



OBITUARY

Morton Levin (1904–1995): History in the Making

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Morton Levin died on July 7, 1995.

An obituary in *The New York Times* stated, "Dr. Morton L. Levin, one of the first epidemiologists to link cigarette smoking to lung cancer, died on Friday at Central Suffolk Hospital in Riverhead, L.I. He was 91 and lived in Port Jefferson, L.I." (1).

Obituaries are usually short on detail and try to highlight what is believed to be most salient about the person. Morton Levin's achievements are many, but he has been recognized by others primarily for his key role in establishing the association between cigarette smoking and lung cancer. However, for an achievement of such magnitude as the reporting of one of the most important epidemiologic findings of the past 50 years, one needs to say more than can be presented in an obituary.

In 1987, during a long discussion with us about historical events leading to the development of the case-control method, Mort Levin described in detail some of the events that led to his establishing this relation. We used some of that information in our introduction to the special issue of *Epidemiologic Reviews* on applications of the case-control method (2):

Interestingly, it was the appearance of two reports on case-control studies of cigarette smoking and lung cancer in the United States in 1950 that established the technique as a viable research tool. Two groups of researchers, Levin et al. [(3)] and Wynder and Graham [(4)], had independently conducted case-control studies into the association of cigarette smoking with lung cancer. Levin, a student of Wade Hampton Frost at the Johns Hopkins University School of Hygiene and Public Health in the mid-1930s, had been trained as an infectious disease epidemiologist, with a particular interest in tuberculosis. He had been recruited to the Roswell Park Memorial Institute in Buffalo, New York, to investigate the etiology of cancer. Frost encouraged Levin to undertake such investigations, because he (Frost) thought that the cancer-causing agents were infectious ones, specifically viruses. Early in his career as an epidemiologist at Roswell Park, Levin was asked to revise the standard admission questionnaire that was used to collect data from all patients. As part of this revision, he introduced cigarette smoking as a new item on the

questionnaire. Subsequently, Levin and his colleagues began a case-control study into the etiology of lung cancer, stimulated by Pearl's report [(5)] that it was inversely associated with tuberculosis. Analysis of the questionnaire data from the cases of lung cancer and three other control groups revealed the association with cigarette smoking.

Levin et al. submitted their paper for publication to the *Journal of the American Medical Association*. The journal was hesitant to publish the report because the Editor was not certain of the scientific value of the research approach used. However, shortly after the receipt of the Levin et al. paper, Wynder and Graham submitted a paper to the same journal reporting essentially the same results from a case-control study! The second author, Everts Graham, was a surgeon with an international reputation as an innovator. It was therefore difficult for the Editor to dismiss the Wynder and Graham paper. Hence, both papers were published in the same issue of the *Journal of the American Medical Association* (2, pp. 3 and 4).

The paper by Levin et al. (3) had a number of strengths that even today many case-control studies cannot emulate. History of tobacco use was obtained routinely over a number of years before the final diagnosis was established; more than one control group was used in the comparisons; and data were obtained using the same approach for both cases and controls.

Over the past decade, a number of reports and articles have described or referred to the earliest papers on the association between cigarette smoking and lung cancer, yet have failed to acknowledge the contribution of Morton Levin (6–8). In this age of MEDLINE® searches that are sometimes limited to the most recent 5 years, it is disheartening to see that a contribution as important as Mort Levin's could be forgotten so quickly by a number of epidemiologists.

The case-control approach used by Levin and his colleagues in the study of lung cancer and cigarette smoking was the first of numerous investigations conducted at Roswell Park that assessed relations between a number of cancers and various characteristics and exposures, thus establishing cancer epidemiology as a specialty.

Considering the importance of the findings on the smoking-lung cancer association, Levin was also interested in developing estimates of relative risk from a case-control study. Jerome Cornfield (9) did provide such a method in 1951. However, given the fact that Levin's self-image was that of a public health officer—as indicated by his own belief that his most important contribution had been to facilitate the poliomyelitis vaccine trials in New York (personal communication)—it is not surprising that the measure he himself developed, the population attributable risk (occasionally referred to as "Levin's attributable risk" (10)), would be a function of both the relative risk and the public health importance of the risk factor.

In the later years of his professional career, Mort spent a great deal of time researching approaches toward screening and early detection of lung cancer, trying to develop additional tools with which to combat this major epidemic.

Sometimes we may think, "Old epidemiologists never die, they are simply forgotten." Sometimes we need special reminders like the 75th anniversary of the *American Journal of Epidemiology* to remember our illustrious colleagues, and then for a fleeting moment only. There is no need to assign blame; we all share in it.

In our search for truth in science, we need not ignore the facts of our history. History in epidemiology is relatively brief. It does not carry such a large burden.

Morton Levin contributed to that burden in his own way.

REFERENCES

1. Cheng V. Morton L. Levin, 91, physician who linked smoking to cancer. *N Y Times* 1995;July 12.
2. Armenian HK, Lilienfeld DE. Overview and historical perspective. *Epidemiol Rev* 1994;16:1-5.
3. Levin ML, Goldstein H, Gerhardt PR. Cancer and tobacco smoking: a preliminary report. *JAMA* 1950;143:336-8.
4. Wynder EL, Graham EA. Tobacco smoking as a possible etiological factor in bronchogenic carcinoma: a study of 684 proved cases. *JAMA* 1950;143:329-36.
5. Pearl R. Cancer and tuberculosis. *Am J Hyg* 1929;9:97-159.
6. White C. Research on smoking and lung cancer: a landmark in the history of chronic disease epidemiology. *Yale J Biol Med* 1990;63:29-46.
7. Weiss NS. Scientific standards in epidemiologic studies. *Epidemiology* 1990;1:85-6.
8. Stolley PD, Lasky T. Investigating disease patterns: the science of epidemiology. New York, NY: Scientific American Library, 1995:58-62.
9. Cornfield J. A method of estimating comparative rates from clinical data: application to cancer of the lung, breast and cervix. *J Natl Cancer Inst* 1951;11:1269-75.
10. Levin ML. The occurrence of lung cancer in man. *Acta Unio Contra Cancrum* 1953;9:531-41.