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The Impact of Diet on Neurodegenerative Diseases: Dietary Patterns and Their Role in Prevention

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ABSTRACT

Neurodegenerative diseases, including Alzheimer's, Parkinson's, and Amyotrophic Lateral Sclerosis (ALS), are increasingly prevalent worldwide, causing severe cognitive and motor impairments. This paper explores the extent to which diet influences the development of these diseases, with a focus on specific dietary patterns associated with either increased or reduced risk. High-sugar diets, for instance, have been linked to cognitive decline, insulin resistance, and oxidative stress, while diets rich in omega-3 fatty acids and antioxidants have shown promising benefits in enhancing cognitive function and protecting neuronal integrity. The research emphasizes the importance of modifiable lifestyle factors, particularly diet, in preventing neurodegenerative diseases. By examining how specific dietary patterns affect neurodegenerative risk, the paper suggests that adopting balanced diets, rich in essential nutrients, could significantly mitigate the global burden of these diseases. Additionally, large-scale health policy reforms may further support the widespread adoption of healthier dietary habits.

Key Words: *Neurodegenerative diseases, diet, cognitive function, antioxidants, amyloid plaques*

INTRODUCTION

Neurodegenerative diseases can degrade parts of the nervous system and, a majority of the time, cause sufficient damage to the frontal lobe of the brain. These diseases often involve a decline in cognitive and motor function, making it harder to go about daily life without caregivers' constant support and assistance. There are different types of neurodegenerative diseases, including dementia-type diseases, demyelinating diseases, Parkinsonism-type diseases, motor neuron diseases, and prion diseases (Cleveland Clinic, 2023). The prognosis and symptoms of these diseases vary as each affects different parts of the nervous system. There is no single etiology behind the onset of such diseases; however, various factors, including genetics, toxins, environmental pollutants, mitochondrial dysfunction, and other lifestyle factors, such as diet and physical activity, contribute towards the same. Over the last 31 years, the overall amount of disability, illness, and premature death, measured as disability-adjusted life years (DALYs)-caused by neurological conditions has increased by 18%, going from approximately 374 million years of healthy life lost in 1990 to 443 million years of healthy life lost in 2021 (The Lancet Neurology, 2024). This may also result from an aging population; however, the changes in various environmental and lifestyle factors today also contribute significantly. Currently, there is no cure for neurodegenerative diseases, and patients are only provided with palliative care that can help relieve them of their symptoms. This does not prevent the disease from progressing further, making it essential to focus on modifiable lifestyle factors,

particularly a person's diet, as a means to prevent the onset of the disease. This research paper, therefore, aims to answer the following question: *To what extent does diet influence the development of neurodegenerative diseases, and what specific dietary patterns are associated with increased or reduced risk?*

This research paper argues that dietary patterns significantly influence the risk of developing neurodegenerative diseases and suggests health policy reforms to address this growing concern.

BACKGROUND

As mentioned in the introduction, neurodegenerative diseases are progressive diseases and currently have no particular cure as a means of stopping the disease from advancing and causing further damage to the nervous system. These diseases are becoming more prevalent due to a number of factors, both environmental and genetic, and there is only so little that caretakers and doctors can help with. The most commonly occurring neurodegenerative diseases (NDs) include Alzheimer's disease (AD), Parkinson's disease, and amyotrophic lateral sclerosis (ALS). Each of these diseases attacks the nervous system; however, since different areas are damaged, the prognosis, etiology, and symptoms tend to be slightly different for each of them.

Alzheimer's disease

Patients diagnosed with Alzheimer's disease experience a progressive decline in their ability to learn, think, and even remember. Initially, Alzheimer's disease usually entails damaging connections between neurons in parts of the brain that are responsible for memory, including the hippocampus and the entorhinal cortex (NIA, 2024). Subsequently, parts of the cerebral cortex that manage essential processes such as communication, metabolism, and even the repair of the human body are hindered. This causes various parts of the nervous system to work abnormally, leading to irreversible damage that can only be slowed and not stopped by medical or pharmaceutical means.

Upon examination of the brains of patients with Alzheimer's disease, it has also been discovered that the brain shows various unusual clumps called amyloid plaques and tangles of bundles of fibers called neurofibrillary or tau tangles (NIA 2021). The amyloid plaques act as toxic buildups accumulating between neurons, disrupting the brain's functioning by interfering with neuron communication pathways. Tau tangles also disrupt the communication of neurons. However, this is done by damaging their internal support structures. There is no single test that can definitively indicate a person having Alzheimer's disease. Therefore, doctors and other medical practitioners can diagnose Alzheimer's disease through various techniques, such as brain imaging, to look for physical changes using techniques such as computerized tomography (CT), magnetic resonance imaging (MRI), or even positron emission tomography (PET). Doctors may also use a technique known as Lumbar puncture to detect amyloid plaques and tau proteins (Cherry, 2022). Specific neuropsychological tests are also conducted using a less invasive and cost-effective approach.

Alzheimer's disease is currently ranked as the 7th leading cause of death in the United States. It is the most common form of dementia in older adults, with 46.8 million people affected by the pathology worldwide, a number expected to increase to 74.7 million in 2030 and 131.5 million in 2050 (Gulisano et al., 2018). Currently, the only FDA-approved drugs for the treatment of Alzheimer's disease are cholinesterase inhibitors, such as donepezil, rivastigmine, and galantamine. These drugs offer a palliative approach by slowing the breakdown of acetylcholine, a chemical messenger critical for memory and judgment. Acetylcholine is an excitatory neurotransmitter, meaning it stimulates nerve cells to transmit signals (Cleveland Clinic, 2022a). In individuals with Alzheimer's disease, there is a significant deficiency of

acetylcholine in the brain. By limiting its breakdown, cholinesterase inhibitors can alleviate some symptoms and temporarily improve the quality of life for those diagnosed. However, these drugs do not halt or reverse the damage caused by the disease. Over time, as the brain's ability to produce acetylcholine diminishes further, the efficacy of these treatments' declines, highlighting the progressive and neurodegenerative nature of Alzheimer's disease.

Parkinson's disease

Parkinson's disease is a neurodegenerative disease that leads to uncontrollable movements such as shaking, stiffness, and problems in maintaining balance and coordination. In the later stages of the disease, patients may also develop problems with memory and dementia. Similar to Alzheimer's, Parkinson's is also a progressive disease where symptoms gradually become worse over time.

Parkinson's disease results from a loss of nerve cells called neurons in the part of the brain called the substantia nigra located in the basal ganglia, which are a group of nuclei responsible for voluntary movement (NHS, 2022). This small structure in the brain helps control body movements. A part of the substantia nigra is responsible for chemical signaling and comprises dopaminergic neurons. These are involved in the release of a neurotransmitter called dopamine. Dopamine acts as a chemical messenger between different areas of the brain and helps control and coordinate body movements. Currently, the causes of the loss of these nerve cells in the brain are unknown; however, scientists have attributed various possible causes to environmental and genetic factors. Factors such as pesticides in food, increasing pollution, and an unhealthy lifestyle are plausible factors contributing to the condition.

Parkinson's also causes significant physical changes to the brains of patients affected by it. This is via Lewy bodies, clumps of proteins that deposit in the brain (Cleveland Clinic, 2022). Mitochondrial dysfunction is also attributed to the occurrence and prevalence of Parkinson's disease and is an important component in understanding its pathogenesis. While there is no current cure for Parkinson's disease, there are still treatments involving dopamine agonists to stimulate the production of dopamine in the brain, enzyme inhibitors that increase the amount of dopamine in the brain by slowing down the enzyme that breaks dopamine down, amantadine to help reduce involuntary movements and anticholinergic drugs that help in reducing tremors and rigidity in muscles (NIA, 2022).

Amyotrophic lateral sclerosis (ALS)

Amyotrophic lateral sclerosis is a neurodegenerative disease that harms the brain and spinal cord's motor neurons, which control voluntary muscle movement and breathing (NINDS, 2024). Certain symptoms exhibited by patients with this disease include muscle cramps and difficulty in chewing and swallowing, which later turn into more serious symptoms such as problems with breathing, drooling, and absorption of nutrients in the body. It can also cause pseudobulbar symptoms such as unintentional crying or laughing.

Currently, there is no clear answer as to what causes amyotrophic lateral sclerosis; however, there are genetic and environmental factors that may be behind it. About 10% of all ALS cases are genetic and inherited. Hence, genetics most commonly do not result in the onset of this disease. Environmental factors such as exposure to heavy metals, high levels of exercise, and high exposure to agricultural chemicals have some influences on the cause of the disease (ALS Association, 2024). One other major factor that may be behind Amyotrophic lateral sclerosis, as well as Parkinson's and Alzheimer's disease, is oxidative stress (Li et al., 2013). Oxidative stress in neurodegenerative diseases refers to an imbalance of free radicals and antioxidants in the body that can cause mitochondrial dysfunction in cells, leading to the death and damage of motor neurons in the brain and

spinal cord (Pham-Huy et al., 2008). All these factors come together and lead to neurodegenerative diseases that progressively get worse over time.

As of now, the only treatments available for amyotrophic lateral sclerosis are primarily through drugs such as Riruzole, which is an oral medication that is considered to reduce damage to the motor neurons as a result of this disease. Edaravone, an antioxidant that can be administered orally or intravenously, has been shown to slow cognitive decline in patients with ALS. Certain other drugs are also used to prevent nerve damage. Other therapies, such as speech therapies and support to help patients breathe, feed, and get adequate nutrition, are provided. Trials and research are being conducted on the use of stem cells, biomarkers, genetics, and epigenetics as a way to understand the disease better and possibly cure it.

These neurodegenerative diseases are life-threatening and currently untreatable. While there are drug treatments, they can only prolong the onset of major symptoms until the disease progresses further and the patient loses more cognitive and motor function. The nervous system continues to decline, and the brain's build-up and accumulation of tangles and proteins cannot be stopped.

Problem Statement

Statistics released by The Lancet Neurology have illustrated how neurological conditions are now one of the leading causes of ill health and disability worldwide, calculated using the disability-adjusted life years (DALYs) (WHO, 2024). The overall burden of disability, illness, and premature death due to neurological conditions has increased by 18% since the 1990s. Recent data from the WHO in 2022 reveal that neurodegenerative diseases account for 7% of all global deaths and are a leading cause of disability. This highlights a pressing global health concern that affects millions, with no current way to reverse the damage caused by these diseases. The population trends in specific countries also make their populations more vulnerable to neurodegenerative diseases. In Asian countries like Japan, rapidly aging populations have led to significant increases in neurodegenerative disease cases. Statistics provided by The Japan Times show that the number of people in Japan aged 65 and above with dementia is expected to increase to nearly 6 million by 2040, meaning almost 1 in 7 elderly people will have this condition (Otake, 2024). Other Asian countries, such as China, that also have a rapidly aging population have seen increased proliferation in cases involving neurodegenerative diseases such as Alzheimer's with the largest increase in incidence rates for neurological conditions from 1990 to 2019 with an estimated annual percent change (EAPC) of 0.19 compared to western Europe with an EAPC of 0.03 and Southern Latin America with 0.03. Another nation that faces challenges with an aging population is Italy, which has an EAPC of 0.13 (Huang et al., 2023).

Due to such drastic increases in cases of neurological conditions and especially neurodegenerative diseases, it is essential to understand the modifiable risk factors and make changes to one's lifestyle in accordance with those to prevent further loss of life, illness, and disability. One particular such factor is diet, which can either accelerate one's chances of being affected by neurodegenerative conditions or avert and reduce the risks. Diet has shown significant potential as a preventive measure for neurodegenerative diseases as it can directly influence brain health by impacting brain inflammation, oxidative stress, and the overall metabolic function of the human body. The diet also introduces different bacteria into the human gut, which has recently shown much control over various aspects of the human brain, such as controlling neurotransmitters and releasing hormones. Elements of a person's diet that may influence the onset and prevention of neurodegenerative diseases are analyzed below.

High-sugar diets

It has been suggested that high-sugar diets can lead to a decline in cognition ability and predispose consumers of such a diet to neurodegenerative diseases. Researchers from the Fred Hutch Cancer Centre show evidence suggesting a high-sugar diet causes insulin resistance in the brain (Pelc, 2023). This prevents the brain from clearing out neuronal debris such as misfolded proteins as it generally would, and the accumulation of such damaged cellular components could lead to subsequent consequences such as oxidative stress, inflammation, neural death, and interference with brain function (Zhang et al., 2023) - the aforementioned results in increased chances of being affected by neurodegenerative diseases and suffering from cognitive impairment.

Microglia are immune cells in the brain and spinal cord that play a crucial role in maintaining the central nervous system. These cells act as the first responders to damage or pathogens in the brain, eliminating dead cells, microbes, and other neuronal debris. Research has shown overconsumption of sugar (carbohydrates) in one's diet can lead to excessive Carboxymethyl)-Lysine (CML) production in hypothalamic neurons, which stimulates hypothalamic inflammatory responses wherein microglia cells activate and increase in number, leading to microgliosis, which can progress to neuronal dysfunction, thus, increasing risk of developing neurodegenerative diseases (Gao et al., 2017).

Saturated and trans fats

Saturated fats and trans fats are both unhealthy forms of fat that can lead to severe health complications, particularly heart disease. These fats are obtained from foods such as hydrogenated oils, red meat, fried foods, and other similar products. Diets involving high amounts of saturated and trans fats have shown links to increased amyloid plaque formation in the brains of patients with neurodegenerative diseases. This is because the protein amyloid beta is a part of metabolizing lipids. These fats in one's diet contribute to an increase in amyloid beta by affecting how amyloid precursor protein (APP) is processed, particularly by an alteration to the lipid rafts (Kao et al., 2020), which are microdomains within the cell membrane where enzymes responsible for producing amyloid beta cleavage are concentrated (Grimm et al., 2012). This can lead to higher production of amyloid beta, which can turn into plaques by their misfolding and clumping together, which potentially disrupts the communication between neurons in the brain, consequently leading to neurodegenerative diseases such as Alzheimer's, Parkinson's, and Amyotrophic lateral sclerosis.

Deficiencies in omega-3 fatty acids

Deficiencies in omega-3 fatty acids can also lead to an increased risk of neurodegenerative diseases. Omega-3 fatty acids are a type of polyunsaturated fat considered healthy and essential to the human body's adequate functioning. Omega-3 fatty acids greatly support cognitive function by becoming integral components of the brain cell membranes. They contribute to the fluidity of neurons and act as the building blocks required for the membranes of brain cells to optimize cognitive function. Research has shown that increased Omega-3 fatty acids in diets can improve the signaling of neurotransmitters, enhance human memory, reduce inflammation, and possibly slow the cognitive decline that comes with aging or neurodegenerative diseases (Dighriri et al., 2022).

The human body cannot synthesize omega-3 fatty acids, so they must be taken externally to help maintain neural integrity. One particular diet that consists of this fatty acid in larger quantities is the Mediterranean diet, which has also been considered by many to be one of the best diets globally. It involves various omega-3-rich foods such as walnuts, fatty fish (commonly including salmon, sardines, mackerel, and trout), chia seeds, seaweed, etc. This diet is increasingly

common in Greece, Spain, Portugal, and Turkey. This diet is also rich in antioxidants that stem from the fruits and vegetables consumed that combat the oxidative stress that is highly damaging to the brain and neurons.

Antioxidant-rich foods

Oxidative stress has been associated with the development of neurodegenerative diseases, and one of the most recommended solutions is to promote a diet of antioxidant-rich foods. These foods include fruits such as berries, vegetables, nuts and seeds, whole grains, herbs, spices, and even cocoa. These foods have antioxidant properties as they contain specific vitamins and pigments. Vitamin C, for one, is a water-soluble vitamin that helps in protecting cells and tissues from free radicals. Another vitamin that gives the foods mentioned earlier their antioxidant properties is vitamin E. Vitamin E protects against free radicals by essentially scavenging them, especially lipid peroxyl radicals, found within a cell membrane and efficiently stopping the chain reaction of lipid peroxidation to help prevent damage to other cell components (Ryan et al., 2010). Overall, consuming antioxidant foods is crucial to counteract the accumulated free radicals in the body and restore balance (Eske, 2019).

Diet is a modifiable lifestyle factor that has shown significant promise to reduce the likelihood of developing neurodegenerative diseases, and a diet rich in antioxidants and fatty acids such as omega-3 has been shown to be highly beneficial for cognitive function. Conversely, the wrong type of diet, such as one consisting of high sugars and saturated and trans fats, can lead to increasing chances of onset of neurodegenerative diseases. This makes it essential to consume a balanced diet with various foods to help combat the steep incline in the neurodegenerative cases presented recently.

Potential Health Policy Reforms

While individuals taking action towards making dietary modifications is essential to reducing cases of neurodegenerative diseases, there are also potential health and policy reforms that can be put in place by the government to create more lasting and impactful changes to help modulate and improve dietary choices. There have already been certain successful dietary and educational interventions applied in some nations that could be adapted worldwide at a larger scale to improve the health and well-being of the general population. Some significant methods of intervention are analyzed below.

Sugar taxes

Countries such as Mexico and the UK have successfully implemented sugar taxes, leading to significant reductions in the purchasing of high-sugar products and processed foods. These foods are known to negatively impact cognitive health, ultimately increasing the risk of neurodegenerative diseases. Sugar taxes have proven to be an effective intervention, particularly in addressing obesity and the prevalence of diabetes, both of which are linked to cognitive decline. In Mexico, research has shown that following the implementation of a sugar tax, households with the fewest resources reduced their purchase of sugary drinks by 11.7%, compared to a 7.6% reduction among the general population (WHO, 2017). Such policies not only reduce the consumption of sugary products but also diminish high-sugar diets, which are associated with adverse effects like insulin resistance, oxidative stress, and mitochondrial dysfunction. Expanding similar measures globally could play a crucial role in preventing neurodegenerative diseases and slowing the dramatic rise in cases worldwide.

Public education campaigns

Public education campaigns are an effective way to promote the importance of a balanced and healthy diet, emphasizing foods rich in omega-3 fatty acids, antioxidants, and polyphenols to reduce the risk of neurodegenerative diseases. The World Health Organization (WHO) has conducted

various campaigns promoting healthy eating habits, such as the #HealthyAtHome campaign, which encourages reducing sugar intake, consuming a variety of nutritious foods, staying hydrated, and limiting salt consumption (WHO, 2025). Scaling such initiatives to a broader and more persistent level could significantly reduce the risk of neurodegenerative diseases by encouraging dietary changes for physical and cognitive well-being. Additionally, these campaigns could advocate for reforms to school meal programs, integrating nutrient-rich foods such as leafy greens and other brain-supporting ingredients. Promoting healthy eating habits from a young age would help instill lifelong behaviors that counter the damaging effects of highly processed, fatty, and sugary diets later in life.

Nutritional labeling policies

Providing honest information to consumers via nutritional labeling policies should become a priority. This has been widely adopted in Australia, where it is essential to include details of energy, protein, fat, saturated fats, carbohydrates, sugar, and sodium content per 100g and serving of a food item (NSW Government, 2024). While this is quite common for store-bought items, including a similar labeling system for restaurants could also be beneficial. This could allow the public to make more informed choices about what enters their body and know the possible health implications of the foods they consume. This would also be ideal for those with diabetes or allergies and make it easier to moderate and modulate their diets on a need-to-need basis. Moreover, this would allow individuals to make healthier life choices without it being imposed on them by others.

Subsidies and incentives for purchasing fresh produce

The government could also initiate subsidies and incentives to purchase fresh produce. This could give people the much-needed push to buy products that aren't only beneficial for their health but also bring about a financial advantage. This could also reduce food insecurity in more vulnerable communities and increase their food purchasing power, which could avert a plethora of health issues, a significant one being the onset of neurodegenerative diseases (An, 2012).

Conclusively, governments and other powerful platforms must take the initiative and implement means of interventions that can help improve the diets of people around the world and promote a diet composed of a variety of foods that stray away from highly sugared and over processed foods. This not only helps reduce the risk of neurodegenerative diseases, where the number of cases is rapidly accelerating, but also tackles obesity and diabetes, which are also chronic diseases with adverse effects on the general population's health.

CONCLUSION

Diet influences the development of neurodegenerative diseases, and specific dietary patterns can be associated with increased or reduced risk of such diseases. This research paper aimed to look at how dietary patterns can notably influence the risk of developing neurodegenerative diseases and the essentiality of understanding how modifications to this aspect of one's lifestyle can help prevent the onset of neurodegenerative diseases and sustain neuronal integrity.

Neurodegenerative diseases cause severe damage to parts of the nervous system, leading to neuronal death and the breakdown of neuronal networks. Consequently, this causes impairments in cognitive and motor function. The most common types of neurodegenerative diseases include Alzheimer's disease, Parkinson's disease, and Amyotrophic Lateral Sclerosis. It is difficult to isolate a single, definitive reason behind the onset of such diseases; however, some causes that have been narrowed down include the formation of toxic amyloid plaques as a result of protein aggregation, neurofibrillary tangles (tau tangles), oxidative stress, and mitochondrial

dysfunction. Despite ongoing research, no cure can provide conclusive results in stopping and reversing damage caused by such diseases. Hence, examining how modifiable lifestyle factors may play a role in developing neurodegenerative diseases is essential.

Research has shown how certain dietary habits can alleviate the risk of neurodegenerative diseases while others can heighten it. High-sugar diets have been associated with a decline in cognitive ability, as it can lead to insulin resistance. This prevents the brain from clearing out neuronal debris effectively and can lead to oxidative stress and the death of neurons. Diets composed of saturated fats and trans fats can also be damaging as they produce a protein that increases the production of amyloid beta protein, eventually turning into amyloid plaques that block neuron signaling. On the contrary, diets rich in omega-3 fatty acids and antioxidants have been shown to improve cognitive function, increase neuronal membranes' fluidity, and counteract oxidative stress's effects.

Diet, therefore, influences the development of neurodegenerative diseases to a great extent. It is, thus, essential to consume a balanced diet and incorporate foods rich in proteins and antioxidants to promote cognitive function, as diet is modifiable and various altercations can be made to improve neuronal activities. Large-scale health policy reforms can enable and facilitate such changes and, in the long term, successfully combat the drastically increasing prevalence of neurodegenerative diseases globally.

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REFERENCES

1. ALS Association. (2024). *ALS Risk Factors | The ALS Association*. Www.als.org. https://www.als.org/research/als-research-topics/als-risk-factors
2. An, R. (2012). Effectiveness of subsidies in promoting healthy food purchases and consumption: a review of field experiments. *Public Health Nutrition*, *16*(7), 1215–1228. https://doi.org/10.1017/s1368980012004715
3. Cherry, K. (2022, July 29). *What Is Alzheimer's Disease?* Verywell Mind. https://www.verywellmind.com/what-is-alzheimers-disease-5075247
4. Cleveland Clinic. (2022a, March 14). *Neurotransmitters*. Cleveland Clinic. https://my.clevelandclinic.org/health/articles/22513-neurotransmitters
5. Cleveland Clinic. (2022b, April 15). *Parkinson's disease: Causes, Symptoms, Stages, Treatment, Support*. Cleveland Clinic; Cleveland Clinic. https://my.clevelandclinic.org/health/diseases/8525-parkinsons-disease-an-overview
6. Cleveland Clinic. (2023, May 10). *Neurodegenerative diseases*. Cleveland Clinic. https://my.clevelandclinic.org/health/diseases/24976-neurodegenerative-diseases
7. Dighriri, I. M., Alsubaie, A. M., Hakami, F. M., Hamithi, D. M., Alshekh, M. M., Khobrani, F. A., Dalak, F. E., Hakami, A. A., Alsueaadi, E. H., Alsaawi, L. S., Alshammari, S. F., Alqahtani, A. S., Alawi, I. A., Aljuaid, A. A., & Tawhari, M. Q. (2022). Effects of Omega-3 Polyunsaturated Fatty Acids on Brain Functions: A Systematic Review. *Cureus*, *14*(10). https://doi.org/10.7759/cureus.30091
8. Eske, J. (2019, April 3). *What is oxidative stress? Effects on the body and how to reduce*. Www.medicalnewstoday.com. https://www.medicalnewstoday.com/articles/324863
9. Gao, Y., Bielohuby, M., Fleming, T., Grabner, G. F., Foppen, E., Bernhard, W., Guzmán-Ruiz, M., Layritz, C., Legutko, B., Zinser, E., García-Cáceres, C., Buijs, R. M., Woods, S. C., Kalsbeek, A., Seeley, R. J., Nawroth, P. P., Bidlingmaier, M., Tschöp, M. H., & Yi, C.-X. (2017). Dietary sugars, not lipids, drive hypothalamic inflammation. *Molecular Metabolism*, *6*(8), 897–908. https://doi.org/10.1016/j.molmet.2017.06.008
10. Grimm, M. O. W., Rothhaar, T. L., Grösgen, S., Burg, V. K., Hundsdörfer, B., Haupenthal, V. J., Friess, P., Kins, S.,

Grimm, H. S., & Hartmann, T. (2012). Trans fatty acids enhance amyloidogenic processing of the Alzheimer amyloid precursor protein (APP). *The Journal of Nutritional Biochemistry*, *23*(10), 1214–1223. https://doi.org/10.1016/j.jnutbio.2011.06.015

11. Gulisano, W., Maugeri, D., Baltrons, M. A., Fà, M., Amato, A., Palmeri, A., D'Adamio, L., Grassi, C., Devanand, D. P., Honig, L. S., Puzzo, D., & Arancio, O. (2018). Role of Amyloid-β and Tau Proteins in Alzheimer's Disease: Confuting the Amyloid Cascade. *Journal of Alzheimer's Disease*, *64*(s1), S611–S631. https://doi.org/10.3233/jad-179935
12. Huang, Y., Li, Y., Pan, H., & Han, L. (2023). Global, regional, and national burden of neurological disorders in 204 countries and territories worldwide. *Journal of Global Health*, *13*. https://doi.org/10.7189/jogh.13.04160
13. Kao, Y.-C., Ho, P.-C., Tu, Y.-K., Jou, I-Ming., & Tsai, K.-J. (2020). Lipids and Alzheimer's Disease. *International Journal of Molecular Sciences*, *21*(4), 1505. https://doi.org/10.3390/ijms21041505
14. Li, J., O, W., Li, W., Jiang, Z.-G., & Ghanbari, H. (2013). Oxidative Stress and Neurodegenerative Disorders. *International Journal of Molecular Sciences*, *14*(12), 24438–24475. https://doi.org/10.3390/ijms141224438
15. NHS. (2022, November 3). *Parkinson's Disease*. NHS; NHS. https://www.nhs.uk/conditions/parkinsons-disease/causes/
16. NIA. (2021, July 8). *What is Alzheimer's disease?* National Institute on Aging. https://www.nia.nih.gov/health/alzheimers-and-dementia/what-alzheimers-disease
17. NIA. (2022, April 14). *Parkinson's Disease: Causes, symptoms, and treatments*. National Institute of Aging. https://www.nia.nih.gov/health/parkinsons-disease/parkinsons-disease-causes-symptoms-and-treatments
18. NIA. (2024, January 19). *What Happens to the Brain in Alzheimer's Disease?* National Institute on Aging. https://www.nia.nih.gov/health/alzheimers-causes-and-risk-factors/what-happens-brain-alzheimers-disease
19. NINDS. (2024, July 19). *Amyotrophic lateral sclerosis (ALS)*. Www.ninds.nih.gov. https://www.ninds.nih.gov/health-information/disorders/amyotrophic-lateral-sclerosis-als
20. NSW Government. (2024). *Labelling laws*. NSW Food Authority. https://www.foodauthority.nsw.gov.au/food-labelling/labels-law/labelling-laws
21. Otake, T. (2024, September 2). *For aging Japan, a troubling link between heat and dementia*. The Japan Times | Special Features. https://features.japantimes.co.jp/extreme-heat-dementia-japan/
22. Pelc, C. (2023, November 8). *Insulin resistance from high-sugar diet may lead to brain decline*. Medicalnewstoday.com; Medical News Today. https://www.medicalnewstoday.com/articles/insulin-resistance-high-sugar-diet-links-obesity-with-dementia
23. Pham-Huy, L. A., He, H., & Chuong Pham-Huy. (2008). Free Radicals, Antioxidants in Disease and Health. *International Journal of Biomedical Science: IJBS*, *4*(2), 89. https://pmc.ncbi.nlm.nih.gov/articles/PMC3614697/
24. Ryan, M. J., Dudash, H. J., Docherty, M., Geronilla, K. B., Baker, B. A., Haff, G. G., Cutlip, R. G., & Alway, S. E. (2010). Vitamin E and C supplementation reduces oxidative stress, improves antioxidant enzymes and positive muscle work in chronically loaded muscles of aged rats. *Experimental Gerontology*, *45*(11), 882–895. https://doi.org/10.1016/j.exger.2010.08.002
25. The Lancet Neurology. (2024, March 14). *The Lancet Neurology: Neurological conditions now leading cause of ill health and disability globally, affecting 3.4 billion people worldwide | Institute for Health Metrics and Evaluation*. Www.healthdata.org. https://www.healthdata.org/news-events/newsroom/news-releases/lancet-neurology-neurological-conditions-now-leading-cause-ill
26. WHO. (2017). *Taxes on Sugary drinks: Why Do it? Sugary Drinks 1 -a Major Contributor to Obesity and Diabetes*. https://iris.who.int/bitstream/handle/10665/260253/WHO-NMH-PND-16.5Rev.1-eng.pdf

27. WHO. (2024, March 14). *Over 1 in 3 people affected by neurological conditions, the leading cause of illness and disability worldwide*. Www.who.int. https://www.who.int/news/item/14-03-2024-over-1-in-3-people-affected-by-neurological-conditions--the-leading-cause-of-illness-and-disability-worldwide
28. WHO. (2025). *Healthy diet for adults*. World Health Organization - Regional Office for the Eastern Mediterranean. https://www.emro.who.int/noncommunicable-diseases/campaigns/healthy-diet-for-adults.html
29. Zhang, W., Xiao, D., Mao, Q., & Xia, H. (2023). Role of neuroinflammation in neurodegeneration development. *Nature*, *8*(1). https://doi.org/10.1038/s41392-023-01486-5

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