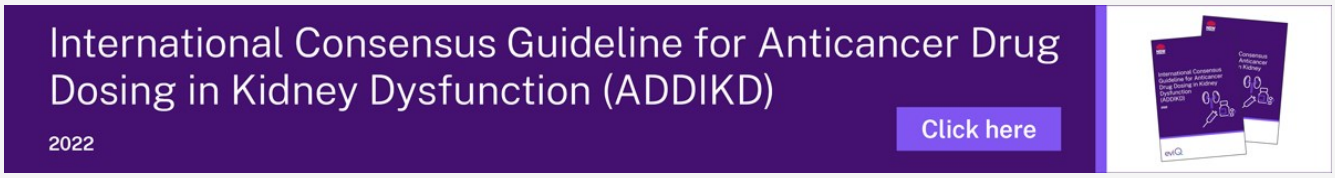
POMP maintenance therapy (mercaptopurine vinCRISTine methotrexate prednisolone)

ID: 165 v.6 **Under review**

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
- Hyper CVAD Part B

Treatment schedule - Overview

Cycle 1 and further cycles

Drug	Dose	Route	Day
Prednisolone	200 mg ONCE a day	PO	1 to 5
mercaptOPURine	50 mg THREE times a day	PO	1 to 28
Methotrexate	20 mg/m^2 ONCE a week	PO	1, 8, 15, 22
vinCRISTine	2 mg	IV infusion	1

Frequency: 28 days

Cycles: Continuous for total of 2 years (24 months)
This hyper CVAD protocol consists of 4 cycles of Part A (Cycles 1, 3, 5, 7) alternating with 4 cycles of Part B (Cycles 2, 4, 6, 8) for a total of 8 cycles, followed by maintenance therapy for 2 years.

Notes:

- The doses in this protocol are taken from the studies by Kantarjian et al.[1, 2] In clinical practice they are frequently reduced due to toxicity (refer to 'dose modifications' below).
- Consider thiopurine methyltransferase (TPMT) testing prior to administration of mercaptopurine.

Drug status: All drugs in this protocol are on the PBS general schedule

Mercaptopurine is available as **50 mg** tablets
Methotrexate is available as **2.5 mg** and **10 mg** tablets
Prednisolone is available as **25 mg**, **5 mg** and **1 mg** tablets

Cost: ~ $380 per month

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 1 and further cycles

Day 1		
Prednisolone	200 mg (PO)	ONCE a day on days 1 to 5. Take in the morning with food.
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.
Methotrexate	20 mg/m^2 (PO)	ONCE a week. Take on an empty stomach at least one hour before or two hours after food.
vinCRISTine	2 mg (IV infusion)	in 50 mL sodium chloride 0.9% over 5 to 10 minutes via minibag

Day 2 to 5		
Prednisolone	200 mg (PO)	ONCE a day on days 1 to 5. Take in the morning with food.
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.

Day 6 and 7		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.

Day 8		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.
Methotrexate	20 mg/m^2 (PO)	ONCE a week. Take on an empty stomach at least one hour before or two hours after food.

Day 9 to 14		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.

Day 15		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.
Methotrexate	20 mg/m^2 (PO)	ONCE a week. Take on an empty stomach at least one hour before or two hours after food.

Day 16 to 21		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.

Day 22		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least

Day 22		
		one hour before or two hours after food.
Methotrexate	20 mg/m^2 (PO)	ONCE a week. Take on an empty stomach at least one hour before or two hours after food.

Day 23 to 28		
mercaptOPURine	50 mg (PO)	THREE times a day. Take on an empty stomach at least one hour before or two hours after food.

Frequency: 28 days

Cycles: Continuous for total of 2 years (24 months)
This hyper CVAD protocol consists of 4 cycles of Part A (Cycles 1, 3, 5, 7) alternating with 4 cycles of Part B (Cycles 2, 4, 6, 8) 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)

All patients *other than* those with mature B-cell ALL and those with Philadelphia chromosome positive acute lymphoblastic leukaemia (Ph+ve ALL) who were candidates for allogeneic stem cell transplantation (SCT) received POMP maintenance therapy for 2 years[1, 2]

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 Ph+ve ALL, 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

Safety alert vincristine administration	For safe administration of vincristine refer to the safety alert issued by the Australian Commission on Safety and Quality in Health Care
Venous access required	IV cannula (IVC) or central venous access device (CVAD) is required to administer this treatment. Read more about central venous access device line selection

Caution with oral anti-cancer drugs	Select links for information on the safe prescribing, dispensing and administration of orally administered anti-cancer drugs. Read more about the COSA guidelines and oral anti-cancer therapy
Emetogenicity minimal or low	No routine prophylaxis required. If patients experience nausea and/or vomiting, consider using the low emetogenic risk regimen. Read more about preventing anti-cancer therapy induced nausea and vomiting
Thiopurine-S-methyltransferase (TPMT) enzyme deficiency	Patients with an inherited deficiency of the TPMT enzyme are at an increased risk of, and prone to developing, rapid bone marrow depression which may lead to severe, life-threatening myelosuppression when undergoing treatment with thiopurines (azathioprine, mercaptopurine, tioguanine). This may be exacerbated by coadministration with drugs that inhibit TPMT, such as olsalazine, mesalazine or sulfasalazine. Consider assessing thiopurine-S-methyltransferase (TPMT) activity prior to administration of thiopurines.
Peripheral neuropathy	Assess prior to each treatment. Based on clinical findings, temporary omission, dose reduction or cessation of the vinca alkaloid may be indicated; review by medical officer before commencing treatment. Read more about peripheral neuropathy Link to chemotherapy-induced peripheral neuropathy screening tool
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
Pneumocystis jirovecii pneumonia (PJP) prophylaxis	PJP prophylaxis is recommended e.g. trimethoprim/sulfamethoxazole 160/800 mg PO one tablet twice daily, twice weekly (e.g. on Mondays and Thursdays) OR one tablet three times weekly (e.g. on Mondays, Wednesdays and Fridays) **Note**: do not administer on day of oral methotrexate. Read about prophylaxis of pneumocystis jiroveci (carinii) in cancer patients
Antiviral prophylaxis	Read more about antiviral prophylaxis drugs and doses
Blood tests	FBC, EUC, eGFR, LFTs and BSL at baseline and prior to each treatment. Repeat FBC weekly for the first month of maintenance treatment.
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	
ANC x 10^9/L, Platelets x 10^9/L (pre-treatment blood test)	
ANC less than 1.5 and platelets less than 100	Delay treatment until recovery

Renal impairment	
Creatinine clearance (mL/min)	
30 to 50	Reduce mercaptopurine and methotrexate by 25%
less than 30	Reduce mercaptopurine and methotrexate by 50%

Hepatic impairment
Consider dose reduction (particularly of methotrexate) in hepatic impairment

Peripheral neuropathy	
Grade 2 which is present at the start of the next cycle	Reduce vincristine by 50%
Grade 3 or Grade 4	Omit vincristine

Mucositis and stomatitis	
Grade 2	Delay treatment until toxicity has resolved to Grade 1 or less and reduce methotrexate and mercaptopurine by 25%
Grade 3 or Grade 4	Delay treatment until toxicity has resolved to Grade 1 or less and reduce methotrexate and mercaptopurine by 50%

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*

Mercaptopurine		
	Interaction	**Clinical management**
Allopurinol	Increased toxicity of mercaptopurine due to reduced clearance as a result of inhibition of xanthine oxidase	If the combination is used the dose of mercaptopurine must be reduced by 75 % (i.e. only one quarter of the usual mercaptopurine dose is used)
Methotrexate, aminosalicylate derivatives (e.g. balsalazide, olsalazine, mesalazine, sulfasalazine)	Increased toxicity of mercaptopurine possible due to reduced clearance	Avoid combination or monitor closely for mercaptopurine toxicity
Ribavirin	Increased toxicity and reduced efficacy of mercaptopurine possible due to metabolic enzyme inhibition by ribavirin	Avoid combination or monitor closely for toxicity of and decreased clinical response to mercaptopurine

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

Vincristine		
	Interaction	**Clinical management**
CYP3A4 and P-gp inhibitors (e.g. amiodarone, aprepitant, azole-antifungals, ritonavir, lapatinib, nilotinib, sorafenib, macrolides, ciclosporin, grapefruit juice etc.)	Increased toxicity of vincristine possible due to reduced clearance	Monitor for vincristine toxicity (esp. neurotoxicity, paralytic ileus)
CYP3A4 inducers (e.g. carbamazepine, phenytoin, phenobarbitone, rifampicin, St John's wort etc.)	Reduced efficacy of vincristine possible due to increased clearance	Monitor for decreased clinical response to vincristine
Mitomycin	Acute shortness of breath and severe bronchospasm has occurred following use of vincristine in patients who had received mitomycin simultaneously or within 2 weeks	Use combination with caution
Ototoxic drugs (e.g. cisplatin, aminoglycosides, frusemide, NSAIDs)	Additive ototoxicity	Avoid combination or perform regular audiometric testing

Prednisolone		
	Interaction	**Clinical management**
Antidiabetic agents (e.g. insulin, glibenclamide, glicazide, metformin, pioglitazone, etc)	The efficacy of antidiabetic agents may be decreased	Use with caution and monitor blood glucose
Azole antifungals (e.g. fluconazole, itraconazole, ketoconazole, posaconazole)	Increased toxicity of prednisolone possible due to reduced clearance	Avoid combination or monitor for prednisolone toxicity
Oestrogens (e.g. oral contraceptives)	Increased toxicity of prednisolone possible due to reduced clearance	Avoid combination or monitor for prednisolone toxicity. Dose reduction of prednisolone may be required
Ritonavir	Increased toxicity of prednisolone possible due to reduced clearance	Avoid combination or monitor for prednisolone toxicity

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

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

Approximate treatment time: 30 minutes

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Peripheral neuropathy assessment tool

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

Prime IV line(s).

Insert IV cannula or access TIVAD or CVAD.

- baseline weight

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Prednisolone

- administer orally ONCE a day on **days 1 to 5**
- to be taken in the morning with or immediately after food

Note: if a dose is forgotten or vomited, contact treating team.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

Methotrexate

- administer orally ONCE a week on **days 1, 8, 15 and 22** of each 28 day cycle only
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken on an empty stomach, one hour before or two hours after food
- if PJP prophylaxis with trimethoprim/sulfamethoxazole e.g. Bactrim® is prescribed, ensure this is not administered on the same day as oral methotrexate.

Note: if a dose is forgotten or vomited, contact treating team.

Vincristine is administered on day one only of each 28 day cycle.

Vincristine

Administer vincristine (vesicant)

- via a minibag over 5 to 10 minutes
- ensure vein is patent and monitor for signs of extravasation throughout administration
- flush with ~150 mL of sodium chloride 0.9%.

Remove IV cannula and/or deaccess TIVAD or CVAD.

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

Days 2 to 5

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Prednisolone

- administer orally ONCE a day on **days 1 to 5**
- to be taken in the morning with or immediately after food

Note: if a dose is forgotten or vomited, contact treating team.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

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

Days 6 and 7

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

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

Day 8

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

Methotrexate

- administer orally ONCE a week on **days 1, 8, 15 and 22** of each 28 day cycle only
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken on an empty stomach, one hour before or two hours after food
- if PJP prophylaxis with trimethoprim/sulfamethoxazole e.g. Bactrim® is prescribed, ensure this is not administered on the same day as oral methotrexate.

Note: if a dose is forgotten or vomited, contact treating team.

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

Days 9 to 14

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

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

Day 15

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

Methotrexate

- administer orally ONCE a week on **days 1, 8, 15 and 22** of each 28 day cycle only
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken on an empty stomach, one hour before or two hours after food
- if PJP prophylaxis with trimethoprim/sulfamethoxazole e.g. Bactrim® is prescribed, ensure this is not administered on the same day as oral methotrexate.

Note: if a dose is forgotten or vomited, contact treating team.

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

Days 16 to 21

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

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

Day 22

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

Methotrexate

- administer orally ONCE a week on **days 1, 8, 15 and 22** of each 28 day cycle only
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken on an empty stomach, one hour before or two hours after food
- if PJP prophylaxis with trimethoprim/sulfamethoxazole e.g. Bactrim® is prescribed, ensure this is not administered on the same day as oral methotrexate.

Note: if a dose is forgotten or vomited, contact treating team.

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

Days 23 to 28

This is an oral treatment

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Chemotherapy - Time out

Mercaptopurine

- administer orally THREE times daily on **days 1 to 28**
- to be swallowed whole with a glass of water; do not break, crush or chew
- to be taken preferably on an empty stomach, one hour before or at least two hours after food
- avoid concomitant consumption of milk or dairy products

Note: missed doses should not be replaced; if a dose is forgotten or vomited, normal dosing should be resumed at the next scheduled dose.

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

Discharge information

Prednisolone tablets

- Prednisolone tablets with written instructions on how to take them.

Mercaptopurine tablets

- Mercaptopurine tablets with written instructions on how to take.

Methotrexate tablets

- Methotrexate tablets with written instructions on how to take them.

Prophylaxis medications

- Prophylaxis medications (if prescribed) i.e. PJP prophylaxis, 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)	
Nausea and vomiting	Read more about prevention of treatment induced nausea and vomiting
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
Constipation	
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
Peripheral neuropathy	Typically symmetrical sensory neuropathy, affecting the fingers and toes, sometimes progressing to the hands and feet. It is associated with several classes of anti-cancer drugs. These include taxanes, platinum-based compounds, vinca alkaloids and some drugs used to treat multiple myeloma. Read more about peripheral neuropathy
Photosensitivity	Increased sensitivity to ultraviolet (UV) light resulting in an exaggerated sunburn-like reaction accompanied by stinging sensations and urticaria.
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.

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:

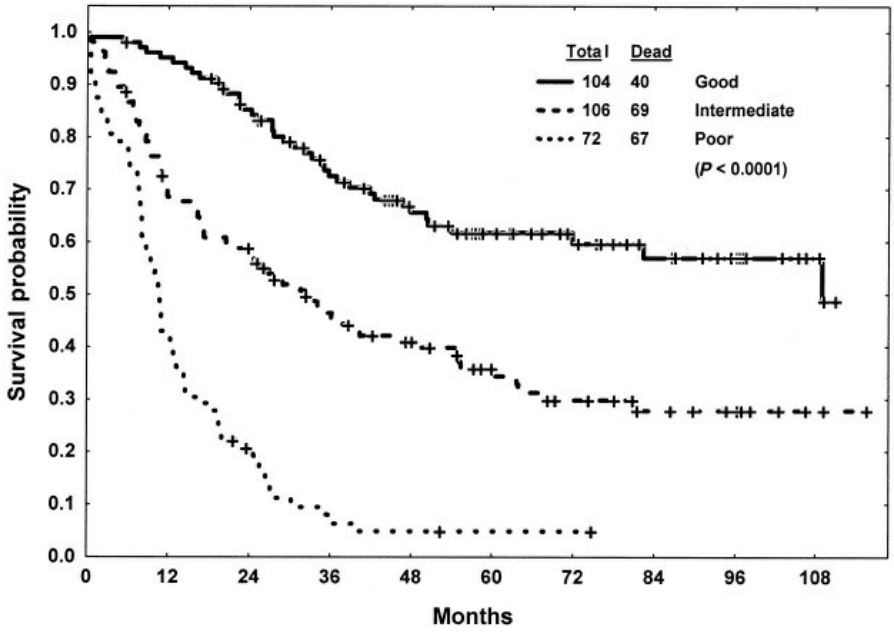
1. Young patients (<60 years) with CD20 expression ≥ 20% did better with rituximab than without (3-year CR duration 70% v 38% p = < .001); overall survival (OS) 75% v 47% (p= 0.003). There was no difference in older patients.
2. For CD20-negative patients, there was no difference in outcome between the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

The median dose of mercaptopurine delivered was 150 mg/day; the median dose of vincristine was 100% monthly; the median dose of methotrexate was 15 mg/m^2 per week; one patient developed acute myeloid leukaemia and two patients developed myelodysplastic syndrome after 34 months, 40 and 47 months, respectively.[1]

Table 3: Toxicity POMP acute lymphoblastic leukaemia[1]

Toxicity	%
Herpes zoster or varicella	6
Pneumocyctis	1
Fungal infection	1

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%.[4]

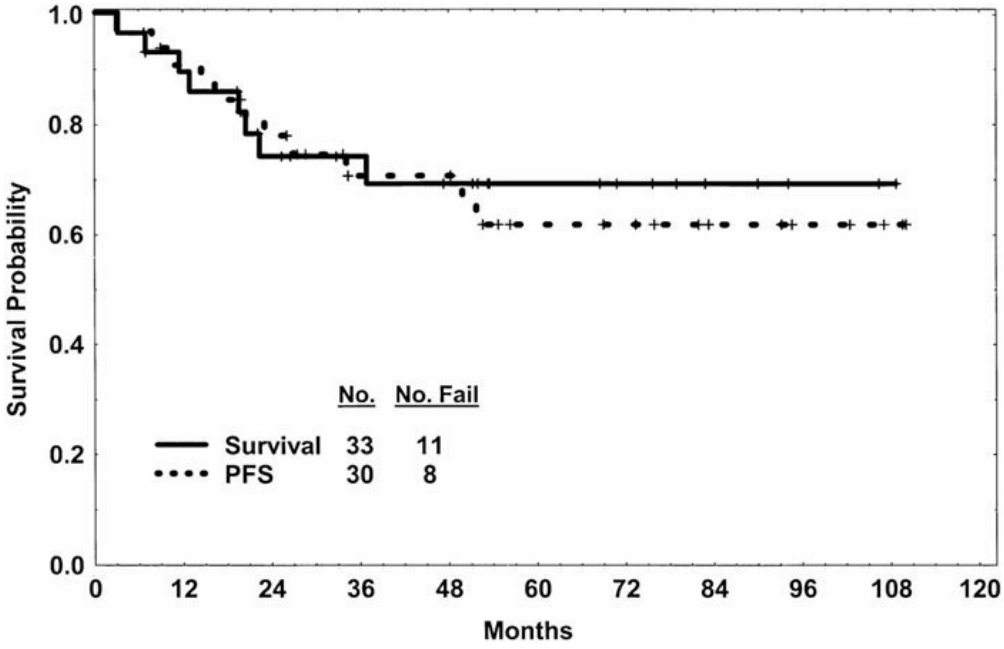
Thomas et al.[5] reported a study of 33 patients with newly diagnosed LBL, median age 28 years (17 to 59 years). 26 (79%) had T-cell

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[5]

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



© Blood 2004

Toxicity

Table 1: Toxicity with hyper CVAD or modified hyper CVAD for lymphoblastic lymphoma (n=33)[5]

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

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)			
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, G. Garcia-Manero, A. Ferrajoli, W. Wierda, F. Ravandi, S. Verstovsek, J. L. Jorgensen, C. Bueso-Ramos, M. Andreeff, S. Pierce, R. Garris, M. J. Keating, J. Cortes and H. M. Kantarjian. 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 Cortelazzo, S., M. Ponzoni, A. J. Ferreri, et al. 2011. "Lymphoblastic lymphoma." Crit Rev Oncol Hematol 79(3):330-343.

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

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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 6

Date	Summary of changes
25/07/2023	• Updated to be a multi-indication protocol to reflect inclusion of lymphoblastic lymphoma indication and evidence • Frequency and cycle notes updated for clarity Changed to version 6.

Version 5

Date	Summary of changes
03/07/2007	Reformatting and addition of extra drug interaction information.
25/06/2008	Changes in the wording of the administration of vincristine to reflect the Australian Council for safety and Quality in Health Care safety alert and the NSW health safety alert.
30/03/2010	Review of protocol; dose modifications reviewed and updated; transferred to eviQ Note: alternate IV schedule not transferred to eviQ as mercaptopurine is not available in Australia as an intravenous formulation.
15/06/2010	Review of protocol at Haematology Reference Committee meeting; protocol amendments made as per meeting, including inclusion of PCP and antiviral prophylaxis as per trial; update of evidence.
19/04/2012	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.
27/06/2014	Protocol reviewed by email survey. Added link to ALLG and ANZCTR with statement 'Patients with ALL should be considered for inclusion into clinical trials'. Next review in 2 years.
11/09/2015	Added Lymphoblastic Lymphoma to the indications and evidence sections.
20/05/2016	Reviewed at the Haematology Reference Committee meeting with no major changes.
31/05/2017	Transferred to new eviQ website. Version number change to v.4. Other changes include: • diluent volume of vincristine changed from '50 to 100 mL' to '50 mL' as per Australian Injectable Handbook Sixth Edition.
21/09/2018	Reviewed at the Haematology Reference Committee meeting with minor updates to evidence.
28/08/2019	Clinical information for consideration of thiopurine methyltransferase (TPMT) testing prior to administration of mercaptopurine added.
21/12/2021	Changed antiemetic clinical information block to minimal or low, to align with new categories. See ID 7 Prevention of anti-cancer therapy induced nausea and vomiting (AINV) v5.
22/01/2022	Pulmonary toxicity added to side effects.
29/07/2022	Clinical information block updated: Thiopurine-S-methyltransferase (TPMT) enzyme deficiency.

First approved: 15 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/165
31 Jul 2023

Patient information - POMP maintenance therapy

Patient's name:

Your treatment

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

POMP maintenance therapy			
This treatment is started after you have finished treatment with Hyper CVAD chemotherapy. This treatment cycle is repeated every 28 days and is ongoing for up to 2 years.			
Day	**Treatment**	**How it is given**	**How long it takes**
1 to 5	**Prednisolone** (*pred-NIS-oh-lone*)	Take orally ONCE a day in the morning with food on days 1 to 5.	
1 to 28	**Mercaptopurine** (*mer-KAP-toe-PURE-een*)	Take orally THREE times a day on days 1 to 28 on an empty stomach, at least one hour before or two hours after food. Swallow whole with a glass of water, do not break, crush or chew. Avoid taking with dairy products as they may decrease its absorption.	
1, 8, 15 and 22	**Methotrexate** (m*eth-o-TREX-ate*)	Take orally ONCE a WEEK on day 1, 8, 15 and 22 only. Swallow whole with a glass of water on an empty stomach at least one hour before or two hours after food.	
1	**Vincristine** (*vin-KRIS-teen*)	By a drip into a vein	About 10 minutes

Missed doses:

- **Mercaptopurine**: if you forget to take your tablets or vomit your tablets, take your normal dose the next time it is due. Do not take an extra dose.
- **Prednisolone**: if you forget to take your tablets or vomit your tablets, contact your treating team.
- **Methotrexate**: as this is only to be taken ONCE a week, if you forget to take a tablet or vomit a tablet, call your doctor for further instructions.

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
	Daytime:.....

- a temperature of 38°C or higher
- chills, sweats, shivers or shakes
- shortness of breath
- uncontrolled vomiting or diarrhoea
- pain, tingling or discomfort in your chest or arms
- you become unwell.

Night/weekend:

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

Information for patients on allopurinol

Tell your doctor, nurse or pharmacist if you are taking allopurinol tablets (including Progout®, Zyloprim® and Allosig®). This treatment contains mercaptopurine, and allopurinol can increase the levels of this drug in the body. This can cause low white blood cells and increase your risk of infection. If you need to take both medicines, your doctor will reduce your dose of mercaptopurine and monitor your blood counts more regularly.

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 may involve 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.
- **Laxatives:** you may be given some medication to prevent or treat constipation. Your doctor or nurse will tell you how and when to take the laxatives.
- **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.

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)	
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.**
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.**
Constipation	• You may have bowel motions (stools, poo) that are less frequent, harder, smaller, painful or difficult to pass. • You may also get: ◦ bloating, cramping or pain ◦ a loss of appetite ◦ nausea or vomiting. • Drink plenty of fluids (unless you are fluid restricted). • Eat plenty of fibre-containing foods such as fruit, vegetables and bran. • Take laxatives as directed by your doctor. • Try some gentle exercise daily. • **Tell your doctor or nurse if you have not opened your bowels for more than 3 days.**
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.**

Nerve damage (peripheral neuropathy)	• You may notice a change in the sensations in your hands and feet, including:
	  ◦ tingling or pins and needles
	  ◦ numbness or loss of feeling
	  ◦ pain.
	• You may find it difficult to do everyday activities, such as doing up buttons or picking up small objects.
	• Test water temperature with your elbow when bathing to avoid burns.
	• Use rubber gloves, pot holders and oven mitts in the kitchen.
	• Wear rubber shoes or boots when working in the garden or garage.
	• Keep rooms well lit and uncluttered.
	• Ask your doctor or nurse for eviQ patient information – Nerve problems during cancer treatment.
	• Tell your doctor or nurse if you get any of the symptoms listed above.

Skin that is more sensitive to the sun (photosensitivity)	• After being out in the sun you may develop a rash like a bad sunburn. • Your skin may become red, swollen and blistered. • Avoid direct sunlight. • Protect your skin from the sun by wearing sun-protective clothing, a wide-brimmed hat, sunglasses and a sunscreen of SPF 50 or higher. • **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.

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

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