Treating Non-Hodgkin Lymphoma in Children

General treatment information

Children and teens with non-Hodgkin lymphoma (NHL) and their families have special needs. These needs can be met best by cancer centers for children and teens, working closely with the child’s primary care doctor. Treatment in these centers gives you the advantage of having teams of specialists who know the differences between cancers in adults and those in children and teens, as well as the unique needs of younger people with cancer.

For childhood lymphomas, this team is typically led by a pediatric oncologist, a doctor who uses chemotherapy and other medicines to treat children’s cancers. Many other specialists may be involved in your child’s care as well, including other doctors, physician assistants, nurse practitioners, nurses, psychologists, social workers, rehabilitation specialists, and other health professionals. For more information, see Children Diagnosed With Cancer: Understanding the Health Care System.

After lymphoma is diagnosed and tests have been done to determine its stage, your child’s cancer care team will discuss the treatment options with you. The most important factors in choosing a treatment include the type and stage of the cancer, although other factors can also play a role. The intensive treatment for childhood lymphoma can possibly cause serious side effects. It’s important to discuss all of the options as well as their possible side effects with your child’s doctors so you can make an informed decision. (For a list of some questions to ask, see the What Should You Ask Your Child’s Doctor About Non-Hodgkin Lymphoma?)

Chemotherapy (sometimes along with other drugs) is the main treatment for all children with NHL, because it can reach all parts of the body and kill lymphoma cells wherever they may be. Even if the lymphoma appears to be limited to a single swollen lymph node, NHL in a child has often spread by the time it is diagnosed. Lymphoma cells are
probably in other organs, but these are too small to be felt by the doctor or seen on imaging tests. Sometimes high-dose chemotherapy followed by a stem cell transplant might be needed if the lymphoma comes back after treatment.

Other types of treatment, such as surgery and radiation, play a much smaller role in treating childhood lymphoma.

**Thinking about taking part in a clinical trial**

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the-art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service at 1-800-303-5691 for a list of studies that meet your medical needs, or see Clinical Trials to learn more.

**Considering complementary and alternative methods**

You may hear about alternative or complementary methods that your doctor hasn’t mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used along with your regular medical care. Alternative treatments are used instead of a doctor’s medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be dangerous.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision. See Complementary and Alternative Medicine to learn more.

**Help getting through cancer treatment**

Your cancer care team will be your first source of information and support, but there are
other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services — including rides to treatment, lodging, support groups, and more — to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists on call 24 hours a day, every day.

The next few sections describe the types of treatments used for NHL in children. This is followed by a description of the most common approaches used based on the type and stage (extent) of the lymphoma.

The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don’t hesitate to ask him or her questions about your treatment options.

Chemotherapy for Non-Hodgkin Lymphoma in Children

Chemotherapy (chemo) is the main treatment for non-Hodgkin lymphoma (NHL) in children. Chemo uses anti-cancer drugs that are usually given into a vein or taken by mouth. These drugs enter the bloodstream and reach all areas of the body, making this treatment very useful for cancers that tend to spread widely, such as NHL. In some cases where the lymphoma may have reached the brain or spinal cord, chemo may also be given into the cerebrospinal fluid (known as intrathecal chemo).

Children with NHL get a combination of several chemo drugs over a period of time. The number of drugs, their doses, and the length of treatment depend on the type and stage of the lymphoma. Some of the drugs commonly used to treat childhood lymphoma include:

- Cyclophosphamide (Cytoxan)
- Vincristine (Oncovin)
- Doxorubicin (Adriamycin)
- Prednisone
- Dexamethasone
- Cytarabine, also known as ara-C (Cytosar)
- Methotrexate
- L-asparaginase (Elspar), PEG-L-asparaginase (pegaspargase, Oncaspar)
- Etoposide (VePesid, others)
- 6-mercaptopurine (Purinethol)
- Ifosfamide (Ifex)

Doctors give chemo in cycles. Each chemo cycle generally lasts for several weeks. A period of treatment is followed by a rest period to allow the body time to recover. Most chemo treatments are given on an outpatient basis (in the doctor’s office or clinic or hospital outpatient department), but some – especially at the start of treatment – may need to be given while the child stays in the hospital.

For more information on chemotherapy, see the Chemotherapy section of our website.

**Possible risks and side effects of chemotherapy**

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemotherapy, which can lead to side effects.

The side effects of chemo depend on the type and dose of drugs given and how long they are taken. These side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea
- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue (due to low red blood cell counts)

These side effects are usually short-lived and go away after treatment is finished. If serious side effects occur, chemotherapy may have to be reduced or delayed.

There are often ways to lessen these side effects. For example, drugs can be given to help prevent or reduce nausea and vomiting. Infections can be very serious in people getting chemo. Drugs known as growth factors can be given to keep the blood cell counts higher.
Tumor lysis syndrome is a possible side effect of chemotherapy in children who have large numbers of lymphoma cells in the body before treatment. It occurs most often with the first cycle of chemo. When chemo kills these cells, they break open and release their contents into the bloodstream. This can overwhelm the kidneys, which aren’t able to get rid of all of these substances at once. Excess amounts of certain minerals may also cause problems for the heart and nervous system. This can be prevented by making sure the child gets lots of fluids during treatment and by giving drugs such as bicarbonate, allopurinol, and rasburicase, which help the body get rid of these substances.

Some possible side effects occur only with certain drugs. For example, drugs such as doxorubicin can damage the heart. Your child’s doctor may order heart function tests (like a MUGA scan or echocardiogram) if your child is getting one of these drugs.

Be sure to ask your child’s doctor or nurse about any specific side effects you should watch for and about what you can do to help reduce them.

Along with the side effects listed above, there are possible long-term effects of chemotherapy in children, such as possible effects on fertility later in life. These are described in Late and Long-term Effects of Treatment for Non-Hodgkin Lymphoma in Children.

- References
See all references for Non-Hodgkin Lymphoma in Children

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Other Drugs for Non-Hodgkin Lymphoma in Children

In recent years, new drugs that target specific parts of cancer cells have been developed. These drugs work differently from standard chemotherapy drugs. They sometimes work when chemo drugs don’t, and they often have different (and less severe) side effects. Some of these drugs might be useful in certain cases of childhood
non-Hodgkin lymphoma (NHL).

**Monoclonal antibodies**

Antibodies are proteins normally made by the body’s immune system to help fight infections. Man-made versions, called *monoclonal antibodies*, can be designed to attack a specific target, such as a substance on the surface of lymphoma cells.

Several monoclonal antibodies are now being used to treat lymphoma in adults. Some of these are now being studied for use in children as well.

**Rituximab (Rituxan):** This antibody attaches to a substance called CD20 on the surface of some types of lymphoma cells. This attachment seems to cause the lymphoma cell to die. Rituximab is being studied for use along with chemotherapy. The treatments are given as intravenous (IV) infusions in the doctor’s office or clinic.

Common side effects are usually mild but can include chills, fever, nausea, rashes, fatigue, and headaches during or after the infusion. Even if these symptoms occur with the first rituximab infusion, it is unusual for them to recur with later doses. Rituximab can also increase a person’s risk of some types of infections.

**Brentuximab vedotin (Adcetris):** This is an anti-CD30 antibody attached to a chemotherapy drug. Some lymphoma cells have the CD30 molecule on their surface. The antibody acts like a homing signal, bringing the chemo drug to the lymphoma cells, where it enters the cells and causes them to die when they try to divide into new cells.

Brentuximab can be used to treat anaplastic large cell lymphoma (ALCL) that has come back after other treatments. So far it has been used mainly in adults, but it is now being studied in children as well. It is given as an infusion into a vein (IV) every 3 weeks.

Common side effects include nerve damage (neuropathy), low blood counts, fatigue, fever, nausea and vomiting, infections, diarrhea, and cough.

**Other new drugs**

Other drugs that target parts of lymphoma cells are now being studied for use in children as well.

For example, the *anaplastic lymphoma kinase (ALK)* gene is often abnormal in ALCL. Crizotinib (Xalkori) is a newer drug that targets cells with an abnormal ALK gene. In early studies, this drug has shown very promising results in children with ALCL that is
no longer responding to other treatments. Doctors are now studying the use of this drug along with chemotherapy in treating ALCL.

- **References**
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**High-Dose Chemotherapy and Stem Cell Transplant for Non-Hodgkin Lymphoma in Children**

High-dose chemotherapy and stem cell transplant is not used as the first treatment for non-Hodgkin lymphoma (NHL) in children, but a transplant may be an option if the first treatment does not work or if the lymphoma comes back after treatment.

A stem cell transplant lets doctors give higher doses of chemotherapy than the body would normally tolerate. Giving higher doses of chemo might be more likely to kill all of the lymphoma cells, but doctors can’t do it routinely because it destroys the bone marrow, which is where new blood cells are made. This could lead to life-threatening infections, bleeding, and other serious problems because of low blood cell counts.

For a stem cell transplant doctors first give high doses of chemotherapy and, sometimes, radiation therapy. After the chemotherapy, the child gets a transplant of blood-forming stem cells to restore the bone marrow. These stem cells can be taken either from the child before treatment (autologous stem cell transplant) or donated from another person (allogeneic stem cell transplant).

**Autologous stem cell transplant**

In an autologous stem cell transplant, blood-forming stem cells are removed from your child’s bone marrow or blood on several occasions in the weeks before treatment. The stem cells are carefully frozen and stored.
Your child then receives high doses of chemotherapy and sometimes radiation treatment to destroy the lymphoma cells, which also destroys the cells in the bone marrow. The frozen stem cells are then thawed and returned to the child as a blood transfusion after the treatment.

For childhood NHL, this type of transplant is done more often than an allogeneic transplant (unless the lymphoma has already reached the bone marrow).

**Allogeneic stem cell transplant**

In an allogeneic stem cell transplant, the stem cells come from someone else. This type of transplant may be used if lymphoma cells are found in a child’s own bone marrow in order to avoid returning lymphoma cells to the child after treatment.

The stem cell donor’s tissue type (also known as the HLA type) needs to match the patient’s tissue type as closely as possible to help prevent the risk of major problems with the transplant. Usually this donor is a brother or sister if they have the same tissue type as the patient. If a parent is a close match to the child, the parent’s cells can sometimes be used. If there are no relatives with a good match, the cells may come from an HLA-matched, unrelated donor – a stranger who has volunteered to donate their cells – if one can be found.

The stem cells for an allogeneic stem cell transplant are usually collected from a donor’s bone marrow or blood on several occasions. In some cases, the source of the stem cells may be blood collected from an umbilical cord attached to the placenta (which is rich in stem cells) after a baby is born. Regardless of the source, the stem cells are then frozen and stored until they are needed for the transplant.

**How stem cells are transplanted**

The child will typically be admitted to the stem cell transplant unit of the hospital on the day before the high-dose chemo begins. He or she will usually stay in the hospital until after the chemo and the stem cells have been given, and until the stem cells have started making new blood cells again (see below).

The child gets high-dose chemotherapy and sometimes radiation treatment to the entire body. (Radiation shields are used to protect the lungs, heart, and kidneys from damage during radiation therapy.) This should destroy any remaining cancer cells, as well as the normal cells in the bone marrow.

After treatment, the frozen stem cells are thawed and given as a blood transfusion. The
stem cells then travel to the child’s bone marrow. Usually within a couple of weeks after the stem cells have been infused, they begin making new white blood cells. This is later followed by new platelet and red blood cell production.

In the meantime, the child is at high risk for serious infections because of a low white blood cell count, as well as bleeding because of a low platelet count. During this time, blood and platelet transfusions and treatment with IV antibiotics are often used to help prevent or treat infections or bleeding problems.

Because of the high risk of serious infections right after treatment, patients usually stay in a special hospital room in protective isolation (guarding against exposure to germs) until the part of their white blood cell count known as the absolute neutrophil count, or ANC, rises above 500. They may be able to leave the hospital when their ANC is near 1,000.

The child is then seen in an outpatient clinic almost every day for several weeks. Because platelet counts often take longer to return to a safe level, the child may get platelet transfusions as an outpatient. Patients may make regular visits to the outpatient clinic for about 6 months, after which time their care may be continued by their regular doctors.

Practical points

A stem cell transplant procedure is a complex treatment that can cause life-threatening side effects. If the doctors think your child may benefit from a transplant, the best place to have this done is at a nationally recognized cancer center where the staff has experience with the procedure and with managing the recovery period.

Stem cell transplants often require a long hospital stay and can be very expensive (costing well over $100,000). Be sure to get written approval from your insurer if it is recommended for your child. Even if the transplant is covered by your insurance, co-pays or other costs could easily amount to many thousands of dollars. Find out what your insurer will cover before the transplant so you will have an idea of what you might have to pay.

Possible side effects

The possible side effects from a stem cell transplant are generally divided into early (short-term) and late (long-term) effects.

Early or short-term side effects
The early complications and side effects are basically the same as those caused by high-dose chemotherapy (see Chemotherapy for Non-Hodgkin Lymphoma in Children), and can be severe. They can include:

- Low blood cell counts (with fatigue and increased risks of infection and bleeding)
- Nausea and vomiting
- Loss of appetite
- Mouth sores
- Diarrhea
- Hair loss

One of the most common and serious short-term effects is the increased risk of serious infections. Antibiotics are often given to try to prevent this. Other side effects, like low red blood cell and platelet counts, may require blood product transfusions or other treatments.

**Late and long-term side effects**

Some complications and side effects can persist for a long time or may not occur until years after the transplant. These can include:

- Graft-versus-host disease (GVHD), which can occur in allogeneic (donor) transplants (see below).
- Radiation damage to the heart or lungs
- Problems with the thyroid or other hormone-making glands
- Problems with fertility
- Damage to bones or problems with bone growth
- Development of another cancer (including leukemia) years later

GVHD happens when the donor’s immune system cells attack tissues of the patient's skin, liver, and digestive tract. Symptoms can include severe skin rashes, diarrhea, weakness, fatigue, mouth sores, nausea, yellowing of the skin and eyes (jaundice), and muscle aches. GVHD can also cause lung damage, leading to problems breathing. In severe cases, GVHD can be life-threatening. GVHD is often described as either acute or chronic, based on how soon after the transplant it begins. Drugs that weaken the immune system are often given to try to keep GVHD under control, although they can have their own side effects.

Be sure to talk to your child’s doctor before the transplant to learn about possible long-term effects your child may have. More information on possible long-term effects can be found in Late and Long-term Effects of Treatment for Non-Hodgkin Lymphoma in Children.
To learn more about stem cell transplants, see Stem Cell Transplant for Cancer.

- References
  See all references for Non-Hodgkin Lymphoma in Children

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Radiation Therapy for Non-Hodgkin Lymphoma in Children

Radiation therapy uses high-energy rays to kill cancer cells. This was once a very common treatment for children with non-Hodgkin lymphoma (NHL). But as doctors have developed more effective chemotherapy treatments, radiation therapy has been used less.

Radiation focused on a cancer from a source outside the body is called external beam radiation. This is the type of radiation therapy most often used to treat NHL. Before treatment starts, the radiation team takes careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation.

The treatment itself is much like getting an x-ray, but the radiation is stronger. It is painless, but some younger children might still need to be sedated to help make sure they don’t move during the treatment. Each treatment lasts only a few minutes, although the setup time – getting your child into place for treatment – usually takes longer. Most often, radiation treatments are given 5 days a week for several weeks.

There are a few instances in which radiation therapy may be used.

- Sometimes radiation is used along with chemotherapy, such as in patients where the lymphoma has reached the brain or spinal cord.
- It may be used as a form of urgent treatment in children with symptoms caused by large tumors in the chest.
- It may be used as part of treatment for children receiving high-dose chemotherapy and stem cell transplant.
• It can be used to relieve symptoms caused by lymphoma in internal organs, such when it is causing pain because it is pressing on nerves.

Possible risks and side effects of radiation therapy

Short-term side effects of radiation therapy depend on where the beams are aimed. It may cause sunburn-like skin problems or hair loss in the area being treated. Radiation therapy that includes large parts of the body can cause fatigue. Radiation of the abdomen can sometimes cause nausea, vomiting, or diarrhea. Often these effects go away after a short while.

Possible long-term side effects of radiation therapy in children can be more serious, and may occur after many years.

- Radiation therapy to the chest may damage the lungs or heart, which could raise the risk of lung or heart problems later in life. In the long term, radiation to the chest may also increase the risk of lung cancer (especially in smokers) and of breast cancer.
- Radiation therapy to the brain might cause headaches and problems such as memory loss, personality changes, and trouble learning at school.
- Radiation to other parts of the body may slow a child’s growth or increase the risks for certain other cancers, such as those of muscle or bone (called sarcomas) or of the digestive tract.

Because of these possible long-term effects, doctors try to avoid using radiation therapy in children or limit the doses used whenever possible. For more on possible long-term effects, see Late and Long-term Effects of Treatment for Non-Hodgkin Lymphoma in Children.

More information can be found in the radiation therapy section of our website.

• References
See all references for Non-Hodgkin Lymphoma in Children

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Surgery for Non-Hodgkin Lymphoma in Children

Surgery often has a limited role in treating non-Hodgkin lymphoma (NHL) since it’s unlikely to cure it by itself, and normal organs might be damaged in the process.

Surgery is sometimes used as the first treatment for early-stage Burkitt lymphoma that is in only one area (such as part of the intestine) to try to remove as much of the tumor as possible before chemotherapy. If the lymphoma can be removed completely, doctors might be able to give a less intensive chemotherapy regimen.

Other uses of surgery include:

- To get biopsy samples for lab tests to determine the exact type of NHL if non-surgical procedures (needle biopsy, bone marrow biopsy, etc.) could not get enough tissue.
- To insert a small plastic tube, called a central venous catheter or venous access device (VAD), into a large blood vessel near the heart. The end of the tube stays just under the skin or sticks out in the chest area or upper arm. The VAD is left in place during treatment to give intravenous (IV) drugs such as for chemotherapy and to take blood samples. This lowers the number of needle sticks needed during treatment.
- To relieve some emergency situations, such as if a lymphoma has blocked a child’s intestines.

Possible risks and side effects of surgery

Possible complications of surgery depend on the location and extent of the operation and the child’s health beforehand. Serious complications, although rare, can include problems with anesthesia, bleeding, blood clots, wound infections, and pneumonia. Most children will have some pain for a while after the operation, although this can usually be helped with medicines if needed.

For more information on surgery as a treatment for cancer, see Cancer Surgery.

- References
See all references for Non-Hodgkin Lymphoma in Children

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Treatment of Non-Hodgkin Lymphoma in Children, by Type and Stage

In general, all children with non-Hodgkin lymphoma are treated with chemotherapy, but the treatments differ depending on the type and stage of the lymphoma. This treatment is intense and might cause serious side effects, so it is very important that it is given in a children’s cancer center, especially when it is first started.

Lymphomas in children (especially Burkitt lymphomas) tend to grow very quickly and may already be quite large by the time they’re diagnosed, so it is important to start treatment as soon as possible. These lymphomas usually respond well to chemotherapy, which can kill large numbers of lymphoma cells in a short period of time. A concern is that this can cause tumor lysis syndrome, a side effect in which the inner contents of the dead cells enter the blood and can cause problems with the kidneys and other organs. Doctors try to prevent this by making sure the child gets lots of fluids before and during treatment, and by giving certain drugs to help the body get rid of these substances.

It is assumed even children with early stage (stage I or II) lymphomas have more widespread disease than can be detected with exams or imaging tests. Because of this, local treatments such as surgery or radiation therapy alone are very unlikely to cure them. Therefore, chemotherapy is an important part of treatment for all children.

Treatment of lymphoblastic lymphoma

Stages I and II: In general, treatment for these early stage lymphomas is similar to the treatment of acute lymphoblastic leukemia (ALL).Chemotherapy is given in 3 phases (induction, consolidation, and maintenance) using many drugs. For example, the BFM regimen uses combinations of many different drugs for the first several months, followed by less intense treatment with methotrexate and 6-mercaptopurine in pill form for a total of about 2 years. Shorter and less intensive treatments, such as the chemotherapy combinations called CHOP (cyclophosphamide, doxorubicin, vincristine and prednisone) and COMP (cyclophosphamide, vincristine, methotrexate, and prednisone) have also been used.
Chemotherapy, usually with methotrexate, is also given into the spinal fluid (known as intrathecal chemo) for at least 4 doses, each separated by a week. This helps kill any lymphoma cells in the brain or spinal cord.

The total length of treatment may be as long as 2 years.

**Stages III and IV:** The treatment for children with advanced lymphoblastic lymphoma lasts for about 2 years. Treatment is typically more intensive than for earlier stage lymphomas. It is given as 3 phases of chemotherapy (induction, consolidation, and maintenance) using many drugs. This is very similar to the treatment of high-risk acute lymphoblastic leukemia (ALL). For more information, see [Treating Childhood Leukemia](#).

Intrathecal chemotherapy is also given into the spinal fluid to kill any lymphoma cells that may have reached the brain or spinal cord. In some cases, radiation therapy may be given to the brain and spinal cord as well.

**Treatment of Burkitt and Burkitt-like lymphoma**

*C Chemotherapy* is the main form of treatment for these lymphomas. Studies are now being done to determine whether adding a *monoclonal antibody* such as rituximab to chemotherapy will make treatment more effective.

**Stages I and II:** Treatment of these lymphomas may include *surgery* prior to chemotherapy if the tumor is in only one area. If there is a large abdominal tumor, it is important that as much of it as possible be removed. After that, chemotherapy is given.

Several different chemo drugs are used. The length of treatment ranges from about 9 weeks to 6 months. Most pediatric oncologists feel that the 9-week treatment is adequate if all of the tumor is removed with surgery first.

Chemotherapy into the spinal fluid is needed only if the lymphoma is growing around the head or neck.

**Stages III and IV:** Children with more advanced Burkitt lymphoma need more intensive chemotherapy. Because these lymphomas tend to grow quickly, the chemotherapy cycles are short, with little rest between courses of treatment.

For example, a treatment plan known as the French LMB protocol regimen alternates between different combinations of drugs every 3 to 4 weeks for a total of about 6 to 8 months. Other similar treatment regimens are the German BFM protocol and the St. Jude Total B regimen.
Chemotherapy must also be given into the spinal fluid.

**Treatment of large cell (including anaplastic) lymphoma**

Chemotherapy is the main form of treatment for these lymphomas. Studies are being done to determine whether adding other drugs to chemotherapy might make treatment more effective.

**Stages I and II:** Treatment for these lymphomas usually consists of chemotherapy with 4 or more drugs given for around 3 to 6 months. For diffuse large B-cell lymphoma, treatment may include surgery in addition to chemotherapy. The usual chemotherapy regimen contains a 4-drug combination of cyclophosphamide, vincristine, prednisone, and either doxorubicin or methotrexate. (These are known as the CHOP or COMP regimens.)

Chemotherapy is given into the spinal fluid only if the lymphoma is near the head or neck.

**Stages III and IV:** Large cell lymphomas don’t often reach the bone marrow or spinal fluid, but if they do they require more intensive treatment.

Chemotherapy includes several drugs given over 9 to 12 months. Many doctors treat advanced large B-cell lymphomas as they would Burkitt lymphoma (see above).

Intrathecal chemotherapy is given into the spinal fluid as well.

Current clinical trials are focusing on the length of chemotherapy, which drugs are important in treating large cell lymphoma, and whether the different types of large cell lymphoma can be treated similarly. Newer drugs that might help treat anaplastic large cell lymphoma, such as brentuximab vedotin (Adcetris) and crizotinib (Xalkori), are also being studied.

**Treatment of recurrent lymphoma**

Generally, if the lymphoma comes back after the first therapy, it is much harder to treat. When possible, more intensive chemotherapy, usually including a stem cell transplant, is recommended. This is often done in a clinical trial. Clinical trials of newer forms of treatment may also be an option.

- References
  See all references for Non-Hodgkin Lymphoma in Children
More Treatment Information About Non-Hodgkin Lymphoma in Children

For more details on treatment options – including some that may not be addressed in this document – the National Cancer Institute (NCI) and the Children’s Oncology Group (COG) are good sources of information.

The NCI provides information by phone (1-800-4-CANCER) and on its website (www.cancer.gov). Detailed information intended for use by cancer care professionals is also available at www.cancer.gov.

The COG is the world’s largest organization devoted to childhood cancer research. The COG website, www.childrensoncologygroup.org, provides information to help support children and their families from diagnosis, through treatment, and beyond.

- References
  See all references for Non-Hodgkin Lymphoma in Children

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