Life Change and Lung Cancer

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Seventy-four lung cancer patients were studied with the Social Readjustment Rating Scale. There was a significantly higher association of recent life change with younger cancer patients than with older ones. There was no such difference in a control group of colorectal cancer patients. These results imply that lung cancer patients fall into two groups: a younger group, in which life change is a promoting factor, and an older group, in which life change has little or no effect in precipitating the onset of the disease.

Multiple factors are related to the development of cancer of the lung. Among these are cigarette smoking, inhalation of asbestos or uranium, and habitation of urban areas.[1] This paper reports a significantly higher association of life change with younger lung cancer patients than with older ones, suggesting that emotional stress may be another promoting factor in this disease.

MATERIALS AND METHODS

To measure the degree of life change, the Social Readjustment Rating Scale (SRRS) was used.[2] Previous studies with this instrument have shown that life changes tend to cluster around health changes. Persons with the highest amount of life change demonstrate the most signs and symptoms. In myocardial infarction and sudden death, for example, marked elevations in magnitude of life changes appear in the six months prior to infarct or death. The occurrence of tuberculosis, the exacerbation of diabetes mellitus, and the postoperative persistence of symptoms after duodenal ulcer surgery also are associated with increased life change scores.

In using the SRRS on cancer patients, the two-year period prior to the patients' onset of first tumor symptoms was evaluated. The total score in life change units is equal to the sum of the individual mean values. Any event occurring twice was scored twice. Those patients who could read the scale were allowed to mark off the events by themselves. If a patient could not read the scale, the test was administered verbally. Only one test administration was deemed to be necessary, since recall reliability at two testings separated by a nine-month interval has been demonstrated by Casey.[3] The patients interviewed in this study were male veterans seen in the Bronx VA Hospital during 1978 and 1979.

RESULTS

Seventy-four histologically proven lung cancer patients were studied. The distribution of their Life Change Unit (LCU) scores is displayed in Figure 1. These scores appeared to array themselves into two groups, each with a distinct peak:

1. Fifty patients fell into a low life-change group, with scores below 137 LCU. This group had a mean

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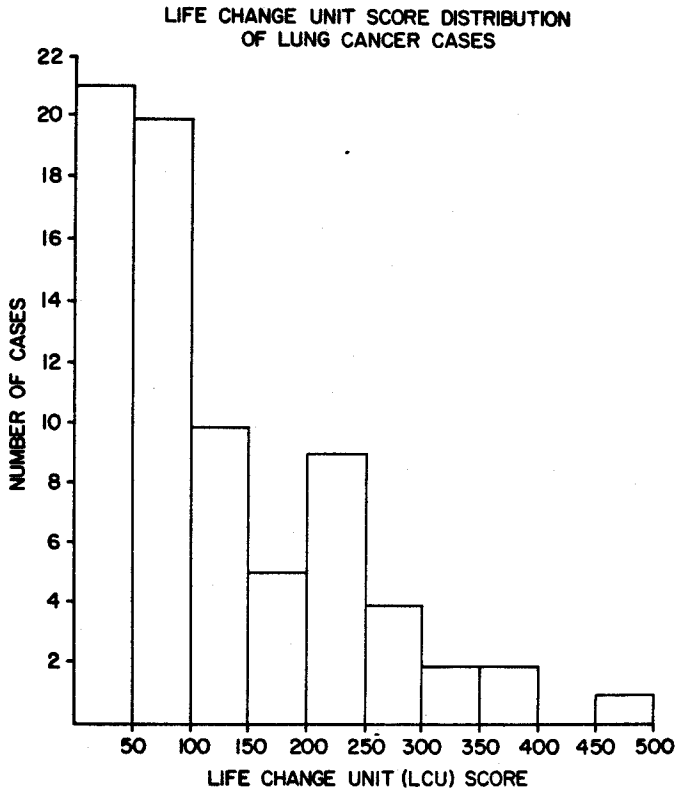

Fig. 1. Note the presence of two distinct peaks in the distribution. One is at 55 LCU, the second at 249 LCU.

score of 54.8 ± 39.2 LCU.

2. Twenty-four patients fell into a high life-change group, with scores above 137 LCU. This group had a mean score of 248.5 ± 80.3 LCU. 137 LCU was chosen as the dividing line because this score is approximately equidistant between the two peaks.

Between the low and high life-change groups, there was a difference in the mean age at diagnosis. In the high life-change group, the mean age at diagnosis was 55.6 ± 6.49 years. The mean age at diagnosis in the low life-change group was 59.5 ± 8.0 years. This difference is significant ($t = 2.08$, $p < 0.05$, two-tailed).

These results may be compared to a control group of 53 male veterans with histologically proven colorectal cancer. The mean age at diagnosis of 39 patients in the low life-change group (below 137 LCU) was 60.85 ± 8.23 years. The mean age at diagnosis of 14 patients in the high life-change group (above 137 LCU) was 59.5 ± 9.32 years. The difference between the mean ages of the two groups is insignificant ($p > 0.6$; with $p = 0.05$ there is less than a 10% chance of missing a 10% difference in the means). (Figure 2)

Jenkins has recently pointed out that life change events are forgotten at the rate of 5% per month, though this rate is highly variable over long intervals.[4] In the present study, the difference between the age at onset and age at interview was 6.08 ± 4.33 months for the high LCU lung cancer patients, 7.85 ± 12 months for the low LCU lung cancer patients. In the colorectal cancer cases, the difference between age at onset and age at interview was 26.2 ± 26.3 months for the low LCU group, 23.8 ± 16.3 months for the high LCU group. One may infer that the effect of forgetting did not affect the outcome of the present study, since the 1.8 month and 2.4 month High LCU - Low LCU variations in the two types of cancer are insignificant.

Previous studies of life change and onset of illness

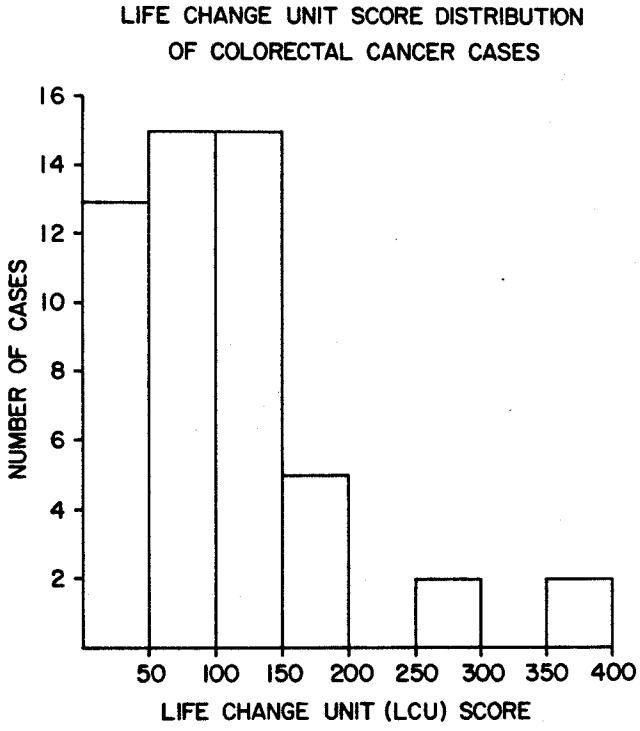

Fig. 2. Note the presence of only one distinct peak in the distribution.

would appear to support the division of cancer cases into low and high life-change groups. These studies reveal that all patients in the low LCU lung cancer group would have less than a 37% chance of developing illness on account of life change; whereas patients in the high LCU group with scores from 200 to 299 LCU would have a 51% chance of developing illness due to life change. Patients with scores above 300 LCU would have a 79% chance to become sick.[2]

With regard to life change stress, further justification for the division of lung cancer patients into two groups comes from the following fact: The incidence of lung cancer increases almost linearly with increasing age between the ages of 30 and 60.[1] Furthermore, the increased susceptibility of older persons appears due to diminished immune competence. Therefore, one would expect a putative promoting factor such as life change to be more closely associated with younger patients than with older, more vulnerable ones. This, in fact, is what the present study demonstrates: The patients in the high LCU lung cancer group were significantly younger than those in the low LCU lung cancer group.

Current medical thought holds that anaplastic changes may be present in a bronchus for several years before tumor symptoms develop. The present study suggests that while this may hold true for many cases of lung cancer, it is not true for all of them. Some cancers may well begin a year to 18 months before first symptoms; however, such tumors are probably a minority, since in the present study there was no significant linear correlation between age and life change in the low or high LCU groups.

There was a similarity in smoking history in the low and high LCU cases. This similarity suggests that life change does not promote lung cancer by a toxic effect similar to cigarette smoke. Rather, life change stress would seem to have a similar effect to aging—that is, a depression of immunity. Depression of immunity is also suggested by the lower immune globulin levels in the high LCU lung cancer cases (Table 2), not found in the high LCU normal controls (Table 3).

The notion that there may be a link between emotions and cancer is not new. In the 1950s Greene tested patients with leukemia and Hodgkin's disease

TABLE 1

CELL TYPE AND SMOKING HISTORY OF LUNG CANCER PATIENTS

	No. Low LCU Cases*	No. High LCU Cases
Squamous cell ca. lung	15	12
Anaplastic ca. lung	18	6
Adenoca. lung	10	5
Poorly diff. ca. lung	5	1

$chi^2 = 3$; $p<0.15$

SMOKING HISTORY OF LUNG CANCER PATIENTS

High LCU cases
59.05 < 28.97 pack yr.

Low LCU cases
53.93 ± 28.76 pack yr.

$p < 0.4$

*Two of the low LCU cases in this study were diagnosed by cytology. Since cell type could not be determined, they are not included in this table.

TABLE 2

IMMUNOGLOBULIN LEVELS IN LUNG CANCER PATIENTS

	Lung Cancer Low LCU cases				Lung Cancer High LCU cases		
Patient no.	IgG (mg%)	IgA	IgM	Patient no.	IgG	IgA	IgM
1	1690	564	296	1	1700	468	131
2	2000	335	453	2	1075	279	100
3	1830	603	172	3	960	219	89
4	1970	238	118	4	1310	294	96
5	940	282	102	5	1540	213	132
6	2150	1278	162	6	1060	180	126
7	1100	447	74				
8	2700	417	158				
Mean	1798	521	192	Mean	1274	276	112

Analysis of variance for a two-factor experiment with replication demonstrates that there is a significant difference in the immune globulin levels between the High LCU cases and the Low LCU cases ($F = 6.14$, $p < 0.03$). The lower immune globulins in High LCU cases again suggest that high amounts of life change may depress immunity. (Immune globulin levels were determined by radial immunodiffusion on Behring Partigen plates. The 14 patients above were selected at random from the 74 patients in this study.)

and discovered that the development of the maladies occurred in a setting of emotional distress.[5-8] LeShan studied more than 400 cancer patients and reported that 72% had suffered the loss of a central relationship in the period ranging from eight years to a few months prior to the onset of disease, compared to 10% in a control group.[9] Thomas, Duszynski, and Shaffer have shown that male medical students who later developed cancer had a lack of closeness to parents.[10] Greer, Morris, and Pettingale reported that recurrence-free survival after breast cancer treatment was more common in two types of patient: those who had initially reacted by denial or who had a fighting spirit.[11] In a study by Fras, Litin, and

TABLE 3

IMMUNOGLOBULIN LEVELS IN NORMAL CONTROLS

Control Low LCU cases				Control High LCU Cases			
Patient no.	IgG (mg%)	IgA	IgM	Patient no.	IgG	IgA	IgM
1	1279	339	110	1	1230	399	47
2	1140	270	42	2	1160	163	65
3	1090	411	115	3	1500	504	190
4	1190	279	90	4	1860	182	52
5	1360	295	128	5	1000	86	84
6	1200	231	64				
Mean	1210	304	91.5	Mean	1350	267	87.6

Analysis of variance for a two-factor experiment with replication demonstrates that there is no significant difference in the immune globulin levels between the Control High LCU cases and the Control Low LCU cases ($F = .28$, $p > .6$). Controls were men in good health, for the most part employees of the hospital, in the same age group as the lung cancer patients.

Pearson, 76% of 46 patients with pancreatic carcinoma had psychiatric symptoms closely related to the presence of the neoplasm.[12]

Still, it is difficult to say why life change stress seems to have a different relationship to lung cancer than to colorectal cancer. The vulnerability of the colon to stress would make one think that there should be a definite relationship. Perhaps the difference may be attributed to a very long period of growth before the production of symptoms in colorectal neoplasms.

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INDEX TERMS

life change events, lung cancer, immunity.

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