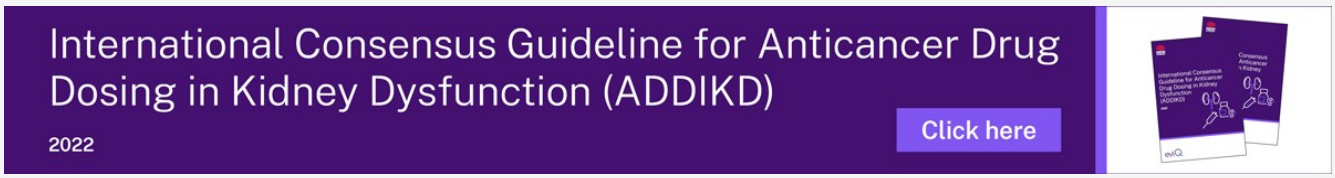
Hyper CVAD Part B

ID: 572 v.8 **Under review** Essential Medicine List

Patients with leukaemia should be considered for inclusion into clinical trials. Link to ALLG website and ANZCTR website.

Patients with lymphoma should be considered for inclusion into clinical trials. Link to ALLG website, ANZCTR website and Lymphoma Australia website.

The anticancer drug(s) in this protocol may have been included in the ADDIKD guideline. Dose recommendations in kidney dysfunction have yet to be updated to align with the ADDIKD guideline. Recommendations will be updated once the individual protocol has been evaluated by the reference committee. For further information refer to the ADDIKD guideline. To assist with calculations, use the eviQ Estimated Glomerular Filtration Rate (eGFR) calculator.



Related pages:

- Hyper CVAD Part A and B/POMP overview
- Hyper CVAD Part A
- POMP maintenance therapy (mercaptopurine vinCRISTine methotrexate prednisolone)
- CNS prophylaxis for acute lymphoblastic leukaemia hyper CVAD protocol

Treatment schedule - Overview

Cycle 2 and 4

Drug	Dose	Route	Day
Methylprednisolone sodium succinate	50 mg TWICE a day	IV infusion	1 to 3
Methotrexate	200 mg/m^2	IV infusion	1
Methotrexate	800 mg/m^2 over 22 hours	IV infusion	1
Calcium folinate (Leucovorin)	15 mg/m^2 every 6 hours *	IV infusion	2
Cytarabine (Ara-C)	3,000 mg/m^2 TWICE a day **	IV infusion	2 and 3
Methotrexate ***	12 mg	Intrathecal	2
Filgrastim	10 micrograms/kg	Subcut	4 and continue daily until neutrophil recovery
Cytarabine (Ara-C) ***	100 mg	Intrathecal	8

Cycle 6 and 8

Drug	Dose	Route	Day
Methylprednisolone sodium succinate	50 mg TWICE a day	IV infusion	1 to 3
Methotrexate	200 mg/m^2	IV infusion	1

Drug	Dose	Route	Day
Methotrexate	800 mg/m^2 over 22 hours	IV infusion	1
Calcium folinate (Leucovorin)	15 mg/m^2 every 6 hours *	IV infusion	2
Cytarabine (Ara-C)	3,000 mg/m^2 TWICE a day **	IV infusion	2 and 3
Filgrastim	10 micrograms/kg	Subcut	4 and continue daily until neutrophil recovery

* Every 6 hours until methotrexate level less than 0.1 micromol/L. Start 36 hours after commencement of methotrexate infusion

** For patients over 60 years, the cytarabine dose was reduced to 1000 mg/m^2 in the Kantarjian et al. study[1, 2] (refer to 'dose modifications' below).

*** The total number of intrathecal (IT) treatments is dependent on patient risk category. The 'Unknown Risk' category is included as default in this protocol (i.e. IT therapy on cycles 2 and 4). The IT dose of methotrexate when given via an Ommaya reservoir is 6 mg.[1] Link to intrathecal CNS prophylaxis schedule .

Frequency: 21 days
Commence next cycle (i.e. Part A) after 21 days or when WCC is greater than 3 x10^9 and platelets are greater than 60 x10^9, whichever is earlier.

Cycles: 4
This hyper CVAD protocol consists of 4 cycles of Part B (Cycles 2, 4, 6, 8) alternating with 4 cycles of Part A (Cycles 1, 3, 5, 7) for a total of 8 cycles, followed by maintenance therapy for 2 years.

Notes:

- Rituximab - In patients with CD20+ disease, a total of 8 doses of rituximab 375 mg/m^2 should be given on days 1 and 11 of Part A and days 1 and 8 of Part B for the first four cycles of treatment.[3]
- Calcium folinate (Leucovorin®) must be administered at the precise timings as prescribed; the first dose must be given 36 hours after the commencement of the methotrexate infusion. See ID 3535 Management of high-dose methotrexate toxicity for more information.
- Methotrexate levels should be monitored at 24 hours after the completion of the methotrexate infusion and daily until the level is less than 0.1 micromol/L.

Drug status: **Filgrastim** is PBS authority

All other drugs in this protocol are on the PBS general schedule

Cost: ~ $2,910 per cycle

Treatment schedule - Detail

The supportive therapies (e.g. antiemetics, premedications, etc.), infusion times, diluents, volumes and routes of administration, if included, are listed as defaults. They may vary between institutions and can be substituted to reflect individual institutional policy.

*Antiemetics if included in the treatment schedule are based upon recommendations from national and international guidelines. These are **defaults only** and may be substituted to reflect individual institutional policy. Select here for recommended doses of alternative antiemetics.*

Cycle 2 and 4

Day 1		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Methotrexate	200 mg/m^2 (IV infusion)	in 500 mL sodium chloride 0.9% over 2 hours
Methotrexate	800 mg/m^2 (IV infusion)	in 1000 mL sodium chloride 0.9% over 22 hours
Day 2		

Day 2		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Calcium folinate (Leucovorin)	15 mg/m^2 (IV infusion)	start 36 hours after commencement of methotrexate infusion and repeat every 6 hours until methotrexate level less than 0.1 micromol/L
Cytarabine (Ara-C)	3,000 mg/m^2 (IV infusion)	in 500 mL to 1000 mL sodium chloride 0.9% over 3 hours TWICE a day (every 12 hours).*
Methotrexate	12 mg (Intrathecal)	adhere to local institution intrathecal policy. Total number of intrathecal treatments is dependent on patient risk category. The 'Unknown Risk' category is included as default in this protocol - see CNS prophylaxis schedule below** (dose is 6 mg if given via an Ommaya reservoir)

Day 3		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Cytarabine (Ara-C)	3,000 mg/m^2 (IV infusion)	in 500 mL to 1000 mL sodium chloride 0.9% over 3 hours TWICE a day (every 12 hours).*

Day 4		
Filgrastim	10 micrograms/kg (Subcut)	inject subcutaneously once daily starting day 4 and continue until neutrophil recovery.

Day 8		
Cytarabine (Ara-C)	100 mg (Intrathecal)	adhere to local institution intrathecal policy. Total number of intrathecal treatments is dependent on patient risk category. The 'Unknown Risk' category is included as default in this protocol - see CNS prophylaxis schedule below**

Cycle 6 and 8

Day 1		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Methotrexate	200 mg/m^2 (IV infusion)	in 500 mL sodium chloride 0.9% over 2 hours
Methotrexate	800 mg/m^2 (IV infusion)	in 1000 mL sodium chloride 0.9% over 22 hours

Day 2		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Calcium folinate (Leucovorin)	15 mg/m^2 (IV infusion)	start 36 hours after commencement of methotrexate infusion and repeat every 6 hours until methotrexate level less than 0.1 micromol/L
Cytarabine (Ara-C)	3,000 mg/m^2 (IV infusion)	in 500 mL to 1000 mL sodium chloride 0.9% over 3 hours TWICE a day (every 12 hours).*

Day 3		
Methylprednisolone sodium succinate	50 mg (IV infusion)	TWICE a day in 100 mL sodium chloride 0.9% over 30 minutes (every 12 hours)
Cytarabine (Ara-C)	3,000 mg/m^2 (IV infusion)	in 500 mL to 1000 mL sodium chloride 0.9% over 3 hours TWICE a day (every 12 hours).*

Day 3		

Day 4		
Filgrastim	10 micrograms/kg (Subcut)	inject subcutaneously once daily starting day 4 and continue until neutrophil recovery.

* For patients over 60 years, the cytarabine dose was reduced to 1000 mg/m^2 in the Kantarjian et al. study[1, 2] (refer to 'dose modifications' below).

** The total number of intrathecal (IT) treatments is dependent on patient risk category. The 'Unknown Risk' category is included as default in this protocol (i.e. IT therapy on cycles 2 and 4). The IT dose of methotrexate when given via an Ommaya reservoir is 6 mg.[1] Link to intrathecal CNS prophylaxis schedule .

Frequency: 21 days
Commence next cycle (i.e. Part A) after 21 days or when WCC is greater than 3 x10^9 and platelets are greater than 60 x10^9, whichever is earlier.

Cycles: 4
This hyper CVAD protocol consists of 4 cycles of Part B (Cycles 2, 4, 6, 8) alternating with 4 cycles of Part A (Cycles 1, 3, 5, 7) for a total of 8 cycles, followed by maintenance therapy for 2 years.

Indications and patient population - Ph- acute lymphoblastic leukaemia

Indications:

- Philadelphia chromosome negative acute lymphoblastic leukaemia (Ph- ALL)

Caution:

- This protocol is intended for patients 25 years of age and older; an alternate protocol may be considered for patients younger than 25 years
- Not generally for treatment of Philadelphia chromosome positive acute lymphoblastic leukaemia, refer to:
  - Acute lymphoblastic leukaemia Ph+ hyper CVAD and daSATinib part A and B/maintenance
  - Acute lymphoblastic leukaemia Ph+ hyper CVAD and imatinib part A and B/maintenance

Indications and patient population - Lymphoblastic lymphoma

Indications:

- Lymphoblastic lymphoma

Caution:

- This protocol is intended for patients 25 years of age and older; an alternate protocol may be considered for patients younger than 25 years

Clinical information

Venous access	Central venous access device (CVAD) is required to administer this treatment. Read more about central venous access device line selection

Antiemetics for multi-day protocols	Antiemetic therapy should be administered throughout the duration of the chemotherapy protocol and to cover delayed nausea. The acute and delayed emetic risk of multi-day chemotherapy protocols will overlap depending on the individual drugs and their sequence of administration. More or less antiemetic cover may be required. As a steroid has been included as part of this protocol, additional antiemetic steroids are not required. Ensure that patients also have sufficient antiemetics for breakthrough emesis: Metoclopramide 10 mg three times a day when necessary (maximum of 30 mg/24 hours, up to 5 days) OR Prochlorperazine 10 mg PO every 6 hours when necessary. Read more about preventing anti-cancer therapy induced nausea and vomiting
Ocular toxicities	Administer corticosteroid eye drops to minimise corneal toxicity from high dose cytarabine. Commence on the day of first dose of cytarabine and continue for at least 72 hours after completion of final cytarabine dose. Read more about ocular toxicities associated with high dose cytarabine
Cytarabine syndrome	Treatment with cytarabine may cause a "cytarabine syndrome" characterised by flu-like symptoms, skin rash and occasionally chest pain.
Cytarabine induced neurotoxicity	This may occur in patients treated with high dose cytarabine. Assess cerebellar function prior to each cytarabine dose. Read more about neurotoxicity associated with high dose cytarabine and access the cytarabine cerebellar neurotoxicity assessment chart
Pre-hydration	Pre-hydration with sodium bicarbonate 8.4% infusion. Urinary pH must be greater than 7 prior to commencing methotrexate infusion. Consider prescribing sodium bicarbonate oral capsules for administration prior to methotrexate infusion. Sodium bicarbonate 8.4% should continue until the methotrexate level is equal to or less than 0.1 micromol/L. Read more about high dose methotrexate-induced toxicity.
High dose methotrexate	Monitoring of methotrexate levels is essential as delayed methotrexate excretion is potentially an emergency situation. Methotrexate levels to be monitored every 24 hours until level is less than 0.1 micromol/L. Methotrexate is renally eliminated. Kidney function must be evaluated prior to treatment. Methotrexate exits slowly from third space compartments (e.g. pleural effusions or ascites), resulting in a prolonged terminal plasma half-life and unexpected toxicity. In patients with significant third space accumulations, it is advisable to evacuate the fluid before treatment and to monitor plasma methotrexate levels. Glucarpidase is recommended in patients with high dose methotrexate (HDMTX)-induced acute kidney injury and delayed methotrexate clearance. It can rapidly lower methotrexate levels and early administration within 48 to 60 hours from the start of the HDMTX infusion is critical, as life-threatening toxicities may not be preventable beyond this time point.[4] Read more about high dose methotrexate-induced toxicity.
Methotrexate interactions	Avoid administering the following drugs in combination with high dose methotrexate: ciprofloxacin, NSAIDs, probenecid, proton pump inhibitors (PPIs) (e.g. esomeprazole, omeprazole, pantoprazole), sulphonamides (e.g. sulfamethoxazole (in Bactrim®, Septrin®)), penicillins (e.g. piperacillin (in Tazocin®)) and trimethoprim. Severe mucositis may occur if administered together.
Corticosteroids	Diabetic patients should monitor their blood glucose levels closely. To minimise gastric irritation, advise patient to take immediately after food. Consider the use of a H2 antagonist or proton pump inhibitor if appropriate. Read more about acute short term effects from corticosteroids
Tumour lysis risk	Patients are at high risk of developing tumour lysis syndrome, prophylaxis is recommended. Read more about the prevention and management of tumour lysis syndrome.

Pneumocystis jirovecii pneumonia (PJP) prophylaxis	PJP prophylaxis is recommended. Myelosuppression may be exacerbated if trimethoprim/sulfamethoxazole is used in combination with methotrexate. Read about prophylaxis of pneumocystis jirovecii (carinii) in cancer patients
Antiviral prophylaxis	Read more about antiviral prophylaxis drugs and doses
Antifungal prophylaxis	Read more about antifungal prophylaxis drugs and doses.
Biosimilar drug	Read more about biosimilar drugs on the Biosimilar Awareness Initiative page
Growth factor support	G-CSF (short or long-acting) is available on the PBS for chemotherapy induced neutropenia depending on clinical indication and/or febrile neutropenia risk. Access the PBS website
Blood tests	FBC, EUC, eGFR, LFTs, LDH and BSL at baseline, prior to each treatment and regularly throughout treatment. Methotrexate levels to be monitored every 24 hours until level is less than 0.1 micromol/L.
Hepatitis B screening and prophylaxis	Routine screening for HBsAg and anti-HBc is recommended prior to initiation of treatment. Prophylaxis should be determined according to individual institutional policy. Read more about hepatitis B screening and prophylaxis in cancer patients requiring cytotoxic and/or immunosuppressive therapy
Vaccinations	Live vaccines are contraindicated in cancer patients receiving immunosuppressive therapy and/or who have poorly controlled malignant disease. Refer to the recommended schedule of vaccination for immunocompromised patients, as outlined in the Australian Immunisation Handbook. Read more about COVID-19 vaccines and cancer.
Fertility, pregnancy and lactation	Cancer treatment can have harmful effects on fertility and this should be discussed with all patients of reproductive potential prior to commencing treatment. There is a risk of foetal harm in pregnant women. A pregnancy test should be considered prior to initiating treatment in females of reproductive potential if sexually active. It is important that all patients of reproductive potential use effective contraception whilst on therapy and after treatment finishes. Effective contraception methods and adequate contraception timeframe should be discussed with all patients of reproductive potential. Possibility of infant risk should be discussed with breastfeeding patients. Read more about the effect of cancer treatment on fertility

Dose modifications

Evidence for dose modifications is limited, and the recommendations made on eviQ are intended as a guide only. They are generally conservative with an emphasis on safety. Any dose modification should be based on clinical judgement, and the individual patient's situation including but not limited to treatment intent (curative vs palliative), the anti-cancer regimen (single versus combination therapy versus chemotherapy versus immunotherapy), biology of the cancer (site, size, mutations, metastases), other treatment related side effects, additional co-morbidities, performance status and patient preferences.Suggested dose modifications are based on clinical trial findings, product information, published guidelines and reference committee consensus . The dose reduction applies to each individual dose and not to the total number of days or duration of treatment cycle unless stated otherwise. Non-haematological gradings are based on Common Terminology Criteria for Adverse Events (CTCAE) unless otherwise specified. Renal and hepatic dose modifications have been standardised where possible. For more information see dosing considerations & disclaimer .

The dose recommendations in kidney dysfunction (i.e.renal impairment) displayed may not reflect those in the ADDIKD guideline and have been included for historical reference only. Recommendations will be updated once the individual protocol has been evaluated by the reference committee, with this version of the protocol then being archived. Clinicians are expected to refer to the ADDIKD guideline prior to prescribing in kidney dysfunction.
International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (ADDIKD).

Note: All dose reductions are calculated as a percentage of the starting dose

Haematological toxicity
Prolonged haematological toxicity in the absence of bone marrow involvement may require a dose reduction at the discretion of the Haematologist

Renal impairment	
Creatinine clearance (mL/min)	
10 to 50	Reduce methotrexate by 50% and reduce cytarabine dose to 1000 mg/m^2
less than 10	Methotrexate contraindicated

Note: *an increased risk of neurotoxicity has been associated with high dose cytarabine when creatinine clearance is less than 60 mL/min.*

Hepatic impairment	
Hepatic dysfunction	
Mild	No dose modifications necessary
Moderate	No dose modifications necessary
Severe	Reduce methotrexate by 25%

Elevations in liver function tests occur with both standard and high dose cytarabine. Significant liver function abnormalities may require discontinuation or a dose reduction

Methotrexate level > 20 micromol/L after completion of infusion[1, 2]
If methotrexate level is greater than 20 micromol/L at 0 hours post completion of methotrexate therapy, reduce cytarabine dose to 1000 mg/m^2

Age older than 60 years[1, 2]
For patients aged older than 60 years, reduce cytarabine dose to 1000 mg/m^2

Mucositis, stomatitis and diarrhoea	
Grade 3 or Grade 4	Diarrhoea and ulcerative stomatitis require interruption of therapy otherwise, haemorrhagic enteritis and death from intestinal perforation may occur; reduce methotrexate by 25%

Interactions

Drug interactions in eviQ protocols are under review and being updated to align with current literature. Further site-wide updates and changes will occur in due course. References & Disclaimer

The drug interactions shown below are not an exhaustive list. For a more comprehensive list and for detailed information on specific drug interactions and clinical management, please refer to the specific drug product information and the following key resources:

- *MIMS - interactions tab (includes link to a CYP-450 table) (login required)*
- *Australian Medicines Handbook (AMH) – interactions tab (login required)*
- *Micromedex Drug Interactions (login required)*
- *Cancer Drug Interactions*
- *Cytochrome P450 Drug Interactions*

Cytarabine		
	Interaction	**Clinical management**
Cytidine deaminase (CDA) inhibitors (e.g. cedazuridine)	Potential increased effect/toxicity of cytarabine due to reduced clearance	Avoid combination or monitor for increased cytarabine effect/toxicity

Methotrexate		
	Interaction	**Clinical management**
Ciprofloxacin **NSAIDS** **Probenecid** **Proton pump inhibitors (e.g. esomeprazole, omeprazole, pantoprazole)**	Increased toxicity of methotrexate possible due to reduced clearance	Avoid combination or monitor for methotrexate toxicity Important note: with high-dose methotrexate therapy, many of these drug combinations are *contraindicated*
Sulphonamides and penicillins (e.g. sulfamethoxazole (in Bactrim®, Septrin®), piperacillin (in Tazocin®) etc.)	Increased toxicity of methotrexate possible due to displacement from serum protein binding	Avoid combination or monitor for methotrexate toxicity
Trimethoprim	Increased toxicity of methotrexate possible due to additive antifolate activity	Avoid combination or monitor for methotrexate toxicity
Mercaptopurine	Increased toxicity of mercaptopurine possible due to reduced clearance	Avoid combination or monitor for mercaptopurine toxicity
Nephrotoxic drugs (e.g. aminoglycosides, amphotericin, contrast dye, frusemide, NSAIDs)	Additive nephrotoxicity	Avoid combination or monitor kidney function closely
Hepatotoxic drugs (e.g. azathioprine, leflunomide, retinoids, sulfasalazine)	Additive hepatotoxicity	Avoid combination or monitor liver function closely
Folic acid (e.g. as in multivitamins) **Asparaginase (administered immediately prior or concurrently)**	Reduced efficacy of methotrexate possible due antagonism of its action	Avoid combination or monitor for decreased clinical response to methotrexate Note: asparaginase administered shortly after methotrexate can enhance its efficacy and reduce its toxicity

Methylprednisolone		
	Interaction	**Clinical management**
CYP3A4 inhibitors (e.g. aprepitant, azole antifungals, clarithromycin, erythromycin, grapefruit juice, ritonavir etc.)	Increased toxicity of methylprednisolone possible due to reduced clearance	Avoid combination or monitor for methylprednisolone toxicity
CYP3A4 inducers (e.g. carbamazepine, phenytoin, phenobarbitone, rifampicin, St John's wort etc.)	Reduced efficacy of methylprednisolone possible due to increased clearance	Avoid combination or monitor for decreased clinical response to methylprednisolone

General		
	Interaction	**Clinical management**
Warfarin	Anti-cancer drugs may alter the anticoagulant effect of warfarin.	Monitor INR regularly and adjust warfarin dosage as appropriate; consider alternative anticoagulant.
Direct oral anticoagulants (DOACs) e.g. apixaban, rivaroxaban, dabigatran	Interaction with both CYP3A4 and P-gp inhibitors /inducers. DOAC and anti-cancer drug levels may both be altered, possibly leading to loss of efficacy or toxicity (i.e. increased bleeding).	Apixaban: avoid concurrent use with strong CYP3A4 and P-gp inhibitors. If treating VTE, avoid use with strong CYP3A4 and P-gp inducers. Rivaroxaban: avoid concurrent use with strong CYP3A4 and P-gp inhibitors. Dabigatran: avoid combination with strong P-gp inducers and inhibitors. If concurrent use is unavoidable, monitor closely for efficacy/toxicity of both drugs.
Digoxin	Anti-cancer drugs can damage the lining of the intestine; affecting the absorption of digoxin.	Monitor digoxin serum levels; adjust digoxin dosage as appropriate.
Antiepileptics	Both altered antiepileptic and anti-cancer drug levels may occur, possibly leading to loss of efficacy or toxicity.	Where concurrent use of an enzyme-inducing antiepileptic cannot be avoided, monitor antiepileptic serum levels for toxicity, as well as seizure frequency for efficacy; adjust dosage as appropriate. Also monitor closely for efficacy of the anti-cancer therapy.
Antiplatelet agents and NSAIDs	Increased risk of bleeding due to treatment related thrombocytopenia.	Avoid or minimise combination. If combination deemed essential, (e.g. low dose aspirin for ischaemic heart disease) monitor for signs of bleeding.
Serotonergic drugs, including selective serotonin reuptake inhibitors (SSRIs e.g. paroxetine) and serotonin noradrenaline reuptake inhibitors (SNRIs e.g. venlafaxine)	Increased risk of serotonin syndrome with concurrent use of 5-HT3 receptor antagonists (e.g. palonosetron, ondansetron, granisetron, tropisetron, dolasetron, etc.)	Avoid combination. If combination is clinically warranted, monitor for signs and symptoms of serotonin syndrome (e.g. confusion, agitation, tachycardia, hyperreflexia). For more information link to TGA Medicines Safety Update
Vaccines	Diminished response to vaccines and increased risk of infection with live vaccines.	Live vaccines (e.g. BCG, MMR, zoster and varicella) are contraindicated in patients on immunosuppressive therapy. Use with caution in patients on non-immunosuppressive therapy. For more information; refer to the recommended schedule of vaccination for cancer patients, as outlined in the Australian Immunisation Handbook

Administration Cycles 2 and 4

eviQ provides safe and effective instructions on how to administer cancer treatments. However, eviQ does not provide every treatment delivery option, and is unable to provide a comprehensive list of cancer treatment agents and their required IV line giving set/filter. There may be alternative methods of treatment administration, and alternative supportive treatments that are also appropriate. Please refer to the individual

product information monographs via the TGA website for further information.

Day 1

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Prime IV line(s).

Access CVAD.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Note: Commence corticosteroid eye drops and continue for 72 hours after the last dose of cytarabine.

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Methotrexate

Prehydration:

- administer 100 mL sodium bicarbonate 8.4% in 1000 mL glucose **OR** sodium chloride 0.9% over 4 hours
- continue hydration with sodium bicarbonate 8.4% as prescribed
- when urine pH is greater than 7 commence methotrexate

If the urine pH drops below 7 during the methotrexate infusion:

- administer stat dose of 100 mL sodium bicarbonate 8.4% over 15 minutes
- continue to test all urine for pH, if the pH continues to drop below 7 seek medical review as further doses of sodium bicarbonate may be required.

Note: A large volume of intravenous fluid is given with this protocol if weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload is present review by medical officer (diuretics may be required).

First dose of methotrexate

- administer via IV infusion over 2 hours
- the starting time of the methotrexate infusion **must** be documented as the calcium folinate (leucovorin) rescue is to commence exactly 36 hours after the commencement of the methotrexate and continue until the methotrexate level is less than 0.1 micromol/L

Second dose of methotrexate (to commence immediately after the first dose):

- administer via IV infusion over 22 hours
- flush with ~50 mL of sodium chloride 0.9%
- **Stop the methotrexate infusion after 22 hours even if the infusion is not completed**

Post methotrexate:

- continue hydration with sodium bicarbonate 8.4% until methotrexate level is less than 0.1 micromol/L
- continue to monitor all urine pH and fluid input and output
- monitor methotrexate concentration every 24 hours until the level is less than 0.1 micromol/L

Continue safe handling precautions until 7 days after completion of drug(s)

Day 2

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Hydration if prescribed

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Calcium Folinate (Leucovorin)

Commence 36 hours after commencement of methotrexate infusion and repeat every 6 hours until methotrexate level is less than 0.1 micromol/L.

- administer via IV bolus via the side port of the IV line over 1 to 2 minutes
- flush with ~ 50 mL of sodium chloride 0.9%

Cytarabine

Prior to administration:

Ensure corticosteroid eye drops have been administered before starting cytarabine. Please see ocular toxicities associated with high dose cytarabine for more information.

Verify that cytarabine neurological assessment has been performed prior to administration of cytarabine:

- if the patient scores 0 then administer cytarabine as charted
- if the patient scores 1 or above, do not administer the cytarabine and immediately notify medical officer.

Administer cytarabine:

- via IV infusion over 3 hours
- flush with ~50 mL of sodium chloride 0.9%.

Administer second dose of cytarabine 12 hours after first dose.

Intrathecal methotrexate

Note:

- intrathecal methotrexate may not be administered with every cycle
- the number of IT treatments is dependent on patient risk category

⚠ Intrathecal methotrexate is to be administered today. The intrathecal procedure is to be done separately to the IV administration of all other cytotoxic drugs

Read more about the procedure for intrathecal methotrexate administration.

Post intrathecal care:

Local policies and guidelines regarding bed rest post dural puncture should be adhered to. At a minimum:

- the patient should have at least 1 set of observations including:
  - vital signs and GCS
  - any abnormal neurological signs such as nausea, vomiting, chills, fever, confusion, headache or other changes in neurological status
- educate the patient to recognise and immediately report any adverse reactions including blurred vision, dizziness, pain and or headache
- observe the lumbar puncture site for any leakage or bleeding post procedure
- document the procedure including outcomes in the patients notes

Continue safe handling precautions until 7 days after completion of drug(s)

Day 3

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Continue corticosteroid eye drops for 72 hours after completion of the last dose of cytarabine.

Hydration if prescribed

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Cytarabine

Prior to administration:

Ensure corticosteroid eye drops have been administered before starting cytarabine. Please see ocular toxicities associated with high dose cytarabine for more information.

Verify that cytarabine neurological assessment has been performed prior to administration of cytarabine:

- if the patient scores 0 then administer cytarabine as charted
- if the patient scores 1 or above, do not administer the cytarabine and immediately notify medical officer.

Administer cytarabine:

- via IV infusion over 3 hours
- flush with ~50 mL of sodium chloride 0.9%.

Administer second dose of cytarabine 12 hours after first dose.

Deaccess CVAD.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 4

Subcutaneous injection

General patient assessment prior to each day of treatment.

Continue corticosteroid eye drops for 72 hours after completion of the last dose of cytarabine.

Filgrastim

- inject subcutaneously ONCE daily, and until neutrophil recovery

---

Day 8

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

- weigh patient before each treatment

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Intrathecal cytarabine

- intrathecal cytarabine may not be administered with every cycle
- the number of IT treatments is dependant on patient risk category

Cytarabine intrathecal

⚠ Intrathecal cytarabine is to be administered today. The intrathecal procedure is to be done separately to the IV administration of all other cytotoxic drugs.

Access the clinical procedure for the safe administration of intrathecal cytarabine.

Post intrathecal care:

Local policies and guidelines regarding bed rest post dural puncture should be adhered to. At a minimum:

- the patient should have at least 1 set of observations including:
  - vital signs and GCS
  - any abnormal neurological signs such as nausea, vomiting, chills, fever, confusion, headache or other changes in neurological status
- educate the patient to recognise and immediately report any adverse reactions including blurred vision, dizziness, pain and or headache
- observe the lumbar puncture site for any leakage or bleeding post procedure
- document the procedure including outcomes in the patients notes.

Continue safe handling precautions until 7 days after completion of drug(s)

Discharge information

Antiemetics

- Antiemetics as prescribed.

Corticosteroid eye drops

- Continue corticosteroid eye drops for at least 72 hours after completion of final cytarabine dose.

Growth factor support

- Arrangements for administration if prescribed.

Prophylaxis medications

- Prophylaxis medications (if prescribed) i.e. tumour lysis prophylaxis, PJP prophylaxis, antifungals, antivirals.

Patient information

- Ensure patient receives patient information sheet.

Administration Cycles 6 and 8

eviQ provides safe and effective instructions on how to administer cancer treatments. However, eviQ does not provide every treatment delivery option, and is unable to provide a comprehensive list of cancer treatment agents and their required IV line giving set/filter. There may be alternative methods of treatment administration, and alternative supportive treatments that are also appropriate. Please refer to the individual product information monographs via the TGA website for further information.

Day 1

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Prime IV line(s).

Access CVAD.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Methotrexate

Prehydration:

- administer 100 mL sodium bicarbonate 8.4% in 1000 mL glucose **OR** sodium chloride 0.9% over 4 hours
- continue hydration with sodium bicarbonate 8.4% as prescribed
- when urine pH is greater than 7 commence methotrexate

If the urine pH drops below 7 during the methotrexate infusion:

- administer stat dose of 100 mL sodium bicarbonate 8.4% over 15 minutes
- continue to test all urine for pH, if the pH continues to drop below 7 seek medical review as further doses of sodium bicarbonate may be required.

Note: A large volume of intravenous fluid is given with this protocol if weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload is present review by medical officer (diuretics may be required).

First dose of methotrexate

- administer via IV infusion over 2 hours
- the starting time of the methotrexate infusion **must** be documented as the calcium folinate (leucovorin) rescue is to commence exactly 36 hours after the commencement of the methotrexate and continue until the methotrexate level is less than 0.1 micromol/L

Second dose of methotrexate (to commence immediately after the first dose):

- administer via IV infusion over 22 hours
- flush with ~50 mL of sodium chloride 0.9%
- **Stop the methotrexate infusion after 22 hours even if the infusion is not completed**

Post methotrexate:

- continue hydration with sodium bicarbonate 8.4% until methotrexate level is less than 0.1 micromol/L
- continue to monitor all urine pH and fluid input and output
- monitor methotrexate concentration every 24 hours until the level is less than 0.1 micromol/L

Continue safe handling precautions until 7 days after completion of drug(s)

Day 2

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Hydration if prescribed

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Calcium Folinate (Leucovorin)

Commence 36 hours after commencement of methotrexate infusion and repeat every 6 hours until methotrexate level is less than 0.1 micromol/L.

- administer via IV bolus via the side port of the IV line over 1 to 2 minutes
- flush with ~ 50 mL of sodium chloride 0.9%

Cytarabine

Prior to administration:

Ensure corticosteroid eye drops have been administered before starting cytarabine. Please see ocular toxicities associated with high dose cytarabine for more information.

Verify that cytarabine neurological assessment has been performed prior to administration of cytarabine:

- if the patient scores 0 then administer cytarabine as charted
- if the patient scores 1 or above, do not administer the cytarabine and immediately notify medical officer.

Administer cytarabine:

- via IV infusion over 3 hours
- flush with ~50 mL of sodium chloride 0.9%.

Administer second dose of cytarabine 12 hours after first dose.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 3

Safe handling and waste management

Safe administration

General patient assessment prior to each treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before recommencing treatment.

Note: A large volume of intravenous fluid may be given with this protocol. If weight increases by more than 1 kg from baseline or fluid balance becomes positive by one litre or any other signs of fluid overload are present, review by medical officer (diuretics may be required).

- daily weight
- monitor pH on all urine output
- strict fluid balance input and output

Continue corticosteroid eye drops for 72 hours after completion of the last dose of cytarabine.

Hydration if prescribed

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Chemotherapy - Time out

Methylprednisolone

Prior to administration

- administer via IV infusion over at least 30 minutes
- flush with ~ 50 mL of sodium chloride 0.9%
- there are reports of cardiac arrhythmias, circulatory collapse and/or cardiac arrest following rapid administration of large IV doses (greater than 500 mg over less than 10 minutes)

Administer second dose of methylprednisolone 12 hours after first dose.

Cytarabine

Prior to administration:

Verify that cytarabine neurological assessment has been performed prior to administration of cytarabine:

- if the patient scores 0 then administer cytarabine as charted
- if the patient scores 1 or above, do not administer the cytarabine and immediately notify medical officer.

Administer cytarabine:

- via IV infusion over 3 hours
- flush with ~50 mL of sodium chloride 0.9%.

Administer second dose of cytarabine 12 hours after first dose.

Deaccess CVAD.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 4

Subcutaneous injection

General patient assessment prior to each day of treatment.

Continue corticosteroid eye drops for 72 hours after completion of the last dose of cytarabine.

Filgrastim

- inject subcutaneously ONCE daily, and until neutrophil recovery

---

Discharge information

Antiemetics

- Antiemetics as prescribed.

Corticosteroid eye drops

- Continue corticosteroid eye drops for at least 72 hours after completion of final cytarabine dose.

Growth factor support

- Arrangements for administration if prescribed.

Prophylaxis medications

- Prophylaxis medications (if prescribed) i.e. tumour lysis prophylaxis, PJP prophylaxis, antifungals, antivirals.

Patient information

- Ensure patient receives patient information sheet.

Side effects

The side effects listed below are not a complete list of all possible side effects for this treatment. Side effects are categorised into the approximate onset of presentation and should only be used as a guide.

Immediate (onset hours to days)	
Bone pain	Bone pain, usually in the lower back or pelvis, associated with G-CSF.
Cytarabine (Ara-C) syndrome	Flu-like symptoms including fever, myalgia and malaise can occur 6 to 12 hours after cytarabine administration. Symptoms generally resolve within 24 hours of completing therapy.
Headache	
Nausea and vomiting	Read more about prevention of treatment induced nausea and vomiting
Neurotoxicity	High dose cytarabine has been associated with acute cerebellar syndrome and diffuse cerebral dysfunction. Read more about neurotoxicity associated with high dose cytarabine
Ocular toxicities	Reversible corneal toxicity (keratitis), haemorrhagic conjunctivitis, vision loss and other ocular side effects can occur with high dose cytarabine. Corticosteroid eye drops must be administered concurrently with treatment. Read more about ocular toxicities associated with cytarabine
Taste and smell alteration	Read more about taste and smell changes

Early (onset days to weeks)	
Neutropenia	Abnormally low levels of neutrophils in the blood. This increases the risk of infection. Any fever or suspicion of infection should be investigated immediately and managed aggressively. Read more about immediate management of neutropenic fever
Thrombocytopenia	A reduction in the normal levels of functional platelets, increasing the risk of abnormal bleeding. Read more about thrombocytopenia
Diarrhoea	Read more about treatment induced diarrhoea
Fatigue	Read more about fatigue
Oral mucositis	Erythematous and ulcerative lesions of the gastrointestinal tract (GIT). It commonly develops following chemotherapy, radiation therapy to the head, neck or oesophagus, and high dose chemotherapy followed by a blood and marrow transplant (BMT). Read more about oral mucositis
Side effects of corticosteroids	Insomnia, oedema, increased risk of infection e.g. oral thrush, gastric irritation, worsening of peptic ulcer disease, increased blood sugar levels, loss of diabetic control, mood and behavioural changes - including anxiety, euphoria, depression, mood swings, increased appetite and weight gain, osteoporosis and fractures (long term use), bruising and skin fragility are associated with corticosteroid use.
Skin rash	Anti-cancer drugs can cause a number of changes in the skin with maculo-papular rash the most common type of drug-induced skin reaction. Read more about skin rash

Late (onset weeks to months)	
Anaemia	Abnormally low levels of red blood cells (RBCs) or haemoglobin in the blood. Read more about anaemia
Alopecia	Hair loss may occur from all parts of the body. Patients can also experience mild to moderate discomfort of the hair follicles, and rarely pain as the hair is falling out. Read more about alopecia and scalp cooling
Cognitive changes (chemo fog)	Changes in cognition characterised by memory loss, forgetfulness and feeling vague. This is also referred to as 'chemo brain' or 'chemo fog'. Read more about cognitive changes (chemo fog)

Delayed (onset months to years)	
Pulmonary toxicity	Pulmonary toxicity may include damage to the lungs, airways, pleura and pulmonary circulation. Read more about pulmonary toxicity associated with anti-cancer drugs

Evidence - Ph- acute lymphoblastic leukaemia

The hyper CVAD regimen consists of a dose-intensive phase of therapy, consisting of eight cycles of alternating hyper CVAD and high-dose methotrexate/cytarabine followed by POMP maintenance (mercaptopurine 50 mg orally (PO) three times a day (TDS) on days 1 to 28, methotrexate 20 mg/m^2 PO once a week, vincristine 2 mg intravenous (IV) monthly and prednisolone 200 mg PO once a day on days 1-5 each month). The long-term response rates to hyper CVAD need to be considered in this context, not just in the context of dose-intensive therapy alone. Additionally, therapy for documented central nervous system (CNS) disease consisted of twice weekly intrathecal (IT) therapy with methotrexate and cytarabine. Patients with cranial nerve root involvement received 24 to 30 Gy of radiation in 10 to 12 fractions directed to the base of skull or whole brain. In those without documented CNS involvement, prophylaxis was administered as methotrexate 12 mg IT on Day 2, and cytarabine 100 mg IT on day 8 for 16 treatments in high-risk patients, 4 treatments in low-risk patients and 8 treatments in unknown-risk patients.

Treatment regimens for acute lymphoblastic leukaemia (ALL) have evolved empirically into complex schemes using numerous agents in various dose combinations and schedules. Few have been subjected to randomised control trials, and it is difficult to assess the comparative merits of each regimen and hence the most important components that lead to cure. Each schedule aims

to use multi-agent therapy at acceptable toxicities allowing for marrow recovery and includes the use of CNS prophylaxis and post-remission consolidation. With each regimen, complete response (CR) rates are > 80% and a median survival of 18 to 36 months. There appears to be very little difference in long-term treatment outcomes after use of any one of the commonly used ALL treatment regimens: disease-free survival (DFS) 29 to 46% at 2 to 10 years. The published results of case series are more strongly influenced by cytogenetics risk factors, white cell count (WCC) and patient age.

Hyper CVAD, as reported by Kantarjan et al., 2000, is a sequential multi-agent alternating cycles of chemotherapy approach for the management of ALL. The results of hyper CVAD reflect its use in 288 patients.[1] Overall a 92% CR rate was achieved, with a 5% death rate during induction chemotherapy. Estimate 5-year survival and CR rates were 38% and 38%, respectively. This is comparable to any other ALL regimen for adults.[1] Patients with good risk disease, as determined by age, absence of Ph-positive disease, leukocyte and platelet count, performance status and liver size, had a 62% 5-year survival.

The group at M.D. Anderson, who devised the hyper CVAD protocol, have made several modifications to the protocol since 2000,[2] which have been the subject of an ongoing phase II study. Progress in this study was published ahead of print in the Journal of Clinical Oncology, comparing the results of the modified hyper CVAD protocol (173 patients) compared to standard hyper CVAD (109 patients).[3] Modifications included:

1. Rituximab, two doses with each of first 4 cycles if CD20 expression is ≥ 20%.
2. Patients with low risk receive 6 IT chemotherapy treatments instead of 4.
3. POMP maintenance is continued for 30 months instead of 24 months.
4. Maintenance included intensifications: 2 hyper CVAD treatments are given at months 6 and 18; IV methotrexate and asparaginase (colaspase) are given at months 7 and 19.
5. Note that initially, there was an anthracycline intensification in cycle 2, but this was scrapped early due to a worse outcome and has not been given since 2001.

The results of this comparison with standard hyper CVAD can be summarised as follows:

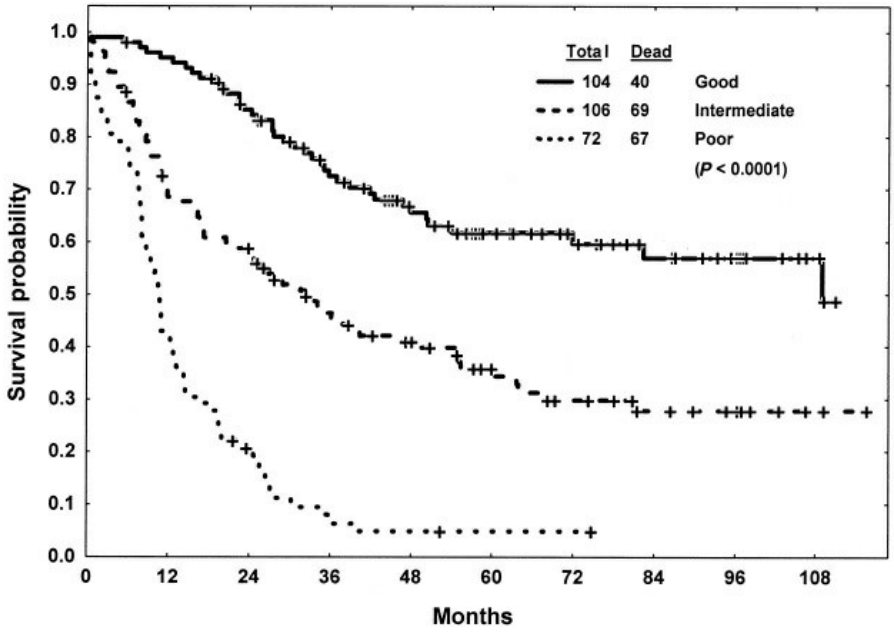
1. Young patients (<60 years) with CD20 expression ≥ 20% did better with rituximab than without (3-year CR duration 70% v 38% p = < .001); overall survival (OS) 75% v 47% (p= 0.003). There was no difference in older patients.
2. For CD20-negative patients, there was no difference in outcome between the modified and standard protocols.

Efficacy

Table 1: Hyper CVAD response rates acute lymphoblastic leukaemia[1]

Complete Response (CR)	92%
Estimated 5 year CR rate	38%
Estimated 5 year Survival	38%
Incidence of CNS Relapse	4%
CR after 1 course	81%

Figure 1: Hyper CVAD survival acute lymphoblastic leukaemia with the presence of none or one, two or three, or four or more adverse factors.[1]



Toxicity

Table 2: Toxicity hyper CVAD acute lymphoblastic leukaemia[1]

Median time to recovery of granulocytes	18 days
Median time to recovery of platelets	21 days
Toxicity Grade 3 to 4	**(%)**
Steroid related neurotoxicity	6
Mucositis	6
Diarrhoea	3
Ileus	2
Disseminated intravascular coagulation (DIC)	2
Following courses - 100% myelosuppression associated side effects	
Hospitalisation for side effects - 18% of courses	

Table 3: Toxicity hyper CVAD acute lymphoblastic leukaemia part B[1]

Toxicity Grade 3 to 4	**(%)**
Sepsis	11
Pneumonia	5
Renal and hepatic	2
Neurotoxicity	5
Skin rash	5
Hand and foot	3
Mucositis	5
Diarrhoea	1
Cytarabine associated fever	6
Hospitalisation for side effects - 42% of courses	

Evidence - Lymphoblastic lymphoma

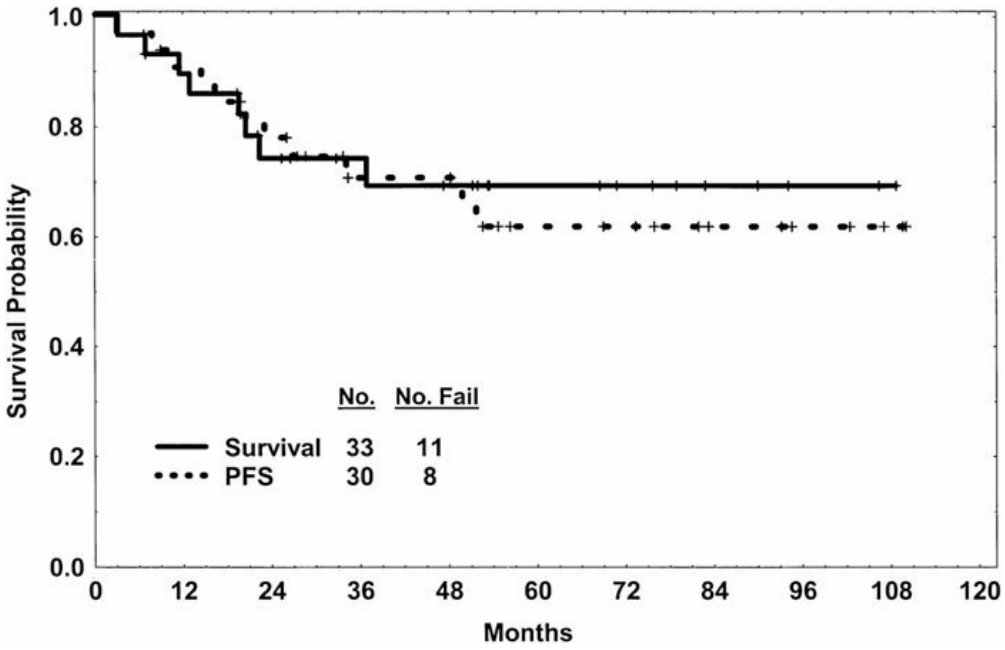
The prognosis of lymphoblastic lymphoma (LBL) has recently dramatically improved with the use of intensive multi-drug chemotherapy regimens similar to those used for acute lymphoblastic leukaemia (ALL). Multiple series using ALL-type regimens for LBL have reported complete response (CR) rates of 55-100% and disease-free survival (DFS) rates of 45-72%.[5]

Thomas et al.[6] reported a study of 33 patients with newly diagnosed LBL, median age 28 years (17 to 59 years). 26 (79%) had T-cell disease, and 6 (18%) had B-cell disease (immunophenotyping was performed on 32 patients only). Patients were treated with hyper CVAD alternating with high-dose methotrexate and cytarabine for a total of 8 cycles or with modified hyper CVAD, which included the addition of a post-induction high-dose anthracycline and cytarabine course (i.e. a total of 9 courses instead of 8). All patients received CNS prophylaxis with alternating intrathecal methotrexate and intrathecal cytarabine for a total of either 6 or 8 treatments depending on their risk factors. Maintenance with POMP was given for 24 months for patients that received standard hyper CVAD and three years for patients that received modified hyper CVAD. Overall, 30 patients (91%) achieved CR, with the remaining 3 patients classified as partial responders. Within a median of 13 months from the start of treatment (range 5 to 37 months), 10 patients (30%) relapsed or progressed. Of these, 2 patients achieved a second CR with salvage therapy and the remainder dying of disease. At a median follow-up time of 48 months (range 8 to 110+ months), 22 patients (67%) remained alive and disease free, with 20 (61%) of the 33 patients treated still in CR from initial treatment with hyper CVAD. The use of early anthracycline intensification, as included in the modified hyper CVAD regimen, had inferior outcomes compared to the standard hyper CVAD regimen, although this may be due to the small patient numbers.

Efficacy

Figure 1: Hyper CVAD survival lymphoblastic lymphoma[6]

Progression-free and overall survival of the entire study group treated with either hyper CVAD or modified hyper CVAD. PFS indicates progression-free survival.



Toxicity

Table 1: Toxicity with hyper CVAD or modified hyper CVAD for lymphoblastic lymphoma (n=33)[6]

Parameter	Number	Grades 1-2	Grades 3-4
Infections during induction (71 courses)*			
Fever of unknown origin (FUO)	13	0	13
Sepsis	8	0	8
Pneumonia	2	0	2
Fungal	1	0	1
Infections during consolidation (131 courses)			

Parameter	Number	Grades 1-2	Grades 3-4
Infections during induction (71 courses)*			
Parameter	Number	Grades 1-2	Grades 3-4
Infections during induction (71 courses)*			
Fever of unknown origin (FUO)	13	0	13
Sepsis	8	0	8
Pneumonia	2	0	2
Fungal	1	0	1
Infections during consolidation (131 courses)			
FUO	32	0	32
Sepsis	9	0	9
Pneumonia	8	0	8
Fungal	2	0	2
Other**	5	0	5
Stomatitis	15	33	12
Nausea/vomiting	6	15	3
Ileus	1	0	3
Increase in creatinine	1	3	0
Peripheral neuropathy	5	9	3
Pericarditis	1	0	3
Increase in bilirubin	3	6	3
Increase in transaminases	6	6	12
Pancreatitis	1	0	3
Rash	1	0	3

* Number of episodes per course until CR

**Other includes cytomegalovirus pneumonia, *pneumocystis carinii* pneumonia, disseminated herpes zoster, and herpetic encephalitis.

References

1 Kantarjian, H., D. Thomas, S. O'Brien, et al. 2004. "Long-term follow-up results of hyperfractionated cyclophosphamide, vincristine, doxorubicin, and dexamethasone (Hyper-CVAD), a dose-intensive regimen, in adult acute lymphocytic leukemia." Cancer. 101(12):2788-2801.

2 Kantarjian, H. M., S. O'Brien, T. L. Smith, et al. 2000. "Results of treatment with hyper-CVAD, a dose-intensive regimen, in adult acute lymphocytic leukemia." J.Clin Oncol. 18(3):547-561.

3 Thomas, D. A., S. O'Brien, S. Faderl, et al. 2010. "Chemoimmunotherapy with a modified hyper-CVAD and rituximab regimen improves outcome in de novo Philadelphia chromosome-negative precursor B-lineage acute lymphoblastic leukemia." J Clin Oncol 28(24):3880-3889.

4 Ramsey, L. B., F. M. Balis, M. M. O'Brien, et al. 2018. "Consensus Guideline for Use of Glucarpidase in Patients with High-Dose Methotrexate Induced Acute Kidney Injury and Delayed Methotrexate Clearance." Oncologist 23(1):52-61.

5 Cortelazzo, S., M. Ponzoni, A. J. Ferreri, et al. 2011. "Lymphoblastic lymphoma." Crit Rev Oncol Hematol 79(3):330-343.

6 Thomas, D. A., S. O'Brien, et al. (2004). "Outcome with the hyper-CVAD regimens in lymphoblastic lymphoma." Blood 104(6): 1624-1630.

Bibliography

Koller, C. A., H. M. Kantarjian, D. Thomas, et al. 1997. "The hyper-CVAD regimen improves outcome in relapsed acute lymphoblastic leukemia." Leukemia. 11(12):2039-2044.

History

Version 8

Date	Summary of changes
25/07/2023	• Methotrexate target level updated to 0.1 micromol/L • Updated to be a multi-indication protocol to reflect inclusion of lymphoblastic lymphoma indication and evidence • Frequency and cycle notes updated for clarity • Rituximab note updated. Changed days of administration to 1 and 8 to align with Thomas et al. Changed to version 8.

Version 7

Date	Summary of changes
14/11/2022	Rituximab note updated. Changed days of administration to 1 and 8 to align with Thomas et al.

Version 6

Date	Summary of changes
22/09/2020	Biosimilar drug added to clinical information. Version number changed to v.6
21/01/2022	Pulmonary toxicity added to side effects.
08/02/2022	PJP prophylaxis clinical information block updated.

Version 5

Date	Summary of changes
06/11/2008	Review and reformatting of patient information sheet.
28/05/2008	Renaming cycles 1, 3, 5 and 7 as part A and cycles 2, 4, 6 and 8 as part B as requested in feedback.
30/03/2010	Review of protocol; review and update of dose modifications; transferred to eviQ.
15/06/2010	Review of protocol at Haematology Reference Committee meeting; protocol amendments made as per meeting, including adding Unknown Risk Group as default to treatment schedule for IT therapy; adding parameters for subsequent cycles as per trial; inclusion of PCP, antiviral and antifungal prophylaxis as per trial; update of evidence.
13/06/2012	New format to allow for export of protocol information. Protocol version number changed to v.2. Antiemetics and premedications added to the treatment schedule. Additional Clinical Information, Key Prescribing table and Key Administration table combined into new section titled Clinical Considerations. Drug specific information placed behind the drug name link. Inclusion of 'Ph-' into title to differentiate between Ph+ protocol. Recalculation of treatment cost.
16/11/2012	Addition of further administration instructions for calcium leucovorin to the treatment schedule summary.
27/08/2014	Protocol reviewed by email survey. Added link to ALLG and ANZCTR with statement 'Patients with ALL should be

Date	Summary of changes
	considered for inclusion into clinical trials'. Changed pegfilgrastim to filgrastim. Next review in 2 years.
09/11/2015	Added Lymphoblastic Lymphoma to the indications and evidence sections.
20/05/2016	Reviewed at the Haematology Reference Committee meeting with no major changes.
10/11/2016	Peripheral neuropathy dose modification removed.
31/05/2017	Transferred to new eviQ website. Version number change to v.4.
21/09/2018	Protocol reviewed at the Haematology Reference Committee meeting with the following changes: • treatment schedule filgrastim dose aligned with Thomas et al. 2004 study • addition of note regarding the addition of rituximab to first four cycles to Hyper-CVAD protocol for CD20+ patients • PJP prophylaxis clinical information updated • minor update to evidence • version change to v.5.
25/10/2018	Link added to high dose methotrexate-induced toxicity document in clinical information.
10/10/2019	Clinical information updated with PBS expanded indications for G-CSF.

First approved: 16 March 2006
Last reviewed: 21 September 2018
Review due: 31 December 2023

The currency of this information is guaranteed only up until the date of printing, for any updates please check:
https://www.eviq.org.au/p/572
31 Jul 2023

Patient information - Hyper CVAD Part B

Patient's name:

Your treatment

The treatment schedule below explains how the drugs for this treatment are given.

Ph- Hyper CVAD Part B			
This treatment protocol alternates with Hyper CVAD Part A and usually continues for a total of 8 cycles of chemotherapy			
Day	**Treatment**	**How it is given**	**How long it takes**
1	**Methylprednisolone** (*methil-predd-niz-oh-lone*)	By a drip into a vein	About 30 minutes TWICE a day
	Methotrexate (*Meth-o-TREX-ate*)	By a drip into a vein	For 24 hours
2	**Methylprednisolone**	By a drip into a vein	About 30 minutes TWICE a day
	Calcium folinate (Leucovorin) (loo-koe-VOR-in)	By a drip into a vein	About 5 minutes repeated every 6 hours
	Cytarabine (*sye-TARE-a-been*)	By a drip into a vein	About 3 hours TWICE a day
	Methotrexate	By injection into your spine (this may not be with every cycle - check with your doctor)	About 4 hours
3	**Methylprednisolone**	By a drip into a vein	About 30 minutes TWICE a day
	Cytarabine	By a drip into a vein	About 3 hours TWICE a day
4	**Granulocyte Colony Stimulating Factor** (*G-CSF*)	By injection under the skin	About 5 minutes
8	**Cytarabine**	By injection into your spine (this may not be with every cycle - check with your doctor)	About 4 hours

When to get help

Anticancer drugs (drugs used to treat cancer) can sometimes cause serious problems. It is important to get medical help immediately if you become unwell.

IMMEDIATELY go to your nearest hospital Emergency Department, or contact your doctor or nurse if you have any of the following at any time:	**Emergency contact details** Ask your doctor or nurse from your treating team who to contact if you have a problem
• a temperature of 38°C or higher	Daytime: Night/weekend:

- chills, sweats, shivers or shakes
- shortness of breath
- uncontrolled vomiting or diarrhoea
- pain, tingling or discomfort in your chest or arms
- you become unwell.

Other instructions:

During your treatment immediately tell the doctor or nurse looking after you if you get any of the following problems:

- leaking from the area where the drugs are being given
- pain, stinging, swelling or redness in the area where the drugs are being given or at any injection sites
- a skin rash, itching, feeling short of breath, wheezing, fever, shivers, or feeling dizzy or unwell in any way (allergic reaction).

Other information about your treatment

Changes to your dose or treatment delays

Sometimes a treatment may be started at a lower dose or the dose needs to be changed during treatment. There may also be times when your treatment is delayed. This can happen if your doctor thinks you are likely to have severe side effects, if you get severe side effects, if your blood counts are affected and causing delays in treatment, or if you are finding it hard to cope with the treatment. This is called a dose reduction, dose change or treatment delay. Your doctor will explain if you need any changes or delays to your treatment and the reason why.

Blood tests and monitoring

Anti-cancer drugs can reduce the number of blood cells in your body. You will need to have regular blood tests to check that your blood cell count has returned to normal. If your blood count is low, your treatment may be delayed until it has returned to normal. Your doctor or nurse will tell you when to have these blood tests.

Central venous access devices (CVADs)

This treatment involves having chemotherapy through a central venous access device (CVAD). Your doctor or nurse will explain this to you. For more information see the eviQ patient information sheets on CVADs.

Other medications given during this treatment

- **Anti-sickness (anti-nausea) medication:** you may be given some anti-sickness medication. Make sure you take this medication as your doctor or nurse tells you, even if you don't feel sick. This can help to prevent the sickness starting.
- **Prophylaxis medication:** you may need to take some medications to prevent infection and to help prevent or reduce some of the side effects of the chemotherapy. Your doctor or nurse will tell you how and when to take these medications.
- **G-CSF:** you will be given injection(s) of a drug called G-CSF (also called filgrastim, lipegfilgrastim or pegfilgrastim) under your skin. This helps to boost your white blood cell count. Your white blood cells help to fight infection. Lipegfilgrastim and pegfilgrastim are given once. Filgrastim is given for several days until your white blood cells recover.
- **Eye drops:** you will be given eye drops to help prevent sore eyes. You will start using the eye drops before you have your first dose of cytarabine and continue to use the eye drops until 72 hours after your last dose of cytarabine.

Side effects

Cancer treatments can cause damage to normal cells in your body, which can cause side effects. Everyone gets different side effects, and some people will have more problems than others.

The table below shows some of the side effects you may get with this treatment. You are unlikely to get all of those listed and you may also get some side effects that have not been listed.

Tell your doctor or nurse about any side effects that worry you. Follow the instructions below and those given to you by your doctor or nurse.

Immediate (onset hours to days)	
Bone pain after G-CSF injection	• You may have discomfort or a dull ache in your pelvis, back, arms or legs. • To reduce the pain, take paracetamol before each injection. • **Tell your doctor or nurse as soon as possible if your pain is not controlled.**
Flu-like symptoms from cytarabine	• You may get a fever, skin rash, aches and pains or increased sweating. • These symptoms are caused by the drug cytarabine. • Symptoms usually happen 6 to 12 hours after your dose, and may last until 24 hours after your treatment has finished. • To reduce any pain or fever, take paracetamol, if needed. • Don't take aspirin, ibuprofen or other similar anti-inflammatory medications unless your doctor tells you to. • Tell your doctor or nurse if these symptoms do not get better after 24 hours.
Headache	• You can take paracetamol if you have a headache. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get a very bad headache that is not helped by pain medication.**
Nausea and vomiting	• You may feel sick (nausea) or be sick (vomit). • Take your anti-sickness medication as directed even if you don't feel sick. • Drink plenty of fluids (unless you are fluid restricted). • Eat small meals more frequently. • Try food that does not require much preparation. • Try bland foods like dry biscuits or toast. • Gentle exercise may help with nausea. • Ask your doctor or nurse for eviQ patient information - Nausea and vomiting during cancer treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have uncontrolled vomiting or feel dizzy or light-headed.**
Nervous system changes from cytarabine	• High doses of cytarabine can affect the nervous system. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following symptoms during or soon after your treatment:** ◦ **dizziness, drowsiness or double vision** ◦ **agitation** ◦ **difficulty walking in a straight line** ◦ **difficulty writing with a pen or pencil** ◦ **jerky movements** ◦ **slow, slurred speech.**
Eye problems from cytarabine	• You may get: ◦ eye pain or irritation ◦ blurred vision ◦ watery or gritty eyes ◦ sensitivity to light. • You will be given eye drops to help prevent and control these symptoms. It is important to use these eye drops as directed. • Protect your eyes from the weather (sun and wind) by wearing sunglasses, especially if you have lost your eyelashes. • Tell your doctor or nurse if you get any of the symptoms listed above.
Taste and smell changes	• You may find that food loses its taste or tastes different. • These changes are likely to go away with time. • Do your mouth care regularly. • Chew on sugar-free gum or eat sugar-free mints. • Add flavour to your food with sauces and herbs. • Ask your doctor or nurse for eviQ patient information - Taste and smell changes during cancer treatment.

Early (onset days to weeks)	
Infection risk (neutropenia)	• This treatment lowers the amount of white blood cells in your body. The type of white blood cells that help to fight infection are called neutrophils. Having low level of neutrophils is called neutropenia. If you have neutropenia, you are at greater risk of getting an infection. It also means that your body can't fight infections as well as usual. This is a serious side effect, and can be life threatening. • Wash your hands often. • Keep a thermometer at home and take your temperature regularly, and if you feel unwell. • Do your mouth care regularly. • Inspect your central line site (if you have one) daily for any redness, pus or swelling. • Limit contact with people who are sick. • Learn how to recognise the signs of infection. • Ask your doctor or nurse for eviQ patient information - Infection during cancer treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following signs or symptoms:** ◦ **a temperature of 38°C or higher** ◦ **chills, shivers, sweats or shakes** ◦ **a sore throat or cough** ◦ **uncontrolled diarrhoea** ◦ **shortness of breath** ◦ **a fast heartbeat** ◦ **become unwell even without a temperature.**
Low platelets (thrombocytopenia)	• This treatment lowers the amount of platelets in your blood. Platelets help your blood to clot. When they are low, you are at an increased risk of bleeding and bruising. • Try not to bruise or cut yourself. • Avoid contact sport or vigorous exercise. • Clear your nose by blowing gently. • Avoid constipation. • Brush your teeth with a soft toothbrush. • Don't take aspirin, ibuprofen or other similar anti-inflammatory medications unless your doctor tells you to. • Tell your doctor or nurse if you have any bruising or bleeding. • **Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if you have any uncontrolled bleeding.**
Diarrhoea	• You may get bowel motions (stools, poo) that are more frequent or more liquid. • You may also get bloating, cramping or pain. • Take your antidiarrhoeal medication as directed by your doctor. • Drink plenty of fluids (unless you are fluid restricted). • Eat and drink small amounts more often. • Avoid spicy foods, dairy products, high fibre foods, and coffee. • Ask your doctor or nurse for eviQ patient information - Diarrhoea during cancer treatment. • **Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if your diarrhoea is not controlled, you have 4 or more loose bowel motions per day, and if you feel dizzy or light-headed.**
Tiredness and lack of energy (fatigue)	• You may feel very tired, have no energy, sleep a lot, and not be able to do normal activities or things you enjoy. • Do not drive or operate machinery if you are feeling tired. • Nap for short periods (only 1 hour at a time) • Prioritise your tasks to ensure the best use of your energy. • Eat a well balanced diet and drink plenty of fluids (unless you are fluid restricted). • Try some gentle exercise daily. • Allow your friends and family to help. • **Tell your doctor or nurse if you get any of the symptoms listed above.**

Mouth pain and soreness (mucositis)	• You may have:
	  ◦ bleeding gums
	  ◦ mouth ulcers
	  ◦ a white coating on your tongue
	  ◦ pain in the mouth or throat
	  ◦ difficulty eating or swallowing.
	• Avoid spicy, acidic or crunchy foods and very hot or cold food and drinks.
	• Try bland and soft foods.
	• Brush your teeth gently with a soft toothbrush after each meal and at bedtime. If you normally floss continue to do so.
	• Rinse your mouth after you eat and brush your teeth, using either:
	  ◦ 1/4 teaspoon of salt in 1 cup of warm water, or
	  ◦ 1/4 teaspoon of bicarbonate of soda in 1 cup of warm water
	• Ask your doctor or nurse for eviQ patient information - Mouth problems during cancer treatment.
	• **Tell your doctor or nurse if you get any of the symptoms listed above.**

Side effects from steroid medication	• Steroid medication may cause:
	  ◦ mood swings and behaviour changes
	  ◦ an increased appetite
	  ◦ weight gain
	  ◦ swelling in your hands and feet
	  ◦ stomach upsets
	  ◦ trouble sleeping
	  ◦ fragile skin and bruising
	  ◦ an increase in your blood sugar level
	  ◦ weak and brittle bones (osteoporosis)
	• Take your steroid medication with food to reduce stomach upset
	• If you have diabetes, your blood sugar levels may be tested more often.
	• Tell your doctor or nurse if you get any of the symptoms listed above.

Skin rash	• You may get a red, bumpy rash and dry, itchy skin. • Moisturise your skin with a gentle non-perfumed moisturising cream like sorbolene or aqueous cream. • Do not scratch your skin. • Protect your skin from the sun by wearing sun-protective clothing, a wide-brimmed hat, sunglasses and sunscreen of SPF 50 or higher. • **Talk to your doctor or nurse about other ways to manage your skin rash.**

Late (onset weeks to months)	
Low red blood cells (anaemia)	• You may feel dizzy, light-headed, tired and appear more pale than usual. • Tell your doctor or nurse if you have any of these signs or symptoms. You might need a blood transfusion. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have any chest pain, trouble breathing, or feel like your heart is racing.**
Hair loss (alopecia)	• Your hair may start to fall out from your head and body. • Hair loss usually starts 2 to 3 weeks after your first treatment. • You may become completely bald and your scalp might feel tender. • Use a gentle shampoo and a soft brush. • Take care with hair products like hairspray, hair dye, bleaches and perms. • Protect your scalp from the cold with a hat, scarf or wig. • Protect your scalp from the sun with a hat or sunscreen of SPF 50 or higher. • Moisturise your scalp to prevent itching. • Ask your doctor or nurse about the Look Good Feel Better program
Chemo brain (chemotherapy-related cognitive impairment)	• You may notice that you are unable to concentrate, feel unusually disorganised or tired (lethargic) and have trouble with your memory. • These symptoms usually improve once treatment is completed. • Ask your doctor or nurse for eviQ patient information – Memory changes and chemotherapy (chemo brain). • Tell your doctor or nurse if you get any of the symptoms listed above.

Delayed (onset months to years)	

Lung problems	• Lung problems are rare, but can be serious. They may occur throughout treatment or after the completion of treatment.
	• You may get:
	  ◦ shortness of breath
	  ◦ fever
	  ◦ dry cough
	  ◦ wheezing
	  ◦ fast heartbeat
	  ◦ chest pain.
	• Your doctor will monitor how well your lungs are working during your treatment.
	• **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have chest pain or become short of breath.**

General advice for people having cancer treatment

Chemotherapy safety

- Learn how to keep you and your family safe while you are having anticancer drugs.
- See our patient information sheet - Chemotherapy safety at home.

Blood clot risk

- Cancer and anticancer drugs can increase the risk of a blood clot (thrombosis).
- Tell your doctor if you have a family history of blood clots.
- A blood clot can cause pain, redness, swelling in your arms or legs, shortness of breath or chest pain.
- If you have any of these symptoms go to your nearest hospital Emergency Department.

Medications and vaccinations

- Before you start treatment, tell your doctor about any medications you are taking, including vitamins or herbal supplements.
- Don't stop or start any medications during treatment without talking to your doctor and pharmacist first.
- Paracetamol is safe to take if you have a headache or other mild aches and pains. It is recommended that you avoid taking

aspirin, ibuprofen and other anti-inflammatory type medications for pain while you are having treatment. However, if these medications have been prescribed by your doctor, do not stop taking them without speaking with your doctor.
- Vaccinations such as flu and tetanus vaccines are safe to receive while having treatment. Do not have any live vaccines during your treatment or for 6 months after it finishes. If you are unsure, check with your doctor before you have any vaccinations.
- People you live with should be fully vaccinated, including having live vaccines according to the current vaccination schedule. Extra care needs to be taken with hand washing and careful disposal of soiled nappies for infants who have recently received the rotavirus vaccine.

Other medical and dental treatment

- If you go to hospital or any other medical appointment (including dental appointments), always tell the person treating you that you are receiving anticancer drugs.
- Before you have any dental treatment, talk to your doctor.

Diet and food safety

- While you are receiving this treatment, it is important that you try to maintain a healthy diet.
- Grapefruit and grapefruit juice can interact with your medication and should be avoided while you are on this treatment.
- Speak to your doctor or nurse about whether drinking alcohol is safe with your treatment.
- If you have any concerns about recent weight loss or weight gain or questions about your diet, ask to speak to a dietitian.
- There are some foods that may cause infection in high risk individuals and should be avoided. For further information on foods to avoid and food hygiene please ask for a copy of the Listeria and food brochure.

Fertility

- Some cancer treatments can reduce your fertility. This can make it difficult or impossible to get pregnant or father a child.
- Talk to your doctor or nurse before you start any treatment. Depending on your situation there may be fertility sparing options available to you and/or your partner, discuss these with your doctor or nurse.

Pregnancy and breastfeeding

- Some cancer treatments can be dangerous to unborn babies. Talk to your doctor or nurse if you think there is any chance that you could be pregnant.
- Do not try to get pregnant or father a child during this treatment. Contraception should be used during treatment and after stopping treatment. Ask your doctor or nurse about what type of contraception you should use.
- If you are planning pregnancy/fatherhood after completing this treatment, talk to your doctor. Some doctors advise waiting between 6 months and 2 years after treatment.
- Do not breastfeed if you are on this treatment, as anti-cancer medications can also pass into breast milk.

Sex life and sexuality

- The desire to have sex may decrease as a result of this treatment or its side effects.
- Your emotions and the way you feel about yourself may also be affected by this treatment.
- It may help to discuss your concerns with your partner and doctor or nurse.

Quitting smoking

- It is never too late to quit smoking. Quitting smoking is one of the best things you can do to help your treatment work better.
- There are many effective tools to improve your chances of quitting.
- Talk to your treating team for more information and referral to a smoking cessation support service.

Staying active

- Research shows that exercise, no matter how small, has many benefits for people during and after cancer treatment.
- Talk to your doctor before starting an exercise program. Your doctor can advise whether you need a modified exercise program.

For more information about cancer treatment, side effects and side effect management see our Patient and carers section.

Where to get more information

Telephone support

- Call Cancer Council on 13 11 20 for cancer information and support
- Call the Leukaemia Foundation on 1800 620 420 (Mon to Fri 9am – 5pm)

- Call the Lymphoma Nurse Support Line on 1800 953 081 (Mon to Fri 9am - 5pm)

Haematology, transplant and cellular therapy information

- Arrow bone marrow transplant foundation – arrow.org.au
- Australasian Menopause Society – menopause.org.au
- Chris O'Brien Lifehouse - Total Body Irradiation - mylifehouse.org.au/departments/radiation-oncology/total-body-irradiation/
- Healthy Male Andrology Australia – healthymale.org.au/
- International Myeloma Foundation – myeloma.org
- Leukaemia Foundation – leukaemia.org.au
- Lymphoma Australia – lymphoma.org.au
- Myeloma Australia – myeloma.org.au
- NSW Agency for Clinical Innovation, Blood & Marrow Transplant Network – aci.health.nsw.gov.au/resources/blood-and-marrow-transplant
- NSW Agency for Clinical Innovation - aci.health.nsw.gov.au/projects/immune-effector-cell-service
- NCCN Guidelines for Patients Immunotherapy Side Effects: CAR T-Cell Therapy - nccn.org/patientresources/patient-resources/guidelines-for-patients
- Talk Blood Cancer – cmlsupport.org.uk/organisation-type/social-media-groups

General cancer information and support

- Australian Rare Cancer (ARC) Portal – arcportal.org.au/
- Beyondblue – beyondblue.org.au
- Cancer Australia – canceraustralia.gov.au
- Cancer Council Australia – cancer.org.au
- Cancer Voices Australia – cancervoicesaustralia.org
- CanTeen – canteen.org.au
- Carers Australia – carersaustralia.com.au
- eviQ Cancer Treatments Online – eviQ.org.au
- Food Standards Australia New Zealand: Listeria & Food Safety – foodstandards.gov.au/publications/pages/listeriabrochuretext.aspx
- LGBTQI+ People and Cancer - cancercouncil.com.au/cancer-information/lgbtqi
- Look Good Feel Better – lgfb.org.au
- Patient Information - patients.cancer.nsw.gov.au
- Radiation Oncology Targeting Cancer - targetingcancer.com.au
- Redkite – redkite.org.au
- Return Unwanted Medicines – returnmed.com.au
- Staying active during cancer treatment – patients.cancer.nsw.gov.au/coping-with-cancer/physical-wellbeing/staying-active

Quit smoking information and support

Quitting smoking is helpful even after you have been diagnosed with cancer. The following resources provide useful information and support to help you quit smoking. Talk to your treating team about any other questions you may have.

- Call Quitline on 13 QUIT (13 78 48)
- iCanQuit – iCanQuit.com.au
- Patient Information - patients.cancer.nsw.gov.au/coping-with-cancer/physical-wellbeing/quitting-smoking
- Quitnow – quitnow.gov.au

Additional notes:

First approved: 16 March 2006
Last reviewed: 21 September 2018
Review due: 31 December 2023

The currency of this information is guaranteed only up until the date of printing, for any updates please check:
https://www.eviq.org.au/pi/572
31 Jul 2023