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Hypertension in Workers over Forty Years of Age

—A Preliminary Report—

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THE blood pressure in workers 40 years of age and over has not been studied sufficiently. Although it is been recognized for many years that the blood ressure rises steadily with age, only a relatively small umber of blood pressure readings in the older age roups has been available. Many blood pressures of ... soldiers and workmen have been published, ... e of these groups generally ranged between ... 0 years. These studies have been cited in a revious paper.[1] One of the largest groups was that tudied by Britten and Thompson[2] who found that in 38 male workers over 40 the systolic pressure was 50 mm. or more in 16% in the decade 40-49 years, 8.6% in the decade 50-59 years, and 51.2% in those 9 years or over.

In the previous paper referred to above[1] we plotted he incidence of hypertension in the general population s calculated from 42,000 published figures. It was hown that the incidence of hypertension (150/90 or more) rose from 5% at the age of 25 to 45% above 5 years. Although the number of cases in the age roup 40 years or over was relatively small, we intiated that hypertension in the general population was more frequent than was ordinarily appreciated. This was emphasized by Robinson and Bruger[3] who concluded from a study of approximately 4600 persons 40 ears or over that about 40% of the adult population s prehypertensive or hypertensive. In this report and a others in preparation[4] we are presenting an analysis of the blood pressure in the general population 40 years of age or over as based on readings obtained in workers in industry, hospital patients, and inmates of homes for the aged.

Knowledge of the true incidence of hypertension in the general population is of fundamental importance in the study of arteriosclerosis, hypertension and the aging process. Its importance is enhanced when one ... rs that the nation's population over 40 is ... g yearly by the millions. Dublin[5] has calcu... at, in the year 1940, 6.8% of the population ... 65 years of age or over, comprising nearly 9,000,000 persons, and 26.8% was 45 years of age or over. He estimates that in 1950 the corresponding percentages would be 14.4 and 40.37, or 22,000,000 persons over 65 years of age and about 61,500,000 persons 45 years of age or over. Stieglitz[6], too, has emphasized the same facts, i.e., that 40% of population in 1980 will be over the age of 45. The interest of the clinician and the physician in industry in the incidence of hypertension in people over 40 lies further in the fact that in the present war emergency many more men and women of the older age groups will be employed than ever before, whereas hitherto they were probably discriminated against to some degree.

Material

WITH the whole hearted cooperation of DR. R. D. MUDD, Medical Director, Chevrolet-Grey Iron Foundry, Saginaw, Michigan, a division of General Motors, of DR. C. H. CEHRMANN, Medical Director, E. I. Du Pont de Nemours & Co., Wilmington, Delaware, and of DR. EDWARD MCSWEENEY, Medical Director, New York Telephone Company, DR. MICHAEL LAKE, Medical Director, R. H. Macy & Co., New York, and DR. LOUIS HAUSMAN, of B. Altman Co., New York, we obtained blood pressure readings in 5453 workers, 40 years of age and over, comprising 3665 men and 1788 women.

In all cases the blood pressures were taken by physicians by the auscultatory method. The sudden diminution in intensity of the sounds (fourth phase) was taken as the diastolic pressure in about one-third to one-half the cases, while in the remaining the total disappearance of sound (fifth phase) was considered as the diastolic level. Since the majority of opinion favors the sudden loss of sound intensity as the correct diastolic blood pressure it will be seen that our diastolic figures are on the conservative side, i.e., in many cases they are lower than they should be. The medical directors took pains to reassure and calm the patient, and the average or final resting blood pressures were recorded. The blood pressure readings were those of applicants for jobs, those obtained during periodical examinations every half to two years, and in the case of the New York Telephone Company also at times of enforced retirement, i.e., age 65 for men and 55 for women. In this company, as probably in the others, any active employee or retired employee could have a voluntary examination any time he wanted.

In general the companies were liberal in their acceptance of employees, taking even young workers with

From the ... Mount Sinai Hospital, New York City.

...hen it is known that the workers are changed every ... weeks, the job being part of a rotating course given ... student employees in the plant.

There are, of course, many related subjects which ... profitably be discussed in a paper of this type, ... as the effects on the skin of washroom soap; of ... compounds; of the action of oils; as well as the ... of many solvents on the skin—but time forbids ... inclusion. It can be said that the control meas... discussed here, coupled with this company's estab... policy of good housekeeping and general plant ... liness, have lowered our dermatitis cases to less ... 1½ cases per 1,000 men a month.

SUMMARY: As uncleanliness of the skin is the chief ... predisposing cause of industrial dermatitis, the em... should provide adequate facilities for the care of ... employees' personal hygiene while at work. This ... include sanitary washrooms equipped with hot and ... running water, a non-irritating soap, towels, and ... certain conditions, bath showers.

Another prominent measure is the elimination of ... materials from contact with the worker by ... or partially enclosing the operation so that ... fumes, vapors, or dusts are prevented from ... the worker.

An important factor in the *prevention* of skin infec... is the use of protective clothing, provided this type ... is kept in good repair, is cleaned and dis... periodically after return to stock when used ... worker before being reissued to another employee. ... of disinfecting solutions are mentioned—a ... of hypochlorite for rubber articles, and ... delicate fabrics, a soap solution containing a ... or other disinfectant.

The last important control measure is the use of ... skin creams. These creams form a "protec... barrier film" between the skin and industrial poi... or dirt and grime likely to cause the dermatitis. ... products should be non-irritating, and should, ... speaking, be insoluble or nearly so in the ... against which they are to protect. They should ... removed at the end of the work period with ... and warm water. At least two or three standard ... are necessary. Occasionally a particular expo... will require a special formulation.

The control measures discussed here, together with ... company's continued good housekeeping policy, has ... the incidence of dermatitis in our Rouge plant ... than 1½ cases for each 1,000 of plant popula... per month.

... ences

... DAVIS, C. L., and DENRMAN, H. T.: Occupational Dermatitis. ... Med., 3:6, 217-229 (1939).

The Occupational Disease Hazard

—*Evaluation in the Field*—

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... extensive and reliable information is con... becoming available concerning the ... of industrial materials which cause injury ... and these which may be considered innocu... In order to apply this knowledge on the toxic ... of these materials, it is necessary to have means ... determining whether or not the exposure is within ...

The evaluation of the occupational disease hazard as we encounter it in the field is of vital importance in the economic control of a potentially injurious exposure. The two principal methods of evaluating the severity of the health hazard are through observation of the occupational environment and through examination of the worker.

Use and Limitations of Eyes and Nose

So much emphasis has been placed on chemical and physical testing of the air for contaminants that the question has been raised: Are our eyes and noses of no assistance to us in the evaluation of hazardous operations? Can only the chemist with his thermal decomposition apparatus, backed by a laboratory full of beakers, volumetric flasks and spectrophotometers, state whether there is too much trichlorethylene in the worker's breathing zone? Or must a man be armed with an interferometer or a tri-per analyzer if he is to avoid a chemical procedure for obtaining this information?

The answer is that it is necessary to utilize physical and chemical methods in many situations in order to evaluate the hazard if we wish to avoid the dangerous procedure of waiting to see if the worker's health is actually being affected. But before discussing the application of these methods, let me point out certain conditions where the eyes and nose are of use in arriving at an opinion of the hazard—and also some of the precautions which should be observed if the eyes and nose are to be employed as guides. In such sensory diagnosis of a condition, one must be on guard not only against optical illusions, but against olfactory illusions as well.

Let us make a survey of a manufacturing plant without benefit of the truck-load of gadgets which are the bane of the industrial hygienist's ambulatory excursions and find out what we can do and how far we can go in the evaluation of the health hazard.

The plant we visit includes a convenient variety of operations—but in this respect it is not different from numbers of actual plants on which many of us call or where we carry on our work. As we step from the office into one end of the factory, we find ourselves in a department where electrical receptacles are being produced of asbestos compounded with a synthetic resin. The first operation involves emptying bags of short asbestos fiber into mixers. No imagination was wasted on this operation; it is accomplished simply by weighing the burlap bag and dumping it manually into the mixer—following with a conscientious shaking of the bag to make sure it is entirely emptied. This operation is intermittent, but while it is being done there is a cloud of asbestos in the air which even the most casual observation would not miss.

The evaluation of the severity of this dust exposure requires one additional element which is often overlooked, the duration of the exposure. If a batch can be made up in 20 minutes which will provide enough material for the whole day, then it is probable that a respirator approved by the U. S. Bureau of Mines for Type A dusts would suffice. But if the operation is repeated every hour, general observation could be considered sufficient grounds to evaluate the hazard as excessive and to serve as the basis of a recommendation for control.

In the adjoining room, we find the batch being fed into molding machines and the receptacles being placed on racks. The plant superintendent is well satisfied with the effectiveness of the exhaust ventilation system installed when this new operation was begun a year ago, and he expects our approbation of

the installation. It is easy to say, "Yes, that is a splendid exhaust system." But what if such an offhand comment closes the subject and six years later one or two of the dozen girls on the operation develop asbestosis? If the condition does look good, what criteria can be used as guides?

Criteria for Evaluation of Dust Hazards

IN THE first place, too quick snap-judgments should be guarded against. If an unjustified OK is given, the health of the worker may be jeopardized; if a condemnation, then money may be spent unnecessarily, to say nothing of developing a lack of confidence of management in your judgment.

In the case of the asbestos dust condition, our evaluation of the exposure should be based on the knowledge that the present toxic limit for asbestos is five million particles of dust per cubic foot of air. This is a very small concentration, so small in fact that the condition may look good even to a critical eye and still present an exposure greater than this low limit. Some indication of the amount of dust present in the air may be obtained by noting the layer of dust on nearby settling places after learning how long a time has elapsed since they were last cleaned. If only a thin layer of dust has accumulated over six months or a year and there are no visible puffs of dust escaping from the operation, it is probable that the condition is satisfactory.

In the case of asbestos dust, however, and this holds with even more certainty for dusts high in free silica content, the toxic limit is so low that the only safe procedure is to have recourse to actual dust determinations. This is especially important where the injurious condition is not immediately evident but requires years to develop as in the case of asbestosis and silicosis.

What rules can be laid down in the evaluation of dust hazards in the field? Although individual conditions call for specialized treatment, a number of general suggestions can be made.

1. Obtain some reliable indication of the free silica content of the dust. A few specific items can be mentioned. In foundries, parting compounds may be largely tripoli which is free silica or they may contain less than 5% free silica. Manufacturers' statements to the latter effect can usually be depended upon. The Compensation Inspection Rating Board of New York maintains a list of parting compounds containing less than 5% free silica for which credit is allowed in the compensation rate. Dust collected in arresters connected to sandblast rooms has been used as a parting compound in some small foundries. This of course is high in free silica.

In the rubber industry, much dust is frequently present from the use of soapstone powder or talc in preventing unvulcanized rubber sheets from sticking together. Where true soapstone or talc is used, the free silica content is low, usually negligible. Imported stocks of these materials are now disappearing from the market and ground minerals obtained in this country are being substituted. Quantities of pyrophyllite, itself a combined silicate, are being utilized as a satisfactory substitute; but this pyrophyllite may include large proportions of quartz—21 and 22%. The evaluation of the potential hazard might thus be changed from negative to severe on the basis of the free silica content of the "soapstone."

2. A second important factor in the evaluation of a dust hazard, and in fact of most of the occupational disease hazards, is the duration of the exposure. In these days of accelerated production and longer work days and work weeks, this matter of duration assumes increased importance. A year ago a man may have been exposed to silica flour two hours a week in the preparation of a paint for some one customer. An evaluation of the hazard at that time may have shown it to be negligible. Today, that customer's order may have increased so that all day long several men are weighing up batches of silica flour as the inert material for this same paint. From the point of view of the paint formula, the silica flour is part of the "inerts"; but from the industrial hygiene point of view it falls within the category of silicosis-producing dusts known as proliferative materials. And if a proliferative dust is present throughout the entire workday and week, it should be given careful attention in order to ascertain definitely whether or not health is being affected.

3. As an aid in learning which dusts may cause injury and which are relatively safe, research has been conducted on the action of various dusts on injection into guinea pigs. The interperitoneal reaction is a measure of the effect of these dusts on being inhaled into the lungs. Publications[1] on the results of these tests may be obtained from the Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland, and it is probable that information on the reaction of certain dusts not included in these publications could also be obtained on inquiry. The dusts are divided into three groups: (1) absorptive, such as calcium carbonate or marble dust; (2) inert, such as aluminum oxide or emery dust, and (3) proliferative, such as silica flour and tripoli. Dusts in the proliferative group are those which produce silicosis on sufficient exposure.

4. If general observation does not indicate an obviously dusty condition where the free silica percentage of the dust is appreciable—in which case control measures should be immediately instituted—dust determinations should be made, unless they are obviously negligible.

Without going into a very extensive discussion of the methods of determining the concentration of the various industrial contaminants in workroom atmospheres, the standard method of dust determination in this country is the impinger.[2] This device, originated by Leonard Greenburg, has since been made more portable and is commercially available as the so-called "midget impinger" through the Mine Safety Appliances Company.[3] Other devices such as the konimeter and the Bausch and Lomb dust counter collect grab samples and are useful control instruments.[4]

Exposures to Toxic Dusts and Fumes

OUR plant survey continues and we proceed to an adjoining department where a litharge-glycerine cement is being used for attaching glass lenses to polished metal reflectors. A group of girls are working around a large table, each being provided with a one-pound carton of litharge. The housekeeping is scrupulously clean. All hygienic measures such as adequate washing facilities are provided and their use rigidly adhered to. The operation involves removal of litharge by means of a spatula from the carton onto a glass plate where a small amount is mixed with glycerine prior to being applied to the end of the glass lens. There is every appearance that conditions are satisfactory. But where workers are handling toxic materials such as lead in a powdered form, it is dangerous to take for granted that exposures are within safe limits on the basis of appearances alone. Even though lead oxide is heavy and tends to settle more rapidly than dusts having lower specific gravities, very finely