European Journal of Clinical Medicine
Vol 6 | Issue 5 | November 2025
ISSN 2736-5476

CASE STUDY

Enhancing Hematological Resilience to Chemotherapy through Synthesit® in Advanced Oral Cavity Cancer: A Case Report

Rusnac Angela[1] and Shahbaz Baig[2,*]

ABSTRACT

Background: **Anemia and myelosuppression due to chemotherapy are frequent side effects that may require treatment. This case examines the effect of Synthesit® (ferric iron III citrate) and its bioavailable iron components on hematologic recovery and general stability during the course of chemotherapy in a patient with stage III cancer of the oral cavity.**

Case Presentation: **Patient M., a 53-year-old woman diagnosed with stage III oral cavity cancer (T3N2M0), experienced severe hematologic toxicity, including anemia and leukopenia, after three cycles of CF chemotherapy. The treatment was interrupted due to deteriorating blood parameters. Following the introduction of Synthesit® and Sorbifer, along with continued chemotherapy, the blood parameters improved, and treatment resumed. The patient's condition stabilized with reintroduction of Synthesit®.**

Aims: **This study focused on the evaluation of Synthesit® as an adjunctive agent in the management of stage III oral cavity cancer with particular emphasis on hematologic recovery, patient stability, and chemotherapy tolerance.**

Methods: **A single-case study with a longitudinal observational design was conducted using laboratory results, chemotherapy logs, and medical records. Hematological parameters such as RBC, Hb, WBC, and PLT were monitored across chemotherapy phases, including Synthesit® and Sorbifer administration.**

Results: **The introduction of Synthesit® and Sorbifer improved hematologic parameters. RBC count increased from 3.53 T/L to 3.88 T/L, and hemoglobin levels rose from 10.2 g/dL to 10.5 g/dL, indicating a partial recovery in erythropoiesis. Despite this, the white blood cell count decreased significantly to 2.91 G/L, highlighting ongoing myelosuppression. The patient showed a positive response in the red blood parameters, although the immune function remained compromised. Neutrophil levels significantly decreased, from 12.03 G/L to 1.41 G/L, suggesting chemotherapy-induced myelosuppression. Eosinophils and basophils remained stable, whereas lymphocytes showed a slight increase, possibly indicating an immune response.**

Conclusion: **Synthesit® increases the levels of hemoglobin, erythrocytes, and hematocrit, thus improving hematologic recovery during chemotherapy. It proposes continued treatment, which indicates its possible effectiveness as an adjunct treatment for chemotherapy-related anemia.**

Keywords: Chemotherapy, ferric iron citrate, oral cavity cancer, Synthesit.

Submitted: October 02, 2025

Published: November 26, 2025

10.24018/ejclinicmed.2025.6.5.394

[1] *Multidisciplinary Clinic, ALFA Diagnostic Subdivision, Moldova.*
[2] *Independent Medical College, Faisalabad, Punjab, Pakistan.*

* ***Corresponding Author:***
e-mail: talha_shahbaz557@yahoo.com

Copyright: © 2025 Angela and Baig. This work is under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

1. Introduction

Oral cavity cancer constitutes an increasingly high burden on global public health with a predominant histological subtype of squamous cell carcinoma constituting more than 90% of oral cancers. It is one of the most aggressive tumors owing to its metastatic potentials and high propensity to recur. Based on the 2020 Global Cancer Observatory data, there are approximat 377,000 new cases of oral cavity cancer with 177,000 deaths per year worldwide which is expected to increase significantly by 2040 [1], [2].

Stage III oral cavity cancers most commonly feature larger tumors and/or metastasized tumors in the regional lymph nodes. In most cases, the standard treatment strategy for stage III disease revolves primarily around surgery, which frequently entails neck dissection with the removal of the affected lymph nodes, and subsequent adjuvant radiotherapy or chemoradiotherapy. Some of the most important chemotherapy regimens include cisplatin and 5-fluorouracil, and are integral for the treatment of locally advanced or unresectable tumors. These therapies are programmed to control of the area of metastasis with the aim of improving the chances of survival [3], [4].

Surgery is still primarily used for patients with locally advanced operable tumors, while borderline resectable tumors are treated with inductive chemotherapy for downstaging to facilitate resectability. In patients with high-risk characteristics, postoperative radiation or concurrent chemoradiotherapy mitigates the risk of recurrence. Such combined modality approaches typically include systemic chemotherapy using cisplatin and 5-fluorouracil [5], [6].

Nonetheless, the administration of systemic chemotherapy, while often lifesaving, can cause an array of adverse effects, such as myelotoxicity, which can often be severe and life threatening. Myelosuppression can lead to the development of anemia, leukopenia and thrombocytopenia while increasing the risk of fatigue, infection and bleeding from a severe of complications. Anemia, in particular, can significantly reduce a patient's functional capacity and quality of life, necessitating the postponement or discontinuation of life-saving cancer therapy. The management of chemotherapy-induced cytopenia's typically includes administration of erythropoiesis-stimulating agents, granulocyte colony-stimulating factors, blood transfusions, and iron supplementation [7], [8]. Despite these interventions, many patients experience only modest improvements in hematologic parameters, often resulting in treatment delays or dose reductions that compromise therapeutic efficacy.

In recent years, there has been growing interest in nutritional and pharmacologic agents that may support hematopoiesis through alternative mechanisms. One such compound is Synthesit®, a novel form of ferric iron III citrate, which has been proposed to possess enhanced bioavailability and improved cellular integration. Synthesit® has been described in preliminary studies as a bio-organic iron compound that may stimulate mitochondrial activity, support regenerative processes, and improve hematologic indices. Preliminary anecdotal and preclinical evidence suggests that it may exert positive effects on red blood cell production, hemoglobin synthesis, and overall energy metabolism, though formal clinical trials remain limited [9]–[11].

Preliminary anecdotal and preclinical evidence suggests that Synthesit® may exert positive effects on red blood cell production, hemoglobin synthesis, and overall energy metabolism, though formal clinical trials remain limited. Experimental studies also indicate that ferric citrate compounds can activate mitochondrial biogenesis via the PGC-1α pathway and enhance erythroid differentiation by stabilizing hypoxia-inducible factor-2α (HIF-2α), thereby linking Synthesit®'s activity to cellular energy metabolism and hematopoietic regulation [12], [13].

A 2025 study on SHK strain mice found that Synthesit® significantly improved cognitive function, spatial memory, and learning efficiency, suggesting broader potential benefits for patients undergoing chemotherapy, where cognitive decline is a common side effect [14]. Additionally, a 2024 case report investigated the effects of Synthesit® on serum cholesterol levels in a 69-year-old male with dyslipidemia, finding that Synthesit® initially lowered cholesterol levels, followed by a slight increase, indicating the need for further investigation into its long-term effects on cholesterol management [15].

The rationale for iron supplementation in chemotherapy-induced anemia has been well established. Iron is a critical component of hemoglobin and is essential for erythropoiesis. However, in patients with cancer, iron metabolism is frequently disrupted due to inflammation-driven hepcidin overproduction, leading to functional iron deficiency [16], [17]. Traditional oral iron supplements, such as ferrous sulfate or sorbiferal are often poorly tolerated and inadequately absorbed, particularly in patients with compromised gastrointestinal function or systemic inflammation. Therefore, compounds with improved bioavailability and systemic integration are of clinical interest [18], [19].

1.1. Objective

To explores the impact of Synthesit® (ferric iron III citrate), a bioavailable iron supplement, on hematologic recovery and overall patient stability during chemotherapy in an individual with stage III oral cavity cancer

1.2. Case Report

Patient M., born in 1971, was diagnosed with stage III oral cavity cancer (T3N2M0) with regional lymph node metastases in France. She underwent three courses of chemotherapy with the CF regimen but experienced progressive deterioration, presenting with fatigue, weakness, apathy, and sleep disturbances. Laboratory results revealed severe cytopenias, including marked anemia (HGB 68 g/dL, erythrocytes 2.3 × 10^6/ml), leukopenia (WBC 2.5 × 10^3/ml), and thrombocytopenia (PLT 145 × 10^3/ml), leading to interruption of therapy. Supportive treatment with filgrastim, iron supplementation, and postponement of specialized therapy resulted in only a minor hematologic

recovery. Upon private consultation, the patient was prescribed Synthesit®, Sorbifer, and hepatoprotectors, and repeat blood testing was advised after three weeks.

2. Methodology

2.1. Study Design

This single-patient case report uses a longitudinal observational design to assess the impact of Synthesit® (ferric iron III citrate) and Sorbifer on hematologic recovery during chemotherapy for stage III oral cavity cancer.

2.2. Study Setting

The study was undertaken at an oncology medical center in France concentrating on head and neck cancer treatment, which includes chemotherapy and supportive management of treatment-related toxicities. The center also supports other ancillary cancer-related chemotherapies such as iron supplementation for chemotherapy-related anemia.

2.3. Study Sample

The study sample consisteds of a single participant, a 53-year-old female diagnosed with stage III oral cavity cancer (T3N2M0). The patient underwent chemotherapy and was observed over multiple cycles, with monitoring of hematological parameters before and after the introduction of Synthesit® and Sorbifer.

2.4. Data Collection and Analysis

Blood test results collected at different intervals during the course of chemotherapy provided data. These included measurements of red blood cell count, hemoglobin level, white blood cell count, and platelet count. The analyzed data tracked parameter changes in the Synthesit® and Sorbifer cohorts. The principal subject of the analysis is the pace of recovery of blood cells and the possible impact of electrolytic iron on the possibility of continuing chemotherapy. The effect of Synthesit® on patient blood cell levels was evaluated using descriptive analysis. Graphs were prepared to show the levels of red blood cell constituents throughout the study period.

2.4.1. Ethical Considerations

The case report was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from the patient for participation and publication of the clinical data.

3. Results

Table I presents the patient's hematological parameters over time, highlighting changes during chemotherapy and concurrent iron supplementation with Synthesit® and Sorbifer. The red blood cell (RBC), hemoglobin (Hb), and hematocrit (Hct) values showed a gradual numerical increase across the observation period, while the white blood cell (WBC) count demonstrated a marked decline by May 2025.

Fig. 1 depicts the changes in the patient's hematologic parameters throughout the course of chemotherapy while receiving Synthesit® and Sorbifer supplementation. The plotted data demonstrate a gradual improvement in red blood cell (RBC), hemoglobin (Hb), and hematocrit (Hct) levels over time, suggesting partial recovery of erythropoiesis following the introduction of iron therapy. The mean corpuscular indices (MCV, MCH, and MCHC) remained relatively stable across all observation points. In contrast, the white blood cell (WBC) count exhibited a marked decline by May 2025, reflecting persistent chemotherapy-induced myelosuppression despite concurrent supplementation.

Table II presents the patient's leukocyte differential count across three observation points (October 2024–May 2025), illustrating changes associated with chemotherapy and concurrent iron supplementation with Synthesit® and Sorbifer. A notable decline in neutrophil levels from 12.03 G/L in January to 1.41 G/L in May 2025. Eosinophil and basophil counts remained within the normal range throughout the monitoring period, suggesting no evidence of hypersensitivity or parasitic response. Lymphocyte levels increased slightly (0.96 G/L–1.24 G/L), while monocyte values declined (0.23 G/L–0.10 G/L).

Fig. 2 illustrates the trends in the differential leukocyte counts over the observation period. Neutrophil levels, which were initially elevated, significantly declined by May 2025, aligning with the decrease in immune function typically observed during chemotherapy. The eosinophil and basophil counts remained relatively stable, suggesting no significant allergic or parasitic reactions. Lymphocyte counts showed a modest increase, which could indicate an immune response, whereas monocyte levels declined, reflecting potential changes in immune regulation.

4. Discussion

4.1. Overview of Clinical Findings

Chemotherapy-induced anemia is a frequent and debilitating complication that significantly impairs the quality of life and often necessitates treatment interruption. In this case, Patient M., diagnosed with stage III oral cavity cancer, experienced severe hematologic toxicity, including anemia, leukopenia, and thrombocytopenia after three cycles of CF chemotherapy, prompting a pause in treatment. Standard supportive care, which included filgrastim and oral iron supplementation, produced only modest improvements in hematologic parameters; however, fatigue and poor general condition persisted.

The introduction of Synthesit®, in combination with conventional Sorbifer, coincided with gradual improvement in erythroid parameters, as indicated by rising RBC and hemoglobin levels. When Synthesit® was discontinued, hematologic indices again declined, and the patient's well-being worsened; resumption of Synthesit® was associated with hematologic stabilization and continuation of chemotherapy. Although this temporal relationship suggests a potential benefit, causality cannot be established given concurrent Sorbifer administration and other confounding factors such as nutritional status or spontaneous

TABLE I: Changes in Hematological Results Over Time Due to Chemotherapy and Synthesit® and Sorbifer (October 2024–May 2025)

Parameter	Reference range	21-10-2024	06-01-2025	14-05-2025
Hématies (RBC) (T/L)	3.80–5.90	3.53	3.60	3.88
Hémoglobine (Hb) (g/dL)	11.5–15.0	10.2	10.2	10.5
Hématocrite (Hct) (%)	34.0–45.0	31	30.9	33.4
V.G.M. (MCV) (fL)	76–96	88	86	86
T.C.M.H. (MCH) (pg)	24.4–34.0	28.3	28.3	27.1
C.C.M.H. (MCHC) (%)	31.9–35.9	32.9	33.0	31.4
I.D.R. (RDW) (%)	11.2–15.9	14.8	17.0	14.5
Leucocytes (WBC) (G/L)	3.80–11.00	14.14	13.09	2.91

Note: RBC–Red Blood Cells (Hématies), Hb–Hemoglobin (Hémoglobine), Hct–Hematocrit (Hématocrite), MCV–Mean Corpuscular Volume (V.G.M.), MCH–Mean Corpuscular Hemoglobin (T.C.M.H.), MCHC–Mean Corpuscular Hemoglobin Concentration (C.C.M.H.), RDW–Red Cell Distribution Width (I.D.R.), WBC–White Blood Cells (Leucocytes).

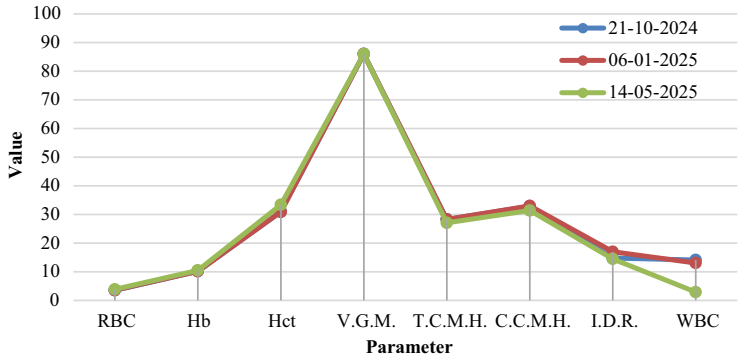

Fig. 1. Graphical representation of hematological results over time (October 2024–May 2025).

TABLE II: Leukocyte Differential Count and Trends During Chemotherapy and Iron Supplementation with Synthesit® and Sorbifer (October 2024–May 2025)

Parameter	Reference range (G/L)	21-10-2024	06-01-2025	14-05-2025
Polynucléaires neutrophiles	1.70–7.50	8.36	12.03	1.41
Polynucléaires éosinophiles	0.02–0.58	0.13	0.10	0.12
Polynucléaires basophiles	0.00–0.11	0.14	0.00	0.04
Lymphocytes	1.00–4.80	1.01	0.96	1.24
Monocytes	0.15–1.00	0.23	0.00	0.10

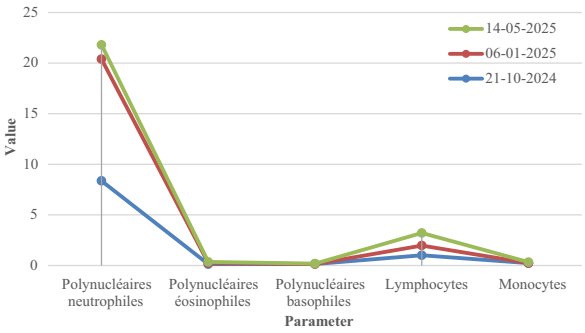

Fig. 2. Graphical representation of leukocyte differential count and trends (October 2024–May 2025).

marrow recovery. Clinically, the patient reported improved energy levels, appetite, and tolerance to chemotherapy following the reintroduction of Synthesit®, suggesting a possible subjective enhancement in overall well-being alongside hematologic recovery.

4.2. Comparison with Literature

Recent reports support the potential hematologic benefits of ferric iron III citrate–based compounds. For instance, a 2023 case study found that Synthesit® improved immune function and blood parameters in a patient with pancreatic cancer who had previously struggled with low neutrophil counts, demonstrating its potential to improve immune system function during chemotherapy [20]. Additionally, a study published in 2024 highlighted the effects of Synthesit® on chemotherapy-induced neuropathy, showing improvements in hematologic and immune parameters in a patient undergoing chemotherapy for fallopian tube cancer [21]. These findings align with the current case, where Synthesit® demonstrated potential in managing hematologic side effects during cancer treatment.

A 2022 case report highlighted ferric citrate hydrate's effectiveness and safety in treating anemia related to niraparib maintenance therapy in ovarian cancer patients. After switching to oral ferric citrate hydrate, the patient avoided severe hematological toxicity and transfusion dependence, allowing ongoing chemotherapy treatment. This supports the role of ferric citrate supplements in managing CIA and improving patient tolerance to cancer therapies [22].

Meta-analyses further reinforce iron supplementation's role in CIA management. A 2022 analysis of 41 trials

(n = 4200) found that iron plus erythropoiesis-stimulating agents significantly improved hemoglobin and hematocrit compared to iron alone [23].

When compared with conventional oral and intravenous (IV) iron formulations, Synthesit® represents a bio-organic ferric iron citrate that has been proposed to exhibit improved mitochondrial iron utilization and higher systemic bioavailability. Unlike standard oral ferrous salts (such as Sorbifer or ferrous sulfate), which often cause gastrointestinal intolerance and have reduced absorption under inflammatory conditions, Synthesit® may facilitate more efficient cellular integration of iron. In contrast, IV iron formulations, such as ferric carboxymaltose or iron sucrose, provide rapid systemic replenishment and are considered the standard of care for patients with functional iron deficiency according to NCCN and ASH guidelines. However, IV iron requires clinical supervision and carries risks of infusion-related reactions. In this context, Synthesit® might offer an oral alternative with improved tolerance and theoretical mitochondrial targeting, but current evidence is limited to case reports and lacks randomized trial validation

4.3. Mechanistic Perspective and Alternative Explanations

Synthesit®'s potential mechanism may involve enhanced mitochondrial iron utilization, modulation of erythroid precursor differentiation, and improved systemic iron integration, all of which could facilitate hematopoiesis during cytotoxic therapy. However, alternative explanations should also be considered. The observed improvement could have been influenced by concurrent Sorbifer use, recovery of bone marrow function after chemotherapy, supportive therapy such as filgrastim, or changes in nutritional and hydration status. These confounders highlight the need for cautious interpretation of the observed hematologic recovery

4.4. Integration with Clinical Evidence

Meta-analyses and clinical guidelines consistently reinforce the role of iron supplementation in managing chemotherapy-induced anemia. Intravenous (IV) iron has shown the most consistent benefit, significantly improved hematopoietic response and reduced transfusion requirements without increasing toxicity [24], [25]. The NCCN guidelines also highlight IV iron as more effective than oral formulations for managing CIA, particularly in patients with functional iron deficiencies [26] . Similarly, the American Society of Hematology recommends IV iron for cancer patients with CIA, emphasizing its role in supporting erythropoiesis [27]. In line with these recommendations, a randomized Phase II trial found that IV ferric carboxymaltose alone significantly increased hemoglobin levels in cancer patients within eight weeks, without ESAs or transfusions [28], [29].

Although oral iron remains widely available, evidence for its efficacy in CIA is less consistent. A Cochrane review of iron supplementation in CIA concluded that adding iron to ESAs improved hemoglobin and reduced transfusion requirements; however, oral iron alone was less well studied, and no improvement in quality of life was demonstrated [30]. Similarly, a randomized controlled trial comparing IV iron with oral ferrous sulfate in patients receiving erythropoietin found improvements in hemoglobin in both groups, but no significant differences between them, suggesting that oral iron may be beneficial but less potent than IV formulations [31].

4.5. Summary of Findings

In summary, this case demonstrates hematologic stabilization following the combined use of Synthesit® and Sorbifer, suggesting a possible supportive role for ferric citrate–based compounds in chemotherapy-induced anemia. However, this observation must be interpreted cautiously due to the single-patient design, concurrent treatments, and lack of biomarker data (e.g., ferritin, hepcidin). Further controlled studies are required to validate Synthesit®'s independent efficacy, elucidate its biochemical mechanism, and compare it directly with established oral and IV iron formulations.

4.6. Limitations and Need for Future Research

This case report is limited by the single-patient sample, which limits generalizability. The retrospective observational design lacks a control group, making it difficult to definitively attribute improvements solely to Synthesit®. Moreover, the duration of follow-up and the limited number of cycles observed do not allow for a comprehensive evaluation of long-term effects. Another important limitation is the absence of inflammatory or biomarker data such as ferritin, hepcidin, and C-reactive protein (CRP) which would have provided greater insight into iron metabolism, inflammation status, and the mechanistic validity of Synthesit®'s proposed effects. Future studies should incorporate these biomarkers to clarify whether improvements in hematologic indices correlate with changes in iron regulation and systemic inflammation Further research focusing on larger sample sizes, randomized controlled trials, and extended follow-up periods, will be essential determining the sustained efficacy and safety of Synthesit® for the management of anemia and myelosuppression secondary to chemotherapy.

4.7. Implications for Practice and Research

This case indicates that Synthesit may be helpful in treating patients with chemotherapy-induced anemia due to iron deficiency and myelosuppression. If future evidence substantiates this, Synthesit® could be used clinically to aid hematologic recovery, sustain chemotherapy, and improve patient outcomes. Moreover, the immunomodulatory effects of Synthesit® and its correlation with cognitive decline requires further research to expand the scope of oncology.

5. Conclusion

In this case, the use of Synthesit® (ferric iron III citrate) alongside conventional oral iron supplementation was associated with modest improvement in red blood cell indices, including hemoglobin, erythrocytes, and hematocrit, as well as better chemotherapy tolerance. The patient's treatment course continued without major interruptions, suggesting that Synthesit® may contribute to

improved hematologic stability and treatment continuity during chemotherapy. These findings indicate a potential supportive role for Synthesit® in the management of chemotherapy-induced anemia and myelosuppression; however, they should be interpreted with caution due to the single-patient design, concurrent therapy, and absence of biomarker analysis. Further well-designed, controlled, and biomarker-based clinical studies are needed to validate these preliminary observations and to better understand Synthesit®'s mechanism, safety, and long-term effects in oncology settings.

Conflict of Interest

The authors declare no conflicts of interest related to this publication.

References

[1] Imbesi Bellantoni M, Picciolo G, Pirrotta I, Irrera N, Vaccaro M, Vaccaro F, *et al.* Oral cavity squamous cell carcinoma: an update of the pharmacological treatment. *Biomedicines*. 2023;11(4):1112. doi: 10.3390/BIOMEDICINES11041112.

[2] Tan Y, Wang Z, Xu M, Li B, Huang Z, Qin S, *et al.* Oral squamous cell carcinomas: state of the field and emerging directions. *Int J Oral Sci*. 2023;15(2023):44. doi: 10.1038/S41368-023-00249-W.

[3] Pakravan F, Abbasi F, Garshasbi MA, Isfahani MN. Relationship between oral cancer stage and elapsed time from the onset of signs and symptoms to diagnosis and treatment. *Cancer Treat Res Commun*. 2021;28(2021):100428. doi: 10.1016/J.CTARC.2021.100428.

[4] Zanoni DK, Montero PH, Migliacci JC, Shah JP, Wong RJ, Ganly I, *et al.* Survival outcomes after treatment of cancer of the oral cavity (1985–2015). *Oral Oncol*. 2019;90(2019):115–21. doi: 10.1016/J.ORALONCOLOGY.2019.02.001.

[5] Bera RN, Tandon S, Singh AK, Boojar FMA, Jaiswal G, Borse S, *et al.* Management and outcome of locally advanced oral squamous cell carcinoma. *Natl J Maxillofac Surg*. 2023;14(2):185. doi: 10.4103/NJMS.NJMS_125_22.

[6] Mohamad I, Glaun MDE, Prabhash K, Busheri A, Lai SY, Noronha V, *et al. Current Treatment Strategies and Risk Stratification for Oral Carcinoma*. American Society of Clinical Oncology Educational Book; 2023. doi: 10.1200/EDBK_389810.

[7] Yue J, Shui H, Li G, Yang B, Tang D. Chemotherapy-induced bone marrow suppression: a bibliometrics analysis. *J Multidiscip Healthc*. 2025;18(2025):1895–911. doi: 10.2147/JMDH.S507187.

[8] Epstein RS, Roy UKB, Aapro M, Salimi T, Moran D, Kreinitsky J, *et al.* Cancer patients' perspectives and experiences of chemotherapy-induced myelosuppression and its impact on daily life. *Patient Prefer Adherence*. 2021;15(2021):453–65. doi: 10.2147/PPA.S292462.

[9] Madeddu C, Neri M, Sanna E, Oppi S, Macciò A. Experimental drugs for chemotherapy-and cancer-related anemia. *J Exp Pharmacol*. 2021;13(2021):593–611. doi: 10.2147/JEP.S262349.

[10] Abdel-Razeq H, Hashem H. Recent update in the pathogenesis and treatment of chemotherapy and cancer induced anemia. *Crit Rev Oncol Hematol*. 2020;145(2020):102837. doi: 10.1016/J.CRITREVONC.2019.102837.

[11] Camaschella C, Nai A, Silvestri L. Iron metabolism and iron disorders revisited in the hepcidin era. *Haematologica*. 2020;105(2):260–72. doi: 10.3324/HAEMATOL.2019.232124.

[12] Kusnir P, Bulgin D, Baig S. Iron citrate synthesit: impact on blood parameters in non-iron deficient models. *Edelweiss Appl Sci Technol*. 2024;8(4):2331–47. doi: 10.55214/25768484.V8I4.1602.

[13] Wojtaszek E, Glogowski T, Malyszko J. Iron and chronic kidney disease: still a challenge. *Front Med (Lausanne)*. 2020;7(2020):565135. doi: 10.3389/fmed.2020.565135.

[14] Dombaanai B, Karabanov R, Baig S. The effect of iron citrate synthesit on cognitive functions in mice. *South East Eur J Public Health*. 2025;26(7):104–11. doi: 10.70135/SEEJPH.VI.6663.

[15] Kusnir P, Baig S. Effect of the synthesit dietary supplement on serum cholesterol levels. *J Univ Med Dental College*. 2024;15(4):959–61. doi: 10.37723/JUMDC.V15I4.1072.

[16] Wyart E, Hsu MY, Sartori R, Mina E, Rausch V, Pierobon ES, *et al.* Iron supplementation is sufficient to rescue skeletal muscle mass and function in cancer cachexia. *EMBO Rep*. 2022;23(2022):e53746. doi: 10.15252/embr.202153746.

[17] Morales M, Xue X. Targeting iron metabolism in cancer therapy. *Theranostics*. 2021;11(17):8412. doi: 10.7150/THNO.59092.

[18] Trivedi S, Shah S, Patel R. Review on novel oral iron formulations with enhanced bioavailability for the treatment of iron deficiency. *J Drug Deliv Sci Technol*. 2023;90(2023):105181. doi: 10.1016/J.JDDST.2023.105181.

[19] Ebea-Ugwuanyi PO, Vidyasagar S, Connor JR, Frazer DM, Knutson MD, Collins JF. Oral iron therapy: current concepts and future prospects for improving efficacy and outcomes. *Br J Haematol*. 2024;204(2024):759–73. doi: 10.1111/bjh.19268.

[20] Kusnir P. Iron Citrate (Synthesit) supplementation during pancreas cancer showed surprising results–case study. *Acta Med Martiniana*. 2023;23(3):107–16. doi: 10.2478/ACM-2023-0014.

[21] Kusnir P, Baig S. The neuropathy as an adverse effect of chemotherapy diminished after administration of dietary supplement with iron citrate–case study. *Futurity Med*. 2024;3(3):1–8. doi: 10.57125/FEM.2024.09.30.06.

[22] Kobayashi H, Yamada Y. Efficacy of oral ferric citrate hydrate treatment for anemia caused by niraparib: a case report. *J Med Case Rep*. 2022;16(2022):1–7. doi: 10.1186/S13256-022-03666-3.

[23] Tan J, Du S, Zang X, Ding K, Ginzburg Y, Chen H. The addition of oral iron improves chemotherapy-induced anemia in patients receiving erythropoiesis-stimulating agents. *Int J Cancer*. 2022;151(2022):1555–64. doi: 10.1002/IJC.34142.

[24] Buchrits S, Itzhaki O, Avni T, Raanani P, Gafter-Gvili A. Intravenous iron supplementation for the treatment of chemotherapy-induced anemia: a systematic review and meta-analysis of randomized controlled trials. *J Clin Med*. 2022;11(14):4156. doi: 10.3390/JCM11144156.

[25] Makharadze T, Boccia R, Krupa A, Blackman N, Henry DH, Gilreath JA. Efficacy and safety of ferric carboxymaltose infusion in reducing anemia in patients receiving chemotherapy for nonmyeloid malignancies: a randomized, placebo-controlled study (IRON-CLAD). *Am J Hematol*. 2021;96(12):1639–46. doi: 10.1002/ajh.26376.

[26] Rodgers GM. A perspective on the evolution of management of cancer- and chemotherapy-induced anemia. *JNCCN J Nat Compr Cancer Netw*. 2012;10(4):434–7. doi: 10.6004/JNCCN.2012.0044.

[27] Ning S, Zeller MP. Management of iron deficiency. *Hematology*. 2019;2019(1):315–22. doi: 10.1182/HEMATOLOGY.2019000034.

[28] Jang JH, Kim Y, Park S, Kim K, Kim SJ, Kim WS, *et al.* Efficacy of intravenous iron treatment for chemotherapy-induced anemia: a prospective Phase II pilot clinical trial in South Korea. *PLoS Med*. 2020;17(6):e1003091. doi: 10.1371/JOURNAL.PMED.1003091.

[29] Abdel-Razeq H, Saadeh SS, Malhis R, Yasser S, Abdulelah H, Eljaber R, *et al.* Treatment of anemia in cancer patients undergoing chemotherapy with intravenous ferric carboxymaltose without erythropoiesis-stimulating agents. *Ther Adv Med Oncol*. 2020;12(2020):1–9. doi: 10.1177/1758835920953292.

[30] Mhaskar R, Wao H, Miladinovic B, Kumar A, Djulbegovic B. The role of iron in the management of chemotherapy-induced anemia in cancer patients receiving erythropoiesis-stimulating agents. *Cochrane Database Syst Rev*. 2016;2(2):CD009624. doi: 10.1002/14651858.CD009624.PUB2.

[31] Hajigholami A, Maghsoodi AR, Ansari H, Kafeshani M. Treatment of chemotherapy induced anemia; a randomized clinical trial to compare quality of life in patients taking intravenous versus oral iron. *Immunopathologia Persa*. 2020;7(2):e32. doi: 10.34172/IPP.2021.32.