

Significance of Chemotherapy in the Management of Acute and Chronic Leukemia

Chris Zhang^{*}

Department of Pharmacy, University of Sao Paulo, Butanta, Sao Paulo, Brazil

DESCRIPTION

Leukemia is a type of cancer that affects the blood and bone marrow, characterized by an overproduction of abnormal white blood cells. Chemotherapy has been one of the primary methods for treating leukemia for decades, acting as a cornerstone in the management of this disease.

Understanding leukemia and its types

Leukemia is broadly classified into four main types based on the nature of the blood cells involved and the rate of progression [1]. These are Acute Lymphoblastic Leukemia (ALL), Acute Myeloid Leukemia (AML), Chronic Lymphocytic Leukemia (CLL), and Chronic Myeloid Leukemia (CML).

Acute leukemias (ALL and AML): These are aggressive forms of leukemia that develop rapidly and require immediate treatment [2]. In ALL, the malignant cells are primarily lymphoid, while in AML, the cells are myeloid.

Chronic leukemias (CLL and CML): These tend to progress more slowly and are characterized by a prolonged phase of stable disease before they worsen. CLL primarily involves lymphoid cells, whereas CML involves the myeloid line, typically linked with the Philadelphia chromosome [3].

The rapid proliferation of abnormal white blood cells interferes with normal blood cell production, leading to symptoms such as anemia, infections, and bleeding. Chemotherapy aims to target and destroy these malignant cells while preserving as many normal cells as possible [4].

The role of chemotherapy in leukemia treatment

Chemotherapy works by targeting rapidly dividing cells, which include cancerous leukemia cells. The drugs used in chemotherapy can be administered intravenously or orally, and they function by disrupting the cell division process at different stages [5]. These medications interfere with DNA replication or the mitotic process, ultimately leading to the death of the tumor cells. However, because chemotherapy targets all rapidly dividing cells, it can also affect normal healthy cells, leading to side effects [6].

In leukemia treatment, chemotherapy is used in various stages of the disease, including induction therapy, consolidation therapy, and maintenance therapy:

Induction therapy: This is the first phase of treatment aimed at achieving remission by eradicating the majority of leukemia cells from the bone marrow and bloodstream. Induction therapy usually involves a combination of chemotherapy agents [7].

Consolidation therapy: After remission is achieved, consolidation therapy is used to eliminate any remaining leukemia cells that might cause a relapse.

Maintenance therapy: This long-term phase aims to prevent the re-emergence of the disease by keeping the leukemia cells under control [8].

Side effects of chemotherapy

One of the major challenges of chemotherapy in leukemia treatment is managing the side effects. Since chemotherapy targets all rapidly dividing cells, it also affects normal cells in the body, leading to a variety of adverse effects [9]. Some common side effects of chemotherapy include:

Bone marrow suppression: Chemotherapy can reduce the production of red blood cells, white blood cells, and platelets, leading to anemia, neutropenia and thrombocytopenia.

Gastrointestinal issues: Nausea, vomiting, diarrhea, and mucositis (inflammation of the mucous membranes) are common side effects.

Hair loss: Many chemotherapy drugs cause hair loss, which can be emotionally distressing for patients.

Fatigue: Chemotherapy-induced fatigue is a frequent and debilitating side effect.

Correspondence to: Chris Zhang, Department of Pharmacy, University of Sao Paulo, Butanta, Sao Paulo, Brazil, E-mail: zhangc@gmail.com

Received: 29-Oct-2024, Manuscript No. JLU-24-35611; Editor assigned: 31-Oct-2024, PreQC No. JLU-24- 35611 (PQ); Reviewed: 13-Nov-2024, QC No. JLU-24-35611; Revised: 20-Nov-2024, Manuscript No. JLU-24- 35611 (R); Published: 27-Nov-2024, DOI: 10.35248/2329-6917-24.12.414

Citation: Zhang C (2024). Significance of Chemotherapy in the Management of Acute and Chronic Leukemia. J Leuk. 12:414.

Copyright: © 2024 Zhang C. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Neurological effects: Certain chemotherapy drugs can cause peripheral neuropathy (nerve damage), leading to symptoms like numbness or tingling.

Increased risk of infection: Due to lowered white blood cell counts, patients undergoing chemotherapy are more vulnerable to infections.

These side effects can significantly impact a patient's quality of life and may require interventions such as growth factors to stimulate white blood cell production, anti-nausea medications, and antibiotics to prevent or treat infections [10].

CONCLUSION

Chemotherapy continues to be a central element in the treatment of leukemia, especially in acute forms like ALL and AML. While it has led to significant improvements in survival rates and remission, the challenges of resistance, side effects, and the need for personalized treatment remain. The future of leukemia treatment lies in the integration of chemotherapy with newer, targeted therapies and immunotherapies, promising better outcomes and fewer long-term complications for patients.

REFERENCES

- 1. Zavala VA, Bracci PM, Carethers JM, Carvajal-Carmona L, Coggins NB, Cruz-Correa MR, et al. Cancer health disparities in racial/ethnic minorities in the United States. Br J Cancer. 2021;124(2):315-332.
- Henson KE, Fry A, Lyratzopoulos G, Peake M, Roberts KJ, McPhail S. Sociodemographic variation in the use of chemotherapy and radiotherapy in patients with stage IV lung, oesophageal, stomach and pancreatic cancer: Evidence from population-based data in England during 2013–2014. Br J Cancer. 2018;118(10):1382-1390.

- 3. Khare SR, Batist G, Bartlett G. Identification of performance indicators across a network of clinical cancer programs. Curr Oncol. 2016;23(2):81.
- Massarweh NN, Haynes AB, Chiang YJ, Chang GJ, You YN, Feig BW, Cormier JN. Adequacy of the National Quality Forum's Colon Cancer adjuvant chemotherapy quality metric: is 4 months soon enough?. Ann Surg. 2015;262(2):312-320.
- Arnold M, Rutherford MJ, Bardot A, Ferlay J, Andersson TM, Myklebust TA, et al. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-based study. Lancet Oncol. 2019;20(11):1493-1505.
- Norell CH, Butler J, Farrell R, Altman A, Bentley J, Cabasag CJ, Cohen PA, Fegan S, Fung-Kee-Fung M, Gourley C, Hacker NF. Exploring international differences in ovarian cancer treatment: a comparison of clinical practice guidelines and patterns of care. Int J Gynecol Cancer. 2020;30(11):1748-1756.
- Allemani C, Matsuda T, Di Carlo V, Harewood R, Matz M, Niksic M, et al. Global surveillance of trends in cancer survival 2000–14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 populationbased registries in 71 countries. The Lancet. 2018;391(10125): 1023-1075.
- McPhail S, Swann R, Johnson SA, Barclay ME, Abd Elkader H, Alvi R, et al. Risk factors and prognostic implications of diagnosis of cancer within 30 days after an emergency hospital admission (emergency presentation): An International Cancer Benchmarking Partnership (ICBP) population-based study. The Lancet Oncology. 2022;23(5):587-600.
- 9. Jonker DJ, Spithoff K, Maroun J. Adjuvant systemic chemotherapy for stage II and III colon cancer after complete resection: An updated practice guideline. Clin Oncol. 2011;23(5):314-322.
- Viechtbauer W. Bias and efficiency of meta-analytic variance estimators in the random-effects model. J. Educ. Behav. Stat. 2005;30(3):261-293.