

THE ASSOCIATED ETHYL COMPANY LIMITED

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OUR REF.

HF/WEB.

YOUR REF.

Dr. Robert A. Kehoe,
Department of Physiology,
College of Medicine,
University of Cincinnati,
CINCINNATI, Ohio,
U.S.A.

August 31st, 1945.

Dear Dr. Kehoe,

I am sending you herewith a copy of Abadan's letter dated the 26th July, together with all the relevant enclosures. You will recall that we discussed together the summary of the lead in urine estimates, when you promised that you would give us an official pronouncement on the raising of the minimum limit which Abadan have been using as a criterion up to the moment.

You will note from their letter that they have asked you to consider whether you would agree to a maximum control limit of 0.12 mgms. per litre.

I also think that you will undoubtedly be interested in the memoranda dealing with their investigations into the hazards associated with Cumene and other aromatic hydrocarbons.

If you have any particular comments on these reports, I am sure that Anglo-Iranian would be most appreciative.

Yours sincerely,


H. FOSSETT.

original by steamer
copy by air mail.

KE 0010212

Britannic House,
Finsbury Circus,
London, E. C. 2.

26th July, 1945.

Dear Fossett,

LEAD IN URINE ESTIMATIONS.

I enclose the information recently received from Abadan on the lead in urine estimations carried out over the past year on operators exposed to lead hazard, the summaries of which you took away with you on Friday last. Would you kindly pass the sheets on to Dr. Kehoe for his information, after you have extracted from them any information you require.

You will doubtless have informed Dr. Kehoe that for the last six months at least, lead estimations on operators in Abadan have been carried out on 24 hour samples. I think you will agree that this strengthens the suggestion that has been made, namely, that the accepted limit of 0.10 mgms. per litre of lead in urine should be reviewed and that the figure of 0.12 mgms. might more accurately indicate the border line degree of significance for Abadan.

It is possible that some definite decision on this matter was taken by Dr. Kehoe after his recent meeting with Dr. Cassells and I would be much obliged for early information on any proposed revision so that I can inform Abadan accordingly.

ETHYL BLENDING -PROPORTIONEERS.

Thank you very much for your letters on "Ethyl Blending - Proportioneers" which I am now going over in more detail with the assistance of the Superintendent of the Controlled Instrument Service, Abadan. His first reaction was that the system could be satisfactorily operated at Abadan provided the T.E.L. was available in bulk, but he also agreed that the present system was very satisfactory and gave trouble-free operation. My personal view is also like yours, that the installation would be rather elaborate for our Australian refinery. However, I will keep you informed on any development in this direction, but I certainly do not intend to recommend it for installation at Abadan at this juncture.

PLUMBITE PRODUCT TANKS.

I also have to acknowledge your letter concerning the hazards involved in cleaning tanks which have been used for plumbite and will pass this information on to Abadan in my next letter to them.

CUMENE.

An informative memorandum and laboratory report has just arrived from Abadan giving their experience when handling Cumene and the steps they took to eliminate, as far as possible, the hazards associated with Cumene and other aromatic hydrocarbons which they have now to handle in the Refinery. I am sending you an extract from the memorandum and a copy of the relevant Laboratory

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DIRECTOR OF MEDICAL SERVICES, PAIFORCE.
MEMORANDUM ON MEDICINE NO. 15

GHQ. Paiforce.
14th December 1943.

CLINICAL ASPECTS OF TETRAETHYL LEAD (TEL) POISONING.

Cases of tetraethyl lead poisoning are only likely to be numerous among men exposed to the vapour of highly leaded petrol for a more or less prolonged period in filling cans, and from spillage in ill-ventilated spaces. Cases have, however, been encountered in individuals who have moved from a TEL petrol factory to another locality during the latent period of the intoxication.

The clinical picture is not in itself characteristic so that the diagnosis is liable to be missed unless its possibility is remembered.

AETIOLOGY.

Risk of poisoning is serious only for persons engaged in the manufacture and handling of TEL itself and certain highly leaded petrols used for special purposes. The risk from ordinary spirit is negligible.

The usual causes of intoxication are exposure to high concentrations of the vapour of highly leaded petrol due to spillage in filling cans, especially when the clothing becomes soaked, and to gross leakage from tins in ill-ventilated spaces, e.g. the hold of a barge. The danger is greater in hot weather.

Absorption into the body is practically entirely by inhalation. The rate of absorption under ordinary exposures is about three times more rapid than the rate of excretion so that the poison is cumulative.

PATHOLOGY.

The changes seen at autopsy are those found in many toxic conditions namely, generalised severe congestion, oedema and haemorrhages. In TEL poisoning the chief incidence of the lesions is in the white matter of the brain and in the lungs. This distribution, though fairly constant, is not sufficiently characteristic to be diagnostic and there are no specific lesions, so that the pathological diagnosis rests upon a history of exposure to TEL together with the finding of significant amounts of lead in the central nervous system and other tissues.

CLINICAL FEATURES.

The nature of the onset varies with the conditions of exposure. An overwhelming exposure, as by being swamped with highly leaded petrol in a confined space, may cause an acute fatal cerebral attack. The usual onset, however, is a subacute or delayed reaction which may begin one or two weeks after a single large dose, or a month or more after repeated absorption of smaller doses.

The symptoms may be divided into minor and major. The former may be the sole effect of mild exposure or may lead up to major symptoms when exposure has been more severe or prolonged.

The minor symptoms are lassitude, undue fatiguability, headache, insomnia, bad dreams and night starts; pallor, coarse muscular tremors anorexia and morning vomiting.

The major symptoms are predominantly mental. They are those of a toxic psychosis, the pattern of which depends somewhat on the patient's personality.

The usual manifestation, which is often preceded by a few hours of increasing cerebral excitement, is an acute confusional state of a maniacal type; less commonly, periods of depression deteriorate with the mania. Moods of fear and hallucinations of persecution may occur and lead to attempts at suicide or homicide. The mental symptoms tend to be nocturnal, in fact a patient who is wildly violent at night may be almost rational in the day time.

Insomnia is always marked and may be complete.

Tendon reflexes are brisk and may be definitely exaggerated.

Taxagait may be ataxic. Brief tonic convulsions may occur. The temperature is normal or subnormal and the blood pressure is usually less than 60 - 100 Hg. systolic and about 60 diastolic.

None of the signs of chronic poisoning by inorganic lead are present there are no focal neurological signs, no colics, no lead line on the gums and no characteristic blood changes.

Lead content of the urine. The normal range for samples from 24 hr. specimens from individuals not specially exposed to lead is from 0.02 to 0.08 mgm per litre with an average of 0.06 mgm per liter. When symptoms of TEL poisoning are present the content is between 0.2 and 0.3 mgm per litre. Unfortunately the reliability of this test depends on such elaborate precautions that it is impracticable in isolated cases.

DIAGNOSIS.

The clinical picture is essentially that of a general intoxication culminating in toxic psychosis. Certain features, for example, the sequence of symptoms, the predominance of maniacal manifestations, intense insomnia, exacerbation at night and complete absence of neurological signs are fairly constant and may suggest the cause but the picture is not sufficiently characteristic to be pathognomic. When, however, the syndrome occurs in conjunction with a history of significant exposure to TEL there can be little doubt of the diagnosis.

The limitations of the test for lead in the urine are noted above.

It is important not to miss the significance of minor symptoms.

High concentrations of petrol vapour (apart from its lead content) may cause giddiness and stupefaction, but these are temporary and leave no after-effects.

COURSE AND PROGNOSIS.

In the case of mild minor symptoms due to comparatively brief exposure, improvement begins after a few days and recovery should be complete in two or three weeks.

When mental symptoms have become established they may persist, or exhibit remissions and recurrences, for up to a month and during this period life is in danger. Once the actual mental stage is over prognosis is good but the patient is likely to remain dull and stupid for some two months more.

Late recurrences and sequelae have not been observed.

TREATMENT.

For mild cases. Rest, good feeding and removal from exposure until completely recovered. The possibility of mental symptoms developing must be remembered.

For severe and mental cases. No sedatives. Full alkalization. Delirium and mania are best controlled by intravenous injection of 200 ccs. of 2 per cent magnesium sulphate every day for three or four days, then on alternate days as required. Improvement usually begins after three or four injections. Nasal feeding is likely to be required and trained mental

attendants are necessary.

Calcium and milk have no preventive or curative value except in so far as the latter is useful for its general nutritional properties.

Alterations in the mobilization of lead in the body may be dangerous so that attempts to expedite excretion should not be made.

Preventive measures at TEL petrol manufactories are outside the scope of this memorandum, but it is worth remembering that TEL is converted on exposure to air into triethyl lead which is non-volatile.

Sd. F. M. Lipscomb, Brigadier,
Consultant Physician.
for Major-General D.M.S.