Trends of Pediatric Oncology at National Cancer Institute (NCI), Cairo, Egypt: Frequencies and Survival from Jan. 2001 to Jan. 2006

Thesis
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By

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Abstract

Background: Public concern about possible increases in childhood cancer incidence in Egypt led us to examine recent childhood cancer trends.

Methods: Cancers diagnosed in 3483children under age 18 years from 2002 to 2006 and reported to registries in the National Cancer were investigated. Cancer trends were analyzed according to anatomic site and histologic categories of the International Classification of Childhood Cancer.

Results: A modest rise in the incidence of leukemia, the most common childhood cancer. For brain and other central nervous system (CNS) cancers, incidence rose strikingly. A few rare childhood cancers demonstrated upward trends (e.g. adrenal neuroblastomas, and retinoblastomas). In contrast, incidence decreased modestly for lymphomas).

Conclusion: There was a substantial change in incidence for the major pediatric cancers, and rates have risen relatively in comparison with the previous NCI study. The strikingly apparent increase that was observed for brain/CNS cancers suggest that the increases likely reflected diagnostic improvements or reporting changes as well as establishment of tremendous radiotherapeutic treatment.

Recommendation: a national cancer registry is required to better determine the real magnitude of childhood cancer in Egypt and thus leading to better management.

Keywords: childhood cancer, childhood leukemia, incidence, trends, cancer registry, epidemiology.

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DEDICATION

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RIHAM A AZIZ.

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Introduction

Over the last few decades tremendous advances have been made in resource-rich countries in the diagnosis, management and cure of children with cancer. They have moved from little expectation of survival in the 1960s to 80% cure rates for many childhood tumors. The human genome project has opened new avenues of research into cellular resistance and treatment failure.

Modern molecular and imaging techniques are adding to the accuracy and precision of diagnosis and residual disease recognition. With these advances, we are focusing more and more on optimizing psychosocial support, improving quality of life and minimizing toxicity, even reducing intensity of treatment for good-risk patients.

The overall incidence of childhood cancer in low-income countries and developed countries is reported to be broadly superimposable (Parkin et al., 1988). Very little is known, however, about the clinical epidemiology and even less about the outcome of pediatric cancer patients, who certainly are not given high public health priority in contexts of care where even essential needs are hardly met. Pediatric cancer patients are therefore at a high risk of severe under-treatment because of lack of resources and organizational facilities (Scopinaro MJ, et al., 2002).

Childhood cancer remains the leading cause of disease-related mortality among children 1 to 14 years of age and there are 1,500 to 1,600 cancer-related deaths annually in the United States among children younger than 15 years of age. The relative contribution of cancer to overall mortality for 15-to 19-year-olds is less than that for younger children, although approximately 700 deaths from cancer occur annually in this age group.

REVIEW OF LITERATURE

There are marked differences between childhood and adult cancer. **First**, cancer is generally a rare disease among children. Annual incidence of all cancer in children under 5 years of age in developed countries is only 0.5%, according to a new report [Stiller CA. Epidemiology and genetics of childhood cancer. Oncogene 2004; 23:6429-44.]. In European countries, 1% of all malignant neoplasms occur in patients younger than 20 years of age (the ACCIS project 2004)

Second, childhood cancers are histologically variable, and embryonic tumors are the most common, while the majority of adult cancers are carcinomas (Stiller CA, 2004).

Twelve types of malignant childhood tumors have been classified according to the International Classification of Childhood Cancer (ICCC)

However, pediatric cancers can also be divided into 3 subgroups (Pinkerton CR et al., 1994)

1. Embryonal tumors, which show early age peaks. Retinoblastoma, neuroblastoma, and Hepatoblastoma have the highest incidence rate in the first year of life.

2. Juvenile neoplasms, which are unique to younger age groups.

3. Adult-type tumors, which are rarely seen in children.

Prenatal factors are considered to affect the incidence of tumors in children under the age of 5 years [Pratt CB, 1985]. It is generally accepted that cancer results from genetic changes [Stiller CA, 2004)

The carcinogenic process in children is much shorter than in adults. Infancy is the age when cancer incidence rates are the highest during childhood; therefore, it is reasonable to assume that many pediatric

cancers result from aberrations in early developmental stages and in utero. An increased risk of childhood cancers has been described to be associated with certain genetic conditions or syndromes such as chromosomal abnormalities, DNA repair disorders, congenital anomalies, hereditary immune deficiency states, and other hereditary syndromes [Stiller CA. 2004).

Although childhood cancer is rare, it is of great scientific interest for a number of reasons. Several types of cancer are virtually unique to childhood, whereas the carcinomas most frequently seen in adults, those of lung, female breast, stomach, large bowel, and prostate, are extremely rare among children.

Some of the most striking progress in cancer treatment has been made in pediatric oncology. Investigation of childhood tumors has led to major advances in the understanding of the genetic etiology of cancer

Classification

Childhood cancers exhibit great histologic diversity and often arise in embryonal precursor cells. Some types of tumor can arise in many different primary sites. Therefore it is more appropriate for childhood cancers to be classified according to histology and site.

The current standard classification is the International Classification of Childhood Cancer, with groups defined by the codes for morphology in addition to topography in the second edition of the International Classification of Diseases for Oncology (ICD-O). The classification contains 12 main diagnostic groups, most of which are divided into subgroups.

The main groups are as follows:

I. leukemia;

II. lymphomas and reticuloendothelial neoplasms;

III. central nervous system and miscellaneous intracranial and intraspinal neoplasms;
IV. sympathetic nervous system tumors;
V. retinoblastoma;
VI. renal tumors;
VII. hepatic tumors;
VIII. malignant bone tumors;
IX. soft tissue sarcomas;
X. germ cell, trophoblastic, and other gonadal neoplasms;
XI. carcinomas and other malignant epithelial neoplasms;
XII. Other and unspecified malignant neoplasms.

Most of these groups are limited to malignant neoplasms, but there are two exceptions. Benign and unspecified intracranial and intraspinal tumors, including choroid plexus papilloma, ganglioglioma, non-malignant gliomas, craniopharyngioma, pituitary adenoma, pinealoma, meningioma, and tumors of unspecified type are included in group III because they are recorded by many cancer registries. For the same reason, non-malignant intracranial and intraspinal germ cell tumors are also included (in group X).

Childhood cancer registration

The aim of a cancer registry is to collect information on all cases of cancer occurring within a geographically defined population. Sometimes there are insufficient resources to maintain a population-based registry, but nevertheless it may be possible to collect similar data on all cases seen in one or more hospitals or pathology departments. In the absence of population-based data, these series can still yield much useful information, and several population-based cancer registries trace their origins to hospital or pathology series. The amount of data collected on each case

varies enormously between registries, but the minimum consists of the patient's name (or other unique personal identifier), sex, date of diagnosis and age at diagnosis, and sufficient information on the primary site and histologic type of the neoplasm for it to be coded according to whatever system is used, preferably ICD-O. Most registries collect the patient's date of birth where known, as this is particularly useful for linking data on the same patient from different sources and for detecting duplicates. The basis of diagnosis is also usually recorded, at least to the extent of whether there was histologic verification. The registration data should be checked for internal consistency.

Population-based general cancer registries, including patients of all ages, now cover the whole or part of about 100 countries. As childhood cancer accounts for a very small proportion of all cancer, registries which restrict their coverage to children are able to collect more detailed information on each case. There are population-based childhood cancer registries in several countries or parts of countries in Europe, the Americas and Oceania. These registries are often operated in close collaboration with pediatric oncologists; in Germany, for example, there is a common follow-up system for the childhood cancer registry and for clinical trials. In many countries where there is no national population-based cancer registration, including the USA, Japan, and Spain, registers of patients are maintained by national organizations of pediatric oncologists or by clinical trial groups.

Epidemiologic approaches in childhood cancer

A variety of epidemiologic studies may be used to describe and evaluate childhood cancers. As their name implies descriptive studies attempt to describe rather than compare data.