Cancer Association of South Africa (CANSA)

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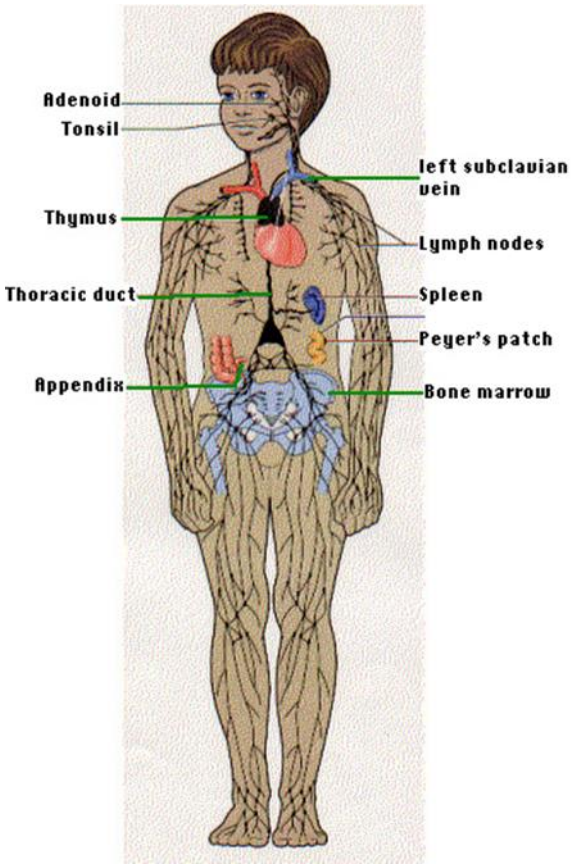
Fact Sheet on Childhood non-Hodgkin's Lymphoma

Introduction

The term '**lymphoma'** refers to cancers that originate in the body's lymphatic tissues. Lymphatic tissues include the lymph nodes (also called lymph glands), thymus, spleen, tonsils, adenoids, and bone marrow, as well as the channels (called lymphatics or lymph vessels) that connect them. Although many types of cancer eventually spread to parts of the lymphatic system, lymphomas are distinct because they actually originate there.



[Picture Credit: Lymphatic System of a Child]

It is said that about 150 children younger than 19 years old are diagnosed with lymphoma each year in South Africa. Lymphomas are divided into three broad categories, depending on the appearance of their cancerous (malignant) cells. These are known as Hodgkin's lymphoma (HL), non-Hodgkin lymphoma (NHL), and Burkitt Lymphoma (BL). Together, they are one of the most common types of cancer in children.

Part of the body's immune system, the lymphatic system is a network of vessels and nodes that normally filters the fluid found within all tissues. Lymph nodes remove bacteria and other disease-causing organisms from the lymph fluid, and produce lymphocytes and antibodies needed to fight off infections caused by these organisms. An increase in the size of a lymph node (lymphadenopathy) indicates increased activity within the node, due to inflammation, infection, or cancer.

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Malignancy (cancer) occurs when a cell's genetic code mutates, or changes, resulting in abnormal cells that grow rapidly and in uncontrolled fashion. Lymphomas are a group of cancers originating from lymphocytes, which are white blood cells whose normal function is to fight off infections within the body.

Chantada, G., Lam, C.G. & Howard, S.C. 2019.
"In high-income countries, more than 90% of children with mature B-cell lymphomas are cured with frontline therapy. However, cure requires prompt and correct diagnosis, careful risk stratification, very intense chemotherapy and meticulous supportive care, together with logistical support for patients who live far from the cancer centre or face financial barriers to receiving care. In low- and middle-income countries (LMIC), cure rates range from 20% to 70% because of lack of diagnosis, misdiagnosis, abandonment of treatment, toxic death and excess relapse with reduced-intensity regimens. Fortunately, a wide range of successful interventions in LMIC have reduced these causes of avoidable treatment failure. Public awareness campaigns have led to societal awareness of childhood cancer; telepathology has improved diagnosis, even in remote areas; subsidized chemotherapy, transportation, housing and food have reduced abandonment; and hand hygiene, nurse training programmes and health system improvements have reduced toxic death. These interventions can be deployed everywhere and at low cost, so are highly scalable. Children and adolescents with Burkitt lymphoma can be cured in all countries by making a timely correct diagnosis, applying protocols adapted to the local context, preventing abandonment of therapy and avoiding toxic death. Reducing these causes of treatment failure is feasible and highly cost-effective everywhere."

Incidence of Lymphoma in Children
The incidence of the different types of lymphoma is provided under the description of each of the lymphomas.

Symptoms of Lymphoma in Children
Warning signs for lymphoma are similar in children and adolescents as well as in adults. Symptoms include:

These and other signs may be caused by childhood non-Hodgkin lymphoma or by other conditions. Check with a doctor if your child has any of the following:

- Trouble breathing.
- Wheezing.
- Coughing.
- High-pitched breathing sounds.
- Swelling of the head, neck, upper body, or arms.
- Trouble swallowing.
- Painless swelling of the lymph nodes in the neck, underarm, stomach, or groin.
- Painless lump or swelling in a testicle.
- Fever for no known reason.
- Weight loss for no known reason.
- Night sweats.

If a child has a lymph node that becomes enlarged without explanation or remains enlarged for a prolonged period of time, a paediatrician should be consulted. He/she may prescribe a course of antibiotics to treat a possible infection before performing a more extensive evaluation (Memorial Sloan Kettering Cancer Center; Lymphoma Research Foundation).

Causes and Risk Factors of Lymphoma in Children

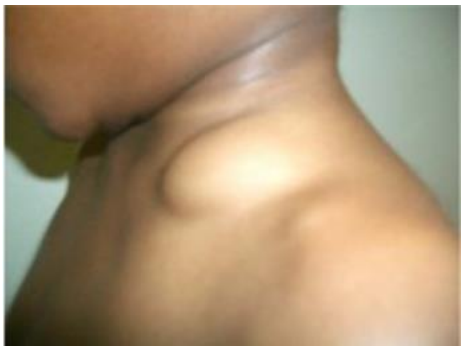
Although the causes of lymphoma remain unknown, the following may increase the risk of childhood or adolescent lymphomas:

- Family history (though no hereditary pattern has been firmly established)
- Presence or history of an autoimmune disease
- Receipt of an organ transplant
- Exposure to chemicals such as pesticides, fertilizers or solvents
- Infection with viruses such as Epstein-Barr, human T-lymphotropic virus type 1, HIV, hepatitis C, or certain bacteria such as *Helicobacter pylori*

The cause of lymphoma is not known, but there is a genetic component. Incidence rates are higher for those who have a family member diagnosed with lymphoma, especially a sibling. While environmental and lifestyle factors are known to play a role in the development of cancer among adults, these factors have less of an impact on the development of childhood cancer.

Non-Hodgkin's Lymphoma

The cancerous cells of non-Hodgkin's lymphoma patients may be either T or B cells. In the United States, approximately 15% of cases of non-Hodgkin lymphoma cases develop from T lymphocytes and 85% develop from B lymphocytes. Normal white blood cells may develop into over thirty different variations of abnormal cells, each classified as a distinct type of non-Hodgkin lymphoma.



[Picture Credit: non-Hodgkin's Lymphoma]

There are three major types of childhood non-Hodgkin lymphoma.

The type of lymphoma is determined by how the cells look under a microscope. The three major types of childhood non-Hodgkin lymphoma are:

<u>Mature B-cell non-Hodgkin lymphoma</u>

Mature B-cell non-Hodgkin lymphomas include:

- Burkitt and Burkitt-like lymphoma/leukaemia: Burkitt lymphoma and Burkitt leukaemia are different forms of the same disease. Burkitt lymphoma/leukaemia is an aggressive (fast-growing) disorder of B lymphocytes that is most common in children and young adults. It may form in the abdomen, Waldeyer's ring, testicles, bone, bone marrow, skin, or central nervous system (CNS). Burkitt leukaemia may start in the lymph nodes as Burkitt lymphoma and then

spread to the blood and bone marrow, or it may start in the blood and bone marrow without forming in the lymph nodes first.

Both Burkitt leukaemia and Burkitt lymphoma have been linked to infection with the Epstein-Barr virus (EBV), although EBV infection is more likely to occur in patients in Africa than in the United States. Burkitt and Burkitt-like lymphoma/leukaemia are diagnosed when a sample of tissue is checked and a certain change to the *MYC gene* is found.

- Diffuse large B-cell Lymphoma: Diffuse large B-cell lymphoma is the most common type of non-Hodgkin lymphoma. It is a type of B-cell non-Hodgkin lymphoma that grows quickly in the lymph nodes. The spleen, liver, bone marrow, or other organs are also often affected. Diffuse large B-cell lymphoma occurs more often in adolescents than in children.
- Primary mediastinal B-cell lymphoma**:** A type of lymphoma that develops from B cells in the mediastinum (the area behind the breastbone). It may spread to nearby organs including the lungs and the sac around the heart. It may also spread to lymph nodes and distant organs including the kidneys. In children and adolescents, primary mediastinal B-cell lymphoma occurs more often in older adolescents.

<u>Lymphoblastic lymphoma</u>

Lymphoblastic Lymphoma is a type of lymphoma that mainly affects T-cell lymphocytes. It usually forms in the mediastinum (the area behind the breastbone). This causes trouble breathing, wheezing, trouble swallowing, or swelling of the head and neck. It may spread to lymph nodes, bone, bone marrow, skin, the CNS, abdominal organs, and other areas. Lymphoblastic lymphoma is a lot like acute Lymphoblastic Leukaemia (ALL).

<u>Anaplastic large cell lymphoma</u>

Anaplastic Large Cell Lymphoma is a type of lymphoma that mainly affects T-cell lymphocytes. It usually forms in the lymph nodes, skin, or bone, and sometimes forms in the gastrointestinal tract, lung, tissue that covers the lungs, and muscle. Patients with anaplastic large cell lymphoma have a receptor, called CD30, on the surface of their T cells. In many children, anaplastic large cell lymphoma is marked by changes in the ALK gene that makes a protein called anaplastic lymphoma kinase. A pathologist checks for these cell and gene changes to help diagnose anaplastic large cell lymphoma.

<u>Some types of non-Hodgkin lymphoma are rare in children</u>

Some types of childhood non-Hodgkin lymphoma are less common. These include:

- Paediatric-type Follicular Lymphoma: In children, follicular lymphoma occurs mainly in males. It is more likely to be found in one area and does not spread to other places in the body. It usually forms in the tonsils and lymph nodes in the neck, but may also form in the testicles, kidney, gastrointestinal tract, and salivary gland.
- Marginal Zone Lymphoma: Marginal zone lymphoma is a type of lymphoma that tends to grow and spread slowly and is usually found at an early stage. It may be found in the lymph nodes or in areas outside the lymph nodes. Marginal zone lymphoma found outside the lymph nodes in children is called mucosa-associated lymphoid tissue (MALT) Lymphoma. MALT may be linked to Helicobacter pylori infection of the gastrointestinal tract and *Chlamydophila psittaci* infection of the conjunctival membrane which lines the eye.
- Primary Central Nervous System (CNS) Lymphoma: Primary CNS lymphoma is extremely rare in children.

- Peripheral T-cell Lymphoma: Peripheral T-cell lymphoma is an aggressive (fast-growing) non-Hodgkin lymphoma that begins in mature T lymphocytes. The T lymphocytes mature in the thymus gland and travel to other parts of the lymph system, such as the lymph nodes, bone marrow, and spleen.
- Cutaneous T-cell Lymphoma: Cutaneous T-cell lymphoma begins in the skin and can cause the skin to thicken or form tumour. It is very rare in children, but is more common in adolescents and young adults. There are different types of cutaneous T-cell lymphoma, such as cutaneous anaplastic large cell lymphoma, subcutaneous panniculitis-like T-cell lymphoma, gamma-delta T-cell lymphoma, and mycosis fungoides. Mycosis fungoides rarely occurs in children and adolescents.

Incidence of Childhood non-Hodgkin's Lymphoma

According to the National Cancer Registry (2017) the following number of non-Hodgkin's Lymphoma cases was histologically diagnosed in South Africa during 2017:

Group Boys: 0 to 19 Years 2017	Actual No of Cases
All boys	49
Asian boys	0
Black boys	43
Coloured boys	4
White boys	2

Group Girls: 0 to 19 Years 2017	Actual No of Cases
All girls	29
Asian girls	1
Black girls	23
Coloured girls	2
White girls	2

The frequency of histologically diagnosed cases of non-Hodgkin's Lymphoma in South Africa for 2017 was as follows (National Cancer Registry, 2017):

Group Boys: 0 to 19 Years 2017	0 – 4 Years	5 – 9 Years	10 – 14 Years	15 – 19 Years
All boys	4	8	17	22
Asian boys	0	0	0	0
Black boys	2	6	15	20
Coloured boys	0	2	0	2
White boys	0	0	2	0

Group Girls: 0 to 19 Years 2017	0 – 4 Years	5 – 9 Years	10 – 14 Years	15 – 19 Years
All girls	3	4	6	16
Asian girls	0	0	1	0
Black girls	2	4	5	12
Coloured girls	0	0	0	2
White girls	1	0	0	2

N.B. In the event that the totals in any of the above tables do not tally, this may be the result of uncertainties as to the age, race or sex of the individual. The totals for 'all boys' and 'all girls', however, always reflect the correct totals.

Diagnosis of Non-Hodgkin's Lymphoma (NHL)

A doctor can't make a diagnosis of NHL in a child based only on symptoms or a physical exam. Most of the symptoms NHL can cause are more often caused by non-cancerous problems, like infections. They may also be caused by other kinds of cancers. If a child does have NHL, it's important to tell which type it is, because each type is treated slightly differently.

For these reasons, an accurate diagnosis is needed, and the only way to do this is to remove some or all of an abnormal lymph node (or tumour) for viewing under a microscope and other lab tests. This is called a biopsy.

There are several types of biopsies. Doctors choose which one to use based on the situation. The goal is to get a sample large enough to make an accurate diagnosis as quickly as possible, with as few side effects as possible.

Excisional or incisional biopsy - these are the most common types of biopsy done if lymphoma is suspected. An exception might be for large tumours in chest, for which a needle biopsy (described below) might be used instead.

In these procedures, a surgeon cuts through the skin to remove either an entire lymph node (excisional biopsy) or a small part of a large tumour (incisional biopsy).

If the node is near the skin surface, this is an operation that might be done with either local anaesthesia (numbing medicine used only at the biopsy site) and sedation or with general anaesthesia (where the child is in a deep sleep). If the node is inside the chest or abdomen, then general anaesthesia is usually needed. This method almost always provides enough of a sample to diagnose the exact type of NHL.

Fine needle aspiration (FNA) or core needle biopsy - In an FNA biopsy, the doctor uses a very thin, hollow needle attached to a syringe to withdraw (aspirate) a small amount of tissue from an enlarged lymph node or a tumour mass. For a core needle biopsy, the doctor uses a larger needle to remove a slightly larger piece of tissue.

If an enlarged lymph node is near the surface, the doctor can aim the needle while feeling the node. If the enlarged node or tumour is deep in the body (such as in the chest or abdomen), the doctor can guide the needle while watching it on a CT scan or ultrasound (see discussion of imaging tests later in this section).

The main advantage of a needle biopsy is that it does not require surgery. This can be especially important for tumours in the chest, because general anaesthesia (where the child is in a deep sleep) can sometimes be dangerous for these children. It is also useful when the lymphoma is in other sites outside of the lymph nodes, such as the bones.

In children, needle biopsies can often be done using local anaesthesia to numb the area, along with sedation to make the child sleepy. General anaesthesia is needed less often.

The main drawback of needle biopsies (especially FNA) is that in some cases the needle might not remove enough of a sample to make a definite diagnosis. Most doctors don't use needle biopsies if they strongly suspect lymphoma (unless other types of biopsies can't be done for some reason). But if the doctor suspects that lymph node swelling is caused by an infection (even after antibiotics), a needle biopsy may be the first type of biopsy done. If a biopsy is needed, doctors typically prefer to do a core biopsy instead of FNA. An excisional biopsy might still be needed to diagnose and classify lymphoma, even after a needle biopsy has been done.

Once lymphoma has been diagnosed, needle biopsies are sometimes used to check areas in other parts of the body that might be lymphoma spreading or coming back after treatment.

Treatment of Childhood non-Hodgkin's Lymphoma

Treatment of childhood lymphoma is largely determined by staging. Staging is a way to categorise or classify patients according to how extensive the disease is at the time of diagnosis.

Chemotherapy (the use of highly potent medical drugs to kill cancer cells) is the primary form of treatment for all types of lymphoma.

In certain cases, radiation therapy (the use of high-energy rays to shrink tumours and keep cancer cells from growing), may also be used.

Short-term and long-term side effects - Intensive lymphoma chemotherapy affects the bone marrow, causing anaemia and bleeding problems, and increasing the risk for serious infections. Chemotherapy and radiation treatments have many other side effects — some short-term (such as hair loss, changes in skin colour, increased infection risk, and nausea and vomiting) and some long-term (such heart and kidney damage, reproductive problems, thyroid problems, or the development of another cancer later in life) — that parents should discuss with their doctor.

Relapses - Although most kids do recover from lymphoma, some with severe disease will have a relapse (reoccurrence of the cancer). For these children, bone marrow transplants and stem-cell transplants are often among the newest treatment options.

During a bone marrow/stem cell transplant, intensive chemotherapy with or without radiation therapy is given to kill residual cancerous cells. Then, healthy bone marrow/stem cells are introduced into the body in the hopes that it will begin producing white blood cells that will help the child fight infections.

New Treatments - Promising new treatments being developed for childhood lymphomas include several different types of immunotherapy, specifically the use of antibodies to deliver chemotherapy

medicines or radioactive chemicals directly to lymphoma cells. This direct targeting of lymphoma cells may avoid the toxic side effects that occur when today's chemotherapy and radiation treatments damage normal, noncancerous body tissues.

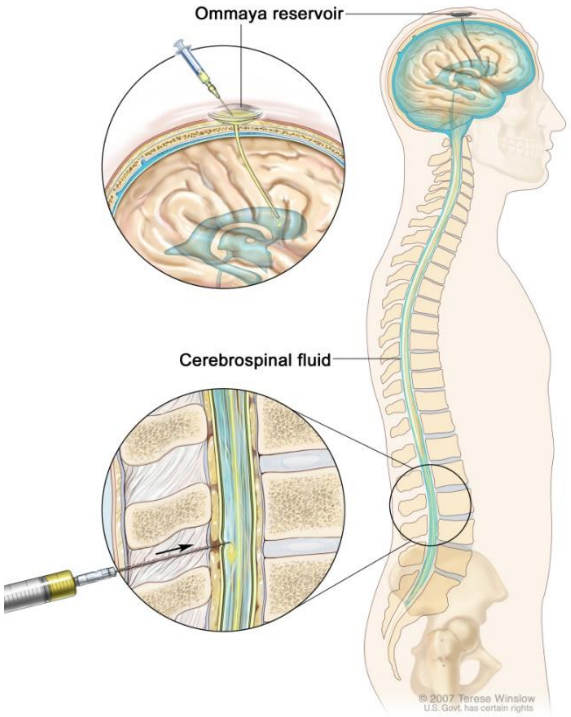
Six types of standard treatment are used in the treatment of non-Hodgkin's Lymphoma:

Chemotherapy

Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing. When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy). When chemotherapy is placed directly into the cerebrospinal fluid (intrathecal chemotherapy), an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas. Combination chemotherapy is treatment using two or more anticancer drugs.

The way the chemotherapy is given depends on the type and stage of the cancer being treated.

Intrathecal chemotherapy may be used to treat childhood non-Hodgkin lymphoma that has spread, or may spread, to the brain. When used to lessen the chance cancer will spread to the brain, it is called CNS prophylaxis. Intrathecal chemotherapy is given in addition to chemotherapy by mouth or vein. Higher than usual doses of chemotherapy may also be used as CNS prophylaxis.



Intrathecal chemotherapy. Anticancer drugs are injected into the intrathecal space, which is the space that holds the cerebrospinal fluid (CSF, shown in blue). There are two different ways to do this. One way, shown in the top part of the figure, is to inject the drugs into an Ommaya reservoir (a dome-shaped container that is placed under the scalp during surgery; it holds the drugs as they flow through a small tube into the brain). The other way, shown in the bottom part of the figure, is to inject the drugs directly into the CSF in the lower part of the spinal column, after a small area on the lower back is numbed.

Radiation therapy

Radiation therapy is a cancer treatment that uses high energy X-rays or other types of radiation\ to kill cancer cells or keep them from growing. There are two types of radiation therapy:

- External radiation therapy uses a machine outside the body to send radiation toward the cancer.
- Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.

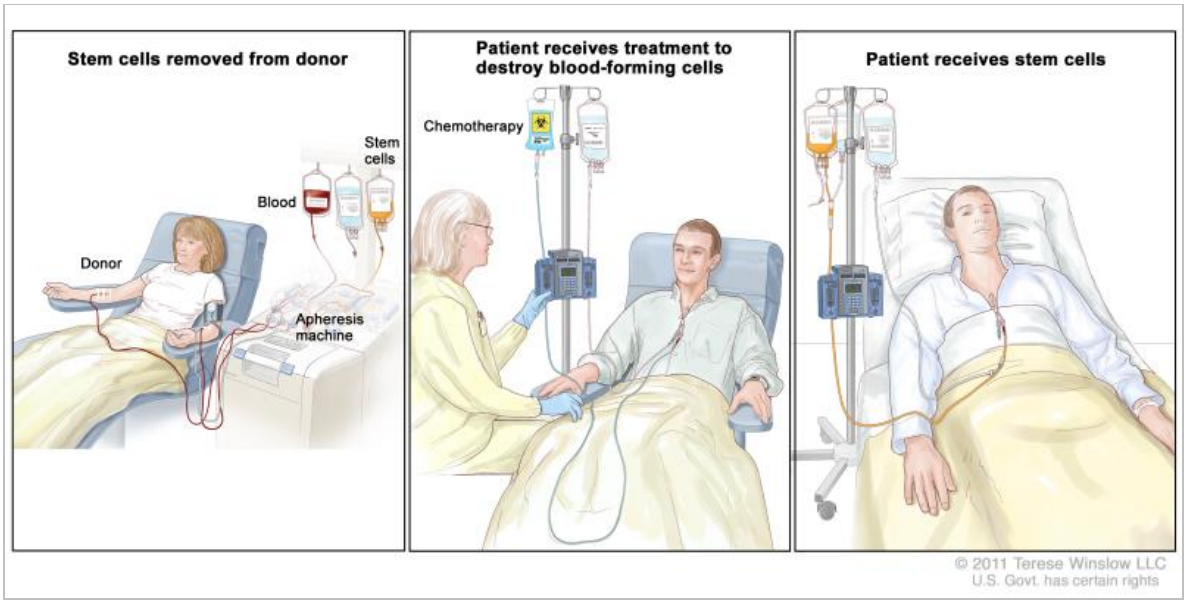
The way the radiation therapy is given depends on the type of non-Hodgkin lymphoma being treated.

External radiation therapy may be used to treat childhood non-Hodgkin lymphoma that has spread,

or may spread, to the brain and spinal cord. Internal radiation therapy is not used to treat non-Hodgkin lymphoma.

High-dose chemotherapy with stem cell transplant

High doses of chemotherapy are given to kill cancer cells. Healthy cells, including blood-forming cells, are also destroyed by the cancer treatment. Stem cell transplant is a treatment to replace the blood-forming cells. Stem cells (immature blood cells) are removed from the blood or bone marrow of the patient or a donor and are frozen and stored. After the patient completes chemotherapy, the stored stem cells are thawed and given back to the patient through an in fusion. These reinfused stem cells grow into (and restore) the body's blood cells.



Stem cell transplant. (Step 1): Blood is taken from a vein in the arm of the donor. The patient or another person may be the donor. The blood flows through a machine that removes the stem cells. Then the blood is returned to the donor through a vein in the other arm. (Step 2): The patient receives chemotherapy to kill blood-forming cells. The patient may receive radiation therapy (not shown). (Step 3): The patient receives stem cells through a catheter placed into a blood vessel in the chest.

Targeted therapy

Targeted therapy is a type of treatment that uses drugs or other substances to identify and attack specific cancer cells without harming normal cells. Monoclonal antibodies, tyrosine kinase inhibitors, , and immunotoxins are three types of targeted therapy being used or studied in the treatment of childhood non-Hodgkin lymphoma.

Monoclonal antibody therapy is a cancer treatment that uses antibodies made in the laboratory from a single type of immune system cell. These antibodies can identify substances on cancer cells or normal substances that may help cancer cells grow. The antibodies attach to the substances and kill

the cancer cells, block their growth, or keep them from spreading. Monoclonal antibodies are given by infusion. They may be used alone or to carry drugs, toxins, or radioactive material directly to cancer cells.

A bispecific monoclonal antibody is made up of two different monoclonal antibodies that bind to two different substances and kills cancer cells. Bispecific monoclonal antibody therapy is used in the treatment of Burkitt and Burkitt-like leukaemia and diffuse large B-cell lymphoma.

Tyrosine kinase inhibitors (TKIs) block signals that tumours need to grow. Some TKIs also keep tumours from growing by preventing the growth of new blood vessels to the tumours. Other types of kinase inhibitors are being studied for childhood non-Hodgkin's lymphoma.

Targeted therapy is being studied for the treatment of childhood non-Hodgkin lymphoma that has recurred (come back).

Other drug therapy

Retinoids are drugs related to Vitamin A. Retinoid therapy is used to treat several types of cutaneous T-cell lymphoma.

Steroids are hormones made naturally in the body. They can also be made in a laboratory and used as drugs. Steroid therapy is used to treat cutaneous T-cell lymphoma.

Phototherapy

Phototherapy is a cancer treatment that uses a drug and a certain type of laser light to kill cancer cells. A drug that is not active until it is exposed to light is injected into a vein. The drug collects more in cancer cells than in normal cells. For skin cancer in the skin, laser light is shined onto the skin and the drug becomes active and kills the cancer cells. Phototherapy is used in the treatment of cutaneous T-cell lymphoma.

Immunotherapy

Immunotherapy is a treatment that uses the patient's immune system to fight cancer. Substances made by the body or made in a laboratory are used to boost, direct, or restore the body's natural defenses against cancer. This type of cancer treatment is also called biotherapy or biologic therapy.
Epstein-Barr virus (EBV)-specific cytotoxic T-lymphocytes are a type of immune cell that can kill certain cells, including foreign cells, cancer cells, and cells infected with the EBV. Cytotoxic T-lymphocytes can be separated from other blood cells, grown in the laboratory, and then given to the patient to kill cancer cells. EBV-specific cytotoxic T-lymphocytes are being studied to treat post-transplant lymphoparoliferative disease.

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The South African National Clinical Trials Register provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

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Background: Rituximab added to chemotherapy prolongs survival among adults with B-cell cancer. Data on its efficacy and safety in children with high-grade, mature B-cell non-Hodgkin's lymphoma are limited.

Methods: We conducted an open-label, international, randomized, phase 3 trial involving patients younger than 18 years of age with high-risk, mature B-cell non-Hodgkin's lymphoma (stage III with an elevated lactate dehydrogenase level or stage IV) or acute leukemia to compare the addition of six doses of rituximab to standard lymphomes malins B (LMB) chemotherapy with standard LMB chemotherapy alone. The primary end point was event-free survival. Overall survival and toxic effects were also assessed.

Results: Analyses were based on 328 patients who underwent randomization (164 patients per group); 85.7% of the patients had Burkitt's lymphoma. The median follow-up was 39.9 months. Events were observed in 10 patients in the rituximab-chemotherapy group and in 28 in the chemotherapy group. Event-free survival at 3 years was 93.9% (95% confidence interval [CI], 89.1 to 96.7) in the rituximab-chemotherapy group and 82.3% (95% CI, 75.7 to 87.5) in the chemotherapy group (hazard ratio for primary refractory disease or first occurrence of progression, relapse after response, death from any cause, or second cancer, 0.32; 95% CI, 0.15 to 0.66; one-sided P = 0.00096, which reached the significance level required for this analysis). Eight patients in the rituximab-chemotherapy group died (4 deaths were disease-related, 3 were treatment-related, and 1 was from a second cancer), as did 20 in the chemotherapy group (17 deaths were disease-related, and 3 were treatment-related) (hazard ratio, 0.36; 95% CI, 0.16 to 0.82). The incidence of acute adverse events of grade 4 or higher after prephase treatment was 33.3% in the rituximab-chemotherapy group and 24.2% in the chemotherapy group (P = 0.07); events were related mainly to febrile neutropenia and infection. Approximately twice as many patients in the rituximab-chemotherapy group as in the chemotherapy group had a low IgG level 1 year after trial inclusion.

Conclusions: Rituximab added to standard LMB chemotherapy markedly prolonged event-free survival and overall survival among children and adolescents with high-grade, high-risk, mature B-cell non-Hodgkin's lymphoma and was associated with a higher incidence of hypogammaglobulinemia

and, potentially, more episodes of infection. (Funded by the Clinical Research Hospital Program of the French Ministry of Health and others; ClinicalTrials.gov number, NCT01516580.).

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSA) does not accept any liability to any person (or his/her dependants/estate/heirs) relating to the use of any information contained in this Fact Sheet.

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