The Case Against Laetrile

The Fraudulent Cancer Remedy

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The evidence for the claims that laetrile (amygdalin) can prevent or control cancers has been reviewed. The β-glucosidase content of cancer tissues is low compared to that of normal liver and small intestine. Cancer tissues contain the enzyme rhodanese in amounts comparable to that of liver and kidney and hence, cannot be attacked selectively by cyanide release through β-glucosidase action on amygdalin. Amygdalin does not have the properties of a vitamin. Rats have been reared for several generations on diets devoid of cyanogenic glycosides, without developing neoplasms. Experiments with tumor-bearing rodents have demonstrated no curative properties by amygdalin administration. Amygdalin is not as non-toxic as claimed, particularly when ingested orally, and especially when taken with plant material high in β-glucosidase. The claims for cure and control of cancers in humans have been refuted by distinguished physicians who specialize in the treatment of cancer patients. The writings of laetrile proponents are filled with erroneous and absurd statements. The propaganda for the doctrine of "freedom of choice in cancer treatment" deludes many individuals with treatable cancer to reject proven methods of treatment.

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IN RECENT YEARS a host of promoters and defenders of laetrile for the treatment of cancer has surfaced. Some have published books or magazine articles, others have put out private pamphlets or founded publications. Most of these promoters denounce the standard treatment of cancer in use as being worthless. They accuse the medical profession of a conspiracy to bar the use of laetrile. They write in strident and biased terms of a "cover up" of favorable data on the beneficial effects of laetrile (amygdalin) in the treatment of cancer. A list of the more prominent defenders of laetrile and their publications is given in references 1, 5, 9, 33, and 43.

All of these pitchmen promote the unfounded claim that amygdalin and other cyanogenic glycosides have the properties of an anti-cancer vitamin (Vitamin B_{17}). They generally accept the claim that cancer is a unitary disease resulting from an aberration of trophoblast cells; and thus, all forms of cancer should respond to a single modality, in this case, cyanide released from cyanogenic glycosides.

Coupled to the alleged anti-cancer vitamin properties of laetrile, there has been taken what is called a "holistic" and nutritional approach to therapy, the administration of megavitamin doses and mineral supplements based on findings in hair analysis, the deletion of animal proteins from the diet, and even faith healing. This doctrine fits into the current trend of food faddism and so-called "natural" and "organically grown" foods.

An important aspect of the campaign to legalize laetrile has been the doctrine that there should be freedom of choice in cancer treatment, as long as the modality is non-toxic, even though it may be totally ineffective. This approach has won the favor of reputable publications (e.g., *New York Times*, July 29, 1975), certain prominent physicians,[27,58] and a number of columnists (e.g., Andrew Tully, *San Francisco Chronicle*, July 13, 1977). The danger in the "freedom of choice" argument is that many subjects with treatable stages of cancer would forgo effective treatment and turn to laetrile.

Many of the prominent promoters of laetrile have profited enormously in various ways from their advocacy. This essay intends to review the different aspects of the laetrile problem, including the falsehoods and fallacies in the public records and in the publications of the chief proponents of laetrile.

Definition of Laetrile

The numerous changes that have occurred in the meaning attached to the term "laetrile" have been reviewed by Kennedy, Commissioner of Food and Drugs.[30] In the present context, laetrile will be identified as amygdalin, since this is the material now generally

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employed by laetrile advocates for the treatment of neoplasms. Prunasin, formed from amygdalin by the removal of the terminal glucose radical, can be present in some amygdalin preparations.

Chemistry and Biology of Cyanogenic Glycosides

The cyanogenic glycosides are glycosidic derivatives of α-hydroxy-nitriles. They have a wide distribution among higher plants, but are also found in ferns and in some moths and millipedes.[8] Cyanogenic glycosides will release HCN on treatment with dilute acids. More commonly, the production of HCN is due to the action of enzymes. These enzymes are usually present in the cyanophoric plants.[8]

Two common cyanogenic glucosides are amygdalin and prunasin. Prunasin contains one less glucose molecule in the β-glucoside linkage. Amygdalin and other β-D-glucosides are specifically hydrolyzed by β-D-glucosidases. The hydrolysis of amygdalin results first in the liberation of prunasin and subsequently of mandelonitrile. This may, to a considerable extent, decompose spontaneously into benzaldehyde and HCN.[38] In plants, a second enzyme has been found, β-oxynitrilase, which catalyses the decomposition of mandelonitrile.

Toxicity of Amygdalin

Taken parenterally, amygdalin is virtually non-toxic and can be administered in huge doses to experimental animals with slight evidence of toxicity. The fate of parenterally administered amygdalin in the body is unknown. It is unfortunate that this has not been investigated up to now. When a source of β-glucosidase is injected along with amygdalin, the toxicity is greatly increased. Orally administered, amygdalin is definitely toxic, presumably due to the presence of β-glucosidase in the small intestine. This enzyme catalyzes the decomposition of amygdalin with the liberation of glucose, cyanide and benzaldehyde.[7,44,51] Ingested with plant material containing β-glucosidase, amygdalin can be lethal. Schmidt *et al.*[49] studied the effect of feeding amygdalin along with sweet almonds to laboratory animals. The latter contains β-glucosidase, but not amygdalin. Six of ten dogs on this regimen died of cyanide poisoning. Three dogs that did not die exhibited neurological impairment.

The explanation for the low toxicity of parenterally administered amygdalin is that animal tissues, with the exception of the intestinal mucosa, liver and kidney, contain very low levels of β-glucosidase.[44] In addition, amygdalin is a poor substrate for animal β-glucosidase.

Dr. Nisselbaum[39] of the Sloan-Kettering Institute studied the hydrolysis of amygdalin by organ extracts of normal AKR mice, of spontaneous mouse mammary tumors and leukemias and of a variety of human cancers. None of these yielded detectable amounts of cyanide with the exception of the intestines and a gastric carcinoma from a human subject. Prunasin, on the other hand, did yield detectable amounts of cyanide with many tissues.[39] This agrees with the observations of Ng that amygdalin is a poor substrate for the β-D-glucosidase of rabbit livers.[38] It was only 1/200th as active as pH 6.5 as the standard p-nitrophenyl-β-D-glucoside commonly employed for assay. Prunasin was found to be about 1/40th as effective as the p-nitrophenyl glucoside. According to Ng, β-mandelonitrile dissociates at a measurable rate in dilute aqueous solution, liberating cyanide.

There is a long history of cases of poisoning from the ingestion of plant material containing cyanogenic glycosides and β-glucosidase.[32] In California, several cases of poisoning from ingestion of ground apricot meal have been reported.[11] Two reports of deaths from swallowing amygdalin preparations intended for the treatment of cancer have been published; one of a child,[26] the other of a 17-year-old girl.[47]

Two cases of toxicity in patients taking amygdalin have been reported by Dr. F. P. Smith and associates.[50] One patient developed fever and a skin rash; the second patient suffered from muscular weakness. Besides the acute toxicity of cyanogenic glycosides, prolonged ingestion of cyanogenic, glycoside-containing, plant foodstuffs is suspected of being a cause in tropical amblyopia and other obscure neurological disorders.[36] These compounds have also been the cause of goiter in geographical areas where cassava root (manioc) is consumed.[14] This condition results from the conversion of liberated cyanide to thiocyanate. It also has recently been observed that amygdalin and its hydrolysis product, mandelonitrile, are mutagenic, as determined by the Ames *Salmonella typhimurium* test.[16] Thus, not only is laetrile an ineffective cancer treatment, it may also be a cancer hazard.

Proponents of laetrile preach that cancer tissues contain a high level of β-glucosidase and lack rhodanese. Thus they are unable to detoxify liberated cyanide. On the contrary, it has been shown that experimental tumors contain about the same levels of rhodanese as comparable normal tissues.[17]

A fatal toxic dose of cyanide, as HCN, for man is reported to be 50–60 mg.[35] The molecular weight of amygdalin is 457; HCN's is 27. Consequently, one gram of amygdalin should yield nearly 60 mg of HCN if it is completely and rapidly decomposed. This is a fatal dose. Thus, there should be evidence of cyanide toxicity even if amygdalin is only partially hydrolyzed. The 60 mg of HCN is equivalent to 143 mg of KCN. The lethal

dose of the latter has been reported to be between 150 and 400 mg for man.[35] This dosage would be for a healthy individual. Debilitated cancer patients would be expected to be much more sensitive to cyanide poisoning. Laetrile practitioners administer up to 9 g of amygdalin by injection per day for prolonged periods and 1 g orally, indefinitely. (See p. 120 of reference 43.)

The Trophoblast Theory and Gonadotropic Hormone

The Krebses adopted the speculation of John Beard (a Scottish embryologist) that cancers are derived only from one source, namely misplaced trophoblastic cells.[21] Since such cells excrete gonadotropic hormone, it was assumed that all cancers would to so, and one could detect the presence of a cancer and control its treatment by determining the gonadotropic hormone in the urine. A large number of neoplasms, not derived from endocrine glands, have been found to secrete this hormone. Employing a sensitive radioimmune assay that specifically measures human chorionic gonadotropin in the presence of human luteinizing hormone, Braunstein *et al.*[4] found a detectable amount of the hormone in only 60 of 828 patients. This and other reports demonstrate there is no universal formation of the gonadotropic hormone by cell cancers. On the other hand, many tumors secrete different "ectopic" hormones. Another dictum of Beard was that cancers developing from trophoblasts were destroyed by the proteases of the pancreas. Part of the treatment by laetrile practitioners is to administer protease preparations.

At this time, the cause of all cancers is not known; in some mammalian species, cancers are produced by viruses, some appear to be determined by heredity, and a large number of physical and chemical agents induce cancers in all animal species. The only cancers known to originate from trophoblasts are certain cancers of the female and male reproductive system. One of these, chorioepithelioma, can be cured by appropriate chemotherapy, not by amygdalin. With the discovery of virus-induced tumors in rodents, it was hypothesized that all cancers might be caused by activation of latent viruses. This theory is not universally accepted by oncologists.[55] No human cancer has been unequivocally demonstrated to be virus-induced.

Vitamins (Vitamin B_{17}) and Cyanogenic Glycosides

As mentioned earlier, proponents of laetrile claim that amygdalin and other cyanogenic glycosides are members of a particular vitamin family, Vitamin B_{17}, which is alleged to be an anti-cancer vitamin. When taken in sufficient amounts, Vitamin B_{17} reputedly prevents the onset of cancer and has a retarding effect on the growth of cancers already present. In a previous publication, the author has detailed the criteria for acceptance of a vitamin and the failure of amygdalin to meet these criteria.

Some Criteria for Legitimate Vitamins

A vitamin may be defined on the basis of several properties: 1) It is a nutritional component of organic composition required in small amounts for the complete health and well-being of vertebrate organisms; 2) Vitamins are not used primarily to supply energy or as a source of structural tissue components of the body; 3) A vitamin functions to promote physiological process or processes vital to the continued existence of the organism; 4) A vitamin, with the exception of vitamin A, cannot be synthesized by the cells of the organisms and must be supplied *de novo*; 5) In man and in other mammals, deficiency of a specific vitamin is the cause of certain rather well-defined diseases. These diseases are prevented or cured by addition of the appropriate vitamin.

The claim that the β-cyanogenic glycosides represent a new hitherto unrecognized water-soluble vitamin (vitamin B_{17}) is refuted by the following facts: 1) No evidence has ever been adduced that laetriles are essential nutritional components; 2) Laetriles have never been shown to promote any physiological process vital to the continued existence of any living organism; 3) No specific disease has been associated with a lack of laetrile in any animal. Since experimental animals (mice, rats, guinea pigs) have been maintained in good health over a number of generations on synthetic diets of pure chemical components, but containing no laetriles, it is evident that lack of this material is not associated with any disease.[19]

A variety of claims has been made in an attempt to establish physiologic functions for cyanogenic glycosides. Cyanogenic glycosides could account for the thiocyanate of body fluids. This is not a unique property, since any source of cyanide formed in the body (and some are known) can be converted to thiocyanate through the action of rhodanese. For example, it is well known that smoking increases the excretion of thiocyanate.[48] In addition to the cyanogenic glycosides, cyanolipids and cyanoaminoacids occur in natural materials. Cyanogenic glycosides might be the source of the cyanide that goes to the formation of cyanocobalamin. Cyanocobalamin is an artifact formed from the physiologically "natural" hydroxocobalamin during the isolation of vitamin B_{12}. In one industrial process, the cyanide was adventitiously present in activated charcoal, and became bound to the natural vitamin B_{12}.

The above suggested properties, of course, have no bearing on the alleged vitamin nature of the cyanogenic

glycosides since they can be caused by any source of cyanide.

Vitamins and Cancer

Is there some special relationship between vitamins and cancer? There are no valid grounds to believe there is. After many years' search for a unique difference in metabolism between normal and neoplastic cells, none has been found, except for quantitative differences in rates of certain metabolic reactions. Cancer cells, like normal cells, require the known essential nutrients to grow and proliferate. Cells with a high rate of turnover are more susceptible to a nutritional deficiency than nonproliferating or slowly proliferating cells.

Deficiency of various vitamins of the B group inhibits growth and many lead to the destruction of rapidly growing neoplasms, as is also true for normal cells. This destruction has been proved most strikingly by the administration of certain vitamin analogues, which produce a profound vitamin deficiency by interfering with the normal use of the vitamin for its appropriate function.

For example, methotrexate (amethopterin), one of the most useful anticancer drugs, exerts its curative effect by interfering with the normal cellular functions of the vitamin, folic acid.[15] This analogue is, of course, also toxic to body cells with a high rate of turnover, namely the hematopoietic system, intestinal mucosa, and dermis. By a proper regimen that permits the regeneration of normal, affected tissues, methotrexate is useful in the treatment of a variety of neoplasms.

Other examples of the inhibition of the growth of experimental cancers are by isoriboflavin, an antagonist of pyridoxine, and pyrithiamine, an antagonist of thiamine. These agents have not found use in cancer treatment because there is only a small difference between the toxic action on cancer and normal cells.

Cyanide's Applicability toward Cancer's Eradication

In my paper in the *Western Journal of Medicine*,[18] I stated that a number of investigators obtained increases in survival times of cyanide-treated, bearing animals, but the general conclusion was that the effective dose was too close to the lethal dose to be practical. McCarty[33] accuses me of stating a half-truth about this result. Supporting my statement, Brown *et al.*[3] writes: "In the reports of previous workers, cyanide seemed to have a differential inhibitory effect upon tumor tissue; but the margin of safety appeared so low that clinical usefulness appeared to be improbable."

Examination of the literature on the subject discloses the following: Karczag[28,29] claimed a retardation of tumor growth and increased survival of potassium cyanide-treated mice implanted with Ehrlich ascites carcinoma. No data are given on the dosage administered nor the route of administration. In a discussion by Haggen of this paper, he stated that he obtained no therapeutic effect with potassium cyanide on large tumors of mice, and only found growth inhibition if treatment was started the day of implantation. There was no response with the Jensen or the Flexner-Jobling rat sarcomas.

Experiments on the effect of cyanide injection on the survival of tumor-bearing mice were performed by Brown *et al.*[3] They administered single doses of 0.75–2.0 mg/kg of KCN intraperitoneally to mice inoculated with the Ehrlich ascites carcinosarcoma and the sarcoma 180, and obtained an increase in survival time of 21–35% with the 0.75 mg/kg dose and from 30–70% with the 1.5 mg/kg dose. In addition to the cyanide, the animals were anesthetized, which has been reported to prevent the acute toxicity of cyanide. Treatment of patients with various advanced cancers of the female reproductive system by femoral vein administration produced no notable response.

The above dosage in the mice is equivalent to 53–140 mg KCN for 70 kg man. This reaffirms my statement that the higher effective dose is too close to the lethal dose for it to be employed in human therapy.

Reitnauer[42] prolonged survival and inhibition of tumor growth by feeding bitter almonds to mice with the Ehrlich ascites tumor. In this experiment, no data are offered of the food consumption by the animals nor of the amount of bitter almonds ingested. Possibly, the animals on bitter almonds greatly reduced their food consumption. It is well known that reduced food consumption increases longevity in experimental tumor-bearing animals.

To evade the contention that no cyanide is released from amygdalin administered parenterally, McCarty[33] proposes that injected amygdalin might be carried to the intestinal tract or the liver, where more active levels of β-glucosidase do occur. How this transport would be accomplished is not explained. The liver, of course, also has the highest activity of rhodanese;[18,41] so, considerable amounts of liberated cyanide would be expected to be converted to thiocyanate. Cyanide liberated in the intestinal tract presumably would be mainly absorbed through the portal system and carried to the liver, where conversion to thiocyanate would take place.

To provide a mechanism for the action of possible traces of cyanide, McCarty proposes the speculative hypothesis, based on the work of Von Ardenne[57] that cyanide would increase acidification of tumors, which would lead to the decomposition of lysosomes and also to the activation of immune systems. That tumors are more acidic than normal tissue is well known, due

to their higher rate of aerobic glycolysis. Would cyanide appreciably increase the glycolysis? This is not known. Release of enzymes from disrupted lysosomes could lead to proteolysis of cancer tissue protein and perhaps the decomposition of other important tissue constituents. It should be noted that disruption of lysosomes requires an acidity of pH 6 or less, hardly expected to be reached by glycolysis. Also, lysosomes occur predominantly in glandular tissues and only to a minor extent in non-glandular tissues, such as connective tissue and muscle. Consequently, sarcomas and rhabdomyosarcoma would be resistant to acidity.[54]

The proposed activation of immune systems is a very dubious hypothesis. Cancer immunology has been found to be an exceedingly complex phenomenon. When a considerable number of cancer cells is present, any immune bodies formed are overwhelmed by the tumor antigens. No antibody specific for a tumor antigen has been reported to have any value in the treatment of cancer in man. Non-specific immuno-stimulation with BCG or *Corynebacterium parvum* has had limited success.[10]

Furthermore, cyanide should be more toxic to tissues that are highly aerobic than to cancer tissue, which gains much of its required energy from glycolysis. This higher toxicity occurs because cyanide is a particularly potent inhibitor of the cytochrome oxidase system and also inhibits other iron porphyrin enzymes.

Recent Reports on Tests of Amygdalin Effect on Murine Tumors

Amygdalin has been extensively tested for antitumor activity against a large number of transplantable and spontaneous murine tumors. Only the more recent reports will be discussed here.

Venditti (Chief of the Drug Evaluation Branch, Drug Research and Development, Division of Cancer Treatment, NCI) tested amygdalin on leukemia L-1210, lymphoid leukemia P-388 and the Walker 256 carcinosarcoma rat tumor.[56] Dosages of up to one g/kg were injected either IM or IP. No significant increase in life span was observed. Wodinsky and Swiniarski[59] of the Arthur D. Little Laboratories found no significant antitumor activity against the Ridgway osteogenic sarcoma, the Lewis lung carcinoma, or the P-388 leukemia. Laster and Schabel[31] ran tests on the L-1210 lymphoid leukemia, the P-388 lymphoid leukemia, the B-16 melanoma, and the Walker 256 carcinosarcoma. In addition to amygdalin alone, tests were performed with added β-glucosidase. This increased the toxicity of amygdalin, as might be expected, without evidence of therapeutic activity.

Hill *et al.*[24] injected doses of 50–5000 mg/kg of amygdalin into C57/BL mice carrying the B-16 melanoma and 2 or 4 g/kg into AKR mice carrying the BW-5147 lymphatic leukemia. No toxic deaths occurred at doses of 50–5000 mg/kg. The drug was found to be ineffective against both of the above mouse tumors. It is to be noted that the above experimental murine tumors are widely used in screening drugs for antineoplastic activity.

Stock *et al.*[52] found amygdalin in high doses to be ineffective against the following transplantable tumors: sarcoma 180, plasma cell tumor LPC-1, leukemia L1210, Mecca lymphosarcoma, Ridgway osteogenic sarcoma, sarcoma T241, mammary carcinoma E0771, Taper liver tumor, Ehrlich carcinosarcoma (solid and ascites) and Walker carcinosarcoma 256.

It was also ineffective against the DMB-induced rat mammary adenocarcinoma. It was also demonstrated that amygdalin had no noticeable effect on the efficiency or toxicity of a variety of cancer chemotherapeutic agents.

A claim that has been widely circulated by the prolaetrile adherents is the preliminary unpublished report of Dr. Sugiura that amygdalin retarded the growth of lung metastasis in CD_8F_1 mice with spontaneous mammary adenocarcinomas. Dr. Sugiura's observations were not confirmed by tests carried out by three independent investigators and by two out of three negative cooperative experiments in which Dr. Sugiura participated. Particularly important was a double-blind experiment in which none of the participants knew which were the treated and which were the control animals.[53] A defect of Dr. Sugiura's tests was that the number of metastases was determined by visual inspection and an occasional histological count. To overcome this in the cooperative tests, the lungs were macerated and the number of viable cancer loci determined by growth in tissue culture.

Of course, no amount of animal results will convince the laetrile cult. Only controlled clinical tests on human subjects can stem, in time, the massive propaganda for treating cancer with this drug.

The Claim that Primitive Populations Ingesting Cyanogenic Glycosides are Free of Cancer

Most of these claims are impressions of itinerant observers that cannot be evaluated. An example of this is the often repeated, unsupported claim that the Hunzas, living in an isolated region of the Himalayas, have a very long life span and are remarkably free from disease. Their diet is presumed to include considerable amounts of apricot seeds. These claims were shown to be totally false by a Japanese expedition[22] who found that the Hunzas were malnourished and suffered from a variety of disease including cancer.

One geographical region in particular showed this claim to be untrue. The diet of a large part of the population of Nigeria and Uganda consists of large amounts of the cassava root (manioc). This material contains the cyanogenic glucoside linamarin (acetone cyanohydrin-β-D-glucoside). An examination of reports on cancer in the population of these countries shows that a variety of cancers do occur. J. N. P. Davies[12] reported that most of the recognized cancer cases appear in the Kampala Cancer Registry, Uganda.

In 1962 and 1963, in the *British Journal of Cancer*, papers were published from the Ibadan Cancer Registry, Nigeria, on Burkitt's lymphosarcoma,[6] Kaposi's sarcoma[34] and breast cancer, and carcinoma of the bladder in Kenya.[2] The incidence of breast cancer was about 5–6% of all cancers seen.

Diet and environment are highly important in the incidence of cancer. The composition of the population is also extremely important in determining both the incidence and type of cancers that occur in a given geographical area. Evaluation of the prevalence of cancers requires careful studies by competent epidemiologists and suitable cancer registries, reported by professional pathologists.

The profile of cancer in the countries mentioned, as might be expected, is not the same as in advanced western countries. Particularly prevalent are carcinoma of the esophagus, primary liver cancer, Burkitt's lymphoma among children, and Kaposi's skin sarcoma. The above are rare or absent in North America and Western Europe.

That cyanide is a product of the ingested cassava, even though various processes are employed to destroy some of the linamarin and the enzymes that decompose it, is shown by an increased urinary secretion of thiocyanate, a considerable incidence of neurological disorders of the goiter (from the thiocyanate) among cassava-eating people.

As evidence that cyanogenic glycosides are cancer preventatives,[33] the proponents of laetrile cite the observation of Davies *et al.*[13] that the cancer incidence of the population of Ryadondo shows no increase after ages of 55–64 in males and 45–54 in females. Cassava, containing the cyanogenic glucoside linamarin, is a staple of the diet of these people. However, the Bantus of South Africa show a similar leveling off of cancer incidence in the older age group and their diet lacks cyanogenic-containing plant material.[25]

The Analgesic and Euphoric Effects of Amygdalin Therapy

The clinicians that I have discussed this subject with, men who are experienced in the treatment of cancer, believe that the analgesic and euphoric effects of amygdalin therapy in patients are due to a placebo phenomenon. The laetrile practitioners claim that the improvement lasts too long to be explained by merely a placebo response. This is an unexplored subject that is worthy of more thorough investigation. The possibility of analgesic action could be tested on other medical conditions than cancer, where there is severe pain. In fact, the alleged analgesia and euphoria would appear to be the only beneficial effect of laetrile therapy. It has recently been suggested that the analgesic agent might be released benzaldehyde.

Claims of Arrest of Cancer Growth of Laetrile Therapy

These claims and their deficiencies have been reviewed by Lewis[32] and by Kennedy.[30] Some recent examples follow.

In 1970, the Contreras Clinic assembled 702 cases treated with laetrile. Of these, 63 patients died within the first three weeks of treatment. Dr. Contreras thought that several types of cancer might be treatable with laetrile with response rates between 30 and 35 percent.

A tragic example of the futility of laetrile treatment is the case history of one of Dr. Richardson's patients, as published in the New York Times, June 26, 1977. Helen D. Schneck was treated in the Richardson Clinic from March through October 1972 by injections of 10 cc each of laetrile as a preventative treatment for cancer. In addition, there was prescribed vitamin therapy, including various enzymes, pangamic acid, and laetrile tablets.

In November 1972, Mrs. Schneck developed a small lump on her neck. Dr. Richardson advised that laetrile injections would cause the lump to disappear and prescribed a series of 15 injections. By December 1972, Mrs. Schneck had developed a rash with lumps on her left shoulder. In January 1973, the rash extended to her left breast. She was advised to have a biopsy, and was diagnosed as having adenocarcinoma. During Mrs. Schneck's stay in the hospital, Dr. Richardson administered approximately 16 injections of laetrile. She was advised by her attending physician to seek conventional therapy, but she opted to continue with Dr. Richardson's regimen. He tripled the injection dose to 33 cc to control the cancer.

By February 1973, the rash and swelling had spread. Dr. Richardson made an appointment for her to see Ernst T. Krebs, Jr. (not a physician). He examined her and informed her that she did not have cancer, but rather a serious skin infection. Dr. Richardson then treated Mrs. Schneck with antibiotics and injections of 10 cc each of laetrile. On February 14, 1973, she

informed him that years before she had eaten raw meat and Dr. Richardson diagnosed her condition as trichinosis. Administration of laetrile was continued.

On February 24, 1973, Mrs. Schneck was unable to leave her bed. A physician called by her husband, ordered her immediate admission to Marin General Hospital. There she was diagnosed as having inflammatory cancer from her collar bone to jaw, an enlarged liver, presumably cancerous. The primary site was inflammatory carcinoma of the breast. She died October 4, 1973.

At no time did Dr. Richardson recommend conventional modalities in the treatment of Mrs. Schneck; in fact, he discouraged her from undergoing such treatment. Dr. Richardson's mismanagement of Mrs. Schneck's case led to much needless suffering and probably a shortening of her life.*

In 1970, Hans Nieper of Germany wrote on 35 cases of patients treated with laetrile. His case reports there may be five or six of his 35 patients that had some objective improvement.

Richardson in his book "Laetrile: Case Histories"[43] states that approximately four thousand patients have been treated at the Richardson Clinic. A cross-section of about 500 were selected for the study. Contact and a working relationship were established with only about 250 of these. The cases with the weakest medical histories were discarded as were those which were overly repetitious. Finally, the remainder, 62 cases, are the patients considered in the book. Of this work, Kennedy states: "It is absolutely incredible that anyone would expect to show the effectiveness of a drug by describing 62 out of 4,000 patients with a selection process of the type Richardson describes."

Nieper has considerably altered his therapeutic procedure as first reported by Dr. Lloyd H. Schoen, Ph.D., of the Sloan-Kettering Institute, May 1974, in that standard therapeutic measures are now part of his treatment.

In an affidavit submitted to the Department of Health, Education and Welfare, Food and Drug Administration, March 1977,[37] Nieper reports his present regimen. The following are several quotations from his revised procedures: "First increasing the prophylactic protection capacity of the host by means of vaccination with BCG or *C. parvum*, enzymatic deshielding of the tumor cell membrane in order to increase the antigenicity and at the same time to 'deblin' already transformed lymphocytes and macrophages, by means of the enzyme bromelain, or also streptokinase; strengthening of enzymes of cell-bound immunity by zinc orotate and carotene or vitamin A. . . ." He goes on to say, "second, combatting the aggressiveness of malignant tissues by antitumor compounds which, however, should not be given at levels that are systemically toxic." Amygdalin is administered both orally and by injection.

From a polyglot treatment such as this, what can be inferred to be the effective agent(s)?

Falsehood and Absurdities of Laetrile Promoters

Several of the proponents of laetrile[20,43,45] make the claim that statistics on the survival of cancer patients, treated by standard procedures are invalid and that these procedures have produced no improvement in survival in the past two decades. This claim has been challenged by Lewis,[32] who writes: "Recent trends in survival of cancer patients[40] shows that substantial progress has been made in all 17 tumor types indexed."

Progress in the effective treatment of cancer has been quite slow, in spite of the expenditure of huge sums of money. Cancer is still an enigma. Much remains to be learned about the nature of the neoplastic transformation and of the subtle differences between normal and cancer cells. The changes that lead to uncontrolled growth have not been identified.

What the promoters of laetrile fail to point out is that there is no valid evidence that therapy with laetrile improves survival. It is claimed by Richardson[43] and others that it is not cancer that kills a patient, but the accompanying cachexia. Cachexia is a consequence of the growing cancer crowding out, displacing, and destroying normal tissue, with a resulting impairment of normal metabolism causing anorexia and weight loss. As a cancer grows, it leaves in its wake a residue of dead and dying cells. The decay of these cells results in a variety of toxic manifestations.

Richardson (see reference 43, p. 28) claims that use of the reduction of tumor mass as the primary test of efficacy of treatmet is indefensible from a scientific point of view. "Most tumors have only a relatively small proportion of cancer cells, consequently getting rid of the cancer often leaves behind a tumor of benign tissue as a memorial to the victory of nature over the disease." This is used as part of the propaganda for laetrile. "The lump or bump of cancer is of no concern." This claim is contradicted by overwhelming observations that when a cancer treatment is effective, the tumor regresses.

Richardson,[43] Rorvick,[46] and others now have come to the support of the Gerson diet and Krebiozen as

* The revocation of Dr. John A. Richardson's license to practice medicine in California was ordered by the Board of Quality Assurance for the State of California following a hearing before Stuart A. Judson, Administrative Law Judge, State of California, Office of Administrative Hearings in San Francisco on August 3–11, 1976. The decision was based in part on the above case.

effective anticancer treatments. The above were shown to be worthless many years ago and have long since been abandoned. Rorvick now accepts the claim of Virginia Livingston that cancer is a bacterial disease,[46] although this absurdity was refuted and buried many years ago, Rorvick also is a convert to holistic medicine, as are Richardson and other proponents of laetrile.

What is holistric medicine? In essence, it is simply giving all possible support to the patient, nutritionally, physically, and mentally. Every conscientious physician tries to do this. But there is no proof that huge doses of vitamins or weird diets, which may lead to malnutrition,[23] are of any benefit. On the contrary, huge doses of vitamin A and vitamin D are toxic. Psychotherapy can be beneficial in easing cancer patients' apprehensions.

Burk[5] now accepts pangamic acid (vitamin B_{15}) and orotic acid as well as laetrile as being vitamins. Pangamic acid and orotic acid have never been shown to be nutritionally essential for any vertebrate species. This criterion is fundamental for acceptance of any substance as a vitamin. Orotic acid can be synthesized by all organisms studied. It is a precursor of pyrimidines in the biosynthesis of these compounds. Inability to synthesize the vitamin is another fundamental criterion for acceptance.

Burk uses the sophistry that it can never be proved that laetrile is not a vitamin, since diligent search might at some time discover an organism for which laetrile is nutritionally essential. That is not the point at issue. The evidence is that laetrile is not nutritionally essential for man or mammals which have been studied.

Another absurdity is the administration of proteolytic enzyme preparations to patients in the treatment of cancer. This approach is based on the theory of John Beard that the pancreatic proteases counteract the tendency of trophoblasts to become cancerous. These prepartions are administered orally in enteric capsules. It is well known that proteins are digested in the intestinal tract and lose what enzymatic capacity they may have possessed.

Judicial Intervention

The freedom of choice campaign by laetrile advocates has resulted in legislation legalizing laetrile therapy in seventeen states (May 1978) and in two court decisions that have nullified the laws against the importation. Judge Bohanon based his decision on the argument that patients seeking laetrile therapy are mature individuals, capable of making rational decisions. This decision has been applied to the U. S. Supreme Court by the Food and Drug Administration.

Similarly, the Court of Appeal, Fourth Appellate District, State of California, overturned the conviction of James Robert Privitera, Jr., *et al.* (November 15, 1977).† However, the California State Supreme Court reversed the Court of Appeal, March 16, 1979 by a 5 to 2 vote thus, upholding the conviction of Privitera *et al.*

What the judges overlooked is that false claims for the curative properties of laetrile enthusiastically made by its advocates can easily confuse the lay public.

In making his decision, Judge Bohanon was impressed by the list of physicians and scientists who advocate the use of laetrile in cancer treatment. The even more impressive list of physicians and scientists who oppose its use was not mentioned. Among the physicians in the latter list are distinguished authorities on the treatment of cancer. Virtually all the individuals in the advocate list profit financially, some enormously, from the sale and prescription of laetrile. These are not unbiased witnesses. Some members of the advocates are not known to profit from laetrile, but it is not unknown for physicians and scientists to become advocates of worthless medical remedies. Pertinent examples are the late Dr. Coffey, noted San Francisco surgeon, who developed and promoted the Coffey-Humber serum for the treatment of cancer and Andrew C. Ivy, distinguished professor of physiology, University of Illinois Medical School, who was the chief promoter of the now discredited cancer remedy, Krebiozen.

ADDENDUM

The Government's authority to outlaw the sale of drugs not proved to be safe or effective has been upheld by two Supreme Court decisions in 1979.

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† A convincing refutation of the freedom of choice doctrine with respect to laetrile, is contained in the dissenting opinion of Judge Cologne in the Dr. James Robert Privitera, Jr. case.

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