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THE THERAPEUTIC USE OF RADON: A BIOMEDICAL TREATMENT IN EUROPE; AN “ALTERNATIVE” REMEDY IN THE UNITED STATES

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□ There is a growing recognition in the United States and Europe that health care is driven to a significant extent by an emphasis on consumer choice and demand. As consumers, people regularly choose their own solutions for health promotion and maintenance, solutions which may or may not be sanctioned by mainstream medicine. Radioactive radon therapy exemplifies a non-sanctioned treatment eagerly sought by certain patients, but scorned or dismissed by many physicians. This is certainly the case in the United States, where well-publicized Environmental Protection Agency (EPA) warnings portray radon as a potential carcinogen. Between 1997 and 2001, I worked with a population of arthritis sufferers who expose themselves to radon gas in Montana radon health mines in order to alleviate their symptoms. In this paper I discuss the decision-making process involved in using radon, and compare the Montana radon health mine facilities with selected radon mines and spas in Europe.

Keywords: Radon therapy, biomedicine, alternative medicine, arthritis

INTRODUCTION

Radioactive radon gas is widely considered to be a health hazard by environmental agencies in the United States (EPA 2005) and in Europe (Becker 1999). Yet despite the warnings of these agencies, thousands of people annually expose themselves to radon for therapeutic purposes, in facilities ranging from rustic old mines, to upscale spas and clinics (Cohen 1995; Falkenbach and Wolter 1997; Parker 1987). In this paper, I describe the medical application of radon as a pain reliever. Using the notion of medical pluralism as a framework, I begin by discussing the controversial nature of radon therapy, and why people choose to use radon therapy in view of its reputation as a carcinogen. I then describe the radon mines in Montana and contrast them with selected radon therapy facilities in Europe.

I first became aware of the therapeutic use of radon in 1997, through a chance encounter with someone who claimed positive results from a treatment she undertook in a mine outside the small town of Boulder,

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Montana. As an anthropologist I was intrigued, and I embarked on a cultural study of the radon therapy that would take me to Montana each summer for four years, and on two occasions to Europe. As a social scientist, I do not claim expert knowledge about radon and its biological effects; rather, my intention is to look at the human dimension of radon therapy.

My interest in this topic originated from my ongoing anthropological study of medical pluralism in contemporary societies. Medical pluralism can be defined as the simultaneous existence of multiple types of health care and health beliefs including, for example, biomedicine, folk remedies, and religious healing. Medical pluralism thrives even where science-based biomedicine is the predominant form of health care at least in part because as consumers, people want to have a range of choices and options (Aldridge 1994; Kleinman 1980; Spector 1996). Moreover, while modern biomedicine has been enormously successful in the treatment of acute illnesses, it has dealt less well with chronic illnesses (Roberto 1994). It is thus not surprising to find that many people suffering from chronic conditions have sought out alternatives to biomedicine, ranging from acupuncture and massage, to herbs, crystals and magnets. In the United States, treatments not sanctioned by conventional biomedicine, nor taught in conventional medical schools, are popularly labeled under the very broad category of “alternative medicine” (Eisenberg et al. 1993; Eisenberg et al. 1998).

In recent years, several major studies have been conducted to determine the prevalence of alternative medicine use in the United States (Eisenberg et al. 1993; Eisenberg et al. 1998). The results of these studies indicate that about 40 percent of the population saw alternative health practitioners in the surveyed years, and according to the National Institute of Health, more than 80 percent use some form of alternative care in addition to conventional care. Of the people surveyed, those suffering from chronic illnesses lacking well-defined causes and cures, and having long-term clinical courses, were most likely to seek alternative therapies. Other studies have shown that pain is often the primary motivation for trying new and even unconventional treatments. Arthritis sufferers, for example, typically rely on pain medications and anti-inflammatory drugs, but when taken over the long term, these may lose their effectiveness, or have severe side effects, in addition to being costly (Kronenfeld and Wasner 1982). Radon taken at therapeutic doses is an alternative to conventional biomedical treatment that apparently relieves pain and other symptoms of arthritis and other inflammatory diseases quite effectively. Because its effects are long lasting, and because it is relatively inexpensive, radon treatment allows many arthritis patients to discontinue using their medications for months at a time, thus providing relief from side effects and financial relief simultaneously.

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RADON THERAPY

The therapeutic use of radon involves the intake of radon gas either through inhalation or by transcutaneous resorption of radon dissolved in water. Most of the radon is subsequently discharged through exhalation, but a small amount remains in the body as radioactive radon progeny, which are physiologically active through their continued decay (Falkenbach and Wolter 1997). In the United States, radon therapy can be obtained only by inhalation in four old mines near the small towns of Boulder and Basin, Montana. In Europe, radon therapy is available in multiple forms, including baths, steam, and inhalation in curative tunnels and mines (Becker 2004; Parker 1987).

Radon Controversy in the United States

Radon therapy is not an approved biomedical therapy in the United States, primarily due to continuing controversy over how much radon exposure is safe (Thomas and Goldsmith 1995). Environmental agencies in the United States and in Europe consider radon an indoor health hazard when it seeps from bedrock into buildings and accumulates (Becker 1999; EPA 2005). The major source of concern is that the decay of radon gas produces radioactive progeny which adhere to dust and smoke and be inhaled. The inhalation of these particles has been correlated with an increased incidence of lung cancer in uranium miners, although the correlation is strongest among smokers (Becker 1999; Falkenbach and Wolter 1997). The Environmental Protection Agency (EPA) and other agencies responsible for protection of the public believe that there is no level at which exposure to radon is safe (BEIR VI 1999; EPA 2005; Miller and Coffey 1998). Because of the correlation of high levels of radon exposure with cancer, these agencies extrapolate the same cancer risk to lower doses, applying the “linear, no-threshold” (LNT) model of radiation carcinogenesis. According to this model, any exposure to radon is harmful (BEIR VI 1999; EPA 2005; Miller and Coffey 1998).

However, some scientists take issue with the LNT model. This point of view is based on the *hormesis* phenomenon, the observation that small amounts of stress on biological organisms, caused by, for example, a chemical, heat or ionizing radiation have a stimulatory or even beneficial effect, although high doses of the same stressor are harmful or lethal (Luckey 1996; Muckerheide 1995; Pollycove 1995). According to this view, the linear extrapolation of the risk from high doses of radiation to low doses assumed by the LNT model greatly overestimates the risk of harm, and ignores the potential benefits. Low doses of radiation have been found to stimulate growth (Stebbing 1982), DNA repair (Kondo 1998a and 1998b), antioxidant action (Feinendegen 1987; Pollycove 1998), and immune response (Liu et al. 1987). Other studies have shown

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that cancer rates actually decrease in populations exposed to low levels of radiation beyond normal background radiation (Bogan 1998; Cohen 1995; Dissanayake 2005; Hattori 1997; Kondo 1993; Mifune 1992). The overestimation of risk by the LNT model is considered important by hormesis advocates, because its cautious perspective prevents patients from receiving low-level ionizing radiation treatments, such as radon, which might help them. Moreover, if radon levels were held to the standards mandated by the EPA and other agencies following the LNT model, the costs of residential radon abatement would be extraordinarily high (Macklis and Beresford 1991; Thomas and Goldsmith 1995).

Because of the controversial nature of radon and its potential dangers, radon therapy exists completely outside of the biomedical health care system, and is never covered by medical insurance. Thus it most assuredly fits the American definition of an “alternative therapy.” As a result, many of the Montana mine visitors report that they hesitate to inform their doctors, or even family and friends, about their decisions to try radon. Mine visitors often express resentment toward governmental agencies, which, in their eagerness to protect the public, may “take away” a method of pain relief they believe is very effective. They also tend to blame the American Medical Association, rightly or wrongly, for failing to conduct clinical tests on the efficacy of radon therapy.

Radon in Europe

Radon therapy in Europe exists in a completely different cultural context. The concerns of European environmental agencies about the hazards of indoor radon contaminations are similar to those in the United States, however this has not seemed to preclude the medical use of radon. In part, this is because European countries tend to incorporate within their biomedical health care systems many of the genres of treatment categorized as “alternative” in the United States. Although each European nation has unique customs, regulations, and laws concerning precisely which types of therapies may be practiced, in general there is a much greater acceptance of naturopathy, homeopathy, manipulative techniques, and traditional medicines within the health care system (Aldridge 1994; Payer 1996). For example, the legislative framework governing the practice of alternative medicine in Germany is permissive, allowing patients to choose orthodox practitioners, complementary practitioners who utilize multiple approaches, or naturopathic healers (Aldridge 1994; Payer 1996). In general, physicians are free to work with a much broader range of therapies, and radon is one of the many possible choices.

In addition, radon treatment is an established therapy that builds on centuries-old spa therapies (Becker 2004; Maretski and Seidler 1985). Spas and spa towns are plentiful throughout Europe, where patients “take the waters”, both as baths and for drinking; however radon baths are pre-

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scribed only after a thorough examination has indicated its application for a particular health problem. In radon curative tunnels such as the Gasteiner Heilstollen in Austria where radon is inhaled, patients are also examined and a specific dose of radon prescribed for their individual conditions. In the words of Dr. Hornátova, former medical director of the Radium Palace in the Czech Republic, radon treatment is definitely not considered to be an “alternative therapy,” nor is it considered to be a nature cure. Rather, it is simply one of many science-based treatment possibilities (see for example, Falkenbach 2001; Franke et al. 2000).

RADON HEALTH MINES IN MONTANA, U.S.

Currently there are four radon health mines in operation in Montana. Radon treatment in these mines is a passive self-treatment in that it involves nothing more than exposing the body to radon by entering the mine. The brochures printed by each radon mine suggest that the optimum treatment program consists of thirty-two one-hour visits over the course of about ten days. These are typically taken in two to three visits per day, for a total of three hours exposure per day. During their visits to the mine, people sit on the chairs and padded benches placed alongside the tunnel walls, where they may read, sleep, or sit and talk with one another. Another popular pastime while in the mines is to sit at tables and play cards or board games. Between visits, the mine visitors are urged to rest, breathe deeply, and drink plenty of water. Radon therapy is not only a self-treatment in this sense, but it is also self-directed. Mine clients are not supervised, and they are expected to keep track of their time in the mines in conformity with the suggested time limits, and an honor system assume that the clients will take only the number of “treatment” they have paid for.

No medical personnel of any kind are available on the premises, and no medical records or referrals are required for admittance. There are rules, however: neither pregnant women nor children under the age of eighteen should use the mine without the express prescription and advice of a licensed physician. The Department of Health and Environmental Sciences of the State of Montana does not actively regulate these mines; they have taken a “hands off” approach and do not inspect the mines or test the levels of radon on a regular basis. However, they have stipulated that an exposure of thirty-two hours per year is acceptable.

Radon Concentrations

Radon in the Montana mines is measured in picocuries per liter of air. According to EPA standards, the maximum home exposure should be no more than 4 pCi/L, and ideally, when technology allows, this level of radon should be reduced to 2 pCi/L (EPA 2005). Concentrations above this level are considered to be dangerous by the EPA. At the mines, radon concen-

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trations are as high as 1600 pCi/L. According to a test made by the State of Montana Department of Health and Environmental Sciences in 1991, radon concentrations in the six mines then in operation ranged from 233 to 1296 pCi/L. However, according to more recent radon tests analyzed by independent laboratories, the radon concentration in the Free Enterprise Radon Health Mine typically ranges from 1100 to 1600 pCi/L in the various parts of the mine tunnel (P. Lewis, personal communication).

Characteristics of the Radon Mines

Besides the radon concentrations, there several major differences between the Montana mines. The Free Enterprise Mine is the only one actually located underground; its mine tunnel is eighty-five feet underground, and must be reached by an elevator. The other mines are horizontal tunnels that one simply walks into. One of them was never actually a working mine; its tunnel was dug specifically for radon mine visitors. Another major difference is the amount of water present. Two of the mines have a stream of water running alongside the tunnel's length, possibly from excessive water seepage. For some mine visitors, this water is a bonus, as it is believed that soaking affected limbs, hands, and feet in the cold, radon-enriched water will add to the effectiveness of the treatment. To facilitate this, the Merry Widow Mine provides buckets and hoses, with seats that face the water channel. All of the mines are cold inside, averaging about 60° F, and as a result they have installed heat lamps along the tunnels. It is not unusual to see people bundled in light blankets, and wearing jackets.

The towns of Basin and Boulder near which the mines are located are very small, with populations of 250 and 1750 respectively; thus accommodations are limited. In addition to several small motels, all of the mines provide camping areas, recreational vehicle hookups, cabins, trailers, or a combination of these. These enable many of the mine visitors to stay onsite where they can conveniently take their daily treatments. The costs of treatment regimens vary, but the most expensive is still very reasonable, compared to expensive drugs or surgery, at about \$150 for thirty-two hours in the mine.

The Free Enterprise Radon Health Mine

The original radon health mine in Montana was the Free Enterprise Mine, which officially opened for treatments on June 23, 1952. Wade Lewis, the owner, had been shipping commercial grade uranium ore from this mine since 1949, but the focus of the mining operation changed abruptly in 1951, with a visit from the wife of one of the mining engineers. She had severe bursitis in her shoulder, but after a visit down into the 85 foot deep mine shaft she claimed to be pain free. She called

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a friend in Los Angeles, who called other friends, and before long the Free Enterprise was inundated with requests from people with arthritis who wanted to go into the mine for “treatment.” By 1952 the numbers of people wanting time in the mine were so great that Lewis decided to close his mining operation and re-open as a “health mine” after making a number of improvements for safety and accessibility (Lewis 1994).

According to local newspapers, by 1954 tens of thousands of people had traveled to Montana to visit either the Free Enterprise Mine, or one of the other local mines that also claimed to have radon and had opened their tunnels to the arthritic public. The American Medical Association (AMA) at that time proclaimed radon therapy for arthritis pain to be a medical hoax and a promotional scheme. The manager of the Free Enterprise Mine asked the AMA to send a qualified observer, but no one was willing to go unless the mine agreed to pay salary and living expenses for several months. The observation by the AMA never took place (Bailey 1955).

Today, approximately 500 people visit the Free Enterprise Mine every year. Many of the mine’s clients are repeat visitors, some of whom have been coming to the mine for years. Many of the people I interviewed claimed that after spending two weeks at the Free Enterprise, they were able to stop taking their medication, and to remain relatively pain-free for as long as a year.

Several described how, as time went by, they gradually noticed the return of their symptoms, and would then know it was time to return to Montana for a “tune-up.” Some clients were able to stretch their visits to one every other year.

In 1998 I collected demographic data from client file cards kept by Patricia Lewis, in order to gain an overview of the clientele who used the mine in the five-year period between 1993 and 1997. Most of this clientele is over the age of 65. There were approximately equal numbers of males and females. Of the 807 individuals I sampled, 83 had been using the mine for twenty years or more, and 173 for ten years or more, indicating a high level of satisfaction with radon therapy. Within this time period, the vast majority of mine clients suffered from arthritis and other rheumatic ailments. Other common complaints were respiratory illness, skin problems, and allergies. Also represented were systemic diseases including scleroderma and lupus, and in fact, several of the mine visitors I interviewed had been treating these conditions with radon for years, with great success.

One of the frequent topics of conversation among the mine visitors is the fact that Europe has radon mines and spas. People are all too aware that what they are doing—at least in the view of the EPA—is considered to be irrational in the United States, especially given the rustic and non-medically supervised setting. In addition to the apparently real

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pain and symptom relief they experience, another way to justify their use of radon is to focus on its acceptance within the biomedical health care system in Europe. Patricia Lewis has made it her goal to become knowledgeable about the science that supports medical radon use, and she has amassed a large collection of journal articles that mine guests may read, if they wish.

RADON THERAPY IN EUROPE

Compared to the rustic mine tunnels in Montana, radon therapy in Europe is much more upscale, a reflection of its accepted status as science-based, and as simply one of a range of possible treatment modalities. Radon therapy facilities in Europe also have the advantage of being generally covered by health insurance. During my trips to Europe, I visited three spas, one radon steam bath, two curative tunnels, and one radon mine. I present brief descriptions of these here. All information is from interviews with medical staff.

Radon Via Bath or Steam

The German spas Schlema and Sibyllenbad function both as “relaxation spas” and as curative spas. The clientele thus may include people visiting for the day, as well as patients coming for a *Kur* who stay in local hotels or guesthouses and use the spa for three or more weeks. Both spas have indoor and outdoor pools, and offer a variety of treatments, including massage, sauna, hot sand beds, warm mud packs, and various types of mineral baths, including radon baths.

Radon baths must be prescribed by the clinic doctor, and the concentration of radon is specific to each patient’s needs. Radon is always given in a bath here. One reason is that the warm bath, especially with added CO₂, increases circulation and thus increases the uptake of radon into the bloodstream. The measurement of radon transfer from water through the skin into expiratory air, taking into account the active ventilation of room air, has been described by researchers at Sibyllenbad (Grunewald and Grunewald 1995; vonPhilipsborn et al. 2000). Baths, which are given in tubs covered so that only the patient’s head is out, also have the advantage of reducing exposure to and inhalation of alpha decay particles. The bathtub covers also help to keep the radon gas from dissipating as it emanates from the water. A typical course of treatment consists of nine radon baths over a three week period.

The Radium Palace in the Czech Republic also offers a number of treatments in addition to radon, but the “relaxation spa” model is definitely not emphasized. The employees prefer to describe the spa as a medical facility that specializes in the therapeutic use of radon. Medical conditions treated here include diseases of the motor system, inflamma-

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tory and degenerative states, posttraumatic and post-surgical conditions, and metabolic diseases. The primary effort of the spa is to relieve pain and symptoms, and to help patients reduce or eliminate their medication. Patients at the Radium Palace must bring a doctor's recommendation, their medical records, and a treatment proposal from the physician. In addition, every patient is then examined by staff physicians before treatment can begin, and a specific treatment plan is drawn up for each patient. Recommended treatment courses consist of twelve to fifteen baths over a three week period.

Another type of radon therapy establishment in Austria called Dunstbad uses a treatment regimen based on similar principles, but with steam rather than bath water as a vehicle for radon uptake. At Dunstbad, patients undress and sit on a bench inside a large container, with only their heads exposed. A towel is tucked around the patient's neck to prevent radon from escaping through the opening. Warm radon-containing steam is then pumped into the container, where radon will enter the bloodstream in the manner it does in a bathtub. In all of these examples, the warmth of the bathwater or steam brings the blood to the surface of the skin, and enhances the uptake of radon.

Radon Via Inhalation

The other radon treatment locations I observed were old mines or tunnels, which rely on inhalation of radon gas for the therapeutic effect. The owners and/or medical directors of these facilities believe that the concentration of radon inhaled is not high enough to be risky, or in any case, that the benefits far outweigh the potential risks. With only one exception, these curative tunnels are connected with a clinic, and as with the radon spas, patients were always examined and prescribed a specific treatment program including the number and length of treatments as well as the concentration of radon deemed most therapeutic for each individual.

The exception I refer to is the Erze Mine [pseudonym] in Germany: the only European radon facility of those I visited that is not operated as a medical clinic, nor staffed with medical personnel. In this regard, it is most closely analogous to the Montana mines. This mine is cold and wet, and seating consists of plastic reclining lawn chairs. Because the owner is not a medical professional, he does not advertise his mine as having radon, but rather as having "special air." Nevertheless, he gets many customers, primarily from local hospitals that bring respiratory patients to the mine in buses. Unlike the Free Enterprise Mine, the Erze Mine rarely has arthritis patients; about 75% have asthma, 15 to 20% have bronchitis or croupe, and the remainder has psoriasis. Radon concentration here is also higher than the Free Enterprise, varying from about 950 to 3600 pCi/L in different areas of the mine tunnel.

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Bad Kreuznach Radonstollen near Frankfurt, Germany, is a manmade tunnel, and it is only one of the range of treatments available at its adjoining *kurhaus* and hotel. In many ways, this facility is similar to Schlema and Sibyllenbad, in that patients stay at the spa for three or more weeks, and can use mineral baths as well as the radon tunnel. However, Bad Kreuznach does not offer radon baths; radon is only available through inhalation in the curative tunnel, where the concentration of radon averages about 1350 pCi/L. In contrast to the Erze Mine, the radon tunnel is warm and dry, and patients recline in comfortable chairs. According to the spa doctor, patients experience a significant reduction in pain and are able to reduce their medications. They are always referred by their personal physicians, and their treatments are generally covered by health insurance.

Finally, the European mine that is best known and most talked about in Montana is the Gasteiner Heilstollen (Curative Tunnel) in Badgastein, Austria. The discovery of the area's radon and its potential for pain relief is amazingly similar to that of the Free Enterprise Mine, but with a very different end result. Bad Gastein is an alpine resort located in the Hohe Tauern National Park. The Gastein region has a long history of being a health resort, dating back to the 13th century. The radon thermal springs themselves are estimated to be about 3000 years old. Long before any scientific evaluation of the water's mineral content, this area had been prized for the healing qualities of its thermal springs, especially for chronic rheumatic conditions of the muscles, tendons, and joints (Becker 2004).

Then in 1940, radon gas was discovered in an old subterranean gold mine at Bockstein village, about 3.5 miles from Badgastein. As the story goes, prospectors had entered the old tunnels looking for gold, but without much success to reward their hard work. About 1800 meters inside the mountain they found a very warm and humid climate, and at some point felt an inexplicable relief from their sore muscles and joints. Their tale prompted scientists to look more closely at the mine. The mineshaft was transformed into an emanatorium for radon, considered to be especially effective because the mine is naturally hot (98°F to 106.6°F) and humid (between 70 and 95%). The combination of heat, humidity and radon is thought to be particularly effective for therapeutic purposes. Not only do patients take in radon through inhalation, but because they are in a hot moist atmosphere, radon is also absorbed into the blood stream through the skin, in much the same way it does in a hot radon bath.

The Gastein Thermal Gallery is part of the Badgastein Thermal Spa and Therapy Center. The resort offers a radon thermal pool and includes 17 radon springs, which generate about 5 million liters of water per day at a temperature of up to 47°C (116°F) and a radon content of about 740 Bq/L (Deetjen 1997). The air in the thermal tunnel has a radon concentration of 4.5 nCi/L. This is the equivalent of 4500 pCi/L, more than

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twice the radon concentration of the Free Enterprise, and about 1000 times greater than the EPA recommended maximum of 4 pCi/L. Treatment consists of ten trips into the tunnel with at least one day between each trip, although the course of treatment may be individualized. Individualized dosages are based on the patient's condition and physical constitution. Many of the patients here suffer from ankylosing spondylitis, a type of arthritis that affects the spine (Falkenbach 2001; Falkenbach and Wolter 1997).

The radon treatment begins at the clinic, where a physician performs a complete physical workup on each patient. The purpose of this extensive exam is to determine how much radon is required by the individual's condition, as the tunnel has areas with varied radon concentration. Moreover, clinic doctors want to make sure that the patient will be able to tolerate the extremely hot and humid conditions of the tunnel, so blood pressure and heart conditions are taken into account. Once patients have been assigned the proper radon regimen, they proceed to a special train that takes patients from the clinic into the mountain. According to the medical director, most people take radon treatments as part of a *kur*, and so in addition to using the other clinic facilities—such as massage and calisthenics—patients may also use the thermal baths at nearby Badgastein, or even walk or hike in the alpine hills surrounding the small valley. Health insurance in Austria and Germany covers up to 90% of the cost.

DISCUSSION

Due to time and language constraints, I was not able to interview European radon users in the way I have tried to do for Montana mine clients. Nevertheless, it is possible to make some broad comparisons. Most importantly, the biomedical status of radon therapy in Europe makes a patient's decision to use radon simply a case of following the doctor's recommendation, in contrast to the struggle to rationalize and justify one's actions that American mine users often experience. Certainly, as I have discussed previously, European environmental protection agencies are just as concerned with excessive indoor radon as their counterparts in the United States. But in Europe there is the sense that medically supervised radon treatment, where used, is scientifically valid, along with the recognition that radon therapy is something completely apart from the potential health problems that might result from living in a radon-filled house. The spa or clinic doctors (as in Radium Palace, Bad Gastein, Bad Kreuznach) claim their patients are NOT afraid of radon; after all, they are purposefully seeking it out, and in some cases coming specifically to that spa *because* it is one of the few that does have radon. This is true even though people are "interested" in the public radon problem.

The *kur* tradition that serves as a framework for European radon therapy is culturally well known, and is viewed as a normal treatment regimen,

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not the “alternative therapy” three weeks of hot springs and massage would certainly be considered in the United States. The medical director at the Radium Palace was adamant that at her establishment, radon therapy was not considered a *nature cure*, nor was it any kind of “*alternative medicine*” in the sense that the term is commonly used. With the long history of “taking the waters” in Europe, radon in baths easily becomes merely one of many possible types of curative baths. Where radon is taken as inhalation, the curative tunnels are invariably used in conjunction with a spa. Patients, therefore, consider radon as simply a part of standard medical practice. Further, the elegance and luxury of Schlemma, Sibyllenbad, the Radium Palace, and the Bad Kreuznach *kurhaus* help to make radon therapy in Europe seem credible, scientific, and upper class.

Of course, in a sense image is everything. When journalists go to Montana to interview mine owners and visitors about radon therapy, they are often unable to hide their disdain, or in some cases, their fear of the radiation. In the tunnel of an old mine, talking to a group of arthritic elderly people playing cribbage, it can be difficult for some of these journalists to keep an open mind about scientific studies supporting radon treatment; it may be easy for them to assume the place is run by amateurs seeking to make a profit from gullible ill people. If the Montana mines looked like the spas in Europe—if they looked like anyone’s cognitive model of a real, professional, medical facility—and if there were a doctor on staff, then they would undoubtedly be taken more seriously. Instead of drawing conclusions based on the appearance of the place, perhaps more attention would be paid to the science that explains why these people are there to begin with.

Because the medical establishment in the United States does not see fit to seriously consider the potential health benefits of radon therapy, Montana mine owners with limited financial resources must simply make do with whatever amenities the mines can afford to provide. Montana mine clients are obviously willing to use the comparatively rustic Free Enterprise Mine, but they clearly realize the implications of the economic differences between Montana mines and European mines and spas. As providers of a non-sanctioned therapy in the United States, the owners of the Free Enterprise Radon Health Mine cannot be expected to provide the luxurious accommodations so artfully depicted in the European brochures, nor can they charge high fees. Mine clients need radon therapy to be reasonably priced, because as a non-sanctioned therapy it is not covered by medical insurance. Complaints among the mine visitors about the American Medical Association, the Environmental Protection Agency, and the medical profession in general, reflect the beliefs of many mine clients that the lack of support for radon therapy in the United States is to a great extent economically driven. There is the feeling among mine clients that American doctors and pharmaceutical companies will pur-

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posely avoid radon therapy, regardless of its merits, because it has less profit potential. The fact that radon therapy is accepted in Europe is not only a validation of mine clients' own health decisions, but it is also a criticism of the American system of health care, and of the biomedical and governmental institutions that force people to risk ridicule by sitting in an old mine.

People need and want choices and options in their health care for a number of reasons. Some of these reasons are economic, not only because the cost of health care in general continues to increase dramatically, but also because chronically ill people must take medications for many years, something that can be a severe financial burden. Moreover, we are frequently reminded in periodicals and newspapers that millions of Americans have no health insurance at all, placing a premium on any type of effective treatment—such as radon therapy—that can be obtained at a reasonable price. Secondly, the people who use radon therapy are predominantly elderly. With increasing age, the body metabolizes medications less efficiently, and compounding the problem, age brings more chronic illnesses, and the increased likelihood that multiple medications are being taken. Drug side effects, which can be severe at any age, can be worse for elderly people. And, according to many mine visitors, the medications they had been taking had lost their effectiveness over time.

Radon therapy should continue to be studied with an open mind, so that its potential for pain relief can be made one of many medical options available to people everywhere.

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