

Summary of the Experiment Concerned with the Inhalation of Lead
During 1960

The lead oxide inhalation study, with Mr. [REDACTED] as the subject, is being conducted in the same chamber and under the same conditions as those maintained in the first two studies during 1950 to 1954 when [REDACTED] and [REDACTED] were subjects.

Finely divided lead oxide (lead sesqui oxide, Pb_2O_3) is produced by burning a mixture of propane, air and tetraethyl lead. The concentration of lead in the atmosphere is kept at 0.150 milligrams per cubic meter of air and the average size of the particles of lead oxide is 0.05 microns.

Samples of the particulate material in the atmosphere of the chamber are collected with an electrostatic precipitator for one hour out of each four hours that the subject is in the chamber. The samples are analyzed by the dithizone method used routinely in this laboratory.

Once during each week a test is made to determine the amount of lead that is retained by the subject. This test consists of having the subject breathe through a mask that has two valves, one that allows air to enter and be inhaled, and the other allows the exhaled air to escape. This exhaled air passes through an electrostatic precipitator tube into a Douglas bag, after which the total volume of the expired air can be measured. These samples are always taken in parallel with a sample of the atmosphere from the chamber. The degree of retention of lead in the lung, in percentage of that inhaled, is then calculated by means of the following formula:

$$\text{Per cent Ret.} = \frac{\text{lead conc. in chamber} - \text{lead conc. in exhaled air}}{\text{lead conc. in chamber}} \times 100$$

As in the past, the following samples obtained from the subject are

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analyzed.

1. Concentration of lead in chamber (daily)
2. Lead retained on electrostatic precipitator during exhalation (weekly)
3. Food and fluids (daily)
4. Urine (daily)
5. Feces (daily)
6. Blood (weekly)

This experiment differs from previous experiments in the following ways:

1. The subject spends three different time periods per day in the chamber, namely 4, 8, and 10 hours. The four-hour periods start at 8.30 a.m. or 12.30 p.m. in a prearranged order, and alternate with the 8 hour period. Ten-hour periods occur every four weeks. The subject spends only week days (Monday through Friday) in the chamber.
2. Blood samples are taken from the subject once every six days in order to vary the day of the week on which the blood sample is taken.
3. All data obtained from the subject are placed on punch cards and processed by the Biometric Department.