

ESSO EUROPE INC.

50, STRATTON STREET, LONDON, W1X 6AU ENGLAND

OFFICE OF ENVIRONMENTAL AFFAIRS

R. J. SHERWOOD - Environmental Health Advisor

OFFICE LOCATION AND MAILING ADDRESS: ESSO RESEARCH CENTRE, ABINGDON, BERKSHIRE OX13 6AE TEL: ABINGDON 1600 EXT. 308

20th February 1974

Professor R. A. Kehoe, M.D.,
Dept. of Environmental Health,
Kettering Laboratory,
College of Medicine,
University of Cincinnati,
Eden & Bethesda Avenues,
Cincinnati,
OHIO 45219, U.S.A.

Dear Professor Kehoe,

I am exceedingly grateful for your letter of 12th February and acknowledge receipt of a copy of the 1960 Harvard Letters. I am not sure whether I should tell you that these have been a constant source of reference to me since I attended your presentation in 1960.

Pressure of daily work has completely prevented any opportunity to investigate the chemical form which lead takes in urine, following either inorganic or alkyl lead exposure, and I see little prospect of this. It does seem a pity that organisations such as A.P.I. with funds available have not considered chemical methods of distinguishing alkyl and inorganic lead absorption.

I am glad you consider that some part of the intake may be released as vapour in exhaled breath. You may be interested in the enclosed reprint on benzene which we have since studied in slightly greater depth. One sees that after exposure breath concentrations may be about one tenth of those to which a man has been exposed, but this drops rapidly to a very small proportion. I do not believe that at present we have methods with adequate sensitivity to assess alkyl lead in breath, except immediately after exposure, but again it would be an extremely interesting subject to research.

In one of our benzene inhalations we used a gasoline sample and I had hoped to pick up an increase of lead level in urine. Unfortunately, we contaminated all the samples and have had no opportunity to repeat the experiment. Should we have an opportunity for further work, I will certainly let you know the outcome.

I am so sorry to hear of your illness and am delighted that you have made a more or less complete recovery. I can imagine that at this stage the cataract must be a thorough nuisance, but also know how successful surgical intervention always is.

I recall with pleasure our meeting again in Buenos Aires, and I do hope that you will be well enough to attend the 1975 Congress which is planned to take place here in Brighton at the end of the summer.

Again, many thanks and very best wishes,

Yours sincerely,

N 6297

February 12, 1974

Mr. R. J. Sherwood
Environmental Health Advisor
Esso Research Centre
Abingdon, Berkshire OX13 6AE
England

Dear Mr. Sherwood:

You need not have spared any trouble to me when you ran into your problems associated with the diagnosis of lead poisoning, as indicated in your letter of June 27, 1973. As we view the function of an industrial hygienist in relation to the various aspects of medical practice, the industrial hygienist is one of the most useful members of the professional group in industrial health. The diagnosis of lead poisoning in industry and in ordinary human life, is seldom made effectively by physicians without benefit of the analytical (and other observations) of the industrial hygienist. What doctor of medicine do you know who can perform a satisfactory analyses of lead in urine, blood or organic tissues? And yet how certain can diagnoses of lead poisoning be made or rejected without some type of analytical services for lead or metabolic substances associated with lead and its effects? I have, for many years, worked in close collaboration with respected associates, who can do things of that sort, which I cannot do or devise means of doing. Which are the more important, medical observations or chemical tests? I shall send you a booklet in which are described many of the first studies which I have carried out on the subjects of lead, lead absorption, sources of exposure to lead, and you will see how important the analytical approach has been in the understanding of various aspects of this subject.

As to lead in the blood, the evidence is that the alkyl lead compounds are very short-lived, as such, in the blood. Just what the lead compounds in the blood are, is not, so far as I know, known to anyone, under any circumstances. Regardless of the form in which it entered the body, it is not volatile long or at the time one withdraws blood from the veins. We know or assume to know, most about it, of course, when the lead in the blood was absorbed as inorganic lead. It can be removed from the liquid blood, as a general rule, by removing the erythrocytes from the blood to which the lead, presumably as inorganic lead, is bound. If you can develop, or have developed, any dependable evidence of the nature of the compound (or compounds) of lead in the blood under given conditions, I shall be glad to have it, for I am at present unaware of the facts in this matter. I wish I could give you accurate information on matters of this type, but I cannot, and, therefore, there is no point in my making assumptions in the matter, or making guesses here.

I feel reasonably certain that some of the tetramethyllead which is absorbed into the human body under certain conditions is evaporated from the lungs of living persons and living animals. My reason for this statement is primarily that this

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February 12, 1974

is the only manner in which certain apparent variations in the toxicity of tetramethyllead appear to be readily explainable. This, obviously, is not a very good reason for this conclusion, but until I can find a better explanation of certain otherwise (to me) unexplainable phenomena, it will have to suffice.

I have had one serious illness (a strange type of stroke last year) which almost resulted in my death, but allowed me finally to survive after somewhat more than two weeks of coma, with but negligible paralytic or residual phenomena (a minute degree of left-sided weakness, very hard to find and measure, and some slight degree of cerebral involvement, resulting in fleeting losses of memory and a mild degree of erratic cerebration). I have now seemingly unrelated to this episode, because it came earlier, some degree of bodily imbalance. I have also, now, bilaterally developing ocular cataracts, which are not yet operable, and give me a fair amount of visual inefficiency. I believe that when these have been removed successfully, I shall have very little residual disability. You may or may not know that I was eighty years old at my last birthday in November, and it is not strange, perhaps, that I have developed some of the disabilities of old age. On the other hand, I have no elevation of blood pressure, and my vascular system, as a whole, shows very little evidence of the changes associated commonly with old age. Just why I managed to have a stroke, affecting apparently my brain stem only, is not clear to me or anyone else.

I am pleased to have had your first letter to me, and I shall be very much interested to know whether you have managed to find any answers to your several questions.

Sincerely yours,

Robert A. Kehoe, M.D.
Professor Emeritus of
Occupational Medicine

RAK:wb

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(continued:-

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R. J. SHERWOOD - Environmental Health Advisor

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27th June 1973

Professor Robert A. Kehoe, M.D.,
University of Cincinnati,
Department of Environmental Health
College of Medicine, Kettering Laboratory.
Eden & Bethesda Avenues,
Cincinnati,
Ohio 45219
U.S.A.

Dear Professor Kehoe,

I am most grateful for your letter on urinary elimination of lead and for the enclosed reprints from Dr. Cholak on methods.

I did not like to trouble you personally with this matter as, being a hygienist, I must restrict my questions to methods of identifying exposure to lead, and not to the diagnosis of effects.

As I mentioned, a diagnosis has been made by a properly qualified academic physician in Italy of chronic lead poisoning from inhalation of alkyl lead. As a hygienist I cannot challenge that, but I think it worthwhile looking to see if analytical methods might help identify the principal source of lead. In the course of studies on benzene retention and elimination, exposure to known concentrations of gasoline have been made here, but unfortunately urines from the only gasoline inhalation to date were contaminated.

I hope to make further tests and to determine quantitatively any immediate increase in lead elimination in urine related to known exposure, and hopefully to identify the chemical form of the lead.

I have always been curious about the lead in blood concentration following inhalation of alkyl lead. I assume the blood must carry it to the brain where the damage occurs, (presumably a quantity is also retained in the fat), and from a knowledge of partition coefficients it should be possible to estimate the amount in specific organs at given times.

Do you have any information on coefficients for air to blood, and blood to tissue for the human body? Perhaps they may be deducible from the work of Bolanowska or Cremer.

I take the liberty of enclosing a preprint on the benzene work as the elimination pattern may be similar to that of alkyl lead.

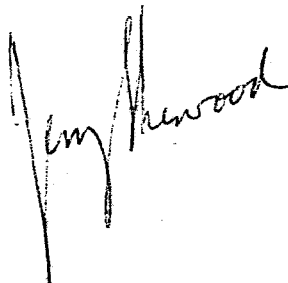
I also wonder if present procedures which depend on initial asking of biological matter might lose alkyl lead through evaporation?

Should we develop any interesting data on the chemical forms of lead in urine I will certainly let you know. It will be some time as this is one of a number of ideas being developed, so I would be delighted to hear of anybody else making such studies.

(continued:-

I was sorry to miss you in Buenos Aires, but look forward to our meeting at the next International Congress in Brighton in 1975 or perhaps at the International Particles and Vapour Conference in Edinburgh about the same time.

Yours sincerely,

A handwritten signature in dark ink, appearing to read "Jim Hewood". The signature is written in a cursive style with a long, sweeping vertical stroke on the left side.

Enc.

RJS:MC
27.6.73