Review article
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Nutritional Determinants of Health and Disease: A Review of Diet's Role in Inflammation, Body Composition, and Cancer Care

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Abstract
This review hypothesizes that evidence-based dietary interventions play a fundamental, rather than auxiliary, role in maintaining health and managing disease, particularly in the context of cancer care. It highlights the critical importance of nutrition as a modifiable factor in determining health and disease. The review examines how dietary habits impact systemic inflammation and body composition, two factors that significantly influence cancer risk, treatment tolerance, and patient outcomes. Evidence suggests that pro-inflammatory nutritional patterns, such as the Western diet, are associated with elevated inflammatory biomarkers and an increased risk of disease. Conversely, anti-inflammatory diets, including the Mediterranean and Dietary Approaches to Stop Hypertension (DASH) diets, promote metabolic homeostasis and improved clinical outcomes. Nutrition also regulates body composition, helping to mitigate sarcopenia and obesity in cancer patients, both of which influence prognosis and quality of life. To integrate nutritional care into oncology practice effectively, early nutritional screening, personalized diet planning, and the inclusion of registered nutritionists within multidisciplinary teams are essential. Future research should aim to elucidate the molecular pathways linking diet to cancer progression and to refine individualized nutrition strategies in standard oncologic care.

Keywords: Cancer Care, Dietary interventions, Metabolic homeostasis, Nutritional Screening, Sarcopenia,

Highlights:
- Diet directly modulates systemic inflammation, as indicated by a 39% higher odds of elevated CRP associated with a high Dietary Inflammatory Index score.
- Nutrition is a primary regulator of body composition, playing a crucial role in combating sarcopenia and obesity in cancer patients.
- Dietary interventions are therapeutic in oncology, improving treatment efficacy, reducing side effects, and enhancing quality of life.
- Success requires early nutritional screening, personalized plans, and the involvement of nutritionists in multidisciplinary teams.

1. Introduction
Nutrition has evolved from being a fundamental need to sustain life to becoming an integral part of modern therapeutic and preventive practices. The latter transformation is especially apparent in the administration of chronic illnesses, where dieting habits are being viewed as a highly significant risk factor and supplement to traditional care. In this perspective, cancer is an excellent target of nutritional interventions, due to strong evidence that involves dietary habits and the risk of cancer and disease progression. The interaction between dietary intake, systemic inflammation, and body composition supports this relationship. Specific nutrients can either slow down or decelerate disease mechanisms. The Mediterranean and Dietary Approaches to Stop Hypertension (DASH) diets, characterized by a high content of fruits, vegetables, and healthy fats, have demonstrated a practical ability to lower inflammation and promote a healthier body composition (Botero *et al.,* 2019). On the contrary, the typical Western diet (a plethora of processed food and sugars) is known to trigger chronic inflammation, thus being part of the poor health outcomes.

This knowledge in oncology has made nutrition not an adjunct to patient care, but a primary component of care. Optimal nutrition has the potential to improve the quality of life, reduce comorbidities associated with cancer, such as sarcopenia, and even enhance treatment tolerance and survival (Botero et al., 2019). A cancer diagnosis will therefore offer a significant opportunity to help patients adopt sustainable, healthy diet habits. The only way to take advantage of this opportunity is by utilizing an interdisciplinary, collaborative model that incorporates the services of registered dietitians

into oncology teams and tailors the education to address the specific needs of a patient group and their respective cultures (Hersberger et al., 2020). The importance of the clinical imperative can also be supported by the susceptibility of certain groups in the population to nutritional deficiencies, such as older adults and individuals undergoing chemotherapy. Screening for nutritional risk is thus an essential part of geriatric and oncologic models of care, which facilitates the identification of individuals at risk and the implementation of targeted interventions to improve nutritional status and clinical outcomes (Hersberger et al., 2020).

Furthermore, the emphasis on body composition, specifically maintaining lean muscle mass and reducing adipose tissue, is of the utmost importance. It has also been demonstrated that individualized nutritional plans are effective in preserving muscle mass and facilitating fat reduction in chronically ill patients, including those with cancer, which is directly linked to improved functional outcomes and reduced complications (Ford et al., 2022; Brinksma et al., 2020). Muscle synthesis, body composition, and protein intake further support the need for personalized dietary plans in this group of people (Ford et al., 2022). The clinical practice is becoming more aware of the increased vulnerability of certain groups of people, namely older adults, and other groups, such as people undergoing chemotherapy, to nutritional deficiencies (Azeem et al., 2025). Therefore, the concept of nutritional risk screening has become an integral part of geriatric and oncologic care frameworks, enabling the identification of patients at risk and the implementation of targeted interventions to improve their nutritional state and clinical outcomes (Botero et al., 2019; Hersberger et al., 2020).

Additionally, the focus on body structure, particularly lean muscle mass and the rigidity of adipose tissue, is of utmost importance. The results of empirical studies suggest that neutral nutritional interventions are effective in preserving muscle mass and reducing adiposity in chronically ill individuals, including those with cancer. These results are directly linked to improved functional performance and a decrease in complications (Ford et al., 2022; Brinksma et al., 2020). The specified connection between protein consumption, muscle protein synthesis, and body composition is another factor that confirms the need for individualized diet plans in this population (Ford et al., 2022).

The health status of the population is also a very important factor. Dietary patterns have been noted as one of the critical factors in the trend of noncommunicable diseases, such as cardiovascular disease and various forms of cancers, and lifestyle behaviors significantly influence the trend. The correlation between the Mediterranean diet and fewer cases of chronic illness, as well as improved prognosis outcomes, justifies the implementation of community-based nutrition programs aimed at reducing the burden of diet-related morbidity (Blake et al., 2021; Lv et al., 2022). The recent outbreak of COVID-19, along with other global health crises, has widened the health gap and highlighted how malnutrition impairs the body's ability to resist infectious diseases, thereby prompting a renewed focus on effective nutrition programs to improve population health(Mackay et al., 2025; Barazzoni et al., 2022). In such facilities, modern professional norms are now defined by the urgency of a holistic approach to nutrition to achieve excellent clinical outcomes (Barazzoni et al., 2022; Seid et al., 2023).

Although the evidence base is growing, significant gaps remain. Future studies should aim to elucidate the precise molecular mechanisms linking dietary exposures to carcinogenesis, as well as the individualization of nutritional regimens. An increased role in nutrition education, as part of the social policy of health and clinical practice, is urgently needed to ensure that all people have access to evidence-based dietary recommendations. Therefore, the primary focus of this review is to examine the evidence linking specific nutritional habits to the regulation of systemic inflammation and to explain their resultant effects on cancer pathogenesis and progression. It also aims to elucidate the critical role of nutrition in controlling adipose tissue and determine its importance in the functional and clinical outcomes of cancer patients. To debate the practice of evidence-based nutritional screening regimes and individualized dietary interventions in interdisciplinary cancer care models.

1.1. Nutritional Determinants of Inflammation

The inflammatory state of an individual is directly linked to the diet. Considering the factors of the Healthy Eating Index, empirical studies have repeatedly shown a significant relationship between dietary habits and inflammatory biomarkers (Yang et al., 2024). These studies have shown that although certain meals can increase the body's levels of specific inflammatory markers, certain diets can help regulate the body's inflammatory response. Additionally, it is worth noting that the Western diet, characterized by high levels of processed foods, refined sugars, and saturated fats, is associated with higher levels of inflammation and increased rates of obesity, diabetes, and cardiovascular disease, underlining the negative impact of the Western diet paradigm. (Mohammadi et al., 2023). The studies by Laclaustra et al. (2020) and Samadi et al. (2021) clarify the mechanism under the influence of dietary lipids and sugars, and prove the idea that a diet with high inflammatory potential is correlated with an increased rate of acquiring chronic illness.

Eating habits enriched in fruits, vegetables, and whole grains have been linked to a decrease in levels of inflammatory biomarkers. The articles by Taku et al. (2025) present strong evidence of the anti-inflammatory effect of nutrient-rich diets. To illustrate, Taku et al., (2025) found that there was a positive relation between low C -reactive protein (CRP)

levels and berry intake. Foods rich in antioxidants have the potential to regulate the overall health of the immune system and cytokine levels (Mohajeri et al., 2021). These findings underscore the importance of a diet rich in fruits and vegetables in promoting long-term health, suggesting that such foods can be effective in managing inflammation and chronic diseases.

This effect is acute, associated with the anti-inflammatory properties of omega-3 fatty acids, which are characteristic of fatty fish (Fang et al., 2024). These components are hallmarks of an anti-inflammatory diet, which is graphically contrasted against a pro-inflammatory diet in Figure 1. The intake of such fatty acids may help inhibit pro-inflammatory cytokines and, in the long term, prevent inflammation (Mohajeri & Aghapoor, et al., 2024). The Mediterranean diet, which includes omega-3 fatty acids, whole grains, and a variety of fruits and vegetables, has been shown to have a substantial impact on systemic inflammation and metabolic health (Su et al., 2023; Samadi et al., 2021). Essentially, this paper highlights the significance of food composition in maintaining our health and the reason why we should include more anti-inflammatory foods on our dinner plates.

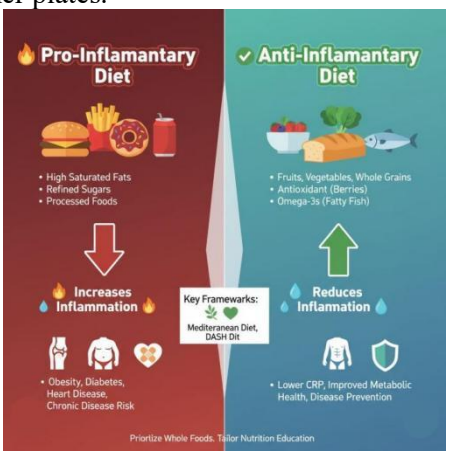

Figure 1: A comparison between a pro-inflammatory diet and an anti-inflammatory diet

A measurement currently accepted to assess the inflammatory potency of various food patterns is the Dietary Inflammatory Index (DII). Bakirhan et al., (2022) state that significant Dietary Inflammatory Index (DII) scores are associated with an increased predisposition to the development of chronic diseases, which supports the relationship between dietary preferences and health outcomes (Farpour et al., 2023). This literature indeed highlights the necessity of creating awareness among people about the subject of diet, as the long-term consequences of the food we consume can severely affect our health. To support this opinion, note that diets can impact the control of obesity and, consequently, have therapeutic potential in combating the chronic disease associated with inflammation (Taku et al., 2025).

Recent meta-analytic studies can provide more insightful information regarding the implications of an inflammatory diet. In a study conducted by Mohammadi et al. (2023), a positive relationship was established between nutritional interventions characterized by low levels of fruit and vegetable intake and higher levels of saturated fat, refined carbohydrates, and elevated C-reactive protein (CRP). The analysis found that individuals in the highest DII category had 39% higher odds of elevated CRP (Pooled OR: 1.39) compared to those in the lowest category, and each one-unit increase in the DII score was associated with a 10% increase in odds (OR: 1.10). These results are consistent with the existing literature, and they outline the key role of food in the regulation of inflammation. The mediation of this process can be achieved through the availability of antioxidants, which can either enhance or weaken the impacts of inflammation based on the amount consumed (Liu et al., 2025). Combined, these findings provide support to the significance of anti-inflammatory dietary interventions in health prevention and promotion. Since the interactions between diet, inflammation, and health are inherently complex, there is an urgent need to discover effective dietary interventions in the context of preventing and managing chronic inflammatory diseases. Promoting healthy eating habits based on empirically supported models, such as the Mediterranean or DASH diets, provides systematic patterns that favour nutrient-dense food consumption, which is beneficial to health (Moludi et al., 2022). The new evidence emphasises the importance of focusing on whole food as compared to processed foods, which further substantiates the correlation between nutrition and inflammatory health complications (Weldegebriel et al., 2023). Such healthy dietary behaviours should be encouraged and would greatly help people overcome the harmful impact of inflammation as well as the associated health risks.

Nutritional education. Specialized nutrition education can empower various populations to make high-quality food choices, especially in the context of a pro-inflammatory food culture that has persisted in the long-term Western context (Cavdar et al., 2025). Dietary habits are influenced by cultural, economic, and environmental factors, making tailored nutrition interventions crucial for optimizing population health outcomes (Montero-Salazar et al., 2022). Mohajeri et al.,

(2021) provide evidence that localized solutions, which consider both food networks and personal preferences, increase adherence to healthier diets and ultimately reduce inflammation at the community level.

1.2. Body Composition and Nutritional Influence

Extensive research has been conducted on the relationship between body composition and nutrition. Different eating habits have an impact on body fat distribution and BMI. Notably, the Mediterranean diet, characterized by a high consumption of olive oil, fish, fruits, and vegetables, has consistently been associated with lower obesity rates and a lower percentage of body fat in various societies. According to Guzeldere et al. (2025), individuals with greater nutritional knowledge are also more likely to adopt this dietary paradigm, which consequently improves health outcomes. Other research has also contributed to the positive effect of the Mediterranean diet on body composition, but this was not mentioned in the original text (Dandin et al., 2023; Guzeldere et al., 2025). On the same note, the DASH diet, which is rich in whole grains, fruits, vegetables, and low-fat dairy, has been shown to have a positive effect on body composition. Pathak et al. (2022) reported significant weight reduction and improved metabolic well-being among individuals following the DASH regimen.

Considering every nutrient separately, macronutrients play a central role in preventing obesity and controlling weight. Dietary fiber is found to increase satiety and metabolism. However, other recent research by Xicota et al., (2020) and Bakirhan et al. (2022) did not explicitly mention this effect. The growing evidence, however, suggests that high-fiber diets lead to caloric restriction and gastrointestinal well-being, resulting in positive changes in body composition. These benefits are foundational to established healthy eating patterns, such as the Mediterranean and DASH diets, which are systematically linked to improved body composition outcomes, as illustrated in Figure 2.

Figure 2: Healthy eating patterns

Inflammatory conditions and body mass are also controlled by nutrition. Yang et al. (2023) have found a strong inverse relationship between the Healthy Eating Index, a composite measure of dietary adherence to healthy trends, and systemic inflammation. Such findings, supported by Zawieja et al., (2024), highlight the association between a better diet and a reduction in inflammatory biomarkers.

On the contrary, the Western diet, characterized by high consumption of saturated fats, refined sugars, and processed foods, has also been recognized as a causative factor of inflammation and the etiology of chronic diseases, including cardiovascular disease and diabetes. Ramos et al. (2022) and Wrzosek et al. (2021) reported high levels of inflammatory markers in individuals who consume this type of diet. The distinct impacts of these different dietary patterns on inflammation and body composition are systematically compared in Table 1, which summarizes the evidence-based effects of the Mediterranean, DASH, and Western diets.

Table 1: Different dietary patterns and their effects on body composition and inflammation.

Dietary Patterns	Effect on Body Composition	Effect on Inflammation	References
Mediterranean Diet	Inversely linked to obesity rates and body fat percentages, it is associated with better health outcomes.	Implied to be anti-inflammatory, but not explicitly stated in this context	Güzeldere *et al.,* 2025; Dandin *et al.,* 2023
DASH Diet	Associated with favorable body composition outcomes; significant improvements in body weight and metabolic health.	Implied anti-inflammatory, but not explicitly stated in this context	Pathak *et al.,* 2022
Western Diet	Implied contribution to obesity	Exacerbates inflammation and is linked to chronic diseases, such as cardiovascular disease and diabetes.	Ramos *et al.,* 2022; Wrzosek *et al.,* 2021

Conversely, a higher intake of fruits, vegetables, and whole grains has been associated with lower levels of systemic inflammation. The rich, nutritious content of berries may explain why eating them appears to significantly lower levels of C-reactive protein (CRP) and other inflammatory markers. The anti-inflammatory effect of these foods is supported by Cahyanillah et al. (2024). Additionally, these dietary ingredients are highly effective in preventing systemic inflammation, which can be beneficial in preventive health practices (Kholdebarin et al., 2024).

Omega-3 fatty acids are also recognized to have anti-inflammatory properties when consumed regularly. The impact of omega-3 fatty acids on pro-inflammatory cytokines and metabolic balance is demonstrated by Pam et al., (2019) and Cahyanillah et al., (2024). Reducing consumption of pro-inflammatory foods and increasing intake of foods rich in omega-3 fatty acids can help regulate inflammatory status and enhance overall health and body composition.

The interaction of nutrition, body composition, and inflammation is relevant to the activities of public-health, educational programs, and policy-making. Healthier diets may be promoted through educational programs that lead to nutrition literacy. Guzeledere et al. (2025) hypothesize that the greater the nutrition knowledge, the greater the dietary adherence, and believe that properly designed nutrition education can enhance health outcomes in the community and make appropriate interventions possible. Bakirhan et al. (2022) and Brook et al. (2021) argue that community-based nutrition education can maximize health outcomes and facilitate intervention.

The diet is also a significant factor in the development of overweight and the accumulation of adiposity over time. Bakirhan et al. (2022) state that a healthy diet with a wide variety of foods is necessary to ensure that it meets the required intake of vitamins and minerals, and helps the immune system prevent infections (Brook et al., 2021). The results of this study underscore the importance of adopting a holistic approach to dietary management, encompassing body composition, particularly in situations of physiological stress. Obesity is defined by changes in diet and metabolic functions that require specialized nutritional intervention. Compared with high-carbohydrate diets, a comparison of high-fat diets in males who trained on strength training showed that the body composition changes were similar when compared to the changes in body composition in the high-carbohydrate diets, despite the difference in the ratios between macronutrients, indicating that the macronutrient proportions were not the main factors that determined the body composition.

1.3. Cancer Care: Dietary Modifications as Therapeutic Interventions

The nutrition changes are essential treatment measures in the course of oncology treatment. A nutritious diet can enhance the effectiveness of therapy, alleviate symptoms, and even improve patient survival (Wang et al., 2024). The importance of nutrition care at every stage of the cancer journey cannot be overstated, as the connection between nutrition and oncological outcomes is becoming increasingly evident (Fu et al., 2025). Customized nutrition regimens have been shown to improve patients' quality of life and change the way doctors treat them (Gomes et al., 2021). Early detection of nutritional risk is the most crucial component of effective diet management in oncology. When a person is undergoing cancer treatment, regular screening should be conducted, as recommended by Botero et al. (2019). The screening can be used to predict and prevent nutritional risk (Botero et al., 2019). Early patient referral to dietitians may be used to design unique therapeutic alternatives that meet the needs of patients and enhance health outcomes (Celik and Koksal et al., 2025). Ji et al. (2022) show evidence that individual nutritional interventions have the potential to prevent some of the adverse treatment-related effects, including weight loss and muscle atrophy.

Forslund et al. (2019) demonstrate that the value of nutritional interventions in patients undergoing radiotherapy for prostate cancer is substantial. According to the authors, men who were counseled by a dietitian on the details of nutrition had significantly less weight gain (median 1.0 compared to 3.5 in the control group) and a 50% lower percentage of patients who gained 5% or more. This evidence suggests that dietary support can be successfully implemented to mitigate the side effects of treatment and, consequently, enhance patient outcomes. The diagnosis of cancer is a transformational experience that has the potential to trigger a temporal shift in dietary behavior, which in the long term can lead to healthier lifestyles (Rashidinejad et al., 2024). When patients are informed of the advantages that may be achieved through the course of treatment, they are usually encouraged to modify their diets. This is relevant to the inclusion of dietetic care in oncology practice (Aytekin -Sahin et al., 2023).

Antioxidants also have a significant role in suppressing cancer inflammation. Pam et al. (2024) indicated that the inflammatory indices of diet and antioxidant capacity were associated with the presence of inflammatory markers in children with acute lymphocytic leukemia (Veronese et al., 2019). Foods rich in antioxidants and anti-inflammatory factors are encouraged to facilitate the reaction to treatment and help maintain the patient's better health (Pourreza et al., 2022). Body composition has an effect on cancer. Ji et al. (2022) emphasized the significance of obesity and adiposity in responding to the treatment (Kumar et al., 2024). The percentage of visceral fat and body fat must be checked on a regular basis. Sarcopenic obesity should be identified to implement specific dietary treatment to maintain a standard body structure. Nutrition has been found to enhance the treatment response and survival by increasing obesity and lean muscle mass (Tajik et al., 2019).

Kisighii et al., (2022) pointed out that the dietary interventions should be adjusted to the Tanzanian setting. The World Health Organization and the World Cancer Research Fund's evidence was used to develop evidence-based recommendations. Culturally specific nutritional interventions lead to better adherence and more favorable outcomes (Pam et al., 2024). A decreased ratio of cancer death has been linked to the Mediterranean diet. A negative correlation between this diet and death of prostate cancer was reported by Bagheri et al. (2019). In this regard, consuming fruits, vegetables, and whole grains more frequently reduces the risk of many cancers (Wu et al., 2019).

It has been demonstrated that when patients participate in the development of the diets, they are more likely to adhere to them (Kacar et al., 2020). According to Liu et al. (2023), plans' efficacy is a matter of opinion. A sense of control over one's food plan boosts adherence, which can improve quality of life and prognosis (Leao et al., 2024). Nutrition education for patients is crucial. Hospitalised patients' energy intake deficit and related eating patterns exacerbate their discomfort and exhaustion (Makhlouf et al., 2019). To avoid jeopardising treatment, it is crucial to keep a significant amount of energy balance during the dietary intervention (Jiang et al., 2025).

Nutrition may also counteract side effects, especially during chemoradiotherapy. Yang et al. (2024) outline the changing processes through which this advantage is becoming increasingly tangible. Blake et al. (2021) emphasize the importance of creating pre-treatment dietary frameworks to support patients undergoing this type of treatment. Pre-treatment nutrition support can also enhance the overall outcome, as it can be used to control the symptoms at the earliest stage. Interdisciplinary cooperation is increasingly crucial. According to Gambescia et al. (2025), collaboration is one of the elements. I believe the introduction of nutritionists to the care team is a sound initiative that can improve nutritional knowledge and consumption among cancer patients (Mayr et al., 2022). Interdisciplinary cooperation is indeed a guarantee of the holistic approach that will fulfill the needs of patients in the treatment process.

Conclusion

The growing evidence highlights a paradigm shift in oncology, aligning nutrition as a fundamental component of cancer care. Dietary patterns have a significant impact on systemic inflammation and body composition, which, in turn, affect treatment tolerance and survival. Anti-inflammatory and nutrient-balanced diets, such as the Mediterranean and DASH patterns, support improved clinical outcomes and patient quality of life. Integrating early nutritional assessment, individualized dietary plans, and dietitian-led interventions within multidisciplinary oncology teams is essential for effective and holistic management. Future directions should focus on elucidating molecular mechanisms linking diet and cancer, advancing personalized nutrition protocols, and strengthening nutritional education among healthcare providers and patients. Empowering individuals with evidence-based dietary strategies will enhance cancer prevention, treatment response, and long-term survivorship.

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Conflict of Interest.

The author declares no conflict of interest.

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