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Some Thoughts on Silicosis

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Systems which installed on similar to have resulted in air ducts by the In order to maintain control, it is a method of company engineers the bulk of at each machine cyclone dust separators and thus relieved trouble-free operation system has been joining very satisfactory.

Industrial solvent recommended by a very numerous is presented: ant manufacturing a tentative design for this operation unit for approximately 12 minute from machines. After operation, design employees feet which work only in effect it vapor hazard ing production. tions are indicated diversity of e presented to solution in room with the exposure of ventilation plant health hazards.

al of 2,606 vent nitted to our e 2,587 plans wh 151 were approved workers at 11, ected thereby f to noxious du This plan exam ated 1,707 p of the ventila tion and for gement.

Unfortunately, the experience of the last few years does not substantiate this rosy outlook. Tremendous advances have been made in controlling the hazard but knowledge of these often seems to be lacking, especially in those quarters where it is most urgently needed. Physicians, industrial and otherwise, still make a diagnosis of occupational fibrosis because of the chest X-ray pattern and/or a history of employment in a supposedly dusty industry. No consideration is given to the fact that dependable estimations of respirable sized particles of dangerous dust and safe atmospheric concentrations have been established. The plant physician is frequently unaware that such standards exist and management has been lax in bringing the matter to his attention. Industrial compensation commissions need to be reminded that

consideration of these factors is essential before awards for disability, based on vague roentgenographic shadows and uncertain exposures, should be granted or upheld.

As more unrelated conditions whose X-ray appearances closely simulate silicosis are recognized, the unreliability of the roentgenogram alone as a diagnostic measure becomes obvious and accurate interpretation is correspondingly difficult.

A situation of this kind points out the necessity of accumulating factual data on exposure through industrial hygiene surveys. Such appraisals must include enough samples to be truly representative. They should faithfully portray actual working conditions and environmental hazards. One should not be concerned so much with the amount of visible dust in the atmosphere of a working place as with the number of harmful particles that actually reach the alveoli of the lungs and are retained. We have seen reports of plant surveys where obviously the hygienist has been too impressed with visible dust around a shake-out where careful analysis revealed mostly smoke, steam, and carbon particles with free silica well below accepted safe limits. This same individual missed a really serious dust hazard where free silica was present in high concentrations but was not evident because the general atmosphere appeared to be clean.

In recent years considerable attention has been given to nodular patterns observed in the X-rays of workers exposed to significant concentrations of iron dust. Reports from this country and abroad have shown that such exposures are capable of producing shadows almost identical with those of silicosis, even in occupations where tests indicate a practically complete absence of free silica in the atmosphere. Post-mortem findings on some of these individuals have demonstrated only simple deposits of iron particles in the lungs with no evidence of fibrosis.

We have noted similar X-ray changes in certain grinders and burners in the foundry industry. The shadows have appeared in comparatively short periods of time, the average being about 6 years. Analysis of the air-borne dust in these locations by counts, X-ray diffraction, and estimations of particle size and per-

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CHEST CONDITIONS WHOSE X-RAYS SIMULATE SILICOSIS

A. Industrial

- | | |
|-----------------|--------------------------|
| Organic | (a) Byssinosis. |
| | (b) Bagassosis. |
| | (c) Tabacosis. |
| Inorganic | (a) Anthracosis. |
| | (b) Radiopaque Deposits— |
| | { Barium (Baritosis). |
| | { Iron (Siderosis). |
| | { Tin. |
| Inert | (c) Beryllium. |
| Toxic | (d) Asbestosis. |
| Proliferative | |

B. Nonindustrial

- | | |
|---------------------|------------------------------------|
| Mycotic | (a) Aspergillosis. |
| | (b) Moniliasis. |
| | (c) Wood dust spores. |
| | (d) Coccidioidomycosis. |
| | (e) Blastomycosis. |
| | (f) Actinomycosis. |
| Yeasts and Molds | (a) Miliary tuberculosis. |
| | (b) Sarcoidosis. |
| | (c) Mitral Stenosis. |
| | (d) Cancer (Metastases). |
| | (e) Vascular changes. |
| Miscellaneous | (f) Miliary calcinosis (Wheatena). |
| | (g) Polycythaemia Vera. |
| | (h) Bronchiolitis. |

sation law, injuries are reportable to the Industrial Accident Commission and are adjudged for compensation under it. The term *injury* as used in this law, includes any injury or disease arising out of employment, including injuries to artificial members.

Legally, occupational diseases as such are not recognized, but under the definition of injury all occupational diseases are covered. The law is therefore a complete coverage, or blanket, occupational disease, as well as injury, law.

Since this law has such broad coverage, many illnesses are reported which do not appear in the reports of many other States. For example, many infectious diseases have been ruled compensable when they have been contracted by medical and nursing personnel from contact with patients. Upper respiratory infections contracted as a result of exposure to inclement weather, and tenosynovitis are other examples.

The term "compensation" defines both treatment and indemnity payment, and is furnished as follows: "All medical, surgical and hospital treatment including medicines, medical and surgical supplies, crutches and apparatus, including artificial members that may be reasonably required to cure and relieve from the effects of the injury." Treatment must be given for any injury or illness arising out of the employment although no indemnity is paid for the first 7 days of the disability.

In as much as the employer is liable for the immediate treatment and the law is well enforced, practically all injuries or illnesses are reported. When the employee first appears for treatment, an initial report is sent to the Industrial Accident Commission by the attending physician or surgeon.

The Bureau of Adult Health of the State Department of Public Health, through an agreement with the Department of Industrial Relations receives from the latter's Division of Labor Statistics and Research a copy of all injury reports which are considered to be occupational diseases. These first reports are studied and followed up by the Bureau of Adult Health and each month summaries are prepared of all the cases reported. For several years 1,000 to 1,200 of these initial reports of occupational diseases have been received and studied each month.

SILICOSIS—

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centage of free silica indicates that the amount of free silica of respirable size in the atmosphere is not sufficient to produce the variations noted in the time indicated. However, there is enough iron oxide in the air to cause them.

In an effort to determine whether this dust can produce silicosis we have been conducting experimental work at the Saranac Laboratory for the past year and a half. Animals exposed to typical concentrations of particles collected in the foundry cleaning room have shown no evidence of the disease thus far. Moreover, there has been no tendency to activate tuberculosis in those animals experimentally infected. The reaction resembles that produced by other inert dusts. The study will be continued for at least another year when a complete report will be made. It is hoped that the results of this work will aid materially in the proper evaluation of occupational disease and discourage the diagnosis of silicosis based on improper and inadequate claims. Until sincere consideration is given to the hygienists' findings, erroneous decisions are going to be made.

Heretofore, the accumulation in the lungs of dust particles below one-half micron in size has been considered of little consequence. Recent studies by Hatch and Kindsvatter, however, have shown very clearly that exposure to low mass concentrations of quartz particles, smaller than one-half micron, results in significant alveolar retention in test animals and produces demonstrable lung change in a relatively short time. It is pointed out further that because of the known pathogenicity of quartz with decreasing size, particles below one-half micron may be of greater importance in the etiology of silicosis than is commonly thought. In this connection, the use of the electron microscope may well result in revision of much of our present thinking on the part played by submicroscopic particles in the production of occupational disease.

The injection of recent observations into the study of silicosis should provide the stimulus for more intensive research since the problem is far from solved.

While it is true that there is still much to learn about silicosis it should not be assumed that definite standards for diagnosis and control of the disease do not exist. Present day methods which take into account such essentials as a complete occupational history, accurate evaluations of exposure to respirable sized particles of harmful dusts, adequate physical examinations and intelligent interpretation of satisfactory chest roentgenograms, have been very effective in establishing the existence of this occupational condition. Periodic employee health examinations, including chest X-rays, provide an efficient adjunct to engineering and hygienic control of the hazard, while the sensible application of sound ventilating principles will result in safe atmospheres and better places to work.

Reference

Hatch, F. T., and Kindsvatter, V. H.: Lung Retention of Quartz Dust Smaller than One-Half Micron. *J. Indust. Hyg. & Toxicol.*, 29: 342-346, September 1947.

EXHIBITS

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purpose of the exhibit, the basic idea, the facts to be presented, the technique to be used, and a budget of the probable expense.

A preparatory sketch showing floor and wall space, partitions, panels, electrical installations, color, and captions.

All-inclusive copy of captions, explanatory matter, charts, slogans, diagrams, and other written, drawn, or printed matter.

A budget showing probable preparation, construction, and operation expenses.

While such a procedure may seem rather formal for some of the simple exhibits set up locally, the beginning exhibitor might be surprised at the good effect achieved by the discipline of a little paper work.

A simple and usable bulletin for the amateur exhibitor is *Exhibits, How to Plan and Make Them* issued by the National Publicity Council, 130 East 22nd Street, New York, N. Y. (60 cents).