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ALTERNATIVE NUTRITIONAL CANCER THERAPIES

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Increasing attention is being paid to the role of nutrition in cancer. Dietary measures, such as decreased consumption of calories, fat, alcohol and smoked or pickled foods have been shown to reduce the incidence of specific ''adult'' cancers, while increased dietary fiber appears to have a protective role. However, no clear scientific evidence exists that dietary manipulation is a successful primary therapy for established cancer. A significant percentage of adult and child cancer patients take unproven therapies during their illness. Alternative nutritional therapies, of which there is a wide variety, are the commonest of these reflecting current public interest in ''natural'' remedies. The efficacy and potential toxicity of commonly utilized dietary therapies are here reviewed, in particular the macrobiotic philosophy, the Gerson diet, the Livingstone diet, and the use of vitamin and mineral therapy. While details may differ, most alternative approaches involve fresh whole foods, with strong emphasis on low-fat vegetarian diet. Most are nutritionally adequate, at least for adults. No anti-cancer diet has been shown to cure established cancers, even those whose incidence is decreased by dietary changes. Careful dietary manipulation may at least improve quality of life for adult cancer patients, and, together with conventional therapy, may prolong survival in selected cancer patients. Assessment by carefully controlled prospective clinical trials is essential; those in pediatric patients must be controlled very strictly, since tumors in children have not been shown to be influenced by diet, and the diets described may be inadequate for children with malignant disease. *Int. J. Cancer* Supplement 11:69–72, 1998.

A study from Australia has confirmed what most oncologists have long believed, that up to half of all pediatric-cancer patients receive alternative therapies at some point in their disease (Sawyer *et al.,* 1994), and the same is true of adult patients (Cassileth *et al.,* 1984; Lerner and Kennedy, 1992). There appear to be many reasons for this phenomenon. Public distrust of government and of the ''profit-driven'' pharmaceutical companies has led to the belief that a conspiracy exists to suppress a cancer cure. This belief is fostered by the limited success of traditional chemotherapy and its accompanying toxicity, also by the view that unproven, alternative therapies are more ''natural'' and, therefore, better. It is also believed that bad diet causes cancer and that therefore dietary manipulation must be able to cure it. Most alternative therapies are justified by ''pseudoscience,'' which makes them sound reasonable to people not trained in the field (''detoxification'' of the body by coffee enemas is but one example). Moreover, the concepts on which traditional methods are based, such as ''evidence-based care'' and ''statistical significance demonstrating efficacy,'' are not as convincing to the lay-person, particularly one whose child is facing death, as anecdotes of apparently successful cures. The problem is intensified by well-meaning practitioners who encourage the use of unorthodox therapies on the grounds that these do no harm and may make the patient feel better. This type of practice not only allows billions of dollars to go into the pockets of practitioners of alternative therapies, but also encourages widespread disbelief in clinical intervention. Some commonly used alternative methods are in fact directly harmful; if, in addition, potentially curative therapy is avoided, the harm is greatly compounded, particularly in childhood cancer therapy, since many of the diseases are curable by conventional treatment.

During the past 2 decades there has been considerable scientific study of the relationship between nutrition, calorie and fat consumption and the development of cancer. Accumulated evidence indicates that diet can reduce the risk of certain cancers, and the National Institutes of Health have published suggested dietary guidelines (Weinhouse *et al.,* 1991). These recommendations are not to be applied indiscriminately to children in whom excessively restricted diets may impair normal growth and development, nor are they intended to suggest that dietary manipulation can cure established cancer (Anon, 1993). It has not been shown that a dietary change associated with a lower risk of developing a specific type of cancer can affect the survival of patients with that specific cancer. Nonetheless, during the past decade there has been a resurgence of nutritional therapies involving diet, herbal and vitamin supplements and other nutritional manipulations. Among the commonest are the macrobiotic diet, the Gerson diet, the Livingstone diet, and megavitamin supplementation.

MACROBIOTIC THERAPY

The macrobiotic diet, first formulated by Ohsawa (né Yukikazu Sakurazawa), consisted of 10 progressively restrictive stages. It was associated with reported cases of scurvy, anemia, hypoproteinemia, hypocalcemia, emaciation, renal failure and death (Dwyer, 1990). The diet was modified and popularized in the USA by Michio Kushi, and is now the most commonly used unconventional nutritional approach to cancer. In addition to the diet, it offers a ''spiritual philosophy''. Kushi, the best known but not the only macrobiotic practitioner, wrote that macrobiotics should not be combined with conventional cancer therapy. The diet, which is primarily vegetarian, high-complex carbohydrate and low-fat, is based mainly on cereal grains, vegetables, seaweeds and beans, and has an advantage over many of the other therapies in that, if carefully formulated, it may not be nutritionally deficient. Whether this is true for cachectic cancer patients, particularly young children, however, is doubtful, and nutritionists feel that it does not conform to any accepted theory of nutritional support and is not helpful in maintaining nutritional status among cancer patients, since the diet is high in bulk, low in several essential nutrients such as vitamins D and B12, iron and calcium, and relatively low in calories (Dwyer, 1992). Reviews by the American Cancer Society (1989) and the Office of Technology Assessment (US Congress, 1990) failed to find clear evidence that the macrobiotic diet was effective in treating any type of cancer. The American Cancer Society asked Kushi to send them documentation of his work, and found no clinical data supporting his claim that a variety of tumor types can be influenced by the macrobiotic diet (American Cancer Society, 1989).

Numerous testimonials of cures can be found, however, some apparently from independent, non-biased sources. After the ''cure'' of a friend with metastatic colon cancer by macrobiotics alone, Newbold (1988), in an extensive review, found 6 cases of complete remission from advanced malignant disease following the use of conventional therapy and macrobiotic diet. Newbold's findings, as well as the following studies, were discussed by Lerner (1994) in his review of alternative cancer therapies. Two retrospective studies by Carter (1990), on patients with pancreatic carcinoma who followed macrobiotic diets as well as conventional therapy for at least 3 months, found significantly longer survivals among the macrobiotic group than in all SEER (Surveillance, Epidemiology and End Results) patients diagnosed during the same period. A

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similar study in 11 cases of prostate cancer showed a median survival of 81 months in the macrobiotic group, as compared with 45 months in those receiving conventional therapy alone. In all the studies, which were not published in peer-reviewed journals, significant methodological issues make interpretation impossible, particularly since only a proportion of the macrobiotic group could be contacted, and this proportion could represent the longest-lived survivors. If that was the case, then the survival differences would no longer be significant (Carter, 1990).

Lerner summarizes the scientific evidence, case reports and clinical assessments by physicians by stating that the macrobiotic program is clearly not any kind of definitive cure for any cancer, but that survival may be enhanced by any healthy vegetarian diet as well as the will to live and a healthy attitude towards life (Lerner, 1994). It appears that properly controlled studies of the addition of a nutritionally balanced macrobiotic-type diet to conventional therapy would be worth doing in specific carcinomas. According to Kushi the cancers that respond best to the macrobiotic diet are cancers of the breast, cervix, colon, pancreas, liver, bone and skin. There is no evidence that this type of diet has any role in the therapy of pediatric tumors. Moreover, strict application of this diet may be harmful in young patients (Dwyer, 1993), though modification of the diet to make it nutritionally sound for young growing patients, while including some of the key elements, such as sea vegetables and miso soup, is possible. I have witnessed this approach in a 14-month-old child with stage-4 neuroblastoma who was cured and did well nutritionally, although what part the diet played in her cure is debatable. A properly conducted trial may be worth doing.

THE GERSON DIET

The Gerson diet was formulated originally by German physician Max Gerson (1881–1959), and is still used by thousands of cancer patients. It requires the patient to eat mainly a raw vegetarian diet and to drink freshly prepared vegetable and fruit juices every hour, take 4 types of enemas, including coffee enemas, and, as prescribed originally, also to consume 2 to 3 glasses of fresh calf's-liver ''serum'' daily. Other key elements of the diet include salt restriction and potassium supplementation, extreme fat restriction, temporary protein restriction, iodine and thyroid administration and vitamin C (Lerner, 1994). More recently, the calf's-liver juice has been replaced by carrot juice because of the many infectious complications associated with the former. Some patients are also given castor-oil enemas and oral and/or rectal hydrogen peroxide and rectal ozone treatment. Forbidden foods include salt, oil, berries, nuts, drinking water and all bottled, canned, refined, preserved and processed foods. No aluminum utensils are used, and juices must be pressed (Anon, 1993).

Gerson felt that, in order to be healed, the body needed to be 'detoxified' with agents that render it hypersensitive to abnormal substances (including bacilli and cancer cells), which the body will then eliminate. The more malignant the cells the more effective the therapy (Lerner, 1994). The detoxification, mainly of the liver, was stimulated by frequent coffee enemas. In fact, the administration of caffeine enemas does appear to cause biliary-duct dilatation and increased bile excretion, but the significance of this finding is unclear. The full-time commitment required by this therapy may play a significant role in whatever good results are achieved (Lerner, 1994). When published originally, Gerson claimed only that the diet could affect the patient's general condition favorably, making further conventional treatment possible, but he did not disassociate himself from his associates' claims that his cases were ''miracle cures'', and thus did himself and his cause irreparable damage. To this day, the evidence for the efficacy of the Gerson diet remains highly questionable, and a recent review by an expert panel found it to be ineffective (American Cancer Society, 1990). No study published in the peer-reviewed literature shows any evidence that Gerson therapy is effective in curing cancer (Anon, 1993). It is possible, however, that in modified form it may be a useful complement to conventional therapy.

The topic was reviewed by Lerner (1994), who quoted some non-controlled studies. In one such study in Austria, a modified Gerson therapy was offered to adult cancer patients in a surgical clinic (personal communication, P. Lechner). The controls (NGPs), were matched patients who refused the therapy. As the authors acknowledged, this was a basically flawed control group. However, the Gerson patients (GPs) showed markedly better tolerance of radiotherapy, and especially chemotherapy, since nausea, vomiting, loss of appetite and loss of hair occurred 3 times as frequently in the NGPs. In some groups the length of survival appeared better in the GPs, particularly those with liver metastases, and pain control appeared be better, possibly due to the caffeine enemas. According to Lerner, the authors found significant advantage for the GPs: some lived longer, others were healthier, had better responses to conventional therapies and fewer side effects, less pain and a better quality of life. It must be remembered, however, that the psychological characteristics of patients who will undertake and remain on this type of therapy may play a part in these results. It is also noteworthy that the ''miracle cures'' claimed for the diet were not seen (Lerner, 1994).

In a second study quoted by Lerner, a British research team visited the Gerson Clinic in 1989. They examined 149 cases selected by the Gerson Institute of which only 27 were evaluable by standard oncologic criteria. The researchers found little objective evidence of an anti-tumor effect. However, in a few patients, definite tumor regression was seen. In view of the poor prognosis of most of the patients, it was perhaps of greater importance that there was a subjective benefit to them and their families. They felt that they had control over their health, had high ratings for mood and confidence, with low pain scores and analgesic requirements, despite extensive metastatic disease. There is evidence that psychological well-being is associated with a better response to conventional therapy, and the nature of the Gerson and other dietary therapies ''requires an active contribution by the patient and family to his state of health and meets a need not satisfied by conventional therapy'' (Reed *et al.*, 1990). This involvement of the patient and family may be the most important part of any of the described dietary therapies. Whether it is necessary to pay US $4000 per week (the cost at the Gerson clinic in 1993; Anon, 1993) to achieve this result, however, is highly debatable.

In conclusion, it appears that the Gerson diet, by itself, does not result in cure for any type of cancer, but that the diet (and this is probably true for many of the alternative therapies) may act as an adjunct to conventional cancer treatment, allowing for greater well-being and quality of life. Whether this applies to pediatric patients, or whether it would even be possible in children, is more doubtful. It seems that adherence to some of the dietary principles, such as a vegetarian diet with fresh fruits and vegetables, is possible, whereas very low fat content, coffee enemas and hourly consumption of fruit juices are neither possible nor desirable.

THE LIVINGSTONE THERAPY

The Livingstone therapy was formulated by Dr. Virginia Livingstone, who believed that cancer was caused by a microbe present in all human cells and susceptible to malignant transformation in disease states, especially those that depress immune function. She viewed cancer as an immunodeficiency condition caused by environmental toxins and inadequate diet (US Congress, 1990; Lerner, 1994). The program of the Livingston-Wheeler Clinic, as described by Lerner (1994), includes a primarily vegetarian whole-food diet (similar to the Gerson diet), with major emphasis on elimination of poultry products and prohibition of smoking, alcohol, coffee, refined sugars and processed foods. The therapy also includes fresh whole-blood transfusions, preferably from a family member, and gamma-globulin (often of placental origin) as a source of antibodies, also splenic extract and a variety of vaccines, including an autologous vaccine prepared from the patient's own blood, together with BCG and other non-specific vaccines. Antibiotics are given to counteract the microbe causing

the cancer, and megadoses of supplemental vitamins, including A, C, E, B_6 and B_{12}. Purging with enemas including coffee, frequent hot baths with vinegar in water, and a program to acidify the blood, are also part of the regimen.

Conventional therapy is given selectively. Livingstone claimed an 82% success rate with her therapy, a figure that Lerner called ''stunningly imprecise'' (Lerner, 1994). There are many anecdotal reports of success, but, in a prospective study, Cassileth *et al.* (1991) compared Livingstone-therapy-plus-standard-therapy with standard therapy alone in patients with metastatic cancer and a poor prognosis, and found that there was no difference in survival between the 2 groups. Unexpectedly, the authors found that the quality of life was worse in patients on the Livingstone therapy, but that it started off worse and that the 2 groups deteriorated at the same rate. Lerner emphasized the negative effect of conventional therapy, forgetting that the practitioners of conventional therapy do not claim to be able to cure or even extend survival in these end-stage patients, whereas the unconventional practitioner does, and charges the patient a considerable amount of money to do so. Once again, what emerges from this study is that alternative nutritional therapies do not produce dramatic survival benefits, let alone cures. The other significant point was that quality of life was not determined by the therapy or its side effects; indeed, treatment was only one influence in a large array of variables, a point of considerable importance when considering dietary alternative therapies as means of improving quality of life (Dwyer, 1993).

MEGAVITAMINS AND TRACE ELEMENTS

Vitamin C

It has been suggested that high doses of vitamins, minerals and other nutritional supplements might cure cancer or delay its course. Vitamin C functions as a chemical reducing agent and anti-oxidant, and many studies have suggested that it reduces the incidence of gastric cancer, bladder cancer and possibly other epithelial tumors, such as those of the lung (Simone, 1992), as well as breast cancer (Howe, 1990). A study on children with brain tumors (Block, 1991) found that a statistically significant 3-fold risk of delivering a child who later developed a brain tumor was associated with low maternal intake of vitamin C during pregnancy; an effect that remained after adjustment for other factors. High-dose vitamin C has also been proposed by Cameron and Pauling (1978) as a means of prolonging life in cancer patients. Controlled studies at the Mayo clinic, however, found no difference in outcome among patients taking vitamin C or placebo, either in heavily pre-treated patients or in patients who received no previous therapy (Creagan *et al.,* 1979; Moertel *et al.,* 1985). Critics of the studies point out that urine tests for vitamin-C levels were not done routinely, and it is possible that some of the controls were in fact on vitamin C. In addition, vitamin C was discontinued as soon as the tumors started to grow, whereas one of the major contentions of Cameron and Pauling (1978) was that vitamin C slowed the growth of tumors rather than stopping growth completely, and also improved the patient's general well-being, at very little cost or toxicity.

The controversy continues and includes not only the efficacy of vitamin-C supplements but also the toxicity. Sestili (1983) suggested that high doses of vitamin C may cause rare adverse effects, including gastrointestinal disturbances, iron overload, altered metabolism of certain drugs, precipitation of calcium-oxalate stones in the renal tubules, and altered absorption of several minerals. Two other studies, by Hoffer (1971) and Klenner (1971), showed no adverse effects of vitamin-C supplements given at high dose (3-30 gm per day) even over a prolonged period (up to 30 years). However, the potential adverse effects include the possibility that, in pharmacologic amounts, vitamin C is both pro-oxidant and cancer-promoting, by releasing highly oxidant catalytic iron from ferritin (Herbert and Kasdan, 1993).

While it remains possible that high-dose vitamin C may slow the progression of an established tumor [although the hypothesis of Cameron and Pauling (1978) is far from proven], it appears clear from the reported studies that high-dose vitamin C does not cure cancer and certainly not non-epithelial ''pediatric-type'' cancers. It is also unclear whether supplements of vitamin C are helpful in preventing certain cancers. A review by Mayne (1997) found that, while observational studies indicate that diet high in anti-oxidants may prevent certain cancers, results from prospective studies of anti-oxidant supplementation have failed to demonstrate efficacy in preventing cancer for any of the anti-oxidants tried, with the exception of a trial in a Chinese population with significant nutritional deficiencies.

Supplementation with any single anti-oxidant nutrient or limited combinations of anti-oxidants therefore cannot be recommended at this time. There is little disagreement, on the other hand, about the importance of a high vitamin-C content in the diet in the form of fresh fruits and vegetables.

Vitamin A and carotenoids

A large body of evidence indicates that foods high in vitamin A and carotenoids are protective against the development of a variety of epithelial cancers (Mettlin *et al.,* 1979; Mettlin, 1984). Vitamin A and retinoids have also been useful in reversing a variety of pre-cancerous conditions, such as bronchial metaplasia and oral leukoplakia. Trans-retinoic acid has been effective in the treatment of acute promyelocytic leukemia (APML), and is being tried as a differentiating agent in several other established cancers, including some pediatric malignancies such as neuroblastoma.

Apart from APML, however, the results of therapy in established cancers have been disappointing, and there is no evidence at present for the use of high-dose vitamin A as a nutritional therapy in advanced malignant disease. In addition, large amounts of retinoids in the blood or tissues can be toxic to skin, liver and brain, and may cause birth defects (Olson, 1983).

Vitamin E

Biochemical studies show that Vitamin E functions as a lipid-soluble anti-oxidant and free-radical scavenger and is likely important in reducing the incidence of epithelial cancers. It is also safe, since no case of vitamin-E toxicity has been reported (Simone, 1992). However, as with the other vitamins, there is no evidence that vitamin-E supplements have any role to play in cancer therapy.

Selenium

There appears to be a strong inverse correlation between selenium intake, also selenium levels in the blood, and cancer risk, particularly in men (Bertram *et al.,* 1987). Selenium is among the most toxic of the essential elements, and the narrow range of safe levels of intake of this nutrient argue against the use of selenium as a food supplement. According to American Cancer Society guidelines, a varied diet should ensure adequate selenium intake (Weinhouse *et al.,* 1991), selenium being found mainly in seafood, meat and cereals.

Many other alternative therapies are available, all claimed to be able to cure cancer. These include Iscador, a mistletoe extract which is used in combination with a vegetarian diet; the Revici therapy, which involves lipids and lipid-based substances; the Kelly therapy, a complex nutritional program including vitamins and enzyme supplements; and ''metabolic typing'' (Dwyer, 1993). The list goes on and on, but the claims remain the same.

CONCLUSION

An appraisal of the literature shows a clear gap between the conventional cancer therapist, with his/her belief in evidence-based medicine, and the purveyors of alternative therapies, including nutritional manipulations. However, it is obvious that adult cancer patients and the parents of pediatric-cancer patients have demonstrated a clear desire for therapies other than the conventional, which will allow them some degree of control over their or their

children's treatment, or allow hope when conventional therapy fails. Possibly the most important way to meet this desire is a caring attitude on the part of the oncology team, which includes dealing with not only the medical concerns but all aspects of the patient's life. If cancer patients do not receive this type of treatment and support from their oncologist, they will seek it elsewhere and often pay large sums of money to do so.

Alternative nutritional therapies do not appear to offer hope of cure of an established malignancy; but judicious attention to diet, plus attention to the general well-being of the patient, as against purely medical concerns, can lead to improved quality of life. In view of the wide variety of nutritional therapies available, all of which have their avid and vocal proponents, the only conclusion possible is that no single diet is good for all cancer patients, and that what we, as traditional care-givers, should do is to spend time with our patients and, by trial and error, find the diet that best suits the individual and, at the same time, will provide the nutrition that he/she needs. In this way, the fringe elements of the alternative therapies, such as unnecessary blood transfusions, unproven immune manipulations and extreme food restrictions (to name a few), can be avoided. To recognize the patients or parents as individuals with particular needs, and to acknowledge their active and vital role in overall care, may be the most important lesson that we can learn from the alternative therapists.

Dying patients, or their parents, will often seek a miracle and, until all cancers are cured, alternative practitioners will always be with us. The demand by medical practitioners for evidence of efficacy will and should remain, but the realization that efficacy refers not only to cure or prolongation of survival but also to quality of life should allow for integration of the best of the conventional with those areas of the unconventional that appear not only safe and reasonable but even desirable.

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