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Short Communication

Is Vagus Nerve Therapy a Potential Alzheimer's Disease Treatment?

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Abstract

A potential treatment for Alzheimer's disease is vagus nerve therapy, which has been made possible by considerable advances in neuroscience. An essential component of the autonomic nervous system, the vagus nerve regulates memory, inflammation, and cognition. Researchers hope to delay the progression of Alzheimer's disease and improve cognitive function by implanting a vagus nerve stimulator (VNS). Alzheimer's patients have higher heart rate variability, according to an ECG study, which may be advantageous. To completely grasp its mechanics and long-term effectiveness, more research is necessary.

Keywords:
Alzheimer; Vagus Nerve Therapy; Neuroscience; Nervius System; Vagus Nerve Stimulator

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Introduction

In recent years, the field of neuroscience has made significant progress in understanding the complex nature of Alzheimer's disease [1], a devastating neurodegenerative disorder that affects millions of people worldwide [9]. A multitude of research studies have sought to uncover potential therapeutic approaches to combat this debilitating condition [4,10]. One emerging area of interest is vagus nerve therapy [3,6,16], a promising treatment that harnesses the power of the vagus nerve to mitigate the symptoms of Alzheimer's disease [7,15].

Moreover, Jin et al. [7] emphasize that the vagus nerve, which serves as an essential conduit between the brain and internal organs, has demonstrated promise in the treatment of a number of brain disorders, including Alzheimer's, Parkinson's, traumatic brain injury, and stroke.

Remembering the vagus nerve, also known as the tenth cranial nerve [5], plays a crucial role in the autonomic nervous system, which regulates various bodily functions, such as heart rate, digestion, and respiratory rhythm. It is a major communication highway between the brain and the body, connecting the central nervous system to widespread organ systems [2]. Furthermore, it has been increasingly implicated in modulating inflammation, cognition, and memory, making it an intriguing target for therapeutic interventions in Alzheimer's disease [17].

The method of vagus nerve therapy involves the implantation of a device called a vagus nerve stimulator (VNS) into the patient's body [11]. This device delivers gentle electrical pulses to the vagus nerve, thereby modulating its activity and influencing the release of neurotransmitters in the brain. These pulses prompt the release of acetylcholine, a vital neurotransmitter involved in memory and learning processes that are impaired in Alzheimer's disease. By enhancing the release of acetylcholine, vagus nerve therapy aims to improve cognitive function and slow down the progression of Alzheimer's [12,13,16].

To evaluate the effects of vagus nerve therapy on Alzheimer's patients, researchers have turned to the use of electrocardiograms (ECGs), a non-invasive tool that measures the electrical activity of the heart [12,13]. ECG analysis can provide valuable insights into autonomic nervous system activity, making it an ideal method to assess the impact of VNS on the vagus nerve's modulation of heart rate variability.

Studies have shown that Alzheimer's patients treated with VNS exhibit increased heart rate variability, indicative of improved autonomic function. This suggests that vagus nerve therapy may have a positive impact on the neurophysiological mechanisms underlying Alzheimer's disease. However, more study is required to monitor the advantages and disadvantages of employing electrocardiogram (ECG) analysis to track the effects of vagus nerve therapy on individuals with Alzheimer's disease.

Moreover, researchers have observed that vagus nerve therapy can lead to reduced inflammation in the brain, a hallmark of Alzheimer's disease [15]. Chronic inflammation is known to contribute to the progression of the disease, causing neuronal damage and impairing cognitive function [8]. By modulating the vagus nerve, VNS can help regulate the inflammatory response and potentially halt the neurodegenerative process.

While vagus nerve therapy shows great promise as a potential treatment for Alzheimer's disease, it is important to acknowledge that further research is needed to fully understand its mechanisms of action and long-term efficacy. However, the convergence of neuroscience, ECG analysis, and vagus nerve therapy presents a unique opportunity to revolutionize the management of Alzheimer's disease.

Future research has shown a great deal of interest in non-pharmacological alternatives, such as electrical stimulation, which is primarily used as an adjunct therapy. VNS is a neuromodulation technique that involves subcutaneous generator implantation through invasive surgery to directly stimulate the left

cervical vagus nerve electrically. Similar to VNS used in Parkinson disease, implantable VNS sends sporadic electrical currents through a wire encircling the vagus nerve [14].

Conclusion

A few research papers cited in this manuscript suggest that vagus nerve therapy is a new and possibly useful treatment for Alzheimer's disease. It is vital to monitor the effects of vagus nerve stimulation (VNS) with electrocardiogram analysis in order to confirm that the treatment reduced inflammation and enhanced cognitive function. In fact, numerous neuropsychiatric and systemic disorders can be treated with vagus nerve stimulation, a therapy that stimulates the cervical vagus nerve electrically. Expanding our understanding of the vagus nerve's function in Alzheimer's disease creates new opportunities for treatment.

References

1. Bondi MW, Edmonds EC, Salmon DP. (2017). Alzheimer's Disease: Past, Present, and Future. *J Int Neuropsychol Soc*. Oct;23(9-10):818-831. doi: 10.1017/S135561771700100X.
2. Breit S, Kupferberg A, Rogler G, Hasler G. (2018) Vagus Nerve as Modulator of the Brain-Gut Axis in Psychiatric and Inflammatory Disorders. *Front Psychiatry*. Mar 13;9:44. https://doi.org/10.3389/fpsyt.2018.00044.
3. Broncel A, Bocian R, Kłos-Wojtczak P, Kulbat-Warycha K, Konopacki J. Vagal nerve stimulation as a promising tool in the improvement of cognitive disorders. *Brain Res Bull*. 2020. Feb. 155:37–47. https://doi.org/10.1016/j.brainresbull.2019.11.011
4. Fang YT, Lin YT, Tseng WL, Tseng P, Hua GL, Chao YJ, Wu YJ. (2023). Neuroimmunomodulation of vagus nerve stimulation and the therapeutic implications. *Front Aging Neurosci*. Jul 6;15:1173987. https://doi.org/10.3389/fnagi.2023.1173987.
5. Grisold, W., Struhal, W., Grisold, A. (2023). Cranial Nerve X: Vagus Nerve. In: *The Cranial Nerves in Neurology*. Springer, Cham. https://doi.org/10.1007/978-3-031-43081-7_15
6. Howland RH. (2014). Vagus Nerve Stimulation. *Curr Behav Neurosci Rep*. Jun;1(2):64-73. doi: 10.1007/s40473-014-0010-5.
7. Jin Z, Dong J, Wang Y, Liu Y. (2023). Exploring the potential of vagus nerve stimulation in treating brain diseases: a review of immunologic benefits and neuroprotective efficacy. *Eur J Med Res*. Oct 19;28(1):444. https://doi.org/10.1186/s40001-023-01439-2.
8. Kinney JW, Bemiller SM, Murtishaw AS, Leisgang AM, Salazar AM, Lamb BT. (2018). Inflammation as a central mechanism in Alzheimer's disease. *Alzheimers Dement (N Y)*. Sep 6;4:575-590. doi: 10.1016/j.trci.2018.06.014.
9. Lamptey RNL, Chaulagain B, Trivedi R, Gothwal A, Layek B, Singh J. (2022). A Review of the Common Neurodegenerative Disorders: Current Therapeutic Approaches and the Potential Role of Nanotherapeutics. *Int J Mol Sci*. Feb 6;23(3):1851. https://doi.org/10.3390/ijms23031851.
10. Makdissi S, Parsons BD, Di Cara F. (2023). Towards early detection of neurodegenerative diseases: A gut feeling. *Front Cell Dev Biol*. Feb 7;11:1087091. https://doi.org/10.3389/fcell.2023.1087091.
11. Mandalaneni K, Rayi A. Vagus Nerve Stimulator. [Updated 2023 Aug 7]. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK562175/
12. Merrill CA, Jonsson MA, Minthon L, Ejnell H, C-son Silander H, Blennow K, Karlsson M, Nordlund A, Rolstad S, Warkentin S, Ben-Menachem E, Sjögren MJ. (2006). Vagus nerve stimulation in patients with Alzheimer's disease: Additional follow-up results of a pilot study through 1 year. *J Clin Psychiatry*. Aug;67(8):1171-8. doi: 10.4088/jcp.v67n0801.
13. Sjögren MJ, Hellström PT, Jonsson MA, Runnerstam M, Silander HC, Ben-Menachem E. (2002). Cognition-enhancing effect of vagus nerve stimulation in patients with Alzheimer's disease: a pilot study. *J Clin Psychiatry*. Nov;63(11):972-80. doi: 10.4088/jcp.v63n1103.
14. Sigurdsson HP, Raw R, Hunter H, Baker MR, Taylor JP, Rochester L, Yarnall AJ. (2021). Noninvasive vagus nerve stimulation in Parkinson's disease: current status and future prospects. *Expert Rev Med Devices*. Oct;18(10):971-984. doi: 10.1080/17434440.2021.1969913.
15. Vargas-Caballero M, Warming H, Walker R, Holmes C, Cruickshank G, Patel B. (2022). Vagus Nerve Stimulation as a Potential Therapy in Early Alzheimer's Disease: A Review. *Front Hum Neurosci*. Apr 29;16:866434. https://doi.org/10.3389/fnhum.2022.866434.
16. Vonck K, Raedt R, Naulaerts J, De Vogelaere F, Thiery E, Van Roost D, Aldenkamp B, Miatton M, Boon P. (2014). Vagus nerve stimulation…25 years later! What do we know about the effects on cognition? *Neurosci Biobehav Rev*. Sep;45:63-71. doi: 10.1016/j.neubiorev.2014.05.005.
17. Yu TW, Lane HY, Lin CH (2021). Novel Therapeutic Approaches for Alzheimer's Disease: An Updated Review. *Int J Mol Sci*. Jul 30;22(15):8208. https://doi.org/10.3390/ijms22158208.

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