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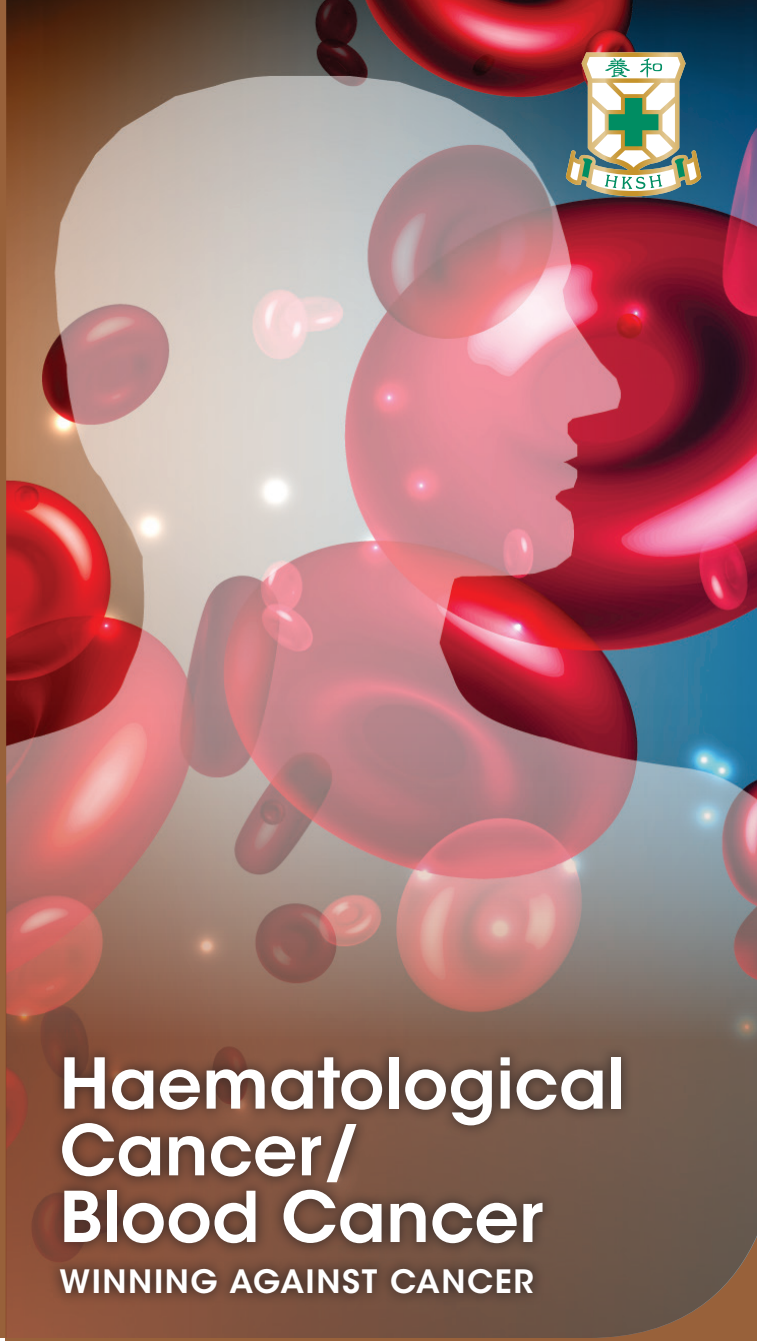
OC.005I.H/E-01-012020



Haematological Cancer/ Blood Cancer

WINNING AGAINST CANCER

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Leukaemia, lymphoma and myeloma are the three major categories of blood cancer. In Hong Kong, over 1,000 new cases are diagnosed each year.

What is leukaemia?

Leukaemia is the malignancy of white cells. While the causes of leukaemia are mostly unknown, it is occasionally related to past chemotherapy or previous radiation exposure, and may be preceded by myelodysplastic syndrome or myeloproliferative disease.

There are 3 main types of leukaemia, i.e. acute leukaemia, chronic lymphocytic leukaemia and chronic myeloid leukaemia.

	Symptoms/ Indications
Acute Leukaemia (Lymphoid or Myeloid)	• Anaemia • Fever • Bleeding • Prone to infection • Low haemoglobin count, high white cell count and low platelet count • Leukaemia cells (immature white cells) in blood and bone marrow • Enlarged lymph nodes, liver and spleen • Damage to the skin and central nervous system
Chronic Lymphocytic Leukaemia	• Initially asymptomatic • Enlarged lymph nodes and spleen • High white cell count (immature lymphocytes), low haemoglobin and platelet count • Bone marrow infiltrated by mature lymphocytes
Chronic Myeloid Leukaemia	• Initially asymptomatic • High white cell count and increase in both mature and immature white cells, high platelet count • Enlarged spleen

How is leukaemia diagnosed and treated?

The diagnosis and treatment vary with different types of leukaemia:

Acute Leukaemia (Lymphoid or Myeloid)	
Diagnosis	• Full blood counts • Peripheral blood film examination • Bone marrow biopsy • Lumbar puncture examination • Cytochemical study and immunophenotyping to define the subtype • Cytogenetic and molecular genetic studies
Treatment	• Intensive chemotherapy is necessary for cure, and infection must be treated without delay. • For the elderly, less intensive treatment may be adopted: - Azacitidine - Decitabine - Venetoclax - Sorafenib - Midostaurin • Supportive care is also important. Patients may require blood and platelet transfusions. • Haematopoietic growth factor (e.g. G-CSF) is frequently used. • Some patients may need allogeneic bone marrow transplantation, while gentle chemotherapy is considered appropriate for the elderly. • All-trans retinoic acid and arsenic trioxide are used to treat acute promyelocytic leukaemia.

Prognosis	• It is a curable disease for young patients. • Most patients respond well to chemotherapy. • Cure rate may exceed 50% for younger patients. • Genetic tests are useful in determining prognosis. • Survival rate improves with bone marrow transplantation.
Chronic Lymphocytic Leukaemia	
Diagnosis	• Full blood counts • Peripheral blood film examination • Bone marrow biopsy • Immunophenotyping to confirm diagnosis • Cytogenetic and fluorescence in-situ hybridisation (FISH) analysis
Treatment	• Various combinations of targeted therapy and chemotherapy are available: - Ibrutinib - Venetoclax - Rituximab - Obinutuzumab - Bendamustine
Prognosis	• Good disease control can be achieved in most cases. • Relapses usually respond to retreatment. • FISH tests are useful in determining prognosis.
Chronic Myeloid Leukaemia	
Diagnosis	• Full blood counts • Bone marrow biopsy • Cytogenetic study showing "Philadelphia Chromosome" • Florescence in-situ hybridisation (FISH) analysis or polymerase chain reaction to detect bcr-abl translocation
Treatment	• Tyrosine kinase inhibitors (TKI) , e.g. Imatinib, Nilotinib or Dasatinib • Long-term therapy • Genetic test monitoring
Prognosis	• If not properly treated, the disease transforms to refractory acute leukaemia within an average period of 3 years. • Most patients respond very well to tyrosine kinase inhibitors and have a long survival period.

What is lymphoma?

Lymphoma is the cancer of lymphoid cells. Like leukaemia, its causes remain largely unknown. It is sometimes related to infection, chemicals, radiation or immunodeficiency.

There are two major types of lymphoma, i.e. i) Hodgkin's Lymphoma or Non-Hodgkin's Lymphoma, and ii) B-Cell, T-Cell or NK-Cell Lymphoma.

Non-Hodgkin's lymphoma accounts for over 90% of cases. They are mostly B-cell lymphomas. Common subtypes include:

- Diffuse Large B-Cell Lymphoma
- Follicular Lymphoma
- Mantle Cell Lymphoma
- Marginal Zone Lymphoma
- Lymphocytic Lymphoma
- Burkitt's Lymphoma
- T-Lymphoblastic Lymphoma
- Peripheral T-Cell Lymphoma
- Nasal NK-Cell Lymphoma

Symptoms include enlarged lymph glands, fever, night sweat and weight loss. Lymphoma may also affect almost all organs and spread to marrow, liver and spleen.

How is lymphoma diagnosed and treated?

Lymphoma is diagnosed with biopsy of the tumour, complemented by positron emission tomography (PET) and computed tomography (CT). Bone marrow biopsy and blood tests may also be conducted.

Chemotherapy is the mainstay of lymphoma treatment. For B-cell lymphoma, Rituximab or Obinutuzumab (an anti-CD20 monoclonal antibody) is often added to chemotherapy treatment. Most cases do respond well.

Local radiotherapy may be performed in selected cases, while others may need bone marrow transplantation. Supportive care, e.g. the use of haematopoietic growth factor (G-CSF), is necessary. Outcomes vary among different types of lymphoma.

What is plasma cell myeloma?

Plasma cell myeloma is also a cancer of lymphoid cells. Subtypes include Light Chain Disease, Non-Secretory Myeloma, Amyloidosis and Plasmacytoma. It mostly affects the elderly.

B-lymphocytes may mature into plasma cells, which produce antibodies to fight infection. For unknown reasons, a plasma cell may be cancerous, i.e. plasma cell myeloma or plasmacytoma. The transformation may be preceded by a condition called "Monoclonal Gammopathy of Undetermined Significance (MGUS) ", which occurs in a small percentage of the elderly population.

Common symptoms are:

- Bone pain
- Bone fracture
- Anaemia
- Kidney failure
- Infection
- High blood calcium level
- Bleeding tendency

How is plasma cell myeloma diagnosed and treated?

Plasma cell myeloma is indicated for presence of paraprotein in blood. Abnormal changes in the bones are also revealed in bone X-ray or bone MRI images, and the presence of abnormal plasma cells is also noted in bone marrow after biopsy of bone marrow or tumour. Kidney function and blood calcium level are also examined if necessary.

Initial treatments against plasma cell myeloma may include:

- Various combinations of chemotherapy
  - Bortezomib (Velcade), Carfilzomib or Ixazomib
  - Thalidomide, Lenalidomide or Pomalidomide
  - Dexamethasone or Prednisolone
  - Cyclophosphamide or Melphalan
  - Daratumumab
- Autologous peripheral blood stem cell transplantation

What is targeted therapy for blood cancers?

Genetic changes cause normal cells to become cancerous. It is these changes that make the difference and serve as a “target” for therapeutic purposes. Either a monoclonal antibody (e.g. Mabthera/ Rituximab for all kinds of B-cell lymphomas) or a chemical (e.g. Imatinib for chronic myeloid leukaemia) can act on these targets to inhibit their effect.

What is haematopoietic stem cell (HSC) transplantation?

HSC transplantation is often used in blood cancer treatments. There are two main types of HSC transplantation, i.e. autologous transplant (which uses the patient’s own HSC) and allogeneic transplant (which uses HSC from Human Leukocyte Antigen (HLA) in compatible donors, e.g. the patient’s sibling or an unrelated donor).

The source of the marrow cells or haematopoietic stem cells can be the marrow itself of G-CSF-driven peripheral blood stem cell or cord blood. A mini-transplant can also be used for elderly patients to minimise the risk.

An unrelated marrow donor registry is available in Hong Kong, i.e. Hong Kong Bone Marrow Donor Registry. It is linked to the registries of Taiwan and the Mainland.