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BACKGROUND

In recent years, a new classification of lymphoid and hematopoietic malignancies has been adopted, based upon the Revised European-American Lymphoma classification system *[1]* and the World Health Organization (WHO) classification *[2]*. The new classification includes lymphomas, leukemias, and multiple myeloma as one group of malignant diseases.

Lymphomas encompass a diverse group of neoplasms with the common characteristic of originating from the cells of the lymphopoietic system. Traditionally, 2 main groups of lymphoma have been distinguished: Hodgkin Lymphoma (HL), characterized by large polynuclear (Reed-Sternberg) cells; and a diverse group of other lymphomas, defined as non-Hodgkin lymphomas (NHL). The new classification further divides NHL into T-cell NHL and B-cell NHL. Lymphocytic leukemias fall within the B-cell NHL group. However, in this chapter we will use the traditional classification, and lymphocytic leukemia will be counted as leukemia.

The classification of leukemias is complex and has seen several changes over the years *[3]*. The traditional classification, which we will use here, includes acute myeloid leukemia, chronic myeloid leukemia, acute lymphocytic leukemia, and chronic lymphocytic leukemia (CLL). Other types include acute monocytic leukemia, other myeloid/monocytic leukemias, other lymphocytic and acute leukemias, and aleukemic leukemia.

Using the traditional classification, NHLs are estimated at 287,000 new cases in the world annually, HLs at 62,000, and leukemias at 257,000. Together, these account for approximately 7% of all incident cancers worldwide *[4]*.

In general, the etiology of lymphomas and leukemias is not well understood. Many studies show groups of risk factors associated with both malignancies.

Etiology of Lymphoma

The risk factors for lymphoma can be classified into 3 groups: immunological function, infections, and lifestyle and occupational exposures.

Immunological function. Strong evidence suggests that altered immunological function, either immunostimulation or immunosuppression, entails an increased risk of lymphoma. For example, renal transplant patients have a 30 times greater risk for developing lymphoma than the general population. Lymphomas that develop in immunosuppressed patients share common characteristics: They are generally high-grade B-cell lymphomas, and they are more likely to be extranodal and of worse prognosis *[5]*. Lymphomas have been reported for a variety of conditions that are either autoimmune in nature or that require immunosuppressive treatment. These include rheumatoid arthritis and Sjogrens syndrome *[6,7]*. An association with celiac disease and NHL of the intestinal tract has also been noted *[8]*.

Infections. The biological agents associated with NHL are human immunodeficiency virus (HIV), human T-cell lymphotropic virus 1 (HTLV-1), and Epstein Barr virus (EBV) *[9-11]*. Hepatitis C virus (HCV) *[12,13]* and human herpes virus 8 (HHV8) have also been linked to the development of NHL *[10,14,15]*. EBV has been shown to be particularly prominent in lymphomas developing in immunosuppressed patients *[16]*. EBV has also been implicated as a causal factor in the etiology of HL *[17]*. In addition, infection with *Helicobacter pylori* is a risk factor for gastric lymphoma *[18]*.

NHL is 80 times more frequent among HIV-infected persons worldwide than in the general population *[19]*. The type of HIV virus that is generally involved with the development of NHL is HIV-1 *[5]*. About 4% of persons with symptoms from their HIV infection develop an NHL each year *[19]*, but this nevertheless represents a relatively modest contribution to the overall incidence of NHL in countries with a low prevalence of AIDS, such as those in the Middle East Cancer Consortium (MECC). The AIDS-related lymphomas tend to be high-grade B-cell lymphomas, and more than 40% occur in uncommon sites such as the brain and heart *[20]*.

Recently it has been shown that EBV can infect normal T lymphocytes *[21]*. The clinical manifestation of primary delayed EBV infection is infectious mononucleosis. EBV is associated with Burkitt's lymphoma in endemic areas, nasopharyngeal carcinoma, and HL, and with NHL among immunosuppressed persons.

Lifestyle and occupational exposures. The third group of putative risk factors includes farming, exposure to pesticides and organic solvents, tobacco use, alcohol consumption, and sun exposure. However, despite extensive research, no conclusions can be drawn regarding the role of these factors in lymphomagenesis.

Etiology of Leukemia

The etiology of leukemia remains rather unclear. Ionizing radiation is a known cause of leukemia in humans. Other suspected risk factors include pesticides; medical conditions such as infectious mononucleosis, autoimmune diseases, and immunodeficiency; and tonsillectomy.

Except for HTLV-1 and a rare type of leukemia, no viruses or infections have been implicated in the etiology of leukemia. Adult leukemia has been associated with working in the chemical industry, and with exposure to benzene, synthetic fiber dust, radioactive materials, and toluene *[22]*.

RESULTS

Overall Incidence

Age-standardized incidence rates (ASRs) of NHL in the United States have been reported to be among the highest in the world *[23]*. Rates have been reported to be low in East Asia, intermediate in Africa and the Middle East, and high in Western Europe, Australia, and Canada. International variations reflect differences in exposure to risk factors or variable reporting *[23]*.

As shown in Table 14.1, in MECC registries, multiyear averages showed very high ASRs for lymphoma among Israeli Jews (18.6) and Egyptians (16.3). These rates exceeded the US SEER incidence rate (15.3) – considered one of the highest in the world – as well as the rates of the other MECC populations. Rates of nodal NHL were also higher among Israeli Jews (11.6) and Egyptians (10.0) than in the other MECC populations and the US SEER rate (8.3), also considered one of the highest worldwide. Extranodal NHL rates among Israeli Jews and Egyptians were lower than US SEER, but higher than in other MECC populations.

Among MECC registries, the ASR of HL was highest among Israeli Jews (3.4), followed by Cypriots (3.0). Egyptians had the lowest rate (2.1). The HL ASRs in US SEER, Jordan, and Israeli Arab registries were intermediate (Table 14.1).

For leukemia, the ASR was again the highest among Israeli Jews (8.6), a rate slightly lower than the US SEER rate (8.8). Rates in other MECC countries were approximately 75% of the rate reported among Israeli Jews (Table 14.1). Among the different types of leukemia, the most frequent was CLL, which showed the

Table 14.1. Lymphoma and Leukemia: Age-Standardized Incidence Rates in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001	Israel (Jews) 1996-2001	Israel (Arabs) 1996-2001	Egypt 1999-2001	Jordan 1996-2001	US SEER† 1999-2001
Lymphoma	10.6	18.6	12.9	16.3	8.9	15.3
Non-Hodgkin lymphoma	7.6	15.2	10.2	14.2	6.4	12.9
Nodal	5.2	11.6	7.8	10.0	4.7	8.3
Extranodal	2.4	3.6	2.5	4.1	1.7	4.6
Hodgkin lymphoma	3.0	3.4	2.7	2.1	2.5	2.4
Leukemia	6.9	8.6	6.4	6.0	6.3	8.8
Chronic lymphocytic leukemia	1.8	3.0	1.3	1.3	1.1	2.2

*Rates are per 100,000 and are age-standardized to the World Standard Million.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

Table 14.2a. Lymphoma: Number of Cases and Age Distribution, by Sex, of Lymphoma, Hodgkin Lymphoma, and Non-Hodgkin Lymphoma, in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001			Israel (Jews) 1996-2001			Israel (Arabs) 1996-2001			Egypt 1999-2001			Jordan 1996-2001			US SEER† 1999-2001		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total cases -- All lymphoma	357	194	163	6,638	3,371	3,267	615	346	269	1,316	820	496	1,733	1,042	691	23,698	12,913	10,785
Total cases -- Hodgkin lymphoma	83	37	46	1,030	521	509	166	99	67	218	151	67	639	383	256	3,099	1,706	1,393
Total cases -- Non-Hodgkin lymphoma	274	274	117	5,608	2,850	2,758	449	247	202	1,098	669	429	1,094	659	435	20,599	11,207	9,392
Age Groups (Distribution) for Lymphoma																		
<50 y	37.8%	37.6%	38.0%	29.9%	32.2%	27.5%	57.1%	60.7%	52.4%	55.2%	58.2%	50.4%	61.1%	63.1%	58.0%	28.0%	30.8%	24.6%
50-69 y	37.0%	38.7%	35.0%	34.2%	34.3%	34.2%	28.6%	26.0%	32.0%	37.2%	34.1%	42.1%	29.3%	28.9%	29.8%	32.7%	34.4%	30.8%
70+ y	25.2%	23.7%	27.0%	35.9%	33.5%	38.4%	14.3%	13.3%	15.6%	7.6%	7.7%	7.5%	9.6%	8.0%	12.2%	39.3%	34.8%	44.6%
Age Groups (Distribution) for Hodgkin Lymphoma																		
<50 y	84.3%	86.5%	82.6%	74.4%	74.1%	74.7%	83.7%	87.9%	77.6%	84.4%	82.8%	88.1%	83.9%	84.6%	82.8%	71.2%	70.9%	71.6%
50-69 y	*15.7%*	*13.5%*	*17.4%*	15.5%	17.3%	13.8%	12.7%	*11.1%*	*14.9%*	14.2%	15.2%	*11.9%*	12.5%	12.8%	12.1%	17.0%	18.5%	15.1%
70+ y	*0.0%*	*0.0%*	*0.0%*	10.1%	8.6%	11.6%	*3.6%*	-	*7.5%*	*1.4%*	*2.0%*	*0.0%*	3.6%	*2.6%*	*5.1%*	11.8%	10.6%	13.3%
Age Groups (Distribution) for Non-Hodgkin Lymphoma																		
<50 y	23.7%	26.1%	20.5%	21.7%	24.6%	18.7%	47.2%	49.8%	44.1%	49.5%	52.6%	44.5%	47.8%	50.7%	43.4%	21.5%	24.7%	17.6%
50-69 y	43.4%	44.6%	41.9%	37.7%	37.4%	37.9%	34.5%	32.0%	37.6%	41.7%	38.4%	46.9%	39.0%	38.2%	40.2%	35.1%	36.8%	33.1%
70+ y	32.8%	29.3%	37.6%	40.6%	38.0%	43.3%	18.3%	18.2%	18.3%	8.8%	9.0%	8.6%	13.2%	11.1%	16.3%	43.4%	38.5%	49.3%

The symbols "-" = 1-2 cases; and "[numeral]*" (italic) = 0 or 3-15 cases.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

highest rates in Israeli Jews (3.0), compared with a range from 1.1 (Jordanians) to 2.2 (US SEER) (Table 14.1).

It is interesting to note the high rates of NHL in Egyptians and Israeli Jews. Rates of NHL have increased dramatically in Western Europe and North America over the past 20 years, due in part to AIDS. However, NHL as a complication of AIDS does not occur in a sufficient proportion of AIDS cases to explain the full extent of the increase in NHL in Western countries. Furthermore, AIDS rates in Egyptians and Israeli Jews are not especially high (although they are thought to be rising, especially in Israel). Other possible explanations for the higher NHL rate in Egypt may be the high prevalence of HCV infections *[9]*, HHV8 infections, other types of infections, or adverse environmental exposures and pollution in that country. It should be noted that lymphoid and hematopoietic cancers were recognized as being relatively common in Egypt *[24]*, even before the high prevalence of HCV. Several studies have reported the possible role of infectious agents in the etiology of NHL. Cowgill et al. (2004) *[25]* reported in an Egyptian case-control study a statistically significant association of HCV RNA with NHL (OR = 2.9; 95% CI, 1.9-4.5), after adjustment for age, sex, rural versus urban birthplace, and rural versus urban residence. Iscovich and Parkin (1997) *[26]* reported large differences in NHL incidence rates among subpopulations in Israel, with relatively high rates in migrants from Asia and Africa. Those high rates persisted into the second generation, suggesting that inherited susceptibility may underlie some of the variation.

Age and Sex

Tables 14.2a, 14.2b, and 14.3 show the age and sex distribution and specific rates for each registry for lymphoma and leukemia over broad age groups.

As seen in these tables and Table 14.1, Egyptians and Israeli Jews showed the highest rates of lymphoma and NHL. Also, Israeli Jews showed the highest ASR for HL. Table 14.4 shows that the 5-year age patterns of NHL and HL rates differed between these 2 registries. Egyptians had higher rates for NHL and HL in age groups 0-14 years than did Israeli Jews.

Contrary to the observations of higher lymphoma rates in Egyptian children than in Israeli Jewish children**,** the age-specific rate among Egyptians over age 75 (41.9) was less than half the rate in their Israeli Jewish counterparts (104.4) (Table 14.4). The low reported rates of lymphoma in older patients in Egypt could be due to cultural factors such as reluctance of older persons to seek medical care. It also could be due to lack of diagnostic facilities for older populations in peripheral regions in Egypt.

The higher rates of lymphoma and NHL reported in Egyptians and Israeli Jews did not differ by sex. As shown in Table 14.5, lymphoma ASRs were higher for Egyptian and Israeli Jewish males, 20.0 and 20.6, respectively, than for males in other registries. Also, lymphoma ASRs for females were higher in Egyptians (12.6) and Israeli Jews (16.9) than in other populations. NHL sex-specific rates were higher for Egyptian (11.3) and Israeli Jewish (13.6) females than for females in other registries. These data represent male-to-female ratios of 1.6:1 for NHL in Egyptians and 1.2:1 for NHL in Israeli Jews.

HL, which showed the highest rate in Israeli Jews (3.4), did not show a significant sex difference (3.5 in males; 3.3 in females) (Table 14.5).

The sex-specific rates of leukemia followed the same pattern as the overall rates (Table 14.1), with higher rates in US SEER and Israeli Jews than in the other registry populations (Table 14.5).

Subsites

As shown in Table 14.6, extranodal NHL represented about one-fourth to one-third of all NHL in the MECC registries, with the lowest proportion in Israeli Jews (23.2%) and the highest in Cypriots

(32.5%). Proportions of extranodal NHL were highest in US SEER (35.9%) (Table 14.6). Further analysis of the anatomical sites of extranodal NHL in our data showed there were no differences in the distribution of stomach extranodal NHL. Nevertheless, skin extranodal sites were higher in Israeli Jews (10.4%) and Israeli Arabs (10.5%) than in other MECC registries, where rates ranged between 1.6% and 2.2% of all extranodal lesions. The US SEER rate for skin NHL was 6.6%. The registry results did not support the previous impression of high prevalence of extranodal lymphoma in the small intestine previously reported in the Middle East in hospital-based studies *[27,28]*.

HL did not vary greatly between MECC registries in relation to nodal and extranodal distribution (Table 14.6). Contrary to the large proportion of extranodal NHL (about one-third of all NHL tumors), extranodal HL represented no more than 5.3% of all HL. Hodgkin extranodal tumors represented 2.3% of Hodgkin tumors in the United States. Further analysis showed there was no major sex difference.

Table 14.2b. Lymphoma: Age-Standardized Incidence Rates,* by Age and Sex, for Lymphoma, Hodgkin Lymphoma, and Non-Hodgkin Lymphoma, in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001†

	Cyprus 1998-2001			Israel (Jews) 1996-2001			Israel (Arabs) 1996-2001			Egypt 1999-2001			Jordan 1996-2001			US SEER‡ 1999-2001		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Age Groups (Rates)* for Lymphoma																		
Total rate -- All lymphoma	10.6	12.1	9.3	18.6	20.6	16.9	12.9	14.4	11.4	16.3	20.0	12.6	8.9	10.3	7.4	15.3	18.3	12.6
<50 y	6.0	6.6	5.5	8.5	9.3	7.6	6.3	7.4	5.1	8.6	11.0	6.2	4.8	5.9	3.6	6.3	7.5	5.2
50-69 y	25.6	30.5	21.2	48.8	53.5	44.6	32.8	34.1	31.3	46.8	54.1	39.4	23.0	25.9	19.8	40.0	48.0	32.8
70+ y	42.4	49.4	36.9	100.4	113.7	90.8	65.4	76.3	56.7	48.5	64.9	34.1	35.3	37.0	33.8	95.3	117.1	80.5
Age Groups (Rates)* for Hodgkin Lymphoma																		
Total rate -- Hodgkin lymphoma	3.0	2.7	3.3	3.4	3.5	3.3	2.7	3.0	2.3	2.1	2.9	1.4	2.5	3.0	2.0	2.4	2.7	2.2
<50 y	3.2	3.0	3.5	3.3	3.4	3.3	2.3	2.9	1.7	2.0	2.7	1.4	2.2	2.7	1.7	2.3	2.4	2.1
50-69 y	*2.5*	*1.9*	*3.0*	3.5	4.1	2.9	3.8	*3.9*	*3.7*	2.9	4.3	*1.6*	3.5	4.1	2.9	2.7	3.3	2.0
70+ y	*0.0*	*0.0*	*0.0*	4.8	*4.9*	*4.7*	*4.8*	-	*7.0*	*1.4*	*3.1*	*0.0*	4.8	*4.5*	*5.0*	4.0	*5.0*	*3.3*
Age Groups (Rates)* for Non-Hodgkin Lymphoma																		
Total rate -- Non-Hodgkin lymphoma	7.6	9.4	6.0	15.2	17.1	13.6	10.2	11.4	9.1	14.2	17.1	11.3	6.4	7.3	5.4	12.9	15.7	10.5
<50 y	2.8	3.6	2.0	5.1	6.0	4.3	3.9	4.5	3.4	6.6	8.3	4.8	2.6	3.2	1.9	4.1	5.0	3.1
50-69 y	23.1	28.5	18.2	45.3	49.4	41.8	29.0	30.3	27.6	43.8	49.9	37.9	19.4	21.7	16.9	37.4	44.7	30.7
70+ y	42.4	49.4	36.9	95.6	108.8	86.1	60.7	74.3	49.7	47.1	61.8	34.1	30.5	32.5	28.8	91.3	112.1	77.2

*Rates are per 100,000 and are age-standardized to the World Standard Million.

†The symbols "-" = 1-2 cases; and "*[numeral]*" (italic) = 0 or 3-15 cases.

‡SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

CLL, which in the new classification is counted as a type of lymphoma, showed high rates (3.0) in Israeli Jews, with higher rates in males (3.8, compared with 2.3 in females), and a male-to-female ratio of 1.7:1. Rates of CLL ranged in other MECC registries and US SEER from 1.1 to 2.2, with male-to-female ratios ranging between 1.25:1 and 2.2:1 (Table 14.5).

Basis of Diagnosis

Histopathological diagnostic rates were over 90% for most types of lymphomas and leukemias (see Table 1.2). However, it should be noted that available diagnostic facilities might not be available at peripheral remote medical centers, and patients may die before reaching cancer centers for correct diagnosis and management. This may be the case for myeloma in Egypt, where a pathologic diagnosis was observed for 100% of cases. The low incidence of myeloma and NHL in the older population in Egypt, and possibly other MECC registries, might be due to misdiagnosis or short life expectancy. It is difficult to know how much the age structure of the population and local factors in each country might influence access to medical care and interfere with the diagnostic facilities for diagnosis and management of hematopoietic malignancies.

Table 14.3. Leukemia: Number of Cases, Age Distribution, and Age-Standardized Incidence Rates, by Age and Sex, in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001			Israel (Jews) 1996-2001			Israel (Arabs) 1996-2001			Egypt 1999-2001			Jordan 1996-2001			US SEER† 1999-2001		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total cases	223	134	89	3,220	1,790	1,430	325	192	133	515	283	232	1,354	782	572	13,178	7,528	5,650
Age Groups (Distribution)																		
<40 y	27.4%	25.4%	30.3%	17.1%	18.1%	15.9%	51.4%	51.6%	51.1%	50.9%	51.6%	50.0%	59.5%	60.0%	58.9%	18.9%	18.7%	19.3%
40-59 y	25.1%	26.9%	22.5%	18.1%	19.7%	16.2%	23.4%	24.5%	21.8%	29.3%	25.1%	34.5%	20.6%	18.7%	23.3%	19.7%	20.5%	18.6%
60-69 y	19.7%	23.1%	*14.6%*	19.8%	19.9%	19.6%	9.5%	9.4%	*9.8%*	14.0%	16.3%	11.2%	12.3%	13.2%	11.2%	16.0%	17.6%	13.9%
70+ y	27.8%	24.6%	32.6%	45.0%	42.3%	48.3%	15.7%	14.6%	17.3%	5.8%	7.1%	*4.3%*	7.5%	8.2%	6.6%	45.3%	43.2%	48.1%
Age Groups (Rates)‡																		
Total rate	6.9	8.5	5.5	8.6	10.5	6.9	6.4	7.8	5.1	6.0	6.7	5.3	6.3	7.1	5.5	8.8	11.0	6.9
<40 y	3.9	4.2	3.7	3.1	3.5	2.6	2.9	3.4	2.4	3.3	3.6	3.0	3.4	3.7	3.0	3.8	4.2	3.5
40-59 y	8.0	10.4	5.7	9.5	11.9	7.3	8.6	10.6	6.5	9.2	8.6	9.8	8.3	8.4	8.2	8.7	10.6	6.9
60-69 y	20.3	30.2	*11.6*	30.7	38.1	24.6	15.2	19.2	*11.9*	17.2	22.4	12.2	20.1	23.2	16.5	27.7	37.1	19.4
70+ y	28.4	32.7	25.2	59.3	74.3	48.6	38.4	47.9	31.1	14.4	20.9	*8.7*	21.4	28.3	15.1	59.5	83.6	43.4

**[Numeral]* (italic) = 0 or 3-15 cases.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

‡Rates are per 100,000 and are age-standardized to the World Standard Million.

SUMMARY AND CONCLUSIONS

Analysis of the MECC registries yields the following interesting observations: (1) Lymphoma and NHL incidence rates in Egyptians and Israeli Jews were high; (2) NHL incidence rates in older Egyptians were relatively low, which could be due to lack of access to medical care in peripheral regions or short life expectancy; and (3) the high rate of CLL in Israeli Jews could be a component of the high lymphoma rate in that population.

Geographic variations in incidence and age distribution of NHL might be a reflection of local environmental factors implicated in the etiology of the disease. Based on the different ethnicities, lifestyles, socioeconomic levels, and adverse environmental exposures among the countries of the Middle East, comparison of populations can provide the background for more sophisticated approaches for disentangling the risk factors for lymphoid and hematopoietic malignancies. Further exploration of potential etiologic risk factors should be the focus of future epidemiologic research.

Table 14.4. Lymphoma: Age-Specific Incidence Rates* of Non-Hodgkin Lymphoma and Hodgkin Lymphoma, by Age and Sex, in Israel (Jews) and Egypt – 1996-2001†

	Non-Hodgkin Lymphoma						Hodgkin Lymphoma					
	Israel (Jews) 1996-2001			Egypt 1999-2001			Israel (Jews) 1996-2001			Egypt 1999-2001		
Age Group	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
0-4 y	1.0	*1.1*	*0.8*	2.6	3.6	*1.5*	*0.2*	*0.4*	-	*0.6*	*0.7*	-
5-9 y	1.6	2.3	*0.8*	2.3	3.2	*1.3*	0.8	1.4	*0.2*	2.3	4.0	*0.5*
10-14 y	1.0	1.4	*0.6*	1.9	3.1	*0.6*	1.6	1.6	1.5	1.7	2.4	*1.0*
15-19 y	2.1	2.2	2.0	1.6	*2.0*	*1.1*	6.0	5.5	6.5	1.9	2.7	*1.1*
20-24 y	3.4	3.2	3.7	4.1	3.8	4.5	6.1	5.7	6.6	2.7	*2.5*	*2.9*
25-29 y	4.1	4.7	3.6	4.6	7.2	*2.3*	6.9	5.8	8.0	*1.8*	*2.8*	*1.0*
30-34 y	7.5	8.4	6.6	7.8	10.7	4.9	4.5	4.2	4.8	*1.2*	*1.6*	*0.8*
35-39 y	8.7	11.0	6.6	10.8	13.7	8.0	3.9	4.1	3.6	*1.5*	*2.0*	*1.1*
40-44 y	13.9	16.2	11.7	16.4	22.0	10.6	3.3	4.3	2.3	3.2	5.3	*1.0*
45-49 y	18.8	22.2	15.7	26.9	29.4	24.0	2.4	3.0	1.8	4.6	*3.8*	*5.5*
50-54 y	30.0	30.9	29.2	37.7	36.7	38.6	3.5	4.1	3.0	*3.3*	*6.1*	-
55-59 y	39.8	46.6	33.6	39.7	48.4	30.5	2.7	3.4	*2.2*	*3.0*	*4.3*	-
60-64 y	51.9	54.7	49.5	50.6	59.6	42.5	4.1	4.3	4.0	*2.0*	-	*2.3*
65-69 y	69.4	77.0	63.4	50.6	60.8	40.4	3.4	5.1	*2.0*	*3.5*	*4.6*	-
70-74 y	86.9	98.2	78.4	52.3	70.8	35.7	6.3	6.2	6.4	-	-	*0.0*
75+ y	104.4	119.5	93.8	41.9	52.8	*32.5*	3.3	3.6	3.1	-	-	*0.0*

*Rates are per 100,000..

†The symbols "-" = 1-2 cases; and "*[numeral]*" (italic) = 0 or 3-15 cases.

Table 14.5. Lymphoma and Leukemia: Age-Standardized Incidence Rates, by Sex, in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001	Israel (Jews) 1996-2001	Israel (Arabs) 1996-2001	Egypt 1999-2001	Jordan 1996-2001	US SEER† 1999-2001
Lymphoma						
Total rate	10.6	18.6	12.9	16.3	8.9	15.3
Male	12.1	20.6	14.4	20.0	10.3	18.3
Female	9.3	16.9	11.4	12.6	7.4	12.6
Non-Hodgkin Lymphoma						
Total rate	7.6	15.2	10.2	14.2	6.4	12.9
Male	9.4	17.1	11.4	17.1	7.3	15.7
Female	6.0	13.6	9.1	11.3	5.4	10.5
Hodgkin Lymphoma						
Total rate	3.0	3.4	2.7	2.1	2.5	2.4
Male	2.7	3.5	3.0	2.9	3.0	2.7
Female	3.3	3.3	2.3	1.4	2.0	2.2
Leukemia						
Total rate	6.9	8.6	6.4	6.0	6.3	8.8
Male	8.5	10.5	7.8	6.7	7.1	11.0
Female	5.5	6.9	5.1	5.3	5.5	6.9
Chronic Lymphocytic Leukemia						
Total rate	1.8	3.0	1.3	1.3	1.1	2.2
Male	2.4	3.8	1.5	1.7	1.3	3.1
Female	1.2	2.3	1.2	0.9	0.8	1.4

*Rates are per 100,000 and are age-standardized to the World Standard Million.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

Table 14.6. Lymphoma: Distribution of Non-Hodgkin Lymphoma and Hodgkin Lymphoma, by Nodal and Extranodal Status, in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001	Israel (Jews) 1996-2001	Israel (Arabs) 1996-2001	Egypt 1999-2001	Jordan 1996-2001	US SEER† 1999-2001
Non-Hodgkin lymphoma – Nodal	67.5%	76.8%	75.3%	70.5%	74.1%	64.1%
Non-Hodgkin lymphoma – Extranodal	32.5%	23.2%	24.7%	29.5%	25.9%	35.9%
Hodgkin lymphoma – Nodal	95.2%	98.4%	97.6%	96.3%	94.7%	97.7%
Hodgkin lymphoma – Extranodal	*4.8%*	1.6%	*2.4%*	*3.7%*	5.3%	2.3%

**[Numeral]* (italic) = 0 or 3-15 cases.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

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