SESSION V - PANEL DISCUSSION OF THE PROBLEMS OF APPLICATION AND FUTURE RESEARCH NEEDS

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A B S T R A C T

The final topic for the lead conference is a panel discussion on the problems of application and future research needs. Most investigators would agree that there is a great deal of research needed in this area. Dr. Carnow did an excellent job of summarizing some of the areas that need further research and outlining possible approaches to this research. We will pursue these matters further in our discussion.

A multidisciplinary group of investigators at the University of California recently met to discuss the topic of Problems of Application and Future Research Needs, and it was agreed that there are six areas where further research is needed, as shown in Table I.

TABLE I

1. Evaluate sensitivity and practicality of presently available screening techniques for identification of increased lead absorption.

2. Identify earliest signs of tissue damage and behavioral impairment and correlate these with the measurements of increased lead absorption.

3. Investigate blood lead distribution with particular emphasis on plasma/RBC ratio and protein binding and correlate any observed shifts in RBC or protein binding of lead with clinical symptoms and signs.

4. Evaluate the safety of CaEDTA therapy and mobilization test with particular emphasis on possible nervous system and renal damage from mobilized lead and cadmium.

5. Evaluate the effectiveness of CaEDTA in treatment of so-called sub-clinical lead poisoning (i.e. nerve conduction abnormalities, perceptual motor impairment, subjective CNS symptoms.)

6. Evaluate significance of concomitant increased absorption of other heavy metals.

I emphasize multidisciplinary research because I believe that this is the only way to study the effects of a toxin, such as lead. Lead has multiple target organs, and, in any given individual, each organ may have varying susceptibility depending on genetic and environmental factors. Therefore, only multidisciplinary studies can assess the impact of increased lead absorption on the entire individual.

In commenting on the list in Table I, over the past few years, numerous new techniques have been developed for the assessment of increased lead absorption.[1] However, the interrelation of these tests has not been adequately evaluated. It will be necessary to make measurements on a large number of lead workers, using all of these various techniques, and then compare how these results correlate with evidence of tissue damage.

Techniques are available for assessing protein binding of various elements including lead.[2] The constance of binding can be determined and the protein that binds lead in the plasma can be characterized. Preliminary reports suggest that varying susceptibility to increased lead absorption may be related to variation in the binding of lead protein.[3-4]

Intravenous infusion of CaEDTA is generally considered the most effective treatment for acute lead poisoning. There have been reports, however, suggesting that through the release of tightly bound cadmium, CaEDTA may be harmful to the kidneys and nervous system.[5] The effectiveness of CaEDTA and other chelating agents in treating the so-called sub-clinical effects of increased lead absorption is unknown (i.e. nerve conduction slowing, visual-motor impairment, etc.)[6]

Finally, the significance of concomitant increased absorption of other heavy metals, has only recently received attention. Children and adults with increased lead absorption have been found to have increased absorption of other heavy metals as well.[5-7] Particularly worrisome is cadmium absorption since cadmium is significantly more toxic than lead at equal dose levels.

REFERENCES

1. Baloh, R.W., Laboratory diagnosis of increased lead absorption, Arch Environ Health 28:198-208, 1974

2. Campion, D.S., Olsen, R., Measurement of drug displacement by continuous ultrafiltration, J Pharm Sci 63:249-252, 1974

3. Robinson, M.J., Korpinski, F.E., Brieger, H., The concentration of lead in plasma, whole blood and erythrocytes of infants and children, Pediatrics 21:793-796, 1958

4. McRoberts, W., Alternation in the fractional blood lead concentrations in the development of inorganic lead poisoning, and the concept of the role of "lead integration" in lead absorption, J Soc Occup Med 23:3-18, 1973

5. Challop, R.S., Role of cadmium in lead poisoning, (Letter to the editor) New Eng J Med 285:970, 1971

6. Airborne lead in perspective, Comm on Biological Effects of Atmospheric Pollutants of the Div of Med Sci Nat'l Coun, NAS, Washington, D.C., 1972

7. Delves, H.T., Clayton, B.E., Bicknell, J., Concentration of trace metals in the blood of children, Brit J Prev Soc Med, 27:100-107, 1973

DISCUSSION LEADER-Dr. Robert Baloh

I would like to present for the first discussion on this panel, Dr. Katherine R. Mahaffey from the U.S. Food and Drug Administration, who is representing Dr. Stephen Krop who is unable to be here today. Dr. Mahaffey.

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Edited By

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University of Illinois School of Public Health
Contract Number 210-75-0026

Chicago, Illinois
February 24-25, 1975

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Surveillance, Hazard Evaluations and Field Studies

February 1976

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

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HEW PUBLICATION NO. (NIOSH) 76-134

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