

CLINICA DEL LAVORO "LUIGI DEVOTO"

DIRETTORE PROF. ENRICO C. VIGLIANI

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MILANO 10th April, 1967
VIA S. BARNABA, 8
57.60.91 - 58.16.10

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Dear Dr. Kehoe,

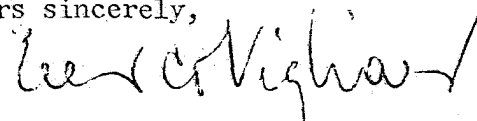
Remembering the visit to the Clinica del Lavoro of Mr. Don Fowler, project manager of the International Lead Zinc Research Organisation, I wrote to him, asking whether he would be interested in our studies on the atmospheric lead pollution in the Milan area and on normal lead in the inhabitants of Milan. He replied a few days ago that we was very interested in our study and thought it might perhaps be possible to let us carry out the same research work on lead that is now under way in six American cities. He said he would consider this problem and talk with several people before making any decision.

As a result of this letter, I sent Mr. Fowler a short account of the lead analyses we have carried out in the last few years in Milan. I thought you might be interested in our results so I am sending you a copy of this account as well. If you think it would be worthwhile carrying out our research work in a more complete and systematic way, and if you think it would be an advantage to have a European city included in the study now under way in the U.S. cities, I would be indeed grateful to you if you could give your favourable support to the possibility of having Milan included in the so-called "normal lead" study.

I am very anxious to hear your views on our results, if you have any suggestions which would help us, please do not hesitate to let me know.

It was really a pleasure to see you and Mrs. Kehoe in San Francisco; after the meeting we had a delightful week in Hawaii. Luisa joins me in sending you and Mrs. Kehoe our very best regards.

Yours sincerely,



Prof. Enrico C. Vigliani

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3rd April, 1967

Research work carried out up to date by the Industrial Hygiene and Toxicology Laboratory of the Clinica del Lavoro, Milan, on the atmospheric lead pollution and on normal lead of the inhabitants of Milan.

1) Lead in the atmosphere of the City of Milan

All samples of air were taken in the middle of the streets and cross-roads with heavy traffic, one metre above street level, at different hours of the day and on different days during the whole year. The results are given in Table 1:

TABLE 1 - Lead in the atmosphere of some streets in Milan

Site	No. of analyses	Pb $\mu\text{g}/\text{m}^3$		
		Mean	Max.	Min.
Cavour Square, corner Senato Street	3	19.20	21.8	16.5
S. Sofia Street, corner Rome Street	5	14.20	18.4	11.3
S. Babila Square	4	12.80	19.4	6.9
Oberdan Square	4	20.00	35.6	7.6
Visconti di Modrone Street, corner Monforte Street	4	9.00	14.0	5.5
Duomo Square, corner Mercanti Street	5	29.58	36.8	21.3
La Scala Square, corner Manzoni Street	3	16.00	18.2	12.4
Baracca Square	4	11.22	14.5	9.1
Turati Street	4	11.00	13.2	9.7
Magenta Street, corner Carducci Street	3	26.25	29.8	19.0

For comparison, several air samples were taken outside the windows of the Clinica del Lavoro and of the Institute of Hygiene of the Province of Milan, 10 metres above a small garden, at a distance of 30-40 metres from any street. These samples were taken during winter only, when thermal inversion and fog are frequent in Milan. The results obtained are shown in Table 2:

TABLE 2 - Lead in the atmosphere near the Clinica del Lavoro and the Provincial Institute of Hygiene, Milan

Site	No. of analyses	Pb $\mu\text{g}/\text{m}^3$		
		Mean	Max.	Min.
Clinica del Lavoro (40 m. from S. Barnaba Street)	30	4.10	7.1	2.8
Institute of Hygiene (30 m. from Juvara Street)*	-	4.65	-	-

* Samples taken and analyzed by the Institute of Hygiene; number of samples not known.

2) Lead in food and beverages

Up to the present, 260 lead analyses have been performed on 62 samples of food and 48 analyses have been performed on 24 samples of beverages, all purchased on the Milan market. The average lead content is given in Table 3:

TABLE 3 - Lead in food consumed in Milan, microgrammes/kilogramme

No. of samples	No. of analyses	Food	Pb $\mu\text{g}/\text{kg}$		
			Mean	Max.	Min.
9	36	Cereals & cereal products: bread, pasta, wheat flour, maize flour, rice, biscuits, barley, rye	940	1095	810
1	4	Potatoes	220	230	195
9	34	Meat: beef, pork, lamb, chicken	300	315	285

TABLE 3 cont.

No. of Samples	No. of analyses	Food	Pb $\mu\text{g/kg}$		
			Mean	Max.	Min.
1	5	Milk	120	180	23
1	3	Butter	760	870	710
2	7	Oil: olive, seed	1200	1355	1045
2	10	Fats; lard, margarine	285	380	190
8	32	Cheese	571	780	362
5	21	Fish, fresh, frozen	192	256	128
1	3	Eggs	238	260	210
1	3	Sugar	500	545	450
6	39	Pulse vegetables	400	468	333
7	27	Fruit, including jam and fruit juices	300	430	170
9	36	Green vegetables	549	678	420
62	260				

TABLE 4 - Lead in beverages consumed in Milan, microgrammes/litre

No. of samples	No. of analyses	Type of beverage	Pb $\mu\text{g/Litre}$		
			Mean	Max.	Min.
1	3	Drinking water of Milan	12	13	11
4	8	Mineral water	14	17	10
5	10	Wine	180	205	160
2	4	Coca Cola	100	130	90
3	5	Beer	71	90	20
2	4	Whisky	36	52	13
2	4	Gin	6	8	5
2	4	Vodka	6	8	5
3	6	Cognac	55	68	34
24	48				

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We do not know whether the same figures also apply to samples of food taken in other cities or in rural areas.

According to the diet prevalent among the inhabitants of Milan, it can be roughly estimated that the daily lead intake of a healthy adult person in Milan amounts to 500-700 μ g. A worker consuming 3400 Cal/day would ingest about 800 μ g of lead. These figures are nearly twice as high as those calculated by Kehoe in Cincinnati; the difference is partly due to a higher consumption of bread and pasta by the Milanese people.

3) "Normal Lead" in urine and blood

180 healthy adults of both sexes, living in the City of Milan and not occupationally exposed to lead, have been analyzed for lead in urine and blood over a period of ten years. Samples of urine were collected at the Clinica and the result of the analysis adjusted to one litre. The mean urinary output of lead was found to be 45 μ g/litre and the mean lead content of blood 40 μ g/100 ml. No significant changes have been found in the mean values during the last ten years. A statistical elaboration of the values obtained, related to age, sex, diet and occupation, has not yet been made. In any case, the normal lead of the inhabitants of Milan seems to be significantly higher than the normal lead found in the population of some U.S. cities; the values match well the higher oral intake of lead in Milan as compared with the American figures.

Appendix

Lead analysis method used by the Department of Hygiene and Toxicology of the
Clinica del Lavoro

The lead determinations were effected using the dithizone titrimetric micromethod, i.e.:

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- Oxidization of the organic substance with concentrated HNO_3 at a temperature of 250°C , until a white residue is obtained;
- Extraction of lead with chloroform solution of dithizone from alkaline solution (pH 9) in the presence of KCN;
- Washing of the excess dithizone, again with alkaline solution and KCN;
- Removal of the lead bound to dithizone by agitation in a solution of hydrochloric acid (the lead passes into the hydrochloric layer - the dithizone remains in the chloroformic layer);
- Titration of the dithizone which has remained in the chloroformic layer with a lead solution of known concentration.

(N. Zurlo, E. Meschia - Medicina del Lavoro, 45, 668, 1954).

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For the samples of atmospheric lead, air is passed through a paper filter connected to two Drechsel Bottles with fritted glass disk bubblers connected in series, at the speed of 5 l/min.

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For the determination of lead in plasma, 50 ccc. of plasma were used.

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