Review

Counseling Patients on Cancer Diets: A Review of the Literature and Recommendations for Clinical Practice

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Abstract. *Background: Many cancer patients use cancer diets. Materials and Methods: We listed 13 cancer diets simulating an internet search for which we systematically reviewed clinical data. In the next step we derived recommendations on counseling patients using a Delphi process. Results: We evaluated the following diets: raw vegetables and fruits, alkaline diet, macrobiotics, Gerson's regime, Budwig's and low carbohydrate or ketogenic diet. We did not find clinical evidence supporting any of the diets. Furthermore, case reports and pre-clinical data point to the potential harm of some of these diets. From published recommendations on counseling on complementary and alternative medicine, we were able to derive 14 recommendations for counseling on cancer diets. Conclusion: Considering the lack of evidence of benefits from cancer diets and potential harm by malnutrition, oncologists should engage more in counseling cancer patients on such diets. Our recommendations could be helpful in this process.*

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Many patients with cancer use certain complementary and alternative medicine (CAM). International data shows that the user rate is approximately 50% (1).

The types of CAM methods preferred by patients are very similar in different surveys. Biological-based methods are most often used in Western countries. In this context, diets and nutritional supplements are most often listed (1, 2). This is understandable as patients often believe pollutants from the environment and an impaired immune system are causes of cancer (3). Accordingly, patients search for means to strengthen their immune system and detoxify the body. Intuitively, changes in diet and consumption of supplements are the easiest way to add apparently lacking substances. However, the effects of pollutants may be counteracted by adding *e.g.* antioxidants or alkaline substances which adjust acidity. In a review of international CAM use data in patients with gynecological cancer, Eschiti and colleagues noted that 75% of patients followed a special diet, used supplements, or both (4).

Even for scientists and clinicians, the question of whether and how nutrition may influence cancer risk and prognosis is controversial as the available data are highly complex [see *e.g.* the report of the World Cancer Research Fund (5)].

Patients searching for information on what they can additionally do to fight their disease mostly rely on family, friends and the media. Non-disclosure of the use od CAM, especially of diets, supplements and herbs, to the oncologist is frequent (6). One reason for this is, that patients are convinced, the oncologist does not have sufficient knowledge on CAM. Furthermore, others are certain that the oncologist does not need the information, and in many cases, the oncologist simply

does not ask (6). Only a minority of therapists in oncology feel proficiently-qualified to communicate with patients on CAM (7), since nutrition, diets, and in particular cancer diets, are not part of curricula for medical students or young physicians specializing in oncology in Germany and other countries. Moreover, a lack of evidence from epidemiological and clinical data makes this field even more doubtful for clinicians who are trained in evidence-based medicine. Patients looking for diet information may be disappointed by answers that do not give a precise prescription on what to eat and what to avoid.

Diets have had special meaning with respect to culture and religion. Diets define rules and promise health, not only for the body but also in the mental and social context. Many are not based on scientific findings [*e.g.* food faddism (8)]. The goal of our article is to provide information about cancer diets to physicians and other caregivers and to provide recommendations on how to discuss cancer diets with patients in order to support evidence-based shared decision-making.

Materials and Methods

In order to provide information on cancer diets and how to discuss these diets with patients we did the following: established a list of the most often used and quoted cancer diets in the Western world; systematically collected the available clinical data on these diets, analyzed and evaluated the information; researched the evidence on counseling cancer patients on CAM.

Resulting from this work, we propose a list of recommendations on how to counsel and inform patients on cancer diets.

List of cancer diets. To derive a list of the most important cancer diets we combined several approaches: Simulation of a patient searching the internet with the term “cancer diet” in four search engines (Google from different countries: Germany, France; USA, Canada in the respective native language). As we have focused on dealing with patients from Western cultures, we elected to use the search engine Google from two European countries and two North American countries for this article. We reviewed the first 100 website hits for types of cancer diet mentioned. This search was carried out on July 10, 2012.

Collection and evaluation of clinical data on these diets. The description of every diet is derived from original publications of the creator and descriptions on the internet as observed during our Google search. For every diet, we performed a systematic Medline search (on August 20, 2012) focusing on clinical data.

In order to assess all publications we used a systematic approach. Starting with the MeSH-term “diet”, we used MeSH terminology in order to search for data on the following: "Diet, Carbohydrate-Restricted", "Diet, Vegetarian", “Fasting”, "Ketogenic Diet", "Diet, Macrobiotic".

The terms "Diet, Carbohydrate-Restricted" and "Ketogenic Diet" were combined in one search by “OR”. This first list of hits was specified by restriction to cancer (“AND” “neoplasm”), and additionally using filters to focus on clinical data (Filters: Humans; Clinical Trial; Meta-Analysis; Randomized Controlled Trial; Review).

For those diets which could not be assessed using MeSH terms (alkaline diet, Bircher-Benner diet, Breuss cure, Budwig diet, Gerson diet, Kelley/Gonzalez Regimen, Livingston-Wheeler Regimen, Moermann diet, raw food diet, vegan diet), we used the most common names in order to build the search.

We assessed each article by title and abstract, if it referred to the respective diet. The full text of all articles describing a diet were analyzed in full text for clinical data and endpoints. We reviewed articles from the literature lists and expanded our search until no further articles were found.

In order to derive recommendations, we distinguished positive recommendations for something from negative ones against something. Following scientific practice *e.g.* with herbs, controlled, if possible randomized clinical studies are mandatory as scientific evidence for the efficacy of a diet and the basis of a positive recommendation. Risks may be derived from case reports and even preclinical data. Therefore we additionally screened all publications selected focusing on safety aspects.

Evidence on counseling patients on CAM. Cancer diets are part of the overall concept of CAM. Patients use cancer diets for the same reasons as other CAM strategies. Thus, effectively discussing these diets with patients should follow the same strategy as for discussing CAM in general. In 2010, Schofield and colleagues (9) published a systematic review on discussing CAM with cancer patients. They derived a list of 10 recommendations for clinicians. An expert team of the working group Prevention and Integrative Oncology of the German Cancer Society has adapted these recommendations to the setting of institutional CAM counseling (10). These rules describe the whole process from preparation to final report and follow-up.

Schofield *et al.*’s recommendations are highly effective. Thus, we decided to use them for our counseling recommendations on cancer diets. We performed an update of Shofield at al.’s findings by a Medline search following the same search strategy [(cancer OR neoplasm) AND (physician–patient relations OR doctor–patient communication) AND (CAM OR complementary and alternative medicine OR complementary therapies OR alternative therapies OR unproven therapies)].

List of recommendations. We formed a new team of experts from the field of nutrition in cancer and from the field of CAM. Members of this team, leading experts on CAM in the German Cancer Society and the German Society for Radiooncology, were the core group that had formerly worked on the adaptations from Schofield *et al*. This new group agreed on a set of recommendations for counseling on cancer diets. The final agreement was made up by a Delphi Process (see Figure 1).

Results

Cancer diets. The results of the simulated search with the term “cancer diet” by country are provided in Table I.

Further results included multiple hits from the same sites from different addresses. We excluded sites discussing nutrition in cancer or supplements and plant extracts and other methods such as vitamin B17 (bitter almonds or seeds from apricots) and Essiac (a tea composition). Some diets like Anemüller-Ries or Kuhl were only mentioned in review articles without recommendation, and therefore were not considered in this review.

In the scientific search, we decided to include diets that are relevant in more than one country (Table I).

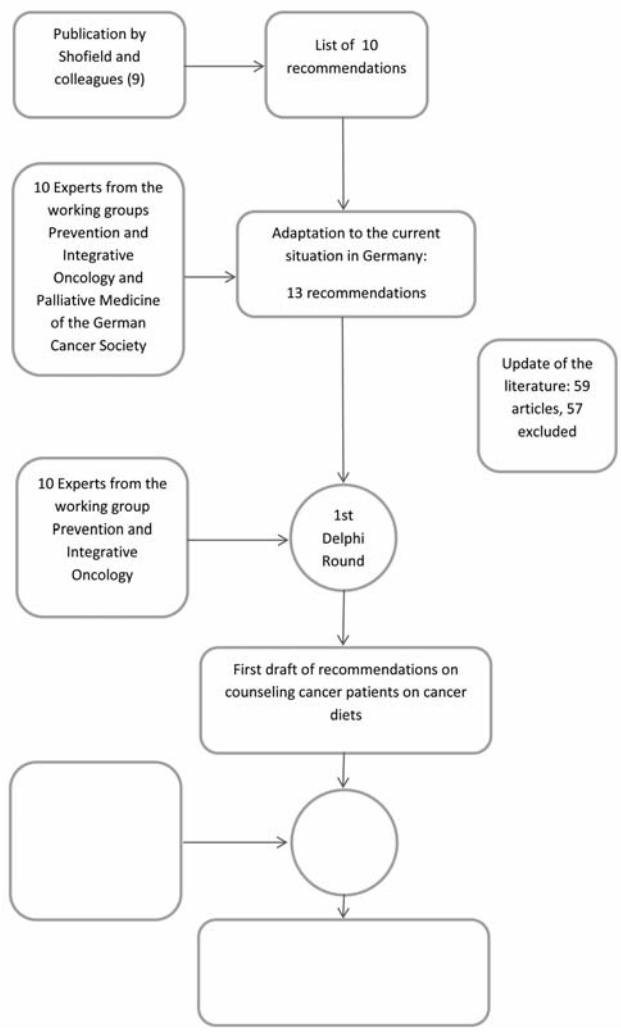

Figure 1. *Process of developing the recommendations on counseling cancer patients on cancer diets.*

Table I. *Hits for "cancer diet" in online searches via Google.*

Cancer diet	Google Germany	Google UK	Google USA	Google Canada	Total number of hits
Breuß' cancer cure	4	0	0	0	4
Budwig's diet	12	6	3	6	27
Low carb diet	17	1	1	4	23
Macrobiotics	2	2	3	1	8
Gerson's regime	4	5	4	4	17
Alkaline diet	3	1	4	0	8
Raw cost	3	4	2	4	13
Fasting	2	0	0	0	2
Bircher-Benner diet	1	0	0	0	1
Livingston-Wheeler Regimen	0	0	1	0	1
Kelley/Gonzalez Regimen	0	0	1	1	2
Vegan diet	0	0	1	0	1
Moermann diet	1	1	1	1	4

Clinical data on cancer diets. The results of the Medline search for clinical studies are presented in Table II, which gives an overview on all 13 diets identified. For the following diets clinical data have been published:

Gerson's regimen. The diet has been combined with various other approaches to stimulate metabolism as raw liver extract, pancreatic and thyroid extracts or Lugol's solution containing iodine. Infusions of potassium, glucose and insulin are also described in recent reports (11, 12). According to the advocates, treatment should be continued for months or years until cure is achieved (12).

Neither Gerson (13, 14) nor Cope (15) present scientific data on the alleged cure of cancer. Hildenbrandt *et al*. (16) from the Gerson Research Organization published a retrospective comparison of survival of patients with melanoma. Yet, this comparison was made with different control groups and the authors did not adhere to a single classification of tumor staging. Thus, no conclusion regarding the efficacy of the regimen is possible.

Lechner and Kronberger (17) describe 18 matched pairs of one patient with different types of cancer and a control person. Patients with Gerson's therapy had a better survival. However, from the publication, we cannot derive whether the matches were truly comparable regarding disease and treatment.

Molassiotis and Peat (18) analyzed six case reports. In one, long-term survival is described in a patient with melanoma, which could be one of the seldom but scientifically acknowledged spontaneous resolutions for this type of cancer. In all other cases, conventional therapy was administered and one patient died.

In 1990, the National Cancer Institute (NCI) in the USA initiated an expert panel to scrutinize case reports either selected by the proponents of the therapy or published in Gerson's book (13). None of these examinations found a proof of the efficacy of the diet (19).

Gonzalez regimen. The diet is similar to that of the Gerson regimen. Gonzalez and Isaacs reported on 11 patients in 1999, nine (81%) survived one year, five (45%) survived two years, and four survived three years (21). In a controlled trial, patients with advanced pancreatic cancer were allowed to choose treatment with either gemcitabine or pancreatic enzymes. The enzyme treatment included orally-ingested proteolytic enzymes, nutritional supplements, de-toxification, and an organic diet. The median survival in the experimental group was 4.3 months, in the control group 14 months. The quality of life ratings were significantly better in the chemotherapy group compared to the enzyme-treated group (22).

Table II. *Overview on cancer diets*.

Diet	Term	Number of articles found in Medline	Number of articles found after restriction	Number of articles on clinical to cancer and [a]	Features of the diet trials	Concept of the diet	Clinical data published	Benefits for cancer patients	Risks for cancer patients
Alkaline diet	Alkaline diet	2,993	13	0	Diet with vegetables and low-sugar fruits, avoidance of sugar, grains, dairy and meat	Acidosis is the reason for diseases such as cancer	None	-	-
Bircher-Benner diet	Bircher-Benner diet	0	0	0	Diet with fruit, vegetables and nuts; spartan physical discipline; gardening work	Sun as source of all energy; This energy is provided by nutrients and work in sunlight	None	No benefit proven for cancer patients, as vegetarian diet possibly beneficial	-
Breuss cure	Breuss diet OR Breuss cure	1	0	0	Living on vegetable tea juice and only for at least 42 days (38)	Aim is to starve the tumor	None	-	Malnutrition and weight loss; patients are advised to refute any conventional therapy during the Breuss cure
Budwig diet	Budwig diet OR protein-oil diet	3	0	0	Omega-3-fatty acids and proteins with high content of sulphur from curd cheese and linseed oil (39)	Cancer arises from an abundance of trans-fatty acids and a deficit in omega-3 and -6 fatty acids	None	As additional serving Budwig's curd cheese consisting of curd cheese and linseed oil offers additional caloric intake to patients loosing weight	Following the strict diet: deficiency in vitamins and other micronutrients
Fasting	Fasting	3803	14	0	Abstenence from nutrients for a period of time	Cancer can be starved	None	-	Malnutrition and weight loss
Gerson regimen	Gerson diet OR Gerson regimen OR coffee enema	91	24	0	To increase potassium, patients should consume juice of at least 10 kg of fruits and vegetable per day. Fat should be avoided. Proteins from animals are only allowed n small quantities. Three to four coffee enemas given every day as cleansing procedure	Cancer arises from a misbalance between potassium and sodium	Hildenbrandt (16) Lechner and Kronberger (17) Molassiotis and Peat (18) (see text)	-	Case reports: Death or sepsis and coma from hyponatremia as well as hyperkalemia (11, 12)

Table II. *Continued*

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Diet	Term	Number of articles found in Medline	Number of articles found after restriction	Number of articles on clinical to cancer and [a]	Features of the diet trials	Concept of the diet	Clinical data published	Benefits for cancer patients	Risks for cancer patients
Kelley/ Gonzalez Regimen	Gonzalez regimen OR Kelley regimen OR pancreatic enzymes	0	322	2	Combination of freeze-dried pancreatic enzymes, vitamins, minerals coffee enemas	Cancer is caused by toxins from the environment	Gonzalez (21) Chabot (22)	-	Meteorism flu-like symptoms low-grade fever muscle aches skin rashes misbalance of electrolytes
Ketogenic Diet	"Diet, Carbo-hydrate-Restricted" [MeSH] OR "Ketogenic Diet"[MeSH]	419	13	0	No refined carbohydrates, reduction of carbohydrates, caloric intake mainly by fat (omega-3 and -6 fatty acids) and proteins; aim: rising ketone level	Diet is based on the Warburg effect which describes that cancer cells gain energy preferably by anaerobe glycolysis; reducing carbohydrates shall stop growth of cancer cells	Schmidt (23) Chu-Shore (24) Nebeling (25)	-	Deficiency in micronutrients loss of appetite nausea constipation loss of weight hypoglycemia hyperlipidemia dehydration metabolic acidosis fatigue sedation (27)
Livingston-Wheeler Regimen	"Livingston-Wheeler regimen" OR "Livingston regimen" OR "Progenitor Cryptocides"	0	0	0	Autogenous vaccine from bacteria derived from body fluids gamma globulin, BCG antibiotics diet with low sodium fruits and vegetables	Cancer is caused by a bacterium (*Progenitor cryptocides*) which Ms Livingston thought to have discovered in patients.	None	-	Injections may lead to immunological reactions
Macro-biotic diet	Macrobiotic diet [MeSH]	46	9	0	Cereals are the most important part of nutrition; modern versions of the macrobiotic diet comprise of 50 to 60% cereals and 20 to 30% vegetables, small amounts of fish and eggs; meat, milk products, sugar, potatoes and tomatoes are discouraged (33).	Cancer arises from a misbalance between yin and yang	Carter (34) US Congress (35) Sherlock (36) Bowman (37) Lindner (38) Dwyer (39)	-	Under strict diet several deaths have been reported; loss of weight deficiencies in proteins, vitamin B12, C, D, zinc, calcium and iron; anemia and scorbut (35, 36, 37, 38)
Moermann diet	Moermann diet	0	0	0	Lactovegetarian diet; vitamins A, B, C,D, E, iodine, sulfur, iron, selenium;citric acid no meat, fish, white flour,	Chronic deficiency of eight essential substances leads to metabolic	None	-	Misbalance of micronutrients

Table II. *Continued*

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Diet	Term	Number of articles found in Medline	Number of articles found after restriction	Number of articles on clinical to cancer and [a]	Features of the diet trials	Concept of the diet	Clinical data published	Benefits for cancer patients	Risks for cancer patients
					Animal fats, beans, peas, lentils, mushrooms, potatoes, sugar, salt, margerine and other hydrogenated oils, coffee, caffeine, egg whites, alcohol, tobacco	Disturbances and alkalosis; microorganisms (symbionts) transform healthy cells into cancer cells; diet will rob the symbionts of their growth medium			
Raw food	Raw food	10,883	45	0[b]	Consumption of uncooked (mostly also unprocessed) food	Cooked food leads to diseases as cancer	None	Avoidance of preservation of food by salting or toxins created by cooking (*e.g.* hetero-cyclic amins)	Less tolerance of raw food in case of mucositis during cancer therapy or in patients with stoma; higher risk of (gastrointestinal) infections[c]
Vegan diet	Vegan diet	650	124	1[d]	Complete avoidance of animal products	Strict vegetarian diet, often ethical considerations	Ornish (42)	High delivery of dietary fibre, vitamin C, vitamin E, folic acid, magnesium; low amount of saturated fat	Weight loss deficiency in vitamin B12, D, calcium, zinc

[a]filter: AND "neoplasm [MeSH]" Filter:Humans, Clinical Trial, Review, Case Reports, Comparative Study; [b]Several clinical studies on primary cancer prevention were excluded; [c]In patients with stable immune system, risk of infection is low if meals are selected and prepared carefully; [d]Several publications on primary prevention or only reporting laboratory data (*e.g.* level of phytoestrogenes or carotenoids) without clinical data were excluded.

Low carbohydrate diet and ketogenic diet. Different forms of this diet exist, some with a moderate reduction of carbohydrates some with a reduction to about 10% of total energy intake with the aim of inducing ketosis. Schmidt *et al*. (23) published a pilot study on 16 patients with advanced cancer, on a diet with a maximum of 70 g carbohydrates per day, for an intended eight weeks. Two patients died, three did not accept the diet and three had progressive disease. Quality of life was assessed in five patients who finished the study. Emotional function and sleep quality was better while other parameters remained stable or deteriorated. The authors argue that this was due to the advanced stage of their cancer. Side-effects of the diet were fatigue and constipation.

Table III. *Ten steps as a guideline for discussing complementary and alternative medicine (CAM) with patients (9).*

1	Elicit the person's understanding of their situation
2	Respect cultural and linguistic diversity and different epistemological frameworks
3	Ask questions about CAM use at critical points in the illness trajectory
4	Explore details and actively listen
5	Respond to the person's emotional state
6	Discuss relevant concerns while respecting the person's beliefs
7	Provide balanced, evidence-based advice
8	Summarize discussions
9	Document the discussion
10	Monitor and follow-up

Table IV. *Recommendations for counseling patients on cancer diets.*

1	All cancer patients should be offered advice on healthy nutrition and cancer diets. If needed, specialists should help the patient to ensure sufficient intake of macro- and micronutrients. (Adaptation from the ethical discussion of Gilmour et al. (42)).
2	Counseling on cancer diets should be available at a low threshold. That means, it should be part of the communication between oncologist and patient or the oncologist should transfer the patient to a specialist who is working in close contact with the tumor center.
3	Qualification: Caregivers giving advice on cancer diets should have knowledge on and experience in nutrition and oncology. Furthermore, they should know details of cancer diets and the strategies with which they are propagated. They must be trained in communication skills. These qualifications should be acquired and regularly updated.
4	Before starting a consultation, the consultant should know about the patient's disease and former and planned therapy. A history of nutrition before disease became apparent should be taken. The patient's (and family's) attitude towards eating is also important.
5	Eating is a social process. Family members often feel responsible for preparing meals and ensuring nutrition. Therefore, members of the family and close friends should be welcomed to the consultation.
6	The individual's history of weight and nutrition since cancer diagnosis should be considered. Furthermore, it is crucial to understand patient's actual attitude, his needs and his objections concering the process of eating. Eating has highly emotional aspects and the consultant should try to understand the point of view of the patient. Attitudes of family members and friends are also of interest. It is important to know patient's beliefs concerning diets and their influence on cancer. If they are interested in or adhere to a cancer diet, their expectations and his experiences should be asked for.
7	Lack of knowledge or misconceptions should be pointed out and the scientific evidence explained. If the patient has a misunderstanding of the situation of their disease, it may be helpful to explain this first and then advance to talking about nutrition and diets. If it is not the oncologist, who is doing the consultation, it may be useful to refer the patient to them, if misconceptions on the disease persist. Communication with respect means that individual beliefs of the patient should be acknowledged but divergent concepts between the patient's point of view and the medical point of view should be named.
8	A list of items and questions to discuss should be agreed. All cancer diets the patient wants to discuss should be described from a scientific point of view but using lay vocabulary. Besides pointing out lack of evidence, fallacies in the underlying cancer theories must be addressed and adverse effects such as malnutrition must be discussed. In order not to leave the patient discouraged, an individual concept of healthy nutrition should be provided.
9	Counseling should be adapted to the patient's needs and resources. It may be helpful to refer to cultural specifics.
10	Counseling on cancer diets should always has to be done in the context of the cancer treatment and should consider treatment aims and aspects of psycho-oncology and palliative care if appropriate.
11	If a more complex problem with eating (*e.g.* loss of weight, malnutrition) exists, the patient must be offered further support.
12	In any consultation it should be regarded whether the patient and/or his family need psychological support. In this case the patient/family should be referred to a psycho-oncologist.
13	The most important points discussed should be put down in a letter to the patient. If appropriate a list of recommendations on nutrition should be included. This letter must be written in a language which lay persons can understand.
14	Follow-up of the patient should be offered.
15	If the patient adheres to a cancer diet despite counseling against it, follow-up is of great importance in order to detect adverse events early and to be able to discuss the diet again. Besides measuring weight, malnutrition can be detected by taking blood levels of micronutrients, or measuring muscle mass or albumin in order to assess protein deficiency. If deficits become obvious, the patient should be informed of the consequences and strongly advised against continuing the diet. In the case of their further adhering to the diet prescription of supplements must be discussed even if they are no adequate substitute.

A retrospective analysis of five children with tuberous sclerosis on a ketogenic diet because of untreatable epilepsy did not reveal any influence on brain tumors (24). A case report of two children with brain tumors on a ketogenic diet describes a reduction of glucose uptake in PET-CT. One girl survived for several months without progression (25).

In an older study, a ketogenic diet with high amounts of omega-3-fatty acids was fed enterally to patients with cachexia from cancer. The authors did not describe a positive effect on cachexia or on the course of disease (26).

Pre-clinical data are ambiguous. Some show a reduction of tumor. Yet some *in vitro* as *in vivo* experiments, gave warnings as to the safety of this diet. *In vitro* data showed that cancer cells not only adapt to the situation but develop mutations and characteristics of stem cells. One hypothesis is that the diet puts the tumor under stress and thus selects for resistance and malignancy. In an experiment on mice, the tumors in the diet-treated group initially grew less but later tumor growth accelerated and exceeded that of the control group (28, 29, 30, 31).

Other experiments show that a reduction of tumor growth is seen if the animals lose weight – independent from the kind of diet (32).

Macrobiotic diet. The macrobiotic was created by two Japanese scientists, Oshawa and Kushi, who endeavored to create a whole system of living which should promote health, peace and happiness in the world. The original diet was combined with other changes in lifestyle and intended as a

Table V. *Recommendations to patients and to the scientific community with regard to the benefits and risks of cancer diets.*

	Benefit proven	Benefit possible	No benefit	No benefit and underlying hypothesis not compatible with scientific concepts of cancer
Risks possible	Patient: Close monitoring	Patient: Recommend taking part in a study; if patient decides to use the diet, close monitoring	Patient: Recommend against; if patient decides to use the diet, close monitoring	Patient: Strongly recommend against; if patient decides to use the diet, close monitoring
	Scientific community: No more studies necessary Examples: none	Scientific community: Clinical studies Examples: Vegan diet	Scientific community: No studies Examples: Budwig diet, Macrobiotic diet,	Scientific community: No studies Examples: Breuss cure, Fasting, Gerson regimen, Kelley/Gonzalez Regimen, Ketogenic Diet, Livingston-Wheeler Regimen, Moermann diet
No risks	Patient: Strongly recommend the diet Scientific community: No more studies necessary Examples: None	Patient: Recommend the diet Scientific community: Additional studies Examples: Bircher-Benner diet	Patient: No recommendation Scientific community: No studies Examples: -	Patient: Recommend against Scientific community: No studies Examples: Alkaline diet, raw food[a]

[a]Depending on individual situations, risks have to be considered.

cancer cure, which might not be achieved by surgery or chemo- or radiotherapy. In the scientific literature there is one retrospective report of 23 patients with pancreatic cancer. The overall survival was 13 months – a comparison with the Surveillance, Epidemiology, and End Results Program (SEER) data discloses an overall survival of only three months. Only patients who adhered to the diet for at least three months were included (34). The procedure suggests a major bias, as patients on the diet who died early may have been excluded.

Six case reports were published within a Health technology Assessment report on unconventional therapies of the US congress. Experts did not find a proof of a positive impact of the diet in any case (35).

Vegan diet. In a randomized study of 93 patients with prostate cancer, Ornish and colleagues (40) tested a complex lifestyle intervention including a vegan diet with approximately 10% of calories from fat. supplemented with soy, fish oil (3 mg daily), vitamin C, E, and selenium. Additionally, moderate aerobic exercise (30 min daily), and stress management techniques (60 min daily) were advised. Participants in the experimental group had a significant decline in prostate specific antigen whereas those in the control group had an increase. Due to the complexity of the intervention, it is impossible to separate the effect of the vegan diet from the other components.

Evidence on Counseling Cancer Patients on CAM

Schofield and colleagues (9) have summed-up the existing evidence on counseling cancer patients on CAM in 10 recommendations (Table III).

Updating their review, we found 59 articles using the same search strategy in Medline. These articles were published between January 2008 and July 2012. We assessed all articles with regard to new clinical data on the process of giving to cancer patients advice on CAM. No publication provided new data on the communication of doctors and patients concerning CAM.

Salamonsen (41) reported that "negative communication experiences resulted in the decision to use CAM, and in some cases to decline conventional therapy; positive communication experiences led to the decision to use CAM as a supplement, not as an alternative to conventional therapy.

Gilmour and colleagues (42) examined the topic from an ethical point of view. In their opinion, providing information on CAM is a physician's duty. "The legal and ethical obligation to obtain informed consent to treatment requires disclosure and discussion of therapies when there is reliable evidence of potential therapeutic benefit." The question regarding CAM is whether there is enough evidence to support this obligation.

Recommendations for Counseling Patients on Cancer Diets

Starting with the recommendations from Schofield *et al*. (9) we discussed if these recommendations are appropriate in the setting of cancer diets. As cancer diets have the characteristics typical of CAM – namely little or lack of evidence from clinical studies, concepts of cancer origin not in line with scientific results but conforming with lay etiology, offering means to patients to be active by themselves and promising cure even in case of advanced cancer – all 10 steps can be applied to the process of discussing cancer diets.

We used these evidence-based recommendations to develop more detailed rules for the whole process of discussing cancer diets with patients. We also took into account the recommendations of a group of us (Huebner, Micke, Muecke, Muenstedt) already published. A list of 14 recommendations was made and agreed upon in a Delphi process (Figure 1; Table IV).

Discussion

In summary, we did not identify clinical evidence on level 1 or 2 for any of the described diets. One randomized study, including a vegan diet, has been published (40). Due to the complexity of the intervention (including supplements and major lifestyle changes) no conclusion on the effects of the mentioned diets is possible to date.

Some diets are based on hypotheses of carcinogenesis which are not compatible with modern scientific concepts such as the Breuss cure or the Moermann or Livingston regimen. In order to give advice to patients a benefit risk assessment is mandatory. From this, different categories of diet arise: those with possible benefits and no risks; possible benefits with potential harm; no benefit and no harm, no benefit and potential harm. In Table V we summarize the diets discussed. Diets for which no clinical benefit has been shown, but which may entail risks should not be recommended. For those diets with no proven benefit which are based on hypotheses in line with scientific concepts of carcinogenesis, clinical studies need to be initiated. Risks reported from case reports or derived from considering the consequences of the diet (*e.g.* risk of weight loss or deficits in micronutrients) must be taken into account while planning these studies. In order to provide as much patient safety as possible, we propose only considering clinical data from controlled studies for benefit, but also to take into account case reports and pre-clinical studies for risk assessment (*e.g.* data on interactions with enzymatic metabolism).

One major concern with any cancer diet is that patients may rely only on these diets and delay or omit cancer treatments. This may entail relapse or progress of disease and suffering from cancer-related symptoms. Therefore, guidance of patients is of high importance.

For most of the diets discussed, the situation is similar to that for CAM treatments. Patients who are searching for hope and cure turn to these methods. The main goals are to treat the cancer directly, reduce side-effects, boost the immune system and to be active themselves (1, 43, 44). These needs are met by methods which are based on concepts of carcinogenesis, are easy to understand for patients and enable them to use CAM treatments. This phenomenon is true for all the cancer diets analyzed here. As these diets are in line with lay etiological concepts, they are highly attractive to patients.

Counseling patients on these diets should take psychological facts and their consequences into account. Merely providing evidence will not be sufficient. Following our recommendations, the physician may take the patients point of view into account and show his respect for the desire to contribute to their treatment. Thus, the likelihood of achieving consent by shared decision-making increases. Our recommendations contain elements of appreciation and mutual acceptance that will allow for further contact between the physician and the patient even in cases of disagreement. In this case, efforts must be undertaken to discover adverse events, while the patient adheres to a cancer diet early in follow-up, in order to prevent serious harm.

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