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Carcinoma of the Lung in Nonsmoking Chinese Women

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The records of 452 lung cancer patients seen in San Francisco between 1972 and 1979 were retrospectively analyzed according to race, sex, findings at histology and smoking history. Of 31 Chinese women with adenocarcinoma or large cell undifferentiated carcinoma, 20 (64.5 percent) had never smoked, which is in sharp contrast to all other subsets. At least 12 of the women were of Cantonese origin. These data support the findings of previous studies carried out in Cantonese women residing in Hong Kong, Singapore and Hawaii. As the incidence of adenocarcinoma in nonsmokers is appreciably higher than that noted in Canton, the possibility must be considered that the cause may be the result of an interaction between some traditional and nontraditional exposures.

IN A RECENT REVIEW of lung cancer patients seen in the Department of Radiation Therapy, St. Francis Memorial Hospital, San Francisco, an interesting subset was identified, namely, nonsmoking Chinese women with either adenocarcinoma or large cell undifferentiated carcinoma. The purpose of this report is to carefully analyze this group and compare the findings with those of previous studies.

Patients and Methods

From 1972 through 1979 approximately 2,500 new patients with cancer were seen in the Department of Radiation Therapy, including 452 with lung carcinoma. Through the services of the hospital's cancer registry, the pertinent clinical data were extracted from the patients' records, computerized and then analyzed accordingly. All histocytopathology was reviewed at the time of diagnosis by a St. Francis Hospital staff pathologist. The material was variable depending on the types of diagnostic procedures carried out.

St. Francis Memorial Hospital is situated near San Francisco's Chinatown and therefore a relatively large number of Chinese patients are referred there for radiation therapy. Approximately 14 percent of the department's total patient population were Chinese, compared with 26 percent of the lung cancer patients. The remainder were predominantly white. In the lung cancer group, there were overall 294 men and 158 women; the male-to-female ratios were 73 to 43 (1.7:1) Chinese and 221 to 115 (1.9:1) non-Chinese. Of the 116 Chinese patients 99 (85 percent) were born in China.

Results

Adenocarcinoma

The percentage of lung cancer patients with adenocarcinoma was Chinese, 24 percent, and non-Chinese, 14 percent. Of the 73 Chinese male patients, 11 (15.1 percent) had adenocarcinoma; of the 43 Chinese female patients, 17 (39.5 percent) had adenocarcinoma. The 17 Chinese fe-

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male patients with adenocarcinoma were all born in China; six were from Canton, one from Hong Kong, one from Hangchow and nine were not further specified. Their ages ranged from 29 to 86, with an average of 68 years. Duration of stay in the United States was recorded in nine women and ranged from 1 to 61 years. Occupations included the following: housewife, 10; seamstress, 4; data processor, 1; not specified, 2. Of the 17 women, 12 (71 percent) had never smoked. Of the remainder, two women smoked fewer than ten cigarettes a day and two women smoked between two and three packs per day. The specific smoking history in one female smoker was unknown.

Large Cell Undifferentiated Carcinoma

The percentage of large cell undifferentiated carcinoma was essentially the same in the Chinese (23 percent) and non-Chinese (24 percent) populations. This diagnosis was made in 18 percent of Chinese men and 32 percent of Chinese women. Of the 14 Chinese women with this diagnosis, 11 were born in China: 6 were from Canton, 1 was from Hong Kong and area of origin was not further specified in 4. Three were born in California. Their ages ranged from 29 to 80, with an average of 61.5 years. Occupations included the following: housewife, 4; seamstress, 3; baker, 1; bakery clerk, 1; waitress, 1; grocery clerk, 1; not specified, 3. The eight (57 percent) nonsmokers were all born in China. Of the six smokers, two smoked less than a pack, three smoked a pack and one smoked one to two packs of cigarettes per day.

Histocytologic Distribution

Table 1 shows the histocytologic distribution according to race and sex. In the present series, 17 and 14 of the 43 Chinese women (that is, 72.1 percent) had adenocarcinoma and large cell undifferentiated carcinoma, respectively. Of these 31 patients 28 were born in China and 20 (64.5 percent) were nonsmokers. This is contrasted with a negative smoking history in two of nine (22.2 percent) Chinese women having squamous cell or small cell undifferentiated carcinoma, 12 percent of Chinese men, 5 percent of non-Chinese men

TABLE 1.—*Histocytologic Distribution of 452 Cases of Lung Cancer by Sex and Race*

	Chinese				Non-Chinese			
	Male		Female		Male		Female	
Findings of Histocytology	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*
Total	73	100.0	43	100.0	221	100.0	115	100.0
Adenocarcinoma	11	15.1	17	39.5	28	12.7	20	17.4
Large cell undifferentiated	13	17.8	14	32.6	51	23.1	31	27.0
Squamous cell carcinoma	30	41.1	8	18.6	76	34.4	25	21.7
Small cell or oat cell carcinoma	14	19.2	1	2.3	46	20.8	28	24.3
Carcinoma, other	..	...	1	2.3	2	.9	5	4.3
Carcinoma, not otherwise specified	2	2.7	..	...	8	3.6	1	.9
No histology or cytology done	3	4.1	2	4.7	10	4.5	5	4.3

TABLE 2.—*Smoking History of Lung Cancer Patients by Histocytology, Sex and Race*

		Chinese				Non-Chinese			
Findings of Histocytology	*Sex*	*Total Number*	*Smoker*	*Non-smoker*	*Unknown*	*Total Number*	*Smoker*	*Non-smoker*	*Unknown*
			Percent Distribution				*Percent Distribution*		
Adenocarcinoma	♂	11	72.8	18.2	9.0	28	96.4	...	3.6
	♀	17	17.6	70.6	11.8	20	85.0	10.0	5.0
Large cell	♂	13	76.9	15.4	7.7	51	96.0	2.0	2.0
	♀	14	42.9	57.1	..	31	83.9	6.4	9.7
Squamous cell	♂	30	93.4	3.3	3.3	76	98.7	1.3	..
	♀	8	75.0	25.0	..	25	88.0	4.0	8.0
Small cell or oat cell	♂	14	92.9	..	7.1	46	95.7	...	4.3
	♀	1	100.0	..	..	28	92.8	3.6	3.6
Carcinoma, other	♂	..	...	..	..	2	100.0	...	..
	♀	1	100.0	..	..	5	80.0	20.0	..
Carcinoma, not otherwise specified	♂	2	100.0	..	..	8	62.5	25.0	12.5
	♀	..	...	..	..	1	...	100.0	..
No histology or cytology done	♂	3	100.0	..	..	10	90.0	...	10.0
	♀	2	50.0	50.0	..	5	80.0	20.0	..

and 14 percent of non-Chinese women (Table 2).

Among the four sex/race groups, the percentage of nonsmoking Chinese women was significantly higher (P less than .0001) than any other sex/race group. These nonsmoking Chinese women were mostly concentrated in the adenocarcinoma and the large cell undifferentiated carcinoma groups. Interestingly, among Chinese female patients in other histocytologic groups, the percentage with a negative smoking history was higher than other sex/race groups but not as high as those with adenocarcinoma or large cell undifferentiated carcinoma.

It is estimated that approximately 85 percent of the San Francisco Chinese originate from Canton. Of our 28 China-born nonsmoking women, 14 had recorded their birthplace as Canton or Hong Kong, 1 (3.6 percent) as Hangchow and the remaining 13 (46.4 percent) not otherwise specified. The presumption that most of the unspecified are of Cantonese origin seems reasonable.

Discussion

The frequency of occurrence of adenocarcinoma in Chinese women is well recognized but there have been few studies of smoking history or other possible carcinogenic exposure, and only one such study in US-residing Chinese (Hawaii).[1]

United States

Fraumeni and Mason[2] studied cancer mortality among Chinese Americans from 1950 through 1969 by using death certificates. They were unable to sort out foreign-born from American-born Chinese. Death patterns of 1,139 Chinese females were compared with those of whites and blacks. A significant excess of lung cancer mortality in Chinese women was noted, with no change over time.

Hinds and colleagues[1] compared lung cancer risk associated with smoking in Japanese, Chinese and Hawaiian women. They noted the association to be least for Chinese women, with only squamous cell and small cell carcinoma significantly related to smoking. Reference was not made to the patient's place of birth.

Hong Kong

Lee and Ts'O[3] in 1963 noted that adenocarcinoma is the most common type of lung cancer in Hong Kong Chinese, occurring in 47 percent of women with lung cancer and 36 percent of men with lung cancer. Chan and MacLennan,[4] in a more recent review of Hong Kong Chinese, observed that incidence of adenocarcinoma in women was 34 percent, compared with 16 percent in men. There was equal incidence of large cell undifferentiated carcinoma (that is, 16 percent) for each sex.

Chan and co-workers[5] carried out an in-depth epidemiologic analysis of 397 Hong Kong patients with bronchial cancer (208 men and 189 women) using a control group of orthopedic patients in the same general age group. For the cancer group, the nonsmoking distribution was women, 44 percent, and men, 21 percent. Of the 189 women, 88 percent were of Cantonese origin. Adenocarcinoma was noted in 34 percent of the women and 22 percent of the men. There were also four women with large cell undifferentiated carcinoma. In this total of 68 women, half were nonsmokers, as compared with a 30-percent nonsmoker incidence in the women with squamous cell or small cell undifferentiated carcinomas. Of the potentially correlative factors studied, including socioeconomic status, air pollution, occupation and kerosene stove cooking, none were rewarding.

Singapore

Shanmugaratnam,[6] using the Singapore Cancer Registry, reviewed 1,072 new cases of lung cancer seen in the city from 1968 through 1970. For this form of cancer, now the most common one in Singapore, there was an age-standardized incidence in women of 14.9, among the highest recorded for women in any country. Singapore is a city of 2.1 million population, 76 percent being Chinese. In 1966 immigrants made up 56 percent of the population aged 30 through 59 years and 82 percent of those aged 60 and over. The Chinese in Singapore mostly originate from the southeastern provinces of Fukien and Canton. The major dialect groups in Singapore are Hokkien (42.2 percent of the Chinese population) derived from Fukien, Teochew (22.4 percent) from the Teochew district of Canton (on the Fukien border) and Cantonese (17.0 percent) who originate from other parts of Canton. These data were confirmed by Law and co-workers,[7] who analyzed 1,747 cases of lung cancer entered into the Singapore Cancer Registry from 1968 through 1972.

MacLennan and associates,[8] further analyzing the Singapore Cancer Registry data of 1968 through 1970, noted the annual incidence of lung cancer in Cantonese women was 25.6, compared with 12.8 in the Hokkien and 10.2 in the Teochew,

with no comparable difference among Chinese men. The relative risks of smoking and other factors from 1972 to 1973 were studied, using matched hospital patients as controls. Virtually all male patients and 90 percent of controls were smokers. In the women, approximately half the Cantonese patients and controls were smokers. In Cantonese women, the percentages of patients with a positive smoking history according to histology were as follows: small cell carcinoma 85.7 percent, epidermoid 80 percent, large cell 66.7 percent and adenocarcinoma 31.3 percent. Other factors studied and discounted included occupational exposure, incense and mosquito coils, cooking, opium, diet and socioeconomic status.

According to these authors, there has been a recent rise in the incidence of lung cancer in Cantonese women in Singapore and Hong Kong but not in Canton. This justifiably suggests that a search be carried out for nontraditional exposures, without precluding the possibility that such exposure might interact with some traditional exposure.

Summary

This San Francisco-based study points out the relatively high percentage of nonsmoking Chinese women with adenocarcinoma and large cell undifferentiated carcinoma of the lung. Combining these two subsets, there are 31 women, of whom 20 (64.5 percent) have never smoked. Of these, 28 (90.3 percent) were born in China and at least 12 (43 percent) of these patients were of Cantonese origin. There were no differences found with regards to age, stage of disease, place of birth in China or other characteristics that could account for the variation between the Chinese female nonsmokers and smokers in the adenocarcinoma and large cell undifferentiated carcinoma groups. It is concluded that Chinese women, specifically those of Cantonese origin, in San Francisco and elsewhere are exposed to a potent lung carcinogen other than tobacco that may interreact with some traditional exposure to increase their susceptibility to adenocarcinoma and large cell undifferentiated carcinoma of the lung.

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