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March 2, 1978

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From: E. S. Jacobs *ESJ*

ILZRO TEL SUBCOMMITTEE REVIEW OF
PROJECT LH-265 -
HOUSEHOLD DUST LEAD EXPOSURE TO CHILDREN

The subject meeting was held on February 28 at the ILZRO offices in New York City. Attending the meeting were:

Gary Ter Haar	- Ethyl Corporation
Emmett S. Jacobs	- Du Pont Company
James Sayre	- U. Rochester Medical Center
Evan Charney	- U. Rochester Medical Center
Edward McCabe	- U. Wisconsin Medical School
Donald R. Lynam	- ILZRO
Lillian Piantonida	- ILZRO

The meeting was held to discuss the final results of ILZRO Project LH-265, "Household Surface Lead as a Source of Low Level Lead Exposure," with the principal investigators, Drs. Sayre and Charney. This project was started in 1976 and has been fully funded by the TEL Subcommittee composed of Du Pont, Ethyl, Nalco, Houston, and Octel.

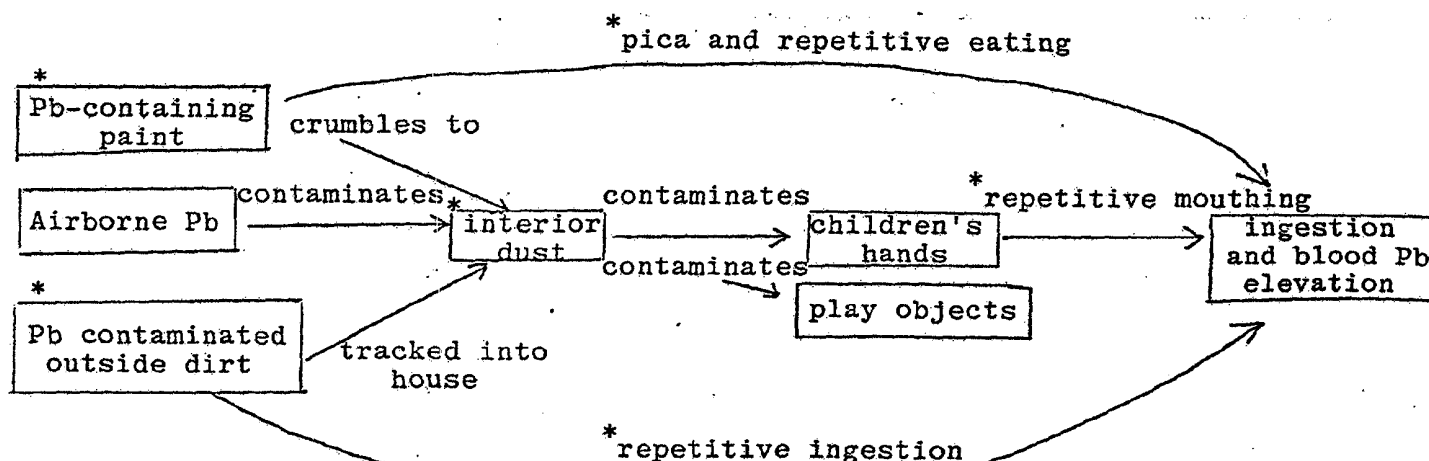
The objective of the program was to determine whether lead present on interior household surfaces constitutes a significant source of exposure to pre-school age, inner-city children. This was studied by selecting a group of 50 children with elevated blood lead levels (40 to 79 $\mu\text{g}/\text{dl}$) and a control group with low blood leads ($\leq 29 \mu\text{g}/\text{dl}$) and FEP ($\leq 59 \mu\text{g}/\text{dl}$). The subjects were selected from the Rochester Lead Screening program and the homes were visited by a trained interviewer who interviewed the parents, observed the child, and obtained special impregnated towel-wipe samples of surfaces at sites the child lived and played. (See Attachment A for protocol.)

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All field work was completed in 1977 and most data analyses are complete. (See Attachment B.) The principal investigators conclude the findings of this study to date show:

1. Moderate level Pb elevation in children is a multifactoral condition: no single factor studied can explain the phenomenon.
2. Pb in interior dust and on the children's hands correlates strongly with blood Pb levels.
3. Pica for paint can explain only 23% of the variance of blood Pb: adding the other factors (hands, soil Pb, household dust Pb) can explain up to 77% of the variance, depending on age.
4. Interior dust Pb levels cannot be explained entirely by Pb from peeling paint in that environment : airborne Pb and/or tracking in of outside Pb from deposition in soil or an outside surface are other potential sources.
5. In this study source of Pb intake appeared to vary by age: in the children 18-33 months eating outside Pb contaminated dirt was an important (although not the only) factor. In children 48-72 months habitual mouthing, interior dust and hand Pb contamination and pica-for-paint all appeared significant."

Possible Mechanisms for Blood Pb Elevation
of Inner City Children



*Significant individual correlation demonstrated in present study.

Alternate explanations are possible but less likely to explain the majority of cases. Thus, if airborne Pb were directly inhaled adult values and other-than-inner city children should be affected (not proven true in Rochester). No source of food or water contamination has been identified.

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We requested additional data analyses in order to evaluate some points not considered and to further substantiate or eliminate the strong correlation of lead in dust and on children's hands with blood lead levels. These additional analyses include:

1. Evaluating effect of race - Low group had 17% white; high group had 2% white.
2. Separate regression analysis of continuous (environmental measurements) and dichotomous (interview data) variables.
3. Examining possible interview bias - Did an interviewer handle only high or low groups, black or white, etc.?
4. Evaluate relation of old and new housing - About one-third of housing is new.
5. Examine relationship of traffic activity.

Dr. Sayre indicated these data analyses should be completed in about two months. In the meantime they will put together a preliminary final report, including additional analyses, for review by the project group, at which time a final decision on what to do with publishing this information will be made.

ESJ/ea
Attach.

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ROCHESTER LEAD POISONING STUDY: HOUSEHOLD ENVIRONMENTAL SURVEY

Subjects and Methods of Study

With the cooperation of the Anthony Jordan Health Center (AJHC) located in the 7th Ward of the city and the Pediatric Lead Program coordinator of Strong Memorial Hospital (SMH) children were selected for the study and control groups. All selected were residents of the city to a large extent clustered in the 3rd and 7th Wards. (A census tract comparison of the groups will be included in the final document.) Both AJHC and SMH have on-going lead testing programs and maintain special files of children's names, testing dates and results of blood lead (PbB) and FEP. The child's age in months, family name and address were ascertained. Prior lead test results were reviewed if performed and available. A data sheet was filled out. The parent was sent a postcard describing the study and stating that the interviewer would come to the home in a few days.

A home interview was then conducted, ^{with parent.} Important aspects ascertained in this interview were: (1) whether the child had received prior treatment for lead poisoning; (2) occupation of the parent and highest level of educational attainment; (3) the various locations frequented by the child in the 4 months previous to the most recent lead test. The amount of time, roughly estimated as hours per week, spent at these locations during that 4 month interval. Could access to these various locations be had by the interviewer; (4) had the house in question been recently repainted; (5) was there chipping paint in the house or on porches accessible to the child. Interviewers were instructed to make their own observations on this point, answering affirmatively as they saw it, regardless of the parent's answer; (6) sucking activities of the child on fingers, toys, or other objects.

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Independent interviewer observations of the child were asked as in (5); (7) pica activities of the child, asking specifically about newspapers, pencils, paint chips, soil inside or outside of house, or other objects. Presence of pica was considered to exist even if considerable time had passed since observed.

Collection of specimens. Wipe samples, paint chips and soil specimens were taken. Wipes were taken in a specified order as follows (1) the Examiner's hands after washing; (2) the child's hands; (3) the windowsill in an area commonly frequented by the child in his (her) daily play; (4) the floor of such an area. After the sill test the examiner once again washed her hands. Hands were washed at conclusion of study. Paint samples were taken from any chipping or flaking surface identified above and irregardless of whether a pica habit was thought to exist on the basis of interview. Soil samples were collected from those homes where the parent said the child like to play in the dirt, put dirty hands in the mouth or eat dirt and were taken from the area of play identified.

All specimens were bagged or bottled and labelled for laboratory analysis with the subject number. A location code was used on specimens.

Laboratory study. Soil and towel analyses were carried out in the lead laboratory of the Environmental Health Sciences Center by a single technician. Paint analyses were sent to one of two outside laboratories dependent on sample size. The N.Y. State laboratory (Health Research Labs Inc.) could not do specimens under 100 mg. size. Such specimens were sent to Environmental Science Associates of Burlington, Mass. Prior to submission paint specimens were homogenized.

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MODERATE BLOOD Pb LEVEL EDUCATION IN INNER CITY CHILDREN -
WHERE DOES THE Pb COME FROM? Evan Charney and James Sayre

2/25/78

- I. Hypothesis: Children, ages 1½-6 years, with blood Pb levels between 40 and 79 ugm%, will have significantly more lead on surfaces in their household environments than will a matched group of children whose blood Pb levels are below 30 ugm%. The (unproved) implication of this hypothesis is that the blood Pb elevation is due to the lead contaminating the childrens' hands and then being ingested by the normal hand-to-mouth activity of these children.

Alternate sources of environmental Pb and mechanisms of ingestion will be determined as well in both groups of children.

Sources

1. Pb in peeling paint in areas where children spend time.
2. Pb in soil (ugm/mgm soil) in outside areas where child plays.
3. Pb on children's hands.

Mechanism

1. History of pica for paint and other substances.
2. History of mouthing behavior, including habitual finger mouthing.

It is hypothesized that hand levels of Pb, and mouthing behavior will be significantly higher in children with elevated blood Pb levels. The other factors may vary as well, but will be less strongly correlated with blood Pb levels than will environmental dust, hand Pb and mouthing behavior.

II. Methods

- A. Subject Selection: Pb screening programs at two Health Centers and Strong Memorial Hospital will be reviewed to identify the following children:

1. High group (n=50) defined as:
 - (a) One capillary or venous blood level between 40-79 ugm%. A second blood level will be drawn within four months of the first and must fall in the same range. Each subject should have an elevated erythrocyte protoporphyrin level.

2. Low group (n=50) defined as either capillary or venous blood level ≤ 29 ugm% with a normal FEP. $\leq 5?$

The low group will be selected to group match for area of residence, age (similar numbers of 1½-3 year olds, 3-4 year olds, 4-6 year olds), race, education and occupational levels of head of household.

- B. Household Dust Samples: Alcohol impregnated towel wipe

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