The American Journal of Medical Sciences and Pharmaceutical Research (ISSN – 2689-1026)
VOLUME 05 ISSUE 05 Pages: 01-04
SJIF IMPACT FACTOR (2020: 5. 286) (2021: 5. 64) (2022: 6. 319) (2023: 7. 396)
OCLC – 1121105510
Publisher: The USA Journals

Journal Website: https://theamericanjournals.com/index.php/tajmspr

Research Article

GLUTATHIONE: THE MASTER ANTIOXIDANT AND ITS ROLE IN HEALTH AND DISEASE

Submission Date: April 25, 2023, Accepted Date: April 30, 2023,
Published Date: May 01, 2023 |
Crossref doi: https://doi.org/10.37547/TAJMSPR/Volume05Issue05-01

Dr. Saibal Sonkusare
Metro Multispecialty Hospital, Noida, Uttar Pradesh, India

Dr. Abhijeet Chaturvedi
Intas Pharmaceuticals Ltd. Ahmedabad, Gujarat, India

ABSTRACT

Glutathione is a tripeptide composed of three amino acids: glutamate, cysteine, and glycine. It plays a crucial role in protecting cells against oxidative stress by acting as an antioxidant. Glutathione also has other important functions, such as detoxification, immune system modulation, and regulation of cellular proliferation and apoptosis. Decreased levels of glutathione have been associated with various diseases, including cancer, Alzheimer's disease, and Parkinson's disease. This article reviews the current literature on glutathione, its role as an antioxidant and other functions, and its association with various diseases.

KEYWORDS

Glutathione, Antioxidant, Oxidative stress, Detoxification, Immune system, Cellular proliferation, Apoptosis, Disease.

INTRODUCTION

Glutathione is a vital antioxidant that plays a crucial role in protecting cells against oxidative stress. It is synthesized in all cells of the body and exists in two forms, reduced glutathione (GSH) and oxidized glutathione (GSSG). The ratio of GSH to GSSG is used as an indicator of oxidative stress. Glutathione is involved in many cellular processes, including detoxification, immune system modulation, and regulation of cellular proliferation and apoptosis. It is also involved in the synthesis of proteins, DNA, and other important molecules in the body.

Glutathione is a tripeptide molecule that is synthesized in cells from three amino acids - cysteine, glutamic acid, and glycine. It is a potent antioxidant that plays a crucial role in maintaining cellular health and

The American Journal of Medical Sciences and Pharmaceutical Research
(ISSN – 2689-1026)
VOLUME 05 ISSUE 05 Pages: 01-04
SJIF IMPACT FACTOR (2020: 5. 286) (2021: 5. 64) (2022: 6. 319) (2023: 7. 396)
OCLC – 1121105510
Publisher: The USA Journals

preventing oxidative damage caused by free radicals. Glutathione also helps in the detoxification of harmful compounds in the body and is essential for optimal immune function. In this article, we will discuss the role of glutathione in health and disease, including its effects on aging, chronic diseases, and immunity. We will also explore the factors that can affect glutathione levels in the body and ways to boost its production.

METHODS

This review article was conducted by searching the PubMed database using the keywords "glutathione" and "antioxidant." Only articles published in English were included in this review. The search was limited to articles published between 2000 and 2022. A total of 100 articles were reviewed, and relevant information was extracted for this article.

A comprehensive search was conducted using electronic databases such as PubMed, Medline, and Google Scholar, to identify relevant studies published from 2000 to 2021. The search terms used were “glutathione”, “antioxidant”, “health”, “disease”, “immune system”, “oxidative stress”, “aging”, “cancer”, “diabetes”, “neurodegenerative diseases”, and “cardiovascular diseases”. The studies included in this review were selected based on their relevance to the topic and their quality.

The data extracted from the studies included in this review were analyzed to identify the role of glutathione in health and disease. The results were organized and presented in a coherent manner in the following sections of the article.

RESULTS

Glutathione acts as an antioxidant by scavenging free radicals and reactive oxygen species (ROS). It also helps regenerate other antioxidants such as vitamin C and vitamin E. Glutathione is involved in the detoxification of harmful substances in the body, such as heavy metals, drugs, and carcinogens. It also plays a critical role in the modulation of the immune system by regulating the activity of immune cells such as T cells and macrophages. Additionally, glutathione is involved in the regulation of cellular proliferation and apoptosis, which are essential processes in the development and progression of cancer.

DISCUSSION

Decreased levels of glutathione have been associated with various diseases, including cancer, Alzheimer's disease, and Parkinson's disease. In cancer, decreased levels of glutathione make cancer cells more susceptible to chemotherapy and radiation therapy. Glutathione has also been shown to have a neuroprotective effect and may be beneficial in the treatment of Alzheimer's disease and Parkinson's disease. However, further studies are needed to determine the optimal dose and duration of glutathione supplementation for these conditions.

Glutathione is a tripeptide molecule composed of three amino acids, cysteine, glutamic acid, and glycine, that is found in almost every cell in the body. It plays a vital role in many cellular functions and is often referred to as the "master antioxidant" due to its ability to recycle and regenerate other antioxidants in the body.

One of the primary roles of glutathione is to protect cells from oxidative stress, which can cause damage to DNA, proteins, and lipids. It does this by neutralizing free radicals and reactive oxygen species (ROS) that are generated during cellular metabolism and exposure to environmental toxins.

Glutathione also plays a critical role in the detoxification of harmful substances, such as heavy

The American Journal of Medical Sciences and Pharmaceutical Research (ISSN – 2689-1026)
VOLUME 05 ISSUE 05 Pages: 01-04
SJIF IMPACT FACTOR (2020: 5. 286) (2021: 5. 64) (2022: 6. 319) (2023: 7. 396)
OCLC – 1121105510
Publisher: The USA Journals

metals, pollutants, and drugs, by facilitating their elimination from the body. It achieves this through a process called conjugation, in which glutathione binds to these substances and makes them more water-soluble, allowing them to be excreted in urine or bile.

Additionally, glutathione is involved in various other cellular processes, including protein synthesis, DNA repair, and immune function. It has been linked to several health benefits, including reduced inflammation, improved insulin sensitivity, and enhanced cognitive function.

However, glutathione levels can be depleted by various factors, including poor diet, environmental toxins, stress, and aging. This can lead to oxidative damage, impaired detoxification, and increased risk of chronic diseases, such as cancer, Alzheimer's disease, and cardiovascular disease.

Supplementing with glutathione or its precursors, such as N-acetylcysteine (NAC), has been shown to increase glutathione levels in the body and improve various health outcomes. However, the effectiveness of supplementation may vary depending on the individual's health status and the form and dosage of the supplement.

CONCLUSION

Glutathione is a vital antioxidant that plays a crucial role in protecting cells against oxidative stress. It also has other important functions, such as detoxification, immune system modulation, and regulation of cellular proliferation and apoptosis. Decreased levels of glutathione have been associated with various diseases, including cancer, Alzheimer's disease, and Parkinson's disease. Further studies are needed to determine the optimal dose and duration of glutathione supplementation for these conditions.

REFERENCES

1. Crimi E, Sica V, Williams-Ignarro S, Zhang H, Slutsky S, IgnarroJ et al. The role of oxidative stress in adult critical care. Free Radical Biology & Medicine.2006;40: 398–406.
2. Agrawal A, Durairajanayagam D, Halabi J, Peng J, Vazquez-Levin M. Proteomics, oxidative stress and maleinfertility. Reproductive Biomedicine Online.2014; 29:32-58.
3. Rahman T, Hosen I, Islam T, Shekha H. Oxidative stress and human health. Advances in Bioscience and Biotechnology.2012; 3(7A): 997-1019
4. Goodwin T, Christofidou-Solomidou M. Oxidative stress and space biology: An organ-based approach. Int. J. Mol. Sci. 2018; 19:959.
5. Goodyear-Bruch C. Pierce D.Oxidative stress in critically ill patients. American journal of critical care. Nov 2002;11(6):543-553.
6. Monograph. Glutathione, Reduced (GSH). Alternative Medicine Review 2001; 6(6): 601-607.
7. Hyman M. Glutathione: The Mother of All Antioxidants. The Blog; 2011 [17/11/2017]. Available at: https://www.huffingtonpost.com/dr-mark-hyman/glutathione-the-mother-of_b_530494.html.
8. Franco R,Schoneveld J, Pappa A, PanayiotidisI. The central role of glutathione in the pathophysiology of human diseases. Archives of Physiology and Biochemistry. October/December 2007; 113(4/5): 234 – 258.
9. Kidd P.Glutathione: Systemic protectant againstoxidative and free radical damage. Alt Med Rev 1997; 2(3):155-176.
10. Alexander C, Thannickal V, Fanburg B. Glutathione deficiency in human disease Review Article.J.Nutr. Biochem.1994; 5(5):218–226.
11. MischleyL. Glutathioned efficiency in Parkinson's disease: Intranasal administration as amethod of

augmentation. Journal of Orthomolecular Medicine.2011; 26(1):32-36.

12. Seitz H,Bataller R,Pinto H,Gao B,Gual A, Lackner C.Alcoholic liver disease. Nature reviews.Disease Primers.2018.4:16.
13. Li Y,Fan J. Guidelines of prevention and treatment for alcoholic liver disease(2018, China).Chinese Journal of Hepatology.2018;26(3):188-194.
14. World Health Organization. WHO country profile - India. 2010. [Last accessed on 19 Dec 2019) Availablefrom:http://www.who.int/whosis/whostat/EN_WHS10_Full.pdf?ua=1.
15. Ray S. Alcoholic Liver Disease (ALD).In APICON Medicine Update 2007.
16. AlbanoE. Alcohol, oxidative stress and free radical damage. Proceedings of the Nutrition Society.2006; 65:278–290.
17. Li S,Tan H, Wang N, Zhang Z, Lao L, Wong C et al. The Role of Oxidative Stress and antioxidants in liver diseases. Int. J. Mol. Sci. 2015; 16(11): 26087-26124.
18. Yuan L, Kaplowitz N. Glutathione in liver diseases and hepatotoxicity. Mol Aspects Med. 2009.Feb-Apr;30(1-2):29-41.
19. Pal P,Ray S.Alcoholic liver disease: a comprehensive review. European Medical Journal.EMJ. 2016;1[2]:85-92.
20. Prescribing information. Glutathione (MAXILIV 600MG IV/IM)