



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE

DIETARY SUPPLEMENTS AND HERBAL PRODUCTS DURING
ANTICANCER TREATMENT: PREVALENCE, INTERACTIONS AND
THE PROBLEM OF NON-DISCLOSURE. A NARRATIVE REVIEW

DOI

[https://doi.org/10.31435/ijitss.3\(51\).2026.6475](https://doi.org/10.31435/ijitss.3(51).2026.6475)

RECEIVED

15 June 2026

ACCEPTED

10 September 2026

PUBLISHED

15 September 2026

LICENSE



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2026.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

DIETARY SUPPLEMENTS AND HERBAL PRODUCTS DURING ANTICANCER TREATMENT: PREVALENCE, INTERACTIONS AND THE PROBLEM OF NON-DISCLOSURE. A NARRATIVE REVIEW

Agata Kotłowska (Corresponding Author, Email: agatakotlowska@gumed.edu.pl)

Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland

ORCID ID: 0000-0001-9665-8533

Julia Lenkiewicz

Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland

ORCID ID: 0000-0002-6976-6990

Wiktoria Napiórkowska

Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland

ORCID ID: 0009-0007-9546-3356

Marcin Trzeciński

Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland

ORCID ID: 0000-0003-4817-7772

Oliwia Lenkiewicz

Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland

ORCID ID: 0000-0002-4794-627X

Aleksandra Izabela Masłowska

Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland

ORCID ID: 0009-0006-7634-1006

Zuzanna Chmielewska

University Clinical Centre, Gdańsk, Poland

ORCID ID: 0000-0003-1106-1119

Anna Gwóźdź-Broczkowska

Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland

ORCID ID: 0009-0005-4839-5261

Gabriela Luba

National Medical Institute of the Ministry of the Interior and Administration, Warsaw, Poland

ORCID ID: 0009-0007-4262-2093

Dominika Galińska

University Clinical Centre, Gdansk, Poland

ORCID ID: 0009-0004-8037-2679

ABSTRACT

Objectives: Dietary supplements and herbal products are widely used by patients undergoing anticancer treatment, and a considerable proportion of this use is never mentioned to their physician. This review summarises current evidence on the prevalence of such use, the pharmacological basis of interactions with anticancer agents, and the factors underlying non-disclosure on the part of both patients and clinicians.

Methods: PubMed/MEDLINE and Google Scholar were searched for publications from January 2011, and July 2026, using combinations of terms relating to dietary supplements, herbal medicine, oncological treatment, herb–drug interactions and physician–patient communication. Priority was given to systematic reviews, meta-analyses and studies conducted in populations receiving anticancer treatment.

Key findings: Reported prevalence varies widely between studies, depending on which products are counted and on the populations examined. Interactions arise principally through effects on drug metabolism and transport. Patients most often cite the absence of any question from the clinician as their reason for not disclosing; clinicians, in turn, describe their own knowledge of these products as insufficient. Training programmes have been developed to address this, but their effectiveness has yet to be established.

Conclusions: Interactions between anticancer agents and dietary supplements or herbal products may be clinically relevant, yet often go unrecognised because their use is not disclosed. Non-disclosure is better understood as a feature of the consultation than as a behaviour of the patient. Two forms of intervention follow: strengthening clinicians' competence, and making enquiry about supplement use routine and free of judgement.

KEYWORDS

Dietary Supplements, Herbal Medicine, Clinical Oncology, Herb–Drug Interactions, Physician–Patient Communication, Disclosure

CITATION

Kotłowska, A., Lenkiewicz, J., Napiórkowska, W., Trzcinski, M., Lenkiewicz, O., Masłowska, A. I., Chmielewska, Z., Gwóźdź-Broczkowska, A., Luba, G., & Galińska, D. (2026). Dietary supplements and herbal products during anticancer treatment: Prevalence, interactions and the problem of non-disclosure. A narrative review. *International Journal of Innovative Technologies in Social Science*, 3(51). [https://doi.org/10.31435/ijitss.3\(51\).2026.6475](https://doi.org/10.31435/ijitss.3(51).2026.6475)

COPYRIGHT

© The author(s) 2026. This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

1. Introduction

Dietary supplements (DS) are among the most widely used health-related products in high-income countries (Cowan et al., 2018; Howiecka et al., 2022). In the United States, 52% of adults reported using at least one supplement within a 30-day period (Cowan et al., 2018), and across Europe national estimates range from 5% to over 50%, depending on the country (Papatesta et al., 2023).

Food supplements are concentrated preparations intended to complement, rather than replace, the ordinary diet. They may contain vitamins, minerals, amino acids, dietary fibre, botanical extracts or other substances exerting a nutritional or physiological effect, singly or in combination. They are administered orally in measured dose form, typically as capsules, tablets, sachets of powder or liquid preparations (Directive 2002/46/EC, 2025).

Herbal products constitute a distinct subset of this category. According to Directive 2004/24/EC of the European Parliament, herbal medicines comprise herbs, herbal materials, herbal preparations and finished herbal products containing parts of plants or other plant materials as active ingredients. Unlike vitamin or mineral preparations, they are multi-component mixtures which may differ in the concentration of their constituents.

Food supplements and herbal medicines are obtained without prescription and are not, in most jurisdictions, subject to pre-market efficacy evaluation (Dwyer et al., 2018). Their regulatory status is correspondingly ambiguous: within the European Union the same botanical material may be marketed as a food supplement or registered as a traditional herbal medicinal product under Directive 2004/24/EC (2004), depending on its presentation and the claims made for it.

The use of dietary supplements and herbal products by patients with cancer is widespread (Asiimwe et al., 2021; Tank et al., 2021). A substantial proportion of patients do not disclose this use to their physician,

and because such products are obtained without prescription they are rarely documented in the medical record (Davis et al., 2012; Foley et al., 2019).

The motivations reported by patients are heterogeneous. Some take supplements to alleviate the adverse effects of treatment, others in the belief that doing so will strengthen immune function or reduce the likelihood of recurrence, and others still to maintain a sense of active participation at a point in illness when most therapeutic decisions are taken on their behalf (Tank et al., 2021).

The clinical significance of this gap has increased over the past decade. Systemic oncological treatment has shifted substantially towards orally administered targeted agents and tyrosine kinase inhibitors, the majority of which are metabolised by cytochrome P450 3A4 (Brokaar et al., 2025; Gandhi et al., 2025). Because these agents have a narrow therapeutic index and are taken daily and unsupervised over months, altered exposure may result either in avoidable toxicity or in loss of efficacy. Interactions between botanical preparations and anticancer agents have been reviewed comprehensively and recently (Gandhi et al., 2025).

The objective of this review is to summarise current scientific evidence on the use of dietary supplements and herbal products by patients receiving anticancer treatment. Specifically, it addresses the prevalence of such use, the pharmacological characteristics of interactions with anticancer agents, the extent to which use remains undisclosed to the treating team, and the patient- and clinician-related factors underlying non-disclosure.

2. Methodology

Database Search Strategy

A narrative literature review was conducted by searching databases such as MEDLINE (PubMed), supplemented by Google Scholar, for publications released between January 1, 2011, and July 1, 2026. Controlled vocabulary (MeSH) and free-text keywords related to dietary supplements, herbal medicine and oncological treatment were combined using Boolean operators: "Dietary Supplements", "Food Supplements", "Herbal Medicine", "Plant Preparations", "Complementary Therapies", "Complementary and Alternative Medicine", "Neoplasms", "Cancer", "Antineoplastic Agents", "Chemotherapy", "Herb-Drug Interactions", "Cytochrome P-450 CYP3A4", "Disclosure", "Non-disclosure", "Physician-Patient Relations" and "Communication".

Inclusion and Exclusion Criteria

Eligible sources included meta-analyses, systematic reviews, cross-sectional and cohort studies, pharmacokinetic studies, randomized controlled trials, as well as regulatory documents and clinical guidelines that: (I) reported the prevalence, patterns or determinants of dietary supplement and herbal product use among patients with cancer; (II) examined the pharmacological basis or clinical consequences of interactions between such preparations and anticancer agents; or (III) addressed disclosure of this use to healthcare professionals, including the perspectives of patients and clinicians. Regulatory and institutional documents defining food supplements and herbal medicinal products were retrieved directly from official sources. Articles published in languages other than English and abstracts without access to the full text were excluded from the review.

Study Selection and Data Extraction

Initial selection was conducted based on a review of titles and abstracts, followed by an assessment of the full texts of potentially relevant publications. Reference lists of relevant articles were screened for additional sources. The data review focused on the study design, characteristics of the study populations (including patients receiving systemic anticancer treatment, cancer survivors and general adult populations), the preparations examined, measured outcomes (prevalence of use, pharmacokinetic parameters, rates of disclosure) and their clinical significance.

3. Results

3.1. Terminology and prevalence of use

Much of the available data on this behaviour concerns not dietary supplements and herbal products as such but complementary and alternative medicine (CAM), an umbrella term for products and practices lying outside conventional medical care. Related terms — traditional medicine, integrative medicine, and the World Health Organization's traditional and complementary medicine — are used largely interchangeably, and no universally accepted definition exists (World Health Organization, 2019). The category typically encompasses herbal preparations, dietary supplements and other natural products alongside practices such as acupuncture, homeopathy, manual therapies and mind–body techniques, and what is regarded as conventional rather than complementary differs between countries and changes over time (Marsh et al., 2009; Quandt et al., 2009).

Among patients with cancer, use of complementary and alternative medicine is common worldwide. A meta-analysis of 152 surveys conducted in 18 countries, comprising more than 65,000 patients, estimated the combined prevalence of CAM use at 40%, with the highest figures reported in the United States and the lowest in Italy and the Netherlands (Horneber et al., 2012). A subsequent systematic review of 61 studies published between 2009 and 2018, involving 21,249 patients across a range of countries — among them Germany and Turkey — reported an average of 51% (Keene et al., 2019). A meta-analysis restricted to 14 Asian countries found a pooled prevalence of 49.3%, ranging across individual studies from 24.0% to 94.8% (Choi et al., 2024). In a Polish study of 864 hospitalised patients, 46.7% of those familiar with such methods reported having used CAM, most often natural products, herbs and vitamin preparations; the great majority used them alongside conventional treatment (Kasprzycka et al., 2022). A second Polish survey of 310 patients found that 24.1% acknowledged such use during active treatment (Puskulluoglu et al., 2021). The width of these ranges is itself informative. The authors of the largest meta-analysis noted that heterogeneity between studies was high and was in part attributable to differences in survey methodology rather than to differences between the populations studied (Horneber et al., 2012).

The demographic factors most consistently associated with CAM use are higher education, younger age and female sex (Keene et al., 2019; Poonthananiwatkul et al., 2015), and there are some therapy preferences that have been reported to be nation-specific (Kasprzycka et al., 2022).

Botanical products deserve separate attention, as they carry the greatest potential for interaction with anticancer treatment. The best available estimate derives from a systematic review and meta-analysis of 155 studies comprising 809,065 participants, which reported a pooled prevalence of herbal medicine use among patients with cancer of 22% (95% CI 18–25%). Prevalence reached 40% (95% CI 23–58%) in Africa and 28% (95% CI 21–35%) in Asia, and was consistently higher in low- and middle-income countries (32%, 95% CI 23–42%) than in high-income countries (17%, 95% CI 14–21%) (Asiimwe et al., 2021). Figures from individual European cohorts fall within a similar range, with herbal and botanical products reported by 12.6% of patients surveyed in Germany (Tank et al., 2021) and 32.5% of those using complementary medicine in a Polish study (Kasprzycka et al., 2022).

Dietary supplement use is substantially more frequent than the use of herbal preparations alone. In a nationally representative analysis of NHANES data covering 2003–2016, 70.4% of 2,772 cancer survivors reported using dietary supplements (Du et al., 2020). In a survey conducted at a comprehensive cancer centre in the United States, non-vitamin non-mineral supplements were taken during initial treatment by 49% of respondents, rising to 52% among those receiving chemotherapy; among these users, however, 18% took a herbal preparation, the subgroup the authors identified as carrying the greatest interaction risk (Luo & Asher, 2018). European figures are consistent with this pattern: 47.2% of patients in the German ambulatory survey cited above reported using supplements of any kind (Tank et al., 2021).

3.2. Herbal products: mechanisms and clinical relevance of interactions

Several features of botanical preparations make their interaction potential harder to assess than that of conventional medicines. They are multi-component mixtures whose composition varies with species, plant part, cultivation, extraction method and manufacturer, so that products sharing a name may differ appreciably in the concentration of the constituents responsible for a given effect. Where marketed as food supplements, they are generally not subject to evaluation of interaction potential before sale, and a single active substance can rarely be assigned to a single metabolic pathway (Dwyer et al., 2018).

Most documented interactions between botanical preparations and anticancer agents arise at the level of drug metabolism and transport rather than at the site of action. Three pathways account for the majority of reported effects: the cytochrome P450 enzyme system, the efflux transporter P-glycoprotein, and, less frequently, uridine diphosphate-glucuronosyltransferase (UGT) (Berretta et al., 2022). Of the cytochrome isoforms, CYP3A4 is the most consequential, since it participates in the metabolism of a substantial proportion of agents used in systemic oncological treatment. The direction of the effect determines its clinical consequence. Inhibition of CYP3A4 reduces clearance and increases exposure, with a corresponding risk of toxicity; induction accelerates metabolism and lowers exposure, potentially to subtherapeutic concentrations (Berretta et al., 2022; Gandhi et al., 2025).

St John's wort (*Hypericum perforatum*) illustrates the latter mechanism and is the botanical preparation for which such interactions have been examined directly in patients receiving anticancer treatment. In ten patients given intravenous docetaxel, fourteen days of supplementation reduced mean exposure to the drug by approximately 12% and increased its clearance ($P = 0.045$ for both) (Goey et al., 2014). The interaction is recognised at the regulatory level: St John's wort is a potent inducer of cytochrome P450 enzymes (most importantly CYP3A4) and P-glycoprotein (Nicolussi et al., 2020).

How often such interactions arise in practice is harder to establish. Estimates vary with the population examined and the threshold applied: among cancer patients using herbal supplements, a proportion approaching one in two has been described as at risk of a herb–drug interaction (Lam et al., 2022), whereas a study of 202 older adults receiving systemic anticancer therapy identified potentially relevant interactions in 4% of the cohort, half of which were judged clinically relevant on independent pharmacist assessment (Brokaar et al., 2025).

Not all effects are unfavourable. Some botanical preparations have been investigated for the management of treatment-related symptoms, though the evidence remains limited (Ryan et al., 2012), and naturally derived compounds have been examined as potential adjuncts to chemotherapy, though this work remains preclinical (Zhou et al., 2023).

3.3. Dietary supplements: antioxidant mechanisms and clinical relevance

The most common dietary supplements include magnesium, calcium, multivitamins and vitamin C (Du et al., 2020; Kasprzycka et al., 2022; Luo & Asher, 2018; Tank et al., 2021). Several of these act as antioxidants. Their main function is to prevent, delay or remove oxidative damage caused by reactive oxygen species (ROS) (Jomova et al., 2023). Reactive oxygen species are the target of a number of anticancer therapies: by increasing ROS production, these treatments lead, directly and indirectly, to apoptosis of tumour cells. Supplementation with antioxidants during treatment might therefore attenuate the intended effect at the same time as it reduces unintended toxicity.

Despite considerable research, no consensus has been reached regarding the potential benefit or harm of combining supplementation with anticancer treatment (Ambrosone et al., 2020; Limbrunner et al., 2025; Woldelessie & Tamene, 2024). Preparations taken without a medical indication and doses exceeding recommended should be avoided during active treatment (Wolf et al., 2022).

3.4. Patients' motivations and sources of information

Patients' motivation to use complementary and alternative medicine, including dietary supplements and herbal preparations, has been the subject of considerable research. Patients report that in doing so they will support their immune system (Kasprzycka et al., 2022; Tank et al., 2021), improve their quality of life (Gras et al., 2019; Kasprzycka et al., 2022; Tank et al., 2021), and manage the adverse effects of treatment (Berretta et al., 2017; Gras et al., 2019; Kasprzycka et al., 2022; Tank et al., 2021). Some seek in them a means of stopping cancer progression, while others use them as an adjunct to conventional treatment (Tank et al., 2021). Among Canadian patients using complementary and alternative medicine, 51.6% stated that they were simply trying to do "everything that might help" (Buckner et al., 2018).

Patients rarely obtain information about these preparations from the clinicians treating them. In a Jordanian study of 602 patients with cancer, 54% relied on social media, while only 11% consulted a healthcare professional (Al-Masri et al., 2025). Among 170 Moroccan women treated for breast cancer, 63.5% drew their information from their immediate circle and 38% from conversations with other patients; use was recommended by relatives or friends in 66.7% of cases (Baladi et al., 2024). A Polish study of 864 hospitalised patients found the same pattern, with information originating from the internet, friends, family and fellow patients rather than from a doctor (Kasprzycka et al., 2022). In a multicentre survey of patients receiving

immune checkpoint inhibitors, the most frequent sources were household members (37.5%), television (25%) and friends (25%) (Kus et al., 2024). In a survey conducted at a comprehensive cancer centre in the United States, 75% of patients who sought advice about supplements consulted professional sources, alongside 47% who used lay sources and 44% who used media, although the response rate of 34% probably favoured patients already engaged with their care (Luo & Asher, 2018).

3.5 The clinical encounter: perspectives of patient and physician

A substantial proportion of patients do not disclose their use of dietary supplements or herbal medicine to their physicians, with reported rates varying widely across studies. A systematic review of studies published up to 2012 found that between 20% and 77% of patients with cancer did not inform their treating physician about complementary medicine use (Davis et al., 2012). In a meta-analysis of clinical populations, only 33% of patients disclosed their use of biologically based preparations (Foley et al., 2019). The variation is partly geographical. In France, 33.5% of patients using complementary medicine discussed it with their oncologist (Gras et al., 2019), whereas in Italy most did so (Berretta et al., 2017).

The reasons patients offer for not disclosing recur consistently across studies and fall into three groups. The first concerns the perceived relevance of the information: patients frequently regard supplement use as unrelated to their conventional treatment (Levy et al., 2018). The second concerns the anticipated response: patients expect disapproval or indifference (Levy et al., 2018). The third is structural: patients do not raise the subject because of limited consultation time (Powell et al., 2002). Across all of these, however, one reason predominates. The most frequently cited explanation for non-disclosure is that the physician did not ask (Davis et al., 2012; Foley et al., 2019; Levy et al., 2018; Puskulluoglu et al., 2021; Roberts et al., 2005).

Clinicians have been reported not to raise the subject routinely (Lee et al., 2014). When asked why, they point to their own knowledge: in a national survey of Chinese oncologists, 75.6% were unwilling to raise the subject because they lacked the knowledge to do so, and only 22.0% had received any professional education on complementary medicine (Yang et al., 2017). Several factors contribute: the subject is absent from most medical curricula, the evidence base is fragmentary, and guidelines address few of the preparations patients actually take.

4. Discussion

The range of dietary supplements or herbal products available to patients continues to expand, as does the range of anticancer agents with which they may interact. Reported use of dietary supplements and herbal preparations during cancer treatment ranges from roughly 20% to nearly 50%, a spread driven as much by definition and method as by the populations studied (Asiimwe et al., 2021; Tank et al., 2021). A substantial proportion of patients do not disclose this fact to their physician (Davis et al., 2012; Foley et al., 2019). The reasons are varied: anticipated disapproval, a belief that the information is not relevant to treatment, the absence of any question from the clinician, or insufficient time within the consultation to raise the subject (Davis et al., 2012; Foley et al., 2019; Levy et al., 2018; Powell et al., 2002; Puskulluoglu et al., 2021; Roberts et al., 2005).

The situation presents clinicians with a significant difficulty. Assessing a given preparation requires knowledge of its pharmacological behaviour, and that knowledge must be kept current as new products enter the market. Databases allowing rapid verification of potential interactions exist (Ziemann et al., 2019), but their usefulness depends on continued maintenance. The clinician must then weigh benefit against risk for an individual patient. Oncologists state this plainly: surveys across different health systems find that a majority describe their own knowledge of complementary medicine as insufficient (Lee et al., 2014; Yang et al., 2017).

The consequences of undisclosed supplement use may affect not only treatment but also the doctor–patient relationship. In a multicentre cluster-randomised trial, oncology physicians who completed a blended-learning training programme reported significantly less distress in advising their patients about complementary and integrative medicine (Helmer et al., 2023). Two years later, patients whose oncologists had received the training still reported a better relationship with their doctor than patients in the control group. They were also less likely to have used complementary therapies without telling their oncologist (13.7% versus 24.0%) (Rogge et al., 2024).

Practical guidance for discussing CAM has also been developed. Schofield and colleagues proposed a structured approach to discussing complementary medicine in conventional oncology settings, beginning with an open and respectful invitation to disclose, seeking to understand what the patient hopes the preparation will

achieve, then reviewing the specific products in use, discussing their potential benefits and risks, allowing the patient to ask questions, and closing with an agreed plan (Schofield et al., 2010). To adapt this approach to everyday clinical practice, Witt and colleagues subsequently developed a consultation manual designed for a duration of approximately twenty minutes. Its content was derived from a literature review and from expert analysis by a multidisciplinary panel drawn from integrative oncology, psycho-oncology, medical ethics, communication, epidemiology and public health, and was refined through pilot testing by participating physicians (Witt et al., 2020).

5. Conclusions

Dietary supplements and herbal preparations are taken by a considerable proportion of patients during anticancer treatment, and much of this use is never mentioned to the treating team — despite established grounds for concern about interactions with agents of narrow therapeutic index.

Non-disclosure is better understood as a feature of the consultation than as a behaviour of the patient. The reason patients most often give for saying nothing is that they were not asked. The reason clinicians most often give for not asking is that they consider their own knowledge insufficient.

Two forms of intervention are needed to open a physician–patient dialogue on this matter. The first is educational: clinicians themselves report a need to strengthen their competence regarding the potential effects of dietary supplements and herbal products. The second concerns the consultation itself, where enquiry about such preparations should be routine and free of judgement. The aim is not to eliminate supplement use but to bring it within the consultation, where the balance of potential benefit and risk can be considered jointly rather than resolved by the patient alone.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

1. Al-Masri, M., Darwish, R., Safi, Y., Mustafa, A., Alzyoud, D., Almasri, M., Kahhaleh, B., & Khader, M. (2025). Herbal and alternative medicine use: A cross sectional study to evaluate the prevalence and predictors of use in cancer patients. *Frontiers in Pharmacology*, 16, 1535795. <https://doi.org/10.3389/fphar.2025.1535795>
2. Ambrosone, C. B., Zirpoli, G. R., Hutson, A. D., McCann, W. E., McCann, S. E., Barlow, W. E., Kelly, K. M., Cannioto, R., Sucheston-Campbell, L. E., Hershman, D. L., Unger, J. M., Moore, H. C. F., Stewart, J. A., Isaacs, C., Hobday, T. J., Salim, M., Hortobagyi, G. N., Gralow, J. R., Budd, G. T., & Albain, K. S. (2020). Dietary supplement use during chemotherapy and survival outcomes of patients with breast cancer enrolled in a cooperative group clinical trial (SWOG S0221). *Journal of Clinical Oncology*, 38(8), 804–814. <https://doi.org/10.1200/JCO.19.01203>
3. Asiimwe, J. B., Nagendrappa, P. B., Atukunda, E. C., Kamatenesi, M. M., Nambozi, G., Tolo, C. U., Ogwang, P. E., & Sarki, A. M. (2021). Prevalence of the use of herbal medicines among patients with cancer: A systematic review and meta-analysis. *Evidence-Based Complementary and Alternative Medicine*, 2021, 1–18. <https://doi.org/10.1155/2021/9963038>
4. Baladi, A., El Fadli, M., Tafenzi, H. A., El Bouaouidi, K., Benhima, N., Afani, L., Essâdi, I., & Belbaraka, R. (2024). Prevalence and associated factors of herbal medicine use among breast cancer patients: A cross-sectional study in Morocco. *Ecancermedicalscience*, 18. <https://doi.org/10.3332/ecancer.2024.1786>
5. Berretta, M., Dal Lago, L., Tinazzi, M., Ronchi, A., La Rocca, G., Montella, L., Di Francia, R., Facchini, B. A., Bignucolo, A., & Montopoli, M. (2022). Evaluation of concomitant use of anticancer drugs and herbal products: From interactions to synergic activity. *Cancers*, 14(21), 5203. <https://doi.org/10.3390/cancers14215203>
6. Berretta, M., Pepa, C. D., Tralongo, P., Fulvi, A., Martellotta, F., Lleshi, A., Nasti, G., Fisichella, R., Romano, C., De Divitiis, C., Taibi, R., Fiorica, F., Di Francia, R., Di Mari, A., Del Pup, L., Crispo, A., De Paoli, P., Santorelli, A., Quagliariello, V., ... Facchini, G. (2017). Use of complementary and alternative medicine (CAM) in cancer patients: An Italian multicenter survey. *Oncotarget*, 8(15), 24401–24414. <https://doi.org/10.18632/oncotarget.14224>
7. Brokaar, E. J., Van Den Bos, F., Portielje, J. E. A., & Visser, L. E. (2025). The prevalence of clinically relevant herb-drug interactions between herbal products and anti-cancer therapy in older adults with cancer – A cross-sectional study. *Exploratory Research in Clinical and Social Pharmacy*, 18, 100585. <https://doi.org/10.1016/j.rcsop.2025.100585>

8. Buckner, C. A., Lafrenie, R. M., Dénonmée, J. A., Caswell, J. M., & Want, D. A. (2018). Complementary and alternative medicine use in patients before and after a cancer diagnosis. *Current Oncology*, 25(4), 275–281. <https://doi.org/10.3747/co.25.3884>
9. Choi, S., Karki Kunwor, S., Im, H., Choi, D., Hwang, J., Ahmed, M., & Han, D. (2024). Traditional and complementary medicine use among cancer patients in Asian countries: A systematic review and meta-analysis. *Cancers*, 16(18), 3130. <https://doi.org/10.3390/cancers16183130>
10. Cowan, A. E., Jun, S., Gahche, J. J., Tooze, J. A., Dwyer, J. T., Eicher-Miller, H. A., Bhadra, A., Guenther, P. M., Potischman, N., Dodd, K. W., & Bailey, R. L. (2018). Dietary supplement use differs by socioeconomic and health-related characteristics among U.S. adults, NHANES 2011–2014. *Nutrients*, 10(8), 1114. <https://doi.org/10.3390/nu10081114>
11. Davis, E. L., Oh, B., Butow, P. N., Mullan, B. A., & Clarke, S. (2012). Cancer patient disclosure and patient-doctor communication of complementary and alternative medicine use: A systematic review. *The Oncologist*, 17(11), 1475–1481. <https://doi.org/10.1634/theoncologist.2012-0223>
12. Directive 2002/46/EC of the European Parliament and of the Council of 10 June 2002 on the Approximation of the Laws of the Member States Relating to Food Supplements (Consolidated Version of 26 November 2025), Official Journal of the European Communities, 51 (2025). <https://eur-lex.europa.eu/eli/dir/2002/46/2025-11-26>
13. Directive 2004/24/EC of the European Parliament and of the Council of 31 March 2004 Amending, as Regards Traditional Herbal Medicinal Products, Directive 2001/83/EC on the Community Code Relating to Medicinal Products for Human Use., Official Journal of the European Union, 85 (2004). <http://data.europa.eu/eli/dir/2004/24/oj>
14. Du, M., Luo, H., Blumberg, J. B., Rogers, G., Chen, F., Ruan, M., Shan, Z., Biever, E., & Zhang, F. F. (2020). Dietary supplement use among adult cancer survivors in the United States. *The Journal of Nutrition*, 150(6), 1499–1508. <https://doi.org/10.1093/jn/nxaa040>
15. Dwyer, J., Coates, P., & Smith, M. (2018). Dietary supplements: Regulatory challenges and research resources. *Nutrients*, 10(1), 41. <https://doi.org/10.3390/nu10010041>
16. Foley, H., Steel, A., Cramer, H., Wardle, J., & Adams, J. (2019). Disclosure of complementary medicine use to medical providers: A systematic review and meta-analysis. *Scientific Reports*, 9(1), 1573. <https://doi.org/10.1038/s41598-018-38279-8>
17. Gandhi, A., Master, S., & Bhise, V. (2025). When nature meets oncology: Unraveling herb–drug interactions in cancer therapy. *International Journal of Molecular Sciences*, 26(21), 10494. <https://doi.org/10.3390/ijms262110494>
18. Goey, A. K. L., Meijerman, I., Rosing, H., Marchetti, S., Mergui-Roelvink, M., Keessen, M., Burgers, J. A., Beijnen, J. H., & Schellens, J. H. M. (2014). The effect of St John’s wort on the pharmacokinetics of docetaxel. *Clinical Pharmacokinetics*, 53(1), 103–110. <https://doi.org/10.1007/s40262-013-0102-5>
19. Gras, M., Vallard, A., Brosse, C., Beneton, A., Sotton, S., Guyotat, D., Fournel, P., Daguenet, E., Magné, N., & Morisson, S. (2019). Use of complementary and alternative medicines among cancer patients: A single-center study. *Oncology*, 97(1), 18–25. <https://doi.org/10.1159/000499629>
20. Helmer, S. M., Rogge, A. A., King, R., Canella, C., Pach, D., & Witt, C. M. (2023). Effects of blended learning training for oncology physicians to advise their patients about complementary and integrative therapies: Results from the multicenter cluster-randomized KOKON-KTO trial. *BMC Cancer*, 23(1), 836. <https://doi.org/10.1186/s12885-023-11348-6>
21. Horneber, M., Bueschel, G., Dennert, G., Less, D., Ritter, E., & Zwahlen, M. (2012). How many cancer patients use complementary and alternative medicine: A systematic review and metaanalysis. *Integrative Cancer Therapies*, 11(3), 187–203. <https://doi.org/10.1177/1534735411423920>
22. Howiecka, K., Maślej, M., Czajka, M., Pawłowski, A., Więckowski, P., Styk, T., Gołkiewicz, M., Kuzdrański, A., & Koch, W. (2022). Lifestyle, eating habits, and health behaviors among dietary supplement users in three European countries. *Frontiers in Public Health*, 10, 892233. <https://doi.org/10.3389/fpubh.2022.892233>
23. Jomova, K., Raptova, R., Alomar, S. Y., Alwasel, S. H., Nepovimova, E., Kuca, K., & Valko, M. (2023). Reactive oxygen species, toxicity, oxidative stress, and antioxidants: Chronic diseases and aging. *Archives of Toxicology*, 97(10), 2499–2574. <https://doi.org/10.1007/s00204-023-03562-9>
24. Kasprzycka, K., Kurzawa, M., Kucharz, M., Godawska, M., Oleksa, M., Stawowy, M., Slupinska-Borowka, K., Sznek, W., Gisterek, I., Boratyn-Nowicka, A., Rucinska, M., Osowiecka, K., & Nawrocki, S. (2022). Complementary and alternative medicine use in hospitalized cancer patients—study from Silesia, Poland. *International Journal of Environmental Research and Public Health*, 19(3), 1600. <https://doi.org/10.3390/ijerph19031600>
25. Keene, M. R., Heslop, I. M., Sabesan, S. S., & Glass, B. D. (2019). Complementary and alternative medicine use in cancer: A systematic review. *Complementary Therapies in Clinical Practice*, 35, 33–47. <https://doi.org/10.1016/j.ctcp.2019.01.004>

26. Kus, F., Can Guven, D., Yildirim, H. C., Akagunduz, B., Karakaya, S., Sutcuoglu, O., Chalabiyev, E., Akyildiz, A., Koksall, B., Sahin, Y. B., Karaca, E., Kavruk, O. A., Zor, N. T., Sirvan, F., Yazici, O., & Yalcin, S. (2024). The use of herbal medicine and dietary supplements in cancer patients receiving immune checkpoint inhibitors: A multicenter cross-sectional study. *Integrative Cancer Therapies*, 23, 15347354241280273. <https://doi.org/10.1177/15347354241280273>
27. Lam, C. S., Koon, H. K., Ma, C. T., Au, K. Y., Zuo, Z., Chung, V. C.-H., & Cheung, Y. T. (2022). Real-world data on herb-drug interactions in oncology: A scoping review of pharmacoepidemiological studies. *Phytomedicine*, 103, 154247. <https://doi.org/10.1016/j.phymed.2022.154247>
28. Lee, R. T., Barbo, A., Lopez, G., Melhem-Bertrandt, A., Lin, H., Olopade, O. I., & Curlin, F. A. (2014). National survey of US oncologists' knowledge, attitudes, and practice patterns regarding herb and supplement use by patients with cancer. *Journal of Clinical Oncology*, 32(36), 4095–4101. <https://doi.org/10.1200/JCO.2014.55.8676>
29. Levy, A. G., Scherer, A. M., Zikmund-Fisher, B. J., Larkin, K., Barnes, G. D., & Fagerlin, A. (2018). Prevalence of and factors associated with patient nondisclosure of medically relevant information to clinicians. *JAMA Network Open*, 1(7), e185293. <https://doi.org/10.1001/jamanetworkopen.2018.5293>
30. Limbrunner, J., Doerfler, J., Pietschmann, K., Buentzel, J., Scharpenberg, M., & Huebner, J. (2025). The influence of antioxidant supplementation on adverse effects and tumor interaction during radiotherapy: A systematic review. *Clinical and Experimental Medicine*, 25(1), 258. <https://doi.org/10.1007/s10238-025-01804-x>
31. Luo, Q., & Asher, G. N. (2018). Use of dietary supplements at a comprehensive cancer center. *The Journal of Alternative and Complementary Medicine*, 24(9–10), 981–987. <https://doi.org/10.1089/acm.2018.0183>
32. Marsh, J., Hager, C., Havey, T., Sprague, S., Bhandari, M., & Bryant, D. (2009). Use of alternative medicines by patients with OA that adversely interact with commonly prescribed medications. *Clinical Orthopaedics & Related Research*, 467(10), 2705–2722. <https://doi.org/10.1007/s11999-009-0764-3>
33. Nicolussi, S., Drewe, J., Butterweck, V., & Meyer Zu Schwabedissen, H. E. (2020). Clinical relevance of St. John's wort drug interactions revisited. *British Journal of Pharmacology*, 177(6), 1212–1226. <https://doi.org/10.1111/bph.14936>
34. Organisation mondiale de la santé (Ed.). (2019). *WHO global report on traditional and complementary medicine, 2019*. World Health Organization.
35. Papatesta, E. M., Kanellou, A., Peppas, E., & Trichopoulou, A. (2023). Is dietary (food) supplement intake reported in European national nutrition surveys? *Nutrients*, 15(24), 5090. <https://doi.org/10.3390/nu15245090>
36. Poonthananiwatkul, B., Howard, R. L., Williamson, E. M., & Lim, R. H. M. (2015). Cancer patients taking herbal medicines: A review of clinical purposes, associated factors, and perceptions of benefit or harm. *Journal of Ethnopharmacology*, 175, 58–66. <https://doi.org/10.1016/j.jep.2015.08.052>
37. Powell, C. B., Dibble, S. L., Dall'Era, J. E., & Cohen, I. (2002). Use of herbs in women diagnosed with ovarian cancer. *International Journal of Gynecological Cancer*, 12(2), 214–217. <https://doi.org/10.1136/ijgc-00009577-200203000-00013>
38. Puskulluoglu, M., Uchańska, B., Tomaszewski, K. A., Zygulska, A. L., Zielińska, P., & Grela-Wojewoda, A. (2021). Use of complementary and alternative medicine among Polish cancer patients. *Nowotwory. Journal of Oncology*, 71(5), 274–281. <https://doi.org/10.5603/NJO.a2021.0051>
39. Quandt, S. A., Verhoef, M. J., Arcury, T. A., Lewith, G. T., Steinsbekk, A., Kristoffersen, A. E., Wahner-Roedler, D. L., & Fønnebo, V. (2009). Development of an international questionnaire to measure use of complementary and alternative medicine (I-CAM-Q). *The Journal of Alternative and Complementary Medicine*, 15(4), 331–339. <https://doi.org/10.1089/acm.2008.0521>
40. Roberts, C. S., Baker, F., Hann, D., Runfola, J., Witt, C., McDonald, J., Livingston, M. L., Ruiterman, J., Ampela, R., Kaw, O. C., & Blanchard, C. (2005). Patient-physician communication regarding use of complementary therapies during cancer treatment. *Journal of Psychosocial Oncology*, 23(4), 35–60. https://doi.org/10.1300/J077v23n04_03
41. Rogge, A. A., Helmer, S. M., Icke, K., & Witt, C. M. (2024). Effects of training oncology physicians advising patients on complementary and integrative therapies on patient-reported outcomes: 2-year follow-up of the multi-center, cluster-randomized KOKON-KTO study. *Cancer Medicine*, 13(14), e70008. <https://doi.org/10.1002/cam4.70008>
42. Ryan, J. L., Heckler, C. E., Roscoe, J. A., Dakhil, S. R., Kirshner, J., Flynn, P. J., Hickok, J. T., & Morrow, G. R. (2012). Ginger (Zingiber officinale) reduces acute chemotherapy-induced nausea: A URCC CCOP study of 576 patients. *Supportive Care in Cancer*, 20(7), 1479–1489. <https://doi.org/10.1007/s00520-011-1236-3>
43. Schofield, P., Diggins, J., Charleson, C., Marigliani, R., & Jefford, M. (2010). Effectively discussing complementary and alternative medicine in a conventional oncology setting: Communication recommendations for clinicians. *Patient Education and Counseling*, 79(2), 143–151. <https://doi.org/10.1016/j.pec.2009.07.038>

44. Tank, M., Franz, K., Cereda, E., & Norman, K. (2021). Dietary supplement use in ambulatory cancer patients: A survey on prevalence, motivation and attitudes. *Journal of Cancer Research and Clinical Oncology*, 147(7), 1917–1925. <https://doi.org/10.1007/s00432-021-03594-7>
45. Witt, C. M., Helmer, S. M., Schofield, P., Wastell, M., Canella, C., Thomae, A. V., & Rogge, A. A. (2020). Training oncology physicians to advise their patients on complementary and integrative medicine: An implementation study for a manual-guided consultation. *Cancer*, 126(13), 3031–3041. <https://doi.org/10.1002/cncr.32823>
46. Woldeselassie, M., & Tamene, A. (2024). Therapeutic controversies over use of antioxidant supplements during cancer treatment: A scoping review. *Frontiers in Nutrition*, 11, 1480780. <https://doi.org/10.3389/fnut.2024.1480780>
47. Wolf, C. P. J. G., Rachow, T., Ernst, T., Hochhaus, A., Zomorodbakhsch, B., Foller, S., Rengsberger, M., Hartmann, M., & Huebner, J. (2022). Complementary and alternative medicine (CAM) supplements in cancer outpatients: Analyses of usage and of interaction risks with cancer treatment. *Journal of Cancer Research and Clinical Oncology*, 148(5), 1123–1135. <https://doi.org/10.1007/s00432-021-03675-7>
48. Yang, G., Lee, R., Zhang, H., Gu, W., Yang, P., & Ling, C. (2017). National survey of China's oncologists' knowledge, attitudes, and clinical practice patterns on complementary and alternative medicine. *Oncotarget*, 8(8), 13440–13449. <https://doi.org/10.18632/oncotarget.14560>
49. Zhou, H., Zhang, M., Cao, H., Du, X., Zhang, X., Wang, J., & Bi, X. (2023). Research progress on the synergistic anti-tumor effect of natural anti-tumor components of Chinese herbal medicine combined with chemotherapy drugs. *Pharmaceuticals*, 16(12), 1734. <https://doi.org/10.3390/ph16121734>
50. Ziemann, J., Lendeckel, A., Müller, S., Horneber, M., & Ritter, C. A. (2019). Herb-drug interactions: A novel algorithm-assisted information system for pharmacokinetic drug interactions with herbal supplements in cancer treatment. *European Journal of Clinical Pharmacology*, 75(9), 1237–1248. <https://doi.org/10.1007/s00228-019-02700-s>