THE IMPORTANCE OF NUTRITIONAL THERAPY IN CHILDREN WITH LEUKEMIA: A SYSTEMATIC REVIEW OF THE LITERATURE

https://doi.org/10.56238/sevened2025.018-007

Andreina Rocha da Silva[1], Jonatas Lessa dos Santos[2], Thaylla Vieira Barbosa[3] and Thiago Silva Ferreira[4]

ABSTRACT

Nutritional therapy in children with leukemia represents a fundamental strategy for clinical recovery and improvement of quality of life. This study aimed to analyze, through an integrative literature review, the importance of nutritional support in childhood cancer treatment. The survey was conducted between January and March 2025, using the Scielo, PubMed, and Google Scholar databases. Initially, 401 articles were identified; After applying inclusion and exclusion criteria, seven studies were selected for critical analysis. The results indicated that adequate nutritional intervention favors the strengthening of the immune system, improves the response to treatment, and reduces the incidence of infectious and nutritional complications. In addition, the risks associated with the treatment, such as loss of lean mass and weight gain, were evidenced, reinforcing the need for continuous nutritional monitoring. It was also observed that the oral route should be stimulated whenever possible, with enteral and parenteral nutrition being indicated in specific cases of greater gastrointestinal involvement. It is concluded that nutritional care, planned in an individualized way, is essential from the time of diagnosis, acting not only in physical support, but also in promoting healthier growth and development during and after cancer treatment. or nutritional risk, due to improved immune function.

Keywords: Childhood Leukemia. Nutrition. Nutritional Therapy.

[1]Nutritionist
Centro Universitário Ateneu, Fortaleza- Ceará
[2]Nutritionist
Centro Universitário Ateneu, Fortaleza- Ceará
[3]Nutritionist
Centro Universitário Ateneu, Fortaleza- Ceará
[4]Master's student in Collective Health
State University of Ceará

INTRODUCTION

Leukemia is a neoplasm characterized by the uncontrolled growth of immune cells in the bone marrow. One of the most common symptoms is anemia, and this type of cancer is more found in children under fifteen years of age (Leite; Muniz, 2007).

We can characterize leukemia into: acute myeloid leukemia, chronic myeloid leukemia (CML), acute lymphoblastic leukemia (ALL) and chronic lymphoblastic leukemia (CLL). ALL is the most common in children. and its treatment can lead to several negative health effects. The most frequent symptoms are anemia, fever, bleeding and pain. These patients lose a lot of lean mass due to their quality of life, so there are risks of infections that are not favorable to treatment, which may reflect a negative effect on the cure of the disease (Caram et al., 2012).

Some authors report that the nutritional status of patients with leukemia varies according to socioeconomic factors as well, thus influencing treatment and showing that nutrition in leukemia is an important factor when it comes to positive results. Malnutrition due to lack of essential nutrients is common in children who have acute lymphoblastic leukemia (ALL) in some countries, such as Brazil and Mexico (Borim et al., 2000).

Malnutrition has a prevalence of diagnosis of children with cancer, ranging from 6% to 50%, according to several studies. Cancer patients are at risk of developing a worsening of the clinical condition at any time during treatment, especially due to the immune system (Garófolo, 2005).

The highest risk of malnutrition during treatment is associated with therapy of several chemotherapy drugs in large doses, along with the combination of radiotherapy. Children with cancer have important changes in their nutritional status, so for this reason, parenteral nutrition has been used for so long as a form of nutritional therapy, but the use of this conduct is due to the very impaired oral intake associated, mainly, with the toxicities of drugs on the gastrointestinal tract (Garófolo, 2005).

The goals of nutritional therapy are to provide energy, fluids, and nutrients in the correct amount to maintain vital functions in an attempt to recover the immune system. To choose the most appropriate method, it will depend a lot on the situation in which the patient is, therefore, the best method is the one that will offer less risk and greater efficiency for a better cost-benefit (Garófolo, 2005).

To assist in the indication of nutritional therapy, some conditions have been established, such as: weight loss proportional to 5% in relation to the weight before diagnosis, weight and height less than 90% or 10th percentile, reduction of adipose reserves, triceps skinfold thickness less than the 5th percentile, reduction of two percentiles

in weight or height, food intake is less than 70% of the requirements for at least 5 days, gastrointestinal disorder or toxicity for 5 days, regardless of anthropometric deficit or other conditions (Garófolo, 2003).

METHODS

This is a systematic review of the literature carried out from January to March 2025, on the importance of nutritional therapy in children with leukemia: a literature review. The following electronic databases were used: Google Scholar; NIH/PUBMED (National Library of Medicine); Scielo (Scientific Electronic Library Online).

Terms that relate to the importance of nutritional therapy in children with leukemia were used to search the databases. The descriptors used were in English and Portuguese: "nutrition" AND "nutrition" AND "nutritional therapy" AND "childhood leukemia".

The articles identified by the search strategy were evaluated individually and in full. For inclusion, the following criteria were followed: studies published between 2014 and 2025, studies conducted among children, and studies addressing the importance of nutritional therapy in children with leukemia. The exclusion criteria were: articles that only touched on the proposed theme, did not present the descriptors, theses and dissertations.

After accessing the chosen databases, a totally individual analysis was carried out for the selected articles, which were verified and then all tabulated. To facilitate data collection, a table was prepared containing the following information: title, year of publication, objective, results and final considerations/conclusion.

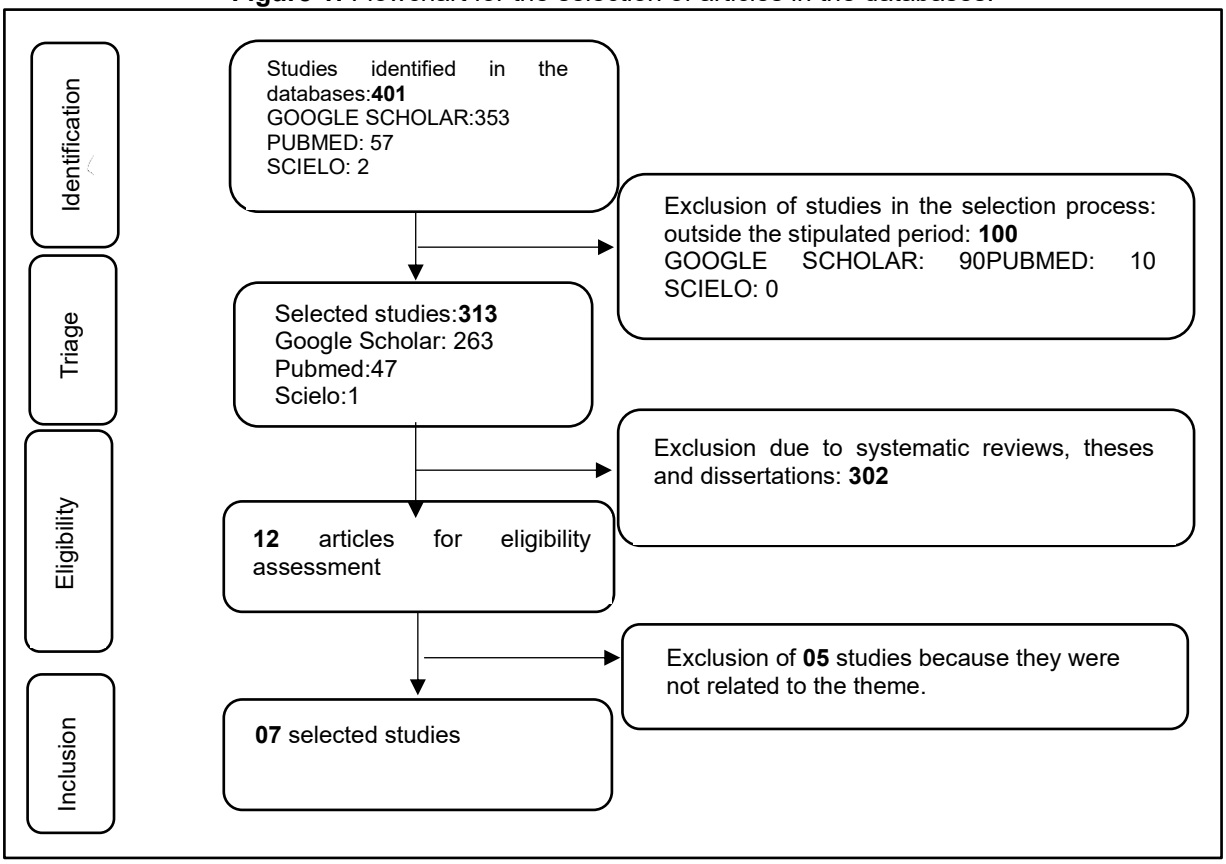
The studies underwent a thorough and careful evaluation of their results, focusing on the importance of nutritional therapy in children with leukemia.

RESULT

A total of 401 studies were found in the selected databases, including Pubmed (57), Scielo (2) and Google Scholar (353). After analysis, regarding the publication period, from 2014 to 2025, 4 studies were excluded. Next, the articles were checked for their type of study and theme, from which 302 articles were excluded, leaving 10 articles eligible for reading.

The eligible studies underwent a verification and the inclusion criteria were applied in which they presented relevance with the proposed theme and those that only touched on the theme or that did not present the proposed descriptors were excluded, resulting in 7 articles that were selected for this Integrative Literature Review (RIL), as shown below:

Figure 1: Flowchart for the selection of articles in the databases.



SOURCE: Authors, 2025.

The articles were arranged in a table including: title, year, objective, results on the importance of nutritional therapy in children with leukemia and final considerations, as shown in Chart 1.

Regarding the methodology used, the studies are varied, being observational, retrospective, quantitative with a longitudinal or cross-sectional design. Regarding the place of research and period, it was observed that the 5 studies were conducted in Brazil and all published in the period from 2014 to 2025.

Chart 1: Characteristics of the studies present in the Integrative Literature Review.

TITLE	YEAR	GOAL	FINDINGS	CONCLUSION
Changes in nutritional status in adolescents surviving leukemia and lymphoma	2020	To analyze changes in the nutritional status of adolescents aged 10 to 19 years after a minimum interval of 12 months after cancer treatment for leukemia and lymphomas.	The sample consisted of 50 adolescents who survived leukemia and lymphomas.	Anthropometric indicators show a significant frequency of overweight and increased triceps skinfolds, as well as a significant increase in body mass index for age and growth deficit among survivors.
Nutritional status and clinical outcomes in pediatric patients with Acute Lymphoblastic Leukemia.	2017	To assess the nutritional status of a cohort of children and adolescents during treatment for acute lymphoblastic leukemia and to determine its association with risk of relapse and five-year follow-up survival.	There was a predominance of males (55.6%) and the median age was 7.0 years at the beginning of follow-up.	Significant weight gain was observed during treatment, but no association was found between nutritional status at diagnosis and risk of relapse, and no influence of excess weight on survival was observed.
Nutritional care in children with leukemia.	2017	The fundamental role of nutrition in oncology is to proceed with the nutritional assessment of these patients, classifying them according to their nutritional status and elaborating diet therapies individually according to nutritional needs, giving them caloric and nutritional support to increase their immunity, also assisting in drug treatment, radiotherapy and chemotherapy.	Contextualize childhood leukemia in nutritional terms, presenting and reflecting the functions and importance of nutrition and the role of the nutritionist. within this context.	Nutritional therapy helps to reduce morbidity and mortality related to nutritional complications, promoting the comfort and quality of life of patients during treatment.
Nutritional profile of pediatric cancer patients admitted to the Children's Hospital of Brasília.	2014	OBJECTIVE: To evaluate the nutritional profile of pediatric cancer patients admitted to the José de Alencar Children's Hospital of Brasília.	A total of 29 medical records were analyzed. The most frequent type of neoplasm in children was Lymphoblastic Leukemia (45%) and in	Studies that monitor the nutritional status of children with cancer can prevent complications and improve the prognosis among those affected.

			relation to nutritional status, most were eutrophic (44%), according to BMI/A.	
Nutritional interventions in children with acute lymphoblastic leukemia undergoing antineoplastic treatment: a systematic review	2024	To evaluate the effect of nutritional interventions in children with ALL on antineoplastic treatment.	We included 25 studies. Very heterogeneous interventions and outcomes; improvement of inflammatory and anthropometric markers has been reported, but without adequate assessment of body composition. Most studies were at high risk of bias.	There is an urgent need for high-quality randomized controlled trials to establish effective nutritional interventions in children with ALL.
The evolution of nutritional care in children and young people with acute lymphoblastic leukaemia: a narrative review	2025	Discuss the evolution of nutritional care for children and adolescents with ALL and the new nutritional challenges.	Obesity is increasingly prevalent at diagnosis and during treatment. In addition to malnutrition, being overweight brings risks such as increased toxicity and metabolic complications. Diet quality and obesity prevention emerge as new priorities.	Changes in treatment require a new nutritional approach, focused on the quality of diet and the prevention of chronic diseases in ALL survivors.
Impact of Acute Lymphoblastic Leukaemia Treatment on the Nutritional Status of Paediatric Patients: A Systematic Review	2024	To assess the impact of ALL treatment on the nutritional status of pediatric patients.	18 studies with 1692 children were analyzed. The treatment compromises growth, alters metabolism, perception of hunger and food palatability, in addition to increasing the risk of malnutrition and obesity.	Nutritional assessment and monitoring should be continuous during the treatment of ALL, and are essential to improve prognosis and quality of life.

Source: Authors, 2025.

DISCUSSION

The oral route (OP) is the most recommended nutritional therapy and should always be the first option when there is an intake of less than 75%, which is recommended within 5 consecutive days (INCA, 2009). Nutritional therapy (NT) will begin with the evaluation of the patient's nutritional status. This evaluation is the responsibility of the nutritionist who makes up the team. Nutritional assessment has to be periodic in the treatment routine, as the patient is sensitive to acquiring infections in the therapeutic response (Silva, 2006).

Nutrition in the context of childhood acute lymphoblastic leukemia (ALL) is a fundamental component for the clinical evolution of patients. As Guzmán-León et al. (2024) point out, although several nutritional interventions have been explored, the great methodological heterogeneity and the high risk of bias in many studies limit the definition of standardized and effective conducts. In general, evidence indicates that nutritional support is capable of improving inflammatory markers and anthropometric parameters, even though more refined aspects, such as the assessment of body composition, are still little considered.

In light of the transformations observed in pediatric oncology, Lovell et al. (2025) highlight that the nutritional scenario of patients has also changed: if before the focus was on combating malnutrition, today the prevention of obesity and the promotion of quality nutrition have become equally central challenges. Studies indicate that excess weight at diagnosis and during treatment is related to increased metabolic complications and worse survival rates, evidencing the need for a more comprehensive and continuous nutritional approach throughout the therapeutic journey.

In the same sense, Picáns-Leis et al. (2024) reinforce that antineoplastic treatment directly impacts the nutritional status of children, compromising global growth and development. Metabolic alterations, changes in the perception of hunger and satiety, and reduced physical activity are factors that, together, favor both the risk of malnutrition and excessive weight gain. In this context, it becomes evident that nutritional assessment and monitoring cannot be one-off actions, but must be part of the care routine from the moment of diagnosis.

According to Xue et al. (2011), enteral nutrition is nothing more than the best way to provide nutrients when the patient is not able to ingest food orally due to abnormalities in the GIT, including the pharynx, oropharynx, stomach and esophagus. Enteral nutrition has its advantages because it has reduced costs, has a better maintenance of intestinal integrity, reduction of infection and thus, reducing the patient's hospitalization time (Aspen, 2002).

Parenteral nutrition will only be recommended when the gastrointestinal tract (GIT) has acute complications from chemotherapy and radiotherapy in a short period of time and is malnourished, so enteral nutrition is no longer viable (Bozzetti et al., 2009).

Nutritional therapy (NT) in children with leukemia aims to ensure levels of all nutrients that are necessary for the prevention or maintenance of lean and body mass. The patient's oral route must always be stimulated, as it is the best route, but there are cases that need to be resorted to enteral and parenteral nutrition, so nutritional therapy will always be individualized, as each individual has different needs (Guedes, Rodrigues; Toscano, 2007). Cancer in children will normally affect the cells of the blood system and supporting tissue (Silva, Barros; Hora, 2010).

Nutritional assessment is essential and has to be done frequently, at the time of hospitalization or soon after diagnosis. In order to control the nutritional status, these patients need to be quickly identified, so that the patient's recovery can be facilitated (Caprara et al., 2009).

Children with cancer have inappetence, which can lead the patient to malnutrition, influencing the child's survival and prognosis and affecting the immune response and therapies. Weight loss happens a lot, causing the loss of lean mass, so the risks of infections predispose, resulting in a worse response in the treatment, which leads to a decrease in cure. Malnutrition is also associated with poor quality of life (Garófolo et al., 2004).

Malnutrition in pediatric patients with leukemia can occur due to several factors, namely: intestinal malabsorption, changes in nutrient metabolism, chemotherapy, radiotherapy or surgery, increased nutritional needs, use and dosage of drugs, depression, anxiety and fear (Nogueira et al. 2004). It is important to maintain adequate nutritional status so that intense treatment can be endured and to support the healthy growth of children and adolescents during and after antineoplastic therapy (SchiavettI et al., 2002).

Belin et al. (2020) observed children and adolescents between 10-19 years old, survivors of leukemias and lymphomas, who had completed cancer treatment at least 12 months in which they collected 50 samples and the results showed that about 38% of patients were classified as overweight after cancer treatment and growth deficit at the end of treatment, without nutritional monitoring.

Belin et al. (2020) also analyzed that child cancer survivors had late effects that can appear early or late, affecting growth and excess weight, especially in girls. Studies show that there is a higher prevalence of overweight in cancer survivors, those who have a high BMI at the time they receive the diagnosis.

According to Almeida et al. (2017), childhood cancer in 70% of cases can be cured if it is diagnosed early and treated correctly. Based on the results, about 80% is acute lymphoblastic leukemia (ALL) among children aged 1 to 4 years, 17% is acute myeloid leukemia (AML) and 3% is chronic myeloid, with a rate of variation between the incidence rates of ALL and AML worldwide. They claim that nutrition along with physical activity can reduce the incidence of cancer worldwide by about 60% to 70%. Therefore, acquiring a healthy diet along with healthy habits contributes a lot to the cancer prevention factor.

Carvalho et al., (2016) assessed the nutritional risk of 54 patients during cancer treatment, children and adolescents between 1 and 18 years old. The study showed that excess weight did not have a statistically significant influence on the survival curves at 5 years of follow-up. The presence of underweight, overweight and obesity prevails in patients with leukemia in about 40% at the time of diagnosis. This happens due to the large excess of corticosteroids during treatment, causing an increase in caloric intake, body fat percentage, and water retention.

Barreto et al., (2013) analyzed 29 medical records of children with cancer, with lymphoblastic leukemia neoplasia being more frequent (45%). With relevance to nutritional status, it can be seen that the vast majority had normal weight. When the blood count tests were analyzed, the vast majority had alterations. In the medical records analyzed, 44% were girls and 56% boys, aged 0 to 6 years.

According to Caram et al., (2012), the types of neoplasms that are most common in children is leukemia. There are several pathophysiological changes that are consequences of leukemia, with the diagnosis of anemia, fatigue, dyspnea, osteoarticular pain and bleeding.

Patients diagnosed with acute lymphoblastic leukemia between zero and 12 years of age were evaluated, of whom some were diagnosed at the outpatient clinic itself, others were diagnosed from other places. In view of the results, the frequency of leukemia was higher in girls, with 57.1% and in boys it was 42.9%, with the age group between 3 and 6 years prevailing with 35.7%. (Caram et al., 2012).

CONCLUSION

The nutritional care of children with leukemia goes far beyond a simple dietary intervention, it becomes an essential part of the healing process. Throughout this review, it became evident that adequate nutritional therapy not only strengthens the immune system,

but also offers children better conditions to face the challenges imposed by cancer treatment.

Food, when planned individually and sensitive to the needs of each patient, is capable of reducing risks, favoring recovery and restoring quality of life at such a delicate time. More than numbers or protocols, the attentive look at nutritional status reaffirms the importance of seeing the child in its entirety, considering its weaknesses and potentialities.

Thus, the need for nutritional therapy to be integrated into all health care is reinforced, respecting times, limits and possibilities of each little patient, helping them to walk a path of hope and overcoming. Thus, nutrition is reaffirmed not only as a support, but as an active part of antineoplastic treatment, requiring an interdisciplinary action sensitive to the particularities of each phase of the disease and child growth.

REFERENCES

1. Almeida, S., & Reis, C. L. B. (2017). Cuidados nutricionais em crianças portadoras de leucemia. Revista Intellectus, 42(1), 1–10.

2. American Society for Parenteral and Enteral Nutrition. (2002). ASPEN guidelines. Silver Spring, MD: Author. Retrieved November 6, 2022, from [insira a URL, se disponível].

3. Barreto, L. M., Haack, A., & Santos, J. S. (2013). Perfil nutricional de pacientes pediátricos portadores de câncer, internados no Hospital da Criança de Brasília. Revista Com Ciências Saúde, 24(2), 123–130.

4. Belin, C. H. S., Bueno, L. M., & Cruz, F. A. (2020). Changes in nutritional adolescents surviving leukemia and lymphoma. Revista de Nutrição, 33(1), e190123. https://doi.org/10.1590/1678-9865202033e190123

5. Borim, C. A., Ruiz, L. M., & Conte, M. (2000). Estado nutricional como fator prognóstico em crianças portadoras de leucemia linfocítica aguda. Revista Brasileira de Hematologia e Hemoterapia, 22(1), 47–53.

6. Bozzetti, F., Arends, J., & Lundholm, K. (2009). ESPEN guidelines on parenteral nutrition: Non-surgical oncology. Clinical Nutrition, 28(4), 445–454. https://doi.org/10.1016/j.clnu.2009.04.011

7. Caprara, G. L., Ricalde, S. R., & Santos, J. S. (2009). Características nutricionais dos pacientes oncológicos pediátricos do Hospital Geral de Caxias do Sul. Pediatria (São Paulo), 31(4), 234–241.

8. Caram, A. L., Franciosi, C., & Pereira, R. R. (2012). Desnutrição em crianças até 12 anos com leucemia, atendidas no grupo em defesa de criança com câncer no município de Jundiaí, SP. Revista Brasileira de Cancerologia, 58(3), 405–412.

9. Carvalho, A. P., Schramm, F. R., & Murad, L. B. (2016). Estado nutricional e desfechos clínicos em pacientes pediátricos com leucemia linfoblástica aguda. Revista Brasileira de Cancerologia, 62(4), 315–322.

10. Garófolo, A., Avesani, C. M., Camargo, K. G., Barros, M. E., Silva, S. R. J., Taddei, J. A. A. C., & Lopez, F. A. (2004). Dieta e câncer: Um enfoque epidemiológico. Revista de Nutrição, 17(4), 491–505. https://doi.org/10.1590/S1415-52732004000400009

11. Garófolo, A. (2005). Diretrizes para terapia nutricional em crianças com câncer em situação crítica. Revista de Nutrição, 18(3), 389–400. https://doi.org/10.1590/S1415-52732005000300011

12. Garófolo, A., Petrilli, A. S., & Lopez, F. A. (2003). Nutrição e dietética em clínica pediátrica. In A. S. Petrilli & F. A. Lopez (Eds.), Nutrição e dietética em clínica pediátrica (pp. 309–316). São Paulo, Brazil: Atheneu.

13. Guzmán-León, A. E., Velasco-Benitez, C. A., & Vasquez-Garibay, E. M. (2024). Nutritional interventions in children with acute lymphoblastic leukemia undergoing

antineoplastic treatment: A systematic review. BMC Nutrition, 10(89), 1–14. https://doi.org/10.1186/s40795-024-00892-4

14. Instituto Nacional de Câncer. (2009). Consenso nacional de nutrição oncológica. Rio de Janeiro, Brazil: INCA.

15. Lovell, A. L., Davies, P. S. W., & Hill, R. J. (2025). The evolution of nutritional care in children and young people with acute lymphoblastic leukaemia: A narrative review. Journal of Human Nutrition and Dietetics, 38(1), e13273. https://doi.org/10.1111/jhn.13273

16. Picáns-Leis, R., López-Cortés, A., & Fernández-Pombo, A. (2024). Impact of acute lymphoblastic leukaemia treatment on the nutritional status of paediatric patients: A systematic review. Nutrients, 16(23), 4119. https://doi.org/10.3390/nu16234119

17. Schiavetti, A. (2002). Nutritional status in childhood malignancies. Nutrition and Cancer, 44(2), 141–145. https://doi.org/10.1207/S15327914NC4402_3

18. Silva, A. P., Barros, W. M., & Hora, A. L. (2010). Experiência de ser um cuidador familiar no câncer infantil. Revista Rene, 11(2), 97–104.

19. Silva, M. P. N. (2006). Síndrome da anorexia-caquexia em portadores de câncer. Revista Brasileira de Cancerologia, 52(3), 285–291.

20. Van, C. E., & Arends, J. (2005). The causes and consequences of cancer-associated malnutrition. European Journal of Oncology Nursing, 9(Suppl. 2), S51–S63. https://doi.org/10.1016/j.ejon.2005.09.007