Candidate Techniques to Alleviate Episodic Migraine Headache

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Forward

According to Kendall McCallister PhD:

"What happens is your emotional state - stress, trauma, disappointment - triggers your hypothalamus and limbic system, which are basically your brain's alarm centers. They start pumping out stress hormones like cortisol and adrenaline. Over time, that chronic activation makes your trigeminal nerve hyper-sensitive - that's the main pain highway in your head.

"Then the physiology kicks back in: blood vessels in your brain start constricting and dilating erratically, which releases inflammatory peptides. Those peptides irritate the meninges - the protective layers around your brain - and that irritation gets read as pain. Meanwhile, your serotonin levels drop, which normally help modulate that brain signal, so the whole system loses its brakes.

"So it's not just "*You're stressed, therefore headache*." It's that your emotional world literally rewires your pain thresholds and how your blood vessels behave. Your brain pain is your physiology screaming that the system's overloaded.

"Most migraine meds - triptans, CGRPs - target the blood vessels or the pain pathways after the storm's already started. Pharmaceuticals are fire extinguishers not smoke detectors. They don't touch the chronic stress load or the trauma that's priming your trigeminal nerve to overreact in the first place. Plus, the brain's chemistry is so individual. A drug that calms one person's serotonin cascade might do nothing for someone else whose migraine is driven more by sensory processing issues or unresolved grief. Pharma can blunt the attack, but it doesn't rebuild the system's resilience. That's why the best outcomes include therapy, lifestyle changes, and learning to regulate your nervous system before it hits the red line. The goal is to treat not only the bullet wound, but the trigger finger itself."

Co-Morbidities common to migraine headache:

1. Altered state of mind: depression, anxiety, irrationality, confusion, hypervigilance, catastrophizing
2. Altered nervous system: physical exhaustion, sympathetic amplification, muscle weakness, HBP
3. Altered brain chemistry: TBI and concussion, sensory sensitivity, cognitive delays
4. TMJ syndrome
5. Insomnia
6. Epilepsy
7. GI disorders: (inflammatory) IBS, Chron's
8. Bipolar disorder

Purpose

The purpose of this review is to evaluate and propose non-invasive, conservative methodologies that might provide patients with relief of the intensity and duration of episodic migraine type headache.

Non-traditional non-invasive/ non-drug approaches to migraine therapy:

1. Transcutaneous activation of the accessory nerve (cranial nerve 11) at the base of the cervical spine using a medical TENs device (transcutaneous electric nerve stimulation.) See 3 articles below.
2. Digital acupressure at the suboccipital muscles (SCM and upper trapezius.)
3. Digital Ischemic compression technique at the suboccipital muscles (SCM and upper trapezius.)
4. Digital SNAGs technique (sustained natural apophyseal glide) at the cervical spine vertebral bodies.
5. Digital EAM-Tragus stimulation of vagus nerve (cranial nerve 10.)
6. Parasympathetic amplification technique using breath and heartbeat control drills.
7. Infrared Heat over the superior small bowel area.

Stacked-Therapy approach to managing migraine headache:

1. Identify biographical contributors to altered emotional state of mind:
    - Feeling out of control, unheard, unappreciated, lost, ignored, unimportant
    - Unmanageable situations that cause: confusion, disappointment, lack of closure
    - Allostatic Load: mental 'wear and tear' of chronicity
    - Trauma (emotional and physical), toxic relationships
    - Personality traits: perfectionism, harm avoidance, negative cognitive patterns
2. Track onset triggers:
    - States of emotion, memories, self-reflection, self-identity
    - Situations that trigger 'alarms': people, places, words, stimulus
3. Provide self-care toolbox:
    - TENs, digital applications
    - Parasympathetic amplification using heat, breath, heartrate control
    - Deescalate/ unprioritized chronic habits and beliefs
    - Create an environment for success and expect progress

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TENs Research Article #1:

Consistent effects of non-invasive vagus nerve stimulation (nVNS) for the acute treatment of migraine: additional findings from the randomized, sham-controlled, double-blind PRESTO trial.

Paolo Martelletti, Piero Barbanti, Licia Grazzi, J Headache Pain. 2018; 19(1):101.
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Non-invasive vagus nerve stimulation (nVNS) has been shown to be practical, safe, and well tolerated for treating primary headache disorders. The recent multicenter, randomized, double-blind, sham-controlled PRESTO trial provided Class I evidence that for patients with episodic migraine, nVNS significantly increases the probability of having mild pain or being pain-free 2 h post stimulation. We report additional pre-defined secondary and other end points from PRESTO that demonstrate the consistency and durability of nVNS efficacy across a broad range of outcomes.

Standard pharmacologic agents for the acute treatment of migraine can be limited by side effects, inconsistent efficacy, contraindications, risk of drug interactions, and their potential contribution to migraine chronification and medication overuse headache [1–5]. Opioids should be discouraged for the acute treatment of migraine due to significant safety concerns and lack of documented efficacy but remain frequently used in the emergency department setting, which significantly increases healthcare costs [6–9]. Practical alternatives are needed to address this healthcare challenge. Non-invasive neuromodulation therapies could represent a novel option for these patients [10, 11]. TENS utilization at the base of the neck yielded >75% pain-free for 24 hours when treated within 20-60 minutes of aura.

Within 20 min of migraine pain onset, patients self-administered bilateral 120-s stimulations (ie, 1 stimulation each to the right and left sides of the neck) and recorded post-treatment assessments in their study diaries 15, 30, 60, and 120 min and 24 and 48 h after completion of the initial bilateral stimulations. Patients were instructed to repeat the bilateral stimulations if pain had not improved at the 15-min assessment, and those who were not pain-free at the 120-min assessment had the option of administering an additional set of bilateral stimulations. Patients were asked to wait 120 min from the first set of stimulations before using acute rescue medication.

TENs Research Article #2:

Nonpainful remote electrical stimulation alleviates episodic migraine pain

David Yarnitsky, Lana Volokh, Alon Ironi, Boaz Weller, Merav Shor, Alla Shifrin, Yelena Granovsky
First published March 1, 2017, DOI: https://doi.org/10.1212/WNL.0000000000003760

Nonpainful remote skin stimulation can significantly reduce migraine pain, especially when applied early in an attack. This is presumably by activating descending inhibition pathways via the conditioned pain modulation effect. This treatment may be proposed as an attractive nonpharmacologic, easy to use, adverse event free, and inexpensive tool to reduce migraine pain.

In 71 patients (299 treatments) with evaluable data, 50% pain reduction was obtained for 64% of participants based on best of 200-μs, 150-μs, and 100-μs pulse width stimuli per individual vs 26% for sham stimuli. Greater pain reduction was found for active stimulation vs placebo; for those starting at severe or moderate pain, reduction (1) to mild or no pain occurred in 58% (25/43) of participants (66/134 treatments) for the 200-μs stimulation protocol and 24% (4/17; 8/29 treatments) for placebo ($p = 0.02$), and (2) to no pain occurred in 30% (13/43) of participants (37/134 treatments) and 6% (1/17; 5/29 treatments), respectively ($p = 0.004$). Earlier application of the treatment, within 20 minutes of attack onset, yielded better results: 46.7% pain reduction as opposed to 24.9% reduction when started later ($p = 0.02$).

TENs Research Article #3:

Remote electrical neuromodulation (REN) in the acute treatment of migraine: a comparison with usual care and acute migraine medications

Rappaport, A., Bonner, J., Lin, T., et. al.
The Journal of Headache and Pain volume 20, Article number: 83 (2019)

There is a significant unmet need for new, effective and well tolerated acute migraine treatments. A recent study has demonstrated that a novel remote electrical neuromodulation (REN) treatment provides superior clinically meaningful pain relief with a low rate of device-related adverse events. The results reported herein compare the efficacy of REN with current standard of care in the acute treatments of migraine.

Remote electrical neuromodulation (REN) is a novel acute migraine treatment [7], in which upper arm peripheral nerves (median and musculocutaneous) are stimulated to induce conditioned pain modulation (CPM) – a descending endogenous analgesic mechanism in which sub-threshold conditioning stimulation inhibits pain in remote body regions [8]

For the 90 participants who treated at least two attacks in both the run-in and the double-blind treatment phases, pain relief and pain-free responses at 2 h post-treatment in at least one of two attacks in the run-in phase were compared with REN responses at 2 h in at least one of two attacks. The percentages of participants achieving pain relief at 2 h in at least one of two attacks were 84.4% (76/90) for REN treatment and 68.9% (62/90) for usual care ($p = 0.02$). Pain freedom at 2 h in at least 1 of 2 attacks was achieved by 50.0% (45/90) of the participants with REN treatment versus 36.7% (33/90) with usual care ($p = 0.050$).

How to use the TENs for Migraine Headache:

Treatment device: BioMedical Life Systems Bio-Stim M7 TENS device

This specific device preserves the prescribed therapeutic wave length signal combination (Hz + μs) without decay, and allows for a specifically prescribed signal combination; therefore, this device is superior to over-the-counter TENS devices, and is of medical quality. The settings are: 0-4 Hz or 100 Hz, combined with 60-70 μs. The intensity of the signal should graduate from 1-7 (0-10 scale) as comfort allows. A signal sensation is not essential to produce the expected results. Both channels should be utilized: one pair on each upper trapezius muscle at least 2" apart (stacked high & low), but not near the neck nor on the scapulae, with the leads aiming inferiorly. The pads should be affixed to clean, dry, un-moisturized skin.

Treatment reasoning: The clinical reasoning for the use of TENS is supported by the evidence. The aim is to trigger the Vagus Nerve (CN 10) into parasympathetic activity allowing the migraine symptoms to subside. However, the Vagus nerve does not have a readily accessible cutaneous presentation for electric stimulation, therefore the aim is to trigger the accessory nerve (CN 11) that has significant dermal presentation at the trapezius muscles (and less advisable SCM) bilaterally; stimulating the Vagus nerve by approximation. Accuracy of pad placement is highly specific.

Treatment duration: 4 minutes each 30 minutes for 2 hours. After 2 hours, remove and store the electrode pads. It is acceptable to remain active during the treatment duration without generating skin moisture or dampness.

Treatment efficacy: In my clinical experience, most patient's experience a 50% reduction in severity and duration within the first 2-3 treatments with episodic migraine. After at least 5 treatments, patients report significant reduction or complete elimination of episodic migraine when combined with recognizing and minimizing situational stimulating factors (sympathetic amplification.)

References

1. Lopes M, Dunn JD, Calhoun AH, Rapoport AM. Concepts in acute migraine management: clinical and managed care perspectives. *Am J Pharm Benefits.* 2012;4(5):201–206. [Google Scholar]

2. Negro A, Koverech A, Martelletti P. Serotonin receptor agonists in the acute treatment of migraine: a review on their therapeutic potential. *J Pain Res.* 2018;11:515–526. doi: 10.2147/JPR.S132833. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

3. Puledda F, Messina R, Goadsby PJ. An update on migraine: current understanding and future directions. *J Neurol.* 2017;264(9):2031–2039. doi: 10.1007/s00415-017-8434-y. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

4. Rolan PE. Drug interactions with triptans: which are clinically significant? *CNS Drugs.* 2012;26(11):949–957. doi: 10.1007/s40263-012-0002-5. [PubMed] [CrossRef] [Google Scholar]

5. Bigal ME, Lipton RB. Overuse of acute migraine medications and migraine chronification. *Curr Pain Headache Rep.* 2009;13(4):301–307. doi: 10.1007/s11916-009-0048-3. [PubMed] [CrossRef] [Google Scholar]

6. Bonafede M, Sapra S, Shah N, Tepper S, Cappell K, Desai P. Direct and indirect healthcare resource utilization and costs among migraine patients in the United States. *Headache.* 2018;58(5):700–714. doi: 10.1111/head.13275. [PubMed] [CrossRef] [Google Scholar]

7. Friedman BW, Irizarry E, Solorzano C, Latev A, Rosa K, Zias E, Vinson DR, Bijur PE, Gallagher EJ. Randomized study of IV prochlorperazine plus diphenhydramine vs IV hydromorphone for migraine. *Neurology.* 2017;89(20):2075–2082. doi: 10.1212/WNL.0000000000004642. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

8. Friedman BW, West J, Vinson DR, Minen MT, Restivo A, Gallagher EJ. Current management of migraine in US emergency departments: an analysis of the National Hospital Ambulatory Medical Care Survey. *Cephalalgia.* 2015;35(4):301–309. doi: 10.1177/0333102414539055. [PubMed] [CrossRef] [Google Scholar]

9. Orr SL, Friedman BW, Christie S, Minen MT, Bamford C, Kelley NE, Tepper D. Management of Adults with Acute Migraine in the emergency department: the American headache society evidence assessment of parenteral pharmacotherapies. *Headache.* 2016;56(6):911–940. doi: 10.1111/head.12835. [PubMed] [CrossRef] [Google Scholar]

10. Lipton RB, Dodick DW, Silberstein SD, Saper JR, Aurora SK, Pearlman SH, Fischell RE, Ruppel PL, Goadsby PJ. Single-pulse transcranial magnetic stimulation for acute treatment of migraine with aura: a randomised, double-blind, parallel-group, sham-controlled trial. *Lancet Neurol.* 2010;9(4):373–380. doi: 10.1016/S1474-4422(10)70054-5. [PubMed] [CrossRef] [Google Scholar]

11. Tassorelli C, Grazzi L, de Tommaso M, et al. (2018) Non-invasive vagus nerve stimulation as acute therapy for migraine: the randomized PRESTO study. Neurology 91(4):e364–e373. [PMC free article] [PubMed]

12. Barbanti P, Grazzi L, Egeo G, Padovan AM, Liebler E, Bussone G. Non-invasive vagus nerve stimulation for acute treatment of high-frequency and chronic migraine: an open-label study. *J Headache Pain.* 2015;16:61. doi: 10.1186/s10194-015-0542-4. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

13. Goadsby PJ, Grosberg BM, Mauskop A, Cady R, Simmons KA. Effect of noninvasive vagus nerve stimulation on acute migraine: an open-label pilot study. *Cephalalgia.* 2014;34(12):986–993. doi: 10.1177/0333102414524494. [PubMed] [CrossRef] [Google Scholar]

14. Kinfe TM, Pintea B, Muhammad S, Zaremba S, Roeske S, Simon BJ, Vatter H. Cervical non-invasive vagus nerve stimulation (nVNS) for preventive and acute treatment of episodic and chronic migraine and migraine-associated sleep disturbance: a prospective observational cohort study. *J Headache Pain.* 2015;16:101. doi: 10.1186/s10194-015-0582-9. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

15. Silberstein SD, Calhoun AH, Lipton RB, Grosberg BM, Cady RK, Dorlas S, Simmons KA, Mullin C, Liebler EJ, Goadsby PJ, Saper JR, Group ES Chronic migraine headache prevention with noninvasive vagus nerve stimulation: the EVENT study. *Neurology.* 2016;87(5):529–538. doi: 10.1212/WNL.0000000000002918. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

16. (2013) The International Classification of Headache Disorders, 3rd edition (beta version). Cephalalgia 33(9):629–808. 10.1177/0333102413485658 [PubMed]

17. Akerman S, Simon B, Romero-Reyes M. Vagus nerve stimulation suppresses acute noxious activation of trigeminocervical neurons in animal models of primary headache. *Neurobiol Dis.* 2017;102:96–104. doi: 10.1016/j.nbd.2017.03.004. [PubMed] [CrossRef] [Google Scholar]

18. Hawkins JL, Cornelison LE, Blankenship BA, Durham PL. Vagus nerve stimulation inhibits trigeminal nociception in a rodent model of episodic migraine. *Pain Rep.* 2017;2(6):e628. doi: 10.1097/PR9.0000000000000628. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

19. Oshinsky ML, Murphy AL, Hekierski H, Jr, Cooper M, Simon BJ. Noninvasive vagus nerve stimulation as treatment for trigeminal allodynia. *Pain.* 2014;155(5):1037–1042. doi: 10.1016/j.pain.2014.02.009. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

20. Ferrari MD, Roon KI, Lipton RB, Goadsby PJ. Oral triptans (serotonin 5-HT(1B/1D) agonists) in acute migraine treatment: a meta-analysis of 53 trials. *Lancet.* 2001;358(9294):1668–1675. doi: 10.1016/S0140-6736(01)06711-3. [PubMed] [CrossRef] [Google Scholar]

21. Cady R, Elkind A, Goldstein J, Keywood C. Randomized, placebo-controlled comparison of early use of frovatriptan in a migraine attack versus dosing after the headache has become moderate or severe. *Curr Med Res Opin.* 2004;20(9):1465–1472. doi: 10.1185/030079904X2745. [PubMed] [CrossRef] [Google Scholar]

22. Grazzi L, Tassorelli C, de Tommaso M, Pierangeli G, Martelletti P, Rainero I, Geppetti P, Ambrosini A, Sarchielli P, Liebler E, Barbanti P. Practical and clinical utility of non-invasive vagus nerve stimulation (nVNS) for the acute treatment of migraine: post hoc assessment of the

randomized, sham-controlled, double-blind PRESTO trial [abstract MTIS2018-059] *Cephalalgia.* 2018;38(1S):42. doi: 10.1177/0333102418789865. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

23. Cady RK, Sheftell F, Lipton RB, O'Quinn S, Jones M, Putnam DG, Crisp A, Metz A, McNeal S. Effect of early intervention with sumatriptan on migraine pain: retrospective analyses of data from three clinical trials. *Clin Ther.* 2000;22(9):1035–1048. doi: 10.1016/S0149-2918(00)80083-1. [PubMed] [CrossRef] [Google Scholar]

24. Gaul C, Diener HC, Silver N, Magis D, Reuter U, Andersson A, Liebler EJ, Straube A, Group PS Non-invasive vagus nerve stimulation for prevention and acute treatment of chronic cluster headache (PREVA): a randomised controlled study. *Cephalalgia.* 2016;36(6):534–546. doi: 10.1177/0333102415607070. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

25. Goadsby PJ, de Coo IF, Silver N, Tyagi A, Ahmed F, Gaul C, Jensen RH, Diener HC, Rabe K, Straube A, Liebler E, Marin J, Ferrari MD, Group AS Non-invasive vagus nerve stimulation for the acute treatment of episodic and chronic cluster headache: findings from the randomized, double-blind, sham-controlled ACT2 study. *Cephalalgia.* 2018;38(5):959–969. doi: 10.1177/0333102417744362. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

26. Silberstein SD, Mechtler LL, Kudrow DB, Calhoun AH, McClure C, Saper JR, Liebler EJ, Rubenstein Engel E, Tepper SJ, Group AS (2016) Non-invasive vagus nerve stimulation for the acute treatment of cluster headache: findings from the randomized, double-blind, sham-controlled ACT1 study. Headache 56(8):1317–1332. 10.1111/head.12896 [PMC free article] [PubMed]

27. Asano E, Goadsby PJ. How do we fashion better trials for neurostimulator studies in migraine? *Neurology.* 2013;80(8):694. doi: 10.1212/WNL.0b013e3182825174. [PubMed] [CrossRef] [Google Scholar]

28. Moeller M, Schroeder CF, May A. Comparison of active and "sham" non-invasive vagal nerve stimulation on lacrimation in healthy volunteers [abstract PS76] *Headache.* 2018;58(suppl 2):135–136. doi: 10.1111/head.13306. [CrossRef] [Google Scholar]

References

1. Vos T, Abajobir AA, Abate KH et al (2017) Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the global burden of disease study 2016. Lancet 390:1211–1259

Article **Google Scholar**

2. Society (IHS) HCC of the IH (2013) The international classification of headache disorders, (beta version). Cephalalgia 33:629–808

Article **Google Scholar**

3. Silva AND, Tepper SJ (2012) Acute treatment of migraines. CNS Drugs 26:823–839 https://doi.org/10.2165/11635440-000000000-00000

Article **Google Scholar**

4. Goadsby PJ, Sprenger T (2010) Current practice and future directions in the prevention and acute management of migraine. Lancet Neurol 9:285–298 https://doi.org/10.1016/S1474-4422(10)70005-3

Article **Google Scholar**

5. Diener H-C, Limmroth V (2004) Medication-overuse headache: a worldwide problem. Lancet Neurol 3:475–483 https://doi.org/10.1016/S1474-4422(04)00824-5

Article **Google Scholar**

6. Bigal ME, Lipton RB (2009) Overuse of acute migraine medications and migraine chronification. Curr Pain Headache Rep 13:301–307 https://doi.org/10.1007/s11916-009-0048-3

Article **Google Scholar**

7. Yarnitsky D, Volokh L, Ironi A et al (2017) Nonpainful remote electrical stimulation alleviates episodic migraine pain. Neurology 88:1250–1255

Article **Google Scholar**

8. Nir R-R, Yarnitsky D (2015) Conditioned pain modulation. Curr Opin Support Palliat Care 9:131–137

Article Google Scholar

9. Yarnitsky D, Dodick DW, Grosberg BM et al Remote electrical neuromodulation (REN) relieves acute migraine: a randomized, double-blind, placebo-controlled, multicenter trial. Headache J Head Face Pain https://doi.org/10.1111/head.13551
10. Tassorelli C, Grazzi L, de Tommaso M et al (2018) Noninvasive vagus nerve stimulation as acute therapy for migraine: the randomized PRESTO study. Neurology 91:e364–e373

Article Google Scholar

11. Spierings EL, Brandes JL, Kudrow DB et al (2018) Randomized, double-blind, placebo-controlled, parallel-group, multi-center study of the safety and efficacy of ADAM zolmitriptan for the acute treatment of migraine. Cephalalgia 38:215–224

Article Google Scholar

12. Diener H-C, Barbanti P, Dahlöf C et al (2010) BI 44370 TA, an oral CGRP antagonist for the treatment of acute migraine attacks: results from a phase II study. Cephalalgia 31:573–584 https://doi.org/10.1177/0333102410388435

Article Google Scholar

13. Kelman L (2006) Pain characteristics of the acute migraine attack. Headache J Head Face Pain 46:942–953 https://doi.org/10.1111/j.1526-4610.2006.00443.x

Article Google Scholar

14. Lipton RB, Dodick DW, Silberstein SD et al (2010) Single-pulse transcranial magnetic stimulation for acute treatment of migraine with aura: a randomised, double-blind, parallel-group, sham-controlled trial. Lancet Neurol 9:373–380 https://doi.org/10.1016/S1474-4422(10)70054-5

Article Google Scholar

15. Ferrari MD, Roon KI, Lipton RB, Goadsby PJ (2001) Oral triptans (serotonin 5-HT1B/1D agonists) in acute migraine treatment: a meta-analysis of 53 trials. Lancet 358:1668–1675 https://doi.org/10.1016/S0140-6736(01)06711-3

CAS Article Google Scholar

16. Wietecha LA, Kuca B, Asafu-Adjei J, Aurora SK (2018) Phase 3 studies (SAMURAI, SPARTAN) of Lasmiditan compared to placebo for acute treatment of migraine (S50. 008). AAN Enterprises
17. Lipton R, Bigal M, Goadsby P (2004) Double-blind clinical trials of Oral Triptans *Vs* other classes of acute migraine medication — a review. Cephalalgia 24:321–332 https://doi.org/10.1111/j.1468-2982.2003.00690.x

CAS Article Google Scholar

18. Marmura MJ, Silberstein SD, Schwedt TJ (2015) The acute treatment of migraine in adults: the American headache society evidence assessment of migraine pharmacotherapies. Headache J Head Face Pain 55:3–20 https://doi.org/10.1111/head.12499

Article Google Scholar