Chronic myeloid leukaemia pONATinib

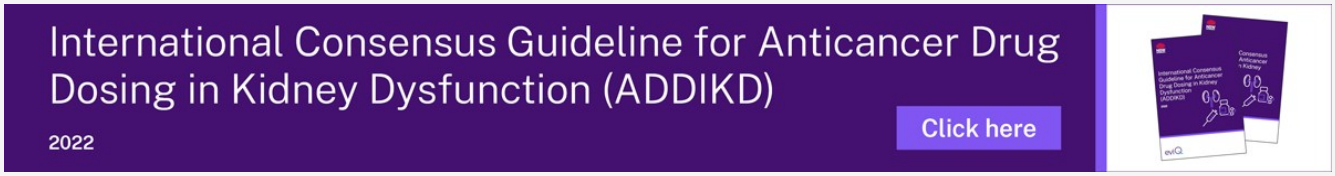
ID: 1891 v.3 **Endorsed**

⚠ Cardiotoxicity and vascular toxicity:
It is highly recommended that clinicians perform cardiovascular and venous thrombotic risk assessments and manage these risks prior to initiation of ponatinib. See the 'Clinical information' section below for more information on ponatinib related vascular occlusion, heart failure and hypertension.

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

This protocol is based on limited evidence; refer to the evidence section of this protocol for more information.

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:

- Chronic myeloid leukaemia daSATinib

- ELN recommendations for the management and avoidance of adverse events of treatment in chronic myeloid leukaemia
- Managing side effects of TKI

Treatment schedule - Overview

Drug	Dose	Route
pONATinib	45 mg ONCE a day	PO

Notes:

- For patients with chronic-phase CML, suggest reducing ponatinib dose to 15 mg daily upon achievement of complete cytogenetic response or molecular response BCR-ABL1 ≤ 1%.[1]
- Strong evidence exists for the efficacy of ponatinib 45 mg once daily dosing, however toxicity may be encountered at this dose and dose adjustments may be considered[2] (see evidence section for further information).

Continuous as long as there is no evidence of progressive disease or unacceptable toxicity.

Drug status: **Ponatinib:** (PBS authority)

Ponatinib is available as **15 mg** and **45 mg** tablets

Cost: ~ $5,760 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.*

Continuous treatment		
pONATinib	45 mg (PO)	ONCE a day with or without food.

Notes:

- For patients with chronic phase CML, suggest reducing ponatinib dose to 15 mg daily upon achievement of complete cytogenetic response or molecular response BCR-ABL1 ≤ 1%.[1]
- Strong evidence exists for the efficacy of ponatinib 45 mg once daily dosing, however toxicity may be encountered at this dose and dose adjustments may be considered[2] (see evidence section for further information).

Continuous as long as there is no evidence of progressive disease or unacceptable toxicity.

Indications and patient population

- Philadelphia chromosome (BCR-ABL1) positive chronic myeloid leukaemia in patients when at least two prior tyrosine kinase inhibitors have failed or been intolerable to a severity necessitating permanent treatment withdrawal; or where there is a T315I mutation

Clinical information

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
Cardiac toxicity	Fatal and serious heart failure or left ventricular dysfunction occurred in patients treated with ponatinib. Monitor patients for signs or symptoms consistent with heart failure and treat as clinically indicated. Interruption or discontinuation of ponatinib may be required in patients with new or worsening heart failure. Read more about cardiac toxicity associated with anti-cancer drugs
Vascular occlusion	Patients treated with ponatinib may experience an increased incidence of vascular occlusion resulting in fatal myocardial infarction, stroke, stenosis of large arterial vessels of the brain, severe peripheral vascular disease, vision loss and the need for urgent revascularisation procedures. Monitor for evidence of thromboembolism and vascular occlusion and interrupt or stop treatment if vascular occlusion occurs. Ponatinib should not be used in patients with a history of myocardial infarction, prior revascularisation or stroke unless the potential benefit outweighs the potential risk. Baseline cardiac assessment and risk factors should be performed and corrected prior to commencing treatment and should be monitored throughout.
Hypertension	Patients treated with ponatinib may experience an increased incidence of hypertension. Pre-existing hypertension should be adequately controlled prior to commencing treatment and blood pressure should be monitored at each clinic visit and managed as clinically indicated. Worsening, labile or treatment-resistant hypertension may require interruption and consideration for renal artery stenosis.

Prolongation of QT interval	This treatment may prolong the QT interval and increase the risk of cardiac arrhythmia. Use with caution in patients with a congenital long QT syndrome, patients treated with a high cumulative dose of anthracycline therapy, patients taking medications that may prolong the QT interval and those with electrolyte disturbances. Risk factors (e.g. electrolyte abnormalities) should be corrected, where possible, prior to commencement of treatment and the concurrent use of drugs that may prolong the QT interval should be avoided. Baseline and periodic monitoring of electrocardiogram (ECG) and electrolytes (potassium, magnesium, calcium) should be considered in patients at high risk of QT prolongation. Read more about drugs that may prolong QTc interval at crediblemeds.org (registration required).
Hepatotoxicity	Ponatinib has been associated with severe hepatotoxicity, with fatal hepatic failure being reported. Refer to blood tests and dose modification sections for specific recommendations.
Haemorrhage	Severe haemorrhagic events including fatalities have occurred with ponatinib, with subdural haematoma and gastrointestinal haemorrhage being the most commonly reported events. Caution is recommended in patients taking concurrent anticoagulant or antiplatelet medications or at risk of haemorrhage.
Pancreatitis	Pancreatitis developed in the majority of the patients within the first 2 months of ponatinib use in clinical trials. Monitor serum lipase every 2 weeks for the first 2 months and then regularly thereafter. Dose interruption or reduction may be required.
Tumour lysis risk	Assess patient for risk of developing tumour lysis syndrome. Read more about prevention and management of tumour lysis syndrome.
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 and serum lipase at baseline and fasting lipid profile. Repeat FBC every 2 weeks for the first three months then monthly or as clinically indicated. EUC, eGFR and LFTs monthly or as clinically indicated. Serum lipase every 2 weeks for the first 2 months then regularly thereafter.
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. Pregnancy must be avoided while a female patient is on tyrosine kinase inhibitor (TKI) therapy. There are very few reports of pregnancy outcomes in partners of men receiving second or third-generation TKIs. Although the majority of infants fathered by men taking dasatinib were reported to be without congenital disabilities at birth, the general advice is for couples to avoid pregnancy (Carlier et al., 2017; Cortes et al., 2015). The safety of these drugs has not been proven, and therefore, pregnancy should be avoided. Effective contraception methods and adequate contraception timeframes 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. Link to Carlier et al. and Cortes et al. references.

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).

Haematological toxicity

Dose adjustment is based upon:
- **the haematological, cytogenetic and molecular response to therapy and**
- **consideration of toxicity (specifically the development of dose-limiting neutropenia or thrombocytopenia).**

ANC less than 1.0 x 10^9/L or platelets less than 50 x 10^9/L	Stop ponatinib and after recovery to ANC greater than or equal to 1.5 x 10^9/L and platelets greater than or equal to 75 x 10^9/L resume daily dose at: • First occurrence: 45 mg (initial dose) • Second occurrence: 30 mg • Third occurrence: 15 mg

Renal impairment

There is no data in patients with renal impairment. Renal excretion is not a major route of ponatinib elimination however caution is recommended for patients with moderate to severe renal impairment.

Hepatic impairment

Caution is recommended in patients with moderate to severe hepatic impairment. Doses above 30 mg have not been studied in patients with hepatic impairment. A starting dose of 30 mg is recommended.

Pancreatitis	
Grade 3	Delay treatment until recovery to less than grade 2. • If occurrence at 45 mg, resume at 30 mg • If recurrence at 30 mg, resume at 15 mg • If recurrence at 15 mg, consider discontinuing ponatinib
Grade 4	Discontinue ponatinib

Elevated lipase/amylase	
Grade 3 or Grade 4	Delay treatment until recovery to less than or equal to grade 1. • If occurrence at 45 mg, resume at 30 mg • If recurrence at 30 mg, resume at 15 mg • If recurrence at 15 mg, consider discontinuing ponatinib

Non-haematological toxicity

If a severe non-haematological toxicity develops, dosing should be interrupted. Once the toxicity has resolved, ponatinib may be

Non-haematological toxicity
resumed at the same dose or at a reduced dose according to initial grade of the toxicity.

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*

Ponatinib		
	Interaction	**Clinical management**
CYP3A4 inhibitors (e.g. aprepitant, azole antifungals, clarithromycin, erythromycin, grapefruit juice, ritonavir etc.)	Increased toxicity of ponatinib possible due to reduced clearance	Avoid combination or monitor for ponatinib toxicity. Consider reducing the starting dose of ponatinib to 30mg with strong CYP3A4 inhibitors
CYP3A4 inducers (e.g. carbamazepine, phenytoin, phenobarbitone, rifampicin, St John's wort etc.)	Reduced efficacy of ponatinib possible due to increased clearance	Avoid combination or monitor for decreased clinical response to ponatinib
Drugs that may prolong the QTc interval (e.g. azole antifungals, tricyclic antidepressants, antiarrhythmics etc.)	May have additive effect with ponatinib; (limited data available) may lead to torsades de pointes and cardiac arrest	Avoid combination or minimise additional risk factors (e.g. correct electrolyte imbalances) and monitor ECG for signs of cardiac arrhythmia
Drugs metabolised by P-glycoprotein (P-gp) (e.g. digoxin, dabigatran, colchicine, pravastatin) or Breast Cancer Resistant Protein (BCRP) (e.g. methotrexate, rosuvastatin, sulfasalazine)	Increased effects/toxicity of these drugs possible due to inhibition of P-gp or BCRP by ponatinib resulting in reduced clearance	Avoid combination or monitor for increased effect/toxicity of the interacting drugs

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.

Administration

This is an oral treatment

Safe handling and waste management (reproductive risk only)

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.

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Treatment - Time out

Ponatinib

- administer orally ONCE daily, at the same time every day
- to be swallowed whole with a glass of water; do not break, crush or chew
- may be taken with or without food

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 (reproductive risk only) for 7 days after completion of drug(s).

Discharge information

Ponatinib tablets

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

Antiemetics

- Antiemetics as prescribed.

Growth factor support

- Arrangements for administration if prescribed.

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)	
Flu-like symptoms	
Headache	
Nausea and vomiting	Read more about prevention of treatment induced nausea and vomiting

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
Abdominal pain	Dull ache, cramping or sharp pains are common with some anti-cancer drugs. These are caused by either increased or decreased gastrointestinal motility and can be associated with diarrhoea or constipation.
Arthralgia and myalgia	Generalised joint pain or and/or stiffness and muscle aches, often worse upon waking or after long periods of inactivity. Can improve with movement. May be mild or severe, intermittent or constant and accompanied by inflammation. Read more about arthralgia and myalgia
Cardiotoxicity	Cardiotoxicity may manifest as asymptomatic reduction in left ventricular ejection fraction (LVEF), arrhythmia, cardiomyopathy, hypertension, cardiac ischaemia and congestive heart failure (CHF). The risk of cardiotoxicity is increased by a number of factors, particularly a history of heart disease and electrolyte imbalances. Read more about cardiotoxicity associated with anti-cancer drugs
Constipation	
Diarrhoea	Read more about treatment induced diarrhoea
Fatigue	Read more about fatigue
Fluid retention and oedema	An excess amount of fluid around the cells, tissues or serous cavities of the body, leading to swelling.
Haemorrhage	
Hepatotoxicity	Anti-cancer drugs administered either alone or in combination with other drugs and/or radiation may cause direct or indirect hepatotoxicity. Hepatic dysfunction can alter the metabolism of some drugs resulting in systemic toxicity.
Hot flushes	
Hyperlipidaemia and hypercholesterolaemia	Abnormally elevated levels of lipids and cholesterol in the blood.
Hypertension associated with angiogenesis inhibitors	High blood pressure can occur with angiogenesis inhibitors and tyrosine kinase inhibitors.
Pancreatitis	Inflammation of the pancreas with impairment of function is associated with treatment.
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
Thromboembolism	Arterial and venous thromboembolic events, including pulmonary embolism, deep vein thrombosis and cerebrovascular accidents can occur. Patients should be carefully assessed for risk factors, and consideration given for antithrombotic prophylaxis in high risk patients.

Late (onset weeks to months)	
Alopecia - partial	Hair thinning and/or patchy hair loss. 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
Anaemia	Abnormally low levels of red blood cells (RBCs) or haemoglobin in the blood. Read more about anaemia

Evidence

Ponatinib is a BCR-ABL1 inhibitor that has demonstrated activity against the native and mutated BCR-ABL1 proteins and is the only tyrosine kinase inhibitor (TKI) effective against the T315I mutation. Ponatinib initially received accelerated approval by the US FDA for the treatment of chronic myeloid leukaemia (CML) in adults with resistance or intolerance to prior TKI therapy but subsequently after reports of vascular complications, including arterial and venous thromboses and embolic events (>27%) this approval was modified to narrow indications to treatment of adults with T315I-positive CML and for adults with CML where no other TKI is indicated.

The initial phase I dose escalation study of ponatinib included 65 patients with relapsed or resistant Philadelphia (Ph) positive leukemia, including 43 patients with CML in chronic phase (CP-CML).[3] In these patients 98% had received two prior TKIs, 63% had received three prior TKIs, and 29% had a known T315I mutation. At a median follow-up of 66 weeks the rates of complete hematologic response (CHR), major cytogenetic response (MCR), and complete cytogenetic response (CCR) were 98, 72, and 63%, respectively. The median time to MCR was 12 weeks (range, 8-72). The median duration of MCR was not reached (range, 8-117). Of those who attained a MCR, 89% (95% CI 69-96%) were estimated to remain on therapy at one year. Of the 12 patients with T315I mutation, all attained a CHR and MCR, CCR, and major molecular response (MMR) were seen in 11, 9, and 8 patients, respectively.

The phase II PACE trial of ponatinib included 449 heavily pre-treated patients who had CML or Ph-positive ALL with resistance to or unacceptable side effects from dasatinib or nilotinib or who had the T315I mutation.[4] This trial reported MCR in 51% of the 203 patients with CP CML and in 70% of the 64 patients in CP with T315I mutations. The median time to MCR was 2.8 months and 91% were sustained at one year. No specific mutations appeared to confer resistance. In the 83 patients with accelerated phase CML including patients with T315I mutations, MHR was observed in 55%. Median time to MHR and median duration of MHR were 21 days and 12 months, respectively. MCR, CCR, and MMR were attained in 39, 24, and 16%, respectively. The median time to MCR was 3.7 months and 73% maintained this response at one year. In the 62 patients with CML in blast crisis (myeloid or lymphoid) including patients with T315I mutations, MHR was achieved in 31%. Median time to MHR and median duration of MHR were 4 and 5 months, respectively. At 12 months, 42% had a sustained response. MCR and CCR were attained in 23 and 18%, respectively. Estimated progression-free and overall survival rates at one year were 55 and 84%, respectively.

The MD Anderson group conducted a single arm phase II study of ponatinib first line in 51 patients with CP-CML.[2] The primary endpoint was the proportion of patients who achieved CCR by 6 months. Median follow-up was 20.9 months. Initially 43 patients were started on 45 mg ponatinib daily but because of tolerability issues subsequently eight patients were started on 30 mg daily. 43 (94%) of 46 evaluable patients achieved CCR at 6 months. The study was terminated early at the recommendation of the FDA due to concern about the increased risk of thromboembolic disease. Similarly the EPIC study, which was an international multicentre randomised, open-label, phase III trial designed to assess the efficacy and safety of ponatinib, compared with imatinib, in newly diagnosed patients with CP-CML was terminated early following these safety concerns, which limited the assessment of the primary endpoint.[5] Although ponatinib first line is efficacious, due to adverse events (particularly arterial occlusive events) it is not recommended nor reimbursed in this setting.

The OPTIC trial is the first prospective randomized clinical trial to evaluate different dosing regimens for CP-CML patients resistant or intolerant to at least 2 previous TKIs, or had T315I mutation.[1] A total of 283 patients were randomly assigned 1:1:1 to 3 cohorts receiving 45 mg, 30 mg or 15 mg ponatinib once daily, with the primary endpoint of response of BCR-ABL1 ≤ 1% at 12 months. In patients who received 45 mg or 30 mg ponatinib daily, the dose was reduced to 15mg daily on achievement of BCR-ABL1 ≤1%. The primary end point (98.3% confidence interval) was achieved in 44.1% (31.7-57.0) of patients who received 45 mg daily, 29.0% (18.4-41.6) of patients receiving 30 mg daily, and 23.1% (13.4-35.3) for patients receiving 15 mg daily. Independently confirmed grade 3 or above treatment-emergent arterial occlusive events occurred in 5, 5, and 3 patients in the 45-, 30-, and 15 mg cohorts, respectively. All cohorts showed benefit in this highly resistant CP-CML population. Optimal benefit/risk outcomes occurred with the 45 mg starting dose, which was decreased to 15 mg upon achievement of a response.

The expert reference panel supported publication of the protocol on the basis of the information summarised below. The committee was most strongly influenced by the study by Cortes et al.[1] and Jain et al.[2]

Source	Study & Year Published	Supports Use	Is the dose and regimen consistent with the protocol?	Comments
Phase I trial	Cortes et al. 2012[3]	**Yes**	Yes	Doses ranged from 2 to 60 mg ONCE daily
Phase II trials	Cortes et al. 2013[4]	**Yes**	Yes	-
	Jain et al. 2015[2]	**Yes**	Yes	First-line ponatinib in CP-CML. Patients

Source	Study & Year Published	Supports Use	Is the dose and regimen consistent with the protocol?	Comments
				enrolled before 25/07/13 were started on a dose of 45 mg ONCE daily. Patients enrolled after this date were started on 30 mg ONCE daily due to tolerability issue.
	Cortes et al. 2021[1]	**Yes**	Yes	Ponatinib in CP-CML after failure ≥ 2 prior TKIs or presence of T315I mutation. Optimal benefit/risk outcome occurred with 45 mg ONCE daily starting dose which was reduced to 15 mg ONCE daily after achievement of BCR-ABL1 ≤1%.

Guidelines	Date published/revised	Supports Use	Is the dose and regimen consistent with the protocol?	Comments
NCCN	CML 2022 V.3	**Yes**	Yes	-
BCCA	June 2021	**Yes**	Yes	-
CCO	Sep 2020	**Yes**	Yes	-

Efficacy

Figure 1. Efficacy of ponatinib in chronic-phase CML (CP-CML) - overall, patients resistant or intolerant to previous treatment with dasatinib or nilotinib, and patients with the BCR-ABL1^{T315I} mutation[6]

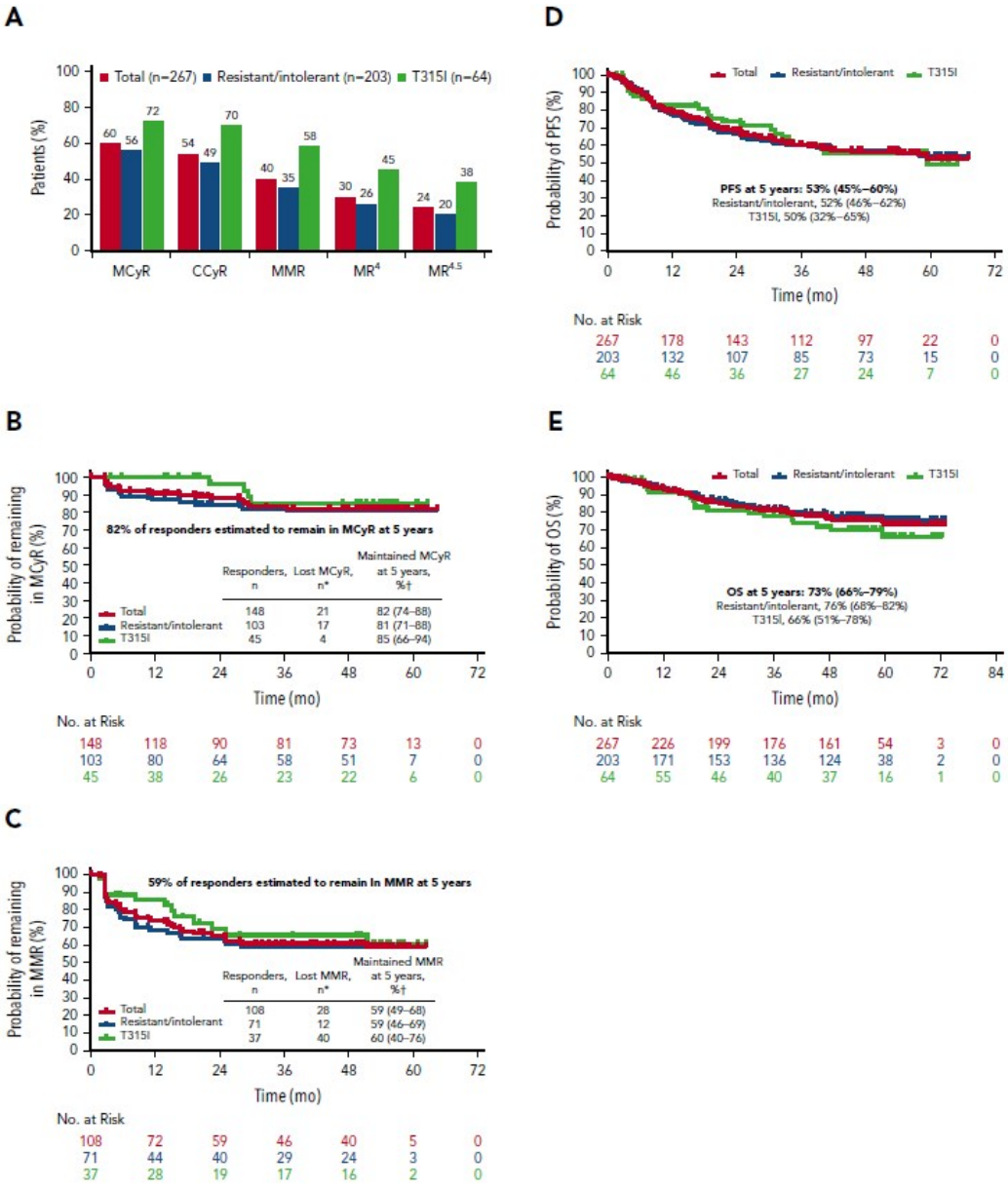
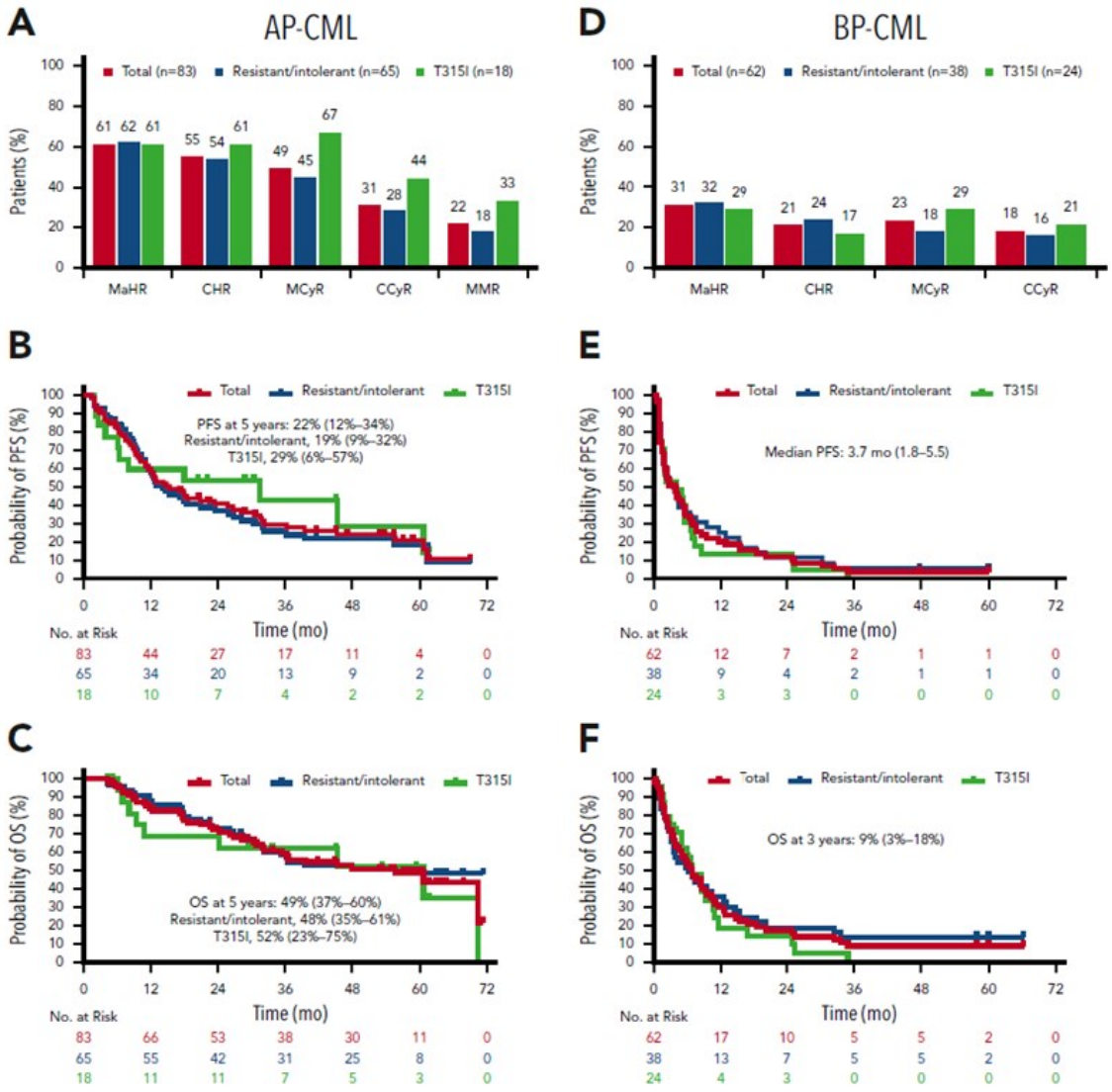


Figure 2. Efficacy in advanced disease (accelerated-phase CML (AP-CML) and blast-phase CML (BP-CML)) - overall, patients resistant or intolerant to previous treatment with dasatinib or nilotinib, and patients with the BCR-ABL1^{T315I} mutation[6]



Adapted from © Blood 2018

Toxicity

In the phase 1 study the most common non-hematologic toxicities were typically mild to moderate and included skin changes (rash, dry skin, acneiform dermatitis) and constitutional symptoms (arthralgia, fatigue, nausea).[3] Pancreatitis, ranging from mild to severe, was seen in approximately 14%. Severe (grade 3 or 4) thrombocytopenia, neutropenia, and anaemia occurred in 28, 14, and 2% respectively.

In the phase II PACE study the most common toxicities (all grades) were thrombocytopenia (41%), rash (40%), dry skin (39%), abdominal pain (27%), and headache (23%).[4] In this report, cardiovascular, cerebrovascular, and peripheral vascular events were described in 7, 4, and 5% of patients, respectively. The majority of patients with vascular events had at least one vascular risk factor (e.g. hypertension, diabetes, hypercholesterolaemia, obesity). Of the patients who continued ponatinib after a vascular event, 36% had subsequent events. Overall, severe adverse events led to the discontinuation of therapy in 13% of patients. Five patients died with two deaths were potentially related to treatment (pneumonia, acute myocardial infarction).

In the MD Anderson first line ponatinib study the most frequent toxicities included skin-related effects (n=35; 69%) and elevated lipase (n=32; 63%).[2] Cardiovascular events (mainly hypertension) occurred in 25 (49%) patients. Grade 3 or 4 myelosuppression occurred in 15 (29%) patients. Five (10%) patients developed cerebrovascular or vaso-occlusive disease. 43 (85%) patients required treatment interruptions and 45 (88%) required dose reductions.

Table 1. Treatment-related adverse events[4]

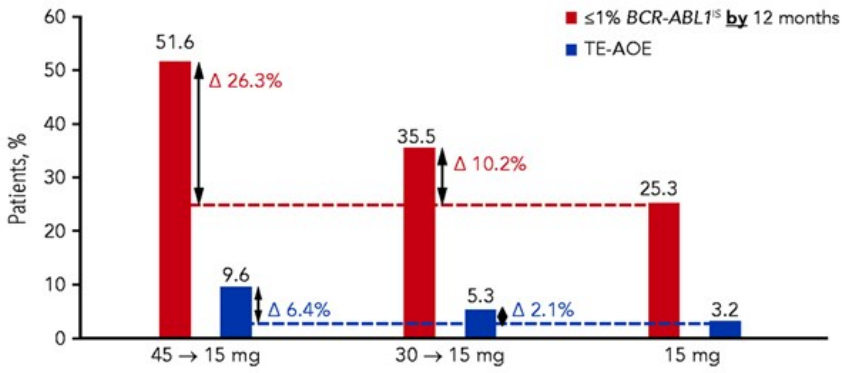
Event	Chronic-Phase CML (N=270)		Accelerated-Phase CML (N=85)		Blast-Phase CML (N=62)		Ph-Positive ALL (N=32)	
	Any Grade	Grade 3 or 4	Any Grade	Grade 3 or 4	Any Grade	Grade 3 or 4	Any Grade	Grade 3 or 4
	number of patients (percent)							
Nonhematologic events								
Rash†	107 (40)	10 (4)	25 (29)	3 (4)	15 (24)	2 (3)	6 (19)	1 (3)
Dry skin	104 (39)	5 (2)	21 (25)	1 (1)	10 (16)	1 (2)	7 (22)	0
Abdominal pain	74 (27)	20 (7)	15 (18)	4 (5)	6 (10)	1 (2)	6 (19)	2 (6)
Headache	63 (23)	5 (2)	10 (12)	0	7 (11)	1 (2)	4 (12)	0
Increased lipase	57 (21)	27 (10)	12 (14)	11 (13)	8 (13)	7 (11)	3 (9)	2 (6)
Fatigue	51 (19)	4 (1)	17 (20)	1 (1)	7 (11)	2 (3)	3 (9)	0
Constipation	53 (20)	3 (1)	11 (13)	1 (1)	3 (5)	0	6 (19)	1 (3)
Myalgia	46 (17)	3 (1)	16 (19)	0	7 (11)	0	2 (6)	0
Arthralgia	45 (17)	6 (2)	16 (19)	1 (1)	8 (13)	0	1 (3)	0
Nausea	38 (14)	1 (<1)	9 (11)	0	12 (19)	0	1 (3)	0
Increased alanine aminotransferase	31 (11)	9 (3)	10 (12)	2 (2)	5 (8)	2 (3)	1 (3)	1 (3)
Pancreatitis	19 (7)	17 (6)	7 (8)	5 (6)	3 (5)	2 (3)	0	0
Hypertension	25 (9)	6 (2)	6 (7)	3 (4)	1 (2)	1 (2)	1 (3)	1 (3)
Increased aspartate aminotransferase	24 (9)	5 (2)	8 (9)	3 (4)	4 (6)	1 (2)	1 (3)	1 (3)
Increased blood amylase	16 (6)	4 (1)	6 (7)	3 (4)	3 (5)	2 (3)	1 (3)	0
Increased γ-glutamyltransferase	11 (4)	4 (1)	7 (8)	2 (2)	2 (3)	1 (2)	0	0
Dyspnea	13 (5)	4 (1)	6 (7)	0	4 (6)	1 (2)	0	0
Cardiac failure	3 (1)	2 (<1)	1 (1)	1 (1)	2 (3)	2 (3)	0	0
Hematologic events								
Thrombocytopenia	111 (41)	86 (32)	36 (42)	28 (33)	17 (27)	16 (26)	3 (9)	2 (6)
Neutropenia	44 (16)	38 (14)	22 (26)	22 (26)	14 (23)	11 (18)	4 (12)	4 (12)
Anemia	27 (10)	15 (6)	14 (16)	8 (9)	14 (23)	13 (21)	5 (16)	4 (12)
Decreased white-cell count	11 (4)	7 (3)	7 (8)	5 (6)	0	0	1 (3)	1 (3)
Pancytopenia	2 (1)	2 (1)	3 (4)	2 (2)	3 (5)	3 (5)	0	0
Febrile neutropenia	1 (<1)	1 (<1)	2 (2)	2 (2)	2 (3)	2 (3)	2 (6)	2 (6)

* Treatment-related adverse events were defined as events that the site investigators deemed to have a possible, probable, or definite relationship to ponatinib. Listed are the treatment-related adverse events that were reported in at least 10% of the patients, along with any incidence of grade 3 or 4 events in more than 1% of the total study population.
† Rash includes erythematous and papular rash.

In the OPTIC study, 33% of all patients had at least one cardiovascular risk factor, and the 2 sudden deaths in the 45 mg ponatinib cohort occurred in patients with cardiovascular risk factors.[1] The overall rate of arterial occlusive events (AOEs) was 6%, with exposure-adjusted treatment-emergent AOEs of 5.6% in those on 45 mg ponatinib. A starting dose of 45 mg with response-related dose reduction was associated with an estimated 6.4 percentage-point increase in the rate of arterial occlusive events compared with 15 mg. However, this was offset by a 26.3 percentage-point improvement in the response rate by 12 months. This benefit-to-risk data is informative when considering that optimal antileukemic effects should be maintained whilst minimizing the risk of adverse events (see Figure 3).

The mechanism by which ponatinib interacts with the endothelium and pre-existing arteriosclerotic plaques is unknown.[2]

Figure 3. Summary of relationship between efficacy and treatment-emergent arterial occlusive event (TE-AOE) rate (by starting dose)[1]



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3 Cortes, J. E., H. Kantarjian, N. P. Shah, et al. 2012. "Ponatinib in refractory Philadelphia chromosome-positive leukemias." N Engl J Med 367(22):2075-2088.

4 Cortes, J. E., D. W. Kim, J. Pinilla-Ibarz, et al. 2013. "A phase 2 trial of ponatinib in Philadelphia chromosome-positive leukemias." N Engl J Med 369(19):1783-1796.

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History

Version 3

Date	Summary of changes
11/03/2022	Protocol reviewed at 2022 Haematology Reference Committee meeting. Version updated to V.3., for review in 2 years. Updates include: • classification terminology updated to BCR-ABL1 • suggest dose reduction for chronic-phase CML to 15 mg daily upon achieving complete cytogenetic response or molecular response of BCR-ABL1 ≤ 1% • clinical information for pregnancy and TKIs updated • OPTIC study details added to evidence and toxicity • efficacy graphs updated.

Version 2

Date	Summary of changes
22/08/2016	Approved and published on eviQ.
21/09/2016	Emetogenicity clinical information block changed from 'minimal' to 'low'.
31/05/2017	Transferred to new eviQ website. Version number change to V.2.
21/09/2018	Reviewed by Haematology Reference Committee with no significant changes, review in 2 years.
10/10/2019	Clinical information updated with PBS expanded indications for G-CSF.
23/10/2020	Protocol reviewed electronically by Haematology Reference Committee, no changes. Review in 2 years.
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.

First approved: 22 August 2016
Last reviewed: 11 March 2022
Review due: 30 June 2024

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/1891
31 Aug 2023

Patient information - Chronic myeloid leukaemia (CML) - Ponatinib

Patient's name:

Your treatment

The treatment schedule below explains how the drug for this treatment is given.

Ponatinib		
This treatment is continuous. Your doctor will advise you how long to take the treatment for.		
Day	**Treatment**	**How it is given**
Continuous	**Ponatinib** *(pon-a-tin-ib)*	Take orally ONCE a day, at the same time each day, with or without food. Swallow whole with a glass of water, do not break, crush or chew. If you forget to take a dose or vomit a tablet, take your normal dose the next time it is due. Do not take an extra dose.

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 • chills, sweats, shivers or shakes • shortness of breath • uncontrolled vomiting or diarrhoea • pain, tingling or discomfort in your chest or arms • you become unwell.	Daytime:..... Night/weekend:..... Other instructions:..... ....

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

You will need to have a blood test before you start treatment and regularly throughout your treatment. Your doctor or nurse will tell you when to have these blood tests.

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 may 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. Your doctor will decide if you need this medication. Follow this link to read more information on how to give this injection.

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)	
Flu-like symptoms	• You may get: ◦ a fever ◦ chills or sweats ◦ muscle and joint pain ◦ a cough ◦ headaches. • Tell your doctor or nurse if you get any of the symptoms listed above. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have a temperature of 38°C or higher.**
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.**
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.**
Stomach pain	• You may get: ◦ dull aches ◦ cramping or pain ◦ bloating or flatulence (gas). • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have stomach pain that you are unable to control.**
Joint and muscle pain and stiffness	• You may get muscle, joint or general body pain and stiffness. • Applying a heat pack to affected areas may help. • Talk to your doctor or nurse about other ways to manage these symptoms. You may need medication to help with any pain.
Heart problems	• You may get: ◦ chest pain or tightness ◦ shortness of breath ◦ swelling of your ankles ◦ an abnormal heartbeat. • Heart problems can occur months to years after treatment. • Tell your doctor if you have a history of heart problems or high blood pressure. • Before or during treatment, you may be asked to have a test to see how well your heart is working. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the symptoms listed above.**

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.**

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.**
Extra fluid in the body (fluid retention)	• You may gain weight over a short amount of time. • Your hands and feet may become swollen, appear red or feel hot and uncomfortable. • Wear loose clothing and shoes that are not too tight. • Try not to stand up or walk around too much at one time. • If your ankles or legs get swollen, try raising them. • Make sure that any cuts or areas of broken skin are treated as soon as possible. • **Tell your doctor or nurse as soon as possible if you get any of the symptoms listed above or gain 1 to 2 kg in a week.** • **Tell your doctor or nurse immediately or go to the nearest hospital Emergency Department if you become short of breath.**

Bleeding (haemorrhage)	• Tell your doctor or nurse if you have a wound that does not heal.
	• **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following signs or symptoms:**
	  ◦ **unusual bleeding or bruising**
	  ◦ **bright red or black, tarry bowel motions (stools, poo)**
	  ◦ **stomach pain**
	  ◦ **slurred speech**
	  ◦ **shortness of breath**
	  ◦ **a fast heartbeat.**

Liver problems	• You may get: ◦ yellowing of your skin or eyes ◦ itchy skin ◦ pain or tenderness in your stomach ◦ nausea and vomiting ◦ loss of appetite • You will have regular blood tests to check how well your liver is working. • **Tell your doctor or nurse as soon as possible if you notice that your urine is a dark colour, the whites of your eyes look yellow, or if you have stomach pain.**
Hot flushes	• You may get flushing of your face, sweating and sensations of heat. • Avoid alcohol, coffee, tea and spicy foods, as they can make hot flushes worse. • Wear lightweight clothes made from natural fibres; dress in layers. • Put a cold, wet towel against your neck during hot flushes. • Talk to your doctor or nurse about other ways to manage these symptoms.
High blood cholesterol levels	• This treatment may increase your blood cholesterol levels. This is not a side effect you will notice. • Your cholesterol levels will be checked during your treatment.
High blood pressure (hypertension)	• You may not have any signs or symptoms if you have high blood pressure. • If it is severe you may get headaches, shortness of breath or feel dizzy. • Your blood pressure will be taken regularly during your treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the signs or symptoms listed above.**
Inflamed pancreas (pancreatitis)	• **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get:** ◦ **abdominal (stomach) pain** ◦ **a swollen stomach** ◦ **nausea or vomiting** ◦ **fever or chills** ◦ **a fast heartbeat.**
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.**
Blood clots (thromboembolism)	• Blood clots can occur with this 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:** ◦ **redness, heat or pain in your leg(s)** ◦ **numbness or weakness in your face, arm or leg** ◦ **chest pain** ◦ **sudden shortness of breath** ◦ **dizziness** ◦ **trouble speaking** ◦ **blurred vision** ◦ **severe headache** ◦ **unexplained falls or loss of balance.**

Late (onset weeks to months)	
Hair thinning	• Your hair may become dry and may break easily. • You may lose some of your hair. • Use a gentle shampoo and a soft hairbrush. • Take care with hair products like hairspray, hair dye, bleaches and perms. • Protect your scalp from the cold with a hat or scarf. • Protect your scalp from the sun with a hat and sunscreen of SPF 50 or higher. • Ask your doctor or nurse about the Look Good Feel Better program (www.lgfb.org.au)
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.**

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)
- Call the Myeloma Australia Support Line on 1800 693 566 (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 – https://aci.health.nsw.gov.au/networks/bmtct
- 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
- Carer Help - carerhelp.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:

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