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4629

NOTED
HMP

February 20, 1952

Dr. A. J. Lanza, Chairman
Institute of Industrial Medicine
New York University - Bellevue Medical Center
477 First Avenue
New York 16, N. Y.

Dear Dr. Lanza:

Re: Labeling of Asbestos Fibre

As you are aware, the Industrial Commission of Illinois has promulgated rules as to the labeling of substances harmful to the health and safety of employees. This is the same law Vandiver Brown wrote you about on October 1, 1951 in connection with diatomaceous earth. "Dust" is specifically referred to and in our opinion asbestos fibre comes within the purview of the regulations.

The law requires that the label contain a signal word. This word is intended to draw attention to the presence of the hazard and to indicate the severity of it. The signal words are in order of diminishing severity of hazard: (1) "DANGER"; (2) "WARNING"; (3) "CAUTION". In naming the product one must avoid using a non-descriptive code designation or trade name and should give notice of exactly what hazards are present in connection with the customary or reasonably anticipated handling or use of the product.

It is our intention to label our bags containing asbestos fibre, using the following:

"CAUTION - ASBESTOS FIBRE"

"Inhalation of asbestos fibre over long periods may be harmful. The material should be so used as not to create dust or, if this is not possible, employees should be equipped with adequate protective devices."

We would greatly appreciate your comments concerning the proposed label and any suggestions you may have for improving the same from the standpoint of accuracy or otherwise.

Very truly yours,

Arthur L. Fink, Jr.
Legal Department

JWZ036

Thetford Industrial Clinic

Thetford Mines, Que.

February 21, 1952.

Dr. Arthur J. Vorwald,
Director of Research,
The Trudeau Foundation,
Saranac Lake, N.Y., U.S.A.

Re: Alphonse Labbé vs
Bell Asbestos Mines Ltd.
Claim No: 759807
"Cancer and Asbestosis"

Dear Dr. Vorwald,

For your information, I am pleased to send you the following "confidential" report which as you may understand has no official character whatsoever.

This case was heard before the full compensation Board during 3 full days, February 12, 13, and 14, 1952; the Bellemare group had 2 pathologists, 1 epidemiologist, 2 clinicians chest men as experts and Mr. Sabourin had Dr. Lanza. The hearing was adjourned to March 11th, 1952.

In summary, the pathologists have certified that the cancer in the case of was a pulmonary epithelioma anaplastic or oat cell carcinoma variety stating that it was impossible to have a lymphosarcoma when the cells are elongated as they were in that case.

The other experts certified that the causal relationship between asbestosis and cancer of the lungs was probable and even certain.

I am anxious to know what Mr. Sabourin will bring in March and I am also anxious to discuss this case with you at the first opportunity.

Yours very truly,

PC/JS

Paul Cartier, M.D.

4145.0

NEW YORK UNIVERSITY-BELLEVUE MEDICAL CENTER
OF NEW YORK UNIVERSITY
POST-GRADUATE MEDICAL SCHOOL
477 FIRST AVENUE, NEW YORK 16, N.Y.

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HMB

DEPARTMENT OF INDUSTRIAL MEDICINE

ORIGEON 9-3100

March 5, 1952

Mr. Arthur W. Fisk, Jr.
Legal Department
Johns-Manville Corporation
22 East 40th Street
New York 16, New York

Dear Mr. Fisk:

I am just now in receipt of your letter of February 20th. I think the wording that you propose for your bags is quite acceptable and adequate. As a matter of fact, the users of the various types of products that cause pneumoconiosis in their production are rarely exposed to prolonged concentrations that are so essential in producing diseases of the lungs.

Sincerely yours,

A.J. Lanza, M.D.

PLAINTIFF'S EXHIBIT 4145.0

PCC EXHIBIT MET-652

Diatomaceous Earth

DE-PD

PLAINTIFFS 36

#127

April 29, 1952

Dr. Anthony J. Lanza
Medical Consultant
Johns Manville Corporation
22 East Fortieth Street
New York, 16, New York

Dear Dr. Lanza:

At Dr. Smart's request, I am sending you a copy of a monthly bulletin which has been routinely distributed by our Bureau of Adult Health. As you can see, the subject matter of this issue is not so routine.

Distribution had already been partially made before this was called to the attention of the Division Office, and although we have temporarily discontinued distribution, I think we shall look less conspicuous if we send out the rest. Had we seen the draft in this office, I think we would have postponed a discussion of this subject until some future date. Certainly we would have done some editing; however, the thing is done.

Sincerely yours,

F. M. Kriete

Frederic M. Kriete, M.D.
Assistant Chief, Division of
Preventive Medical Services

FMK:dr

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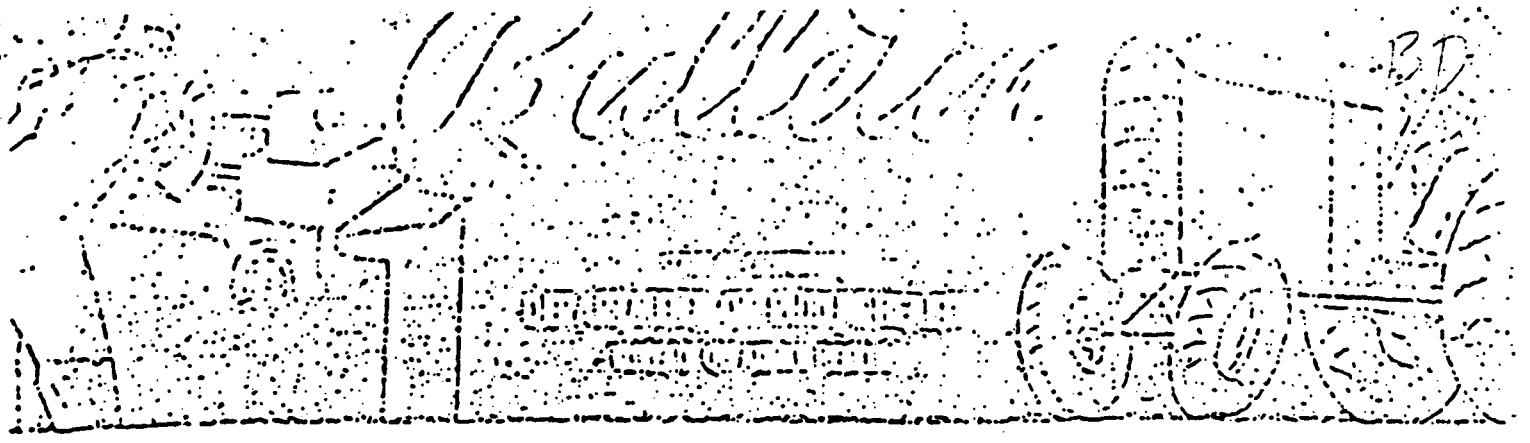

Occupational Health Bulletin "R"

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

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

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

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 puzzolan 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 213,585 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, [illegible] ranks first in point of production.

1. Lewis, R. B., and Myers, W. M.: Nonmetallic Minerals, 2nd ed., McGraw-Hill, 1951.

2. Communication from Johns-Manville Corporation, Dec. 26, 1951.

3. Podwyssocki, W.: Beitr. path. Anat., 47, 270, 1910, quoted in Vigliani, E.C., British J. Industr. Med., 5, 148, July 1948.

4. Legge, R. T., and Rosenkrantz, E.: Observations and Studies on Silicosis by Diatomaceous Earth, Amer. J. Public Health, 22, 1055, Oct. 1932.

5. Ruck, quoted in Nordmann.

6. Nordmann, Martin: Die Staublunge der Kieselguhr Arbeiter, Virchow Arch., 311, 116-148, 1943.

7. Duvoir, M., and Derobert, L.: La Pneumoconiose par terre de diatomees etude experimentale et clinique, Ann. de med. leg., 27, 48-58, Jan.-Feb. 1947.

8. Vigliani, E. C., and Mottura, G.: Diatomaceous Earth Siliconis, Brit. J. Industr. Med., 5, 148, July 1948.

9. Gardner, L. U.: Reaction of the Living Body to Different Types of Mineral Dusts, A.I.M.E. Mining Technology, 2, 1-15, May 1938, Tech. Pub. 929.

10. Miller, J. W., and Sayers, R. R.: The Response of Peritoneal Tissue to Industrial Dusts, Public Health Reports, 56, 264-272, Feb. 14, 1941.

11. Johnstone, R. T.: Occupational Medicine and Industrial Hygiene, C. V. Mosby Co., St. Louis, 1948, p. 353.

12. Examples of this may be found in the following case records in the files of the California Industrial Accident Commission:
LA 86-535 Hartnell LA 85-140 Embry LA 86-234 McLean
LA 82-296 Hooper SF 85-723 Williams 112-556 McCabe

13. Vorwald, A. J.: Diatomaceous Earth Pneumoconiosis, Proc. Ninth Internat. Congress Ind. Med., Bristol, Eng., John Wright, 1949.

14. Death by Dust, Search, Calif. Tuberculosis And Health Assn., San Francisco.

15. San Francisco Chronicle, Jan. 13, 1952.

16. Hamilton, Alice: Forty Years in the Poisonous Trades, Amer. Industr. Hygiene Assn. Quarterly, March 1943.

17. Banning, J. G.: Cancer of Skin and Occupational Tumors, J. Amer. Med. Assn., 148, 345, Jan. 26, 1952.

19. Gardner, L. U.: Report to Johns-Manville Corporation on six lungs examined, included in case of Hooper Widow vs. Industry, LA 32-295.

20. Motley, H. L.: Pathological and Physiological Factors Involved in the Treatment of Silicosis in Coal Miners, Arch. Industr. Hygiene and Occup. Med., 2, 565-573, Oct. 1950.

21. Brown, E. W., and Van Winkle, W.: Present Status of Aluminum in the Therapy and Prophylaxis of Silicosis, J. Amer. Med. Assn., 140, 1024-1029, July 23, 1949.

22. Bader, E. W.: The Aluminum Dust, Ztschr. f. Unfallmed. u. Berufskrankh. 1949, June 5 and Sept. 15, 42. Abstract in Bulletin of Hygiene, 26, 266, March 1951.

23. Ivanova, M. G., and Ostrovskaya, I. S.: Action of Aluminum Dust on Animal Organism, Hygiene and Sanitation, Moscow, April 3, 1950.

24. Poitevin, E., Personal communication, Mar. 4, 1952.

25. Anderson, W. M.: Unpublished talk before Santa Barbara County Hospital staff Dec. 14, 1950.

26. Anderson, W. M.: Diatomaceous Earth Pneumoconiosis, paper delivered at meeting of California Tuberculosis and Health Association, April 4, 1952, San Francisco.

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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 Kaiser, 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

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History Is Illuminating, But Not Read Often Enough

In California, diatomaceous earth has been mined and processed for almost 50 years. Policzynski (3) in Germany reported in 1910 experiments in which he was able to produce in animals true granulomatous growths 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

"Studies 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 Hasenkrantz study for the Freeman study in 1860 and the California Tuberculosis and Health Association for the National Civic Federation, a similar picture becomes apparent.

Dowling (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 64.5% 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. (15)

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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."

[illegible] died of other immediate causes of death, the pathologist found evidence of diatomaceous earth pneumoconiosis in all. The Bureau of Adult Health has records of 47 reliably 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 1948 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 became 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 enlarged 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 2.3%, 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 Kordzaman'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: "....calite, an

amorphous silica....produces a progressive fibrosis indistinguishable from that resulting 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, coalescent 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."

Bullous emphysema may be noted at the extreme apices and bases.

Pleuritis may be evidenced by tenting 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 silicosis 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.

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 managements and unions.

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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.

August 1, 1952

Dr. A. J. Lanza, Chairman
Institute of Industrial Medicine
New York University-Bellevue Medical Center
477 First Avenue
New York 16, New York

Dear Dr. Lanza:

Attached to this letter, as well as to Hugh Jackson's copy, is Sorsaa's first interim report of May 7, 1952, on the asbestosis and pulmonary cancer study that is being conducted for the Canadian Q. A. M. A.

You will note that the conclusions so far do not indicate unfavorable findings. Of course, later conclusions on results of animal exposure beyond the fourteen months here covered may change the picture.

Sincerely yours,

J. P. Hosking

Enclosure

Copy to: Mr. H. M. Jackson

bc: Herbert M. Hall (one)