

Pleomorphic Bacteria As A Cause Of Hodgkin's Disease (Hodgkin's lymphoma) A Review of the Literature

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3-24-6

Paper Type: Review

Please cite as: Cantwell AR Jr. Pleomorphic Bacteria as a Cause of Hodgkin's Disease (Hodgkin's lymphoma): A Review of the Literature. JOIMR 2006;4(1):1

Published: 21 February 2006

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Abstract

Hodgkin's disease (HD) is widely considered a neoplastic disease. However, for more than a century some investigators have considered HD an infectious disease, caused by pleomorphic bacteria closely related to the mycobacteria that cause tuberculosis. A recent report showing "intracellular bacteria" in HD, as well as a previous electron microscopic study showing intra- and extracellular "microorganism-like structures," adds credence to the idea that bacteria are associated with HD. This communication provides a review of the largely forgotten literature pertaining to the complex microbiology of HD. Microphotographs of cell wall deficient and mycoplasma-like intracellular and extracellular forms, observed in vivo in acid-fast stained microscopic tissue sections of HD, are also presented, as previously reported.

Bacteria in Hodgkin's Disease

Hodgkin's disease was first described in 1832 by Thomas Hodgkins. For more than a century HD was not considered a cancer, but was widely regarded as a bacterial and infectious disease, possibly related to tuberculosis.

The cause of HD is unknown. However, over the past century there have been various reports implicating "pleomorphic" bacteria, possibly derived from the so-called "acid-fast" (red-staining) mycobacteria that cause tuberculosis.

Pleomorphic bacteria are capable of assuming different shapes and sizes.

Bacteria observed and cultured from HD are most commonly described as intermittently acid-fast round coccus forms resembling common staphylococci; and rod-shaped bacteria known as corynebacteria (also called "diphtheroid" bacteria and "propionibacteria") [1-8].

Hodgkin's Disease Coexisting with Other Cancers

HD is considered a form of cancer affecting the lymphatic system, usually

beginning as a painless swelling of lymph glands (nodes). Later stages of the disease include fever, persistent fatigue, weight loss, itching, and night sweats. Some of these clinical signs resemble those of tuberculosis (TB).

A definitive diagnosis of HD is made by the pathologist based on the type of cell found on biopsy. A distinct kind of cell (the so-called "Reed-Sternberg cell") is a hallmark of this cancer. Carl Sternberg himself claimed in 1898 that HD was caused by TB bacteria; and Dorothy Reed noted the frequent association of tuberculosis, even finding TB and HD in the same lymph node, as quoted by Stewart [4].

HD and tuberculosis can coexist in the same patient. A recent report of a Polish case concluded "the association between HD and TB must be considered, especially in countries where the latter is endemic. The diagnosis may be difficult due to similarities in the clinical course, laboratory tests and imaging procedures" [9].

HD can also coexist with sarcoidosis, a disease often affecting the lungs and lymph nodes and long thought to also have a close relationship with TB and TB bacteria [10]. Lymph nodes draining cancer can occasionally show evidence of sarcoidosis.

Recent observations suggest a closer association between HD and "non-Hodgkin's lymphoma" than previously recognized [11]. There are about 8000 cases of HD diagnosed yearly in the U.S.; and 55,000 cases of non-Hodgkin's. Various pathological types of "B-cell" and "T-cell" non-Hodgkin's lymphoma can be further divided and classified into aggressive and non-aggressive, and slow and fast-growing types. Each type of lymphoma looks slightly different under a microscope and each carries a different prognosis.

"T-cell lymphoma of the skin" is also known as mycosis fungoides; and HD and mycosis fungoides may also coexist together in the same patient [12].

Pleomorphic acid-fast bacteria similar to those found in HD have also been reported in mycosis fungoides and non-Hodgkin's lymphoma, by Busni [1-2], Aplas [13-14], and Cantwell [15-16].

HD is also closely related to leukemia [17] and Kaposi's sarcoma [18]. French physician Georges Mazet found acid-fast bacteria in the blood of leukemia cases in 1962 [19]. AIDS patients have an increased incidence of both Hodgkin's and non-Hodgkin's lymphoma, as well as a high incidence of Kaposi's sarcoma [20]. Pleomorphic acid-fast bacteria have been observed in AIDS-related lymphoma and Kaposi's sarcoma by Cantwell et al. [21-24]. Before chemotherapy and radiation treatments were designed for HD, the disease was uniformly fatal. Now the 5-year survival rate is about 80%.

However, the patient may pay a heavy price healthwise for this standard therapy. Patients who survive radiation treatment for HD can develop a second related cancer. According to Aisenberg, deaths from second malignancies are the most important cause of death other than HD itself [25].

A recent study points to radiation as causing women survivors of HD to have up to a 40 percent greater risk for breast cancer [26]. HD patients are also at increased risk for acute leukemia and non-Hodgkin's lymphoma. University of

Texas Southwestern Medical Center researchers have found that patients surviving childhood Hodgkin's disease suffer strokes later in life at rates about four times that of the general population. They suspect the radiation used in treating this cancer as a cause [27].

Because the cause of all these different cancers is unknown, it is assumed there is no etiologic connection between them. However, cancer microbe research suggests that infectious pleomorphic bacteria (and virus-like forms of bacteria) are implicated in many forms of cancer.

The Microbiology of Cancer

The microbiology of Hodgkin's disease is intimately connected with the microbiology of cancer. The reason for this is that similar bacteria, primarily in the coccus-like form in microscopic tissue sections, are found in various forms of cancer. In addition, similar microbes have been observed in non-cancerous diseases, such as sarcoidosis, lupus erythematosus, scleroderma, and others [6, 27-31].

Microbiologist Lida Mattman, in *Cell Wall Deficient Forms: Stealth Pathogens*, presents detailed information on the possible role of pleomorphic bacteria in cancer. A chapter in her book ("Microbes and Malignancies") contains an excellent single source of reference material to the microbiology of cancer. Mattman cites dozens of researchers dating back to 1910 who wrote about pleomorphic bacteria in HD. [32]

Important and long-forgotten contributions to the bacterial etiology of cancer were made in the 1920s by Scottish obstetrician James Young [33-34], Montana surgeon Michael Scott [35-36], and Chicago surgeon John Nuzum [37], all of whom consistently found pleomorphic microbes, characterized by cocci and unusual stages of growth in culture.

The leading proponents of the bacteriology of cancer in the last half century are Virginia Wuerthele-Caspe Livingston, M.D. [38], microbiologist Eleanor Alexander-Jackson [39], cell cytologist Irene Diller [40-41], and noted biochemist Florence Seibert [42-43]. Their work is documented in Livingston's *Cancer: A New Breakthrough* [44] and *The Conquest of Cancer* [45]; and in my books, *The Cancer Microbe* [46], and *Four Women Against Cancer* [47]. Color photographs of Cantwell's cancer bacteria are published on-line at the Journal of Independent Medical Research website (www.joimr.org).

During the 1970s and 1980s I identified bacteria in acid-fast stained tissue sections from HD patients, carefully studied by use of the ordinary light microscope, using the oil immersion lens at a magnification of 1000 times. Microphotographs of bacteria in tissue sections of the heart, lung, lymph nodes, skin, pancreas, cerebrum, bone and marrow from four HD patients, were reported in 1981, along with a review of the literature showing bacteria in HD [7-8].

In 1979 I encountered a 56-year-old white man with a rare HD tumor initially confined to the skin. Intracellular and extracellular coccoid forms were identified in the deep layers of the skin; and *Propionibacterium acnes* - a rod-

shaped bacterium with acid-fast granules was cultured from the skin tumor. Later that year the patient developed new swellings of lymph nodes diagnosed microscopically as HD. Similar coccoid forms were seen in the node. Despite radiation therapy and chemotherapy, he died the following year from cardiac arrest. At autopsy, the heart showed changes consistent with "radiation pericarditis." Rare foci of scattered acid-fast coccoid forms were noted in the lung and heart. There was no autopsy evidence of HD. However, microbes were present in the lung tissue sections, as reported in 1984, by Cantwell and Kelso [8].

Pleomorphic bacteria cultured from HD and cancer have a "life cycle" that does not conform to the strict laws of microbiology. Various forms include cocci and rods, larger round forms similar to yeasts and spores, and fungus-like forms [33-37]. In addition, there are smaller, mycoplasma-like forms, and filter-passing virus-like submicroscopic forms [38].

Of special interest is the cancer research undertaken in the late nineteenth century by Scottish pathologist William Russell, who described variably-sized pleomorphic round forms (some as large as red blood cells) in cancer tissue, which he believed represented "the parasite of cancer" [48-49]. These forms are now well-known to pathologists as "Russell bodies." Although the exact nature of Russell bodies remains an enigma, pathologists do not interpret them as microbial in origin [50]. It is my belief that they represent the large round forms of coccoid bacteria which have lost their cell wall and have become "mycoplasma-like." Similar-appearing large bacterial forms of cell wall deficient bacteria in culture are known to bacteriologists as "large bodies." According to noted microbiologist Louis Dienes, "large bodies" are the connecting link between pleomorphic bacteria and cell wall deficient "L-forms" (also known as mycoplasma) [51]. Due to the loss of a bacterial cell wall, large bodies vary in size and can enlarge in culture (in vitro) up to 50 micron in size. These large forms are many times larger than the standard size of ordinary bacterial cocci. The largest forms are known as "giant large bodies." Large body forms of bacteria may be what Russell observed in cancer and tuberculosis tissue (in vivo) and interpreted as "parasites." Cantwell reported "large bodies" in scleroderma and pseudoscleroderma [52]. Variably-sized "eosinophilic bodies," frequently found in the tissue of AIDS-related Kaposi's sarcoma, may also represent large bodies [53].

Russell's "cancer parasites" may also relate to the cancer microbe research of Dr. Doyen, a French surgeon who routinely cultured coccoid forms from various cancers for fourteen years, also in the late nineteenth century. A brief note on his research ("Dr. Doyen and the microbe of cancer") appears on pages 126-27 in the Jan 11, 1902, issue of *The Lancet*, which states, "The microbe appears in the forms of motile diplococci, one coccus of which is sometimes four or five times as big as the other." Doyen called his cancer microbe "micrococcus neoformans," and like "Russell's parasite" is long forgotten.

Bacteria as a Cause of Hodgkin's Disease

Could the entire medical establishment, except for a few dissidents, be wrong in completely rejecting a bacterial cause of HD for more than a century?

In 2005 the Nobel Prize in medicine was given to two Australian researchers, microbiologist Barry J Marshall and pathologist J Robin Warren, who discovered that stomach ulcers were caused by bacteria that millions of people carry normally in their stomach. For a century these bacteria, now identifiable in tissue with a special tissue stain, went undetected by physicians, all of whom were taught that bacteria could not live in the acid environment of the stomach. Now a curative antibiotic treatment has been designed to treat *Helicobacter pylori* infection. We also now recognize that chronic infection with helicobacteria can lead to stomach cancer, and also to a lymphoma cancer of the stomach, known as "MALT-lymphoma" (mucosa-associated lymphoid tissue lymphoma).

Closely allied to the microbiology of cancer is recent research showing that human blood is not sterile. On the contrary, bacteriologists have discovered that human blood normally contains various species of bacteria, such as staphylococci, corynebacteria, and others, some of which are acid-fast [54-58]. There may prove to be an intimate connection between bacteria in the blood and bacteria in cancer; and the blood bacteria may also prove to be the origin of such bacteria.

In 1975, using the electron microscope, Parmley et al. showed "microorganism-like structures" in lymph nodes in some untreated patients with HD. These round forms with "internal composition" were found within and outside of the cells and resembled mycoplasma and cell wall deficient bacteria, suggesting "subclinical infection" [59].

More recently, Swiss oncologist Christian Sauter and pathologist Michael Kurrer discovered "intercellular rods" and "spheres" in six HD patients, by use of a special PAS stain, a traditional stain used to detect fungal infection of tissue [60]. They note that many features of HD suggest a bacterial infection; and that the epidemiology of HD also suggests a bacterial disease like TB. Sauter and Blum have also recently noted regression of HD of the lung by use of prolonged antibiotic therapy with ciprofloxacin and clarithromycin [61]. Sauter and his colleagues hypothesize that the development of HD may be similar to cancer in plants, whereby a plant bacterium called *Agrobacterium tumefaciens* exchanges genetic material with plant cells to cause plant crown gall tumors. Their "crown gall" hypothesis for Hodgkin's disease would explain the clinical observations of a bacterial infection that behaves like a malignant tumor. Sauter thinks antibiotic treatment of very early Hodgkin's disease may be successful before there is a genetic exchange between the bacteria and human cells.

Microphotographs of Bacteria in Hodgkin's Disease

Unlike extremely small submicroscopic viruses, HD bacteria are large enough to be observed by use of the conventional light microscope. Therefore, bacteria can be observed in-vivo in microscopic examination of cancerous tissue.

Virginia Livingston made a valuable contribution to the microbiology of cancer by stressing that the acid-fast stain is the key to the identification and demonstration of the microbe both in tissue (in vivo) and in culture (in vitro). Lida Mattman's seminal research delineating the various forms comprising the "life cycle" of cell wall deficient bacteria, particularly TB-causing mycobacteria, are essential contributions to identifying microbes in cancer [62-63].

In addition, Anna Csillag has shown that there is a "mycococcus form" of acid-fast mycobacteria. This small round coccus is an inherent and stable part of the life cycle of mycobacteria [64]. Mycococcal forms greatly resemble micrococci and staphylococci and are similar in size and shape to the coccoid forms regularly seen in vivo in acid-fast stained tissue sections of HD and cancer.

When searching for TB mycobacteria, pathologists generally search for acid-fast red-stained rod-shaped forms of the TB germ. They ignore other growth forms of the tubercle bacillus, which are the round coccoid forms. These forms are not acid-fast. Thus, "atypical" forms of TB bacteria and other microbes can go unrecognized in diseased tissue.

The microphotographs accompanying this article clearly show round intra- and extracellular elements in vivo that appear as bacteria. What is the evidence that such forms are bacteria? First of all, as mentioned, cocci have been cultured from Hodgkin's disease and non-Hodgkin's lymphoma by various cancer researchers. Secondly: these coccoid forms in vivo have the size and shape of cocci cultured in the laboratory (in vitro) from HD. They stain like microbes, grow and multiply like bacteria, have the appearance of pleomorphic microbes, invade the cell like bacteria, and kill like bacteria. For a century it has been noted that "normal" lymph nodes may harbor bacteria. Thus, it may be argued that the finding of bacteria in lymph nodes of HD might be discounted for this reason. However, the same appearing microbes in the nodes of HD were also present found in the skin tumors of HD and in other organs and throughout the connective tissue at autopsy. The widespread presence of these coccoid forms strongly suggests the microbe is involved in the pathogenesis of lymphoma.

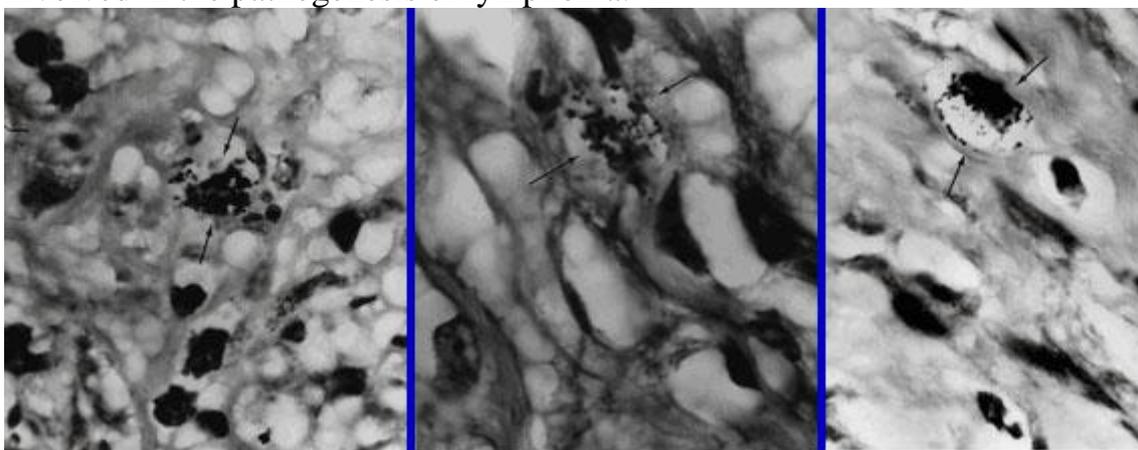
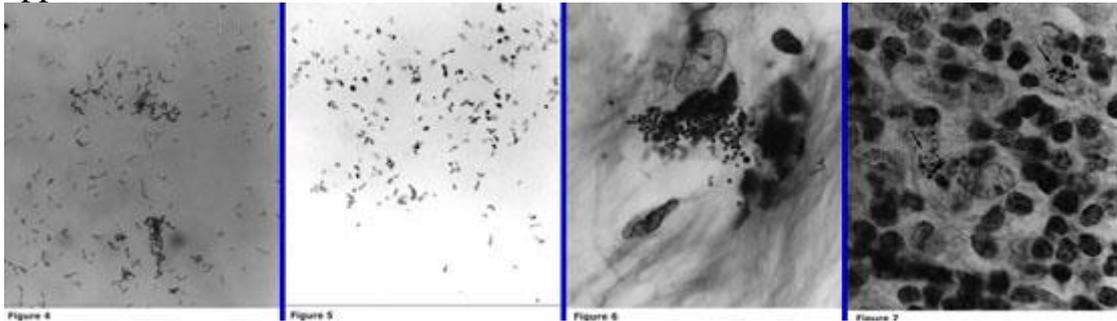


Figure 1

Figure 2

Figure 3

Figures 1-3 show coccoid forms in the skin and lymph node of a previously reported 56 year-old man with HD of the skin and lymph node [8]. Figures 4 and 5 show the appearance of the microbe (*Propionibacterium acnes*) grown from the skin tumor, when stained with the acid-fast stain and also with the ordinary Gram's stain used for bacteria. Figure 6 shows the variably-sized round coccoid and spore-like forms seen in the lungs at autopsy from a reported fatal case of HD in a 15 year-old Latina [7]. Figure 7 shows larger round forms in a lymph node from Hodgkin's disease, consistent with the appearance of Russell bodies.



Microphotographs of Russell's bodies in HD have been reported by Cantwell [6]. Additional photos of Russell bodies in Hodgkin's disease can be found on the Internet by Googling: Russell Body + Alan Cantwell.

Is There a Specific Bacterial Agent in Hodgkin's Disease?

After a century of bacteriologic study of HD it is clear that there is no specific species of microbe connected with the disease. However, in my view, all cultural isolates showing cocci and pleomorphic forms should be carefully considered as etiologic suspects, particularly if the cancerous tissue sections show pleomorphic forms in vivo.

In my experience cultures from cancer often appear as common staphylococci, such as *S. epidermidis*; or as common corynebacteria. All cultures should be examined for acid-fastness; and cultures should be examined and re-examined over a period of time, rather than being discarded after several days, as is the case with most "routine" bacterial cultures.

All tissue specimens should be examined with an acid-fast stain, as that is the staining procedure that offers the best overall staining of these bacteria. Acid-fast rod forms are extremely rare; intra- and extracellular coccoid and granular forms are the common forms. "Large bodies" can occasionally be observed, suggesting that the cancer microbe exists in vivo in HD in the cell wall deficient phase or mycoplasma-like phase. Due to their size, the largest pleomorphic bacterial forms may be easily confused with fungal spores and yeasts.

For almost a half century the late physician Milton W White was convinced that a pleomorphic fungus caused cancer. In his last communication in 2002 he referred to the cancer agent as an "intracellular invasive microbe." He termed the coccoid forms as "seeds" of an "invasive asexual spore" related to fungi [65]. Abstracts of White's numerous papers on his cancer-causing "mycococcus," published in *Medical Hypothesis*, can be found at the PubMed

website.

Most cancer microbe researchers believe the cancer microbe is a bacterium. However, years ago I observed in bacterial cultures from scleroderma that the initial cocci and rod forms of the microbe became more fungus-like as it aged [30]. The exact identification of this fungus could not be ascertained, even though my professor, J Walter Wilson, M.D., was one of the world's leading fungal experts. In my experience, scleroderma and cancer microbes are closely related to the acid-fast mycobacteria. And bacteriologists all agree that mycobacteria are closely related to the fungal-like "actinomycetes." The word "myco" is Greek for fungus, thus emphasizing their close relationship.

The Peculiar Microbiology of Hodgkin's Disease

The wide range of bacterial forms found in HD in the early twentieth century was reviewed in 1933 by Andrew Wallhauser, M.D., who cited reports of acid-fast bacteria, streptococci in the blood, various types of cocci, a large diplococcus, *Staphylococcus albus* [now called *S. epidermidis*], "curious bodies resembling the spores of fungus," diphtheroid bacteria (now known also as corynebacteria and propionibacteria), and filterable forms called the "tuberculosis virus," and others [3].

Of particular interest was the HD research of Natalia Busni of the University of Odessa in the Ukraine, recorded in the German literature in 1928 and 1931 [1-2]. She reported a peculiar organism in 5 cases of mycosis fungoides (T cell lymphoma of the skin) and 140 cases of "lymphogranulomatosis" (an older synonym for HD and also for sarcoidosis). The bacteria initially cultured from HD showed TB-like acid-fast rod forms, but after 24 hours the rods completely transformed to cocci, resembling common staphylococci, as quoted by Steiner [5]. Busni's coccus did not return to the acid-fast rod form in vitro in the lab, but had to be passed through an animal before it could be recovered again in its initial acid-fast rod form. Busni regarded mycosis fungoides and lymphoma as closely related, and considered them both as bacteremias (blood infections). Busni's coccus and its derivation from acid-fast rod-shaped bacteria is reminiscent of Anna Csillag's non-acid-fast "mycococcus" derived from acid-fast mycobacteria.

Although such microbes are still looked upon with disbelief by many bacteriologists, this pleomorphism is consistent with bacteria cultured and studied by various cancer microbe researchers over the past century. Busni's work showing acid-fast bacteria in HD was later confirmed by Aplas in a series of papers (1959-1963) in the German literature [13-14], and by Cantwell in 1982 [6-8].

The pleomorphic microbe of cancer cannot be easily "classified" because it defies the laws of microbiology. As stated, traditional microbiologists and pathologists do not believe in "life cycles" for bacteria.

The famous Russian microbiologist N A Krasilnikov, in his seminal book, *Soil Microorganisms and Higher Plants*, remarks about the classification of bacteria, particularly the "actinomycetes" (the bacteria-like and fungal-like microbes), to which the HD microbe (and the cancer microbe) is closely

related. He writes:

The classification of microorganisms is very unsatisfactory. There is no common principle of classification in microbiology. The classification of bacteria and actinomycetes is especially inadequate. This can be explained by the peculiarity of those organisms, the simplicity of their structure and growth and lack of external properties for differentiation.

The bacteria of the genus *Micrococcus* are characterized by their spherical shape. Into this group organisms which in fact belong to coccoid bacteria are included and also not infrequently specimens of actinomycetes are included in the genus *Mycococcus*.

The shortcomings of the bacteriological classification have their origin in our scant knowledge of the life of the organisms. In order to be able to speak of the phylogenetic relations between the organisms, it is not sufficient to know and study one randomly chosen stage of the life cycle of the microbe. A thorough knowledge of its growth, development, structure, reproduction, life cycle, polymorphism, variability, etc, is needed. In order to obtain much knowledge, the organism in question should be studied not only in laboratory conditions but also in natural surroundings. (*italics Cantwell*)

The lack of knowledge of the life cycle of this or another microbe frequently misleads the investigator. For example for this reason mycobacteria are considered by some authors as micrococci or as rodlike bacteria. Krasinikov's full treatise is available free on-line in the Library section at www.soilandhealth.org.

Cancer, and the "Human-Bacteria Hybrid"

Most people do not envision the human body as immersed in a sea of microbes from internal and external sources. Our only protection from the trillions of potentially dangerous bacteria that inhabit our bodies is our immune system and the grace of God, for want of a better phrase.

There is also recent evidence that bacteria and human cells constantly "swap genes", much like the AIDS retrovirus swaps its genetic material with human cells. Rowan Hooper, writing in *Wired News* about new research at Imperial College London, notes: "Most of the cells in your body are not your own, nor are they even human. They are bacterial. From the invisible strands of fungi waiting to sprout between our toes, to the kilogram of bacterial matter in our guts, we are best viewed as walking 'superorganisms,' highly complex conglomerations of human cells, bacteria, fungi and viruses. More than 500 different species of bacteria exist in our bodies, making up more than 100 trillion cells. Because our bodies are made of only some several trillion human cells, we are somewhat outnumbered by the aliens. It follows that most of the genes in our bodies are from bacteria, too. Luckily for us, the bacteria are on the whole commensal, sharing our food but doing no real harm."

Some physicians might expect a cancer germ to be a specific kind and species of bacterium, but there is no reason why this should be the case. Physicians also expect an antibiotic (and radiation) to kill cancer bacteria, when, in fact, cancer bacteria cannot be eradicated so easily. Doctors expect a cancer germ

to be present in cancer patients, but not in cancer-free patients. However, Virginia Livingston and others carefully noted that everyone carries cancer germs. This is not unlike the millions of healthy Americans who carry antibiotic-resistant staphylococci in the nose, the same bacteria that in other people can cause death-threatening infections unresponsive to any available antibiotic therapy. Or normal, healthy people who carry cancer-causing bacteria in the stomach.

I am aware of microbiologists and pathologists who demand "proof" that these round forms are microbes. However, I contend that after attending medical school physicians should be able to recognize bacteria when they see them. And surely these "forms" reported for a century should be recognized as significant and studied carefully. The disinterest of the medical and microbiologic community in investigating bacteria in HD and other forms cancer is not in the tradition of good science.

There is no longer any excuse to be ignorant of research pointing to bacteria as a possible cause of cancer, particularly when evidence of such bacteria resides in the medical literature. Previously, the contents of medical journals were closed to most people who could not gain entrance to a medical library. By use of Internet search engines and the PubMed website, published medical literature is now easily available to everyone via the click of a mouse.

A computer Internet search, using key words such as: cancer microbe, cancer bacteria, pleomorphism, and nanobacteria + cancer, provides a good introduction to the microbiology of cancer. In addition, I suggest Googling cancer research workers, such as Virginia Livingston, Erik Enby, Guenther Enderlein, Alan Cantwell, Lida Mattman, Wilhelm Reich + T Bacilli, Raymond Royal Rife, and others.

The cancer microbe has a rich history dating back to the nineteenth century. Anyone interested in the bacterial cause of cancer and certain other diseases of unknown etiology would be well advised to explore it.

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