Return to [illegible]

NEW YORK UNIVERSITY-BELLEVUE MEDICAL CENTER

OF NEW YORK UNIVERSITY

INSTITUTE OF INDUSTRIAL MEDICINE

[illegible] EAST 30TH STREET
NEW YORK 16, N.Y.

Mailing Address: 477 FIRST AVENUE, NEW YORK 16, N.Y.
Telephone: MURRAY HILL 9-1500

September 5, 1951

MEMORANDUM

Control of Pneumoconiosis due to Diatomaceous Earth.

The object of this memorandum is to present the present status of the diatomaceous earth problem in industry with the emphasis placed on the various factors in accordance with their importance.

It might be stated at the outset that the industries which are involved in the production and processing of diatomaceous earth are interested primarily in the prevention of occupational disease or in the prevention of any pulmonary disease incident thereto. The treatment of pulmonary disease whether from the viewpoint of the alleviation of symptoms or of actual cure is secondary. However desirable it may be to alleviate the symptoms of employees suffering from the results of exposure to diatomaceous earth, prevention is a basic target at which effort is being made. It is important that these two objectives be kept clearly in mind in order to avoid confusion either in thinking or in procedure.

PATHOLOGICAL DATA

We know that while diatomaceous earth is almost pure silica, the effects on inhalation differ from crystalline silica. On the basis of observations in industry it may safely be stated that the natural earth produces little effect. After long continued exposure it may produce a pneumoconiosis but this apparently does not progress to disability nor does it carry with it increased susceptibility to tuberculosis. A pneumoconiosis which does occur does not resemble true silicosis on the X-ray film nor are the results similar as concerns pathology.

The flux-calcined diatomaceous earth is apparently a more active pulmonary irritant than the untreated earth, presumably due to the presence in varying proportions of cristobalite. The flux-calcined earth will produce a pneumoconiosis leading to disability and in a few instances is associated with fatal results. Again the X-ray films of this condition do not resemble silicosis produced by crystalline silica. Marked susceptibility to tuberculosis is not present.

The matter of tuberculous infection has an important bearing on all pneumoconiosis problems. The familiar picture of tuberculosis as a complication of silicosis has been described in all the hard rock mining communities in

Published by AsbestosClaims.Law
asbestosclaims.law/library/11223/1

the world and in severe silicosis it is usually the factor of a complicating tuberculosis that accelerates and brings about a fatal termination.

At Lompoc, after thirty years of operation, the familiar picture that is so unmistakable in communities with a crystalline silica hazard is missing. The incidence of tuberculosis among the employees is low as far as any evidence is available. A careful check of all the physical examination record cards of the employees at Lompoc for 1948, 1949, and the first six months of 1950 was made by Mr. Jackson and the writer. There were included a total of 617. These cases were classified as follows: Negatives 191; P-1, 246; P-2, 136; P-3, 44. There were 15 cases, mostly in the P-3 class, that showed massive shadows (conglomeration). There were 7 that were classified as possible infection. There was one proven case of tuberculosis. The 7 cases that were classified as possible infection (tuberculosis) and the 15 showing massive shadows have been the subject of considerable debate as to the possibility of a tuberculous factor. It is true that some years ago these cases might have been diagnosed as tuberculous on the basis of X-ray film. Continued experience has demonstrated more and more that one cannot be so dogmatic with respect to X-ray interpretation and there is more than a reasonable doubt that these 22 individuals can be classified as tuberculous. If they are tuberculous then the reaction of diatomaceous earth to the tubercle bacillus is quite different from that of crystalline silica. Had these 617 employees been exposed to a similar hazard of crystalline silica the above picture would have been quite different:- there would have been more disability, a high tuberculous infection rate and a high death rate.

I think it may safely be stated that the cases classed as negative, P-1, and P-2 were all symptom-free as far as any occupational disease was concerned. The P-3, with conglomeration, cases presented some symptoms and were mostly working along with the others.

PREVENTION

The prevention of pneumoconiosis as is well known presents two major phases, i.e., engineering control of environmental factors and medical supervision and control of the individual. At Lompoc the engineering control has been carried on over recent years with great success with marked abatement of the dust hazard. We do not know what may be the threshold limit of exposure to diatomaceous earth either with reference to natural earth or calcined earth. The accepted standard of five million particles per cubic foot for crystalline silica has no scientific warranty and is based upon clinical observation, the idea being that an exposure limited to five million particles will not produce disability within the average working life-time. If it is true, as has been stated, that cristobalite is more active than ordinary crystalline silica, it is reasonable to suppose that a threshold limit of five million particles might not be acceptable. However, there are various other factors concerned here, namely, the presence of particles other than cristobalite so that one cannot be too sure of his ground. In any event, it would seem most desirable to give earnest consideration to supplementing dust control with other measures of prevention if such are available.

Published by AsbestosClaims.Law
asbestosclaims.law/library/11223/2

It is not necessary here to recount the history of aluminum therapy as applied in the hard rock mining industry and other industries with a crystalline silica hazard. Suffice it to say that for some fifteen years a good many thousand individuals in Canada and the United States have been subjected to inhalation of aluminum in therapeutic amounts without there having been as far as is known to the writer any untoward incidence or backfire.

In the year 1950 there were 63 industrial corporations in the United States representing 75 plants who were using aluminum prophylaxis. There were involved about 19,000 individual employees. 22 more firms were preparing to use the aluminum. In Canada, for the same year, 65 corporations representing about 70 plants including approximately 19,000 individuals were also using aluminum prophylaxis. The companies both in the United States and in Canada included some of the leading well known industries.

Mention has been made on various occasions of the fact that at the Melbourne Pneumoconiosis Conference last year there was a report from Sweden of a number of men who had been exposed to very heavy concentrations of aluminum dust. There were about 13 such individuals and to the best of my recollection about 6 of these showed signs of pneumoconiosis on X-ray. Disability was present in several cases and if I remember rightly there was one fatal case. This experience has no practical application to the use of aluminum therapeutically. The pharmacopoeia includes many drugs which are in constant use and which are highly toxic if too large a dose is given. Also if any foreign substance, including water, is inhaled into the lungs in massive quantities, it will cause disability and death. The fact that massive amounts of aluminum cause a pulmonary reaction of a serious nature has no bearing upon the administration of aluminum in prophylactic quantities.

Two of our leading authorities in the field of research in pulmonary diseases, namely, Dr. Vorwald and Dr. Dudley Irwin, have both stated that considering the type of reaction of the lungs to diatomaceous earth, it would be reasonable to expect that such reaction would respond more favorably to the use of aluminum than would crystalline silica.

ANIMAL EXPERIMENTATION

At the present time the following programs are under way at Saranac:

I. To determine prophylactic and therapeutic effectiveness of powdered aluminum hydroxide and McIntyre powdered aluminum in the inhibition and stabilization of pulmonary fibrosis resulting from inhalation of regular flux-calcined diatomaceous earth.

   1. In one chamber animals will be exposed simultaneously to calcined earth and aluminum hydroxide mist.
   2. In another chamber animals will be exposed simultaneously to calcined earth and to standard McIntyre aluminum powder.
   3. Intratracheal tests on aluminum and diatomaceous earth to be started in April 1951 to determine toxicity. The result of these tests should be known by October 1951.

Published by AsbestosClaims.Law
asbestosclaims.law/library/11223/3

II. This second program was initiated in June 1948 and revised in November 1948.

1. Inhalation experiment with natural diatomaceous earth and animals.
    a. Groups of guinea pigs, rabbits, rats and mice, both normal and tuberculous.
2. Injection experiments with special flux-calcined diatomaceous earth and animals.
    a. Intravenous in rabbits.
    b. Intratracheal in guinea pigs.
    c. Intratracheal in rats.
3. Inhalation experiment with a special flux-calcined diatomaceous earth (high cristobalite) and animals.
    a. Groups of guinea pigs, rabbits, rats and mice, both normal and tuberculous.
4. Inhalation experiment with regular flux-calcined diatomaceous earth and animals.
    a. Normal animals only.

This second program was scheduled for 18 months and the results should be forthcoming before much longer.

What we wish to know might be summed up as follows:

A. Will aluminum protect animals from diatomaceous earth in a manner similar to that with respect to crystalline silica?

B. Is there involved in the administration of diatomaceous earth plus aluminum any danger of a toxic reaction?

C. Will aluminum protect human beings from the action of diatomaceous earth?

With respect to B, toxicity, it should not be difficult to determine this in a relatively short time and it would seem that a definite statement with respect to this item should be forthcoming shortly from Saranac.

With respect to C, we will never know the answer until aluminum has been administered to human beings. What we have every reason to expect is that the inhalation of aluminum will prevent the development of diatomaceous earth fibrosis in the lungs; in other words, it would stop the production of P-2's and P-3's. This is the result that the industry wishes to achieve.

Whether aluminum will have any favorable action upon well developed fibrosis due to diatomaceous earth is a secondary consideration and I do not think that any of those connected in the working out of this problem have any great expectations that it will accomplish much in this direction.

Published by AsbestosClaims.Law
asbestosclaims.law/library/11223/4

Let me again emphasize that what the industries are primarily interested in and concerned with is prevention. Experimentation in the field of therapy with drugs like cortisone, ACTH, or other procedures are hospital or joint hospital-laboratory techniques and do not come within the field of industrial medical service. If and when hospital-laboratory experimentation reveals that any given method of treatment is valuable, then the question of its practicability for industrial medical service can be considered. But prevention can be accomplished only in an industrial plant.

It is to be hoped that a fair trial of prevention methods and techniques can be applied without undue delay. Industry is responsible for using every effort to introduce methods of prevention with respect to any occupational health hazard. The extremely widespread use of aluminum justifies the adoption of this technique in the case of diatomaceous earth unless it can be shown clearly that aluminum in combination with diatomaceous earth is definitely toxic. On the other hand, undue or unwarranted delay in trying a preventive program may expose the industry to criticism. If the program proves to have little or no merit, no harm is done, but at least the position of the industry will be advantageous.

STEPS TO BE TAKEN

1. Discuss with Company officials.
2. Review and discuss with interested plant management.
3. Discuss and present aluminum inhalation program to union officials.
4. Present to employees through Industrial Relations.
5. Initiate program through McIntyre Research Foundation or Saranac Laboratory.
6. Special conferences with medical staff regarding methods, control, records and supervision.

A.J. Lanza, M.D.

COPY TO: Mr. J.P. Woodard ✓
Mr. H.M. Jackson
Mr. D.R. Tallefson
Dr. V.H. Anderson
Dr. R.H. Smart