**Short Communication**
Volume 09:03, 2024

Journal of Cancer Clinical Trials

ISSN: 2577-0535 Open Access

# A Scoping Review of Oxidative Stress and Cognitive Changes Caused by Cancer Chemotherapy Drugs

**Harrison White***

*Department of Surgical Oncology, University of Monash, Melbourne, VIC 3800, Australia*

## Introduction

Cancer chemotherapy is a widely used treatment modality for cancer patients, but it is often associated with significant side effects, including cognitive impairment. Cognitive changes caused by cancer chemotherapy, also known as Chemotherapy-Related Cognitive Impairment (CRCI), can have a profound impact on the quality of life of cancer survivors. Oxidative stress, which occurs when the balance between the production of Reactive Oxygen Species (ROS) and the body's antioxidant defenses is disrupted, has been implicated as a potential mechanism underlying CRCI. This scoping review aims to provide an overview of the current literature on the relationship between oxidative stress and cognitive changes caused by cancer chemotherapy drugs [1].

## Description

Oxidative stress is a state of imbalance between the production of ROS and the body's antioxidant defenses. ROS, such as free radicals, can damage cellular components, including DNA, proteins, and lipids, leading to cellular dysfunction and death. Cancer chemotherapy drugs, including alkylating agents, platinum compounds, and anthracyclines, can generate ROS as a byproduct of their mechanism of action. This can lead to oxidative stress, which can damage cancer cells and contribute to their death. However, oxidative stress can also affect normal cells, including those in the brain, leading to cognitive impairment. Several studies have investigated the relationship between oxidative stress and cognitive changes caused by cancer chemotherapy. These studies have used a variety of methods, including animal models, in vitro experiments, and human studies. Animal studies have shown that cancer chemotherapy drugs can induce oxidative stress in the brain, leading to cognitive impairment. For example, one study found that rats treated with the chemotherapy drug, cyclophosphamide, had increased levels of ROS in the brain and impaired cognitive function [2].

In vitro experiments have also shown that cancer chemotherapy drugs can induce oxidative stress in neural cells, leading to cellular damage and death. For example, one study found that the chemotherapy drug, doxorubicin, induced oxidative stress and apoptosis in neural cells. Human studies have also investigated the relationship between oxidative stress and cognitive changes caused by cancer chemotherapy. For example, one study found that breast cancer patients treated with chemotherapy had increased levels of oxidative stress markers in their blood and impaired cognitive function [3].

Antioxidant interventions, such as vitamin E, vitamin C, and N-acetylcysteine, have been investigated as a potential strategy to mitigate cognitive changes caused by cancer chemotherapy. These interventions aim to reduce oxidative stress by neutralizing ROS and promoting antioxidant defenses. Several studies have investigated the efficacy of antioxidant interventions in reducing cognitive changes caused by cancer chemotherapy. For example, one study found that breast cancer patients treated with vitamin E and chemotherapy had improved cognitive function compared to those treated with chemotherapy alone [4].

While the current literature suggests a relationship between oxidative stress and cognitive changes caused by cancer chemotherapy, there are several limitations to the existing research. For example, many studies have used animal models or in vitro experiments, which may not accurately reflect the complex biology of human cancer patients. Additionally, the majority of studies have focused on breast cancer patients, and it is unclear whether the findings can be generalized to other types of cancer. Future studies should aim to address these limitations by using more robust study designs, such as randomized controlled trials, and investigating the relationship between oxidative stress and cognitive changes in a more diverse population of cancer patients [5].

## Conclusion

Cancer chemotherapy is a widely used treatment modality for cancer patients, but it is often associated with significant side effects, including cognitive impairment. Oxidative stress has been implicated as a potential mechanism underlying CRCI, and antioxidant interventions may be a promising strategy to mitigate cognitive changes caused by cancer chemotherapy. However, further research is needed to fully understand the relationship between oxidative stress and cognitive changes caused by cancer chemotherapy and to develop effective interventions to mitigate these changes.

## Acknowledgement

None.

## Conflict of Interest

None.

## References

1. Tannock, Ian F., Tim A. Ahles, Patricia A. Ganz and Frits S. Van Dam. "Cognitive impairment associated with chemotherapy for cancer: Report of a workshop." *J Clin Oncol* 22 (2004): 2233-2239.
2. Costantini, David. "Understanding diversity in oxidative status and oxidative stress: The opportunities and challenges ahead." *J Experiment Biol* 222 (2019): jeb194688.
3. Singh, Anju, Ritushree Kukreti, Luciano Saso and Shrikant Kukreti. "Oxidative stress: a key modulator in neurodegenerative diseases." *Molecule* 24 (2019): 1583.
4. Wilkinson, Chris F. and James C. Lamb IV. "The potential health effects of phthalate esters in children's toys: a review and risk assessment." *Regulatory Toxicol Pharmacol* 30 (1999): 140-155.

***Address for Correspondence:** Harrison White, Department of Surgical Oncology, University of Monash, Melbourne, VIC 3800, Australia, E-mail: whiteharrison@um.au*



**Received:** 22 May, 2024, Manuscript No. jcct-24-144899; **Editor Assigned:** 24 May, 2024, PreQC No. P-144899; **Reviewed:** 05 June, 2024, QC No. Q-144899; **Revised:** 10 June, 2024, Manuscript No. R-144899; **Published**: 17 June, 2024, DOI: 10.37421/2577-0535.2024.9.257

5. Guéraud, Françoise. "4-Hydroxynonenal metabolites and adducts in pre-carcinogenic conditions and cancer." *Free Rad Biol Med* 111 (2017): 196-208.

**How to cite this article:** White, Harrison. "A Scoping Review of Oxidative Stress and Cognitive Changes Caused by Cancer Chemotherapy Drugs." *J Cancer Clin Trials* 9 (2024): 257.