Acta Med. Nagasaki 34 : 13−15

The Pattern of Leukemia in Singapore

R. Suri

Department of Medicine
National University Hospital, Singapore

INTRODUCTION

Leukemia is an uncommon malignancy worldwide, except in children. The incidence of the different types of malignancies, including leukemias and lymphomas, varies in the different countries and populations around the world. Environmental and genetic factors, among other causes, probably account for these differences. Interest in the epidemiology of leukemia has recently been revived with the discovery of the association of the HLTV 1 retrovirus and adult T cell leukemia plus improved immunological and molecular biological techniques in sub-typing leukemia. The geographic differences in the pattern of leukemia subtypes, particularly the lymphoid malignancies, could provide clues to important etiological factors associated with the development of the disease. This paper summarizes the pattern of leukemia in Singapore concentrating on the lymphoid malignancies and highlights important differences as compared to other population groups.

PATTERN OF LEUKEMIA

In Singapore, for the 17 years, from 1968 to 1984, 1213 patients of all ages presented with leukemia of various types (see Table 1). There was no racial differences in leukemia incidence among the 3 ethnic races in Singapore (Chinese, Indians and Malays) (Fig.1). Acute myeloblastic leukemia was the commonest type of leukemia (46%) seen if all age groups were considered. Acute lymphoblastic leukemia (ALL) was commoner in children (age 15 years and below) (Fig. 2). The paucity of chronic lymphatic leukemia (only 2.8% of all leukemias) is well recognised in most populations outside the United States and Europe. Chronic granulocytic leukemia is commonly seen but with a younger age group peak (30-40 years).

Further analysis of the data of the 412 patients with ALL (34% of all leukemias, all

Table 1. Leukemia patients/subtypes (all ages) in Singapore from 1968 to 1984 (17 years)

Leukemia Subtype	Patients		Calculated Average No. of Patients Expected Per Year
	Numbers	%	
Acute Myeloblastic Leukemia	558	46.0	33
Acute Lymphoblastic Leukemia	412	34.0	24
Chronic Granulocytic Leukemia	203	16.7	12
Chronic Lymphatic Leukemia	34	2.8	2
Hairy Cell Leukemia	1	0.1	0
Plasma Cell Leukemia	5	0.4	0
	1213	100.0	71

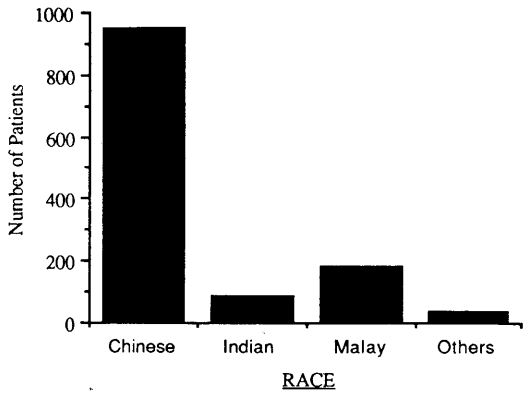

Fig. 1. Leukemia in Singapore by Race (1968 to 1984)

age groups) provides interesting information. There is a distinct early age group (0-4 years) peak (Fig. 2) noted in the age of presentation of Singapore ALL patients. This early age peak was noted in England in the twenties, the United States in the forties and in Japan in the sixties. It is a feature noted in high socio-economic industrialised countries. This distinct early age group peak is also present in the Chinese population in Singapore but lost in the Malay and Indian population (numbers are small, however).

In the last two years, immunotyping of acute lymphoblastic leukemia was carried out with a core panel of monoclonal antibodies using the indirect immunofluorescent technique. Of 32

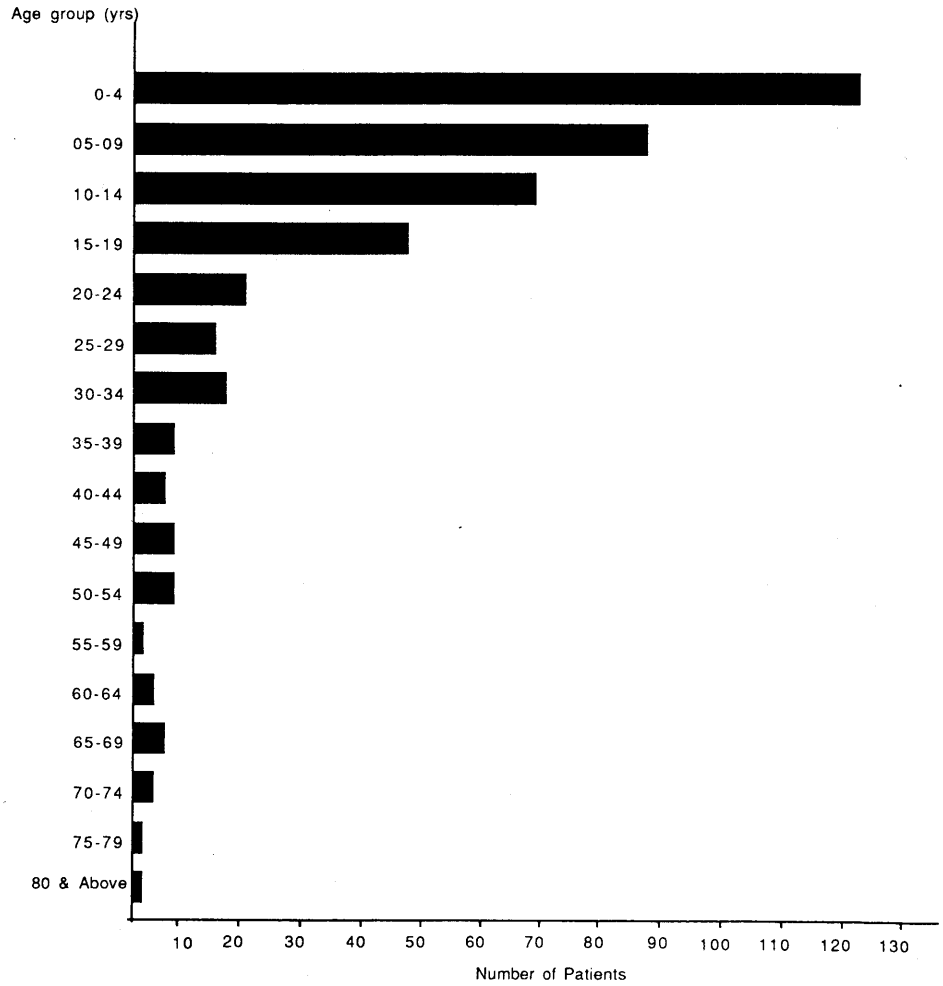

Fig. 2. Age at presentation of ALL patients in Singapore (1968 to 1984)

patients tested, 44% had the common ALL phenotype, 37% T cell phenotype, 1% B cell phenotype and 16% 'null' cell phenotype (Table 2). The high proportion of T cell phenotype noted in this Singapore population is in variance from that seen in the west where the common ALL phenotype accounts for 60-70% of all patients and the T cell phenotype only 10-20% of all patients.

Table 2. Cell Surface Markers in ALL and Lymphoma-Leukemias

Number of Patients	Immunophenotype			
Tested (%)	c ALL	T	B	NULL
32 (100)	14 44%	12 37%	1 3%	5 16%

What does the presence of an early distinct ALL age group peak (0-4 years) plus a higher proportion of T-ALL mean? ALL is rarely seen in equatorial Africa, present at a low incident rate in Asia/S. America and at a slightly higher rate in the United States and Europe. In 1982, Ramot and MaGrath (1) proposed a hypothesis stating that they believed environmental factors (relating particularly to socioeconomic circumstances) was more important than racial factors in governing frequency of childhood lymphoid malignancies. They went on to describe three phases in the spectrum of lymphoid neoplasia evolution as socioeconomic status improves. In countries with a low socioeconomic status, e.g. equatorial Africa, B cell lymphomas (Burkitt's) predominate and ALL is rare with T cell type predominance and no early age group peak, in countries with a high socioeconomic status, e.g. U.S. whites and Europeans, there is a lower incidence of B cell lymphomas with a higher incidence of ALL (early age group peak noted with mainly common ALL phenotype). Countries with an intermediate socioeconomic status, e.g. Israeli Arabs, U.S. blacks and now Singapore, B cell lymphomas are infrequent and ALL is more frequently seen (with a higher T cell proportion) and the early age group peak has begun to appear. A study of the pattern of ALL subtypes in various countries around the world should help decide if this hypothesis is true. If it is true then clearly the environment (diet, viruses, ?) should provide clues to the etiology of the lymphoid malignancies.

CONCLUSION

Leukemia is an uncommon cancer in Singapore (71 new patients expected/year out of a population of 2.6 million). Acute myeloblastic leukemia is the commonest type of leukemia seen, if all ages are considered. Acute lymphoblastic leukemia, in Singapore, has the distinct early age group peak (0-4 years) with a higher proportion of T-ALL (37%). Chronic lymphatic leukemia is rare (2.8% of all leukemias) whereas chronic myeloid leukemia is common (16.7% of all leukemias).

REFERENCES

1) Ramot B. MaGrath I. : Hypothesis : The environment is a major determinant of the immunological subtype of Lymphoma and Acute Lymphoblastic Leukemia in Children. Br J of Haem. 1982 ; 52 : 183-189.