N E T W O R K

THE NEWSLETTER OF THE INTERNATIONAL NETWORK FOR CANCER TREATMENT AND RESEARCH

INCTR

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THE PRESIDENT'S MESSAGE

A PLAGUE FROM WITHIN[1]

by Ian Magrath

.....in the midst of a scourge, there is more to admire in the actions of men than to despise.....

--Albert Camus, *La Peste*

A Dickensian Antiphony

In the course of the last century, humanity has sunk to its greatest depths and risen, by some measures, to its greatest heights. The world has been consumed by two world wars that resulted in 50 million civilian deaths in Europe and the Soviet Union alone. Unfortunately, war appears to be a perennial affliction of the human race. More than 60 major armed conflicts have begun since 1945, approximately 50 of which continue to the present day in some shape or form. Violence not infrequently reaches the level of mass slaughter or even genocide—more than 800,000 people were killed in Rwanda, for example, in 1994. The majority of these conflicts are in developing countries in which the deaths and serious injuries often have a greater and more lasting impact on societal structure than they would in societies with more advanced infrastructure. Moreover, they create millions of refugees, many of whom flee to countries barely able to provide for their own populations, such that death rates from starvation and disease among the refugees are high. The recent attacks in the USA caused the deaths of more than 5,000 civilians who came from 80 countries. Future terrorist acts as well as counter-terrorist measures will inevitably result in the deaths of even more innocent people. The INCTR extends its sincerest condolences to the families, friends and fellow countrymen of all of the innocent victims of the various heinous acts that have littered recent history and which will, unfortunately, almost certainly continue into the

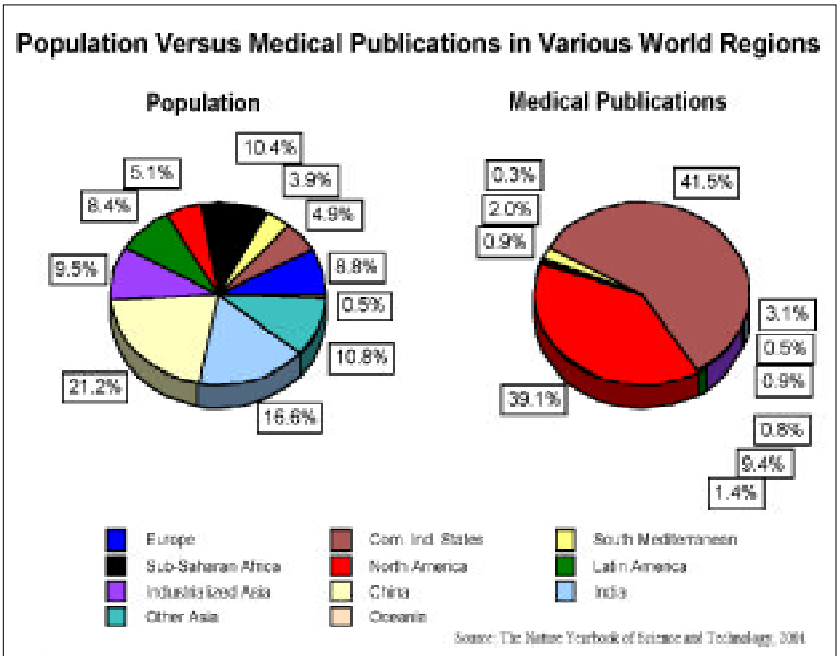


Figure 1

[1]*Plague is believed to have caused the deaths of some 50 million Europeans between 1347 and 1771 and worldwide, perhaps 200 million people. Modern risks to human health come primarily from antibiotic-resistant strains and the potential use of the plague bacillus (whose genome recently has been fully sequenced) as an agent of biological warfare.*

foreseeable future.

Yet while host to internecine struggles of cataclysmic proportion, the last century has also witnessed unprecedented advances in science and technology, without which, ironically, neither the recent attacks in the USA nor the almost instantaneous transmission of the devastating images of death and destruction to every corner of the globe (a result clearly desired by the perpetrators) would have been possible. We live in an era in which the secrets of quarks and bosons, the elementary particles of matter, are being unraveled, space probes are sent to the furthest reaches of the solar system, and more than 90% of the human genome has been sequenced. Many of us are fortunate enough to be able to enjoy, first-hand, the cultures of many other countries and peoples, as well as the artifacts, literature and music of other ages. More than 500 million people now have immediate access to enormous quantities of information through the Internet.

A FAUSTIAN DILEMMA

Paradoxically, despite the enormous strides made in the fields of science and technology, ignorance and poverty still engulf a large proportion of the human race, and diseases, old and new, continue to ravage populations. Average life expectancy has greatly improved, but socioeconomic inequity is increasing. Today, more than one billion people drink unsafe water and 2.4 billion are without adequate sanitation. Approximately 3.4 million people, mostly children, die each year of water-related diseases, over a million from malaria alone. In 1999, there were 5.4 million new cases of AIDS (4 million of whom were living in sub-Saharan Africa) and 8.4 million new cases of tuberculosis, while in the year 2000 there were 10 million new cases of cancer. The sheer scale of the human misery caused by these diseases, which is predicted to increase dramatically with time (cancer cases will reach an estimated 20 million by 2020) is incomprehensible. One may, I hope, be forgiven for asking whether this is indeed a paradox, or simply a consequence of human nature and the laws of mathematics. But whatever its cause, the profound Dickensian contrasts of the twentieth century confront us with a major challenge for the twenty-first century. How can we bring the benefits of science and technology to the huge fraction of the world's population that presently has little or no access to them? And at the same time, how can we avoid the misuse of technology—in the words of Faust, the false path arising from the fact that so much poison is hidden in the cure?

E PLURIBUS UNUM

The recent terrorist acts in the USA have galvanized the world into an unprecedented cooperation to deal with the threat of future attacks, for aggression of such magnitude and consequence against the richest, most powerful, most influential and most visible country on earth unequivocally demonstrates universal vulnerability and has created huge social, political and economic reverberations globally. To control terrorism—the perpetrators of which can hide amidst the general population, are succored by multiple resources wittingly or unwittingly provided, move easily from one country to another, and can turn the accouterments of everyday life into weapons against innocent people—broadly-

EXTRACTS FROM THE UNIVERSAL DECLARATION OF HUMAN RIGHTS

Article 25

(1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services.

Article 26

(1) Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.

(2) Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace.

Article 27

(1) Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

based global cooperation is essential. We can but hope that September 11 will become not only a day of remembrance for the victims of terrorism, but also a day on which to celebrate the beginning of a new world order—a day that catalyzed the nations of the earth to unite to a previously unprecedented degree in combating not only terrorism, but all common enemies. If so, the deaths and suffering will not have been in vain.

It is only in the twentieth century that wars on a truly global scale have erupted, and as a reaction to their previously unimaginable horrors we have witnessed the emergence of international organizations whose members are nation states, such as the United Nations (including the World Health Organization and the International Court of Justice), the World Trade Organization and the World Bank. While there is perennial debate about the efficiency and success of such organizations, the fact of their existence, combined with such instruments as the Universal Declaration of Human Rights (see panel opposite), signifies that the human race is moving into an era in which international interactions are increasingly subject to the rule of law and independent arbitration rather than to the ancient formula of "might is right." There is, of course, a considerable distance to travel along this path pitted with land mines, and many nations will be wary of subjecting their present freedom of action to international consensus, particularly when such consensus must be reached by countries with broadly different cultures, economies, interests and sensibilities.

But whereas political commonality may be difficult or impossible to reach, there is a surprising degree of agreement on universal human rights. Perhaps too, there can be consensus on universal threats, for there can be no more potent a unifying force. International terrorism, the enhanced power of which in this technological era has been so starkly demonstrated, is on center stage at the moment, but other, more endemic problems such as ignorance, poverty and disease affect vastly greater numbers of people and also carry major and more sustained socio-political consequences. Concerted action is surely the most effective means of dealing with these problems, and ought also to be particularly achievable in the context of disease, since the latter is less susceptible (although not immune) to differing political perspectives. The eradication of smallpox stands as an example of successful international action of this kind. Moreover, improving the lives of people is likely to be a potent means of increasing national and international security.

In an era in which tools capable of changing our biological nature have emerged (to be greeted, quite naturally, with clamorous debate), alongside the ability to annihilate the human race, perhaps the time has come to seek to match these technical marvels with political and organizational structures of equivalent virtuosity. Probing the mysteries of fundamental particles or the human genome may be likened to pushing the accelerator of progress, but by the same token, the interwoven blights of ignorance, poverty and disease are huge burdens which act as brakes, both by reducing the intellectual potential of the human race and, perhaps worse, by predisposing populations to crime, social unrest, political instability and ultimately, armed conflict. Poverty and ignorance provide a breeding ground, if not for the architects of terror, at least for those susceptible to its propaganda.

MINIMIZING HARM

The versions of terrorism are many and varied. Consequently, effective control is dependent upon the gathering of "intelligence" about the locations of terrorists, their means of support and the acts they plan to commit. The eradication of terrorism, based on such intelligence, must be carried out with a minimum of harm to innocent people—whether physical or at the level of societal freedoms. Research into the origins of terrorism is also essential if we are to prevent it. This will entail much soul-searching and greater attention to the long-term results of political or military actions.

Strong parallels exist with disease control, perhaps because terrorism is, in effect, a plague from within, a cancer that attacks the innocent and unsuspecting. Cancer, like terrorism, has definable causes which will need to be identified through research for intervention to be successful. While a major element of prevention must be socio-political, immediate action is necessary to minimize the suffering of present victims. In order for appropriate authorities or donors to commit the needed resources to disease control, scientists and physicians must be responsible for providing evidence (intelligence?) concerning cancer patterns in various world regions, for the causes of individual cancers, and for the effectiveness of preventive or therapeutic measures. Sometimes, disease prevention can be accomplished by a simple act.

Hand washing with soap and water can reduce the incidence of diarrhea by 35%, and smoking cessation dramatically reduces the mortality from several cancers and many other diseases. Of course, modifying human behavior, particularly that associated with a significant psychological, political or economic benefit, is never easy. Reducing smoking rates, for example, is not simply a question of dealing with addiction to nicotine, but also involves addressing the competing influences of different sectors of society, some of which stand to profit enormously from encouraging the smoking habit. Consequently, in spite of knowledge of tobacco's harmful effects, Richard Peto has estimated that there were 71 million tobacco-related deaths between 1930 and 1999 in industrial nations alone, and the World Health Organization estimates that there are presently 3 million deaths a year worldwide from tobacco, almost a third of which occur in developing countries.

Where prevention fails, it is essential to confirm the diagnosis of cancer. Missing the diagnosis may have fatal consequences, and an incorrect diagnosis may lead to unnecessary psychological anxiety as well as to time-consuming, expensive and potentially risky treatment. Treatment should be no more than is necessary (proportionate?), and adjusting treatment to risk is a difficult task that entails identifying the locations of cancer throughout the body. The collections of cancer "cells" (a word recently co-opted to refer also to terrorist groups), are particularly difficult to eliminate when scattered throughout the body since (collateral?) damage to normal tissues must be kept to a minimum, although it is difficult or impossible to avoid altogether.

AN EQUAL MUSIC

Fighting cancer, like terrorism, is not a single process and requires application of a broad range of approaches to its prevention and treatment. These, in turn, must be managed by highly trained, dedicated teams of professionals—underpinned, of course, by the political will to commit the required resources. Because of its cost, it attracts little attention as a health problem in the poorest, heavily indebted nations, which must sometimes focus all of their available resources on providing clean water and helping their infants to survive beyond the age of five. Similarly, international organizations, for many reasons, tend to focus primarily on these grass roots problems even though many developing countries have undergone significant epidemiological transitions such that mortality rates from chronic diseases, including cancer, are rapidly rising and represent a health challenge of ever increasing importance. But research in fundamental physics, cosmology and sophisticated biotechnology is conducted in nations whose average wealth is high, but in which poverty has yet to be eliminated. Whilst priorities in government spending will always be hotly contested, some of this research is conducted by non-governmental organizations, and in any event, the greater good is probably better served by including significant expenditure on fundamental research whilst simultaneously addressing the alleviation of poverty and ignorance—indeed, the former may, sooner or later, have a significant impact on the latter.

By the same token, given that cancer is a global problem, all nations need to address it at some level, although there must, of necessity, also be quantitative and qualitative differences in national emphasis. Enhanced international cooperation is likely to have a synergistic effect on efforts to control cancer although, as with other global coalitions, individual countries will contribute in different ways or to different degrees whether with respect to the provision of financial support, experts, or simply helping to take advantage of opportunities to better understand one or more aspects of cancer. At present, a tiny fraction of global research, including medical research, takes place outside North America, Europe, Japan and Australasia (Figure 1), yet the developing countries provide an immensely rich source of potential knowledge about cancer, as well as numerous, largely untapped opportunities for the conduct of research into its prevention and treatment—research that would help both the local populations as well as people everywhere. These opportunities are currently being largely overlooked, partly because of the mal-distribution

ON SCIENCE AND WORLD POPULATION

Europe and North America account for 15% of the world's population, and 75% of its total output of scientific papers. Industrialized Asia accounts for 10.8% and all other nations, 4%.

of global resources, but also because many western researchers are not aware of the possibilities that exist for effective collaboration. Changing this situation should be given a much higher priority.

In 1971, Richard Nixon, then President of the United States of America, announced a war on cancer. The consequent boost in resources has been of tremendous benefit to understanding and controlling cancer, but almost all of these benefits have been reaped by the rich countries. Cancer, like terrorism, is a scourge that merits exceptional action on the part of the international community. In this United Nations *Year of Dialogue Among Civilizations*, might not cancer be elevated, along with other common ills, to the rank of a global problem that, like terrorism, requires global action? And should not developing countries, home to the major part of human suffering, be involved more fully in the struggle against it? ■

REGIONAL NEWS

INDIA

INCTR is supporting the development of the Acute Leukemia Study Group of India (ALSGI), including support for data management. Data collected between 1990 and 1997 on acute lymphoblastic leukemia patients treated with protocol MCP841 from these centers are being analyzed. The results of the analysis will be prepared for joint publication by the three centers which presently form the core of the ALSGI. A new group protocol is being developed, the design of which will draw heavily upon information obtained in the course of conducting previous protocols.

Investigations into the molecular profile of acute lymphoblastic leukemia (ALL) in India in comparison to that in other world regions are underway. Early findings suggest significant differences, for example, a paucity of ALL with a 12:21 translocation in India. This information has relevance to treatment approaches and outcome, since prognosis varies in ALL with different translocations (patients with 12:21 translocations generally have an excellent prognosis). These studies are being done in a collaboration between the All India Insitute for Medical Sciences and Dr Kishor Bhatia's laboratory at the King Fahad Children's Medical Center in Saudi Arabia. The findings will be presented at the annual meeting of the American Society of Hematology in December. ■

With the support of INCTR, Chinese oncologists met in Shanghai to discuss pediatric lymphomas.

CHINA

INCTR is supporting the development of a cooperative group for pediatric lymphomas in Eastern China. With INCTR funds, a computer and printer were purchased, a data manager was employed, and a meeting was supported - a joint National Lymphoma Collaboration meeting associated with a National Training Course for Pediatric Oncologists. The meeting lasted 10 days and included approximately 25 people. ■

SUB-SAHARAN AFRICA

Dr Chitsike in Harare, Zimbabwe, will participate in the collection of data regarding the reasons for late presentation of retinoblastoma. ■

EDITOR'S NOTE

Due to space limitations, the Institutional Profile that normally appears in NETWORK is being held for the next issue. Look for a report from the Philippines Children's Hospital next time.

COURAGEOUS FIGHT BY A PATIENT WITH BURKITT'S LYMPHOMA IN TANZANIA

WARNING SIGNS

The case presented here is that of a nine-year-old girl who developed a jaw swelling in April 1994. This was initially attributed, by her parents, to a recent tooth extraction.

The swelling progressively increased in size. When the parents noticed that their daughter was sitting on the sand by herself and looked very very tired while all the other children were playing in the playground, they developed an unsettled feeling which made them to take her to the nearby district hospital right away.

After examining the patient, the doctor – a medical assistant at the district hospital - suspected that the patient might have Burkitt's lymphoma but had no facilities to perform tests to confirm the diagnosis. The clinical diagnosis was conveyed to the parents. When the word cancer was mentioned, the parents were overcome with shock, fear and denial. The doctor recommended that the patient be referred to the Consultant Hospital in Dar es Salaam, which is 1,000 km from the district hospital. Since at that time it was the rainy season and most of the roads were not easily passable, it took about ten days for the family to arrive at the Consultant Hospital.

THE DIAGNOSIS

The patient and her parents had a horrible trip to Dar es Salaam. She developed malaria on the way. The deterioration in her health only emphasized the seriousness of the situation. The parents were physically and financially exhausted and could only watch in utter despair as the staff at the casualty department of the Consultant Hospital whisked their daughter off to the pediatric ward for supportive care and work-up to establish the diagnosis. The investigations included a full blood count, chest X ray, ultrasound of the abdomen and pelvis, spinal fluid examination, touch imprint and tissue biopsy. The diagnosis of Burkitt's

The life of this young patient was saved through chemotherapy.

lymphoma was confirmed in the third week of her stay at the Consultant Hospital. During the weekly Tumor Board meeting in her fourth week at the consultant Hospital, the Tumor Board recommended that the patient be transferred to the Ocean Road Cancer Institute where she was to receive her chemotherapy.

THE TREATMENT

Burkitt's lymphoma is a very aggressive cancer but it is also exquisitely sensitive to chemotherapy. This patient's prognosis was extremely good. At the Ocean Road Cancer Institute the expected cure rate for a patient with her stage of disease is 85%. Although cytotoxic drugs are usually not affordable to most Tanzanians due to their high costs, at the Ocean Road Cancer Institute (ORCI) we have a policy of supporting all pediatric oncology patients with free chemotherapy treatment. Therefore the patient was assured of receiving the ORCI recommended combination chemotherapy despite the fact that her family could not afford to pay for the treatment.

THE VICTORY

In July 1994 the patient was started on cyclophosphamide 30mg/kg i.v bolus, vincristine 1.4mg/m^2, methotrexate 15mg/m^2 and allopurinol 100mg three times a day – repeated at two weekly intervals. After four cycles the tumor had melted away. Throughout the grueling ordeal the patient gained weight and her general condition improved. We advised the patient to continue with chemotherapy for another two cycles to ensure that the cancer did not come back. In October 1994 the patient was finally free – free from intravenous fluid administration, free from the raid of cytotoxic drugs on her body, and free from disease. The mother was ecstatic. As for the patient, all she could really think about was school, home and her friends.

THE PATIENT IN 2001

The patient is well and attending secondary school. When asked what she plans to do with her life – a life she so nearly lost - she says that she intends to become a doctor. ■

submitted by Dr Twalib Ngoma
Ocean Road Cancer Institute,
Dar es Salaam, Tanzania

A BURKITT'S LYMPHOMA CASE FROM NIGERIA

O.B. is an 11-year-old boy referred from a private clinic to the Department of Pediatrics, University College Hospital (UCH), Ibadan, Nigeria, with a month history of swelling of the left jaw. The left upper first premolar tooth was lost a week prior to presentation. Because the gum was bleeding so easily, the patient had changed from using a toothbrush to foam for cleaning his teeth. There was no weight loss.

Mother had been applying 'Robb' liniment and hot fomentation to the swelling because she perceived it was due to trauma. However, the swelling continued to increase rapidly in size. Out of frustration, the mother visited a 'native' doctor who made scarification marks on the swelling to ward off the evil spirit thought to be responsible for the illness. In addition to this, native herbs (name unknown) were applied to the swelling.

As there was no improvement, the patient was taken subsequently to two private hospitals. He was given an intramuscular injection for five days in the first hospital, while on reaching the second hospital, he was promptly referred to UCH, Ibadan.

AT THE HOSPITAL

The patient was the first of four children in a monogamous family of low socioeconomic status. Physical examination revealed a malnourished boy, weight 25kg (70% of weight for age). There was a smooth mass over the left maxilla and mandible, measuring 9 x 8 cm in the transverse and longitudinal diameter, respectively. The swelling was hard and many scarification marks were visible. There was no intra-oral extension of the mass. The first left upper premolar was missing, but no other tooth was loose. Mild dental mal-alignment was noted. A diagnosis of Burkitt's lymphoma, stage B, was made.

Jaw radiograph showed loss of the dental lamina dura (a hard layer of bone surrounding the tooth) and marked displacement of teeth. Fine needle aspiration cytology was suggestive of a non-Hodgkin's lymphoma, Burkitt's type. On the 16th day of admission, and with the help of the social worker, some of the required cytotoxic drugs were purchased. However, the patient had deteriorated as shown by increased liver size (5cm) and the presence of meningism, suggesting involvement of the cerebrospinal fluid (CSF). A spinal tap was done, and the CSF was shown to have a low glucose level with elevated protein (140mg/dl) but no tumor cells were observed. The chemotherapeutic regimen included: cytarabine at 50mg/m^2 (45mg), 12 hourly for 6 doses, intrathecal cytarabine (delivered by spinal tap), 36mg/m^2 (35mg) on days 1 and 5, intravenous (i.v.) cyclosphophamide 1000mg/m^2 (960mg) on day 1, i.v. oncovin 1.5mg m^2 (1.4mg) on day 1, and oral prednisolone 40mg daily for five days (COAP). Allopurinol, at a dose of 100mg thrice daily, and liberal oral fluids (3L/day) were administered.

By the fifth day of the first course of chemotherapy, the meningism had resolved. The electrolyte and urea, calcium and phosphate, creatinine and uric acid values were normal except for a low serum sodium level of 126mmol/L.

Between the 23rd and the 31st day of admission the patient developed headache, blurring of vision and occasional dizziness with a left facial nerve palsy and left hemiparesis. Repeat CSF cytology showed clusters of large lymphoblastic cells, indicative of central nervous system involvement by Burkitt's lymphoma. There was also papillodema, suggesting raised intracranial pressure. The patient became confused on the 31st day of admission. With further financial support provided by the social worker, the second course of treatment was started and 20% mannitol 1gm/kg / dose 6 hourly was given on three occasions in an attempt to control the elevated intracranial pressure. It is interesting to note that the jaw swelling had become reduced in size.

THE LOSS

On the 37th day of admission the patient had a tonic-clonic seizure lasting about two minutes. The electrolytes were normal. However, the papilloedema had not resolved, suggesting that the raised intracranial pressure caused the seizure. Further seizures ensued, which failed to respond to paraldehyde and phenobarbitone. The patient went into coma after four days and died the following day.

Post mortem showed multiple tumor nodules in both kidneys, leptomeningeal (coverings of the brain and spinal cord) infiltration by the tumor with evidence of brain swelling and left testicular involvement. ■

submitted by Dr Goke Falade
Ibadan University Hospital
Nigeria

BURKITT'S LYMPHOMA - A CLINICAL PERSPECTIVE

Burkitt's lymphoma (BL) was first recognized in Africa as a tumor of the jaw occurring in high frequency in children. Although it is believed that BL has existed in Africa for thousands of years, the earliest documentation of this tumor can only be traced to the beginning of the twentieth century when its unusual and prominent features were observed and recorded by European missionary doctors. Hospital records from the first missionary hospital in Uganda dating from 1897 to 1956 revealed a high frequency of tumors of the jaw and orbit in children seen there in this period, and analysis of these records suggest strongly that over 50% of the cases of childhood cancer were what we would now call BL - a figure very similar to more recent estimates of the incidence of BL in Uganda.

During the 1950s and '60s, in-depth clinical and pathological descriptions of the features of this tumor were made by Dennis Burkitt, Greg O'Conor, Dennis Wright (the author of the accompanying article on page 10) and others. Another of the many contributions made by Burkitt and his colleagues (see also Professor Wright's article) was to delineate the geographical distribution of this tumor in Africa. The findings of their survey suggested that this disease had a high incidence in an area that is approximately 15 degrees north and south of the equator with a prolongation southward in the eastern side of the African continent. This was shown to be a consequence of climatic factors and led to the hypothesis, likely, but still unproven, that malaria predisposes to Burkitt's lymphoma. It also led to the discovery of Epstein Barr virus, based on an earlier and subsequently disproved hypothesis that the disease might be caused by a virus vectored by a mosquito.

Shortly after the descriptions of the African lymphoma were published, pathologists recognized that some childhood lymphomas occurring in the US and Europe at low incidence ("sporadically") were histologically identical to African BL, whose incidence was considered high enough for the disease to be referred to as "endemic." In equatorial African countries, the average annual incidence is four to ten per 100,000 children under the age of 16 years whereas in western countries it accounts for a few percent all childhood cancers and has an annual incidence rate of 0.2 per 100,000.

The clinical distribution of disease, and differences in the frequency of involvement of various sites in different world regions, as well as in HIV-associated BL (particularly with respect to jaw involvement) is described in the accompanying article. Clinical staging is based on the extent of disease, and total tumor volume appears to be a major determinant of prognosis. Patients with central nervous system (CNS) involvement tend to have the worst prognosis in patients outside Africa, where CNS disease is usually associated with extensive disease elsewhere, particularly in the bone marrow. In Africa, however, CNS disease is often isolated, or associated with minimal disease elsewhere, and bone marrow involvement is uncommon (less than 10% of patients, even after relapse).

Many lessons have been learned from the study of African BL, one of the most important being that it was one of the first tumors shown to be curable by chemotherapy alone. The investigation of the efficacy of recently developed chemotherapy agents in the treatment of this disease was a logical approach in the 1960s since traditional approaches to cancer management - radiotherapy and surgery - were not feasible. Radiotherapy was, by and large, not available in Africa, and complete surgical resection of tumor masses, particularly those in the facial region, or large masses in the abdomen, was not possible. Furthermore, rapid recurrence usually occurred in patients who underwent surgical resection of localized disease.

A number of drugs were shown to be active in the treatment of BL, most notably cyclophosphamide (CTX), vincristine (VCR) and methotrexate (MTX). Chemotherapy with CTX alone, even one or two doses, resulted in some cures. However, combination chemotherapy regimens using CTX, VCR and MTX (COM), coupled with intrathecal chemoprophylaxis with MTX, appeared to improve the overall survival rates. Results achieved in studies conducted during the 1970s resulted in the cure of 40 to 50% of patients. The treatment regimens used were not expensive, were relatively simple to administer, and toxicities were manageable in the African setting. Since then, attempts have been made to improve upon the results achieved by employing more complex treatment regimens, for example, based on the French LMB regimens. Although effective, these regimens are more toxic and expensive, and for these reasons cyclophosphamide alone or simple COM or COM-like regimens are still widely used for the

NEWS OF INCTR STRATEGY GROUPS

RETINOBLASTOMA STRATEGY GROUP

The treatment sub-committee of the Retinoblastoma Strategy Group met in July to design and develop treatment protocols for advanced retinoblastoma. Two protocols were proposed: one for the treatment of patients with extraocular disease without overt signs of metastatic disease at presentation, and another for the treatment of patients with metastatic disease at first diagnosis. Protocol objectives, patient eligibility criteria, treatment and evaluation parameters were agreed upon for both studies. It is anticipated that draft versions of the two protocols will be completed by early 2002.

The INCTR Ethical Review Committee has reviewed and approved the survey study, "Understanding Problems Faced by Parents of Children with Retinoblastoma Prior to Treatment." This questionnaire was designed at the January meeting of the Strategy Group. Early feedback from investigators participating in this study has been informative. They say that parents are very willing to share their stories and that the process of obtaining information required for the questionnaire also provides an opportunity to educate parents about the disease.

INCTR is presently working with Retinoblastoma International in the preparation of a public service announcement relating to the early detection of retinoblastoma. The announcement will be linked to a popular television series called "The Bold and the Beautiful," starring Hunter Tylo. ■

OSTEOSARCOMA STRATEGY GROUP

Progress has been made in approving the new protocol for the treatment of metastatic osteosarcoma in participating centers. So far the protocol has been approved in three centers: the King Fahad Children's Medical Center, the Philippines Children's Medical Center and the Shanghai Children's Medical Center. Protocol accrual will commence imminently. ■

LEUKEMIA STRATEGY GROUP

In follow-up to the January meeting among investigators participating in the Acute Leukemia Study Group of India that took place in Hyderabad, Dr Banavali visited INCTR with an outline of a new protocol to be used by the major Indian centers participating in this group. The protocol was discussed in detail and a draft protocol document will be prepared for review by the Leukemia Strategy Group early next year. ■

treatment of African BL, although there is rather limited documentation of results obtained.

The observation that there was no difference between the histological appearance of African Burkitt's lymphoma and BL observed in the USA and Europe led investigators in the USA to employ the same treatment regimens used in Africa for American patients. From early studies conducted by John Ziegler and colleagues in the USA, it appeared that there was no difference in response or survival rates compared to those achieved in African patients, and a clinical trial conducted by the Children's Cancer Study Group using a "COMP" regimen lasting 18 months, which included prednisone and local radiation, resulted in a survival rate of approximately 50%. Since this time, considerable progress has been made in the treatment of Burkitt's lymphoma in the industrialized nations. The development of newer short duration, more intensive combination chemotherapy regimens along with considerable improvements in supportive care, have made this disease curable in 90% of patients. Unfortunately, current treatment results for children with African BL continue to remain the same as those achieved in the 1970s.

In summary, much was learned and continues to be learned from African BL. This knowledge has resulted in benefits not only to the medical and scientific community, but also to many cancer survivors. It is an important goal of the INCTR to develop strategies to improve the outcome of children with African BL. The INCTR would be pleased to hear from investigators in Africa interesting in participating in studies of BL. ■

--submitted by Melissa Adde , INCTR

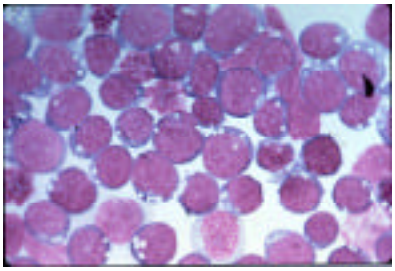
BURKITT'S LYMPHOMA – A PATHOLOGIST'S PERSPECTIVE

Denis Burkitt wrote his first paper on the lymphoma that bears his name in 1958. The feature that drew his attention to the tumor was the characteristic, and often dramatic, involvement of the jaws. The first of his many contributions to the study of this tumor was to show that patients with jaw tumor also had visceral tumors and that similar visceral tumors were seen in patients without jaw involvement.

Burkitt's lymphoma (BL) has a characteristic cytomorphology. Labeling tumor cells *in vitro* with tritiated thymidine showed a proliferation rate of 100%, a figure subsequently confirmed by labeling with proliferation markers such as Ki67. An international meeting of hematopathologists in 1969, sponsored by the World Health Organization and the International Agency for Research on Cancer, expressed a majority view that BL should be defined on the basis of its cytomorphology. Two members of the group, however, were of the opinion that the tumor should be defined on the basis of its clinico-pathological features and they rejected the view that BL exists in a specific histological and cytological sense. More than 30 years later, it is apparent that the minority group were at least partly correct, insofar that BL has different clinical features in different world regions, is also predisposed by immuodeficiency syndromes and HIV infection, and may, in fact, be a family of closely related tumors.

BL, as defined by cytology and histology, falls into at least three categories. Endemic BL, as described by Burkitt, shows age-related jaw tumors and visceral tumors involving the kidneys, liver, endocrine organs, gonads, breasts and gastro-intestinal system. Involvement of peripheral lymph nodes is unusual. The tumor occurs in children, with a peak age incidence of seven years, and occasionally in young adults.

Sporadic BL, as seen in Europe and the USA, typically involves the abdomen, and has a particular penchant for the terminal ileum and ascending colon. A number of patients present with massive intra-abdominal tumors and the exact origin of these tumors may be difficult to ascertain. Peripheral lymph node involvement is more common, and bone marrow involvement not infrequent, particularly at relapse. This is often referred to as acute B cell leukemia, but patients with marrow involvement respond well to the same therapy used for BL and poorly to acute lymphoblastic leukemia therapy. BL is the most common non-Hodgkins lymphoma of children in the developed world.



Cytological appearance of Burkitt's lymphoma. These tumor cells were obtained from a simple fine-needled aspirate of a jaw tumor in an African child. The white spots are tiny fat globules, or "lipid vacuoles," which are characteristic of this tumor.

A third category of BL is AIDS related BL, a tumor that occurs in HIV-positive individuals, usually early in the course of their disease prior to significant immuo-suppression. It presents more often with peripheral lymphadenopathy and often involves unusual sites. Interestingly, in spite of the high prevalence of HIV in Africa, there is no evidence that this has influenced the incidence of BL. In contrast, the incidence of Kaposi's sarcoma has been dramatically increased.

It can be seen that the eponymous title "BL" has been applied to two tumors that are clinically different from the tumors described by Denis Burkitt in Africa. The reason why these tumors are morphologically identical is presumably because they have translocations involving one of the immunoglobulin genes and the c-myc oncogene. This results in c-myc deregulation and consequent unrestrained cell proliferation without differentiation. The resulting B-blasts therefore look identical.

The Epstein-Barr virus status of the three varieties of BL is also different. Endemic BL is 100% EBV positive; rare EBV negative cases have been described from Africa but it is not clear whether these are endemic cases. The EBV status of sporadic BL varies with the childhood prevalence of EBV infection in the community from which the cases are derived. In Europe and North America, where EBV infection occurs later in childhood, it is in the region of 20%, in north Africa and Iran, where EBV infection occurs earlier, it is between 70-90%. Paradoxically, only 20 to 30% of AIDS-related BL are EBV associated, although almost all patients have antibodies against EBV.

The terms endemic and sporadic BL are not entirely appropriate since rare cases with the typical clinical features of endemic BL are seen in Eu-

rope and the USA, and it is possible that a small fraction of African cases correspond to sporadic BL. In addition, it is not clear how these terms should be applied in other world regions which sometimes have clinical patterns intermediate between the two (e.g. some parts of South America and Turkey). Basing distinctions on clinical features alone is imprecise at best.

The different features of the subtypes of BL probably reflect origins from different types of B-cells and possibly differences in the pathogenesis of the tumors. Studies of cases of BL from the American BL Registry, mainly of sporadic type, showed a transition between reactive follicles and tumor, suggesting an origin from follicle centre cells. This author has suggested that endemic BL may be derived from marginal zone B-cell and therefore is a type of MALT lymphoma. The evidence for this is circumstantial in that the tumor frequently involves mucosal sites, does not usually affect peripheral lymph nodes and shows relative sparing of the bone marrow and spleen. Mucosal B-lymphocytes migrate to the breasts during late pregnancy and lactation, which might provide an explanation for why massive breast involvement by tumor is seen in young women who present with endemic BL during pregnancy and lactation. Denis Burkitt recorded cases in which there was spontaneous regression of breast tumors on cessation of lactation.

If endemic BL is derived from mucosal lymphocytes, how can we account for the jaw tumors that are such a characteristic feature of this tumor? Involvement of the jaws greatly exceeds involvement of any other part of the skeleton. Jaw tumors are age-related. All children aged three with BL seen in Uganda in the 1960s had jaw tumors, whereas by the age of 15 only 10% had jaw involvement. The age incidence of jaw tumors coincides with the period of maximum dental development. It also coincides with the presence of cellular bone marrow in the mandible. Recent studies using magnetic resonance imaging have shown that cellular marrow in the mandible retreats toward the condyle and is largely replaced by fatty marrow in late childhood.

Jaw tumors in endemic BL usually involve more than one quadrant of the jaw and involvement of all four quadrants is not uncommon. The tumors are clonally related, precluding independent origin in each quadrant, and suggesting that the tumor cells specifically home to and proliferate at this site. A few years ago Dr Jayola Thomas and I conducted a histological study on segments of mandible obtained at post-mortem examination on children from Ibadan, Nigeria. Most of these children had died of infection or trauma. We identified lymphoid aggregates in relation to the unerupted teeth, at the site where the earliest jaw tumors are detected by radiology. This finding raises many questions. Are these aggregates of mucosal lymphoid tissue? The dental epithelium is a downgrowth from the oral epithelium and therefore of mucosal origin. Is this lymphoid tissue physiological or is it induced by an infectious agent, possibly EBV? Unfortunately the jaw marrow is not the easiest tissue to study but it would be of interest to know whether this lymphoid tissue is found in the jaws of children from other areas of the world. It is intriguing to consider that if these lymphoid aggregates are caused by an infectious agent much more common in African children, and if they also account for the high frequency of jaw involvement in Africa, then environmental factors, like host factors (e.g. the lactating breast), may have a role in determining the clinical sites of disease. ■

submitted by Dennis Wright
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The University of Southampton

NEWS BRIEFS

VOLUNTEERS

INCTR is very pleased to have a number of volunteers helping in the Brussels office. These include Sandra Jackson, who is assisting in the administration of the INCTR's new education program, Janet King, who is providing overall administrative support, and Hilary Wallace, who is providing assistance in INCTR's public relations efforts. ■

VISIT TO IARC AND UICC

INCTR staff visited the International Agency for Research in Cancer and the International Union Against Cancer in July. The purpose was to discuss collaboration in the area of cancer control, particularly with respect to activities in Nepal in conjunction with the Nepalese Cancer Relief Society. It was agreed with IARC to explore the possibility of establishing a project relating to the early detection of cervical cancer, and possibly to establish a cancer registry in at least one region in Nepal. The UICC also expressed an interest in collaborating in cancer control projects, and will further explore specific possibilities with INCTR in the context of Nepal. ■

PROFILES IN CANCER MEDICINE

DEVELOPING NEW MEDICINE IN TURKEY

Dr Ayhan Çavdar, two-time President of the Turkish Academy of Sciences and the leading pediatric oncologist in her country, has fulfilled her lifelong dream to make a difference through medicine. Under her guidance, what began as a single bed for admission of a pediatric oncology patient at the Medical School of Ankara University has grown into twin pediatric oncology centers that treat young patients with the best medicine available, and a research center that is carrying on vital scientific work in the battle against cancer.

Çavdar, who first trained in pediatric medicine at Ankara University, pursued additional training in hematology at Washington University in St. Louis, Missouri. She spent four years in the United States as a clinical and research fellow, returning to her native Turkey in 1961. There, she served as chief resident in the department of pediatrics at Ankara University, working to build her subspecialty and teaching other physicians how to treat young oncology patients with new chemotherapeutic agents. "I had great difficulties to convince the director of the department and my colleagues that I should work and take care of patients in my subspecialty since there was no other staff member who had subspecialty training at that time," she says. Little more than twenty years later, the Ministry of Health accepted pediatric oncology as a subspecialty.

Dr Ayhan Çavdar developed the practice of pediatric oncology in Turkey.

When she returned to Turkey from the USA in 1961, she recognized that treatments of pediatric malignancies through chemotherapy were seriously deficient. She utilized the connections she had made in the United States to improve the options available to Turkish children and their families. "I joined the research projects in collaboration with the USA's National Cancer Institute, and obtained new drugs which were introduced for the first time in my country. In addition to this, through numerous contacts with the Ministry of Health, chemotherapeutic agents were officially imported in the following years."

Most of the new chemotherapeutic agents for childhood cancers were used for the first time by her pediatric oncology group in Turkey. Chemotherapy regimens employed such drugs as vincristine, daunomycin, adriamycin, cytarabine and idarubicin, with great success. Çavdar also initiated chemotherapy regimens using MOPP, VAMP, ABVD, and OPPA for the first time in her country. Her group also was the first to demonstrate that malignant lymphomas were the second most common childhood tumors in Turkey, a statistic that still stands today.

She also is responsible for establishing the first research unit in pediatric oncology in 1975. This research unit, supported by the Turkish Scientific and Technical Research Council, produced several important professional papers that have been published in international journals such as *Cancer*, the *American Journal of Pediatric Hematology Oncology*, and *Lancet*, and has since grown into a Research Center now affiliated with Ankara University. This center, established in 1987, continues research activity in pediatric oncology in addition to the study of trace elements, particularly zinc, for their effectiveness in treating cancer and other diseases.

An international leader in her field, Çavdar has organized several symposia and congresses, including a Symposium on Acute Leukemias during the National Hematology Congress in 1975, the European-African Hematology Congress in 1977, the Pediatric Hodgkins Symposium in 1987, and the Symposium on Malignant Lymphomas in Childhood, in 1995. ■.

submitted by M. Landskroener