Lead in petrol causing brain damage

Date: Colonel Charles Howard-Bury publicly questioned Neville Chamberlain, U.K. Minister of Health, on his awareness of the use of tetraethyl lead (TEL)\(^1\) ethyl in petrol. Petrol containing TEL was believed to harmful to human health after five workers died from a form of sudden lead poisoning at one of Standard Oil and General Motor’s facility in New Jersey in 1924.

Forecast of impending disaster: Philip J. Landrigan (M.D. and Director of the Children's Environmental Health Center) published a study (1976) that suggested there might be a correlation between lead exposure and a child’s IQ.\(^2\) In a later study (2002), he claimed leaded petrol was a leading cause of lead exposure and stated that lead exposure can cause a wide range of illness in adults and poses especially high risks for children, affecting their neurological development, growth and intelligence.\(^3\)

Forecasting Method: Landrigan, in his 1976 study, evaluated the prevalence, sources and health consequences of lead absorption among children living near a primary lead smelter and found that increased lead exposure was associated with anemia and slow nerve conduction. No direct causal relation was found between them. Later claims of dangerous health effects of lead poisoning from motor vehicle exhaust were primarily based on informal observations and expert opinions.

Actions called for: Col. Howard-Bury, “in view of the great dangers that there are of lead poisoning,” called for a ban of the use of leded ethyl in 1928. Organic chemist Derek Bryce-Smith began a campaign to ban lead in petrol in the late-1960s that was picked up by housewife Jill Runnette and others\(^4\). In 1970’s, soon after Landrigan’s study was published, U.S. Congress called for a federal ban on leaded petrol.

Endorsements of and challenges to the forecast: The danger of leaded gasoline received unfavorable publicity in mid-1920 mostly by The New York World I and by some labor union publication, which named TEL as the “loony gas”. The forecast was also endorsed by experts at leading institutions such as Alice Hamilton, (Harvard Medical School), and Dr. Yandell Henderson (Yale University), which added credence to the public fear of leaded gas. Dr. Clair Patterson (California Institute of Technology) was the first to scientifically identify the presence of lead in the environment due to human activity, predominately automobile exhaust, in 1953.\(^5\) When the U.S. Senate Committee was conducting hearings in 1966 in regards to the Clean Air Act, Senator Ed Muskie focused on the dangers of lead in gasoline.\(^6\) In addition, interests groups such as the Asian Development Bank, The World Bank, and the World Health Organization, are taking global initiative to achieve gasoline lead phase-out in different countries. The prediction that lead in petrol was causing a major public health problem was, however, challenged by industry scientists and spokespeople. In contrast to the alarms over lead in the popular press, technical journals and medical experts remained skeptical. Dr. H.E. Howe, the editor of Industrial and Chemical Engineering, and Dr. H.C. Parmelee, editor of Chemical and Metallurgical Engineering, for example, did not support the forecast. Dr. Robert A. Kehoe, a physician consulting for ethyl, said "the major significance of the events of May, 1925 lay in the fact that they created in the public mind an apprehension concerning hazards associated with the distribution and use of leaded gasoline which, while wholly unjustified, was so great and so widespread as to require official action on the part of the health authorities of the U.S. government."

\(^{1}\) TEL: Tetraethyl lead
\(^{3}\) Landrigan, Philip J. (2002). "Lead Poisoning and the Environment."
Outcomes of the conflict: In 1973, the Environmental Protective Agency (EPA) began an enforced phase out of the use of TEL that called for a phase down of lead to one tenth of a gram per gallon by 1986. The EPA had eliminated almost all lead in gasoline by 1996. EPA Administrator, Carol M. Browner claimed “the elimination of lead from gas is one of the great environmental achievements of all time.” More recently, there has been international effort from the United Nations Environment Program (UNEP) to achieve global gasoline lead phase-out, with focus on sub-Saharan Africa.

Despite these policies, there is no scientific evidence that shows that lead from vehicle exhaust poses danger as an air pollutant. That is because most is dropped as a lead bromide powder onto the ground. To date, the EPA has not been able to explain the falling blood lead levels to less than 50% of their 1935 figure throughout middle 20th century when petrol emissions had actually risen by 700%. Landrigan’s testing of the effects of lead poisoning on children and was then generalized to adults. However, children are more susceptible to harmful effects because their chance of intake is higher because they have a natural tendency to put things in their mouths, placing them at higher risk of lead intake. Additionally, children have higher physiological uptake rates and are still in the developmental phases, enabling lead content in the environment to be more influential. These same effects have not shown to be applicable to adult populations as they are larger and can withstand exposure to greater quantities of lead, more than might result from automobile exhaust, before toxicity becomes an issue.