migraine. *Headache Journal of head and face pain*. 1996.
5. Kunkel R. Migraine aura without headache: benign, but a diagnosis of exclusion. *Cleveland Clinic journal of medicine*. 2005.
6. Olesen J. International Classification of Headache Disorders, 3rd edition. *Headache*. 2013
7. Savundra P, Carroll J, Davies R. Migraine-Associated Vertigo. *Cephalalgia*. 1997.
8. Wolff K R, Hoffmann P, Schulte-Mattler S. Persistent ocular motor disturbances in migraine without aura. *Neurological Sciences*. 2004; 25(1).8–12
9. Stewart, J. Prevalence of Migraine headache in the U.S. *JAMA*. 1992
10. Franco A, Gonçalves D, Castanharo S. Migraine is the most prevalent primary headache in individuals with temporomandibular disorders. *Journal of orofacial pain*; 2015.
11. Kelman L. Osmophobia and Taste Abnormality in Migraineurs: A Tertiary Care Study. *Journal of Orofacial Pain*; 2013.
12. Bellamy J, Roger M, Cady K, Durham P. Salivary Levels of CGRP and VIP in Rhinosinusitis and Migraine Patients. *Headache*; 2006.
13. Tuca J, Planas J, Parellada R. Increase in PGE2 and TXA2 in the Saliva of Common. Migraine Patients. Action of Calcium Channel Blockers. *Headache*; 1989.
14. Burstein R, Cutrer M, Yarnitsky D. The development of cutaneous allodynia during a migraine attack Clinical evidence for the sequential recruitment of spinal and supraspinal nociceptive neurons in migraine. *Brain*. 2000; 8:1703–1709.
15. Lempert T, Olesen J. Vestibular migraine: Diagnostic criteria. *Journal of Vestibular Research*. 2012; 22(4)167-172.
16. Silberstein S. Migraine Symptoms: Results of a Survey of Self-Reported Migraineurs. *Headache*. 1995
17. Ferrari M. Migraine. *Lancet*. 1998.
18. Visser W, Jaspers N, Ferrar R. Chest symptoms after sumatriptan: a two-year clinical practicereview in 735 consecutive migraine patients. *Cephalalgia*. 1996;16:554 -9
19. Dahliif C, Falk L, Risenfors M, Lewis C. Safety trial with the 5HT_{1B/1D} agonist avitriptan (BMS-180048) in patients with migraine who have experienced pressure, tightness, and/or pain in the chest, neck, and/or throat following sumatriptan. *Headache*. 2006.
20. Burstein R, Yarnitsky D, Goor-Aryeh I, Ransil B, Bajwa Z. An association between migraine and cutaneous allodynia. *Ann Neurol*. 2000;47:614–624
21. Fotuhi M, Glaun B, Quan S, Sofare T. Vestibular migraine: a critical review of treatment trials. *Neurology*. 2009.
22. Harnod T, Wang Y, Kao C. Association of Migraine and Sleep-Related Breathing Disorder: A Population-Based Cohort Study. *Medicine*. 2015; 94(36): e1506.
23. Silberstein S. Migraine Symptoms: Results of a Survey of Self-Reported Migraineurs. *Headache*. 2005.

24. Havanka-Kanniainen H, Tolonen U, Myllylä V. Autonomic Dysfunction in Migraine: A Survey of 188 Patients. *Headache* . 1988.

25. Ailani J. A Practical Approach to Autonomic Dysfunction in Patients with Headache. *Current Neurology and Neuroscience Reports* . 2016;16.

26. Palacios-Ceña M, Ferracini G, Florencio L, Ruíz M, Guerrero A, Arendt-Nielsen L, Fernández-de-las-Peñas C. The Number of Active But Not Latent Trigger Points Associated with Widespread Pressure Pain Hypersensitivity in Women with Episodic Migraines. *Pain*. 2017.

27. Luedtke K, Starke W, May A. Musculoskeletal dysfunction in migraine patients. *Cephalalgia* . 2017.

28. Graham U, Magorrian M, Burns P. An unusual headache. *BISM* . 2014