

# THE TOBACCO LEAF

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## Statistics Do Not Imply Cause And Effect . . .

*An Address Delivered at the New York Medical College*

(EDITOR'S NOTE: Dr. Milton B. Rosenblatt is Associate Clinical Professor of Medicine, New York Medical College, and Visiting Physician to the New York City Hospital. The accompanying paper was presented at one of the series of medical conferences held by the Society of the New York Medical College. He is the author of the textbook, "Bronchiecstasis," and numerous articles on pulmonary diseases and is now working on a monograph on cancer of the lung to be published by the Oxford University Press.)

The tremendous increase in the incidence of lung cancer for the past two decades has furnished a therapeutic challenge to the medical profession. Many explanations have been offered for the unusual increase in incidence but smoking at the moment occupies the prime position in the lay press. However, the public which is already so concerned about cancer should not be unduly alarmed without proper justification. A great deal of thought and experimental investigation is necessary before any definite conclusions can be reached.

The increase in the incidence of lung cancer can be attributed to two main causes. The disease was clinically unrecognizable 25 years ago. Bronchoscopy,

the perfection of X-ray technique, cytological studies, etc., have been developed in the past few years. At the Brompton Hospital in London (which specializes in chest diseases) there were only 29 bronchoscopies between 1926-29; at the present there are more than 800 done each year. The second factor for the tremendous increase has been the general awareness of the disease and the intensification of pathological studies. It has been commented philosophically that a sharp rise in incidence in certain institutions was coincident with the establishment of pathology departments. Much has been made of the increase in autopsy statistics in lung cancer on the assumption that autopsy statistics reflect the general trend in population.

Necropsy records are subject to the same errors of distortion, lack of control and misinterpretation as clinical data. The widespread use of anti-biotics resulted in fewer hospital admissions and fewer deaths from infectious diseases, and proportionately, more from malignancy.

Probably the most important consideration in the explanation for increase in incidence is the age distribution of patients with lung cancer which is a disease of older age groups. The span of life has steadily increased and with it has come a proportionate increase in

the number of potential candidates for lung cancer. There are now four times as many people, age 65 or over in the United States, as there were in 1900.

The evidence pointing to smoking has been chiefly on a statistical basis. A statistical correlation does not signify that there is a cause and effect relationship. Analysis of numerous statistical studies shows that there is actually very little difference in the incidence of smoking between cancer patients and control patients, particularly if the statistics are evaluated with respect to age groups.

In an official report of the British Ministry of Health (Doll and Hill) there were practically no differences between the cancer cases and the controls with respect to age of starting to smoke, number of years smoked, and number of years stopped smoking. There was also little difference in the total amount of tobacco consumed by all the cancer and control cases despite the emphasis on certain categories.

Reports of Hoffman, Schrek, Muller, Mills and Porter, Ochsner, Wynder and Graham and Watson appear to show that smoking is involved in lung cancer. They merely show a statistical correlation between the two phenomena without any proof that there is a cause and effect relationship. Even the statistical data when analyzed carefully show that there is very little difference in the incidence of smoking in the cancer group and the control group.

In the report of Mills and Porter, the percentage of heavy smokers in the control group equalled or exceeded that of the cancer patients. Ochsner stated that the carcinogenic effect of cigarette smoking does not become evident until approximately 20 years. Also that the

death rate will increase steadily so that by 1970 it will be 29.4 per cent per 100,000 of population. This is merely a form of extrapolation, or educated guessing, and is not to be interpreted as establishing a cause and effect relationship between lung cancer and smoking.

Although Wynder and Graham are most emphatic in claiming that smoking causes lung cancer, analysis of their own figures shows that the conclusions are unwarranted in regard to the establishment of a specific cause or effect relationship. They show that 96.5 per cent of the cancer patients were moderate smokers and 73.7 per cent of the controls were moderate smokers; 51 per cent of the cancer patients were heavy smokers and 19 per cent of the controls were heavy smokers.

This appears to be an unusually low figure for the incidence of smoking in controls for both men and women inasmuch as only one per cent of Wynder and Graham's women control patients smoked more than a pack daily for 20 years. Wynder and Graham also studied a group of adenocarcinomas of which only ten per cent were excessive smokers among the men and there were no excessive smokers among the women. As a matter of fact, 87 per cent of this group of women did not smoke.

Numerous attempts have been made to demonstrate the carcinogenic effect of tobacco during the past 50 years and the results are still very equivocal. In many instances the only pathological change produced in mice was baldness. Helwig, Cooper, and Bogen and Loomis painted the skin of mice and rabbits with tobacco tar and obtained no significant effects. Sugiura produced only one skin

(Continued on Page 28)

## Hit Statistics In Cancer Row

(Continued from Page 20)

cancer in 168 mice and no cancers with rats and rabbits. He classified tobacco as a 'weak carcinogenic agent.'

Campbell exposed mice to fumes and tarry matter from cigarette smoke seven hours a day, five days a week and at the end of the experiment (829 days) 17 of the exposed animals and 11 of the controls had lung cancer. However, in both groups of animals the cancer developed only after the second year of life. There were no cancers in the young mice and Campbell attributed the occurrence of lung cancer in mice more to old age than to tobacco.

Pathologically lung cancer in mice resembles only remotely bronchogenic carcinoma in the human. The occurrence of lung tumors in mice in the course of experimental studies may be incidental inasmuch as lung cancer often occurs spontaneously in mature mice.

A great deal more research must be done before one can establish the etiology of lung cancer or, as a matter of fact, all cancer. The recent ability to diagnose lung cancer plus the fact that it occurs only in older age groups, which have increased tremendously during the past two decades, seems sufficient to explain the increased incidence of the disease. Although the percentage of heavy smokers (20 years or longer) between 40 and 45 years of age is very large, the incidence of lung cancer in this group is negligible.

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