Mini Review

Neuroscience and Psychiatry: Open Access

A Brief Discussion on Neuroprotection in Neurological Disorders

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Received: 03-Apr-2023, Manuscript No. npoa-23-96799; **Editor assigned:** 05-Apr-2023, Pre-QC No. npoa-23-96799 (PQ); **Reviewed:** 19-Apr-2023, QC No npoa-23-96799; **Revised:** 21-Apr-2023, Manuscript No. npoa-23-96799 (R); **Published:** 28-Apr-2023; DOI: 10.37532/npoa.2023.6(2).35-37

Abstract

In clinical practice, neurological disorders that affect the nervous system and have different causes are common. Functional RNA molecules with a length greater than 200 nucleotides that participate in essential functions but do not encode proteins are referred to as long non-coding RNA (lncRNA) molecules. lncRNAs may play a role in the pathogenesis of neurological disorders and may be therapeutic targets, according to research. Phytochemicals in customary Chinese natural medication (CHM) have been found to apply neuroprotective impacts by focusing on lncRNAs and directing quality articulation and different flagging pathways. Through a comprehensive literature review, our goal is to determine the development status and neuroprotective mechanism of phytochemicals that target lncRNAs. From the beginning to September 2022, manual and electronic searches of the PubMed, Web of Science, Scopus, and CNKI databases yielded a total of 369 articles. Natural products, lncRNAs, neurological conditions, and neuroprotective effects were used as keywords in the search.

Keywords: Neurological disorders • Neuroprotection • Chinese natural medication

Introduction

Phytochemical-targeted lncRNAs' progress in neuroprotection was presented in a critical review of the included studies, which totaled preclinical trials. Through the regulation of lncRNAs, phytochemicals have demonstrated neuroprotective effects in preclinical studies of various neurological disorders. These issues incorporate arteriosclerotic ischemia-reperfusion injury, ischemic/hemorrhagic stroke, Alzheimer's sickness, Parkinson's illness, glioma, fringe nerve injury, post-stroke sadness, and despondency. Through anti-inflammatory, antioxidant, anti-apoptotic, autophagy regulation, and inhibition of A-induced neurotoxicity, a number of phytochemicals protect neurons. By controlling the expression of microRNAs and messenger RNAs, some phytochemicals protected neurons by focusing on lncRNAs. The rise of lncRNAs as obsessive controllers gives an original course to the investigation of phytochemicals in CHM. The process by which phytochemicals regulate lncRNAs can be better understood, which will aid in the identification of new therapeutic targets and encourage their use in precision medicine.

Neurological problems make harm the sensory system, and come from different causes. Infection, neoplasms, vasculopathy, trauma, poisoning, neurodegeneration, and metabolic disorders are all common causes. Motor, sensory, reflex, autonomic, and higher-order neurological dysfunction are the primary clinical manifestations of neurological disorders. Over the 50 years, the area of neuroscience has gone through fast turn of events, bringing about the consistent development of novel hypotheses, advances, and treatments, subsequently driving phenomenal advancement and progressions in clinical nervous system science. However, multiple neurological conditions, such as stroke, continue to be the most common cause of human death and disability. In 2019, the global Burden of Disease study found that China had the highest lifetime risk of stroke, at 39.9%. The overall incidence of stroke in China has been rising over the past 30 years, and the trend is younger. The overall incidence of a first stroke among people aged 40–74 in China was 189 per 100,000 in 2002 and 379 per 100,000 in 2013, representing an average annual increase of 8.3%. Recombinant tissue-type plasminogen activator (rt-Dad) is presently the essential treatment choice for intense ischemic stroke. However, despite the fact that the rt-PA intravenous thrombolysis window has been extended to 4.5–9 hours after onset, only a small

number of Chinese ischemic stroke patients are able to benefit from this treatment. There has been significant progress in the treatment of neurodegenerative diseases like Alzheimer's disease (AD).

The FDA has granted priority review status to lecanemab and donanemab, which both target amyloid beta (A). However, the phase III clinical trials of these two drugs produced unfavorable outcomes. To confirm their clinical efficacy, additional large, multicenter controlled studies are required. The most common and most aggressive malignant tumor in the nervous system is glioma, which has a high mortality rate and high recurrence rate. Every year, 11 million people worldwide are diagnosed with cancer, and that number is expected to rise to 16 million by 2020. Multi-modal treatments like radiotherapy, chemotherapy, and surgical resection have made some progress recently. However, glioma patients still have a low overall survival rate, particularly for glioblastoma, with a median survival time of just 14 months. Moreover, chemotherapy has restricted adequacy on malignant growth cells and antagonistically affects typical cells, prompting myelosuppression, loss of craving, and fringe neuropathy [1-5].

Discussion

Neurological disorders can be treated with phytochemicals extracted from spices, fruits, vegetables, grains, and medicinal plants. For instance, vincristine, an alkaloid extricated from Vinca minor, has been used in the treatment of neurological problems related with cerebrovascular brokenness, for example, stroke and dementia. Paclitaxel, a well-known chemotherapy drug derived from Taxus brevifolia, has been shown to have fewer active ingredients and more side effects than an extract of a medicinal plant. As a result, patented drugs may not be as safe or effective as traditional Chinese herbal medicine (CHM) extracts; more research is required on the targets and molecular mechanisms involved in disease treatment.

A class of functional ncRNAs known as long non-coding RNA (lncRNA) has transcripts that are longer than 200 nucleotides long and lack an open reading frame (ORF). A lot of lncRNAs have been discovered as a result of the development of high-throughput sequencing technology, and people now have a basic understanding of how these lncRNAs work. It has been demonstrated that LncRNAs alter gene expression, act as signaling molecules, serve as scaffolds for protein complexes, and function as molecular decoys to accomplish their biological functions. They are also deeply involved in a variety of neurological conditions. Additionally, LncRNAs have the potential to serve as therapeutic targets for neurological conditions. Antisense nucleotide innovation can be utilized to obstruct lncRNAs that are pathogenic. For lncRNAs that capability by restricting to proteins, little atom mixtures can likewise be utilized to disrupt the cooperation among lncRNA and proteins, to take out the capability of lncRNA. As a result, lncRNAs have become popular as potential therapeutic targets.

Due to their positive effects and ambiguous mechanisms, the efficacy of phytochemicals is still unknown. The precision medicine model of "phytochemicals-target-molecular mechanism-disease" can be realized by clarifying targets at the upstream gene regulation level. This reveals the nature of the multi-target and multi-level treatment of diseases. Research into how phytochemicals affect lncRNAs has grown in recent years. Hence, in this survey, we methodicallly presented the essential attributes and natural capability system of lncRNA and clarified the component of normal lncRNAs in neurological issues. We also looked at how phytochemicals affect lncRNA and its downstream targets critically and critically. In conclusion, we provided a synopsis of the potential lncRNAs as therapeutic targets for the creation of phytochemical-based treatments for neurological disorders [6-10].

Conclusion

Neurological disorders continue to affect tens of millions of people worldwide, despite significant efforts in clinical practice. Donepezil, memantine, and levodopa are just a few of the chemically synthesized medications that have been approved by the US Food and Drug Administration for the treatment of neurological disorders. Despite the fact that these medications can have a number of adverse effects when taken for an extended period of time, their high prices frequently prevent low- and middle-income individuals from purchasing them. The safety profiles of phytochemicals derived from spices, vegetables, fruits, grains, and medicinal plants, on the other hand, have been used for therapeutic purposes since antiquity and are well documented. Additionally, these preparations are easily accessible and minimally toxic. A scientific foundation for the efficacy of these phytochemicals in treating neurological

disorders has been provided by recent advances in molecular biology.

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