DICTIONARY OF TERMS

A guide for patients, families & whānau

leukaemia & blood cancer NEW ZEALAND

Vision to Cure. Mission to Care.

INTRODUCTION

This booklet has been written to help you and your family/whānau understand many of the medical terms you may come across.

If you or someone you care for has been diagnosed with a blood cancer or condition, you may be feeling overwhelmed, upset or anxious. This is normal. Perhaps you have already started treatment, or you are discussing different treatment options with your doctor and your family/whānau. Whatever stage you are at, we hope that the information contained in this booklet is useful in answering some of your questions. It may raise other questions, which you should discuss with your health care team.

Some people may require more information than is contained in this booklet. There is a range of disease-specific information booklets available from Leukaemia & Blood Cancer New Zealand (LBC). These can be found on the LBC website, leukaemia.org.nz, or by contacting an LBC Support Services Coordinator on 0800 15 10 15.

It is not the intention of this booklet to recommend any particular form of treatment to you. You need to discuss your circumstances with your doctor and treatment team.

Interpreter service

New Zealand's Code of Health and Disability states that everyone has the right to have an interpreter present when they go to a medical appointment. If a patient and their health care professional do not speak the same language, a family/whānau member or friend may assist. The hospital can organise a trained interpreter if needed, either in person or through a telephone interpreter service. NZ Sign Language interpreters are also available.

Informed consent

If you are supporting a family/whānau member who needs language support at appointments, your doctor may ask an interpreter to join meetings where informed consent is required. Interpreters are specially trained to explain medical information clearly.

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ABOUT LEUKAEMIA & BLOOD CANCER NEW ZEALAND

Leukaemia & Blood Cancer New Zealand (LBC) is the only not-for-profit organisation in New Zealand dedicated to providing care, and supporting research for a cure, for people living with blood cancer and serious blood conditions.

LBC is committed to improving the quality of life for our patients and their families/whānau. LBC provides patient support services, funds research, provides the latest information, helps raise awareness, and advocates for patients and their families/whānau.

LBC provides individualised support to patients, runs support programmes for adults and children, facilitates education sessions, and provides emergency financial assistance.

Eight Kiwis – adults and children – are diagnosed with a blood cancer each day.

Based on Ministry of Health data, LBC estimates that close to 21,000 people live with blood cancer in New Zealand.

LBC has support centres in Auckland, Hamilton, Wellington, Christchurch and Dunedin, and our team travels to other parts of New Zealand regularly.

Website
leukaemia.org.nz

Nationwide Phone number
0800 15 10 15

LOCATIONS

Northern Region/Head Office
6 Claude Road
Epsom
Auckland, 1023

PO Box 99182
Newmarket
Auckland, 1149

Midland Region
27 Pembroke Street
Hamilton, 3204

PO Box 4317
Hamilton East
Hamilton, 3247

Central Region
9-11 Riddiford Street
Newtown
Wellington, 6021

PO Box 16154
Newtown
Wellington, 6242

Upper Southern Region
20 Cashel Street
Christchurch City
Christchurch, 8013

PO Box 36278
Merivale
Christchurch, 8146

Lower Southern Region
218 George Street
Dunedin 9016

PO Box 5238
Dunedin 9054

LIST OF ABBREVIATIONS

AA – Aplastic anaemia

ALL – Acute lymphoblastic leukaemia

AML – Acute myeloid leukaemia

APL (or APML) – Acute promyelocytic leukaemia

ATG – Anti-thymocyte globulin

BJP – Bence-Jones protein

BMT – Bone marrow transplant

BP – Blood pressure

CAR T-cell – Chimeric antigen receptor T-cell

CBC – Complete blood count

CLL – Chronic lymphocytic leukaemia

CML – Chronic myeloid leukaemia

CMML – Chronic myelomonocytic leukaemia

CMV – Cytomegalovirus

CNS – Central nervous system

CRP – C-reactive protein

CSF – Cerebrospinal fluid

CT/CAT – Computed tomography/computed assisted tomography (scan)

CVC/CVAD – Central venous catheter/central venous access device

DLBCL – Diffuse large B-cell lymphoma

DNA – Deoxyribonucleic acid

DVT – Deep vein thrombosis

DX – Diagnosis

EBV – Epstein-Barr virus

ECG – Electrocardiogram

ECHO – Echocardiogram

EEG – Electroencephalogram

ESR – Erythrocyte sedimentation rate

ET – Essential thrombocythaemia

FBC – Full blood count

FLC – Free light chains

FNA – Fine needle aspiration

G-CSF – Granulocyte-colony stimulating factor

GvHD – Graft-versus-host disease

GvL – Graft-versus-leukaemia

HEPA – High-efficiency particulate air

HL – Hodgkin lymphoma

HLA – Human leukocyte antigen

HR – Heart rate

HSCT – Haematopoietic stem cell transplantation

HTLV – Human T lymphotropic virus

ICU – Intensive care unit

IM – Intramuscular (injection)

INR – International normalised ratio

IT – Intrathecal (injection)

ITP – Immune thrombocytopenia

IV – Intravenous (injection/infusion)

LDH – Lactate dehydrogenase

LFT – Liver function test

MBL – Monoclonal B-cell lymphocytosis

MDS – Myelodysplastic syndromes

MDT – Multidisciplinary team

MF – Myelofibrosis

MGUS – Monoclonal gammopathy of undetermined significance

MPN – Myeloproliferative neoplasms

MRD – Minimal/measureable residual disease

MRI – Magnetic resonance imaging

MUD – Matched unrelated donor

NG – Nasogastric

NHL – Non-Hodgkin lymphoma

NMAT – Non-myeloablative allogeneic transplant

PCR – Polymerase chain reaction

PCV – Packed cell volume

PET – Positron emission tomography (scan)

PICC – Peripherally inserted central catheter

PMF – Primary myelofibrosis

PRCA – Pure red cell aplasia

PV – Polycythaemia vera

RBC – Red blood cell

RIC – Reduced-intensity chemotherapy

RNA – Ribonucleic acid

SCID – Severe combined immunodeficiency disease

SCT – Stem cell transplant

SFLC – Serum free light chain

TBI – Total body irradiation

UTI – Urinary tract infection

VOD – Veno-occlusive disease

VWD – Von Willebrand disease

WBC – White blood cell

WM – Waldenstrom macroglobulinaemia

ZIG – Zoster immune globulin

COMMON DRUG AND TREATMENT ABBREVIATIONS

ABVD – Doxorubicin, bleomycin, vinblastine, dacarbazine

Ara-C – Cytarabine (also known as cytosine arabinoside)

BEACOPP – Bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, prednisone

BR – Bendamustine, rituximab (often referred to as R-Bendamustine)

CSA – Cyclosporin

CTD – Cyclophosphamide, thalidomide, dexamethasone

CyBorDex – Cyclophosphamide, bortezomib (Velcade), dexamethasone

EPOCH – Etoposide, prednisone, vincristine, cyclophosphamide, doxorubicin

FCR – Fludarabine, cyclophosphamide, rituximab

GDP – Gemcitabine, dexamethasone, cisplatin

ICE – Ifosfamide, carboplatin, etoposide

KCD – Carfilzomib, cyclophosphamide, dexamethasone

MTX – Methotrexate

R – Rituximab

R-CHOP – Rituximab, cyclophosphamide, doxorubicin, vincristine, prednisone

RVd – Lenalidomide (Revlimid), bortezomib (Velcade), dexamethasone

VMP – Bortezomib, melphalan, prednisone

VTD – Bortezomib, thalidomide, dexamethasone

This is only a selection of common treatment plans used in haematology. You may be offered other treatments or altered treatment regimens that are specific to you. If you have any questions about your treatment options, it is best to discuss this with your doctor.

HAEMATOLOGY DEFINITIONS

Acute – A disease with an abrupt onset and, usually, a short course. Often requires urgent treatment.

Acute leukaemia – A rapidly progressing cancer of the blood. Usually of sudden onset and characterised by the uncontrolled growth of immature blood cells, which take over the bone marrow and spill into the bloodstream. If left untreated, acute leukaemia may be fatal within a few weeks or months.

Acute lymphoblastic leukaemia (ALL) – A rapidly progressing cancer of the blood affecting the type of white blood cells that produce lymphocytes. ALL is the most common form of childhood leukaemia and can also occur in adults. See the LBC website for booklets on ALL in children and ALL in adults.

Acute myeloid leukaemia (AML) – A rapidly progressing cancer of the blood affecting immature cells of the bone marrow, which normally produce neutrophils, red cells and platelets. AML is more common in adults than in children. See the LBC website for a booklet on AML.

Acute promyelocytic leukaemia (APL or APML) – A malignancy of the bone marrow in which there is a deficiency of mature blood cells in the myeloid line of cells and an excess of immature cells called promyelocytes. APL is a rare subtype of AML and accounts for only 10% of all AML diagnoses. Also known as promyelocytic leukaemia.

Adenosine deaminase inhibitors – A group of drugs that act mainly by inhibiting the production of DNA in the lymphoid cells (e.g. fludarabine).

Aetiology – The factors that contribute to a disease developing, e.g. environmental factors such as infections and radiation. An example is "the aetiology of some leukaemias is benzene exposure".

Alkylating agent – A type of chemotherapy drug that interacts with genetic material (DNA) to prevent division of the cells. Drugs of this type include busulphan, chlorambucil, cyclophosphamide and melphalan.

Allogeneic stem cell transplant – Transplant using blood stem cells collected from a matched healthy donor, usually a brother or sister. See the LBC website for a booklet on allogeneic stem cell transplants.

Allopurinol – A drug used to prevent high levels of uric acid in the body, including the increase caused by certain cancer medications. High levels of uric acid may cause gout, kidney stones or renal failure.

Alopecia – Loss of hair. Usually temporary when due to chemotherapy or radiotherapy treatment.

Amyloidosis – The general term given to a relatively rare and serious group of disorders in which an abnormal protein forms deposits of proteins in tissues such as the heart and kidneys.

Anaemia – A reduction in the haemoglobin level in the blood, often associated with a reduction in the number of red blood cells. Haemoglobin carries oxygen to all the body's tissues. Anaemia can cause tiredness, paleness and sometimes shortness of breath.

Anorexia – Lack or loss of appetite for food.

Anthracyclines – A group of chemotherapy drugs used to prevent cell division by disrupting the structure of DNA. Drugs of this type include daunorubicin and doxorubicin (Adriamycin).

Antibiotics – Drugs that kill or stop the growth of bacteria, e.g. penicillin.

Antibodies – Naturally produced substances in the blood, made by white blood cells called B-lymphocytes or B-cells. Antibodies target antigens or foreign or abnormal substances such as bacteria, viruses and some cancer cells and cause their destruction or removal.

Antiemetic – A drug that prevents or reduces nausea and vomiting (feeling and being sick), which may be a side effect of some chemotherapy drugs. There are many different types of antiemetic drugs. Two common antiemetic drugs used to reduce nausea and vomiting are metoclopramide (Maxolon) and ondansetron (Zofran).

Antigen – Any substance (usually a protein), including those on the surface of a foreign body such as a virus or bacteria, that stimulates an immune response, such as the formation of an antibody or the activation of specific cells.

Antihistamines – Drugs given to reduce histamine levels, which are produced in some allergic reactions. Drugs of this type include promethazine (Phenergan).

Antimetabolites – A group of chemotherapy drugs that prevent cells growing and dividing by blocking the chemical reactions required to produce DNA. Drugs of this type include mercaptopurine, azathioprine, thioguanine, and methotrexate.

Anti-thymocyte globulin (ATG) – Antibodies obtained by immunising horses or rabbits with human white cells called T-lymphocytes (T-cells). These antibodies are collected from the animals and purified into ATG, which is used to treat some haematology conditions.

Anxiety – An ongoing worry or concern about something that doesn't go away. Feelings of worry that a person does not seem to be able to control, or seem greater than they should feel in a situation.

Apheresis – Method of collecting blood via an intravenous catheter into an apheresis machine. The blood is then separated into its liquid and cellular components. The cells required are collected and unneeded blood components are infused back into the donor. Used for collecting platelets, plasma and stem cells, can also be used therapeutically to remove leukocytes.

Aplastic anaemia – A rare blood condition that occurs when bone marrow stops producing enough new blood cells. The word 'aplastic' means the body's inability to create new cells. See the LBC website for a fact sheet on aplastic anaemia.

Apoptosis – A form of cell death in which a programmed sequence of events leads to the death of cells. Apoptosis plays a crucial role in developing and maintaining health by eliminating old, unnecessary and unhealthy cells.

Audiogram – A hearing test charted for different frequencies. Useful for the early detection of deafness from various causes including drug toxicity to the eardrum.

Autoimmune disease – A group of diseases caused by an individual's immune system producing antibodies against their own tissues (known as autoantibodies). Examples include some haemolytic anaemias, immune thrombocytopenia, rheumatoid arthritis and systemic lupus erythematosus (SLE or lupus).

Autologous stem cell transplant – Transplant using stem cells or bone marrow collected from the patient's own blood or bone marrow that has been stored after intensive treatment. See the LBC website for a booklet on autologous stem cell transplants.

Bacteria – Microscopic organisms that cause many infections, e.g. pneumonia. The presence of bacteria (even normally harmless bacteria) on the skin or in the mouth can result in serious illness if you have a compromised immune system.

Basophil – A type of white blood cell involved in allergic and inflammatory reactions, normally present in low numbers in the blood. Basophils work with neutrophils to fight infection.

BCR-ABL1 gene – See Philadelphia (Ph) chromosome.

Bence-Jones protein (BJP) – A small protein or immunoglobulin light chain made by plasma cells that may be found in the urine. Detection of BJP may be suggestive of myeloma or Waldenstrom macroglobulinemia. Testing for BJP has been largely superseded by the free light chains (FLC) test.

Benign – Non-cancerous. Such a growth may or may not need to be surgically removed. This depends on its size and position in the body.

Benzene – A colourless, toxic liquid hydrocarbon that is widely used as a solvent, also a natural part of crude oil, gasoline and cigarette smoke. Benzene exposure is a known risk factor for some blood cancers.

Biopsy – A small sample of fresh tissue, e.g. lymph node or bone marrow, removed for laboratory analysis to establish the exact diagnosis, or to monitor treatment response.

Bisphosphonates – A group of drugs commonly used to treat and prevent osteoporosis and myeloma bone disease. These drugs work by protecting the bone surfaces from the action of osteoclasts, cells normally involved in bone breakdown.

Blast cells – Immature cells known as precursor cells or stem cells. Blasts give rise to all kinds of different specialised cells, e.g. blood cells come from blasts in the bone marrow.

Blast crisis – The phase of a chronic condition that has transformed into an acute condition, e.g. when chronic myeloid leukaemia progresses to acute leukaemia. This can result in a very high number of immature, abnormal white blood cells (blasts) in the bone marrow and blood.

Blood cancer – Haematology cancers are also called blood cancers. Although blood cancers are often diagnosed in the blood, they usually originate from the bone marrow.

Blood cells – There are three main types of cells in the bloodstream: red blood cells, which carry oxygen; white blood cells, which fight infection; and platelets, which help prevent bleeding.

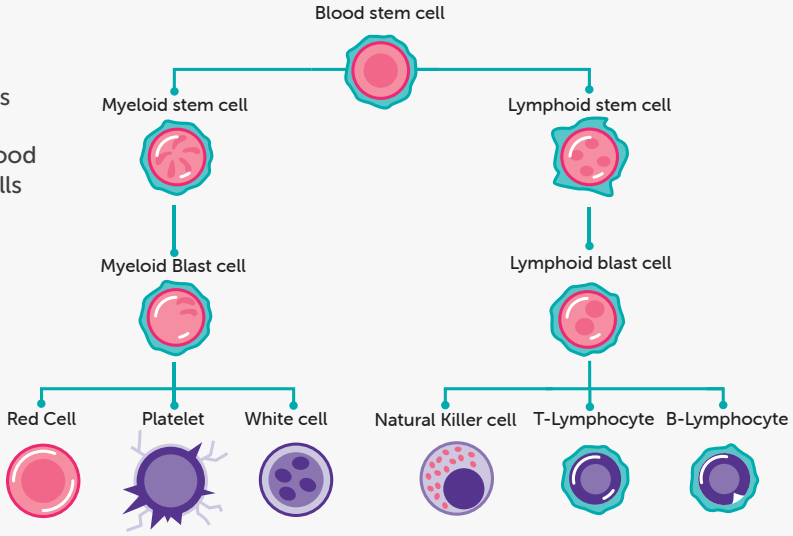
Blood count – Also called a full blood count (FBC) or complete blood count (CBC). A routine blood test that measures the number and types of cells circulating in the blood.

Blood stem cells – The most primitive cells in the bone marrow from which all the various types of blood cells develop. In Figure 01 you can see the blood stem cell has divided to create the different blood cells that function in our body.

B-lymphocyte – A type of white blood cell normally involved in the production of antibodies to combat infection. Also called B-cells.

Figure 01

The cells created from blood stem cells

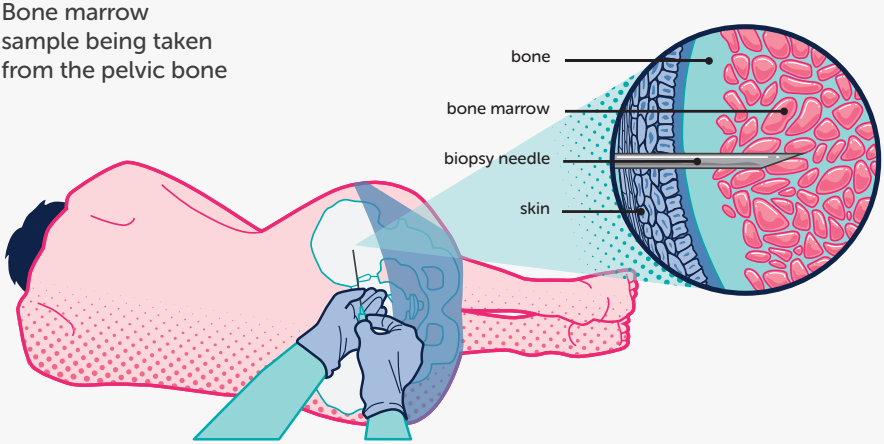


Bone marrow – The tissue found at the centre of many flat or big bones of the body, e.g. the breastbone (sternum), thigh bone (femur) and hip bone (iliac crest). Bone marrow contains stem cells from which all blood cells are made.

Bone marrow biopsy – A procedure to collect a sample of the bone marrow, usually taken from the back of the hip bone (iliac crest of the pelvis) or occasionally from the breastbone (sternum). This procedure is done under local anaesthetic, with or without light sedation, and incorporates either or both of the following:

- **Aspirate** – A procedure that involves removing (or aspirating) a small sample of bone marrow fluid for examination in the laboratory.
- **Trephine** – A procedure that involves removing a small core of bone and bone marrow for examination in the laboratory. It is used to assess bone marrow structure, and the number and distribution of all the blood cell types.

Figure
02
Bone marrow sample being taken from the pelvic bone



Bone marrow transplant (BMT) – See Stem cell transplant.

Bowel – Also known as intestines or guts. After the stomach has finished processing food that has been eaten, it goes into the small intestine (small bowel), which absorbs nutrients that the body needs. What is left after this moves into the large intestine (large bowel) and eventually moves out of the body as waste, known as a bowel motion (commonly known as poo). See appendix A on page 37 for an image showing the small and large intestines.

Brachytherapy – A means of delivering radiotherapy directly to a tumour by an implanted tube. It avoids the use of external beams of radiation and often allows stronger local treatment without an increase in toxicity to surrounding organs.

Burkitt lymphoma – A rapidly growing type of non-Hodgkin lymphoma. It develops when B-lymphocytes (B-cells) become abnormal. Burkitt lymphoma requires immediate treatment and may present as a type of leukaemia (Burkitt leukaemia).

Cancer – Disease caused by abnormal cells growing in an uncontrolled way, creating a tumour, invading nearby tissues and/or spreading through the blood and lymph systems. Also called malignant disease or neoplasia.

Candida – A type of yeast infection or fungus that grows out of control in moist skin areas of the body, such as the mouth. It is usually the result of a weakened immune system but can be a side effect of chemotherapy or treatment with antibiotics. Also called thrush.

Cannula – A plastic tube inserted into a vein, usually in the hand or arm, to allow fluid to enter the bloodstream, such as an intravenous (IV) infusion.

Carcinogen – A substance that may have the ability to cause developing cells to become cancerous, e.g. tobacco smoke and asbestos. For many people with cancer, a specific carcinogen is not known.

Carcinogenesis – The process by which normal, healthy cells transform into cancer cells. Also called oncogenesis.

Cardiac – Related to the heart.

CAR T-cell therapy – A treatment for lymphoma, acute lymphoblastic leukaemia (ALL) and other blood cancers in which the patient's T-cells are genetically engineered and infused into the bloodstream, where they attack and kill the cancer cells.

Catheter – A hollow tube inserted into organs of the body for instilling or removing gases or liquids, e.g. a urinary catheter is used to remove urine from the bladder.

CD34 cells – Cells with the specific 'CD34' protein in their membrane, including blood stem cells, which are involved in a transplant. A CD34 count is used to measure a patient's readiness to have cells collected after mobilisation.

Cell biology – The study of the structure, composition and function of cells.

Cell markers – Usually proteins or antigens on the cell surface that distinguish and discriminate between different cell types. Cell markers are like flags stuck to the

outside of a cell, which can be analysed in the laboratory using sophisticated analysers called flow cytometers. This technique is also called immunophenotyping.

Cells – The smallest structural and functional unit of an organism. They are only visible through a microscope.

Central nervous system (CNS) – The brain and spinal cord.

Central nervous system (CNS) leukaemia – Leukaemic cells have been found in the CNS (brain and/or spinal cord). This can often be diagnosed by examination of cerebrospinal fluid obtained by a lumbar puncture.

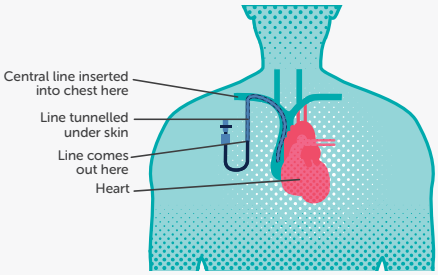
Central venous catheter/line (CVC) – Also known as central venous access device (CVAD). A plastic tube inserted through the skin into a major blood vessel in the chest or neck. Used for patients undergoing intensive therapy and provides a route for taking blood samples and administering drugs and other treatments without repeated needle punctures into the patient's arm. It may have one or multiple tubes (called lumens). Different manufacturing companies produce these devices. Examples include the Groshong catheter, Hickman catheter, apheresis catheter and portacath.

Cerebrospinal fluid (CSF) – Fluid that surrounds and protects the brain and spinal cord. Samples can be obtained by lumbar puncture, and chemotherapy also can be injected by the same route to prevent or treat some blood diseases that can invade the central nervous system, such as acute lymphoblastic leukaemia (ALL).

Chemoimmunotherapy – A treatment plan that uses both chemotherapy and immunotherapy drugs. By combining chemotherapy with immunotherapy, the effectiveness of each drug is improved. Various combinations of chemotherapy and immunotherapy are in use.

Chemotherapy – Single drugs or combinations of drugs that may be used to kill and prevent the growth and division of cancer cells. Although aimed at the cancer cells, chemotherapy often affects rapidly dividing normal cells and this is responsible for some unwanted side effects. Most of the side effects of chemotherapy are usually temporary and reversible.

Figure 03
Central line placement



Chemotherapy cycle – Chemotherapy is usually given in cycles, with chemotherapy drugs given for a predetermined number of days, followed by a recovery period. The purpose of the recovery period between cycles of chemotherapy drugs is to allow the recovery of the normal cells in the bone marrow, i.e. red blood cells, white blood cells and platelets, before giving further chemotherapy to eradicate remaining cancer cells.

Chromosomes – The human body is made up of cells. Inside most cells are chromosomes which, under the microscope, look like threads. Each thread contains hundreds to thousands of genes. Genes determine things like hair and eye colour and how the body develops. Each person has 23 pairs of chromosomes (half from your mother and the other half from your father).

Chronic – An illness or disease that persists for a long time or is constantly recurring.

Chronic leukaemia – A persistent cancer of the blood, usually of gradual onset and generally of slow progression. May be diagnosed by chance following a routine blood test and before clinical symptoms appear.

Chronic lymphocytic leukaemia (CLL) – A slowly progressing form of leukaemia characterised by an increased number of lymphocytes (a type of white blood cell). It is the most common form of leukaemia and occurs predominantly in late middle age onwards. People may live with this condition for many years before needing treatment, or between treatment cycles. See the LBC website for a booklet on CLL.

Chronic myeloid leukaemia (CML) – A type of leukaemia that affects the myeloid blood cells that are made in the bone marrow. In people with CML, the bone marrow produces too many white blood cells called granulocytes. CML usually develops slowly during the early stages of disease. See the LBC website for a booklet on CML.

Chronic myelomonocytic leukaemia (CMML) – A form of myelodysplasia characterised by an increase in the number of circulating white blood cells known as monocytes. People with CMML may develop problems with infection or bleeding and in some cases it may transform into acute leukaemia.

Clinical trial – A controlled and carefully monitored assessment of new forms of treatment subject to ethical approval. Trials can vary in design and size from small-scale trials of experimental treatments to large international trials that compare subtle variations in current therapies. Patients will be informed and will always be given the option to join or not, without detriment to their usual treatment if they decline to participate. Likewise, patients can opt out of a clinical trial at any time. See the LBC website for a fact sheet on clinical trials.

Clotting factors – Components of plasma (factors I to XIII) that are involved in the clotting of blood. Also called coagulation factor.

Coagulation – Clotting of the blood.

Combination therapy – A treatment modality that combines two or more drugs, e.g. chemotherapy. Chemotherapy drugs are given that work by different mechanisms, which target the cancer cells in different ways. This approach produces a greater cell death and decreases the possibility of tumour drug resistance.

Complementary therapies – Therapies used alongside medical treatment that help a person cope and feel better with their diagnosis and treatment, e.g. massage, yoga.

Complete remission – The disappearance of all signs of cancer in response to treatment.

Computed tomography scan (CT scan) – A body scanning or imaging technique using X-rays that produces a series of detailed three-dimensional (3D) images of cross sections of the body.

Congenital – A term used to describe deformities or diseases that are present at the time of birth.

Consolidation treatment – A course of treatment with anticancer drugs given to the patient while in remission with the aim of killing any remaining cancerous cells.

Cord blood – Found in the umbilical cord and the placenta. This is a valuable source of stem cells for paediatric patients undergoing allogeneic stem cell transplants. These can be frozen and stored for future use by the donor or a matched recipient.

Corticosteroids (steroids) – A group of synthetic hormones, including prednisone, prednisolone, methylprednisolone and dexamethasone, used in the treatment of some leukaemias, lymphomas, myeloma, autoimmune conditions and other bone marrow diseases. They are also used to suppress graft rejection and graft-versus-host disease (GvHD) following stem cell transplants. Side effects may include an increased risk of infection, hypertension, high blood glucose levels, weight gain and sometimes thinning of the bones (osteoporosis) with longer-term use.

C-reactive protein (CRP) – A protein released by the liver in response to inflammation in the body. The level of CRP may be elevated in some conditions.

Creatinine – A waste product of muscle breakdown normally excreted by the kidneys. The level of creatinine in the blood will be raised if the kidneys are not functioning properly.

Cure – This means that there is no evidence of disease and no sign of the disease reappearing, even many years later.

Cyclosporin (CSA) – A drug used to prevent and treat rejection and graft-versus-host disease (GvHD) in allogeneic stem cell transplant patients by suppressing the normal immune system. Also used in aplastic anaemia and other autoimmune conditions.

Cytogenetics – The study of the structure of chromosomes. Cytogenetic tests are commonly carried out on samples of blood and bone marrow taken to detect chromosomal abnormalities associated with a disease. These tests help in the diagnosis and selection of optimal treatment. Results can be delayed because the cells may need to be grown for days in a test tube before analysis.

Cytokines – Chemicals excreted by the cells in the immune system to communicate with other cells during the coordination of the body's immune response.

Cytomegalovirus (CMV) – A virus that is usually harmless in healthy people but may cause serious infection in immunosuppressed patients. This can be particularly dangerous following a stem cell transplant.

Cytopenia – A reduction in the number of cells circulating in the blood.

Cytoplasm – The cellular substance outside the nucleus of each cell. Plasma cells are named as such because they contain a lot of cytoplasm.

Cytotoxic drugs – Anticancer drugs that act by killing or preventing the division of cells.

Deep vein thrombosis (DVT) – A blood clot in a deep vein, usually in the thigh or calf.

Deletion – A chromosome abnormality in which a part of the chromosome has been lost.

Deoxyribonucleic acid (DNA) – The cell's hereditary material that contains instructions for development, growth and reproduction. DNA is located in nearly every cell of the human body. DNA provides the essential building block for storing genetic material in 'tapes' or chromosomes. There are four different chemical compounds of DNA (bases) arranged in coded sequence as genes that determine an individual's inherited characteristics.

Depletion – A laboratory procedure for reducing the number of specific cell types within bone marrow donated for transplantation, e.g. the removal of some types of lymphocytes to avoid rejection or graft-versus-host disease (GvHD) particularly in unrelated donor stem cell transplants.

Diagnosis – The identification and naming of a person's disease.

Diaphragm – The layer of muscle under the ribs that divides the stomach and the abdomen from the chest cavity, and assists with breathing. See appendix A on page 37 for an image of the diaphragm.

Differentiation – The gradual maturation (ageing) of a cell whereby its function and properties become increasingly specialised, usually associated with increased function and specialisation. Leukaemia cells are often poorly differentiated, that is, they show immature characteristics. The more a cell is differentiated, usually the less able it is to divide.

Digestive system – The system in the body that deals with food and digestion, beginning at the mouth and ending at the anus. Turns food and fluids into fuel for the body.

Disease progression – Disease advancement, or worsening, despite treatment.

Diuretic – Drugs that increase the production of urine by the kidneys. These are sometimes used during chemotherapy or with a blood transfusion to prevent fluid overload, to treat heart or kidney failure, or to increase kidney flow. May be used during chemotherapy to assist with the excretion of anticancer drugs.

Donor lymphocyte infusion – The giving of lymphocytes from the donor of an allogeneic stem cell transplant. This is sometimes used to treat disease that has relapsed following a stem cell transplant.

Echocardiogram (ECHO) – Ultrasound scan of the heart.

Electrocardiogram (ECG) – Electrical trace of the heart.

Electroencephalogram (EEG) – Electrical brain recording.

Electrolytes – Various salts in the blood, e.g. sodium and potassium). Measurement helps to monitor kidney function.

Embolus – A blood clot that starts in the leg or other distant vein or artery, which breaks loose only to lodge elsewhere in the body and block blood supply, e.g. a clot in a vein may cause a problem in the lung (called a pulmonary embolism).

Engraftment – The process by which transplanted or transfused cells (e.g. after a stem cell transplant) begin to grow and reproduce themselves within the recipient.

Enzymes – Proteins that control the chemical reactions essential for life. Every cell contains many enzymes that control all of its functions.

Eosinophil – A type of white blood cell involved in inflammatory, allergic or antiparasitic responses. Usually present in the blood circulation in very low numbers.

Eosinophilia – Increased numbers of eosinophils circulating in the blood. This occurs occasionally in some cases of Hodgkin lymphoma (HL), in drug reactions, asthma, hay fever and parasitic infections.

Epidemiology – The science of studying the occurrence of disease in populations and relating this to genetic and/or environmental causes.

Epstein-Barr virus (EBV) – A common virus that causes glandular fever and sometimes post-transplant complications. Also associated with Burkitt lymphoma. Epstein and Barr are the two people who first described this virus.

Erythrocyte sedimentation rate (ESR) – A blood test that detects and monitors inflammation in the body. It is a measurement of the rate at which red blood cells fall to the bottom of the test tube. ESR increases in inflammation and infection and in diseases where antibodies are increased, such as myeloma. An abnormal ESR may indicate certain forms of cancer, autoimmune disease or infection.

Erythroleukaemia – A rare subtype of acute myeloid leukaemia (AML).

Essential thrombocythaemia (ET) – A disease where too many platelets are made in the bone marrow. Platelets are normally needed in the body to control bleeding, however when there are too many platelets they may clump together and make it hard for the blood to flow. This can lead to increased risks of inappropriate blood clots. See the LBC website for a fact sheet on ET.

Exterior beam – Delivering radiotherapy to the inside of the body by beaming (shining) radiation through the skin as opposed to delivering it internally through an implant in or near a tumour (known as brachytherapy or internal radiation).

Extra-nodal lymphoma – A lymphoma that presents outside the lymph nodes, in tissues containing lymphocytes. A term used when describing the extent and site(s) of disease.

Fanconi anaemia (FA) – A rare inherited type of aplastic anaemia where the cells of the body have an increased sensitivity to chemotherapy. FA carries an increased risk to the patient of developing leukaemia. May be treated by a stem cell transplant.

Febrile – Having a fever or a high temperature above the normal baseline (37°C).

Ferritin – The major iron storage protein in the body. The blood level of ferritin serves as an indicator of the amount of iron stored in the body. Ferritin is reduced in iron-deficiency anaemia, and can be grossly increased in untreated haemochromatosis.

Fine needle aspiration (FNA) – Removal of a small piece of tissue or fluid from a suspicious mass in the body using a hypodermic needle and syringe. The tissue is then microscopically examined and tested for cancer and other cells.

Foetus – An unborn child.

Folic acid – A vitamin necessary for marrow cell growth, obtained from green leafy vegetables, e.g. spinach. It is essential for the production of DNA and therefore the growth and division of cells. Also known as folate.

Folic acid antagonist – A chemical that inhibits a cell's capacity to use folic acid and so prevents cell division. An example is a drug called methotrexate, which is used to treat some leukaemias and autoimmune diseases.

Fungus – A minute infective agent such as a mould or yeast (includes candida and aspergillus), causing particular problems in immunosuppressed people. Usually larger than bacteria and harder to treat, fungi require different drugs that are not yet as easy to use as bacterial antibiotics.

Gamma globulin – A concentrated solution of the antibody fraction of human blood given through the vein to prevent or fight infections, e.g. measles in patients with low resistance. Gamma globulins are purified and sterilised from donated blood donations.

Generic drug – This is a more scientific name for a particular drug. Each drug company will have its own name for a particular drug, called the brand name. For example, ondansetron (generic name) is called Zofran (brand name) by one drug company. There may be different costs and pharmaceutical benefits of different brands. This should be discussed with your haematologist.

Genes – Collection of DNA on a chromosome, present in the nucleus of the cell. Genes direct the activities of cells. They are responsible for the inherited characteristics that distinguish one individual from another. Each person has an estimated 20,000 separate genes.

Genetic variants – Genetic differences between individuals, also known as polymorphisms. Most variants are harmless, whereas some affect the risk of disease and some cause disease (previously referred to as mutations).

Genome – The total set of genes and DNA carried by an individual or cell.

Grade – A term used to describe how aggressive a disease looks under the microscope.

Graft rejection – When the transplanted tissue is rejected by the recipient's immune system, which then destroys the transplanted tissue.

Graft-versus-host disease (GvHD) – A common, and sometimes serious, complication of allogeneic stem cell transplantation. Some of the donor's immune cells try and reject the patient's own cells as foreign. The skin, liver and gut may be affected. It can occur in either chronic or acute forms and is treatable by immunosuppressive drugs.

Graft-versus-leukaemia (GvL) – Occurs when the donor stem cells recognise antigens on the leukaemia blast cells as foreign and initiate immune-mediated clearance of the malignant cells. GvL is an important part of the antileukaemic effect of transplantation.

Granulocyte – A type of white blood cell containing granules in its cytoplasm (e.g. neutrophil, eosinophil, basophil). Granulocytes protect the body against infection by seeking out and killing microorganisms.

Groshong catheter – A form of central venous line/catheter.

Growth factors – A complex family of proteins produced by the body to control growth, division and maturation of blood cells by the bone marrow. Synthetic growth factors may be given to stimulate normal cell production following chemotherapy or transplantation. G-CSF (granulocyte-colony stimulating factor) is a synthetic growth factor that stimulates the production of neutrophils.

Growth hormone – A hormone secreted by the pituitary gland in the brain that controls growth and is particularly important during adolescence. Radiotherapy given to the head and neck of children may lead to a deficiency in growth hormone. This may be replaced by intramuscular injections of synthetic growth hormone.

Haem – Comes from a Greek word meaning blood. Used in many medical terms, e.g. haematologist and haemoglobin. (Spelled heme- in the USA.)

Haematocrit – Measurement of the proportion of the blood occupied by the red blood cell. The remaining blood volume is plasma.

Haematologist – A doctor specialising in the diagnosis and treatment of blood and bone marrow diseases.

Haematology – The study of diseases of the blood and bone marrow.

Haematoma – A localised collection of blood, usually clotted, in an organ, space or tissue. Due to a break in the wall of a blood vessel, usually after trauma.

Haematopoiesis – The process involved in blood cell formation. Also called haemopoiesis.

Haemochromatosis – A genetically inherited disorder involving excessive iron absorption leading to inappropriately high levels of iron in the organs. The stored iron levels may potentially become high enough to cause damage to major organs, especially the liver, but also the heart, pancreas, joints and the organs that produce hormones. This iron overload can be treated by venesection. See the LBC website for a fact sheet on haemochromatosis.

Haemoglobin – The iron-containing pigment in red blood cells that carries oxygen around the body. Lack of haemoglobin is one cause of anaemia. Normal haemoglobin levels vary with age and sex.

Haemolysis – The destruction of red blood cells, which leads to the release of haemoglobin from within the red blood cell into the blood plasma.

Haemophilia – A group of inherited disorders in which the ability of the blood to clot is impaired because of a deficiency of one of the clotting factors. The two most common forms of the disorder are haemophilia A (classic haemophilia due to factor VIII deficiency) and haemophilia B (factor IX deficiency).

Haemorrhage – The medical name for bleeding. Can occur inside the body (internal) as well as outside the body (external).

Haemorrhagic cystitis – A potential side effect of some high-dose chemotherapy (usually given before stem cell transplant), characterised by painful bladder spasms and blood in the urine.

Hairy cell leukaemia – A rare leukaemia distantly related to chronic lymphocytic leukaemia (CLL) and characterised by the presence of abnormal cells with hair-like projections. It typically occurs in middle age onwards. Treatment may involve removal of the spleen but the most common current therapy is a single course of the drug 2-chlorodeoxyadenosine (2-CdA), also known as cladribine.

Heparin – An anticoagulant drug that decreases blood clotting. Used to treat blood clots by preventing any increase or extension in clotting, while the body's own anticoagulation system clears the formed clots. Small amounts of heparin are also sometimes flushed into a central venous line/catheter in a patient to stop clots forming in the line.

Hepatitis – Inflammation of the liver from a number of causes including viral infections, chemicals, drugs and autoimmune conditions.

Hepatomegaly – Enlargement of the liver.

Hickman catheter – A type of central venous line/catheter that is inserted through the skin, under anaesthetic, into a major blood vessel in the chest. It is used for patients undergoing intensive therapy and provides a route for taking blood samples and the administration of drugs without repeated needle puncture of a vein. It may be a single, double or triple tube (or lumen). Other companies produce similar venous devices with different names (e.g. Groshong catheter).

High-dose therapy – The use of higher than normal doses of chemotherapy to kill off resistant and/or residual (leftover) cancer cells that have survived standard-dose therapy.

High-grade lymphoma – A fast-growing lymphoma.

Histology – The investigation of tissue samples by chemical and microscopic analysis.

Hodgkin lymphoma (HL) – A type of lymph gland tumour named after Thomas Hodgkin, who first identified the disease in the 19th century. Also known as Hodgkin's lymphoma or Hodgkin's disease. See the LBC website for a booklet on HL.

Human immunodeficiency virus (HIV) – The virus that causes AIDS (acquired immune deficiency syndrome).

Human leukocyte antigen (HLA) – A complex family of genetically inherited proteins found on the surface of cells throughout the body, which determine the match between patient and potential donor in stem cell transplantation. HLA factors are inherited from the mother and father and so the greatest chance of having the same HLA type is between brothers and sisters.

Human T-lymphotropic virus (HTLV) – A group of viruses that invade T-cells. Includes a rare leukaemia virus, HTLV 1, found primarily in Japan and the Caribbean, causing an increased incidence of T-cell leukaemia in these populations. The family of viruses also includes the AIDS-causing virus, HIV.

Hypercalcaemia – Abnormally high levels of calcium in the blood. Commonly associated with myeloma due to degradation of the bones but can occur in other cancers. It is dangerous if not controlled and leads to constipation, confusion, dehydration, renal failure and abnormal heart rhythms. Now commonly controlled by tablets or infusion of bisphosphonate drugs.

Hyperviscosity – Increased viscosity (thickness) of the blood, usually caused by a build-up of protein in the blood. Blood flow becomes more sluggish and slows the blood supply to various parts of the body, including the brain, and eyes.

Iatrogenic disease – A disease produced as a consequence of medical or surgical treatment.

Idiopathic – A term applied to diseases to indicate that the cause is unknown.

Iliac crest – The back of the hip bone (pelvis). A common site for a bone marrow biopsy.

Immature – Not fully developed, e.g. a cell that is immature is still at a baby stage. It will mature (or develop) over time to an adult stage.

Immune deficiency – Impaired ability of the body's defence mechanisms to combat infections by bacteria, viruses and fungi. This can also result in impaired resistance to cancer.

Immune response – The reaction of the body to a foreign antigen, e.g. an infectious agent, or to the tissues of another individual as in the rejection of an organ transplant.

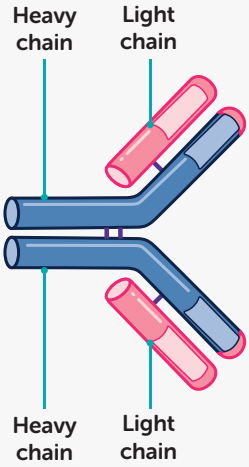
Immune system – The cells and tissues that make up the body's defence mechanism against infection and disease.

Immune thrombocytopenia (ITP) – A rare disorder characterised by an acute shortage of platelets as a result of their increased destruction in the spleen that can result in bruising and spontaneous bleeding. Antiplatelet antibodies are detectable in some cases. It may present in either acute or chronic form. See the LBC website for a fact sheet on ITP.

Immunocompromised – When the function of the immune system is reduced. Can be due to disease or treatment side effects.

Immunoglobulins – Proteins in the blood plasma that function as antibodies and play an important part in controlling infections. Immunoglobulins (Ig) are Y-shaped structures made up of two heavy chains and two light chains (see Figure 04). There are five main families of immunoglobulins, which are named after the heavy chains that form an important part of their structure: IgA, IgD, IgE, IgG and IgM. There are two types of light chains: kappa (κ) and lambda (λ). Purified immunoglobulins from blood donors (such as Intragam P) are used to prevent or treat infections.

Figure
04
Immunoglobulin structure



Immunophenotyping – Specialised laboratory test used to detect markers on the surface of cells. These markers identify the origin of the cell.

Immunosuppression – A treatment-induced reduction in the body's defence mechanisms. Deliberate immunosuppression is a necessary part of the stem cell transplant procedure to allow engraftment and to prevent graft-versus-host disease (GvHD).

Immunosuppressive drug – A drug that inhibits the body's normal defence mechanisms, e.g. cyclosporin.

Immunotherapy – Type of cancer treatment that works by boosting a person's own immune system to fight the cancer.

Indolent – Slow growing.

Informed consent – Understanding the information and accepting the possible risks and benefits of the treatment or procedure. Informed consent also means that other treatment or procedure options have been explained. Written consent means a consent form needs to be signed, verbal consent is where someone says they agree to a treatment or procedure.

Infusion – The giving of antibiotics, blood products, anticancer drugs or nutrients into a person's vein. The period of time an infusion is given varies from minutes to hours.

Intensification – Increasing the amount, number or combination of anticancer drugs given to a person in an attempt to kill aggressive, drug-resistant or residual malignant cells.

Interferon – A family of proteins derived from human cells which normally have a role in fighting viral infections. It is now available as a product of molecular engineering to be used in the treatment of some blood cancers and blood-related diseases.

Intramuscular (IM) injection – Injection of drugs into a muscle.

Intrathecal (IT) injection – Injection of drugs into the spinal fluid to prevent or treat brain or central nervous system (CNS) leukaemia or lymphoma, or to treat meningitis. The space between the brain and spinal cord and their coverings is known as the intrathecal space.

Intravenous (IV) injection – Injection of drugs into a vein.

Karyotype – Analysis to check the number, form and structure of chromosomes. Can give valuable information to aid in the diagnosis of disease and the selection of treatment.

Lactate dehydrogenase (LDH) – An enzyme normally produced by the body. Higher than normal blood levels of LDH may indicate the presence of tissue damage, a large amount of tumour, or a fast-growing tumour in the body.

Laparoscopy – An operation done through a small keyhole incision in the skin, often assisted by camera views. The spleen and gallbladder are often removed using this technique.

Laparotomy – An operation in which the abdominal cavity is opened.

Late effects – Side effects of chemotherapy and/or radiotherapy that only become apparent with long-term monitoring of the patient over a period of years. These are of particular concern in children treated before puberty.

Leukaemia – Cancer of the blood and bone marrow characterised by the widespread, uncontrolled production of large numbers of abnormal and/or immature blood cells. These cells take over the bone marrow and often spill out into the bloodstream and can accumulate in other organs.

Leukaemic blasts – Abnormal blast cells which multiply in an uncontrolled manner, crowding out the bone marrow and preventing it from producing normal blood cells. These abnormal cells also spill out into the bloodstream and can accumulate in other organs.

Leukapheresis – Method of separating blood into its liquid and cellular components for the removal of white blood cells before returning the remainder of the blood to the patient. Used to reduce an abnormally high white cell count in emergencies or when chemotherapy is to be avoided, such as during pregnancy. Also the technique used to collect stem cells from the blood to be used in transplants.

Leukocytes – Collective term for white blood cells. Leuko = white; cyte = cell.

Leukopenia – Condition in which the number of white blood cells in the blood is greatly reduced. When the white cell count is very low, there is an increased risk of infections.

Lineage – Term used to describe cell families with a common ancestry that develop from the same type of immature cell, e.g. lymphoid lineage refers to immature and mature lymphocytes.

Localised disease – Disease that is confined to a small area or areas of the body.

Long-term survival – Used to describe the survival of leukaemia patients who have been disease-free for a prolonged period of time, usually at least five years. The chance of the disease returning (relapse) decreases with time.

Low grade lymphoma – A slow-growing lymphoma.

Lumbar puncture – A procedure for removing cerebrospinal fluid from around the spinal cord using a fine needle in the lower part of the back. Samples are analysed for evidence of infection or CNS disease. Also used to administer anticancer drugs either to prevent or treat central nervous system (CNS) disease.

Lupus anticoagulant – An antibody produced by the body that interferes with blood coagulation and can lead to thrombosis. This antibody can occur spontaneously or in certain diseases such as systemic lupus erythematosus (SLE).

Lymph – The almost colourless fluid in the lymphatic system that transports lymphocytes around the body.

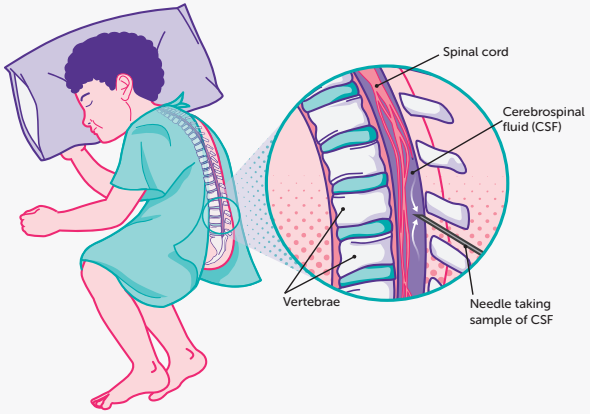
Lymphatic system – An extensive network of vessels that carries a fluid called lymph through almost all tissues in the body. The lymphatic system is part of the immune system. See appendix B on page 38 for an image showing the lymphatic system including the spleen, thymus, bone marrow, lymph nodes and lymph vessels.

Lymph nodes – Tissue structures found throughout the body in the neck, groin, armpit and abdomen that contain both mature and immature lymphocytes. These can be enlarged in infections or cancers, especially lymphomas. Also known as lymph glands.

Lymphocytes – Specialised white blood cells involved in defending the body against disease and infection. There are two types of lymphocytes: B-lymphocytes (B-cells) and T-lymphocytes (T-cells).

Lymphoma – A cancer that originates from the uncontrolled cancerous proliferation of lymphocytes. These lymphoma cells can be found in lymph glands, the spleen and other tissues. Lymphoma can spread to involve the bone marrow and blood and then look like leukaemia. The general term 'lymphoma' includes over 40 different forms of the

Figure 05
Lumbar puncture



disease, classified in two main categories: Hodgkin lymphoma and non-Hodgkin lymphoma.

Lymphoproliferation – An increase in the production of lymphocytes. May occur as a normal response to infection or as a consequence of a lymphoproliferative disorder such as a lymphoma or chronic lymphocytic leukaemia (CLL).

Macroglobulinaemia – A condition where the blood contains high levels of large proteins (macroglobulins, IgM antibodies) and is too thick to flow through the small blood vessels. The most common cause is a condition called Waldenstrom macroglobulinaemia, where clonal cancerous lymphoid cells make the abnormal antibody.

Macrophage – A type of white blood cell that migrates from the blood into tissues and acts as a scavenger, ingesting particles such as bacteria.

Magnetic resonance imaging (MRI) – A body scanning technique that uses an intense magnetic field to generate three dimensional (3D) images of internal organs and structures. Properties of normal and cancerous cells differ, allowing malignant tumours to be identified.

Maintenance treatment – Treatment given for a period of months or years to maintain remission and eliminate or suppress any residual leukaemia cells in the body, usually for acute lymphoblastic leukaemia (ALL).

Malignancy – A term applied to tumours characterised by uncontrolled proliferation of cells. See cancer.

Matched unrelated donor (MUD) transplant – An allogeneic stem cell transplant where the donor is unrelated to the patient but has a similarly matched tissue type. Also called voluntary unrelated donor (VUD) transplant, or unrelated donor (URD) transplant.

Mediastinum – The central part of the chest surrounded by the lungs and heart containing thymus and lymph glands.

Megakaryocyte – Large cells in the bone marrow that produce platelets by maturing and fragmenting into discrete platelets.

Minimal residual disease (MRD) – A very small number of cancer cells that remain in the body during or after treatment. MRD can be found only by highly sensitive laboratory tests that are able to find one cancer cell among one million normal cells. This is called MRD testing. Also referred to as measureable residual disease.

Mobilisation – A process using drugs and growth factors by which increased numbers of stem cells are produced that then overflow out of the bone marrow into the blood stream ready for collection via apheresis. This is done to collect adequate numbers of stem cells for transplantation.

Monoclonal antibodies – A type of protein made in the laboratory that can bind to substances in the body, including cancer cells. There are many kinds of monoclonal antibodies. A monoclonal antibody is made so that it binds to only one substance. Monoclonal antibodies are being used to treat some types of cancer, either alone or to carry drugs directly to cancer cells.

Monoclonal B-cell lymphocytosis (MBL) – A common condition, where there is a small clone of identical lymphocytes. Occasionally progresses to chronic lymphocytic leukaemia (CLL) or a similar condition.

Monoclonal gammopathy of undetermined significance (MGUS) – A benign condition in which there is a detectable monoclonal protein (antibody) in the blood. Requires regular monitoring as a small percentage may progress to develop myeloma. See the LBC website for a fact sheet on MGUS.

Monocyte – A type of white blood cell or macrophage of the blood that works with neutrophils and lymphocytes to fight infection. They also help act as scavengers (cleaners) to remove dead tissue.

Monocytic/monoblastic leukaemia – Cancer of the bone marrow due to growth or proliferation of cells of the monocyte series. A subtype of acute myeloid leukaemia called acute monocytic leukaemia (AMoL).

Monosomy – A term indicating the loss of a whole chromosome, such as monosomy 7. Each person usually carries 46 chromosomes (23 pairs), but in monosomy there is a reduction to 45.

Mucositis – Inflammation of the lining of the mouth, throat or gut (stomach and bowels).

Multiple myeloma – See myeloma.

Mutation – A minute change to the DNA code, caused (for example) by exposure to hazardous chemicals or copying errors during cell division. Some mutations can affect normal cell function, leading to disease development, and can be inherited by the next generation. Increasingly being referred to as a variant.

Myeloblasts – Immature stem cells of the myeloid series, which arise from primitive stem cells and develop into mature granulocytes and monocytes.

Myelodysplastic syndromes (MDS) – A group of bone marrow disorders in which the bone marrow does not make enough healthy blood cells (white blood cells, red blood cells and platelets) and there are abnormal cells in the blood and/or bone marrow. When there are fewer healthy blood cells, infection, anaemia or bleeding may occur. Sometimes MDS becomes acute myeloid leukaemia (AML). See the LBC website for a booklet on MDS.

Myelofibrosis – See primary myelofibrosis. Myelofibrosis can happen on its own (primary myelofibrosis). Secondary myelofibrosis is a reactive state that can develop from another bone marrow disorder.

Myeloma – A cancer of plasma cells, which are a type of white blood cell that forms part of the immune system. Abnormal plasma cells grow uncontrollably and cause damage to the body. Excess myeloma cells can form collections known as tumours (plasmacytomas) that accumulate in different parts of the body, most commonly in the bone marrow and on the surfaces of different bones. Myeloma may also be called multiple myeloma or plasma cell myeloma. See the LBC website for a booklet on myeloma.

Myeloproliferative neoplasms (MPN) – A group of diseases in which the bone marrow makes too many cells (either red blood cells, white blood cells or platelets). MPNs are a type of blood cancer. The four main types of chronic myeloproliferative neoplasms are essential thrombocythaemia (ET), polycythaemia vera (PV), primary myelofibrosis (PMF) and chronic myeloid leukaemia (CML).

Neuropathy – Damage to nerves, usually of hands and feet. This is seen in diseases such as diabetes, but can also occur as a side effect of treatment with certain drugs used to treat some blood cancers.

Neutropenia – A reduction in the number of circulating neutrophils. Causes include bone marrow disease, chemotherapy, infection, autoimmune disorders, vitamin B12 deficiency and folate deficiency.

Neutrophils – The most common type of cell within the granulocyte group of white blood cells. They are needed to mount an effective fight against bacterial infection.

Non-Hodgkin lymphoma (NHL) – A large group of cancers of lymphocytes (white blood cells). NHLs can occur at any age and are often marked by lymph nodes that are larger than normal, fever and weight loss. There are many different types of NHL, which can be divided into aggressive (fast-growing) and indolent (slow-growing) types, and they can be formed from either B-lymphocytes (B-cells) or T-lymphocytes (T-cells). See the LBC website for a booklet on NHL.

Non-myeloablative (reduced-intensity) transplant – Term used to describe a type of stem cell transplant where lower dosages of chemotherapy and/or radiotherapy are used than those in a standard transplant, and the patient's bone marrow is not totally eradicated prior to receiving the donor cells.

Nucleus – The central body of a cell that contains the chromosomes with the genetic code for controlling the cell's activities.

Oncogenes – Genes with the potential to cause cancer.

Oncologist – General term for a specialist who treats cancer, e.g. medical, surgical or radiation oncologist.

Osteoporosis – A condition whereby the bones become brittle and fragile and can break more easily.

Packed cell volume (PCV) – Measurement of the proportion of the blood occupied by the red blood cells when packed down in a test tube. The remaining blood volume is plasma.

Paediatrician – A doctor who has special training in medical care for infants, children and adolescents.

Paediatrics – The area of medicine that cares for infants, children and adolescents, including their development and managing diseases and treatments.

Palliative care – Treatment aimed at relieving symptoms, pain and improving quality of life rather than curing a disease. This type of treatment is given to all patients, often in addition to other treatment aimed at reducing the cancer size or disease activity. Patients with advanced disease receive palliative care to relieve pain and other symptoms, even when curative treatment is no longer an option.

Pancytopenia – Reduced numbers of all types of blood cells (especially red cells, neutrophils and platelets).

Paraprotein (monoclonal protein) – Abnormal accumulation of the antibody produced by mature B-cells (usually plasma cells). Paraproteins are associated with diseases such as myeloma and some lymphomas but do occur commonly in older people, sometimes without any disease evolving.

Partial remission – The disease has responded to treatment but remains detectable.

Pathogenesis – The process of disease development.

Pathologist – A doctor who specialises in the laboratory diagnosis and investigation of diseases.

Peripheral blood stem cells – Stem cells that have spilled over from the bone marrow into the bloodstream and are circulating in the blood throughout the body.

Peripherally inserted central catheter (PICC) line – A long, thin tube that is inserted through a vein in the arm and passed through to the larger veins near the heart. This is used in patients undergoing intensive therapy for the administration of drugs, transfusions and other treatment and may also be used for taking blood samples.

Pernicious anaemia – A rare blood disorder characterised by the inability of the body to properly absorb vitamin B12, which is essential for the development of red blood cells. In most cases it results from a lack of gastric protein, known as intrinsic factor, without which vitamin B12 cannot be absorbed.

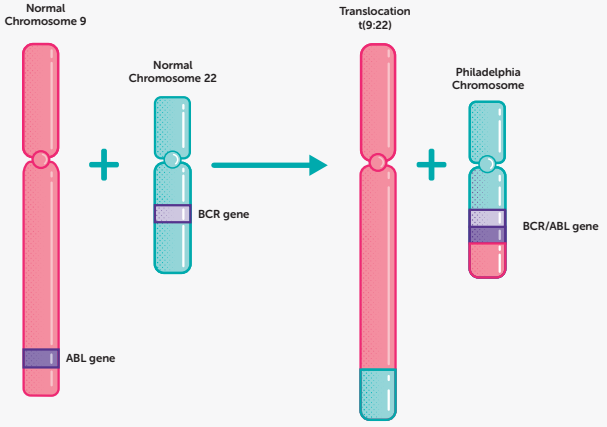
Petechiae – Small red or purple pinhead spots on the skin caused by minor bleeding from broken capillary blood vessels (usually a result of a low platelet count). Petechiae commonly appear in clusters and may look like a rash. They are usually flat to the touch and don't lose their colour when pressed on.

Pharmacokinetics – The study of the action of a drug in the body over a period of time, including absorption, metabolism and excretion.

Philadelphia (Ph) chromosome – The abnormal chromosome present in almost all cases of chronic myeloid leukaemia (CML)

Figure 06

Philadelphia chromosome translocation



and in some cases of acute lymphoblastic leukaemia (ALL). It is formed when part of chromosome 9 (ABL1 gene) breaks off and attaches itself to part of chromosome 22 (BCR gene) in a process called translocation (see page 35 for definition of translocation). This translocation—t(9;22) —produces a new gene BCR-ABL1 and can be measured with PCR testing. Named Philadelphia after the city where it was first described.

Plasma – A light-yellow coloured fluid in the blood. This fluid carries the blood components throughout the body. The main role of plasma is to take nutrients, hormones and proteins to parts of the body that need it.

Plasma cell – Large B-cells derived from mature lymphocytes. Not normally found in circulating blood but restricted to bone marrow and lymph nodes where they make antibodies.

Plasma cell leukaemia – A condition when immature plasma cells are found circulating in the blood. Can occur in advanced multiple myeloma.

Plasmacytoma – When myeloma cells (abnormal plasma cells) collect in one location, forming a single tumour. Can form in the bones/bone marrow or may be extramedullary (in tissues outside of the bone marrow).

Plasmapheresis – The removal of plasma from the blood via apheresis. The blood goes through an apheresis machine, which extracts the plasma, separating it from the other blood cells. These blood cells are then returned to the donor.

Platelets – Type of blood cells produced in the bone marrow that circulate in the blood, playing an important role in the prevention and immediate control of bleeding.

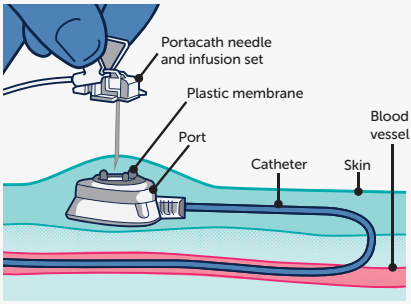
Pneumocystis – Pneumocystis jirovecii is a fungus that causes pneumocystis pneumonia (PJP). PJP can occur in immunosuppressed individuals, including those who have been receiving certain types of chemotherapy. Some people will be prescribed an antibiotic (usually cotrimoxazole) to prevent this infection.

Polycythaemia vera (PV) – A rare disease where there are too many red blood cells made in the bone marrow. People with PV are at increased risk of clotting due to excessive numbers of red blood cells in the circulating blood. Treatment usually includes the removal of blood cells by bloodletting (known as venesection) combined with drugs to suppress marrow production of cells to prevent the blood clotting.

Polymerase chain reaction (PCR) – Type of blood test looking at molecular changes in a cell's DNA. Used in the diagnosis and monitoring of conditions such as BCR-ABL1 levels (see Philadelphia (Ph) chromosome) in chronic myeloid leukaemia (CML).

Portacath – A form of central venous line with a reservoir implanted under the skin in the chest or abdomen. Used in patients undergoing intensive therapy and provides a route for taking blood samples and administering drugs, transfusions and other treatment.

Figure 07
Portacath



Positron emission tomography (PET scan) – An imaging test that can help reveal the metabolic or biochemical function of organs and tissues in the body. The PET scan uses a radioactive drug to show both normal and abnormal metabolic activity. Can help distinguish between cancerous and non-cancerous tissue deep in the body.

Power of attorney – One person gives another person legal permission to act on their behalf, such as making decisions about their health or operating their bank account. A lawyer can usually arrange this.

Pre-leukaemia – A general term referring to some cancerous blood disorders, such as myelodysplasia, which carry an increased risk to the patient of developing acute leukaemia.

Primary myelofibrosis (PMF) – A rare disease that disrupts the body's normal production of blood cells. Myelofibrosis causes extensive scarring in the bone marrow, leading to anaemia that can cause weakness and fatigue. Bone marrow scarring can also cause low numbers of platelets, which increases the risk of bleeding. Myelofibrosis often causes an enlarged spleen. Myelofibrosis belongs to a group of diseases called myeloproliferative neoplasms (MPN). Secondary myelofibrosis is a reactive state that can develop from another bone marrow disorder. See the LBC website for a fact sheet on primary myelofibrosis.

Progenitor cell (precursor cell) – An immature cell in the bone marrow with the potential to develop into a functioning mature blood cell.

Prognosis – An assessment of the likely progression of disease, particularly concerning the chances of cure, complete recovery or likely years of survival.

Proliferation – Rapid increase (or growth) in the number or amount of something.

Prolymphocytic leukaemia – An aggressive B-cell leukaemia similar to chronic lymphocytic leukaemia (CLL) in which the malignant cells have a more immature appearance. Treatment for this disease may require removal of the spleen, chemotherapy and/or radiotherapy.

Prophylaxis – Precautionary treatment given with the aim of preventing a disease or event occurring, e.g. an antibiotic to prevent infection.

Protocol – A schedule of treatment that defines the number, frequency and timing of administration of medications, procedures and tests. May refer to a clinical trial, chemotherapy or stem cell transplant schedule.

Psychological – Concerning a person's mental and emotional well-being.

Pulmonary – Of the lungs. See appendix A on page 37 for an image showing the lungs.

Pure red cell aplasia (PRCA) – A rare condition of severe anaemia characterised by a very low reticulocyte count and the virtual absence of red cell precursors in the bone marrow. Platelets and white blood cells are usually not affected.

Purpura – A small bleed (up to about 1cm in diameter) in the skin or a mucous membrane (such as the lining of the mouth), which may be caused by a shortage of platelets, clotting factors or because of trauma.

Quality of life (QOL) – A person's perception of their position in life in the context of their culture and value system and in relation to their goals, expectations, standards and concerns. Can be a measure of how a disease and its treatment is affecting a person, and their ability to achieve what is important to them.

Radiation – Energy that is radiated or transmitted in the form of rays or waves of particles.

Radiation field – The area of the body to which the radiation therapy is targeted.

Radiation oncologist – A doctor who specialises in the treatment of cancer by radiation therapy. Calculates the dose and location of treatment.

Radiation therapist – Also known as medical radiation therapist (MRT). Specially trained to administer radiation therapy treatment.

Radiation therapy – A cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumours. At low doses, radiation is used in X-rays to see inside the body (e.g. teeth or broken bones). Radiation can be administered by injection, an external beam or by an internally placed tube (brachytherapy). Also known as radiotherapy.

Radiology – A field of medicine that uses a variety of technologies, including X-rays, for diagnostic and therapeutic purposes.

Randomised trial – A scientific study where patients are randomly allocated to one, two or more therapies to test effectiveness and toxicity. The type of treatment is sometimes blinded, meaning that the patient and their doctors do not know who is receiving which form of treatment. These trials are regularly reviewed by investigators, coordinators and ethics committees and if at any time one treatment option is found to be superior, future patients are usually likely to receive that therapy.

Recombinant – A term used to describe drugs that have been produced using genetic engineering techniques. The products are exact equivalents of compounds produced naturally by the body.

Red blood cells – The cells of the blood containing haemoglobin, which carries oxygen from the lungs to all the tissues of the body. Low haemoglobin is called anaemia. Sometimes referred to as red cells or red corpuscles.

Reduced-intensity conditioning (RIC) – Refers to a conditioning regimen that uses less chemotherapy and radiation than the standard regime, which destroys the patient's bone marrow cells prior to stem cell transplantation. The goal of using an RIC regime is to decrease transplant-related complications.

Reed-Sternberg cell – A large, abnormal lymphocyte (type of white blood cell) that may contain more than one nucleus. These cells are found in Hodgkin lymphoma.

Refractory anaemia (RA) – An older name for a type of myelodysplasia that primarily affects red blood cell production by the bone marrow. In some cases the developing red blood cells show an internal ring of iron granules, which are called sideroblasts. Refractory anaemia (RA) and refractory anaemia with sideroblasts (RAS) are older names for types of myelodysplastic syndromes (MDS).

Refractory anaemia with excess blasts (RAEB) – An older name for a form of myelodysplasia characterised by the accumulation of immature white blood cells in the bone marrow. It is now called MDS-EB. If the immature cells are particularly numerous, it may indicate a risk of transformation to acute leukaemia.

Relapse – The recurrence of disease in the bone marrow or other organs after a remission has been achieved. In leukaemia, this may be indicated by changes in the blood, bone marrow, central nervous system (CNS) or testes, even before the patient experiences any symptoms.

Remission – Restoration of the blood, bone marrow and general health of the patient to normal. Usually induced by chemotherapy and/or radiotherapy.

Remission induction – The initial course of treatment given to patients to remove all clinically detectable cancer. Also known as induction chemo.

Renal – Related to the kidney. See appendix A on page 37 for an image showing the kidneys.

Resistant or refractory disease – When the disease is not responding to treatment.

Reticulocytes – Immature red blood cells normally restricted to the bone marrow and present in the bloodstream in low numbers (0.2–2% of all red blood cells). An increased reticulocyte count in the blood indicates increased red blood cell marrow production, as occurs following chemotherapy, after bleeding or in haemolytic anaemia. An absence of reticulocytes is seen in pure red blood cell aplasia or temporarily after chemotherapy.

Retinoic acid – A synthetic compound related to vitamin A, which can stimulate some marrow cells to become fully mature. It may be used to treat some forms of leukaemia, notably a subtype of acute myeloid leukaemia (AML) called acute promyelocytic leukaemia (APL/APML).

Ribonucleic acid (RNA) – A copy of the genetic code or DNA, used by cells as a template for making proteins.

Rigors – A chill (feeling cold), usually with shivering, at the onset of having a high fever (temperature).

Second primary cancer – A term used to describe a new primary cancer that occurs in a person who has had cancer in the past. Second primary cancers may occur months or years after the original cancer was diagnosed and treated. Certain types of cancer treatment, such as chemotherapy and radiation, may increase the risk of a second primary cancer.

Septicaemia – A general term to describe a serious bacterial infection in the body, with leakage into the blood of substances that cause high fever and sometimes shock.

Serum – The part of the blood plasma which remains after cells, platelets and fibrinogen have been removed, usually by allowing the blood to clot.

Serum free light chain (SFLC) assay – A test which helps detect, diagnose and monitor plasma cell disorders, e.g. myeloma, and/or to monitor the effectiveness of treatment. Light chains are proteins produced by plasma cells. Also called kappa (κ) and lambda (λ) light chains, they link together with other proteins (heavy chains) to form immunoglobulins (also known as antibodies). Within a plasma cell, two light chains and two heavy chains combine to form an immunoglobulin. SFLC testing measures the amount of kappa and lambda light chains in the blood and calculates a kappa/lambda ratio. Free light chains in the urine have historically been referred to as Bence-Jones protein (BJP).

Severe combined immunodeficiency disease (SCID) – A group of rare disorders caused by mutations in different genes involved in the development and function of infection-fighting immune cells. Children born with SCID are susceptible to severe infections and require treatment that can include stem cell transplant, gene therapy or enzyme therapy.

Shingles – A skin infection caused by the reactivation of the herpes zoster virus that has remained dormant in the nerves of the body after a previous episode of chickenpox. Shingles is a painful condition that involves inflammation of sensory nerves and causes numbness, itching or pain followed by the appearance of clusters of little blisters or vesicles. People with a weakened immune system have an increased risk for developing shingles as the dormant virus can become active again more easily. Treatments include the early use of antiviral drugs and techniques to reduce the nerve pain.

Sibling – Brother or sister.

Sickle cell anaemia – One of a group of disorders known as sickle cell disease. Sickle cell anaemia is an inherited blood disorder in which haemoglobin, the molecule in red blood cells that delivers oxygen to the cells throughout the body, becomes defective and causes the red blood cells to change shape (to crescent moons or sickles).

Sickle cell disease – A group of disorders that affects haemoglobin, the molecule in red blood cells. The red blood cells, normally disc shaped, become crescent shaped. Sickle cell disease is particularly prevalent in Africa and the Middle East.

Side effect – Unintended effect of a drug or treatment.

Spleen – An organ that accumulates lymphocytes, acts as a reservoir for red blood cells for emergencies, and destroys blood cells (red blood cells, white blood cells and platelets) at the end of their lifespan. The spleen, situated high on the left side of the abdomen under the ribcage, is often enlarged in leukaemia and some other blood cancers or blood conditions. See appendix A on page 37 for an image showing the spleen.

Splenectomy – Surgical removal of the spleen done by laparoscopic techniques or laparotomy. This procedure is sometimes recommended as part of treatment for some blood cancers and blood conditions.

Splenomegaly – Enlargement of the spleen.

Stable disease – When a disease is stable, it is not getting any better or worse, with or without treatment.

Staging – An assessment of the spread of disease through the body, e.g. in lymphoma. Stage 1 usually means localised disease only, whereas stage 4 represents widespread disease. Staging can be important for determining the best treatment option.

Standard therapy – The most effective and safest therapy (treatment) currently being used.

Stem cell mobilisation – The use of chemotherapy and/or growth factors to move blood stem cells out of the bone marrow and into the bloodstream, where they can be collected (harvested).

Stem cells – Primitive cells that mature and can give rise to more than one cell type. There are many different types of stem cells in the body. See blood stem cells for information specific to stem cells found in the bone marrow.

Stem cell transplant – A procedure where stem cells are infused through a drip (IV) into the bloodstream after having high doses of chemotherapy and sometimes radiotherapy. With high-dose chemotherapy, stem cells are destroyed and cannot recover by themselves, so patients are given 'new' stem cells to replace those that were destroyed. Stem cell transplants can be autologous (collected from the patient) or allogeneic (collected from another person). A stem cell transplant may also be called a bone marrow transplant or a peripheral blood stem cell transplant.

Sternum – The breastbone, a site sometimes used for a bone marrow biopsy.

Subcutaneous injection – An injection into the tissue immediately under the skin.

Supplements – Tablets or liquids that are taken as well as a regular food. Supplements can include vitamins, minerals and herbs.

Supportive care – Treatment options to help a person cope with their diagnosis of a blood cancer or blood condition, the symptoms of that disease, and the impact of treatment. Supportive care ensures the best quality of life. Examples of supportive care include, blood transfusions, pain relief or support from a dietitian, psychologist or social worker.

Syngeneic – Identical twins that have exactly the same genes.

Systemic – Throughout the body.

Systemic lupus erythematosus (SLE) – A chronic autoimmune disease where the immune system attacks its own tissues, causing widespread inflammation and tissue damage in the affected organs. May affect the blood, skin, joints, kidneys, heart, lungs and nervous system.

Testicular relapse – Recurrence of leukaemia in the testicles. The disease may be restricted to the testicles or may also be present in the bone marrow or central nervous system (CNS). Treatment will depend on the timing and extent of the relapsed disease.

Thalassaemia – An inherited disease of the red blood cells where a genetic defect results in the reduced synthesis of one of the globin chains of the haemoglobin molecule. Can result in mild blood changes such as smaller-sized red blood cells, or severe anaemia.

Thrombocythaemia – A rare clotting disorder that causes an over-production of platelets. Also known as essential thrombocythaemia (ET), which is part of a group of conditions called myeloproliferative neoplasms (MPN).

Thrombocytopenia – Abnormally low platelet count in the blood.

Thromboembolism – Blockage of a blood vessel by a clot that can travel or has moved in the bloodstream to the heart, lungs or brain, where it can cause serious damage.

Thrombophilia – A group of inherited or acquired disorders that increase a person's risk of developing thrombosis (abnormal blood clotting).

Thrombosis – The development of a clot in a blood vessel, usually in a vein but sometimes in an artery. Potentially life-threatening if left untreated.

Thymus – The gland at the base of the neck that is involved in the production of functional T-cells. White blood cells destined to be T-lymphocytes complete their development in the thymus after leaving the bone marrow. The thymus gland can be markedly enlarged in some cases of acute lymphoblastic leukaemia (ALL), Hodgkin lymphoma and thymoma. See appendix A on page 37 for an image showing the thymus.

Tissue typing – Testing of a person's human leukocyte antigen (HLA) type on their white blood cells. Analyses of blood samples from the patient, their family and prospective donors are performed when a stem cell transplant is being considered, to find a matched donor.

T-lymphocyte – A type of white blood cell derived from the thymus involved in controlling immune reactions and fighting certain infections. Uncontrolled growth of this type of cell gives rise to T-cell leukaemia/lymphoma. Also called T-cells.

Tomography – The process of generating X-ray pictures of internal organs of the body. CT scanning is a special type of tomography.

Total body irradiation (TBI) – Radiotherapy often given in several doses or fractions prior to stem cell transplantation with the aim of killing any residual cancer in the patient. Used in conjunction with high-dose anticancer drugs.

Transformation – A term used to describe either the change of a normal cell into a cancerous cell or the acceleration of disease, e.g. in chronic myeloid leukaemia (CML), transformation from the chronic to a more acute phase characterised by the production of large numbers of blast cells.

Translocation – A chromosome abnormality in which part of one chromosome has transferred to another. See Figure 06 on page 27 for an example of a translocation between chromosomes 9 and 22, which results in a chromosome called the Philadelphia (Ph) chromosome.

Trisomy – A term used to indicate the presence of an additional chromosome. Each cell usually has 46 chromosomes but in trisomy this is increased to 47.

Tumour – An accumulation or mass of abnormal cells, which may be benign (non-cancerous) or malignant (cancerous).

Tyrosine kinase – An enzyme that helps send growth signals in cells so blocking it stops the cell growing and dividing.

Tyrosine kinase inhibitors (TKIs) – A group of drugs that inhibit tyrosine kinases.

Ultrasound (ultrasonography) – Pictures of the body's internal organs built up from the interpretation of reflected sound waves. Used frequently to determine the size of the liver and spleen, and also to see if there is a thrombosis in leg veins.

Urinary tract infection (UTI) – An infection in any of the parts of the body that make or store urine or take urine out of the body, e.g. bladder or kidneys.

Vaccine – A substance introduced into a person's body to prevent them from getting a specific disease by stimulating an immune response in the body to prevent future infections with similar microorganisms.

Variant – See genetic variant.

Venesection – Incision of a vein for the removal or withdrawal of blood. Also called phlebotomy

Veno-occlusive disease (VOD) also known as hepatic sinusoidal obstructive syndrome (SOS) – A complication of stem cell transplant or high-dose chemotherapy where the blood vessels that pass through the liver become blocked. Blood flow in the liver is reduced, leading to toxic changes in the liver and a reduction in normal liver function.

Ventilator – A machine that maintains a patient's breathing by mechanical means.

Vinca alkaloids – A group of chemotherapy drugs originally derived from vinca (periwinkle) plants. Drugs of this type include vincristine and vinblastine.

Virology – The study of viruses and viral diseases.

Virus – A minute infective agent that depends on the cell it infects for its replication and survival. Sometimes a virus behaves like a 'wild gene' and attaches to the genetic code.

Von Willebrand disease (VWD) – A blood disorder in which the body does not clot properly. Blood contains many proteins that help the blood clot when needed, one of which is called von Willebrand factor (VWF). People with VWD either have a low level of VWF in their blood or the VWF protein doesn't work the way it should.

Waldenstrom macroglobulinaemia (WM) – An indolent (slow growing) type of non-Hodgkin lymphoma that starts in the white blood cells of the immune system. It is also known as lymphoplasmacytic lymphoma. Abnormal lymphoplasmacytic cells multiply out of control, causing an overproduction of a protein called monoclonal immunoglobulin M (IgM) or macroglobulin antibody.

Warfarin – An anticoagulant drug used to prevent the blood from clotting and to treat blood clots. Warfarin works by suppressing the production of some clotting factors and thereby inhibiting the clotting of blood. An international normalised ratio (INR) blood test measures warfarin therapy.

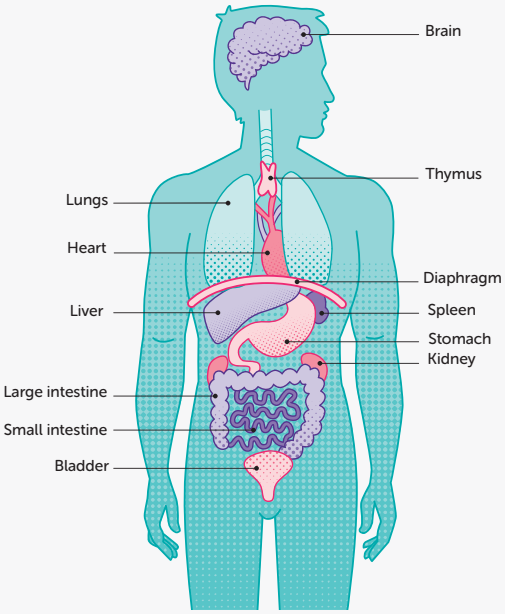
White blood cells – Also known as leukocytes, these include several different types of cells within three main groups: granulocytes, lymphocytes and monocytes. White blood cells are formed in the bone marrow and it is usually their uncontrolled proliferation that leads to leukaemia. Sometimes referred to as white cells.

X-ray – A form of radiation used both in diagnosis and treatment.

Zoster immune globulin (ZIG) – Gamma globulin directed specifically against the chickenpox or shingles virus (also known as herpes zoster), which is sometimes given to an immunosuppressed patient following direct contact with the virus to prevent infection.

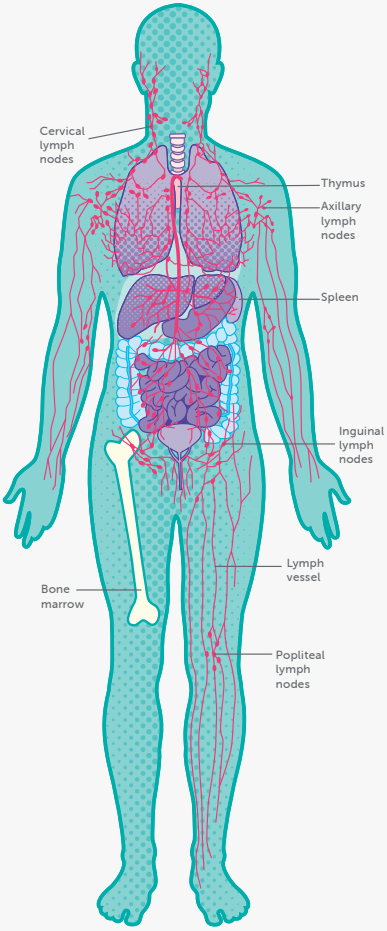
APPENDIX A

Figure
08
Main organs of the body



APPENDIX B

Figure
09
The lymphatic system



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QUESTIONS AND NOTES

HAEMATOLOGY CENTRES IN NZ

Centre	Address	Phone
Whangarei Hospital	Hospital Road, Whangarei	09 430 4100
North Shore Hospital	Shakespeare Road, Takapuna, Auckland	09 486 8900
Auckland City Hospital	Park Road, Grafton, Auckland	09 367 0000
Starship Hospital	Park Road, Grafton, Auckland	09 367 0000
Middlemore Hospital	Hospital Road, Otahuhu, Auckland	09 276 0044
Waikato Hospital	Pembroke Street, Hamilton	07 839 8899
Thames Hospital	Mackay Street, Thames	07 868 0040
Tauranga Hospital	Cameron Road, Tauranga	07 579 8000
Rotorua Hospital	Pukeroa Street, Rotorua	07 348 1199
Hastings Hospital	Omahu Road, Hastings	06 878 8109
Whakatane Hospital	Stewart Street, Whakatane	07 306 0999
Palmerston North Hospital	Ruahine Street, Palmerston North	06 356 9169
Wellington Hospital	Riddiford Street, Newtown	04 385 5999
Nelson Hospital	Tipahi Street, Nelson	03 546 1800
Christchurch Hospital	Riccarton Avenue, Christchurch	03 364 0640
Dunedin Hospital	Great King Street, Dunedin	03 474 0999
Invercargill Hospital	Kew Road, Invercargill	03 218 1949

Contacting us

Leukaemia & Blood Cancer New Zealand provides services and support throughout New Zealand. Every person's experience of living with a blood cancer or condition is different. Living with leukaemia, lymphoma, myeloma or a related blood condition is not easy, and our Support Services Coordinators are here to help.

Freephone 0800 15 10 15
Telephone 09 638 3556
Facsimile 09 638 3557
Email info@leukaemia.org.nz

National Office
6 Claude Road, Epsom 1023
PO Box 99182, Newmarket 1149
Auckland, New Zealand

leukaemia.org.nz

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