AEROSOL INHALATION OF $\text{CaNa}_2\text{E.D.T.A.}$ (MOSATIL) BY WORKERS CONSTANTLY EXPOSED TO LEAD POISONING

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An aerosol of $\text{CaNa}_2\text{E.D.T.A.}$ ("mosatil") has been administered in hospital to two groups of five men who had been working on a lead smelter and exposed to lead in air concentrations of the order of 0.6 to 1.25 mg. of lead per m^3 . Five patients each inhaled 0.6 g. of $\text{CaNa}_2\text{E.D.T.A.}$ on seven successive days, and 2.4 g. on the ninth day. An average of 21.6 mg. of lead was excreted during the treatment.

Five patients given 2.4 g. of $\text{CaNa}_2\text{E.D.T.A.}$ every other day for eight days excreted an average of 14.2 mg. of lead each during treatment. The urinary coproporphyrin level fell to normal in both groups.

In recent years aerosol therapy has found an increasing use. Its advantage is that the fine aerosol particles are absorbed directly from the lungs into the blood stream through the alveolar epithelium without discomfort to the patient, and it can be given simultaneously to groups of patients. Alkaline mineral waters have been used in this way for silicosis (Beckmann and Reif, 1955). The disadvantages of aerosol therapy are the need for special equipment and the uncertainty about the dose received by the patient. Sometimes drying of the mucous membranes may be uncomfortable for the patient.

The value of $\text{CaNa}_2\text{E.D.T.A.}$ in the treatment and prevention of lead poisoning is well recognized (Teisinger and Srbová, 1956; Buckup and Remy, 1958; Unseld, 1958). It may also be used as a diagnostic test (Albahary, Truhaut, and Boudène, 1958; Savićević, Petrović, Stanković, and Djordjević, 1959). Teisinger and Srbová (1956) have already reported favourably on the use of $\text{CaNa}_2\text{E.D.T.A.}$ aerosols. Four patients were given 5 ml. 10-20% $\text{CaNa}_2\text{E.D.T.A.}$ three times daily with breaks over a period of 19 days. The blood lead and urinary coproporphyrin levels were reduced and clinical symptoms disappeared.

Method

Solutions of $\text{CaNa}_2\text{E.D.T.A.}$ ("mosatil") were given to 10 patients as an aerosol generated by a Draeger

aerosol apparatus. The patients were working in a smelting plant with an atmospheric concentration of 0.6-1.25 mg. lead oxide per m^3 . During treatment the nasal mucosa became dry and this was attributed to the warm air from the apparatus and the high Ca content of the drug.

Five patients received 0.6 g. $\text{CaNa}_2\text{E.D.T.A.}$ (5 ml. "mosatil") daily for seven days and on the ninth day 2.4 g. $\text{CaNa}_2\text{E.D.T.A.}$ (10 ml. "mosatil forte"). The total dose was 6.6 g. $\text{CaNa}_2\text{E.D.T.A.}$ Five patients received four doses of 2.4 g. $\text{CaNa}_2\text{E.D.T.A.}$ on alternate days, a total of $\text{CaNa}_2\text{E.D.T.A.}$ 9.6 g.

All the patients were in hospital during treatment and for the two subsequent days. Daily analyses were carried out of the urinary lead and coproporphyrin and a haematogram including stippled cells and reticulocytes was drawn. Blood lead was determined two to three times during the period of treatment.

Results

In Fig. 1 the values for urinary lead and coproporphyrin in the first group are shown. The excretion of lead rises as soon as inhalation therapy starts, drops sharply when it is discontinued, and rises when it is resumed. The daily fluctuations in lead excretion related to treatment on alternate days is shown more strikingly in the second group (Fig. 2). The total lead excreted falls steadily and remains at a constant low level for the three days after treatment stopped. Urinary coproporphyrin shows a fall in both groups. Blood lead levels, originally

FIG. 1.—The excretion of lead (continuous line —) and coproporphyrin (broken line ----) in the urine of men receiving $\text{CaNa}_2\text{E.D.T.A.}$ by inhalation on successive days.

FIG. 2.—The excretion of lead (continuous line —) and coproporphyrin (broken line ----) in the urine of men receiving $\text{CaNa}_2\text{E.D.T.A.}$ by inhalation on alternate days.

0.1 mg./100 ml., fell by 20 to 45% during treatment in both groups.

Stippled cell counts showed some irregularity during the course of treatment but there was no other change in the blood picture.

The absorption of E.D.T.A. during aerosol inhalation has been studied. Preliminary observations show that individuals vary in the degree to which they absorb E.D.T.A. but for a given subject the value is fairly constant and lies between 10 and 30% of the dose administered.

However, the first group receiving only 6.6 g. E.D.T.A. excreted on the average 21.6 mg. Pb while the second group receiving 9.6 g. E.D.T.A. excreted only 14.2 mg. This difference may be due to the fact that the first group received continuous treatment but the second received E.D.T.A. on alternate days.

Conclusion

The administration of $\text{CaNa}_2\text{E.D.T.A.}$ by aerosol therapy increases the urinary excretion of lead. If evidence can be obtained that the long-term administration of E.D.T.A. itself carries no risk, it may have a use in the preventive treatment for exposed workers. Daily inhalations seem to be more effective than intermittent administration. Further work is needed on the absorption of $\text{CaNa}_2\text{E.D.T.A.}$ given by various routes.

REFERENCES

- Albahary, C., Truhaut, R., and Boudène, C. (1958). *Arch. Mal. prof.*, 19, 121.
 Beckmann, H., and Reif, E. (1955). *Beit. Silikose-Forsch.*, Heft 39.
 Buckup, H., Remy, R. (1958). *Arzt. Forsch. (Orig.)*, 12, 92.
 Savičević, M., Petrović Lj., Stanković, M., and Djordjević, S. (1959). *Zbl. Arbeitsmed.*, 9, 6.
 Teisinger, J. and Srbová, J. (1956). *Arch. Gewerbepath. Gewerbehyg.*, 14, 579.
 Unseld, D. W. (1958). *Klin. Wschr.*, 36, 328.

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