

THE ROCKEFELLER UNIVERSITY

New York, N.Y. 10021

13 December 1968

Dr. Detlev Bronk, President Emeritus
The Rockefeller University
New York, New York 10021

Dear Dr. Bronk,

This is a summary of the information I have learned over the past several months concerning lead poisoning in slum children, which we discussed very briefly the other day. In addition, I have included a series of legislative proposals that have been suggested by various people concerned with this problem, and a brief conclusion of my own. All of the figures can be easily substantiated, but I felt this was inappropriate for this summary. If you need any references for verification, I can furnish them on very short notice.

Thank you very much for your help on this major urban problem.

Sincerely,

Glenn L. Paulson
Graduate Fellow

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LEAD POISONING IN SLUM CHILDREN

I. Introduction

Lead poisoning in slum children, caused by the eating of peeling lead-containing paint and plaster, in dilapidated ghetto housing, is probably one of the greatest public health problems in the United States. Its causes, pathological consequences and epidemiology are known; techniques already exist for screening, treatment, and prevention of this disease. Yet, because of lack of public awareness and action, this "silent epidemic" each year kills hundreds of children and causes mental retardation or other permanent neurological damage in many thousands more.

II. Epidemiology

The true incidence of lead poisoning is difficult to determine, since most of the children in early stages of poisoning have symptoms easily confused with those of other diseases. The best approximations of the incidence rate have been derived from active screening programs that have sent investigators into ghetto homes to obtain blood or urine samples from children aged one to six for determination of lead levels or heme precursors such as delta-aminolevulinic acid or (less satisfactory) coproporphyrin. This has been done in several cities, with the following percentage of children aged one to six fulfilling diagnostic criteria for lead poisoning:

Chicago	8.3 %
Baltimore	7.1
Rochester	6.6
Cleveland	6.4

Recent information from Chicago shows a somewhat higher incidence rate. A study of about 500 children in the South Bronx done by the New York Scientists' Committee for Public Information ^{THIS THE STUDENT HEALTH ORGANIZATION} this summer showed that, before corrections for 24 hour urinary output, a much higher percentage of the children showed abnormally high levels of a heme precursor that is elevated by excess lead intake. Simultaneous examination of groups of children living in newer public housing with lead-free paint show almost none with lead poisoning.

For purposes of discussion, let us use the range of 5-10 % for an incidence rate. The City has recently said that there are 800,000 dilapidated living units in New York. Demographic data

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indicate there are, on the average, 2.5 people per living unit, with 9 % of these people aged one to six; both of these numbers may well be underestimates for ghetto populations. Using them, one obtains an estimated 9,000-13,000 children in New York City currently suffering with lead poisoning. (The City Department of Health has publicly stated there may be as many as 35,000 cases.) The same calculation using the commonly cited figure of 10 million dilapidated living units in the nation yields an estimate of 112,500-225,000 children with lead poisoning in the United States. This too is probably a conservative estimate, because of the demographic figures used.

In contrast to the estimate of 9,000-13,000 affected children in New York City, the Department of Health presently receives reports of only about 500 cases per year. The communicable diseases reported most frequently in New York during 1966 were gonorrhea (about 30,000 cases), syphilis (about 14,000 cases) and measles (about 8500 cases). During the past 30 years, the greatest number of cases of polio reported in New York in one year was about 2500 in 1949. Comparison of these figures justifies, I think, designating lead poisoning as a "silent epidemic."

III. Consequences

The early clinical signs of lead poisoning are, as mentioned above, not very striking and may include abdominal pain, constipation, vomiting, loss of appetite, anemia and irritability. Unless the parents and physician are alert to the possibility of lead poisoning, the necessary laboratory test to verify the presence of an excess body burden of lead will not be performed and the child, if treated at all, will be treated for gastroenteritis or some similar problem. This means that lead intake will continue and the child may eventually enter the acute stage of the disease, usually developing convulsions and coma; such cases are the bulk of the approximately 500 reported per year in New York. At this stage of the disease, which occurs in about 5 % of the total number of poisoned children, the dangers are very great. About one-fourth of these children die; between one-fourth and one-half suffer permanent neurological damage, very commonly mental retardation. One study showed that many months after the severe stage, a group of 32 children had an average IQ of 74 (range 35-115), with the majority severely retarded; many other series of children showing similar consequences are described in the literature.

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It is not known at the moment whether children with the less severe physiological symptoms have, in addition, some less severe neurological damage, for example, an IQ drop of 10 or 15 points. (As you know, this is often the case with environmental problems; experiments and observations have simply not been performed yet on most important aspects of what is currently being called "human ecology.") Nevertheless, prudence would indicate that all exposure to excess lead should be avoided if possible. In contrast, here in New York, and probably in most other urban areas, children already diagnosed with acute lead poisoning are, after medical treatment, sent back to their original environments, where they may again take in lead. The recurrence rate of severe lead poisoning is high; in New York it is around 50 %. Such "two-time losers" have a 90 % chance of permanent neurological effects. And a significant fraction are "three-time losers," with severe brain damage almost a certainty. This is due to the lack of environmental "treatment," which is every bit as important as the medical treatment of the child.

As you can see, the cost to the individual suffering from this disease may be tremendous. Less often mentioned is the cost to society, which must hospitalize and treat the child, and then either pay for the institutionalization of a severely affected child for the rest of his life, or pay the "social cost" of the effect such individuals may have in the family, the classroom, the place of work, the streets, and the community at large.

IV. Cause

The primary source of lead in all studies in the medical literature is old paint, which until 20 years ago or so had lead as a major ingredient. In old buildings, the chances are very good that older layers of paints contain lead. If because of poor maintenance, leaking pipes, etc., the walls become unsound, then the paint and plaster will peel, crumble and fall to the floor where it becomes accessible to young children. A certain fraction of all children, no matter what social class, especially those aged one to three, engage in "pica," that is, the ingestion of non-food objects. There is no agreement in the literature on whether this is originally due to physiological causes (teething, for example), nutritional deprivation or psychological causes; probably all these factors and others play a role. This practice causes problems for the child only when the environment offers harmful objects to eat; lead-containing paint chips are such harmful objects.

Approximately one-tenth of all ingested lead is absorbed. A single paint chip about one-half inch square may contain 50 mgm of lead of which 5 mgm would be absorbed. It would not take many days for a child to absorb an amount of lead equal to the average adult body

burden of 200 mgm. If ingestion of the chips continues and the body burden increases even more, symptoms may develop, ranging from mild to severe as described above.

V. Legislative Remedies

Those of us who have been involved see the possibility for several kinds of legislative approaches to this problem. The suggestions below presuppose no existing legislation at all. In some cases the laws already exist for some cities and states, but the national scope of the problem demands action by all cities and states if the actual incidence of this disease is to be reduced.

1. The use of lead-containing paints for all interior surfaces, windowsills, porches, etc., should be banned. Lead paint sold should carry clear warning labels. (Many large cities already have this type of ordinance.)

2. A State could make it illegal to have accessible lead-based paint on walls of multiple dwelling units and public buildings such as schools and hospitals after a period of one or two years. This would require either removal of the paint or the installation of a new wall surface by the owners, whether public or private. (By the way, the peeling paint samples I have obtained from three hospitals in New York City all have lead in them.) Matching funds for repairs, or possibly tax write-offs, could be furnished as an incentive to landlords.

3. State law could require an agency of local health or building departments to remove leaded paint if the landlord has refused to do so, giving the agency in addition a lien against the landlord to recover costs. In addition, a special "lead poisoning prevention statute" could allow tenants who repair their walls themselves to deduct the cost from their rents; an agency could be established to widely publicize this possibility, provide technical suggestions, etc.

4. The condition of peeling lead-containing paint could be classified by a State as a rent-impairing violation where rent-strike provisions are part of the law. Efforts could be made to assure that in all areas the presence of lead-based paint on interior walls is a violation of local health or building codes. (This is the case already in New York City.) More importantly, steps should be taken by the State to insure that this condition constitutes a "nuisance" as commonly defined in any given jurisdiction.

5. A State statute could be drafted to simplify the legal proof needed to make a landlord liable for health damages due to lead-based paint.

6. State legislation could mandate local health departments to institute screening programs in convenient public institutions such as hospitals, well-baby clinics, nursery schools, and so forth, and to have a paint-testing program in addition. All results of these programs should be reported to local health departments, so that adequate follow-up by medical social workers will be possible. (The mandated screening for phenylketonuria in New York State, which affects approximately 0.01 % of newborn children, and the offering of free X-ray examinations are precedents of a sort.)

7. Federal legislation could provide grants to cities to implement such programs, similar to the Federal legislation for providing funds to local rat control programs.

8. The essential cause of this disease is old, dilapidated slum housing; the above measures offer temporary ways to keep the leaded paint in such housing from the children. Nevertheless, this problem is one of many health and other problems that will be alleviated by the construction of new, low-cost housing in urban areas. As such, lead poisoning can serve as an added reason for more rapid progress in legislation concerning this area.

VI. Conclusion

The number of children poisoned by lead in the future will be closely tied to the fate of our cities. If slums continue to grow, the number of dilapidated houses will grow and the number of poisoned children will grow. If housing conditions improve so that new, lead-free housing is built and the lead in old housing is kept on the walls by careful maintenance and new techniques, the number of poisoned and permanently damaged children will decrease. In this sense, the future incidence of lead poisoning in ghetto children will serve as a good measure of the effectiveness of America's attack on the housing component of the urban crisis.

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