

## Malignant Neoplasms Among Koreans

—A statistical study based on biopsy materials and blood smears—

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### INTRODUCTION

According to the many statistical surveys cancer is the main causes of death in most countries and the prevalence of cancer appears to be actually increasing with each passing year. Recent statistics of the United States of America indicate that it is the second most frequent cause of death, only preceded by cardiovascular diseases (Robbins, 1974).

In the literature one frequently finds difference in cancer incidence and relative frequency among countries and/or races. These findings have been used for international epidemiological studies in order to improve the knowledge of the etiology of this disease.

To know the status of a cancer in a country, the statistical survey on the incidence among the population is of primary importance. And the primary data in tumor statistics principally should be based on histopathologically diagnosed

biopsy or autopsy materials. In Korea however, only a few articles on the cancer incidence are available and all of these statistical survey have been conducted mostly in limited scale (Yun, 1949. Lee, Lee and Yun, 1959. Lee, Lee and Kim, 1965. Wetteland, 1970. Kim et al., 1973).

In 1968, The Korean Society of Pathology performed a nationwide statistical survey on malignant tumors among the Koreans for the first time. The study was based on the biopsy and autopsy cases which were diagnosed at the varying major general hospitals throughout the country during a period of ten years, 1958 to 1967 (Lee et al., 1968). However, this study was made on malignant solid tumors and no cases of leukemia which was one of the major malignancies among the Korean males and females were included. Moreover, it has been considered that the cases studied were not satisfactory in number at the statistical point of view. And the following consecutive nationwide scale of statistical surveys should be carried out in every certain period of years.

In this connection, an attempt was made by the authors to carry out a statistical study on

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the primary malignant tumors among Koreans based on the biopsy cases. The all biopsy cases were diagnosed at the departments of pathology, and clinical pathology, college of medicine and attached hospital, Seoul National University, during a period of five years, 1970—1974.

## MATERIALS AND METHODS

All of the surgical specimens studied at the present investigation derived from in-patients and out-patients department of Seoul National University Hospital during a period of five years, 1970—1974. The total cases of primary malignant tumors which were histopathologically diagnosed at the departments of anatomical pathology and clinical pathology of the University Hospital during the same period were collected. And all histological and hematological diagnosis and patient's data were reviewed to confirm the correct diagnosis, and to avoid multiple registrations in cases with more than one examination. Tumors metastasized were excluded in the statistics.

Description of tumors of each case was made in a punch card system. And these cards were classified according to the World Health Organization code numbers of diseases and other items including those of each calendar year, sex and the age distributions. The disease categories used were those of the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death; as based on the recommendation of the Eighth Revision Conference in 1965 (WHO, 1965).

## RESULTS

The total number of malignant tumors included in this survey is 2,757 cases. There were 1,458 cases of males (52.88%), and 1,299 cases of females (47.12%).

The mean age of total malignant tumor is 45.2 years; male, 45.4 years and female 44.4 years.

Number of new cases of malignant tumors diagnosed during each calendar year by primary site and sex is listed in Table 1 and 2. It discloses that annual identification of total malignant tumors shows a tendency of gradual increase since 1970, the first year of survey except the year of 1973. In 1973 among other calendar years the highest number of malignant tumors is identified with obscure reasons.

Among malignant tumors, cancers of the pharynx, nasal cavities, lungs, prostate and brain in male and cancers of the thyroid and uterus in female indicate increasing trend annually. In the other hand, cancers of the paranasal cavities, trachea, major bronchi and rectum in both sexes, lymphomas and lymphatic leukemia in male and cancer of the tongue and myeloid leukemia in female appear to be abruptly decreased in number in 1974, the last year of survey with no explainable reasons.

The frequency rank of malignant tumors in male, female and both sexes is listed in Table 4. Among all malignant tumors in male, the relative incidence of tumor in percentage is highest for cancer of the stomach (14.8%), and, thereafter in order of frequency ratio, for leukemia (13.7%), malignant lymphoma (8.4%), cancers of the liver (8.2%), the larynx (6.9%), the skin (5.4%), the lung (5.1%), the urinary bladder (4.3%), the oral cavity except that of the tongue and the rectum (3.1%).

In female, the relative incidence of tumor in percentage is highest for cancer of the uterine cervix (35.3%), cancer of the stomach (11.3%), leukemia (10.1%), malignant lymphoma (6.6%), cancers of the liver (5.3%), the breast (4.7%), the larynx (4.3%), the skin (4.1%),

the rectum (3.5%) and the lung (3.5%).

The number of new cases diagnosed during the period of five years, 1970—1974, by primary site, sex and age are listed in Table 3.

*Cancer of the uterine cervix* is the most prevalent (17.0%) among all malignant tumors diagnosed with biopsy specimens, and it shows also the highest relative incidence (35.3%) among them in female. Except the year of 1972 the number of annual identification of cervical cancer appears to be increased gradually with each passing year. The mean age at the time of histopathological diagnosis is 46.4 years. And the peak incidence is observed in the age-group of 40—49 years (fifth decade).

*Cancer of the stomach* is the second most prevalent (11.3%) among all malignant tumors, being the most prevalent (14.8%) in male and the third most prevalent (7.4%) in female. Sex ratio of this cancer between male and female is 2.1:1. Annual identification of stomach cancer appears to show no significant changes in number with each passing year. The mean age is 53.2 years in male and 49.4 years in female.

The highest incidence in male is observed in the sixth decade and that in female is in the fifth decade.

*Leukemia* is third most prevalent (10.1%) among all malignant tumors, being the 2nd (13.7%) in male and the 4th (5.9%) in female. Sex ratio of leukemia between male and female is 2.6:1. Annual identification of leukemia appears to show no remarkable changes in number during the period of five years. However, in 1974, the last year of the survey, leukemia is considerably decreased in number in contrast to each of other calendar years. The mean age is 22.3 years in male and 26.2 years in female. In leukemia, there are no remarkable

differences in age incidence between male and female. In lymphatic leukemia higher incidence is observed in the first and second decades and the majority which comprise 83.3% of total cases are observed in the age group of 1 year to 29 years. In myeloid leukemia the relatively higher incidence is observed in the rather broad range of age groups; that is from the second to fifth decade.

*Malignant lymphoma* is fourth most prevalent (6.6%) among all malignant tumors, being the 3rd (8.4%) in male and the 5th (5.2%) in female. The sex ratio between male and female is 1.8:1. Out of 188 cases of malignant lymphoma, 100 cases (53.2%) are lymphocytic type, 47 cases (25%) are histiocytic type, and 17 cases (9.0%) are Hodgkin's disease. The mean age is 42.5 years in male and 46.4 years in female. The highest incidence in male and female are in the third decade.

*Cancer of the liver* is 5th most prevalent (5.3%) among all malignant tumors, being the 4th (8.2%) in male and the 9th (2.0%) in female. The mean age is 47.1 years in male and 48.0 years in female. The highest incidence is observed in the 5th decade in both male and female.

*Cancer of the breast* is 6th most prevalent (4.7%) among all malignant tumors, and is second most prevalent (9.9%) in female. There is only one case of the carcinoma of the breast in male. The sex ratio between female and male is 128:1. The mean age is 45.1 years and the highest incidence is in 4th decade in female.

*Cancer of the larynx* is 7th most prevalent (4.3%) among all malignant tumors, being the 5th (6.9%) in male and the 14th (1.4%) in female. The sex ratio between male and female is 5.6:1. The mean age is 55.3 years in male and 51.8 years in female. The highest

incidence in male is in the 6th decade and that in female is in the 7th decade.

*Cancer of the skin* is 8th most prevalent (4.1%) among all malignant tumors, being the 6th (5.4%) in male and the 8th (2.6%) in female. The sex ratio between male and female is 2.3 :1. The mean age is 54.7 years in male and 53.3 years in female. The highest incidence is in the 6th decade in both male and female.

*Cancer of the rectum* is 9th most prevalent (3.5%) among all malignant tumors, being the 10th (3.1%) in male and the 7th (4.0%) in female. The sex ratio between male and female is 1:1.2. The mean age is 50.7 years in male

and 43 years in female. The highest incidence in male is in the 6th decade and that in female is in 4th decade.

*Cancer of the lung* is 10th most prevalent (3.5%) among all malignant tumors, being the 7th (5.1%) in male and the 13th (1.5%) in female. Annual identification of the lung cancer particularly in male, shows a steady increase in number with each passing year. The sex ratio between male and female is 3.75:1. The mean age is 55.2 years in male and 49.5 years in female. The highest incidence in male is in the 6th decade and that in female is in the 7th decade.

**Table 1.** Number of new cases of malignant tumors diagnosed during each calendar year, by sex

Year	Male		Female		Male and Female	
	Absolute number	per cent	Absolute number	per cent	Absolute number	per cent
1970	240	16.5	256	19.7	496	18.0
1971	310	21.3	240	18.5	550	19.9
1972	283	19.4	232	17.9	515	18.7
1973	343	23.5	299	23.0	642	23.3
1974	282	19.3	272	20.9	554	20.1
Total	1,458	100.0	1,299	100.0	2,757	100.0

**Table 2.** Cancer in Korea, 1970-74. Number of new cases diagnosed during each calendar year, by primary site and sex.

Primary site	Sex	1970	1971	1972	1973	1974	Total	Percent
Lip	M	2	2	2	—	—	6	0.4
	F	—	—	—	1	1	2	0.15
	T	2	2	2	1	1	8	0.29
Tongue	M	10	7	2	3	5	27	1.9
	F	5	4	1	1	1	12	0.9
	T	15	11	3	4	6	39	1.41
Salivary gland	M	—	1	1	—	3	5	0.3
	F	1	—	1	1	1	4	0.3
	T	1	1	2	1	4	9	0.33
Other and unspecified parts of mouth	M	14	9	7	7	13	50	3.4
	F	2	2	1	4	3	12	0.9
	T	14	11	8	11	16	62	2.2

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Primary Site	Sex	1970	1971	1972	1973	1974	Total	Percent
Pharynx, unspecified	M	3	7	7	4	11	32	2.2
	F	2	3	1	—	1	7	0.5
	T	5	10	8	4	12	39	1.4
Stomach	M	38	37	42	56	43	216	14.8
	F	21	14	23	12	26	96	7.4
	T	59	51	65	68	69	312	11.3
Small intestine	M	3	—	5	1	—	9	0.6
	F	1	—	1	1	—	3	0.2
	T	4	—	6	2	—	11	0.44
Large intestine, except rectum	M	8	6	8	8	11	41	2.8
	F	—	1	5	2	5	13	1.0
	T	8	7	13	10	16	54	2.0
Rectum	M	6	10	8	16	5	45	3.1
	F	13	11	7	14	7	52	4.0
	T	19	21	15	30	12	97	3.5
Liver and intrahepatic bile duct	M	19	25	16	37	22	119	8.2
	F	5	6	6	7	2	26	2.0
	T	24	31	22	44	24	145	5.3
Gall bladder	M	—	1	2	—	—	3	0.2
	F	—	—	—	3	2	5	0.4
	T	—	1	2	3	2	8	0.3
Bile duct, extrahepatic	M	1	1	—	1	2	5	0.3
	F	—	—	1	—	—	1	0.1
	T	1	1	1	1	2	6	0.22
Pancreas	M	—	1	—	2	1	4	0.3
	F	—	—	—	2	3	5	0.4
	T	—	1	—	4	4	9	0.3
Peritoneum	M	—	—	—	—	1	1	0.1
	F	—	—	—	—	1	—	0.1
	T	—	—	—	—	1	1	0.04
Retroperitoneal tissue	M	1	—	—	—	1	2	0.1
	F	1	—	—	1	—	2	0.2
	T	1	—	—	1	1	4	0.15
Unspecified digestive organs	M	1	2	3	8	7	21	1.4
	F	3	2	—	3	2	10	0.8
	T	4	4	3	11	9	31	1.12
Nose and nasal cavities	M	4	4	8	7	8	31	2.1
	F	5	—	5	4	3	17	1.3
	T	9	4	13	11	11	48	1.7

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Primary Site	Sex	1970	1971	1972	1973	1974	Total	Percent
Paranasal cavities	M	7	7	2	5	2	23	1.6
	F	3	1	—	3	1	8	0.6
	T	10	8	2	8	3	31	1.1
Larynx	M	19	20	14	22	26	101	6.9
	F	2	3	6	3	4	18	1.4
	T	21	23	20	25	30	119	4.3
Trachea and major Bronchi	M	6	2	3	2	1	14	1.0
	F	1	1	—	2	—	4	0.3
	T	7	3	3	4	1	18	0.65
Lungs	M	5	7	13	17	18	60	4.1
	F	4	1	2	4	5	16	1.2
	T	9	8	15	21	23	76	2.8
Pleura	M	—	—	1	—	—	1	0.1
	F	—	—	—	—	—	—	—
	T	—	—	1	—	—	1	0.04
Mediastinum	M	1	—	1	1	—	3	0.2
	F	—	—	—	1	—	1	0.1
	T	1	—	1	2	—	4	0.15
Bone	M	2	7	5	7	5	26	1.8
	F	1	3	4	5	1	14	1.1
	T	3	10	9	12	6	40	1.5
Fibrous or fibroadipose tissue	M	1	0	1	1	—	3	0.2
	F	3	1	1	1	2	8	0.6
	T	4	1	2	2	2	11	0.4
Muscle	M	1	2	—	—	1	4	0.3
	F	1	—	—	—	—	1	0.1
	T	2	2	—	—	1	5	0.2
Other soft tissue	M	1	1	2	4	1	9	0.6
	F	—	3	1	—	1	5	0.4
	T	1	4	3	4	2	14	0.51
Skin	M	17	20	14	11	17	79	5.4
	F	11	3	11	5	4	34	2.6
	T	28	23	25	16	21	113	4.1
Breast	M	—	—	—	—	1	1	0.1
	F	21	27	28	31	21	128	9.9
	T	21	27	28	31	22	129	4.7
Cervix uteri	M	—	—	—	—	—	—	—
	F	84	101	66	104	104	459	35.3
	T	84	101	66	104	104	459	17

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Primary Site	Sex	1970	1971	1972	1973	1974	Total	Percent
Chorionepithelioma	M	—	—	—	—	—	—	—
	F	7	4	1	5	3	20	1.5
	T	7	4	1	5	3	20	0.7
Uterus	M	—	—	—	—	—	—	—
	F	4	1	1	1	1	8	0.6
	T	4	1	1	1	1	8	0.3
Ovary	M	—	—	—	—	—	—	—
	F	4	4	3	7	4	22	1.7
	T	4	4	3	7	4	22	0.8
Other and unspecified female genital organs	M	—	—	—	—	—	—	—
	F	1	1	—	1	3	6	0.5
	T	1	1	—	1	3	6	0.2
Prostate	M	3	—	—	2	7	12	0.8
	F	—	—	—	—	—	—	—
	T	3	—	—	2	7	12	0.4
Testis	M	2	2	1	—	3	8	0.5
	F	—	—	—	—	—	—	—
	T	2	2	1	—	3	8	0.3
Penis	M	1	5	4	6	—	16	1.1
	F	—	—	—	—	—	—	—
	T	1	5	4	6	—	16	0.6
Other and unspecified male genital organs	M	—	1	—	—	—	1	0.1
	F	—	—	—	—	—	—	—
	T	—	1	—	—	—	1	0.05
Urinary bladder	M	8	14	10	17	13	62	4.3
	F	7	4	2	7	4	24	1.8
	T	15	18	12	24	17	86	3.1
Kidney	M	4	4	4	4	4	20	1.4
	F	3	—	—	3	1	7	0.5
	T	7	4	4	7	5	27	1
Other and unspecified urinary organs	M	1	—	—	—	—	1	0.1
	F	—	—	—	—	1	1	0.1
	T	1	—	—	—	1	2	0.1
Eye	M	3	2	6	1	2	14	1
	F	1	2	2	1	3	9	0.7
	T	4	4	8	2	5	23	0.8
Brain	M	—	1	4	2	9	16	1.1
	F	1	—	3	2	2	8	0.6
	T	1	1	7	4	11	24	0.8

—Lee et al.: Malignant Neoplasms among Koreans—

Primary Site	Sex	1970	1971	1972	1973	1974	Total	Percent
Spine	M	—	—	1	—	—	1	0.1
	F	—	—	1	1	1	3	0.2
	T	—	—	2	1	1	4	0.15
Peripheral nerve	M	—	—	—	—	1	1	0.1
	F	—	—	—	1	—	1	0.1
	T	—	—	—	1	1	2	0.1
Other parts of nervous system	M	—	—	1	1	—	2	0.1
	F	—	—	1	2	2	5	0.4
	T	—	—	2	3	2	7	0.3
Thyroid gland	M	—	3	—	2	2	7	0.5
	F	8	11	12	16	17	64	4.9
	T	8	14	12	18	19	71	2.6
Adrenal gland	M	—	2	1	1	1	5	0.3
	F	1	—	—	2	2	5	0.4
	T	1	2	1	3	3	10	0.4
Pituitary gland	M	—	—	2	3	—	5	0.34
	F	—	—	—	3	2	5	0.38
	T	—	—	2	6	2	10	0.36
Lymphoma	M	18	30	26	21	7	102	7.05
	F	14	19	13	6	10	62	4.81
	T	32	49	39	27	17	164	5.9
Unclassified malig. neoplasms of lymph node	M	—	1	8	8	2	19	1.3
	F	—	—	3	1	1	5	0.4
	T	—	1	11	9	3	24	0.87
Other neoplasms of lymphoid tissue	M	—	—	—	1	—	1	0.06
	F	—	—	—	1	—	1	0.1
	T	—	—	—	2	—	2	0.07
Multiple myeloma	M	1	—	4	7	4	16	1.1
	F	—	—	—	1	—	1	0.1
	T	1	—	4	8	4	17	0.6
Lymphatic leukemia	M	10	31	15	24	5	85	5.8
	F	2	5	6	9	7	29	2.2
	T	12	36	21	33	12	114	4.1
Myeloid leukemia	M	16	28	28	18	14	104	7.1
	F	13	2	10	13	6	84	3.4
	T	29	30	38	31	20	148	5.4
Monocytic leukemia	M	—	1	—	4	—	5	0.34
	F	—	—	—	—	—	—	—
	T	—	1	—	4	—	5	0.2



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Primary site	Sex	1970	1971	1972	1973	1974	Total	Percent
Other and unspecified leukemia	M	2	2	—	1	1	6	0.41
	F	—	—	1	1	2	4	0.3
	T	2	2	1	2	3	10	0.4
Spleen	M	—	—	—	—	—	—	—
	F	—	—	1	—	—	1	0.1
	T	—	—	1	—	—	1	0.04
Unspecified nature of other and unspecified organs	M	1	4	1	—	2	8	0.54
	F	—	—	1	—	—	1	0.1
	T	1	4	2	—	2	9	0.33
Total	M	240	310	285	343	282	1458	100
	F	256	240	232	299	272	1299	100
	T	496	550	515	642	554	1757	100

Table 3. Cancer in Korea. Number of new cases diagnosed during the five year period 1970-1974, by primary site, sex and age.

Primary site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Lip	M	—	—	—	—	—	—	—	3	1	1	1	—	6	0.4
	F	—	—	—	—	—	—	—	—	—	2	—	—	2	0.15
	T	—	—	—	—	—	—	—	3	1	1	1	—	8	0.29
Tongue	M	—	—	—	—	—	4	5	5	10	1	2	—	27	1.9
	F	—	—	—	—	—	1	2	1	7	1	—	—	12	0.9
	T	—	—	—	—	—	5	7	6	17	2	2	—	39	1.41
Salivary gland	M	—	—	—	2	—	2	1	—	—	—	—	—	5	0.3
	F	—	—	—	—	—	1	1	1	—	1	—	—	4	0.3
	T	—	—	—	2	—	3	2	1	—	1	—	—	9	0.33
Other and unspecified parts of mouth	M	—	—	—	1	—	2	11	13	19	3	1	—	50	3.4
	F	—	—	—	—	1	3	1	4	—	3	—	—	12	0.9
	T	—	—	—	1	1	5	12	17	19	6	1	—	62	2.2
Pharynx, unspecified	M	—	—	—	1	2	3	6	10	8	2	—	—	32	2.2
	F	—	—	—	—	1	1	3	2	—	—	—	—	7	0.5
	T	—	—	—	1	3	4	9	12	8	2	—	—	39	1.4
Stomach	M	—	—	—	—	4	21	51	79	56	4	1	—	212	14.8
	F	—	—	—	—	3	17	32	26	15	3	—	—	96	7.4
	T	—	—	—	—	7	38	83	105	71	7	1	—	312	11.3
Small intestine	M	—	—	—	—	—	—	3	4	2	—	—	—	9	0.6
	F	—	—	—	—	1	—	—	1	1	—	—	—	3	0.2
	T	—	—	—	—	1	—	3	5	3	—	—	—	12	0.44

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Primary Site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Large intestine, except rectum	M	—	—	—	1	1	1	3	5	14	12	3	1	41	2.8
	F	—	—	—	—	—	2	2	—	6	2	—	1	13	1.0
	T	—	—	—	1	1	3	5	5	20	14	3	2	54	2.0
Rectum	M	—	—	—	—	—	1	6	13	16	7	2	—	45	3.1
	F	—	—	—	—	1	3	15	12	13	7	—	—	52	4.0
	T	—	—	—	—	1	4	21	25	29	14	2	—	97	3.5
Liver and intrahepatic bile duct	M	—	—	1	1	3	5	10	47	38	12	2	—	119	8.2
	F	—	—	—	—	—	2	3	9	8	4	—	—	26	2.0
	T	—	—	1	1	3	7	13	56	46	16	2	—	145	5.3
Gall bladder	M	—	—	—	—	—	—	—	1	1	1	—	—	3	0.2
	F	—	—	—	—	—	—	—	1	1	3	—	—	5	0.4
	T	—	—	—	—	—	—	—	2	2	4	—	—	8	0.3
Bile duct, extrahepatic	M	—	—	—	—	—	—	—	2	2	1	—	—	5	0.3
	F	—	—	—	—	—	—	—	—	—	1	—	—	1	0.1
	T	—	—	—	—	—	—	—	2	2	1	1	—	6	0.22
Pancreas	M	—	—	—	—	—	—	—	—	3	1	—	—	4	0.3
	F	—	—	—	—	—	1	1	—	3	—	—	—	5	0.4
	T	—	—	—	—	—	1	1	—	6	1	—	—	9	0.3
Peritoneum	M	—	—	—	—	1	—	—	—	—	—	—	—	1	0.1
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	1	—	—	—	—	—	—	—	1	0.04
Retroperitoneal tissue	M	—	—	—	—	—	1	—	—	1	—	—	—	2	0.1
	F	—	—	—	1	—	—	1	—	—	—	—	—	2	0.2
	T	—	—	—	1	—	1	1	—	1	—	—	—	4	0.15
Unspecified digestive organs	M	—	—	—	—	—	—	—	2	10	9	—	—	21	1.4
	F	—	—	—	—	—	—	—	3	5	2	—	—	10	0.8
	T	—	—	—	—	—	—	—	5	15	11	—	—	31	2.1
Nose and nasal cavities	M	—	—	—	—	1	2	3	4	10	11	—	—	31	2.1
	F	—	—	—	—	—	1	1	5	4	2	4	—	17	1.3
	T	—	—	—	—	1	3	4	9	14	13	4	—	48	1.7
Paranasal cavities	M	—	—	—	—	1	—	2	6	7	6	1	—	23	1.6
	F	—	—	—	—	—	—	—	1	4	2	1	—	8	0.6
	T	—	—	—	—	1	—	2	7	11	8	2	—	31	1.1
Larynx	M	—	—	1	—	—	2	3	16	42	33	4	—	101	6.9
	F	—	—	—	1	—	1	—	—	5	9	2	—	18	1.4
	T	—	—	1	1	—	3	3	16	47	42	6	—	119	4.3
Trachea and major bronchi	M	—	—	—	—	—	—	1	2	6	4	1	—	14	1.0
	F	—	—	—	—	—	1	—	2	—	1	—	—	4	0.3
	T	—	—	—	—	—	1	1	4	6	5	1	—	18	0.65

—이 등 : 한국인의 악성종양—

Primary Site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Lungs	M	—	—	—	—	—	1	2	12	24	20	1	—	60	4.1
	F	—	—	—	—	—	1	2	—	3	9	1	—	16	1.2
	T	—	—	—	—	—	2	4	12	27	29	2	—	76	2.8
Pleura	M	—	—	—	—	—	1	—	—	—	—	—	—	1	0.1
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	—	1	—	—	—	—	—	—	1	0.04
Mediastinum	M	1	—	—	—	—	—	—	1	—	1	—	—	3	0.2
	F	—	—	—	—	—	1	—	—	—	—	—	—	1	0.1
	T	1	—	—	—	—	1	—	—	1	1	—	—	4	0.15
Bone	M	—	—	1	1	9	5	4	3	3	—	—	—	26	1.8
	F	—	—	—	1	3	4	2	1	3	—	—	—	14	1.1
	T	—	—	1	2	12	9	6	4	6	—	—	—	40	1.5
Fibrous or fibroadipose tissue	M	—	—	—	—	1	—	1	—	—	—	1	—	3	0.2
	F	—	—	—	—	2	1	3	1	—	1	—	—	8	0.6
	T	—	—	—	—	3	1	4	1	—	1	1	—	11	0.4
Muscle	M	—	—	—	1	1	—	1	—	1	—	—	—	4	0.3
	F	—	—	1	—	—	—	—	—	—	—	—	—	1	0.1
	T	—	—	1	1	1	—	1	—	1	—	—	—	5	0.2
Other soft tissue	M	—	—	—	—	2	3	2	—	—	1	1	—	9	0.6
	F	—	—	—	—	1	—	2	1	—	1	—	—	5	0.4
	T	—	—	—	—	3	3	4	1	—	2	1	—	14	0.51
Skin	M	—	—	—	—	1	4	5	16	24	19	6	4	79	5.4
	F	—	—	—	—	1	3	2	5	12	5	5	1	34	2.6
	T	—	—	—	—	2	7	7	21	36	24	11	5	113	4.1
Breast	M	—	—	—	—	—	—	—	1	—	—	—	—	1	0.1
	F	—	—	—	—	—	3	41	37	37	9	1	—	128	9.9
	T	—	—	—	—	—	3	42	37	37	9	1	—	129	4.7
Cervix uteri	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	1	1	3	95	212	125	21	1	—	459	35.3
	T	—	—	—	1	1	3	95	212	125	21	1	—	459	17
Chorion epithelioma	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	—	—	10	8	1	1	—	—	—	20	1.5
	T	—	—	—	—	—	10	8	1	1	—	—	—	20	0.7
Other malignant neoplasm of uterus	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	—	—	—	—	2	4	1	1	—	8	0.6
	T	—	—	—	—	—	—	—	2	4	1	1	—	8	0.3
Ovary	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	—	5	2	4	3	6	2	—	—	22	1.7
	T	—	—	—	—	5	2	4	3	6	2	—	—	22	0.8

—Lee et al.: Malignant Neoplasms among Koreans—

Primary Site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Other and unspecified female genital organs	M	—	—	—	—	—	—	—	1	4	1	—	—	6	0.5
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	—	—	—	1	4	1	—	—	6	0.2
Prostate	M	—	—	—	—	—	—	—	—	1	6	2	3	12	0.8
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	—	—	—	—	1	6	2	3	12	0.4
Testis	M	—	—	1	—	—	3	2	1	1	—	—	—	8	0.5
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	1	—	—	3	2	1	1	—	—	—	8	0.3
Penis	M	—	—	—	—	—	—	4	4	5	2	0	1	16	1.1
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	—	—	4	4	5	2	—	1	16	0.6
Other and unspecified male genital organs	M	—	—	—	—	—	—	—	—	—	1	—	—	1	0.1
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	—	—	—	—	—	1	—	—	1	0.05
Urinary bladder	M	—	—	—	—	—	—	4	11	18	18	11	—	62	4.3
	F	—	—	—	—	—	—	2	1	5	7	6	3	24	1.8
	T	—	—	—	—	—	—	6	12	23	25	17	3	86	3.1
Kidney	M	—	1	1	—	1	1	2	5	4	4	1	—	20	1.4
	F	2	—	1	1	—	—	—	—	1	2	—	—	7	0.5
	T	2	1	2	1	1	1	2	5	5	6	1	—	27	1.0
Other and unspecified urinary organs	M	—	—	—	—	—	—	—	—	1	—	—	—	1	0.1
	F	—	—	—	—	—	—	—	—	1	—	—	—	1	0.1
	T	—	—	—	—	—	—	—	—	2	—	—	—	2	0.1
Eye	M	—	1	5	3	—	—	1	4	—	—	—	—	14	1.0
	F	—	1	1	3	1	—	1	—	1	—	1	—	9	0.7
	T	—	2	6	6	1	—	2	4	1	—	1	—	23	0.8
Brain	M	—	—	—	4	2	1	5	1	3	—	—	—	16	1.1
	F	—	—	—	1	5	1	—	1	—	—	—	—	8	0.6
	T	—	—	—	5	7	2	5	2	3	—	—	—	24	0.8
Spine	M	—	—	—	—	—	—	—	—	1	—	—	—	1	0.1
	F	—	—	—	—	—	1	—	1	1	—	—	—	3	0.2
	T	—	—	—	—	—	1	—	1	1	1	—	—	4	0.15
Peripheral nerve	M	—	—	—	—	—	—	—	1	—	—	—	—	1	0.1
	F	—	—	—	—	—	—	—	—	—	1	—	—	1	0.1
	T	—	—	—	—	—	—	—	1	—	1	—	—	2	0.1
Other parts of nervous system	M	—	—	—	—	—	—	—	1	1	—	—	—	2	0.1
	F	—	—	—	—	—	2	2	1	—	—	—	—	5	0.4
	T	—	—	—	—	—	2	2	2	1	—	—	—	7	0.3

—이동 : 한국인의 악성종양—

Primary Site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Thyroid gland	M	—	—	—	—	—	1	5	—	1	—	—	—	7	0.5
	F	1	—	—	—	—	11	18	19	7	6	2	—	64	4.9
	T	1	—	—	—	—	12	23	19	8	6	2	—	71	2.6
Adrenal gland	M	—	—	2	1	—	1	—	1	—	—	—	—	5	0.3
	F	—	—	1	2	2	—	—	—	—	—	—	—	5	0.4
	T	—	—	3	3	2	1	—	1	—	—	—	—	10	0.4
Pituitary gland	M	—	—	—	—	1	—	1	2	1	—	—	—	5	0.34
	F	—	—	—	1	1	2	1	—	—	—	—	—	5	0.38
	T	—	—	—	1	2	2	2	2	1	—	—	—	10	0.36
Lymphoma	M	—	—	3	4	12	14	9	21	19	13	6	1	102	7.05
	F	—	1	1	2	4	14	2	4	12	14	6	2	62	4.81
	T	—	1	4	6	16	28	11	25	31	27	12	3	164	5.9
Other neoplasms of lymphoid tissue	M	—	1	1	1	6	4	1	2	1	2	—	—	19	1.3
	F	—	—	—	—	1	3	—	—	—	1	—	—	5	0.41
	T	—	1	1	1	7	7	1	2	1	2	—	—	24	0.87
Metastatic or unclassified malign. neoplasms of lymph node	M	—	—	1	—	—	—	—	—	—	—	—	—	1	0.06
	F	—	—	—	—	1	—	—	—	—	—	—	—	1	0.1
	T	—	—	1	—	1	—	—	—	—	—	—	—	2	0.07
Multiple myeloma	M	—	—	—	—	1	—	3	8	3	1	—	—	16	1.1
	F	—	—	—	—	—	—	—	1	—	—	—	—	1	0.1
	T	—	—	—	—	1	—	3	9	3	1	—	—	17	0.6
Lymphatic leukemia	M	1	1	18	22	18	14	6	3	2	—	—	—	85	5.8
	F	—	1	5	10	5	3	2	1	—	2	—	—	29	2.2
	T	1	2	23	32	23	17	8	4	2	2	—	—	114	4.1
Myeloid leukemia	M	1	0	3	9	24	22	22	12	7	4	—	—	104	7.1
	F	—	0	2	3	10	10	2	8	6	2	—	1	44	3.4
	T	1	—	5	12	34	32	24	20	13	6	—	—	148	5.4
Monocytic leukemia	M	—	—	—	—	2	—	2	—	—	1	—	—	5	0.34
	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	T	—	—	—	—	2	—	2	—	—	1	—	—	5	0.2
Other and unspecified leukemia	M	—	—	1	1	1	1	1	—	1	—	—	—	6	0.4
	F	—	—	—	—	—	—	2	2	—	—	—	—	4	0.3
	T	—	—	1	1	1	1	3	2	1	—	—	—	10	0.4
Spleen	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	—	—	—	—	—	—	1	—	—	1	0.1
	T	—	—	—	—	—	—	—	—	—	1	—	—	1	0.04
Unspecified nature of other and unspecified organs	M	—	—	—	—	—	1	2	5	—	—	—	—	8	0.54
	F	—	—	—	—	—	—	—	—	—	1	—	—	1	0.1
	T	—	—	—	—	—	1	2	5	—	1	—	—	9	0.33

Primary site	Sex	Age												Total	Percent
		-4w	-1y	-4y	-9y	-19	-29	-39	-49	-59	-69	-79	-80		
Total	M	2	5	39	49	95	99	156	285	381	285	49	13	1458	100
	F	3	3	12	27	49	87	242	376	318	140	36	6	1299	100
	T	5	8	51	76	143	186	398	661	698	435	85	19	2757	100

Table 4. Frequency rank of malignant tumors by sex

Freq. Rank	Male		Female		Both Sexes	
	Organ or type of tumors	Per cent	Organ or type of tumors	Per cent	Organ or type of tumors	Per cent
1	Stomach	14.8	Uterine cervix	35.3	Uterine cervix	17.0
2	Leukemia	13.7	Breast	9.9	Stomach	11.3
3	Malignant lymphoma	8.4	Stomach	7.4	Leukemia	10.1
4	Liver	8.2	Leukemia	5.9	Malignant lymphoma	6.8
5	Larynx	6.9	Malignant lymphoma	5.2	Liver	5.3
6	Skin	5.4	Thyroid	4.9	Breast	4.7
7	Lung	5.1	Rectum	4.0	Larynx	4.3
8	Urinary bladder	4.3	Skin	2.6	Skin	4.1
9	Oral cavity except tongue	3.4	Liver	2.0	Rectum	3.5
10	Rectum	3.1	Urinary bladder	1.8	Lung	3.5
11	Large intestine except rectum	2.8	Ovary	1.7	Urinary bladder	3.1
12	Pharynx, unspecified	2.2	Chorionepithelioma	1.5	Thyroid	2.6
13	Nose and nasal cavities	2.1	Lung	1.5	Oral cavity except tongue	3.2
14	Tongue	1.9	Larynx	1.4	Large intestine except rectum	2.0
15	Bone	1.8	Nose and nasal cavities	1.3	Nose and nasal cavities	1.7
16	Other tumors	15.9	Other tumors	13.6	Other tumors	17.8
	Total	100.0		100.0		100.0

## DISCUSSION

In almost all countries with mortality statistics, *carcinoma of the uterus* appears as one of the three commonest causes of death from cancer in women; the other two being in most countries carcinoma of the breast and colon or stomach (Willis, 1967). Malignant tumor of the uterine cervix is responsible for 81.4% of all primary genital cancer in women, and for 35.3% of the total number of female cancer

within the series of the present study. The relative site incidence is remarkably higher than that of the United States (6.14%, U.S. Dept. of Health, Education and Welfare, 1975.). The reason for the outstanding high incidence of uterine cervical cancer in Korea might be explained partly due to the increasing trend of biopsy performance, particularly in the gynecological field for the early detection of uterine cancer. And it is also considered that the "real" incidence in Korea appears to be higher than that in the majority of western countries.

The mean age at the time of histopathological diagnosis is 46.4 years, and is similar to that of 46 years in European and American series (Willis, 1967). However, the highest age incidence of 5th decade in Korea is remarkably low compared with 7th decade of the United States (Martinez et al., 1975). Of our series, 94% of total cervical cancer is observed in women from 4th to 6th decade.

*Cancer of the breast* is second most prevalent among malignant tumors in the Korean female. However, its site incidence of 9.9% is remarkably low in comparison with 27.2% of the United States. In Korean female carcinoma of the uterine cervix predominate in contrast to carcinoma of the breast in the United States.

*Gastric cancer* is the most frequent cause of cancer death among Korean men. In the present survey gastric cancer ranked as the first in relative frequency among Korean males, and constitutes the 3rd most common malignant tumor in females. Among the Japanese, carcinoma of the stomach ranks as the first in males as well as in females and outnumbers by far other malignant tumors in relative incidence (male 42.9%, female 30.1%, Takeda, 1957). It is also very common in the Chinese (Willis, 1967). Also in European countries and the United States gastric carcinoma is one of the most common cancers in man. Only a few decades ago, it was close to the top of the list of lethal cancers in the United States. The incidence of this tumor, however, has steadily fallen for the past six decades, and it now rates fifth as a cause of death in this country (Robbins, 1974). In a series of recent survey in the United States (U.S. Dept. of Health, Education and Welfare, 1974) the relative incidence of this tumor ranks the 7th (4.2%) in male and the 9th in female (2.7%). In the series of the

present survey there is no remarkable changes in the annual trend in number of newly diagnosed gastric cancer during the past five years from 1970 to 1974.

In Korean male and female *cancer of the large intestine except rectum* is outstandingly low in incidence (2.8% in male and 1.0% in female) in comparison with that of the United States (9.3% in male and 11.1% in female). In the United States colon cancer is second most prevalent in female and third most prevalent in male. In Korea the malignant tumors in the upper alimentary tract (stomach) predominate, in contrast to those of cancer in the lower organs of the system (colon and rectum) in the United States survey.

*Carcinoma of the liver* is also one of the important malignant neoplasms among Korean population. This neoplasm is the 4th prevalent (8.2%) in male and the 9th (2.0%) in female. The incidence is outstandingly higher than that of the United States where primary carcinoma of the liver is rare (0.96% in male, 0.52% in female, U.S. Dept. of Health, Education and Welfare, 1974).

Primary carcinoma of the liver shows particularly high incidence in other parts of the Orient including China and Japan (10.6% in male, 4.2% in female, Takeda, 1957) as well as in regions of Africa and South America. Races with a high incidence of hepatic cancer are also the one with a high incidence of cirrhosis of liver, particularly the post-hepatic or post-necrotic type with macronodular pattern. The association of cholangiocarcinoma with infestation of *Clonorchis sinensis* is also well established (Hou, 1956, Kim et al, 1973). This parasite is common among Koreans.

*Cancers of the lungs and bronchi* in Korean

male and female are remarkably low in site incidence (5.1% in male and 1.5% in female) in comparison with that of the United States (21.2% in male and 5.3% in female). In the United States cancers of the lungs and bronchi are the major malignant tumors and rank number one in male and number four in female.

*Leukemia* is one of the major malignant neoplasms (10.1%) among Korean males and females in the present series. This neoplasm is, as mentioned previously, 2nd most prevalent (13.7%) in male and the 4th most prevalent (5.9%) in female. The relative incidence, particularly in male is outstandingly higher than that of the United States (3.7% in male, 2.8% in female, U.S. Dept. of Health, Education and Welfare, 1974).

*Lymphoma* is also one of the major malignant neoplasms (6.6%) and rank next to leukemia. Lymphoma and leukemia altogether are responsible for 16.7% of all cancers in male and female. In the United States relative incidence

of lymphoma in male is approximately 4.8% and that in female is 4.0%. Among lymphomas, lymphosarcoma comprises more than half (53.2%) of total lymphomas in the present series. It is noteworthy that Hodgkin's disease is not frequent (9.0%) compared to those of the United States and England where Hodgkin's disease and lymphosarcoma occurred about equally (Steward, 1971).

Another striking difference in Korean and American males is *cancer of the prostate*. In our series, 0.8% of the site incidence of the prostatic cancer is outstandingly lower than 16.3% of that in the United States. The frequency ratio of nodular hyperplasia of the prostate in the aged group of Korean male is also remarkably low in comparison with that in the United States.

The magnitude of the difference in cancer incidence and its relative site incidence between Korea and western countries cannot be totally explained on the basis of difference in

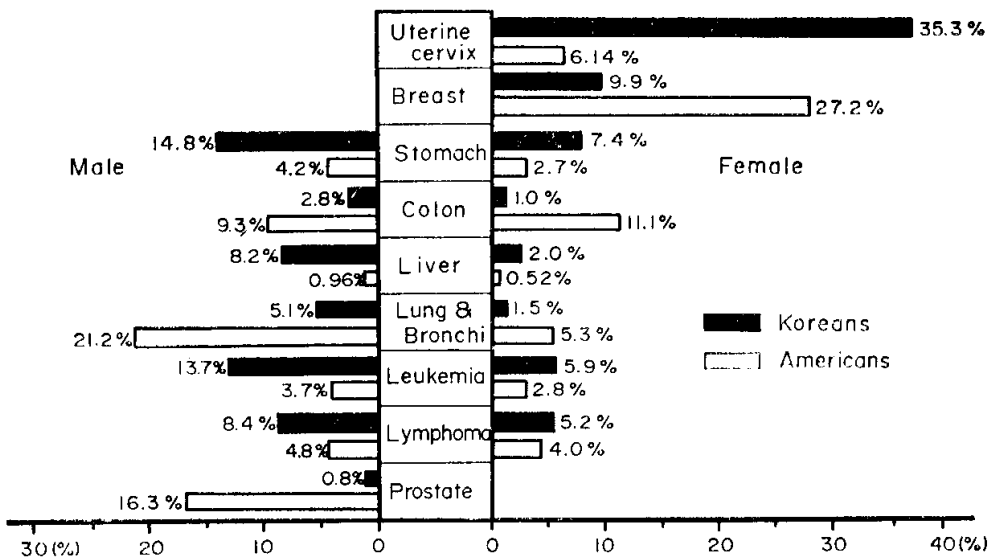


Fig. 1. Site incidences of malignant tumors among Koreans and Americans



diagnosis and reporting of cases. The malignant tumors disclosing the significant difference in the site incidence between the Koreans and Americans are schemed in Figure 1. Variations in exposure or susceptibility to carcinogenic agents of the different study groups could be considered as a possible explanation (Martinez, 1975). And it is much more likely that geographic variations are attributable to environmental rather than to individual and racial susceptibility on the causation of malignant neoplasms.

The data obtained through the present study may represent the general feature of the relative site incidence, and could suggest the annual trend and the pattern of age distribution of malignant neoplasm among the Korean population. In order to collect more reliable data on the incidence and mortality statistics, it is evident that far greater number of biopsies and autopsies should be performed. For this purpose nationwide cancer registration system should be set up as soon as possible, and the regular periodic statistical survey on malignant neoplasms should be conducted through this system in Korea.

### SUMMARY

A statistical survey on the primary malignant neoplasms among Koreans based on biopsy materials and blood and bone marrow smears was performed. In this study 2,757 cases of total primary malignant tumors (male 1,458 cases, female 1,299 cases) diagnosed at the Departments of Anatomical Pathology and Clinical Pathology, Seoul National University Hospital, during a period of five years, from 1970 to 1974, were subjected.

All malignant neoplasms were classified according to the WHO code number. The relative

(site) incidence in male by the frequency ratio is highest for cancer of stomach (14.8%), and thereafter in order of frequency ratio, by leukemia (13.7%), larynx (6.9%), skin (5.4%), lung (5.1%), urinary bladder (4.3%), oral cavity except tongue (3.4%), and rectum (3.1%). The relative (site) incidence in female by the frequency ratio is highest for cancer of the uterine cervix (35.3%), and follows in order of cancers of breast (9.9%), stomach (7.4%), leukemia (5.9%), malignant lymphoma (5.2%), thyroid (4.9%), rectum (4.0%), skin (2.6%), liver (2.0%), and urinary bladder (1.8%).

The age distribution of malignant neoplasms shows the highest frequency in the sixth decade (26.1%) in male and the fifth decade (28.9%) in female.

Generally, the annual identification of total malignant neoplasms shows a tendency of gradual increase since the first year. And the increase is more pronounced in cancers of the pharynx, lungs, prostate and brain in male and cancers of thyroid and uterine cervix in female.

### ▷圖文抄錄◁

### 한국인의 악성종양

—생김재료 및 혈액도말표본에 의한 통계적 조사연구, 1970~1974—

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본 조사연구는 1970년 1월 1일부터 1974년 12월 31일까지 5년간 서울대학교 의과대학 부속병원 병리과 및 임상검사과에서 진단된 원발성 악성종양 총 2,757예를 대상으로 WHO 질병 분류법에 따라 종양별 및 부위별, 연도별, 성별 및 연도별 분류를 시행 하였다. 본 연구 결과를 요약하면 다음과 같다.

총 악성종양 2,757예중 남성이 1,458예(52.88%)이며 여성이 1,299예(47.12%)이다.

총 악성종양 환자의 평균연령은 45.2세이며, 남성은 45.4세, 여성은 44.4세이다. 총 악성종양의 연도별 분포는 조사 초년도인 1970년도 부터 1973년도를 제외하고는 점차로 증가해가는 경향을 보인다. 모든 악성종양중 남성에 있어서는 인두암, 미강암, 폐암, 전립선암 및 뇌암이, 그리고 여성에서는 갑상선암 및 자궁경부암이 연차로 증가하는 경향을 보인다.

악성종양들의 비교빈도(Frequency ratio, site incidence)의 순위를 보면 남성에서는 제 1위가 위암(14.8%)이며 다음이 순차적으로 백혈병(13.7%), 악성인파종(8.4%), 간암(8.2%), 후두암(6.9%), 피부암(5.4%), 폐암(5.1%), 방광암(4.3%), 선암을 제외한 구강암(3.1%) 및 직장암(3.1%)등의 순위이다. 여성에서는 제 1위가 자궁 경부암(35.3%)이며 다음이 순차적으로 위암(11.3%), 백혈병(10.1%), 악성인파종(6.6%), 간암(5.3%), 유방암(4.7%), 후두암(4.3%), 피부암(4.1%), 직장암(3.5%) 및 폐암(3.5%)등의 순위이다.

본 조사연구에서의 악성종양의 비교빈도와 미국인에서의 그것과 비교하여 보면 한국인에서 현저하게 높은 것은 자궁 경부암, 위암, 간암, 백혈병 등이며 한국인에서 현저하게 낮은 것은 유방암, 직장암을 제외한 대장암, 폐암, 전립선암 등이다.

우리나라의 악성종양에 관한 보다 신빙성이 있는 통계수치를 얻기 위해서는 생검 및 특히 부검에수가 증가 하여야 하며 병리조직학적 진단을 토대로한 전국적인 암 등록제도(Cancer Registry)가 하루 속히 이루어져야 하겠다.

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