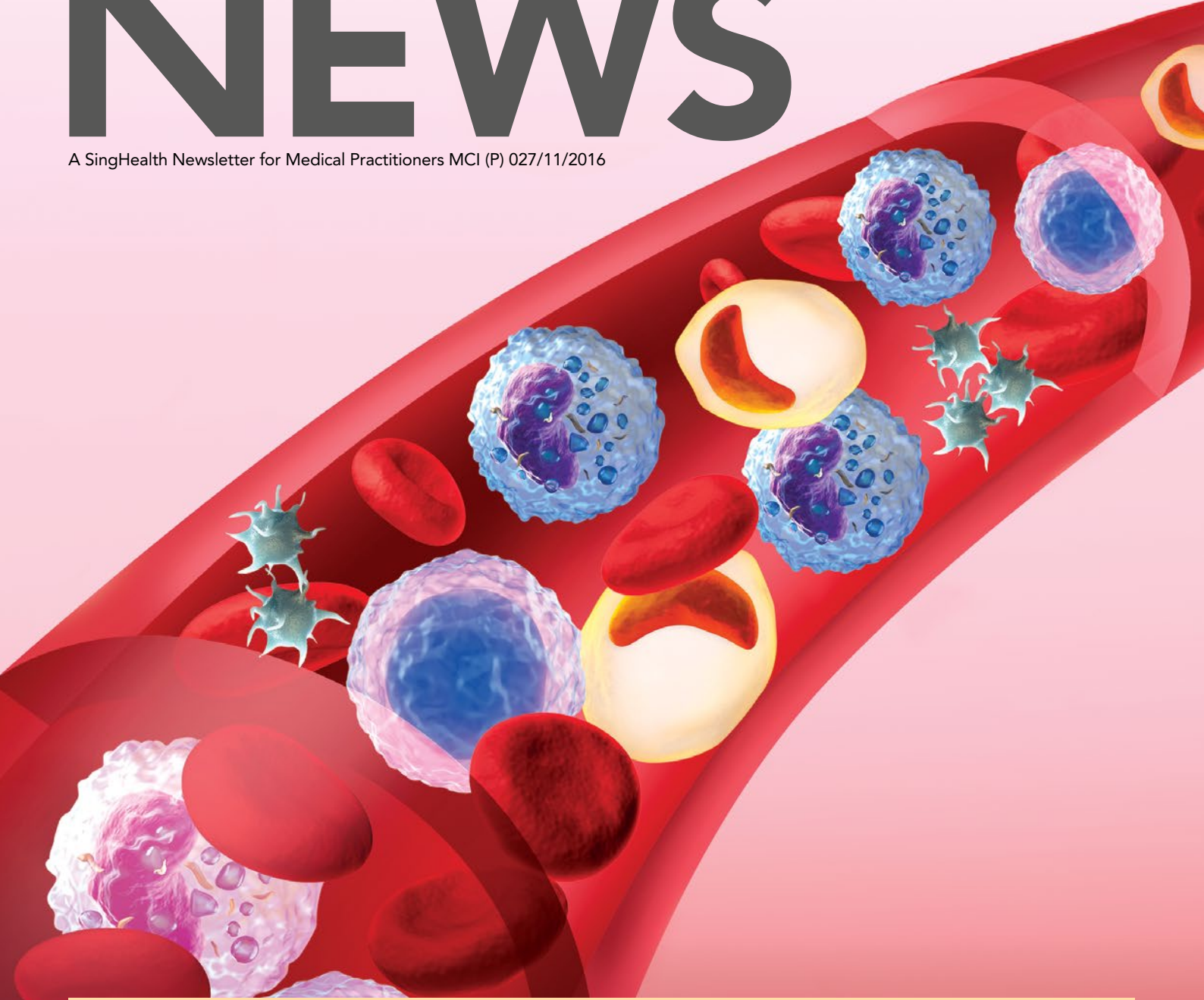


MEDICAL NEWS

A SingHealth Newsletter for Medical Practitioners MCI (P) 027/11/2016



FOCUS: BLOOD CANCER

Haematologic Emergencies
in the General Practice

When to Suspect
Myeloma in Primary Care

An Overview of
Myeloproliferative Neoplasms

Approach to an Adult with
Lymphadenopathy in Primary Care





Haematologic Emergencies in the General Practice

Adj Assoc Prof Wong Gee Chuan, Senior Consultant, Department of Haematology, Singapore General Hospital; SingHealth Duke-NUS Blood Cancer Centre

Patients with malignant haematological diseases may present with dramatic and life-threatening complications. General physicians must be able to recognise these conditions as prompt treatment can be life-saving. Hyperleukocytosis and leukostasis and febrile neutropaenia in patients with haematologic malignancies are two such conditions highlighted in this article.

HYPERLEUKOCYTOSIS AND LEUKOSTASIS IN HAEMATOLOGIC MALIGNANCIES

Hyperleukocytosis has been variably defined as a total white cell count (WBC) of $50 \times 10^9/L$ or $100 \times 10^9/L$. Leukostasis is a medical emergency characterised by hyperleukocytosis and symptoms of tissue hypoperfusion. It is most commonly seen in patients with acute myeloid leukaemia (AML) or chronic myeloid leukaemia (CML) in blast crisis.

Symptoms of leukostasis occur less frequently in patients with acute lymphoblastic leukaemia (ALL) or chronic lymphocytic leukaemia (CLL) unless the WBC exceeds $150 \times 10^9/L$.

Pathologically, it is characterised by intravascular accumulation of blasts in the microvasculature, resulting in increased blood viscosity and decreased perfusion. It is also postulated that local hypoxaemia may be exacerbated by the high metabolic activity of the dividing blasts and release of cytokines.

SIGNS AND SYMPTOMS

Clinically, this should be suspected when the full blood count (FBC) shows hyperleukocytosis in a patient presenting with respiratory or neurologic distress. Patients can present with dyspnoea and hypoxia which can be picked up on pulse oximetry. Neurologic signs and symptoms include visual changes, headache, dizziness, change in

mental state and unsteadiness in gait. There is also increased risk of intracranial haemorrhage.

Besides affecting the central nervous system, eyes and lungs, other manifestations include myocardial ischaemia, limb ischaemia or bowel infarction. Leukostasis may also occur where the clinical picture is less typical and at a WBC lower than the arbitrarily defined figures, especially in rapidly increasing blasts counts.

INVESTIGATIONS

Besides elevated WBC and blasts in the FBC, evidence of tumour lysis syndrome (TLS) may be present in up to 10% of patients with leukostasis. These include raised creatinine, hyperuricaemia, hyperkalaemia, hyperphosphatemia and hypocalcaemia. Disseminated intravascular coagulation (DIC) may manifest with thrombocytopenia and an abnormal coagulation profile.

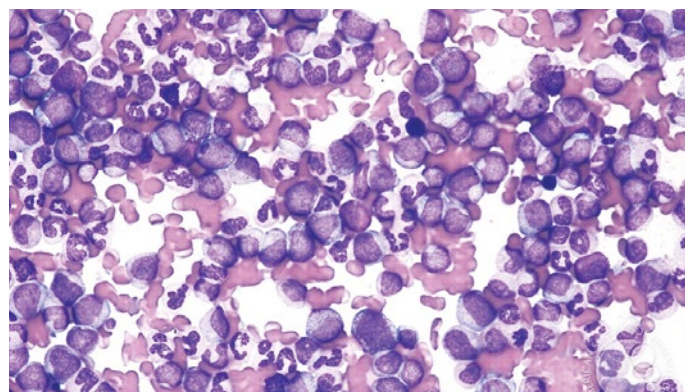
MANAGEMENT

The diagnosis requires a high degree of suspicion. It is made clinically when a

patient presents with a high white cell count and symptoms suggestive of tissue hypoxia.

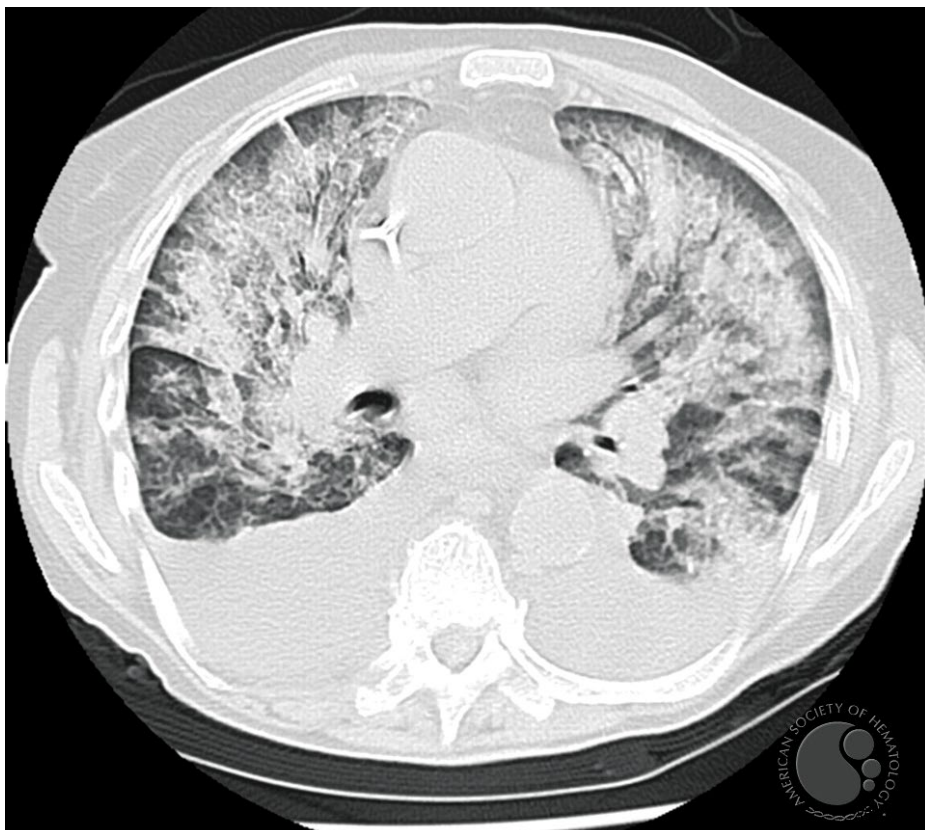
Leukostasis constitutes a medical emergency. Prompt treatment is indicated. If left untreated, the one-week mortality can be as high as 40%. Symptomatic patients have a worse prognosis when compared to asymptomatic patients with hyperleukocytosis alone.

The patient should be urgently referred to the Emergency Department of a hospital, where he should be rapidly stabilised. Rapid cytoreduction can be achieved with chemotherapy or leukapheresis. This should be accompanied by tumour lysis syndrome prophylaxis and aggressive hydration and allopurinol. Specialised, supportive care such as mechanical ventilation for respiratory failure may be required.



Hyperleukocytosis in peripheral blood film of a chronic myeloid leukaemia patient.

This image was originally published in ASH Image Bank. Peter Maslak. Hyperleukocytosis – CML - 1. ASH Image Bank. 2010; image number-1022. © the American Society of Hematology.



CT scan of patient with fungal pneumonia

This image was originally published in ASH Image Bank. Peter Maslak. Fungal pneumonia - 1. ASH Image Bank. 2007; image number-3475. © the American Society of Hematology.

FEBRILE NEUTROPAENIA IN PATIENTS WITH HAEMATOLOGIC MALIGNANCIES

Febrile neutropaenia (FN) is one of the most serious adverse events in patients with haematologic malignancies treated with chemotherapy. Since the magnitude of the inflammatory response may be muted in the neutropaenic patients, a fever may be the earliest and only sign of infection. Infections in these patients can progress rapidly, leading to life-threatening complications.

FN is considered a medical emergency. Prompt initiation of broad-spectrum antibiotics is necessary to avoid progression to sepsis and possibly death.

DEFINITIONS

The Infectious Diseases Society of America (IDSA) defines fever in neutropaenic

patients as a single oral temperature of $>38.3^{\circ}\text{C}$ (101°F) or a temperature of $>38.0^{\circ}\text{C}$ (100.4°F) sustained for >1 hour.

Neutropaenia is an absolute neutrophil count (ANC) <1500 cells/ μL , and severe neutropaenia is defined as ANC <500 cells/ μL or that is expected to decrease below 500 cells/ μL during the next 48 hours, and profound neutropaenia is an ANC <100 cells/ μL . The risk of clinically important infections rises as the ANC decreases.

Initial neutropaenic fever syndromes can be classified into 3 categories:

- Microbiologically documented infection – neutropaenic fever with a clinical focus of infection and an associated pathogen
- Clinically documented infection – neutropaenic fever with a clinical focus (e.g. pneumonia) but without the isolation of an associated pathogen

- Unexplained fever – neutropaenic fever with neither a clinical focus of infection nor an identified pathogen

RISK OF COMPLICATIONS

The IDSA guideline considers low-risk patients as those who are expected to be neutropaenic (ANC <500 cells/ μL) for ≤ 7 days and those who have no active comorbidities or evidence of significant hepatic or renal dysfunction.

High-risk patients are those who are expected to be neutropaenic (ANC <500 cells/ μL) for >7 days. Patients with neutropaenic fever who have ongoing comorbidities or evidence of significant hepatic or renal dysfunction are also considered to be high-risk, regardless of the neutropaenia duration.

Assessment of the risk of complications is crucial in patients with neutropaenic fever as this will dictate the approach to therapy, such as the need for inpatient admission and intravenous antibiotics.

PATHOGENESIS

Chemotherapy-induced mucositis and seeding of the bloodstream from endogenous flora in the gastrointestinal tract is believed to cause the majority of neutropaenic fevers. Immune defects related to the underlying haematologic malignancy and the immunosuppressive effects of chemotherapy are other contributory factors to the pathogenesis of neutropaenic fever.

An infectious source is identifiable in approximately 20-30% of febrile neutropaenic episodes.

About 80% of identified infections arise from the patient's endogenous flora. Gram-positive bacteria (e.g. *Staphylococcus aureus*, *Enterococcus* spp, *Streptococcus pneumoniae*) are the most common causes of infections in the febrile neutropaenic patients.

However, infections caused by gram-negative bacteria (e.g. *Pseudomonas aeruginosa*, *Klebsiella* spp, *Escherichia coli*) are associated with most serious consequences.



Invasive fungal infections are more common in high-risk patients with prolonged fever syndromes, with *Candida* and *Aspergillus* spp accounting for most of these infections.

Viral infections, including infections caused by respiratory viruses and human herpes viruses, are also more common in high-risk patients with neutropaenia.

MANAGEMENT

It is critical to recognise neutropaenic fever early and for empiric broad-spectrum antibiotics to be initiated promptly to avoid progression to a sepsis syndrome and possible demise.

The managing oncologist can educate and instruct the patient and their caregivers to recognise symptoms that require prompt medical attention and to inform healthcare providers on their chemotherapy administration.

These patients should be assessed without delay and referred to a hospital where empiric broad-spectrum antibiotics can be initiated immediately after blood cultures have been obtained. International guidelines advocate the administration of empiric antibiotics within 60 minutes of presentation in all patients with febrile neutropaenia. Empiric therapy aims to cover the most likely pathogens that may rapidly cause serious or life-threatening infections in neutropaenic patients.

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Trained in the MD Anderson Cancer Center, Houston, Texas, Dr Wong spearheaded the setup of the Leukaemia Registry and the Myeloproliferative Disorders Registry in the Department of Haematology, Singapore General Hospital. She also developed Leukaemia protocols, antibiotics and antifungal guidelines for immunocompromised hosts.

Besides authoring patient guidebooks on Leukaemia, Lymphoma and Febrile Neutropaenia, she has also published extensively on Malignant Haematology and Myeloproliferative Disorders and conducted multiple trials in these areas. She is the Director, Acute Leukaemia Service, Department of Haematology, Singapore General Hospital. Her current research interests include treatment of acute leukaemia and management of febrile neutropaenia in immunocompromised hosts. She also has specialist accreditation in Palliative Medicine.



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An Overview of Myeloproliferative Neoplasms



Dr Grace Kam, Senior Consultant, Department of Haematology, Singapore General Hospital; SingHealth Duke-NUS Blood Cancer Centre

Myeloproliferative neoplasms (MPNs) are chronic haematological disorders characterised by elevated blood counts. MPNs arise from uncontrolled proliferation of haematopoietic stem cells in the bone marrow.

There are 3 main MPN subtypes: essential thrombocythaemia (ET), polycythaemia vera (PV) and myelofibrosis. ET is characterised by an elevated platelet count and PV by a high haemoglobin and haematocrit. Myelofibrosis classically demonstrates marrow fibrosis, splenomegaly, a leukoerythroblastic blood picture and varying degrees of elevated blood counts and cytopenias. Myelofibrosis can occur as primary myelofibrosis, or can develop from the progression of ET and PV to secondary myelofibrosis.

EPIDEMIOLOGY

Based on data from the USA and Europe, the incidence of ET, PV and myelofibrosis is 1.9-2.8 per 100,000, 1.5-2.5 per 100,000 and 0.4-1.5 per 100,000 respectively. The corresponding prevalence of ET, PV and myelofibrosis is 24-40 per 100,000, 22-30 per 100,000 and 0.5-2.7 per 100,000.

Using this data, it is estimated that there are approximately 2,600 to 4,000 people in Singapore with an MPN. It is likely that a doctor in primary care would encounter a patient with an MPN either at presentation or for the treatment of other conditions at least once in their career.

The median age of diagnosis is in the sixth to seventh decade of life but up to 20% are below the age of 40 at presentation. There is a slight male predominance in PV and myelofibrosis, while ET is more often seen in females. The cause of MPNs is unknown.

PRESENTATION AND SYMPTOMS

Up to a quarter of patients may be asymptomatic and the diagnosis made incidentally such as during a health screening.

Often the General Practitioner (GP) is the person who first detects the elevated blood counts and is the initial point of contact to ensure that patients with elevated blood counts are appropriately referred for further evaluation.

Symptoms in MPN are often non-specific and can be categorised into:

- **Symptoms related to elevated blood counts.** These include giddiness, headache and transient visual disturbances.
- **Constitutional symptoms.** Often such symptoms are cytokine-related. The most prevalent constitutional symptom in MPNs is fatigue but may also include bone pain, fever, night sweats, and unexplained weight loss.
- **Symptoms related to hepatosplenomegaly.** Common symptoms relate to mass effect and include early satiety, abdominal distension and a sensation of fullness or pain at the left hypochondrium.

ET patients may have erythromelalgia, a condition where there is redness, warmth and a burning pain in the hands and feet. PV patients classically have itch, especially after a shower or bath but in the local context, this is not frequent.

PROGNOSIS AND COMPLICATIONS

Compared to many other haematological malignancies, the survival in MPNs is relatively good. In myelofibrosis, the median survival is 7 years but can vary from 1 to 2 years to more than 10 years. Survival in ET can measure decades while in PV, survival can be 20 to 30 years. Untreated however, the median survival in PV is between 6 to 18 months.

The overriding risk in MPNs is thrombosis. Thrombosis is more commonly arterial but can also be venous. In patients with ET and extreme thrombocytosis (platelet count $\geq 1000 \times 10^9/L$), the risk of haemorrhage is also increased. This is due to abnormalities in platelet function and increased consumption of von Willebrand factor.



All MPNs can undergo disease transformation to acute leukaemia while ET and PV can progress to secondary myelofibrosis. There is no current treatment that can alter the natural history or prevent disease progression.

The long-term risk of progression to acute leukaemia is approximately 5% for ET, 10% for PV and 10-20% for myelofibrosis. Rates of progression to myelofibrosis are 5-10% for ET and 10-20% for PV.

DIAGNOSIS

There are several mutations that are seen in MPNs and are used in the diagnostic work-up. These include:

- JAK2 V617F mutation
- Calreticulin (CALR) mutation
- MPL mutation
- JAK2 exon 12 mutation

The JAK2 V617F mutation is seen in 95% of PV patients and the JAK2 exon 12 mutation in 1-3% of PV cases. If patients with elevated haemoglobin are negative for these two JAK2 mutations, it is unlikely that the elevated haemoglobin is due to polycythaemia vera and secondary causes of polycythaemia have to be considered. The CALR and MPL mutations are not seen in PV.

In ET and myelofibrosis, the JAK2 V617F mutation is seen in 50-60% of patients, CALR in 15-25% and MPL in 5-10%. The presence of one of these mutations demonstrates that the patient has an MPN but a bone marrow is required to ascertain if this is ET or myelofibrosis.

Patients who do not carry any of these mutations are referred to as 'triple negative'. For triple negative patients with an elevated platelet or white cell count and do not have secondary causes to account for the elevated counts, a bone marrow will be required to confirm the diagnosis and subtype of MPN. Sometimes additional investigations are required to confirm the diagnosis and exclude reactive causes.

TREATMENT

In ET and PV, the major goal of treatment is to reduce the risk of thrombosis.

Secondary aims of treatment are to decrease symptoms related to elevated blood counts and in patients with extreme thrombocytosis (platelet count >1000 x 10⁹/L), to lessen the risk of haemorrhagic events. Based on the risk of thrombosis, a risk-stratified approach is used.

Using the risk factors of age ≥ 60 years and a history of thrombosis, a low-risk patient has zero risk factors, while a high-risk patient has one or both risk factors.

Low-risk ET patients with a platelet count <1500 x 10⁹/L should receive low-dose aspirin but there is no indication for cytoreduction. For low-risk ET patients with a platelet count >1500 x 10⁹/L or high-risk ET patients, cytoreduction is administered. Options for cytoreduction include hydroxyurea, anagrelide and pegylated interferon.

For **high-risk ET patients**, hydroxyurea would be the agent of choice in lowering the platelet count. One of the concerns with hydroxyurea is whether it could potentially contribute to the risk of acute leukaemia. From available literature however, hydroxyurea has not been demonstrated to increase the risk of leukaemic progression.

All PV patients should receive low-dose aspirin. The haematocrit should be maintained at less than 45%. This can be achieved with regular venesection or cytoreductive therapy using either hydroxyurea or pegylated interferon. Low-risk PV patients can be managed with venesection while high-risk patients should receive cytoreduction to optimise the haematocrit.



The management of myelofibrosis is often challenging. Patients may face a range of concerns including thrombotic risk, elevated blood counts, constitutional symptoms, splenomegaly, anaemia, thrombocytopaenia and leukopaenia.

There is no effective treatment to improve thrombocytopaenia and leukopaenia. Treatment has to be individualised depending on the myelofibrosis-related issues, age, comorbidities, patient's fitness and wishes and aims of treatment.

There is no curative treatment apart from allogeneic stem transplant. However transplant can only be considered for fit younger patients who have high

risk/advanced myelofibrosis. The risk of transplant for myelofibrosis is quite substantial and up to 50% may have transplant related complications or even death.

Depending on the issues that patients have, treatment is tailored to address these issues. Patients with anaemia may require regular blood transfusions. Agents such as erythropoietin, thalidomide (with or without prednisolone) or danazol can be tried but often patients may not have an improvement in the haemoglobin level, or only a transient response.

In patients with an elevated white cell or platelet count, cytoreduction may be required while patients who have

constitutional symptoms or symptoms related to splenomegaly may benefit from ruxolitinib, a JAK inhibitor. For patients who are asymptomatic, management can be expectant.

CONCLUSION

Although GPs are unlikely to be directly managing the MPN, GPs play a vital role in ensuring that patients with elevated blood counts are referred for further evaluation and working with patients' haematologists to provide comprehensive and holistic care to patients with MPNs.

WHEN TO REFER

Refer patient urgently to A&E if the patient has symptoms suggestive of **hyperviscosity** or a **thrombotic event** regardless of blood counts.

For pregnant patients with elevated blood counts who do not fulfill the criteria for urgent referral, please contact the haematologist on call for advice and early appointment.

Platelet count

- Urgent referral to A&E if platelet count $>1000 \times 10^9/L$
OR if platelet count less than 1000 but patient has current/recent bleeding or thrombosis or neurological symptoms
- Non-urgent referral if the platelet count is persistently elevated (at least 2 platelet readings above the upper limit of normal over a 4-6 week period)

Haemoglobin

- Urgent referral to A&E if Hb >20 g/dL or Haematocrit $\geq 60\%$
- Non-urgent referral if Hb is persistently elevated for at least 2 readings 4-6 weeks apart: women Hb >16.0 g/dL, men Hb >16.5 g/dL

White cell count

- Urgent referral to A&E if blasts or a leukoerythroblastic picture is noted
OR if WBC $>50 \times 10^9/L$
- Non-urgent referral if WBC persistently elevated ($>20 \times 10^9/L$) for at least 2 readings 4-6 weeks apart



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When to Suspect Myeloma in Primary Care

Dr Chandramouli Nagarajan, Consultant, Department of Haematology, Singapore General Hospital; SingHealth Duke-NUS Blood Cancer Centre

Multiple myeloma is a malignant tumour of plasma cells infiltrating the bone marrow. The median age of presentation of myeloma is 65 years. A high index of suspicion is important for early recognition of the condition, especially to avoid renal failure from setting in as established renal failure can change the overall prognosis in myeloma patients.

This article gives a quick snapshot of when to suspect myeloma in primary care.

The **SingHealth Duke-NUS Blood Cancer Centre (SDBCC)** hosts specialty clinics for multiple myeloma, run by Haematologists specially trained to manage such patients. We often have clinical trials for patients with myeloma that help us to bring some of the most effective and newest discovered medicines against myeloma to our patients.

For more information on myeloma, please visit www.sgh.com.sg/myeloma.

Red flag symptoms for diagnosis of myeloma in patients with back pain

- Age >50 years
- Pain that is worse in supine position
- Pain that is worse at night or awakening from sleep
- Pain with a band-like sensation around the body
- Pain not responding to conventional analgesia
- Associated constitutional symptoms (fever, weight loss, dehydration, recurrent infections)
- New or worsening neurological deficits in lower limbs

Clinical manifestations of multiple myeloma

Symptoms:

- Back pain with red flags as above or bone pain over long bones/ribs
- Constitutional symptoms like generalised malaise, lethargy or fever
- Frequent infections without reason
- Peripheral neuropathy/carpal tunnel syndrome
- Unexplained bleeding
- Symptoms of hypercalcaemia – Nausea, constipation, thirst
- Symptoms of hyperviscosity – Headaches, easy bruising, epistaxis, ischaemic neurological symptoms

Clues from investigations:

- Full blood count – Macrocytic anaemia, pancytopenia, abnormal coagulation, rouleaux on blood film
- Liver function tests – High total protein with low albumin
- Urine – Proteinuria
- High ESR
- Bone profile – Hypercalcaemia
- Renal profile – Renal dysfunction
- Radiology – Lytic lesions in skull, vertebrae or long bones/vertebral compression fractures or just diffuse osteopaenia

Tests to send for diagnosing myeloma (in addition to the above-mentioned):

- Serum protein electrophoresis and immunofixation
- Serum free light chain assay



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His main area of interest is malignant haematology, especially lymphomas, myeloma, as well as immune and laboratory haematology. His other area of interest is clinical/medical education and he has been involved in teaching undergraduate and postgraduate students throughout his career. He has contributed as a member of several committees, was the clinical lead for blood transfusion services and has been involved in research, serving as Principal Investigator in clinical trials, during his tenure in the United Kingdom.



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Approach to an Adult with Lymphadenopathy in Primary Care



Dr Chandramouli Nagarajan, Consultant, Department of Haematology, Singapore General Hospital; SingHealth Duke-NUS Blood Cancer Centre

The lymphatic system consists of a network of lymph nodes (LN) and interconnecting lymphatic vessels. It is a slow-flow, low-pressure system serving to return filtered interstitial fluid back to the blood. They collect and process antigens from the interstitial fluid and are the sites of primary immune response.

The body has approximately 600 lymph nodes and they are located around ports of entry and along blood vessels. The peripheral lymph nodal groups are easily palpable on clinical examination, and are routinely looked for, but those in the submandibular, axillary or inguinal regions may be normally palpable in healthy individuals.

Lymphadenopathy (LAP) refers to one or more nodes that are abnormal in consistency, number or size.

The cause of LAP is usually due to an immune response to infective agents, inflammatory cells in immune disease involving the lymph node or a primary or secondary neoplastic process, causing infiltration in the node.

Since there are lots of potential causes for LAP, it is challenging as well as important to differentiate the benign processes from the malignant ones. This article summarises the broad clinical approach to an adult presenting with LAP in primary care.

In a population-based Dutch study, about 10% of patients with unexplained LAP presenting to primary care required referral to a specialist but only 1% had a malignancy. There have been many retrospective studies suggesting different percentages of risk of malignancies in patients presenting with unexplained LAP but the simple conclusion is that it increases with age, especially above 40 years.

In primary care settings, patients 40 years of age and older with unexplained LAP have about a 4% risk of cancer versus a 0.4% risk in patients younger than age 40.

CLINICAL FACTORS TO CONSIDER FOR A PATIENT WITH LAP

1. HISTORY CONSIDERATIONS FOR LAP

The onset, duration and progression of the LAP – Nodes that last less than 4 weeks or those that have been persistent without any size increase for a year or more are unlikely to be neoplastic. This rule should not be considered absolute and patients who have other risk factors must be considered for further testing if in doubt.

Presence or absence of systemic symptoms – When present, systemic symptoms including pruritus, autoimmune-type symptoms like rash/arthritis, etc, significant weight loss (5% over 3 months or 10% over 6 months), fever (in the absence of infection) or drenching night sweats usually indicate an underlying systemic cause for LAP.

The last 3 of the above are classed together as 'B' symptoms in the staging system of lymphomas. Although usually associated with lymphoproliferative disorders, together or separately, they may be present in many other diseases, one of which is tuberculosis.

// Since there are lots of potential causes for LAP, it is challenging as well as important to differentiate the benign processes from the malignant ones. //



Suffice to say, the presence of any of these or other systemic symptoms in most situations might indicate the need for an expeditious referral to a specialist centre for further evaluation – especially a lymph node biopsy.

Generalised vs localised LAP – Generalised LAP is defined as LAP in 2 or more non-contiguous lymph node regions and it usually indicates a systemic cause that will need evaluation. In contrast, for localised LAP the cause is likely to be in the draining area of the enlarged nodes – for example, dental/scalp/ENT lesions could explain the cause of cervical LAP and a careful examination of these areas is warranted in patients presenting with cervical LAP.

Recent exposure to certain drugs and the onset of LAP that temporally correlates with the start of such drugs (phenytoin, methylodopa, hydralazine, allopurinol, etc) might indicate them to be the cause, especially when associated with eosinophilia/skin rash.

History of sexual exposure or intravenous drug use (IVD) might serve as a clue to retroviral disease. Past history of TB, lymphoma, etc should be taken into consideration as the LAP could signify a recurrence.

2. EXAMINATION FINDINGS

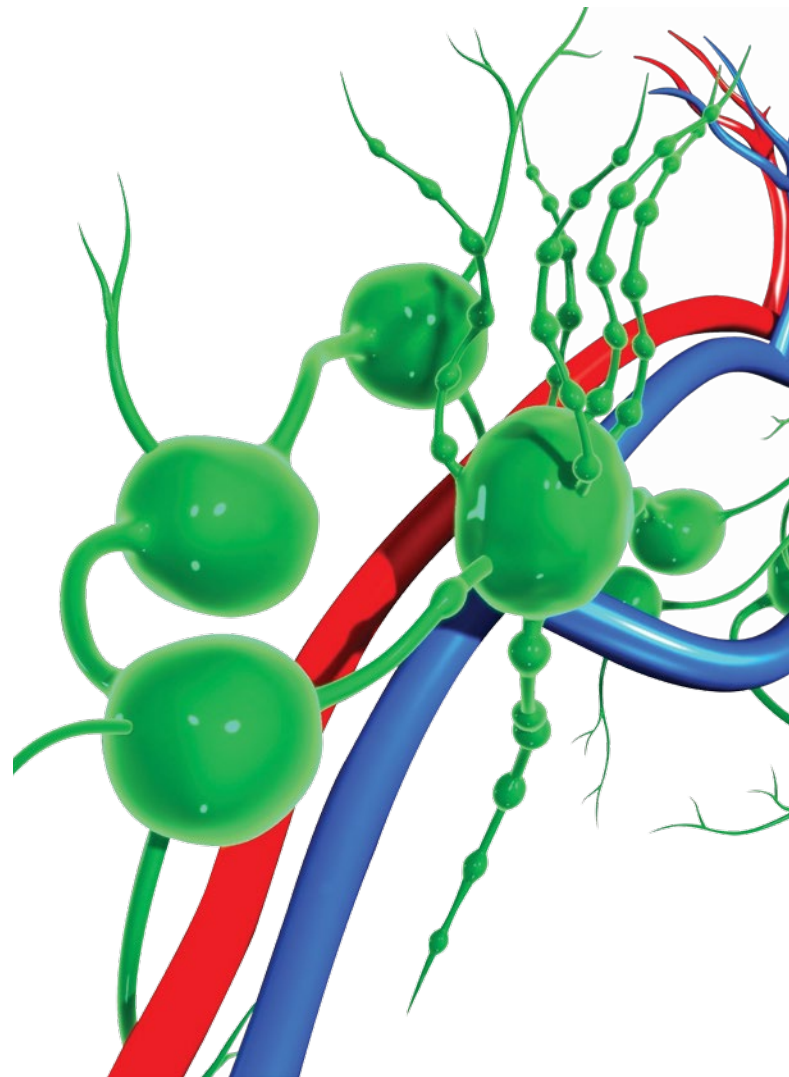
Site: As mentioned above, certain nodes can be felt 'normally' in a patient. In a thinly-built person, even a normal size lymph node could become palpable. Epitrochlear, supraclavicular or popliteal LAP should always be considered pathological and suspected for malignancy.

Size: There is no one uniform size above which a node is considered abnormal. By consensus most nodes in any site ≤ 1 cm are likely to be 'normal' and those ≥ 2 cm are likely to be pathological and need to be evaluated further.

An exception might be inguinal nodes which are commonly 'enlarged' > 1 cm and may be insignificant – it has to be interpreted in the clinical context. Size of nodes also depends on age (smaller sizes that might be significant for kids) and the size and build of the patient. Size does not give any clues as to the aetiology of the LAP.

Consistency: The following can serve as a rough guide to differentiate between a benign vs malignant process.

- Soft → Inflammation/Infective
- Firm/Rubbery → Lymphomatous process
- Hard/Fixed → Carcinomatous/Metastasis
- Fluctuant → Suppurative
- Matting → Infection/Malignant
- Pain → Due to stretching of capsule/inflammation, but can also be due to rapid growth/haemorrhage or necrosis within the enlarging node, hence this feature is not very useful to differentiate benign from malignant.



Shape: Several studies have reported that one of the most important and sensitive (but less specific) predictive factors for malignant lymph node is the Long/Short axis ratio (L/S) where if that ratio is less than 2.0, malignancy is highly likely. That is, if the width of the lymph node approaches its length, malignancy should be suspected – however note that sub-mandibular and parotid lymph nodes can normally be round in shape.

Though an ultrasound is a more objective technique for calculating this ratio, an initial clinical impression of the ratio might be gleaned and used for decisions on further evaluation in the light of the whole clinical picture. Since the sensitivity is high, L/S ratio less than 2 should be considered suspicious while a normal L/S ratio should not be taken for granted.

Generalised LAP: Most common causes of this picture is infectious mononucleosis syndromes, HIV infection, autoimmune diseases including Kikuchi's disease, acute and chronic lymphoproliferative disorders like lymphomas and some leukaemias.

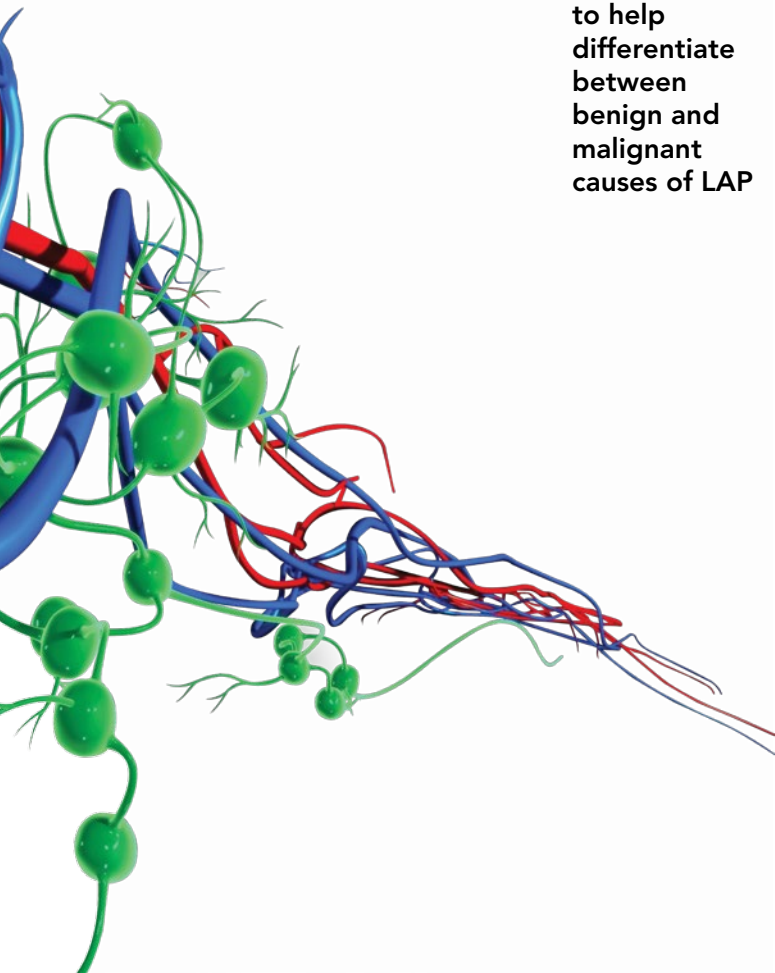


Table 1
Factors to consider to help differentiate between benign and malignant causes of LAP

Feature	Malignant	Benign
Size	>2 cm	<2 cm
Consistency	Hard/firm/rubbery	Soft or fluctuant
Duration	>2 weeks	<2 weeks
Mobility	Fixed	Mobile (benign nodes are mobile but all mobile nodes are not necessarily benign)
Surroundings	Attached	Not attached
Location	Supraclavicular/ Epitrochlear/ generalised	Inguinal/ submandibular (less commonly malignant)

Table 2
The acronym 'ALL AGES' can be used to remember the points to consider in differentiating benign vs malignant causes.

A ge
L ocation
L ength of the time present
A ssociated symptoms and signs
G eneralised LAP
E xtra nodal associations
S plenomegaly and fever

3. ASSOCIATED FINDINGS

(See Tables 1 & 2)

Splenomegaly: Splenomegaly in the presence of LAP is a rare occurrence in primary care (4.5% of the cases according to one study). The most likely causes for the splenomegaly and LAP appearing together are infectious mononucleosis, Hodgkin and non-Hodgkin lymphomas, chronic lymphocytic leukaemia and some acute leukaemias. The presence of splenomegaly is relatively rare in metastatic solid cancers.

Skin lesions: Autoimmune disorders, some lymphomas, cutaneous cancers with secondary lymph nodes, and drug-induced LAP are potential possibilities.

4. INVESTIGATIONS

Full blood count: A full blood count (FBC) with examination of a peripheral blood film (PBF) is a useful and simple tool in patients with LAP. Abnormalities in the FBC including anaemia, and raised white cell count with either neutrophilia or lymphocytosis can point towards infection or immune causes.

In particular if lymphocytosis is present, it might point towards an underlying low-grade lymphoproliferative disorder like chronic lymphocytosis leukaemia/marginal zone lymphoma.

It is important to note this finding, as a referral to a Haematologist can help to confirm this diagnosis by performing a flow cytometry on the peripheral blood rather than subjecting a patient to an unnecessary biopsy.

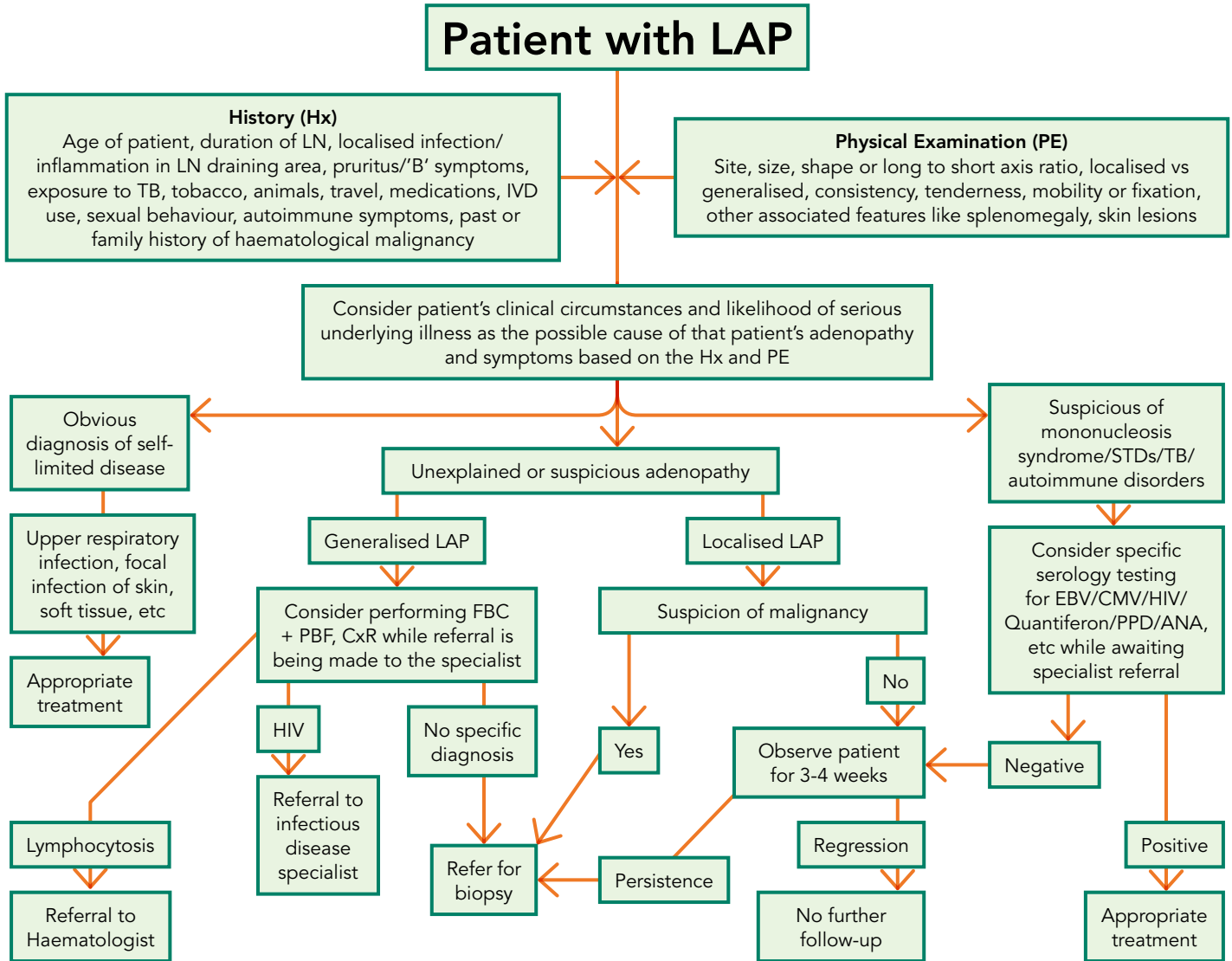
Chest X-ray: Another simple investigation that can be performed in primary care is a chest X-ray (CXR) which will help to pick up mediastinal widening caused by LAP.

Serology: In the presence of corroborative history, a HIV serology or an autoimmune work-up like ANA, etc might also be considered while the appropriate specialist referral is being initiated. If there are features suggestive of a mononucleosis syndrome (fever, sore throat, fatigue, swollen tonsils, LAP, headaches), a serology for common viruses like CMV or EBV (IgM anti-CMV or EBV antibody) could be performed and increasing titres documented on paired samples over 2 to 4 weeks could be suggestive of such infections.



APPROACH TO LAP IN PRIMARY CARE

Below is a suggested pathway for managing patients with LAP, but Haemato-oncologists at the **SingHealth Duke-NUS Blood Cancer Centre (SDBCC)** would be happy to discuss referrals and provide guidance if you are in doubt.



Dr Chandramouli Nagarajan is a Consultant at the Department of Haematology, Singapore General Hospital (SGH) and the SingHealth Duke-NUS Blood Cancer Centre (SDBCC). He is a Clinical Lecturer at the NUS Yong Loo Lin School of Medicine and an Adjunct Assistant Professor at the Duke-NUS Medical School. He served as a Consultant Haematologist in the Northwest of England for 2½ years before joining SGH in 2014.



His main area of interest is malignant haematology, especially lymphomas, myeloma, as well as immune and laboratory haematology. His other area of interest is clinical/medical education and he has been involved in teaching undergraduate and postgraduate students throughout his career. He has contributed as a member of several committees, was the clinical lead for blood transfusion services and has been involved in research, serving as Principal Investigator in clinical trials, during his tenure in the United Kingdom.

GPs can call for appointments through the GP Appointment Hotlines at 6321 4402 (SGH) or 6436 8288 (NCCS), or scan the QR code for more information.



SingHealth Duke-NUS Blood Cancer Centre

Multidisciplinary Care for Blood Cancers



Blood Cancer Centre

The SingHealth Duke-NUS Blood Cancer Centre (SDBCC) was formed to bring together specialists from the Singapore General Hospital (SGH), National Cancer Centre Singapore (NCCS) and KK Women's and Children's Hospital (KKH) to unify the delivery of care for patients. This ensures high-quality patient-centric care that brings together over forty specialists trained at some of the best centres in the world.

OUR SERVICES

The SDBCC service line will strengthen multidisciplinary, disease-orientated care teams and patient service. These are the 5 key specialties for SDBCC:

- 1. Acute Leukaemia**
 - ▶ Acute Lymphoblastic Leukaemia
 - ▶ Acute Myeloid Leukaemia
- 2. Myeloid Malignancies**
 - ▶ Myelodysplastic Syndrome
 - ▶ Myeloproliferative Neoplasm
 - ▶ Chronic Myeloid Leukaemia
- 3. Lymphoid Malignancies**
 - ▶ Lymphoma
 - ▶ Myeloma
- 4. Paediatric Blood Cancers**
(at KK Women's and Children's Hospital)
- 5. Cellular Therapy and Transplant**
(principally Haematopoietic Progenitor Cell Transplantation or HPCT)
 - ▶ Clinical
 - ▶ Cell Processing
 - ▶ Collection Facility

For GP referrals to the SingHealth Duke-NUS Blood Cancer Centre, please call 6321 4402 (SGH) or 6436 8288 (NCCS).

There has been a steady increase in the number of patients with blood cancers like leukaemia, lymphoma and myeloma in Singapore. According to the NRDO (National Registry of Diseases Office), there has been an increase in the incidence of a type of blood cancer (in adults) called lymphomas between 1998 to 2012, with an increase of 4 cases per 100,000 population among males and 2.2 per 100,000 population among females in this time period.

There has been a similar increase in the incidence of leukaemias and an associated group of bone marrow cancers called myeloproliferative neoplasms.

Many of these blood cancers are now curable or manageable by keeping them at bay with medications over long periods of time, such that they have become almost like chronic diseases (for example like diabetes).

Another crucial aspect in the treatment of blood cancers is that it is on its way to becoming individualised, such that each patient's cancer may require a carefully thought-out treatment approach based on several factors specific to that individual and their cancer.

This needs a good lab infrastructure and a team of lab scientists to capture and integrate that information of the cancer and a dedicated team of physicians, specialists, nurses and allied health professionals with experience to manage and navigate the patient through the treatment.

OUR VISION & MISSION

Our vision is to be an international renowned leader in blood cancer that delivers the best outcomes for our patients.

Our mission and strategic goals are as follows:

Clinical Services

To provide a single referral channel for all blood cancers for the delivery of unrivalled consistent, compassionate and cutting-edge clinical care.

Education

To attract and retain world-class talent while developing our clinicians into world-class medical leaders through lifelong continuing education in blood cancers.

Research

To be at the forefront of translational and clinical research in order to provide innovative strategies for the diagnosis, stratification and treatment of our patients with blood cancers.



OUR CLINICIANS

DEDICATED TO LEADING EACH SERVICE

Acute Leukaemia

- **Assoc Prof Wong Gee Chuan**
Senior Consultant,
Dept of Haematology, SGH
- **Assoc Prof Hwang Ying Khee, William**
Senior Consultant/Head,
Dept of Haematology, SGH
- **Assoc Prof Goh Yeow Tee**
Senior Consultant,
Dept of Haematology, SGH
- **Assoc Prof Ho Yew Leng, Aloysius**
Senior Consultant,
Dept of Haematology, SGH
- **Dr Lao Zhentang**
Consultant,
Dept of Haematology, SGH

Paediatric Blood Cancers (at KK Women's and Children's Hospital)

- **Assoc Prof Chan Mei Yoke**
Senior Consultant/Head,
KKH-CCF Children's Cancer Centre
- **Prof Tan Cheng Lim,**
Emeritus Consultant
- **Assoc Prof Tan Ah Moy**
Senior Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Joyce Lam**
Senior Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Soh Shui Yen**
Senior Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Rajat Bhattacharyya**
Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Enrica Tan**
Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Prasad Iyer**
Consultant,
KKH-CCF Children's Cancer Centre
- **Dr Michaela Seng**
Associate Consultant,
KKH-CCF Children's Cancer Centre

Lymphoid Malignancies

Lymphoma

- **Dr Diong Colin Phipps**
Consultant,
Dept of Haematology, SGH
- **Prof Lim Soon Thye**
Senior Consultant/Head,
Division of Medical Oncology,
NCCS
- **Assoc Prof Goh Yeow Tee**
Senior Consultant,
Dept of Haematology, SGH
- **Adj Assoc Prof Richard Quek**
Senior Consultant,
Division of Medical Oncology,
NCCS
- **Dr Tao Miriam**
Senior Consultant,
Division of Medical Oncology,
NCCS
- **Dr Lee Yuh Shan**
Consultant,
Dept of Haematology, SGH
- **Dr Chandramouli Nagarajan**
Consultant,
Dept of Haematology, SGH
- **Dr Grigoropoulos Nicholas Francis**
Consultant,
Dept of Haematology, SGH
- **Dr Mohamad Farid Harunal Rashid**
Consultant,
Division of Medical Oncology,
NCCS
- **Dr Tang Pooi Ling, Tiffany**
Consultant,
Division of Medical Oncology,
NCCS

Myeloma

- **Dr Sathish Kumar Gopalakrishnan**
Consultant,
Dept of Haematology, SGH
- **Dr Chen Yunxin**
Associate Consultant,
Dept of Haematology, SGH
- **Dr Chandramouli Nagarajan**
Consultant,
Dept of Haematology, SGH

Myeloid Malignancies

- **Dr Charles Chuah Thuan Heng**
Senior Consultant,
Dept of Haematology, SGH
- **Assoc Prof Goh Yeow Tee**
Senior Consultant,
Dept of Haematology, SGH
- **Dr Grace Kam Li Shan**
Senior Consultant,
Dept of Haematology, SGH
- **Assoc Prof Ho Yew Leng, Aloysius**
Senior Consultant,
Dept of Haematology, SGH
- **Dr Yiu Cheung Richard**
Senior Consultant,
Dept of Haematology, SGH

Cellular Therapy and Transplant

- **Assoc Prof Ho Yew Leng, Aloysius**
Senior Consultant,
Dept of Haematology, SGH
- **Assoc Prof Hwang Ying Khee, William**
Senior Consultant/Head,
Dept of Haematology, SGH
- **Assoc Prof Goh Yeow Tee**
Senior Consultant,
Dept of Haematology, SGH
- **Dr Linn Yeh Ching**
Senior Consultant,
Dept of Haematology, SGH
- **Dr Tao Miriam**
Senior Consultant,
Division of Medical Oncology,
NCCS
- **Dr Diong Colin Phipps**
Consultant,
Dept of Haematology, SGH
- **Dr Lee Yuh Shan**
Consultant,
Dept of Haematology, SGH
- **Dr Lim Wei Inng Francesca Lorraine**
Consultant,
Dept of Haematology, SGH
- **Dr Sathish Kumar Gopalakrishnan**
Consultant,
Dept of Haematology, SGH

Cardiovascular Homograft Transplant (Transplant Tissue Centre)

The National Cardiovascular Homograft Bank (NCHB) was established in February 2008 by the National Heart Centre Singapore to respond to the growing request of Singaporeans in need of cryopreserved homografts. The bank supplies cryopreserved aortic, pulmonary valves and vascular tissues for patients. The main objective of NCHB is to provide cryopreserved tissues for patients and be self-sustaining through altruistic donation.

In 2012, NCHB was accredited as a Tissue Bank in accordance with the Standards of the American Association of Tissue Banks (AATB). The achievement in this accreditation was a result of intensive and vigorous inspections and quality improvements. This is to ensure that the cryopreserved cardiovascular homografts are of the highest quality and that tissue banking activities are performed professionally, consistently and exceeding international standards.

PAVING THE WAY FOR CARDIOVASCULAR HOMOGRAPHS

The future of the NCHB, apart from continuing to ensure the highest quality of cryopreserved homografts, is to explore the possibility of decellularised homografts.

Studies have shown that decellularised homografts may decrease immunological responses, increase the durability of the homograft implants, and decrease the number of repeated surgeries.

Heart valve disease can be congenital or acquired during one's lifetime. Currently, valvular stenosis, regurgitation and infective endocarditis are the most common heart valve diseases in Singapore. A defective or infected heart valve may be replaced with a donated heart valve (human cardiovascular allograft, or homograft) or an artificial heart valve.

The advantages of a cardiovascular homograft transplant include:

- Anticoagulation medicine is not required
- Absence of haemolysis
- Higher resistance to endocarditis

A new tissue can make a big difference in the quality of life for heart valve patients, and relieve them of symptoms such as breathlessness, tiredness and dizzy spells. It may even save them from death.

WHO CAN DONATE

Anyone can donate. Many people assume that they are not healthy enough or are too old to donate, but their heart valves may be working perfectly even if they have conditions such as high blood pressure or heart disease.

The NCHB has an average of 10 consented donors a year since 2008. Although human heart valves are the replacement of choice for many valvular conditions, its usage has been largely limited by availability and timeliness. Without a suitable human heart valve, patients may ultimately have to undergo a less ideal operation or at times, postponement in surgery.

HOW TO SIGN UP AS A DONOR

Anyone above the age of 18 years can make this life-saving decision by completing an Organ Donation Pledge Form and submitting it to the National Organ Transplant Unit (NOTU). This form can be obtained from the NOTU office or downloaded from the Live On website at www.liveon.sg

It is important for potential donors to share their wishes with their family, so that at the time of donation, their family will know that they are acting according to their loved ones' wishes.

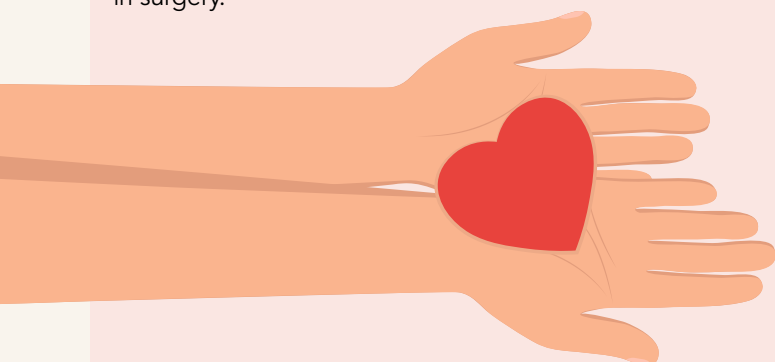
For more information, contact:

National Cardiovascular Homograft Bank

c/o National Heart Centre Singapore
Tel: **6704 8150**
Fax: **6844 9035**
Email: homograftdonation@nhcs.com.sg
Website: www.nhcs.com.sg/NCHB

National Organ Transplant Unit

c/o Singapore General Hospital
Tel: **6321 4390**





THE JOURNEY OF A RECOVERED CARDIOVASCULAR HOMOGRRAFT

From the recovery to the release of homograft, the safety and standards of the homograft depend on various healthcare professionals such as the Transplant Coordinators, Medical Laboratory Technologists, Nurses, Medical Directors and Cardiothoracic Surgeons.

1 SCREENING, CONSENT AND RECOVERY OF HOMOGRRAFT

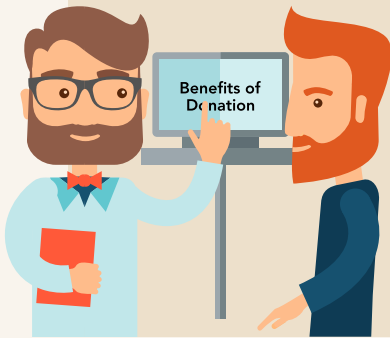
SCREENING AND CONSENT OF HOMOGRRAFT

When the Transplant Coordinator is notified of a death, he/she will verify on the Organ Donor Registry that the potential donor is not an objector before approaching the potential donor's next-of-kin (NOK) to share the option of tissue donation.

With the NOK's consent, the Transplant Coordinator will screen the suitability of the potential donor through his/her medical records and social history for any risk of transmissible diseases (HIV, Hepatitis B, Hepatitis C, syphilis, autoimmune diseases and cancer).



The conversation with the donor's family will cover the description of the tissue donation process, the benefits of donation and how it can save the lives of others as well as the reassurance that the funeral arrangements will not be unduly delayed because of the donation.



RECOVERY OF THE CARDIOVASCULAR HOMOGRRAFT

When an altruistic consent for donation has been made, the respective healthcare professionals involved are notified and blood is drawn from the donor.

Recovery of the homograft shall take place within 15 hours from the time of death. The recovered homograft is placed in media and transported to the National Cardiovascular Homograft Bank's laboratory.



2 PROCESSING AND QUALITY CONTROL OF CARDIOVASCULAR HOMOGRRAFT

PREPARATION

The dissection of the recovered homograft is performed by the Medical Director inside a laminar flow hood. While the dissected homograft is soaked in a combination of antibiotics for 24-32 hours at a low temperature (2-8°C), samples of the dissected homograft are sent for microbiological and histopathological testing.



CRYOPRESERVATION

After disinfection, each homograft is individually packed into a pouch with cryopreservation solution and frozen down at a controlled rate. The cryopreserved homograft is first stored in a quarantine liquid nitrogen storage tank until approved for clinical use by the Medical Director of the tissue bank. Cryopreserved homografts have a shelf life of 5 years.

QUALITY CONTROL

The blood test, histopathology and dissected tissues' microbiological results are reviewed by the Medical Director. The tests that are performed include:

- Microbiology:
 - Aerobic bacteria
 - Anaerobic bacteria
 - Fungi
- Serology: Screening of the donor for transmissible disease
 - Hepatitis B
 - Hepatitis C
 - AIDS
 - Syphilis
- Histology: Examination of tissue dissected
 - Myocardium
 - Aorta



3 FINAL VALIDATION

The Medical Director of the tissue bank, after having obtained all necessary results, will review the conformity to the regulations and requirements of the AATB Standards before releasing the homograft for clinical applications.





SINGAPORE GENERAL HOSPITAL

Appointments: 6321 4402
Email: appointments@sgh.com.sg


APPOINTMENTS



Dr Shum Koin Lon
Associate Consultant
Dept
Internal Medicine



Dr Lee Kian Guan
Associate Consultant
Dept
Renal Medicine



Dr Cassandra Hong Fong Yi
Associate Consultant
Dept
Rheumatology & Immunology

Dr Indumathi Venkatachalam
Consultant
Dept
Infectious Diseases

Dr Muli Jogi Ravi Kumar
Associate Consultant
Dept
Diagnostic Radiology

Dr Kang Hui Min
Associate Consultant
Dept
Emergency Medicine

Dr Kavitha Garuna Murthee
Associate Consultant
Dept
Internal Medicine

Dr Huang Hian Liang
Associate Consultant
Dept
Nuclear Medicine & PET


PROMOTIONS - SENIOR CONSULTANTS



Dr Ng Shin Yi
Senior Consultant
Dept
Anaesthesiology
Sub-specialty
Intensive Care Medicine




Dr Haja Mohideen Salahudeen Mohamed
Senior Consultant
Dept
Diagnostic Radiology
Sub-specialty
Body Imaging




Dr Emily Ho Tse Lin
Senior Consultant
Dept
Endocrinology
Sub-specialty
Diabetes, General Endocrinology, Quality Management




Dr Tan Hui Hui
Senior Consultant
Dept
Gastroenterology & Hepatology
Sub-specialty
Hepatology, Liver Transplantation, Fatty Liver Disease, Drug-induced Liver Disease, Viral Hepatitis; Procedures – Diagnostic Endoscopy, Therapeutic Endoscopy



Dr Ng Joo Ming Matthew
Senior Consultant
Dept
Family Medicine & Continuing Care




Dr Lee Ser Yee
Senior Consultant
Dept
Hepato-pancreato-biliary & Transplant Surgery
Sub-specialty
Hepatobiliary and Pancreatic Surgery, Liver Transplantation, Laparoscopic Surgery and Surgical Oncology



Dr Lam Wing Chuen Winnie
Senior Consultant
Dept
Nuclear Medicine & PET



Dr Tan Eng Loy
Senior Consultant
Dept
Obstetrics & Gynaecology
Sub-specialty
Maternal Fetal Medicine



Dr Sin Gwen Li
Senior Consultant
Dept
Psychiatry
Sub-specialty
Old Age Psychiatry



Appointments

SINGAPORE GENERAL HOSPITAL

Appointments: 6321 4402
Email: appointments@sgh.com.sg

PROMOTIONS - CONSULTANTS



Dr Tan Kwong Wei Emile John
Consultant
Dept
Colorectal Surgery
Sub-specialty
Advanced Cancer and Pelvic Floor Disease



Dr Yeo Shen-Ann Eugene
Consultant
Dept
Colorectal Surgery



Dr Lim Chee Yeong
Consultant
Dept
Diagnostic Radiology
Sub-specialty
Musculoskeletal Radiology



Dr Moey Hui Lin Tammy
Consultant
Dept
Diagnostic Radiology
Sub-specialty
Breast Imaging



Dr Lee Phong Ching
Consultant
Dept
Endocrinology



Dr Tay Wei Yi
Consultant
Dept
Family Medicine & Continuing Care



Dr Koay Siew Ching Doreen
Consultant
Dept
Gastroenterology & Hepatology



Dr Than Hein
Consultant
Dept
Haematology
Sub-specialty
General Haematology, Haematology-oncology



Dr Chung Shimin Jasmine
Consultant
Dept
Infectious Diseases



Dr Lim Chin Hong
Consultant
Dept
Upper Gastrointestinal & Bariatric Surgery
Sub-specialty
Gastrointestinal, Laparoscopic & General Surgery, Metabolic & Bariatric Surgery



Dr Geoffrey Sithamparapillai Samuel
Consultant
Dept
Rehabilitation Medicine
Sub-specialty
Musculoskeletal Rehabilitation Medicine



Dr Tan Yeow Leng
Consultant
Dept
Rehabilitation Medicine



Dr Arunachalam Sridhar
Consultant
Dept
Neonatal & Developmental Medicine

PROMOTIONS - ASSOCIATE CONSULTANTS



Dr Muntasir Mannan Choudhury
Associate Consultant
Dept
Hand Surgery



Dr Tan Ek Khoon
Associate Consultant
Dept
Hepato-pancreato-biliary & Transplant Surgery












Dr Ngeow Jia Hao Alvin
Associate Consultant
Dept
Neonatal & Developmental Medicine








KK WOMEN'S AND CHILDREN'S HOSPITAL

Appointments: 6294 4050
Email: centralappt@kkh.com.sg

PROMOTIONS - SENIOR CONSULTANTS

 <p>Dr Loh Yee Jim <i>Senior Consultant</i> Dept Cardiothoracic Surgery Service</p>	 <p>Dr Toh Han Wei Luke Michael <i>Senior Consultant</i> Dept Diagnostic & Interventional Imaging</p>	 <p>Dr Arif Tyebally <i>Senior Consultant</i> Dept Emergency Medicine</p>
 <p>Dr Rukshini Puvanendran <i>Senior Consultant</i> Dept Family Medicine Service</p>	 <p>Dr Thia Wee Hong Edwin <i>Senior Consultant</i> Dept Maternal Fetal Medicine</p>	 <p>Dr Chen Ching Kit <i>Senior Consultant</i> Dept Paediatric Subspecialties (Cardiology Service)</p>
 <p>Dr Lee Jan Hau <i>Senior Consultant</i> Dept Paediatric Subspecialties (Children's Intensive Care Unit)</p>	 <p>Dr Nandhakumar Nagarajan <i>Senior Consultant</i> Dept Paediatrics (General Paediatrics & Adolescent Medicine Service)</p>	 <p>Dr Leong May Ying <i>Senior Consultant</i> Dept Pathology & Laboratory Medicine</p>

PROMOTIONS - CONSULTANTS

 <p>Dr Tan Yia Swam <i>Consultant</i> Dept Breast Department</p>	 <p>Dr Sandra Sylvia Mascarenhas <i>Consultant</i> Dept Child Development</p>	 <p>Dr Zaw Lwin <i>Consultant</i> Dept Emergency Medicine</p>
 <p>Dr Tewani Komal Girish <i>Consultant</i> Dept Gynaecological Oncology</p>	 <p>Dr Amudha Jayanthi Anand <i>Consultant</i> Dept Neonatology</p>	 <p>Dr Nirmal Kavalloor Visruthan <i>Consultant</i> Dept Neonatology</p>
 <p>Dr Odattil Geetha <i>Consultant</i> Dept Neonatology</p>	 <p>Dr Yip Wai Yan <i>Consultant</i> Dept Neonatology</p>	 <p>Dr Koh Huiting, Lynn <i>Consultant</i> Dept Otolaryngology</p>
 <p>Dr Chow Chu-Tian Cristelle <i>Consultant</i> Dept Paediatrics (General Paediatrics & Adolescent Medicine Service)</p>	 <p>Dr Kang Chun-Wui Gavin <i>Consultant</i> Dept Plastic, Reconstructive & Aesthetic Surgery</p>	



Appointments

KK WOMEN'S AND CHILDREN'S HOSPITAL

Appointments: 6294 4050
Email: centralappt@kkh.com.sg

PROMOTIONS - CONSULTANTS



Dr Kong Tze Yeon
Consultant
Dept
Plastic, Reconstructive & Aesthetic Surgery



Dr Liu Shuling
Consultant
Dept
Reproductive Medicine



Dr Tan Tse Yeun
Consultant
Dept
Reproductive Medicine

PROMOTIONS - ASSOCIATE CONSULTANTS



Dr Lee Mi Li Jean Jasmin
Associate Consultant
Dept
Family Medicine Service

NEW APPOINTMENTS



Dr Chan Yoke Hwee
Head
Dept
Children's Intensive Care Unit



Dr Thia Wee Hong Edwin
Head
Dept
Obstetric Ultrasound & Prenatal Diagnostic Unit



Assoc Prof Chang Tou En Kenneth
Head
Dept
Pathology & Laboratory Medicine

SENGKANG HEALTH

Appointments: 6472 2000
Email: ah.appointment@skh.com.sg

APPOINTMENTS - SENIOR CONSULTANTS



Dr Seet Chong Meng
Senior Consultant
Dept
Emergency Medicine



Dr Aw Chen Wee Derrick
Senior Consultant
Dept
General Medicine (Dermatology)



Dr Koh Fang Yung Angela
Senior Consultant
Dept
General Medicine (Internal Medicine)



Dr Azman Johan
Senior Consultant
Dept
General Medicine (Internal Medicine)



Dr Poon Kein Boon
Senior Consultant
Dept
Orthopaedic Surgery

APPOINTMENTS - CONSULTANTS



Dr Tay Bee Gek Laura
Consultant
Dept
General Medicine (Geriatric Medicine)



Dr Tan Choon Chieh
Consultant
Dept
Surgery

SENGKANG HEALTH

Appointments: 6472 2000
Email: ah.appointment@skh.com.sg

APPOINTMENTS - ASSOCIATE CONSULTANTS



Dr Ye Qin hao Jonathan
Associate Consultant
Dept
General Medicine
(Respiratory Medicine)



Dr Siow Wei Ming
Associate Consultant
Dept
Orthopaedic Surgery



Dr Peter Cynthia Assimta
Associate Consultant
Dept
Radiology

PROMOTION - SENIOR CONSULTANT



Dr Puneet Seth
Senior Consultant
Dept
Emergency Medicine

PROMOTIONS - CONSULTANTS



Dr Sueziani Binte Zainudin
Consultant
Dept
General Medicine (Endocrinology)



Dr Anandakumar s/o Vellasamy
Consultant
Dept
Orthopaedic Surgery



Dr Chew Chee Ping
Consultant
Dept
Orthopaedic Surgery



Dr Ho Chi Long
Consultant
Dept
Radiology

NATIONAL NEUROSCIENCE INSTITUTE

Appointments: 6357 7095
Email: da_neuroscience@nni.com.sg

APPOINTMENT



Dr Ti Joanna Pearly
Consultant
Dept
Neuroradiology



Appointments

NATIONAL NEUROSCIENCE INSTITUTE

Appointments: 6357 7095
Email: da_neuroscience@nni.com.sg

PROMOTIONS



Dr Daniel Oh Chia Theng
Senior Consultant
Dept
Neurology
Sub-specialty
Stroke, Neuro-intensive Care



Dr Tham Huilian Carol
Consultant
Dept
Neurology



Dr Xu Zheyu
Consultant
Dept
Neurology



Dr Purohit Bela Satish
Consultant
Dept
Neuroradiology



Dr Low Yin Yee Sharon
Associate Consultant
Dept
Neurosurgery

SINGAPORE NATIONAL EYE CENTRE

Appointments: 6322 9399
Email: appointments@snecc.com.sg

APPOINTMENT



Dr Donny Hoang Q V
Consultant (Part-time)
Dept
Surgical Retina

PROMOTIONS - CONSULTANTS



Dr Chew Chee Yen Annabel
Consultant
Dept
Glaucoma



Dr Jayant Venkatramani Iyer
Consultant
Dept
Glaucoma

PROMOTIONS - ASSOCIATE CONSULTANTS



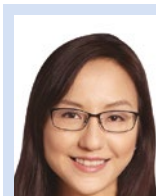
Dr Teo Yi Chong Kelvin
Associate Consultant
Dept
General Cataract & Comprehensive
Ophthalmology



Dr Ting Shu Wei Daniel
Associate Consultant
Dept
General Cataract & Comprehensive
Ophthalmology



Dr Tsai Shih Hsiang Andrew
Associate Consultant
Dept
General Cataract & Comprehensive
Ophthalmology



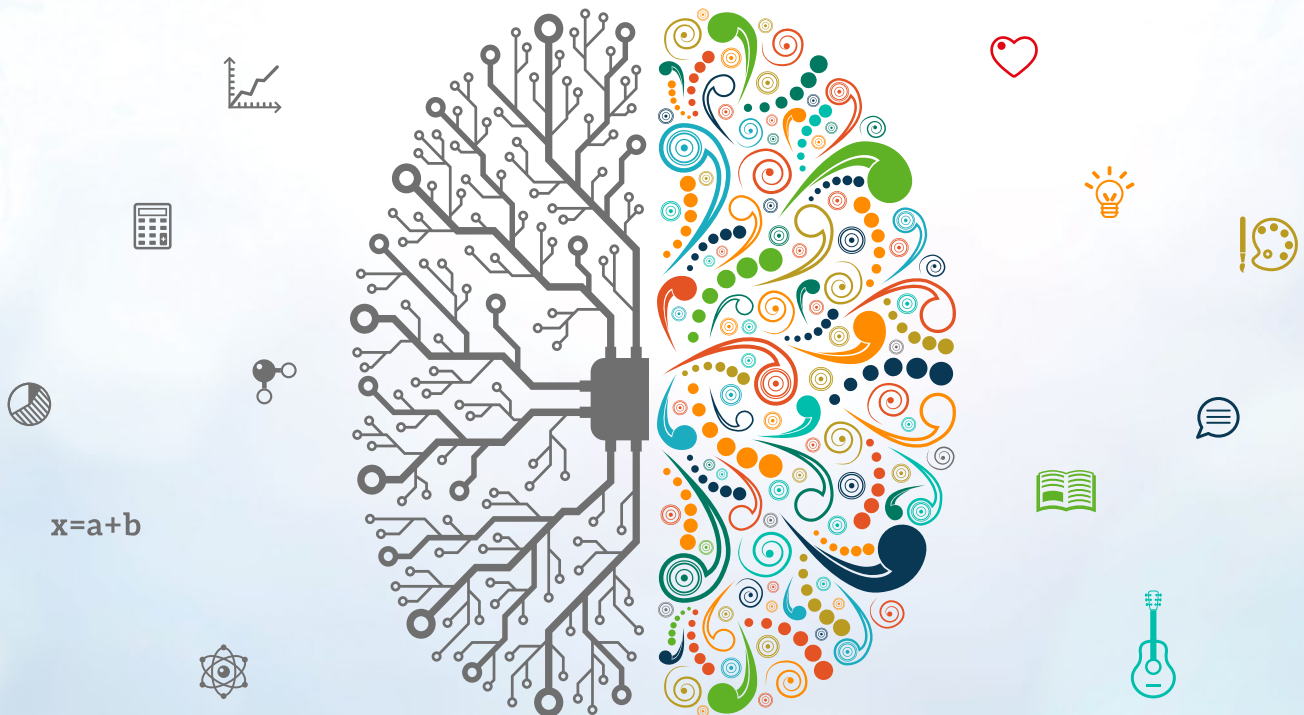
Dr Yong Kailing
Associate Consultant
Dept
General Cataract & Comprehensive
Ophthalmology



5th Singapore International Neurocognitive Symposium

Themed **Early Intervention for a Better Tomorrow**, our international, regional and local experts at the 5th Singapore International Neurocognitive Symposium will be covering an extensive range of plenary sessions from clinical and biomarker aspects of early diagnosis as well as the strategies for timely intervention. Updates on pharmacological management, non-pharmacological management and novel biomarkers in the field of dementia will be presented.

The Symposium will feature practical workshops, translational research symposium and parallel sessions. There will be a Welcome Reception, which will be a perfect opportunity for delegates to network with researchers and clinicians in the field.



Date

- **16 March 2017 (Thursday)**
Pre-Symposium Workshop & Translational Research Symposium
- **17 – 18 March 2017 (Friday to Saturday)**
Main Symposium

Venue

Raffles City Convention Centre
80 Bras Basah Road
Singapore 189560

CME Points

Maximum 12 points

Contact

National Neuroscience Institute
11 Jalan Tan Tock Seng
Singapore 308433
Tel: 6357 7152/7541
Fax: 6256 4755
Email: nni_secretariat@nni.com.sg

Registration is required.

For more details or to register, visit www.nni.com.sg/education/pages/5thNeuroCog.aspx



Recruitment

Don't Limit Your Challenges. Challenge Your Limits.

If you are a qualified doctor/dentist, a challenging career awaits you at SingHealth. We seek suitably qualified candidates to join us as:

- RESIDENT PHYSICIANS / FAMILY PHYSICIANS
- REGISTRARS / STAFF REGISTRARS

Interested applicants to email CV with full personal particulars, educational and professional qualifications (including housemanship details), career history, present and expected salary, names of at least two professional references, contact numbers and e-mail address together with a non-returnable photograph.

Please email your CV to the respective institutions' email addresses/online career portals below with the Reference Number MN1701.



The SingHealth Duke-NUS Academic Medical Centre draws on the collective strengths of SingHealth and Duke-NUS Medical School to drive the transformation of health-care and provide affordable, accessible, quality healthcare.

With 42 clinical specialties, a network of 2 Hospitals, 5 National Specialty Centres, 9 Polyclinics and Bright Vision Community Hospital, it delivers comprehensive, multidisciplinary and integrated care.

In 2018, the Sengkang General Hospital and Sengkang Community Hospital will be completed to serve the community in the north-east of Singapore. To enhance community care, the new Outram Community Hospital on SGH Campus will be completed in 2020.

■ KK Women's and Children's Hospital

Department seeking Resident Physicians and Staff Registrars:

- Women's Anaesthesia

Departments seeking Clinical Associates:

- Neurosurgical Service
- Neonatology

Website: www.kkh.com.sg

Email: medical.hr@kkh.com.sg

■ Sengkang Health

Departments seeking Resident Physicians and Staff Registrars:

- Anaesthesiology
- Cardiology
- Emergency Medicine
- General Surgery
- Internal Medicine
- Neurology
- Orthopaedic Surgery
- Rehabilitation Medicine

Website: www.singhealth.com.sg/AboutSingHealth/CorporateOverview/sengkang-health/pages/home.aspx

Email: careers@skh.com.sg

■ National Heart Centre Singapore

Department seeking Registrars:

- Cardiothoracic Surgery

Website: www.nhcs.com.sg

Email: hr_mgr@nhcs.com.sg

■ SingHealth Polyclinics

Seeking Resident Physicians and Family Physicians:

- Polyclinic (Family Medicine)

Website: <http://polyclinic.singhealth.com.sg>

Email: hr_admin@singhealth.com.sg





SingHealth

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GP FAST TRACK APPOINTMENT HOTLINES

 Singapore General Hospital	6321 4402
 KK Women's and Children's Hospital	6294 4050
 Sengkang Health	6472 2000
 National Cancer Centre Singapore	6436 8288
 National Dental Centre Singapore	6324 8798
 National Heart Centre Singapore	6704 2222
 National Neuroscience Institute	6357 7095
 Singapore National Eye Centre	6322 9399

DIRECT WARD REFERRAL CONTACT NUMBERS

 Singapore General Hospital	6321 4822
 KK Women's and Children's Hospital	6394 1180

SINGHEALTH DUKE-NUS ACADEMIC MEDICAL CENTRE

 Singapore General Hospital	 KK Women's and Children's Hospital
 Sengkang Health	 National Cancer Centre Singapore
 National Dental Centre Singapore	 National Heart Centre Singapore
 National Neuroscience Institute	 Singapore National Eye Centre
 Polyclinics SingHealth	 Bright Vision Hospital