Smoking: The Cancer Controversy, Edinburgh: Oliver and Boyd 1959, pp. 45–47.

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INHALING

WHEN, several years ago, it appeared that a verifiable association could be established between smoking an cancer of the lung, and before there was any reason to doubt the simple theory that the products of combustion could so act on the surface of the bronchus as to induce the growth of a cancer, it was natural to seek the powerful confirmation of this theory which would be obtained if those practising inhalation of cigarette smoke appeared with much higher frequency among the cancer patients than among those suffering from other conditions.

The failure of Hill and Doll's retrospective inquiry to supply such corroboration took these workers by surprise, and at first they could scarcely believe the question had been understood. The investigators who actually questioned the patients, however, seem to have had no doubt of this; and the statisticians had the embarrassing choice between frankly avowing that one striking and unexpected result of their enquiry was clearly contrary to the expectations of the theory they advanced, or to take the timid and unsatisfactory course of saying as little about ti as possible.

It has taken some years, therefore to elicit the tables below,

TABLE 1

		Maximum daily cigarettes									
		1–4		5–14		15–24		25–49		>49	
Men	Cancer	7	17	141	67	133	63	96	78	21	24
	Control	17	21	162	80	157	44	74	44	16	7
Women	Cancer	3	3	7	8	7	5	5	3	0	0
	Control	2	10	2	7	6	0	0	0	1	0

(I=Inhaler, N=Non-inhaler)

which are a reconstruction of the original observations. I have asked for, and have now obtained, confirmation that these are the actual counts originally made. Certain pipe and cigar smokers were originally included on the basis of total tobacco consumed, and I have not been able to secure their removal.

The women are too few to be discussed further; for each of the five tables for men, we may ask how many of the inhalers would have shown cancer, if the proportion had been the same as that among the non-inhalers.

TABLE 2

Cigs. *per diem*	Expected	Observed	Deficiency
1–4	10.737	7	3.737
5–14	138.380	142	−3.620
15–24	153.095	133	20.095
25–49	109.119	96	13.119
> 49	33.260	21	12.260
Total	444.591	399	45.591

If, following the method of the Medical Research Council, these differences were ascribed to inhalation as a cause, then inhalers may congratulate themselves of reducing the cancer incidence by over 10 per cent.,using a very simple, and even enjoyable, method of prevention. This is indeed an under-estimate, for pipe smokers seldom inhale, and have a low cancer incidence, so that their inclusion has lowered the apparent advantage of inhaling*.

To test the significance of this apparent protection due to inhaling, we must recognize the effects of random sampling not only due to the limited number of inhalers, but equally of the non-inhalers with whom they are compared. This is conveniently done by reducing the deficiency in the ratio of the non-inhalers to the total.

No particular importance need be attached to the test of significance. It disposes at about the 1 per cent. level the hypothesis that inhalers and non-inhalers have the same cancer incidence. Even equality would be a fair knock-out for the theory that smoke in the lung causes cancer. The fact, however, and it is a fact that should have interested Hill and Doll in 1950, is that inhalers get fewer cancers. and the difference is statistically significant.

TABLE 3

Cigs. *per diem*	Reduced deficiency	Sampling variance
1–4	2.290	3.49
5–14	−1.947	24.60
15–24	10.174	19.54
25–49	5.301	17.10
>49	3.485	3.75
Total	20.299	68.48
Standard error	8.274	

Should not these workers have let the world know, not only that they had discovered the cause of lung cancer (cigarettes), but also that they had discovered the means of its prevention (inhaling cigarette smoke)? How had the M.R.C. the heart to withhold this information from the thousands who would otherwise die of lung cancer?

Those who refuse the jump from association to causation in the case of cigarette smoking will not be tempted to take it in the case of inhaling; but the M.R.C. and its Statistical Research Unit think this argument is valid in the first case. Can they refuse to admit it in the second?

NOTE: Data from which 78 have been removed as they did not smoke cigarettes, but which still include mixed smokers of pipes and cigarettes give the enhanced effect expected and show apparent "protection" of about 13 per cent.

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* See Note [lower down the page]