

LEAD INDUSTRIES ASSOCIATION

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LEAD HYGIENE and

SAFETY BULLETIN

No. 126

To the Members of the Lead Industries Association:

MISUSE OF "ETA"

Last referred to in a Lead Hygiene and Safety Bulletin issued on June 20, 1956, the drug "ETA" (Edathamil, Mulsapron, Sequestrene, Versene) continues the outstanding choice of the medical profession in the treatment of lead poisoning. Evidence that the drug was being misused led the American Medical Association to issue, in 1955, a warning on this score prepared by Dr. Robert A. Kehoe. Such misuse appears to continue in some quarters, and we have accordingly reprinted this warning report, by permission of the A.M.A., and a copy is herewith. Particular attention is called to the closing sentences of the report.

MEDICAL EXAMINATIONS

Wide variations in policy in the matter of pre-employment and periodic medical examinations among our member companies have led us to secure a supply of the current publication of the A.M.A. on this subject, "Guiding Principles of Medical Examinations in Industry," and a copy of this is also herewith.

OF INTEREST TO OUR MINING MEMBERS

The U. S. Department of the Interior has recently issued, as Bureau of Mines Information Circular 7789, a 24-page publication with the title "State Regulations Pertaining to the Use of Internal-Combustion Engines Underground." This is available from the Publications Section, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa., without charge.

Harold Bowditch
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Director of Health and Safety



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COUNCIL ON INDUSTRIAL HEALTH AND COUNCIL ON PHARMACY AND CHEMISTRY

REPORT TO THE COUNCILS

The Council on Industrial Health and the Council on Pharmacy and Chemistry jointly have authorized publication of the following report.

CARL M. PETERSON, M.D., Secretary,
Council on Industrial Health
R. T. STANWELL, M.D., Secretary,
Council on Pharmacy and Chemistry.

MININE OF EDATHAMIL CALCIUM-DINODIUM FOR PROPHYLAXIS OF LEAD POISONING

Robert A. Kehoe, M.D., Chairman

The enthusiasm that has greeted the development of a satisfactory compound of edathamil (diethylenetriamineacetic acid, EDTA) for clinical trial in the therapy of lead poisoning, and the recent flood of experimental and case reports concerning its use, furnish ample testimony to the alertness of physicians regarding new means of alleviating human disease and distress. These professional responses also focus attention upon the sad fact that the incidence of this acute disease is unduly high, despite the availability of adequate and practical methods for the recognition and control of hazardous absorption of lead by industrial employees and other persons in the general population. It is not common knowledge that there are in the United States some thousands of cases of lead encephalopathy annually among children up to 5 years of age and that the mortality rate within this group, so far as it is recorded, exceeds 25%.¹ Therefore, it is understandable that effective preventive measures have not been demanded and applied. There is, however, no justification for the frequency with which obviously hazardous industrial exposure to lead persists, nor for the failure of industry generally to employ the measures that have banished hazardous exposure to lead from some industrial operations.

There are signs that a promising remedial agent, edathamil calcium-dinodium, may be missed and perhaps discarded in advance of a full exploration of the potentialities of its proper usage. For this reason physicians may need to be reminded of the role of preventive medicine in the lead trades and of their duty to keep the responsibility for the safety of the industrial environment in the hands of industrial management, where it belongs. The hazards of the lead-using occupations are measurable by reliable methods. Thus, when the physician in industry undertakes, by medical means, to palliate the effects of the absorption of demonstrably dangerous quantities of lead by industrial employees, he must look at his reasons for doing so and in all humility and professional integrity ask himself where the welfare of his industrial work may lie. His function is to know the extent of the danger and to portray the facts to industrial management so that their meaning is clear. He must also

set up satisfactory and practical criteria for the safe conditions that are to be achieved. When he fails in his critique and in his insistence on the necessity of adequate control of exposure to lead (or to other occupational hazards), he contributes to the risks to which workmen are subjected and becomes a party to their existence.

The nature of the projected misuse of edathamil calcium-dinodium in the old story of naively optimistic application of prophylactic therapy to the lead trades. Attempts on the part of physicians and others to mitigate the effects of current excessive absorption of lead by industrial workmen have been numerous. Milk,² ascorbic acid,³ laxatives and purgatives, and "remunerals" fortified by acid⁴ have had their proponents, if not always their persistent usage. Recourse to the procedure of the "fasting"⁵ of lead in the skeleton during exposure, followed periodically, in some instances, by prophylactic "mobilization"⁶ of lead from the skeleton,⁷ was based on the investigations of Aub and his associates.⁸ Because of the inadequacies of the methods of analysis available at the time, this led to the mistaken belief that these opposed effects on the lead metabolism could be affected by shifts in the calcium metabolism in the corresponding direction. That these and other comparable methods, which have been employed in prophylactic (and curative) therapy, are essentially ineffectual⁹ is beside the point. The fault is that they were often used in lieu of the adequate measures of environmental control that are dictated by considerations of sound industrial hygiene and by decent regard for the safety and welfare of human beings. It is to be expected that industrial management should favor and be unduly impressed by the magic of simple and relatively inexpensive medical prophylactic procedures rather than face the stern and often costly necessities of safe process design and plant engineering. If a physician, broadly or unconsciously wandering beyond his professional province, will bear the responsibility for the threatened health of industrial employees, many managers will relinquish it gladly, at least until the facts of life overtake them in the form of the treatment of employees and increases in compensation costs.

The administration by proper means of the appropriate salt of edathamil, in contrast with many of the old methods of prophylaxis proposed and employed in the past, offers certain interesting prospects for beneficial effects. Its use to achieve such benefits, under appropriate safeguards, in competent and conscientious hands, and under certain carefully weighed circumstances, eventually may be found to be advantageous. Only careful and thorough investigation, however, can determine whether this is feasible, and whether the uncer-

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the beneficial effects outweigh, in the long run, certain hazards of its use.

Experience has shown that the intravenous or intramuscular administration of diethylenetriamine calcium diethylenetriamine, in limited dosage and over brief periods of time, is an essentially safe medication. That it can be relied on for the relief of symptoms or for saving life has not been established,⁸ but it is well tolerated by adults and even by infants during episodes or more prolonged periods of acute and potentially lethal lead intoxication.⁹ Its action, described superficially of necessity, is as follows. It combines with lead in the soft tissues of the body, forming a stable, soluble, non-toxic compound. Because of the rapid excretion of this compound, principally by way of the kidney, it virtually sweeps out lead from the soft tissues.¹⁰ However, the compound seems unable to penetrate into the erythrocytes. Therefore, the lead concentration in the blood is not decreased as substantially and as promptly as it is after the administration of dimercaprol (BAL).¹¹ The details of the biochemical process and its remote effects are not clear at this time and remain to be established by investigation. This applies, with special significance, to the extent to which other metals are taken out of the body. For this reason, the prolonged administration of the drug, even intermittently, is fraught with unknown potentialities for the derangement of the mineral metabolism of the body.

It is obvious that the use of the drug for purposes of

prophylaxis in industry would be facilitated greatly by its administration by mouth, and such a preparation is available for use in this manner. Thus it could be given to industrial employees without inconvenience or objection on their part, and in a form that would not suggest that a somewhat drastic therapy was being employed. The beneficial results that are assumed to follow the use of this procedure would be those of a considerable increase in the overall rate of excretion of lead and the maintenance of an appreciable reduction, as compared with that expected otherwise, in the concentration of lead in the soft tissues. Unfortunately, however, the absorption of the drug from the alimentary tract is comparatively poor.¹² Although there is evidence of a slight to moderate increase in the urinary excretion of lead,¹³ there is also evidence indicating that this increase occurs in association with a corresponding decrease in the output of lead from the alimentary tract.¹⁴ In that case, the end-result is a failure to expedite the elimination of lead from the body. Even if there should be some overall increase in the rate of elimination of lead, the quantities of lead involved, in relation to the total quantities absorbed and retained in the body under the conditions of potentially hazardous exposure to lead, probably would be too small to be of practical significance. Certainly, if a significant increase in elimination were to be achieved, the virtually continuous use of the prophylactic agent would be required. From the aspect of effective use of the drug, there is no information that would enable even the most enthusiastic proponent of such a regimen to anticipate what might be its consequences, whether overt or insidious. Under these circumstances the subjecting of men to such a regimen, except for the purpose of cautious investigation surrounded by appropriate technical and ethical safeguards, could only be regarded as rash and irresponsible.

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**GUIDING PRINCIPLES
OF
MEDICAL EXAMINATIONS
IN INDUSTRY**



The Council on Industrial Health
American Medical Association
535 North Dearborn Street
Chicago 10, Illinois

N 355.02

The Committee that prepared this report consisted of:

CLARENCE D. SELBY, M.D. (Ch.), Port Huron, Mich.
 LEONARD S. ARLING, M.D., Minneapolis
 JAMES P. BAKER, M.D., White Sulphur Springs, West Va.
 E. S. JONES, M.D., Hammond, Indiana
 FRANK PRING, M.D., Cincinnati
 NORMAN J. ROBERTS, M.D., New York
 GEORGE R. ROWNTREE, M.D., Louisville

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GUIDING PRINCIPLES OF MEDICAL EXAMINATIONS IN INDUSTRY

These guiding principles have been approved for publication by the Council on Industrial Health. The material is a revision of the Council's previous publication entitled "Medical Service in Industry—Industrial Health Examinations."

CLARE D. BARBOUR
 Acting Secretary.

The purpose of a health service in industry is to provide a program of positive health maintenance for the employee. An important element of such a program is the supervision of the health status of the individual through examination, counseling, and assistance in proper job placement. Medical examinations of employees are designed to permit assignment of work compatible with the physical and mental fitness of individuals and to help them maintain their health.

Proper placement of workers with due regard for the variations in physical demands required by different jobs, and for the safety and health limitations involved in disabilities, can result in improved job performance, less absenteeism, decreased likelihood of injury, less hazard to the health and safety of others, lessened chance of aggravation of disorders, and, doubtless, a longer productive life span. Examination for and assistance in job placement are, therefore, practical, individualized applications of the principles of preventive medicine.

The objectives of industrial medical examinations are as follows:

1. To measure the medical fitness of individuals to perform their duties without hazard to themselves or others.
2. To assist individuals in the maintenance or improvement of their health.

3. To detect the effects of harmful working conditions and advise corrective measures.
4. To establish a record of the condition of the individual at the time of each examination.

Medical examination programs, properly conducted, provide maximum benefits to employees, employers, and the community. The emphasis should be on the placement of individuals according to their abilities and not simply selection of the physically perfect and rejection of all others. Unjust or questionable exclusions from work, through improper application of the findings upon examination, is against the public welfare and contrary to sound industrial health principles.

Functions of Physicians and Assisting Personnel

Maintenance of the physician-patient relationship with fairness to both employee and employer is essential to the success of any industrial health program. Both should feel that their interests are represented with integrity.

The examination should be conducted by the physician himself. It may be facilitated if a nurse or other adequately trained person can develop basic data from the examinee, such as height, weight, and age. Custom requires that a nurse or other female attendant be present when women are being examined.

It is the duty of the physician to interpret medical findings and to make decisions regarding their work significance. Health counseling requires special training and should be performed by the physician or under his supervision.

It is fundamental that the physician must have firsthand knowledge from personal observation of the various jobs within his industry. Information showing physical demands, working conditions, and accident and health hazards of each job classification facilitates selective placement.

Scope of the Examination

It is essential that each examination be thorough and suitable for its purpose. What may be adequate in one case may be quite insufficient in another. Many factors influence such decisions. For example, the physical de-

mands on an ironworker engaged in construction of a skyscraper are quite different from those of the sedentary typist.

It might be economically unwise for an essentially nonhazardous industry to include, routinely, extensive laboratory and x-ray tests of all applicants. On the other hand, a brief and superficial examination can be false economy and be misleading to employer and employee alike.

The nature of the industry, its inherent hazards, the variation in jobs, and physical demands and health exposures are determinants. The values of different examination procedures and their cost in time and dollars must be asayed. The physician, after carefully studying the problems involved, should advise management concerning the scope of the examination to be made.

The best type of examination program is one that emphasizes flexibility according to need, rather than one that has a set and invariable routine. A flexible plan provides for a basic minimum examination but recognizes the differences between individuals, age groups, and jobs. This permits the examining physician to devote less time and procedure to the evidently healthy young individual in a nonhazardous job. The older worker engaged in a more hazardous job receives more searching attention, with clinical impressions gained from the history and examination being supplemented by appropriate laboratory tests. Frequency of examination should vary with age, sex, occupation, and individual findings.

Opinions vary considerably as to what constitutes a minimum examination. The following minimum has been suggested: history, age, height and weight, and general appearance; skin, eyes, ears, nose, mouth and throat (lungs and heart), lymph nodes, peripheral blood vessels, abdomen including hernia, anus, genitalia, and spine and extremities; blood pressure, pulse, and temperature; urinalysis; and visual and hearing acuity. Personality, temperament, and significant nervous or mental manifestations should be noted.

In those cases in which an assistant takes the history, the physician should review it and elaborate the history still further. Most physicians feel that a carefully taken

personal health and occupation history is of great value, as it may suggest additional examination or warrant extra attention.

The trend in examinations is to make them more thorough, including chest x-ray, laboratory studies, electrocardiograms, special attention to the common sites of cancer, as well as mental or emotional status.

The employee should be examined in privacy and should be dressed. The extent of the examination of female genitalia is a moot point, depending upon whether the examination is for employment purposes only or is part of a regular health maintenance plan, upon the age of the workers, and upon other factors. The higher incidence of abnormal findings has brought about the more general inclusion of laboratory tests in examination of persons over 45 years of age.

Because of the importance of vision with respect to job efficiency and safety, it is advisable to perform rather detailed vision examinations measuring visual acuity for near and distance, visual fields, color discrimination, and depth perception. Instruments for making these tests are in general use. Detailed tests and records of the worker's hearing acuity before employment and periodically thereafter are often of value, particularly where there is an exposure to excessive noise.

Laboratory tests are indispensable where there is an exposure to toxic substances. Chest x-rays before employment and periodically thereafter may be indicated for workers engaged in dusty trades, particularly the mineral dusts.

Types of Examinations

The various kinds of examinations may be classified as original, periodic, and special.

Original Examinations.—Original examinations (also often called preemployment or preplacement examinations) are made for the express purpose of determining and recording the physical condition of the prospective worker and assignment to a suitable job in which his disabilities, if any, will not affect his personal efficiency, safety, and health nor the safety of others. The applicant (or his personal physician, on the applicant's approval) is advised of conditions needing attention.

Periodic Examinations.—Periodic examinations of employees may be on a voluntary or required basis.

If voluntary, it is usually customary to make the examination on or near the birthday of each individual. This usually results in a reasonable spread of examinations over the calendar year and eliminates peak loads. If the operations involved are relatively nonhazardous, intervals between examinations can be as much as two or three years at the discretion of the physician. However, it is desirable that persons past 45 years of age be examined annually inasmuch as degenerative disorders become increasingly manifest around this period.

A mandatory basis of periodic examination is usually applied to workers who are exposed to processes or materials that are definite health hazards or whose work involves responsibility for the safety of others. Substances like lead or carbon tetrachloride, capable of causing occupational disease, are usually subjected to process controls to keep the workers reasonably safe from poisoning; however, caution dictates the advisability of periodic medical examination to be certain that the engineering controls are effective. This also enables early detection of the hypersensitive individual and the worker whose personal unsafe practices defeat the control measures.

Frequency of the examination will vary in accordance with the quality of the engineering control, the severity of the exposure and the individual findings on each examination. Thus, some exposures might justify examinations or laboratory tests of the workers on a monthly or quarterly basis, while in other cases annually or biennially may be adequate.

In some cases, screening laboratory tests at regular intervals will suffice as the major portion of a periodic examination program with complete examinations being made less frequently.

Examinations of executives may be regarded as a special type of periodic examination of a particular class of employees. While not entirely new, they are becoming more prevalent, and are justified, by their advocates, on the premise that business executives carry heavy and never-ending responsibilities, included in which may be the welfare of large numbers of employees.

While some of these programs are on a required basis, considerable advantage accrues when they are voluntary, aided by a thorough promotional campaign inasmuch as individuals seeking examination are more cooperative and appreciative of the service. Practices vary regarding use of in-plant medical departments. If the in-plant medical facility is staffed and equipped to perform any extra work involved, many feel it is preferable to do those examinations within the department. Otherwise, it is best to send executives to outside facilities qualified to perform the required services.

Special Examinations.—Special examinations may be indicated at time of transfer from one job to another. The control of communicable diseases by examination of those who handle food is another example of special purpose examinations. In many jurisdictions these are required by law.

Many organizations find it worthwhile to make "return to work" examinations of employees who have been absent more than a specified number of days due to illness or injury. This is done to control communicable disease as well as to determine suitability for return to work. Upon return to work following such absence, a new evaluation of physical capacities may be necessary. Rehabilitation procedures may be necessary to reduce disability and improve the range of employability.

Upon retirement, resignation, or termination of employment, some organizations have found it desirable to make examinations and a record of the findings at that time. This is particularly true in operations involving definite exposure to health hazardous substances as lead, benzol, silica, and asbestos dust.

Report Forms

No single examination report form has been devised to suit all requirements or the content of detail desired by various physicians. There are report forms by the score.

Some reports in current use are so detailed they run into several pages and include two pages of minute detail devoted to personal history. There is a considerable divergence of opinion as to the actual value of such elaborate history detail even if completely honest and

accurate answers can be obtained for every question. Other examination forms in use are so brief they are almost valueless as adequate records or as an indication of the detail of the examination.

Many physicians prefer that the form include space to make narrative notes of any significant history, medical findings, and the advice given to the individual.

One popular type of form is that in which the items of examination are arranged in a vertical column with four to eight blank columns alongside. The results of the first examination are entered in the first blank column and dated. Subsequent examination data are entered in the adjacent blank columns, thereby promoting and facilitating comparison with earlier findings.

The desired detail and arrangement of the form is a matter for decision by the doctor after consultation with management relative to scope of the examination.

Preservation and Use of Records

The examining physician may properly put information derived from industrial health examination to the following uses:

1. All significant findings should be discussed with the worker with professional discretion. Good judgment should be used to prevent the raising of unnecessary fears, while emphasizing the importance of obtaining adequate personal medical care.
 2. A transcript or pertinent data may be supplied to another physician or to health agencies, or as required for insurance purposes on request or consent of employee.
 3. The employer should be given a classification of fitness to facilitate placement. A form may be devised for this purpose.
 4. The employer should be notified of potentially harmful work environment detected through examination.
 5. Governmental agencies such as courts, workmen's compensation commissions, or health authorities should be supplied with information on official order or when required by law.
- In all other respects the confidential character of

health examination records should be rigidly observed and access should be granted only on written consent of the worker, preferably after preliminary discussion with the examining physician.

Suitable filing equipment and training of personnel should be provided for the safeguarding and confidential maintenance of all medical records in the exclusive custody and control of medical personnel.

Fitness Classification Methods

It is not the function of the physician to inform the applicant whether he is to be employed. This is the prerogative and duty of management, as there are other factors in addition to physical qualifications that bear upon suitability for employment.

The referral of completed examination reports to lay persons for use in placement is particularly undesirable for several reasons. This practice violates the true physician-patient relationship and is an invasion of the confidential nature of such reports. Furthermore, untrained lay personnel are entirely unqualified to interpret medical facts into terms of work significance; this is the responsibility of the physician.

Placement information should be conveyed by a separate form, based on an agreed plan. This plan or rating method will enable the examining physician to convert medical findings into meaningful industrial terminology. The language of industry used in describing the physical activities and work demands of jobs has supplanted the once familiar but vague and indefinite medical admissions, for example, "light work."

Many systems of rating are now in use. One method depends solely upon classification into three categories, for example:

- a. Fit for any work.
- b. Fit for a specific job.
- c. Rejection.

Another method uses the following classifications:

- a. Physically fit for any work.
- b. Defect that limits fitness for work and leaves applicant eligible for certain jobs (the defect may or

may not be correctable but may require medical supervision).

- c. Defect that requires medical attention, is presently handicapping, and disqualifies for any type of employment.

Some methods are well developed and involve a complete appraisal of physical capacities on a report identical in format to the form used in analyzing jobs for the physical demands required of a worker to perform the job. This method has many virtues, as it promotes the effective matching of workers to jobs.

From the public and industrial health standpoints, the only bars to immediate employment in nonhazardous occupations should be the following findings:

1. Communicable disease. It is obvious that communicable diseases need to be brought under prompt control not only for the benefit of the individual but for the public welfare as well. This may involve the assistance of public health officials.
2. Incapacitating injury or disease. One of the great values of an examination program is the detection of disease in its early stages, when it is most amenable to treatment. Applicants with incipient but still nondisabling disorders can often be employed while they secure treatment from their personal physicians. Many applicants with incapacitating injury or disease can be referred to rehabilitation agencies for effective assistance in improving their employability and job opportunities.
3. Mental illness in which impaired judgment or notions prevent cooperative effort. It is not generally appreciated by laymen that there is a significant percentage of persons having mental illness or emotional disturbance. These aberrations can be of many degrees and frequently can be important enough to act as a bar to employment. The trained physician can frequently detect them at the time of examination.