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their way through the mask, thus tending to demonstrate the ineffectiveness of masks. Reference also was made to the report of the New York State Department of Labor dated June 16, 1931, a copy of which we have, in which the statement is made that masks are not effective in protecting workmen from the perils of breathing rock dust.

CLARENCE L. SAGER

Metropolitan Life Insurance Company

Frederick H. Ecker, President

A. J. LANZA, M.D.
ASSISTANT MEDICAL DIRECTOR

New York City November 23, 1929

Mr. Allen Wardwell,
16 Broad Street,
New York City.

Dear Mr. Wardwell:

I enclose the bibliography on asbestosis. There are three articles in this list that appeared in "Tubercle", an English publication, and I am sending for extra copies of these and when I get them I shall send a set to Mr. Hyatt in Newark.

We have almost completed our work in Manville which we found a larger job than we had anticipated. I spent a day there recently and found it a very fine plant indeed.

Please let me know if we can secure any other information for you.

With best regards, I am,

Sincerely yours,

A. J. Lanza, M.D.
Assistant Medical Director.

METROPOLITAN LIFE INSURANCE COMPANY
Frederick H. Ecker, President
New York City.

Anthony J. Lanza, M.D.
Assistant Medical Director.

May 31, 1932.

Vandiver Brown, Esq.,
Johns-Manville,
292 Madison Avenue,
New York, N.Y.

Dear Mr. Brown:

Many thanks indeed for your letter of May 25th and the two volumes of the record of the case of Butler. I am very glad indeed to get this material and appreciate your courtesy in sending it to me.

I am now back in New York for good and hope to drop in and see you some time in the near future.

As you are probably aware, there are a great many of these suits being filed, particularly in Rochester. I have had several attorneys and other interest people come to me for such advice as I could give them. These people always ask if I can refer them to others who have had similar experiences. I have always refrained from mentioning the Johns-Manville Company or anybody connected with it in any way but I am wondering whether there might not be some advantage in a community of interests, so to speak, for after all misery loves company.

Mr. Folger of Harris, Beach, Folger, Bacon and Keating, 40 Franklin Street, Rochester, New York, Attorney for the New York Central Railroad, is handling a great many of these cases. A Mr. Hardigg of the American Society of Mechanical Engineers is trying to get up some sort of a Manufacturers' Defense Association on behalf of the abrasive industries, and a Mr. de Blois, who used to be the head of the safety department of the Dupont organization is also trying to get together some organization for the benefit of the Rochester manufacturers.

I shall appreciate it if you will let me know some time whether you would wish to confer with any or all of these people or whether I should maintain the attitude that I have in the past of merely referring them to various government authorities in Washington.

With best regards,

Sincerely,

(Signed) A. J. Lanza
Assistant Medical Director.

January 28, 1946

Mr. Donald E. Cummings
205 E. Cowgomic Street
Ironwood, Michigan

Dear Don:

I just received your letter of January 21 which I have gone over very carefully. I am in thorough agreement with what you say and do not think there is any question at all but that all of us, at least those of us in the Homicide Club, are in thorough accord in this matter.

I did not talk with many of the delegates present at the Pittsburgh meeting and I did not get any impression one way or the other as to their main interest being in fighting claims. I presume that it is would be so for some of them and possibly for the majority of them but I do not think from what I know of the Mellon Institute that you could get the Mellon Institute to set up an organization chiefly interested in claim fighting.

Dr. Keller outlined his position to Dr. McConnell and myself and also to Pendergrass and Sayers very frankly. I am sure that he would agree to every statement that you made in your letter to us both from what he said and from my knowledge of him. Not it is possible that Dr. Weidlein may take a different view but I doubt it.

I was not inclined to pay too much attention to some of the reactionary statements that were made by one or two of the speakers as they were special pleaders and were recognized as such by the audience. It may be that the effects of their statements were out of proportion as far as the audience was concerned. If so, I think that is too bad.

Possibly Dr. Weidlein and Mr. Nichols did not make sufficiently clear what they had in mind in setting up a central co-ordinating agency. I find it difficult to believe that they would be so short-sighted as to have any kind any set-up that was not organized on the broadest and most useful scientific lines. However, time will soon answer the question.

I would appreciate it very much if, after the Chicago conference, you would write and tell me what your impressions were and whether anything is coming out of this.

With best regards and many thanks for your letter, I am

Sincerely,

METROPOLITAN LIFE INSURANCE COMPANY
FREDERICK H. ECKER, PRESIDENT

NEW YORK CITY

ANTHONY J. LANZA, M.D.
Associate Medical Director

February 26, 1935

Dr. Leroy U. Gardner, Director,
Saranac Laboratory,
Saranac Lake, N. Y.

Dear Roy:

I have your letter of February 24 and cannot say that I blame you for feeling somewhat puzzled about the present situation. However, a lot of the confusion is due to misunderstanding and a general groping around. I think it will straighten itself out. I enclose a copy of a letter that I wrote to Don. At the request of Mr. Hitchins, I also sent a copy to Mr. Gentholtz of the Republic Steel Company and I have sent a copy to Dr. Sayers and Mr. Fletcher of the St. Joseph Lead Company, who has been quite a help.

This morning, I have a wire from Don saying that he has delayed returning to Ironwood as he is to appear before the Legislative Committee in Ohio considering the silicosis bill. He intimates that Hitchins and his group will get the support of the iron and steel people if they can straighten out some of their misunderstandings. I tried to clarify the situation in my letter and only hope that I did not succeed in muddling it the more.

I have no idea at this time whether or not the scheme proposed in Pittsburgh is going to work and whether, if it works, any of us will want to have anything to do with it. If they want to center their efforts on the litigative and legal aspects of the question, then neither you nor I nor the Public Health Service will be interested. If they wish to sponsor and coordinate research, then they cannot get along without the support of the Public Health Service and Saranac. In any event, I do not see that Saranac is in any way threatened. Nobody is going to set up a research or investigative organization to do what you and the Public Health Service are now doing.

I do not see any chance of my being able to give anything more to this enterprise than advice. I do not think it is in the picture at all for me to become actively identified with it. I agree with Mr. Fletcher that if anything is to be accomplished, the best promise of success would be to have the undertaking sponsored by and administered by the Saranac Laboratory not necessarily in Saranac. However, I imagine the whole subject will be simplified and clarified if and when the interested parties who contribute the money send their representatives to decide what and how they wish it done.

000026

February 28, 1935

Dr. Anthony J. Lanza
Metropolitan Life Insurance Company
New York City

Dear Tony:

Your letters have done a lot to straighten my own think'ng on the matter of the Silicosis Trust. I am glad to know where you stand because it will help me in my relations with the other people concerned. I am sorry you feel that you must take the personal stand that you have with regard to it, but I can appreciate that you would hardly dare to take any other, at least for the present.

Your letter to Cummings should be most gratifying to him for apparently you told Mr. Hitchins some of the things that Dom felt he should hear. I am glad that they intend to go easy on the expenditure of their first $25,000. If they should make mistakes with it they might never be able to get more. I understand some of the members have already contributed their first instalment of $500 each and I hope somebody holds it tight until there is general agreement on where it should be placed.

I do not expect to be in the city in the very near future but if I do have occasion to come down you may be sure I will drop in.

Sincerely yours,

Leroy U. Gardner, M.D.
Director

LUG:CC

METROPOLI[illegible] [illegible]PAN

FREDERICK H. ECKER, [illegible]

NEW YORK CITY

ANTHONY J LANZA, M.D.
Assistant Medical Director

April 2, 1938

Dr. Leroy U. Gardner, Director,
Saranac Laboratory,
[illegible],
Saranac Lake, N.Y.

Dear Roy:

Herewith the amended plan for a Dust Institute. As far as I know, this is O.K. by the small group whose [illegible] are appended thereto. When I get the final check from each one, I will transmit the plan to Mr. Hitchins and Mr. Sherwood who then can take it or leave it. If they take it and agree to drop all reference to the subject of claims, I think the Dust Institute will go ahead. If they insist on injecting claims and claim matters as an essential part of the Dust Institute, then all the rest of us will promptly drop out, in which case, I think that Don's contacts will probably set up an independent venture of their own.

I have not forgotten the matter of Atwell and will get hold of Mr. Fletcher in a day or two.

Best regards.

Sincerely yours,

A. J. Lanza, M.D.
Assistant Medical Director

00037[illegible]

FREDERICK H ECKER, Chairman of the Board
LEROY A. LINCOLN, President

NEW YORK CITY

ANTHONY J LANZA, M.D.
Assistant Medical Director

November 26, 1940

Vandiver Brown, Esq.,
General Attorney,
Johns Manville Corporation
22 East 40th Street,
New York, N.Y.

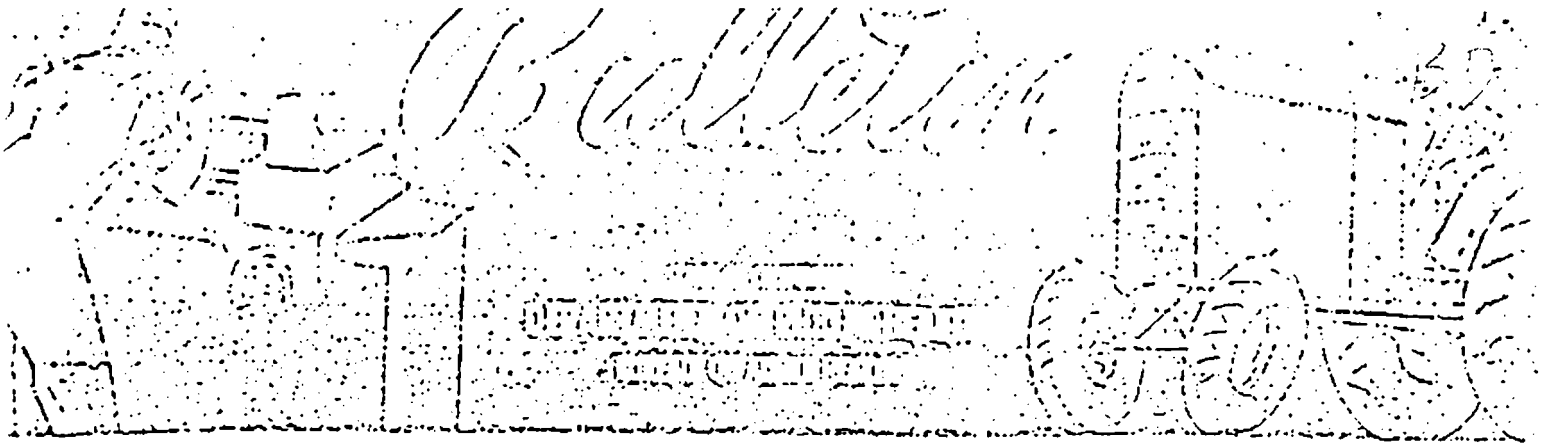
Dear Mr. Brown:

With further reference to your question concerning Richmond, I remembered after I returned to my office that I had had a conversation with a Dr. Edward Arthur Delarue, a young doctor in Richmond who seems to be very well connected and who is anxious to get into industrial work. He is thirty-three years old, was graduated in Richmond in 1933, and has an office at 116 East Franklin Street, Richmond. He struck me as a personable young man with a good background that might be worth considering.

Sincerely yours,

A. J. Lanza, M.D.
Assistant Medical Director

12/7/40
To Mr. F. G. Lippert, CH



Occupational Health Bulletin "R"

DIATOMACEOUS EARTH PNEUMOCONIOSIS

Diatomaceous earth is a form of "free silica," or silicon dioxide (SiO_2).* Like the ordinary silica from quartz, diatomaceous earth, when inhaled in sufficient amounts over sufficient periods of time, causes a disabling and often fatal disease of the lungs.

In this country the disease is usually termed "diatomaceous earth pneumoconiosis."** In Europe it is ordinarily referred to as silicosis due to diatomaceous earth. The disease differs in certain characteristics from, and has certain basic similarities to, conventional silicosis. These will be discussed.

What Is Diatomaceous Earth?

The natural or raw diatomaceous earth is a fine grained material composed of the siliceous skeletons of tiny aquatic plants known as diatoms. Through the ages, these have been deposited on the bottoms of bodies of fresh and salt water. In various parts of the world, these deposits have appeared at the earth's surface and many of them are now being commercially exploited.

Mineralogically, diatomaceous earth is classified as opal, a hydrous form of silica. The pure mineral is entirely free silica (silicon dioxide - SiO_2), but in its natural state diatomaceous earth contains about 25 to 40% water. Commercial varieties variously contain small amounts of impurities such as clay, lime, quartz, and others. Practically all samples of the dry earth, however, contain upwards of 75% silicon dioxide.

The natural diatomaceous silica differs from quartz silica, the common type found in most mines, in the fact that quartz silica shows a characteristic crystalline pattern in studies with the X-ray spectrometer, whereas the raw

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* "Free silica" is silicon dioxide (SiO_2).

** Pneumoconiosis is a general term for any disease of the lungs resulting from

In California, the Johns-Manville plant at Lompoc is said to be the largest producer of the material in the world, certainly in the United States. The other large producer in California is the Great Lakes Carbon Corporation, which operates a plant near Valleria, Los Angeles County, and is now constructing a large plant near Lompoc. There are other small producers in Santa Barbara, Inyo and San Diego Counties.

In recognition of the potential danger to workers handling diatomaceous earth products, the leading producers have recently inaugurated a program of labelling the containers of the powdered products as follows:

Caution

> "Celite" materials consist of an almost pure amorphous diatomaceous silica plus varying percentages of crystalline silica. Inhalation of silica dust over long periods may be harmful. The materials should be used so as not to create dust or--if this is not possible—employees should be equipped with adequate protective devices. (2)

In the producing industries, there are numerous dust generating operations which have been incriminated as sources of disease. However, in California at least, the chief danger spots today are in the occupations having to do with sacking the materials, loading them into railroad cars, and in the baghouses.* In the diatomaceous-earth-using industries, some of the trouble spots are those in which the materials are unloaded from railroad cars or other vehicles, or in which the material is emptied from sacks and mixed with other materials or otherwise used.

Number of Workers Exposed

In the mining and milling industries of the four western states, there are about 1,000 employees (about 800 in California) employed at any one time. However, the labor turn-over in the dusty jobs is exceedingly high, ranging up to almost 400% per year in certain instances, so that the number of workers exposed, whose lungs may have been damaged, is impossible to ascertain.

The number of workers exposed to the dust in the numerous industries using these products is not known, but is probably very high.

THE DISEASE

History Is Illuminating, But Not Read Often Enough

In California, diatomaceous earth has been mined and processed for almost 50 years. Fedyszoski (3) in Germany reported in 1910 experiments in which he was able to produce in animals true granulomatous deaths by introducing the dust subcutaneously.

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* "Baghouse" is a loose term for a bag type dust collector unit including fabric bag dust filters, support and housing for the bags, a shaking system, and

diatomaceous earth is usually "amorphous"; i.e., it fails to show a definite crystalline pattern with presently available equipment.

When the natural diatomaceous earth is subjected to heating (calcining) and treatment (fluxing) with certain chemicals (such as sodium carbonate) in the manufacture of numerous commercial products, a varying proportion of the so-called amorphous form is converted to a crystalline form of silica known as cristobalite.

In the United States, diatomaceous earth and its products are known by a large variety of names, commercial and otherwise: diatomite, celite, dicalite, etc., and there are various designations for powders containing mixtures of diatomaceous earth and other dusts, such as silocel, etc.

In Europe, there are also many designations for the same materials: infusorial earth, kieselguhr, fossil flour, fossil meal, tripolite, polirschiefer, desmid earth, moler, white peat, tellurine, randanite, bergmehl, etc.

Uses of Diatomaceous Earth

Diatomaceous earth in one or another form finds numerous practical applications: A few examples are:

a. Filtering and refining of sugar, syrups, spirits, juices, waters, petroleum products, chemicals, varnishes, serums, pharmaceuticals, etc.

b. Insulation of heat and cold in: power plant equipment, steel plants, petroleum refineries, glass manufacturing, furnaces, kilns, refrigerators, etc.

c. Fillers: in battery boxes, roofing, flooring, waxes, paints, plastics, explosives, insecticides, abrasives, cosmetics, fertilizers, etc.

d. Building industry: admixture for concrete, cements, plasters, hi-silica and pozzolan cements, roads, light weight building blocks, etc.

e. Miscellaneous: manufacture of filter candles, soluble silicates, glazes, oil-decolorizing products, poultry litter, sweeping granules, etc.

The percentage uses of diatomite in the United States are as follows:

Filtration	50%
Insulation	25%
Fillers, miscellaneous	25%

In 1947, production in the United States reached 213,533 short tons and today the figure is doubtless much larger. (1)

Occupational and Industrial Exposures

Potential occupational exposures exist in the numerous industries which utilize the material. However, the most important source of disease has been in the industries engaged in producing the material and its products. While deposits of the earth may be found in many parts of the United States, most presently commercially exploited deposits are in the West: California, Oregon, Nevada, and Washington, which [illegible] on account of production.

"Stories of mercurialism in the hatters' trade in this country began with one published by J. Addison Freeman of Orange, New Jersey, in 1860. He described some 100 hatters of Orange who were victims of typical mercurial poisoning, but 15 years passed before the next record appeared, quite as shocking as the first. Nothing was done about it, little attention was paid, none by the medical world. Then in 1912, 37 years later, the public was startled by a report made by a lay organization, the National Civic Federation....."

If the reader will substitute the Legge and Bessemrants study for the Freeman study in 1860 and the California Tuberculosis and Health Association for the National Civic Federation, a similar picture becomes apparent.

Dowming (17) summarizes the problem well:

"It is apparent in the study, control, and prevention of occupational health hazards.....that the United States is not on a par with other countries. Lack of recognition of the importance of industrial skin cancer stands out in sharp contrast to the unrestricted and wide publicity given this important matter in England, Germany, and Switzerland, where these cancers are notifiable and compensable diseases, and information regarding them, therefore, is relatively reliable. The history of industrial medicine here is full of failures to prevent the unnecessary deaths in industry that have occurred, for example, from berylliosis of the skin and lung, cancer of the lung from chromates, tumors of the bladder due to aniline dyes, osteogenic tumors from radioactive chemicals, and cancer due to carcinogens in the tar industry. All these industrial hazards could have been controlled or eliminated."

Incidence and Prevalence of the Disease

No accurate data are available because of (1) ignorance on the part of most physicians of the existence of the disease; (2) the resemblance of the disease to pulmonary tuberculosis; (3) the failure to report the disease according to requirements of the California Labor Code.* (18)

Despite this situation, some figures at hand are revealing. In the 1930 study of Legge, of 103 men examined, 81 or 64.9% had abnormal lung changes. Twenty years later, the Lompoc plant physician submitted to the press his report that of 922 people he examined since 1945, 33.5% had lung changes. (19)

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* The Bureau's normal source of information on occupational disease is the reporting required by law to the California State Department of Industrial Relations. Section 6409 of the Labor Code states: "Every employer, insurer, and physician or surgeon who attends any injured employee shall file with the Division of Labor Statistics and Research, under rules and regulations prescribed by the Division of Labor Statistics and Research, a complete report of every injury to each employee arising out of or in the course of his employment unless disability resulting from such injury does not last through the day or does not require medical service other than ordinary first aid treatment."

to be died of other intensive causes of death, [illegible] found evidence of diatomaceous earth pneumoconiosis in all. The [illegible] Health has records of 47 medically confirmed cases obtained through records of the Industrial Accident Commission and other sources. Continuing investigation is revealing more cases. (There are a number of proven cases without records in the Industrial Accident Commission files.) Up to date of preparation of this bulletin (March, 1952) the Division of Labor Statistics and Research had received four physicians' reports of the disease, all of them since January 1951. A thorough check of all employers' reports from 1943 to the end of 1951 by the Division reveals one report, which was received in December 1951.

For the relatively small number of workers exposed at any one time, the attack rate is high by any standard, even on the basis of very incomplete data.

Tuberculosis statistics for Santa Barbara County for the area where the diatomaceous earth industry is located are now being critically analyzed. Reports in the lay press indicate they were high. (15)

Pathology of the Disease

Viglioni (8) describes the lungs of two workers who died after 11 years of exposure to the calcined diatomaceous earth dust:

> "The lung changes.....in the final stage become a diffuse fibrotic and hyaline sclerosis fairly similar to that of the massive quartz silicosis. But we have noted some important differences from the usual quartz silicosis: lack of hyalinized single or conglomerated nodules and different features of the changes leading to sclerosis. These changes consist in a diffuse cellular thickening of the walls of the lung air spaces, produced by proliferation of dust phagocytes. This proliferation becomes gradually so marked that it replaces every air space and initiates a massive granuloma which only in a very late stage becomes fibrotic. Emphysema, dilation of blood capillaries, and hyperplasia of all the smooth muscle cells of the arterioles and bronchi are secondary phenomena.
>
> "The diffuse distribution of changes in the air spaces somewhat resembles that of asbestosis....."

Vorwald (13) describes the lungs of 10 workers (8 after death and 2 after surgery), who had exposures "ranging from two to 23 years." He summarizes the pathology as follows:

> "Although there are scattered foci of hyalinization and necrosis not unlike the pulmonary response to inhaled quartz, nevertheless the fibrosis is generally more diffuse and cellular in type and involves not only the perivascular and peribronchial tissue but, and more especially, the alveolar walls. These are greatly thickened and often fused; the alveolar spaces are either obliterated, greatly distorted and small, or are coalesced to form emphysematous areas. The diffuse cellular pulmonary fibrosis seems to be the most important lesion. It is more serious than the discrete nodular fibrosis of uncomplicated silicosis and is, perhaps, responsible for the pronounced respiratory difficulty encountered in cases of this disease."

SiO_2 (in three forms: quartz, tridymite and cristobalite) were found in the lungs of Vorwald's cases by means of the X-ray diffraction technique. However, the range of amounts found in these lungs is broad and no rules can be set down. In all of Vorwald's cases except one, the quartz silica content did not exceed 2.5%, from which he concludes the "quartz is not the primary toxic agent..... either cristobalite or diatomite must be incriminated."

Since deposits of diatomite contain varying amounts of quartz, the precise type of lesion produced may vary with the quartz content of the dust. Thus Kordenaal's (6) cases showed typical quartz silicosis lesions in addition to evidence of diatomaceous earth. These people had been exposed to diatomaceous earth containing significant amounts of quartz.

Pathological End-Results

Regardless of the minutiae of pathology, this disease, like ordinary quartz silicosis, sets up the usual vicious circle of effects: fibrosis, emphysema, right heart embarrassment with the consequent symptoms of respiratory and circulatory failure.

Susceptibility to Tuberculosis and Other Respiratory Diseases

There is suggestive evidence to indicate that diatomaceous earth pneumoconiosis predisposes to pulmonary tuberculosis. (25) However, there has been no adequate study of this question. There is, of course, no evidence for the oft-repeated myth that diatomaceous earth confers resistance to tuberculosis. On the contrary, those with the combined diseases have practically a hopeless prognosis.

Vorwald (13) states, "Our experimental results indicate the deleterious effect of the fused calcined product on the course of associated tuberculosis infection. Several of the patients studied had extensive tuberculosis."

Doctors for the industry state that there seems also to be an increased incidence to pneumonia and acute pneumonitis among those who develop the conglomerate lesions of diatomaceous earth pneumoconiosis. (26)

Role of Different Forms of Diatomaceous Earth

There are two primary types of diatomaceous earth: (a) the crude or so-called amorphous form and (b) the processed form which has been heated to high temperatures and treated with a flux, usually sodium carbonate. There is agreement by all investigators that the fluxed and calcined variety, which contains large amounts of SiO_2 as cristobalite, is highly toxic, more so than quartz silica. The role of amorphous diatomite has not been studied as well. However, there is good evidence that it is capable of causing disease if there is sufficient exposure to it. (13,19)

All forms of the dust cause lung changes within a year or more of exposure. Some instances of marked lung changes have developed as early as six months after exposure. (26) In general it is believed that the amorphous form can produce disease but will take longer to do it.

In animal experiments by Gardner (9), he rated diatomite (amorphous diatomaceous earth) as being equal in toxicity to quartz silica: ".....celite, an

amorphous silica....produces progressive fibrosis indistinguishable from the reaction from quartz." He found cristobalite to be more toxic than either quartz or diatomite.

Vorwald summarizes the subject as follows: "Clinical and experimental evidence indicate that both crude and fluxed, calcined diatomaceous earth are capable of producing pulmonary fibrosis, the latter more than the former." (13)*

Signs and Symptoms

In general, the symptoms of this disease are similar to those of silicosis and other pneumoconioses as well as pulmonary tuberculosis. The onset is generally insidious with dyspnea, cough, chest pain, loss of weight and loss of appetite.

Spontaneous pneumothorax is much more frequent in this disease than it is in classical silicosis, as a result of the formation of emphysematous bullae at the pleural surface.

As the disease progresses, the individual becomes increasingly disabled. Death has ensued in known cases within a few months to several years from the onset of symptoms.

The immediate cause of death may be heart failure, spontaneous pneumothorax, superimposed tuberculosis, or other infections, or other pneumonic or cardiovascular complications predisposed by the basic lung disease.

The course of the disease is generally more rapid than that of classical silicosis. Workers who stop exposure to the dust after only minimal lung changes have taken place may retard the progress of the disease. On the other hand, the disease may progress after cessation of exposure at any stage.

Superimposition of tuberculosis, of course, worsens the prognosis.

X-Ray Findings

The earliest lung changes seen are described as "linear exaggeration." Another change often seen is that of fine reticulation, producing a sort of ground glass appearance. Following this stage there may be seen evidence of nodulation, but the nodules in this disease are not as discrete as those of classical silicosis. In more severe cases no nodulation may be detected as the disease advances with conglomerate, spreading, confluent lesions.

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* Poitevin (24), of Canada, reports an interesting experience with diatomaceous earth in cattle: "These animals were suffering from infected bladder and the disease was known locally as Red Water. This disease was noted especially in British Columbia in pasture areas flooded every spring and where cattle were placed after the water had receded. The soil and the grass were studied and they were found to contain a large percentage of diatoms especially sponge spicules which as you know look like needles under the microscope. Bladders of several of the dead animals were studied in the same way as a human lung and it was found that hundreds of sponge spicules were embedded in the tissues of the bladders investigated and were no doubt responsible for the infection."

[illegible] of the lung upon [illegible]. Bullous emphysema may be noted at the anterior apices and [illegible].

Pleuritis may be evidenced by [illegible] of the diaphragm. Spontaneous pneumothorax is common.

As in all types of pneumoconiosis, the radiograph cannot be depended upon to assess accurately the degree of disability or even to show evidence of disease. A worker may be disabled and yet show minimal X-ray changes. Conversely, there may be minimal disability in the presence of advanced X-ray changes.

Diagnosis

Diagnosis depends upon a

History of exposure, and

Signs and symptoms of pneumoconiosis.

The disease can be easily confused with pulmonary tuberculosis. It may also be mistaken for many other lung lesions. However, there should be no doubt of the diagnosis of a bilateral lesion characteristic of pneumoconiosis with or without nodulation and a history of dust exposure to diatomaceous earth.

Tuberculosis can usually be ruled out if no bacteriological proof of the presence of tubercle bacilli can be obtained. If tubercle bacilli are found and the other findings are as above, one must diagnose the combined diseases.

Pulmonary function tests are valuable in assessing disability.

Treatment

There is no cure known. Certain procedures such as positive pressure therapy combined with bronchodilating drugs may give temporary relief. (20)

Aluminum therapy or prophylaxis has not been proven to be of value in ordinary siliconis and there is no reason to believe it would be any more useful for diatomaceous earth. There is suggestive evidence that aluminum itself may be harmful. (21,22,23)

There have been no reports in the literature of the effects of ACTH or cortisone on this disease.

Prevention

Prevention of this disease is 100% possible, as is true of all occupational diseases. It is achieved by use of the same principles as are applied to other dust diseases. These are:

1. Environmental controls.

   a) Control of the dust at its source by ventilation methods, enclosure of process and the like.

b) Effective respirators only when dust control is not technically possible. Respirators in general are an unsatisfactory solution because they are uncomfortable, require constant maintenance, and at best are not often efficient.

c) Production methods may at times be altered to eliminate a toxic exposure. For example, one of the diatomaceous earth producing companies has recently changed their carloading operation from an individual sack loading method to the more efficient and cleaner method employing fork-lift trucks, which lift the sacks piled on pallets.

2. Medical controls: periodic physical examinations including chest X-ray and pulmonary function tests to detect evidence of illness early.

3. Good labor-management practices

a) Joint labor-management health and safety committees which work to assure intelligent participation by all personnel in safe and healthful practices.

b) Production policies which make it possible for the employees to carry out safe practices. For example, in many industries employees are paid "incentive" wages to obtain maximum production. The employee, intent on earning more, tends to disregard safety precautions which slow his work. This phenomenon is common where pay is based on "incentive" or "piece work."

Research Needed

Several questions about the disease remain not satisfactorily answered:

1. The precise level of dust exposure beyond which harm results. That is, what should the "Maximum Allowable Concentration" be? The M.A.C. is a useful tool in the public health control of occupational diseases. At present the M.A.C. for quartz silica is used. The evidence now suggests that if there is a change it will probably be lower for the processed forms of diatomaceous earth than for quartz.

2. The precise toxicity and relationships of the amorphous and processed diatomaceous earth dusts.

3. The relationship of this dust to tuberculosis.

4. The true incidence of the disease in both the producing and consuming industries.

A thorough epidemiologic study is needed to provide the answers. The State Health Department Bureau of Adult Health is commencing such a study with the help of other governmental agencies and the industrial management and unions.

Glossary

1. Bullae: Large air-containing spaces in the lung which are formed by the fusion of ruptured air sacs, often associated with emphysema.

2. Calcine: Process of heating to high temperatures to hasten chemical reaction desired.

3. Dyspnea: Labored or difficult breathing.

4. Fibrosis: Abnormal increase in the growth of scar tissue.

5. Flux: Chemical treatment to hasten reaction desired. In diatomaceous earth processing, the chemical ordinarily used is sodium carbonate.

6. Granuloma: A persistent overgrowth of granulation tissue. Granulation tissue is produced in the initial step of repair of injured or diseased tissue.

7. M.A.C.: Maximum Allowable Concentration, i.e., the maximum concentration of material in the air breathed during an 8-hour work-day beyond which disease may result over a period of time.

8. Pneumothorax: An accumulation of air in the pleural space which pushes in or collapses all or a part of a lung. A spontaneous pneumothorax arises from internal causes, and is often the result of rupture of an emphysematous bulla on the surface of the lung.

9. Pulmonary emphysema: Distention and stretching of the walls of the air sacs in the lung. It is found usually in the outer parts of the lung which have the greatest capacity for expansion, and occurs as an attempt to compensate for other parts of the lung which function poorly.

References

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