

Mesothelioma ipilimumab and nivolumab (flat dosing)

ID: 4013 v.2 Endorsed

Treatment must be initiated and supervised by specialist physicians experienced in the treatment of cancer using immunological agents. Before commencing immunotherapy treatment in any patient, clinicians should have an understanding of the immune-related adverse events (irAEs) associated with immunotherapy treatment and their management.

Check for clinical trials in this patient group. Link to [Australian Clinical Trials](#) 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](#).

International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (ADDIKD)

2022

[Click here](#)



Related pages:

- [Mesothelioma ipilimumab and nivolumab \(weight based dosing\) SUPERSEDED](#)

Treatment schedule - Overview

Cycle 1 to 17

Drug	Dose	Route	Day
Nivolumab	360 mg	IV infusion	1 and 22
Ipilimumab	1 mg/kg	IV infusion	1

Frequency: 42 days

Cycles: 17 or until disease progression or unacceptable toxicity for up to 2 years

Notes:

- In clinical trials patients could be treated after progression, provided that they had a clinical benefit and did not have substantial adverse effects, as assessed by the investigator.
- In the first few months after the start of immunotherapy, some patients can experience transient tumour flare (termed "pseudo progression" or an immune response). This may manifest as growth of existing lesions or the development of new lesions prior to later tumour regression. While this is rare (~5%), continuing treatment and performing a second scan 4 to 6 weeks later to confirm progression may be considered, particularly if the patient remains well.
- Radiation recall has been observed with PD1 inhibitors, consideration should be given to the timing when starting this treatment after a prolonged course of radiation therapy.

Drug status: Ipilimumab and nivolumab are [PBS authority](#)

Cost: ~ \$23,730 per cycle

Treatment schedule - Detail

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

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

Cycle 1 to 17

Day 1		
Nivolumab	360 mg (IV infusion)	in 50 mL to 100 mL sodium chloride 0.9% over 30 minutes
Ipilimumab	1 mg/kg (IV infusion)	in 50 mL sodium chloride 0.9% over 30 minutes *
Day 22		
Nivolumab	360 mg (IV infusion)	in 50 mL to 100 mL sodium chloride 0.9% over 30 minutes

* Wait for 30 minutes after the completion of nivolumab before commencing ipilimumab.¹

Frequency: 42 days

Cycles: 17 or until disease progression or unacceptable toxicity for up to 2 years

Indications and patient population

Indications:

- First line treatment of unresectable malignant pleural mesothelioma
 - ECOG performance status 0 or 1.

Exclusions:

- Patients with primitive peritoneal, pericardial, tunica vaginalis, or testis mesothelioma.
- Prior immune checkpoint inhibitor therapy.

Precautions:

If any of these conditions are present, clinical judgement should be used and individual cases discussed with an expert in the field as indicated:

- significant autoimmune disease (e.g. myasthenia gravis, inflammatory bowel disease, systemic lupus erythematosus, rheumatoid arthritis, autoimmune ocular disease)
- organ transplantation
- previous history of viral hepatitis
- HIV/acquired immune deficiency syndrome (AIDS)
- pre-existing deranged liver function tests (this is not predictive of ipilimumab toxicity but extra attention should be applied)
- in patients with asymptomatic or treated brain metastases, clinical judgement should be used and individual cases discussed with an expert in the field
- previous radiation to the lungs
- symptomatic interstitial lung disease.

Clinical information

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](#)

Emetogenicity MINIMAL	<p>No antiemetics should be routinely administered before treatment in patients without a history of nausea and vomiting. If patients experience nausea and/or vomiting, consider using the low antiemetic prophylaxis regimen.</p> <p>Read more about preventing anti-cancer therapy induced nausea and vomiting</p>
Immune-related adverse events (irAEs)	<p>Immune-related adverse events (irAEs) can occur early and escalate quickly in patients receiving immune checkpoint inhibitors. irAEs can also occur after discontinuation of treatment. These events occur at higher frequencies and earlier when nivolumab is administered in combination with ipilimumab when compared to monotherapy. Fatalities have been reported. Management of irAEs is largely based on expert opinion and consensus guidelines.</p> <p>Examples of irAEs with high risk of mortality include:</p> <ul style="list-style-type: none"> • cardiac toxicity: myocarditis • musculoskeletal toxicity: myositis • neurological toxicity: encephalitis, Guillain-Barré syndrome, myelitis, myasthenia gravis • pulmonary toxicity: pneumonitis • skin toxicity: Steven-Johnson syndrome, toxic epidermal necrolysis. <p>Examples of irAEs in order of frequency include:</p> <ul style="list-style-type: none"> • Common <ul style="list-style-type: none"> ◦ endocrinopathies: thyroid dysfunction ◦ gastrointestinal toxicity: diarrhoea ◦ musculoskeletal toxicity: arthralgia, myalgia ◦ skin toxicity: rash, erythema, pruritus • Less common <ul style="list-style-type: none"> ◦ endocrinopathies: hypophysitis, type I diabetes mellitus ◦ gastrointestinal toxicity: colitis ◦ musculoskeletal toxicity: inflammatory arthritis ◦ ocular toxicity: dry eye ◦ renal toxicity ◦ skin toxicity: vitiligo • Rare <ul style="list-style-type: none"> ◦ endocrinopathies: primary adrenal insufficiency ◦ gastrointestinal toxicity: pancreatitis ◦ haematological toxicity ◦ musculoskeletal toxicity: vasculitis ◦ ocular toxicity: uveitis, iritis. <p>Proactive monitoring, patient self-monitoring and early reporting of adverse events is critical. Treatment interruptions/discontinuation, consultation with specialist and administration of corticosteroids and/or supportive care is required to minimise the risk of death.</p> <p>Read more about the management of immune-related adverse events (irAEs)</p>
Baseline investigations	<p>Consider ECG and troponin at baseline. There is no clear evidence regarding the efficacy/value of baseline ECG or troponin in patients receiving immune checkpoint inhibitor therapy. Some cancer specialists obtain baseline testing, and others continue this through the initial period of therapy. Consider urinalysis at baseline, particularly in patients with additional risk factors for developing immune-related acute kidney injury.</p>
Blood tests	<p>FBC, EUC, eGFR, LFTs, serum cortisol, TFTs and BSL at baseline.</p> <p>Repeat FBC, EUC, eGFR, LFTs and BSL prior to each treatment and serum cortisol and TFTs prior to each cycle. Check lipase and amylase if symptomatic of pancreatitis.</p> <p>In the absence of suspicion of immune-related adverse events less frequent monitoring may be applicable, according to institutional guidelines. Evidence for the frequency of routine blood testing with immunotherapies varies within published studies and guidelines.</p> <p>Read more about immunotherapy blood test monitoring recommendations.</p>

Hepatitis and HIV	<p>Hepatitis screening is recommended in all patients who are to receive immune checkpoint inhibitors.</p> <p>Immunotherapy is associated with inflammatory adverse reactions resulting from increased or excessive immune activity and patients are at risk of developing autoimmune hepatitis. It should be used with caution in patients who have a history of chronic hepatic infections (hepatitis B and C), detectable human immunodeficiency virus (HIV) viral load or acquired immune deficiency syndrome (AIDS).</p>
Vaccinations	<p>The safety of having vaccinations during treatment is unknown. Patients in the clinical trials were typically allowed to receive inactivated and recombinant vaccines but not live vaccines.</p> <p>Caution: in patients receiving combination ipilimumab and nivolumab there have been reported cases of fatal myocarditis, myositis and rhabdomyolysis shortly after administration of the influenza vaccine. Whilst a causative relationship to the use of influenza vaccine has not been demonstrated, caution is advised.</p> <p>Read more about COVID-19 vaccines and cancer.</p>
Effects of cancer treatment on fertility	<p>Studies to evaluate the effects of immune checkpoint inhibitor therapy on fertility have not been performed. Therefore, the effect on male and female fertility is unknown. Limited evidence supports that immune checkpoint inhibitor-related hypogonadism due to orchitis and hypophysitis can impact fertility. Immune checkpoint inhibitors can cause fetal harm when given to pregnant women. A pregnancy test should be considered 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. There is very limited evidence to provide guidance regarding contraception timelines. Some studies have demonstrated PD-1 receptor occupancy for greater than 9 months after anti-PD-1 therapy (Brahmer et al., 2010). As a result, some cancer specialists advise using contraception for at least six months or even as long as two years after treatment finishes.</p> <p>Read more about the effect of cancer treatment on fertility</p> <p>Link to Brahmer et al., 2010</p>

Dose modifications

- Dose reduction is not recommended
- No dose adjustment is required in the elderly, mild or moderate renal impairment or mild hepatic impairment. Immune checkpoint inhibitors have not been studied in patients with severe renal impairment or moderate to severe hepatic impairment
- When nivolumab is administered in combination with ipilimumab, if either agent is withheld, the other agent should also be withheld. If dosing is resumed after a delay, clinical judgement and/or discussion with an expert in the field is advisable to decide whether the patient should be rechallenged with combination treatment or monotherapy with nivolumab

Management of immune-related adverse events (irAEs)

Link to [Management of immune-related adverse events \(irAEs\)](#)

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](#)

Ipilimumab		
	Interaction	Clinical management
Immunosuppressants (inc. corticosteroids)	Reduced efficacy of both immunosuppressants and ipilimumab possible due to pharmacodynamic interaction	It is recommended that patients requiring corticosteroids prior to treatment receive the lowest possible dose (preferably no greater than 10 mg prednisolone or equivalent steroid per day). Once started on ipilimumab the use of corticosteroids to treat immune related adverse events (irAEs) does not appear to impact the clinical response to ipilimumab. In patients requiring ongoing corticosteroids post management of an irAE, the dose should be as low as possible. Monitor for signs of organ rejection in transplant recipients.
Vemurafenib (for melanoma)	Increased risk of hepatotoxicity	Combination not recommended outside of a clinical trial
Nephrotoxic drugs (e.g. aminoglycosides, amphotericin, contrast dye, frusemide, NSAIDs)	Additive nephrotoxicity	Avoid combination or monitor kidney function closely

Nivolumab		
No formal pharmacokinetic drug interaction studies have been conducted with nivolumab.		
	Interaction	Clinical management
Immunosuppressants (inc. corticosteroids)	Reduced efficacy of both immunosuppressants and nivolumab possible due to pharmacodynamic interaction	It is recommended that patients requiring corticosteroids prior to treatment receive the lowest possible dose (preferably no greater than 10 mg prednisolone or equivalent steroid per day). Once started on nivolumab the use of corticosteroids to treat immune related adverse events (irAEs) does not appear to impact the clinical response to nivolumab. In patients requiring ongoing corticosteroids post management of an irAE, the dose should be as low as possible. Monitor for signs of organ rejection in transplant recipients.
Nephrotoxic drugs (e.g. aminoglycosides, amphotericin, contrast dye, frusemide, NSAIDs)	Additive nephrotoxicity	Avoid combination or monitor kidney function closely

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: 2 hours

Handling of monoclonal antibodies and waste management

Safe administration

Immunotherapy patient assessment prior to each treatment.

Any toxicity may require delay of treatment and review by medical officer before commencing treatment.

Prime IV line(s).

Insert IV cannula or access [TIVAD](#) or [CVAD](#).

Pre treatment medication

Administer antiemetics if required

🕒 Treatment - Time out

Nivolumab

Administer nivolumab:

- a low protein binding 0.2 micron or 1.2 micron inline filter should be used
- via IV infusion over 30 minutes
- observe for infusion-related reactions
- flush with 50 mL of sodium chloride 0.9%.

Mild or moderate infusion-related reaction:

- decrease the rate of infusion and monitor closely
- give any further doses with close monitoring
- premedication with paracetamol and an antihistamine should be considered for further doses.

Severe infusion-related reaction:

- stop infusion immediately
- medical officer review.

Wait for 30 minutes after the completion of nivolumab before commencing ipilimumab.

Ensure a separate filter is used for ipilimumab.

Ipilimumab

Administer ipilimumab:

- a low protein binding 0.2 micron or 1.2 micron inline filter should be used
- via IV infusion over 30 minutes
- observe for infusion-related reactions
- flush with 50 mL of sodium chloride 0.9%

Mild or moderate infusion-related reaction:

- decrease the rate of infusion and monitor closely
- give any further doses with close monitoring.
- premedication with paracetamol and an antihistamine should be considered for further doses.

Severe infusion-related reaction:

- stop infusion immediately
- medical officer review.

Remove IV cannula and/or deaccess [TIVAD](#) or [CVAD](#).

Day 22

Approximate treatment time: 60 minutes

Handling of monoclonal antibodies and waste management

Safe administration

Immunotherapy patient assessment prior to each treatment.

Any toxicity may require delay of treatment and review by medical officer before commencing treatment.

Prime IV line(s).

Insert IV cannula or access [TIVAD](#) or [CVAD](#).

Pre treatment medication

Administer antiemetics if required

🕒 Treatment - Time out

Nivolumab

Administer nivolumab:

- a low protein binding 0.2 micron or 1.2 micron inline filter should be used
- via IV infusion over 30 minutes
- observe for infusion-related reactions
- flush with 50 mL of sodium chloride 0.9%.

Mild or moderate infusion-related reaction:

- decrease the rate of infusion and monitor closely
- give any further doses with close monitoring
- premedication with paracetamol and an antihistamine should be considered for further doses.

Severe infusion-related reaction:

- stop infusion immediately
- medical officer review.

Remove IV cannula and/or deaccess [TIVAD](#) or [CVAD](#).

Discharge information

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.

The most common side effects with this treatment are immune-related adverse events (irAEs). irAEs can escalate quickly and close monitoring of the patient is required. Symptoms should improve promptly after the introduction of immunosuppressive therapy. If this does not occur review the diagnosis and seek further specialist advice. Refer to the [Management of immune related adverse events](#) document for further information.

Immune related adverse events	
Cardiotoxicity	<p>Cardiotoxicity is a rare but serious side effect, which may manifest as asymptomatic reduction in left ventricular ejection fraction (LVEF), arrhythmia, cardiomyopathy, myocarditis, pericarditis, cardiac fibrosis, hypertension, cardiac ischaemia, congestive heart failure (CHF) and cardiac arrest.</p> <p>Read more about Management of immune related adverse events.</p>
Gastrointestinal toxicity	<p>Colitis, diarrhoea or more bowel movements than usual; blood or mucous in stools; dark, tarry, sticky stools; abdominal pain or tenderness.</p> <p>Read more about Management of immune related adverse events</p>
Haematological toxicity	<p>Autoimmune haemolytic anaemia (AIHA), acquired thrombotic thrombocytopenic purpura (TTP), aplastic anaemia (AA), immune thrombocytopenia (ITP), acquired haemophilia (AH), haemolytic uremic syndrome (HUS) and lymphopenia are rare but potentially serious immune-related adverse events associated with immunotherapy treatment.</p> <p>Read more about Management of immune related adverse events.</p>
Hepatotoxicity	<p>Transaminase and total bilirubin elevation, jaundice, severe nausea or vomiting, pain on the right side of the abdomen, drowsiness, dark urine, bleeding or bruising more easily than normal, anorexia.</p> <p>Read more about Management of immune related adverse events.</p>
Musculoskeletal toxicity	<p>Inflammatory arthritis, temporal arteritis, arthralgia, myalgia, synovitis, vasculitis, polymyalgia-like syndrome and myositis.</p> <p>Read more about Management of immune related adverse events.</p>
Neurological toxicity	<p>Aseptic meningitis, myasthenia gravis, Guillain-Barre syndrome, encephalitis, meningeal symptoms, optic neuritis, neuropathy and acute inflammatory demyelinating polyneuropathy are infrequent but potentially serious immune-related adverse events associated with immunotherapy treatment.</p> <p>Read more about Management of immune related adverse events.</p>
Ocular toxicity	<p>Eye pain, blurred vision, Uveitis/iritis, episcleritis, blepharitis, optic neuritis, tear duct stenosis, conjunctivitis, hyperlacrimation, watery or dry eyes and photophobia.</p> <p>Read more about Management of immune related adverse events.</p>
Other endocrinopathies	<p>Type 1 diabetes mellitus, hypophysitis, hypopituitarism and adrenal insufficiency are infrequent but potentially serious immune-related adverse events associated with immunotherapy treatment.</p> <p>Read more about Management of immune related adverse events</p>
Pulmonary toxicity	<p>Radiographic changes, dyspnoea, new or worsening cough, hypoxia, tachycardia, chest pain or fever.</p> <p>Read more about Management of immune related adverse events.</p>
Renal toxicity	<p>Increase in serum creatinine, oliguria, haematuria, peripheral oedema and anorexia.</p> <p>Read more about Management of immune related adverse events.</p>
Skin toxicity	<p>Rash including full thickness, pruritus, skin blisters, ulceration and necrosis. Radiation recall can occur at site of previous radiation therapy. Symptoms include vesiculation, desquamation and ulceration of the skin.</p> <p>Read more about Management of immune related adverse events</p>
Thyroid toxicity	<p>Thyroid toxicity is common with immune checkpoint inhibitors. Hypothyroidism is most frequent however hyperthyroidism can also occur.</p> <p>Read more about Management of immune related adverse events</p>

Non-immune related adverse events	
Nausea and vomiting	Read more about prevention of treatment induced nausea and vomiting
Anorexia	Loss of appetite accompanied by decreased food intake. Read more about anorexia
Fatigue	Read more about fatigue
Headache	

Evidence

The evidence supporting this protocol is provided by a phase III multicentre international open-label randomised trial (CheckMate 743) involving 605 patients comparing nivolumab plus ipilimumab with pemetrexed plus cisplatin or carboplatin in patients with previously untreated unresectable malignant pleural mesothelioma.²

Between November 2016 and April 2018, 605 patients were randomised in a 1:1 ratio. 303 patients were randomised to nivolumab (3 mg/kg, every 2 weeks) plus ipilimumab (1 mg/kg, every 6 weeks) for up to two years. 302 patients were randomised to pemetrexed 500 mg/m² plus either cisplatin 75 mg/m² or carboplatin AUC 5, every 3 weeks for up to 6 cycles.²

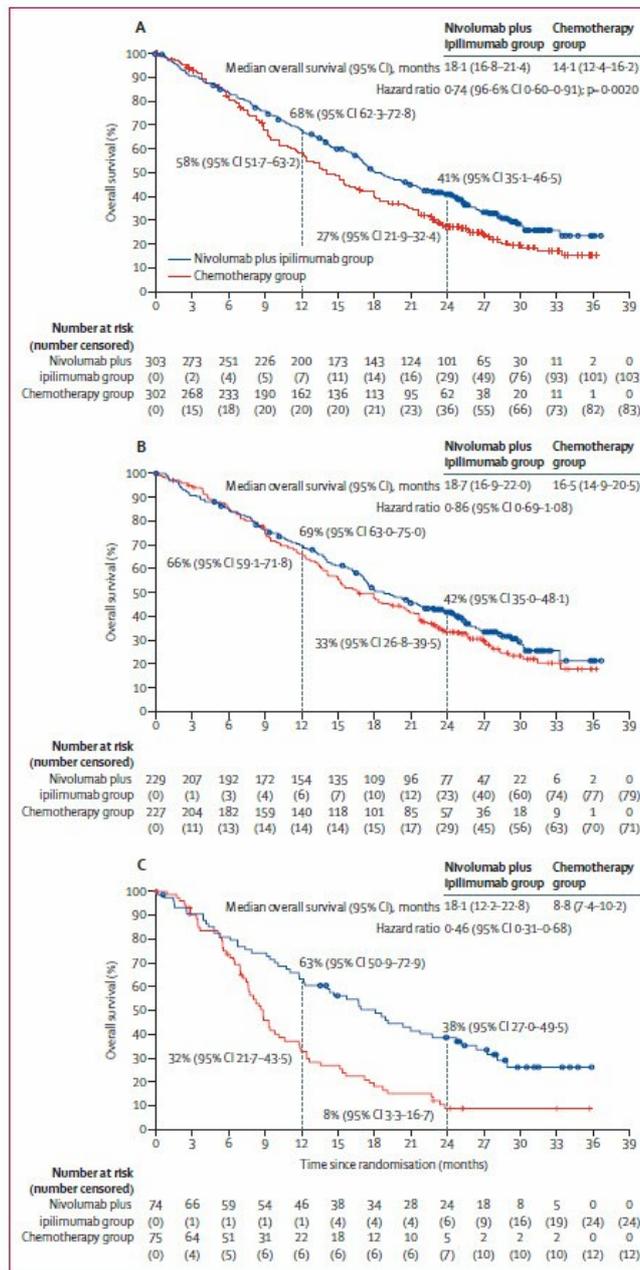
The primary endpoint was overall survival (OS). Secondary endpoints were progression-free survival (PFS), objective response rate (ORR), time to response, duration of response, disease control rate; and OS, PFS and ORR by PD-L1 expression. Exploratory endpoints included safety and tolerability.²

The evidence for flat dosing of nivolumab at 360 mg every 3 weeks in combination with ipilimumab 1 mg/kg every 6 weeks comes from a pharmacokinetic (PK) modelling study presented at ESMO 2021 and yet to be published.³ The study used population PK modelling and simulation to compare nivolumab plus ipilimumab PK exposures along with the clinical safety of the regimen using data from the CheckMate 743 trial.² Model-predicted mean probabilities for OS and grade ≥ 2 immune-mediated adverse events were comparable between the weight based and flat dosing regimens. Further support for the use of nivolumab flat dosing in first line treatment of mesothelioma is provided by the drug evaluation conducted by Hotta et al.⁴ Of note this treatment schedule is also recommended as a preferred first-line systemic therapy in the NCCN guidelines.⁵

Efficacy

After a median follow up of 29.7 months, median OS was 18.1 months (95% CI 16.8 to 21.4) in the nivolumab plus ipilimumab arm versus 14.1 months (95% CI 12.4 to 16.2) in the chemotherapy arm (HR= 0.74, 96.6% CI 0.60 to 0.91; p=0.002).² The median OS in nivolumab plus ipilimumab group was reasonably consistent across subgroups, including by histology (non-epithelioid: 18.1 months, 95% CI 12.2 to 22.8 vs. epithelioid: 18.7 months, 95% CI 16.9 to 22.0) and tumour PD-L1 expression (tumours with PD-L1 expression of $\geq 1\%$: 18.0 months, 95% CI 16.8 to 21.5 vs. tumours with PD-L1 expression of $< 1\%$: 17.3 months, 95% CI 10.1 to 24.3). However, nivolumab plus ipilimumab showed better efficacy compared to chemotherapy in non-epithelioid subtype (HR=0.46, 95% CI 0.31 to 0.68 vs. HR=0.86, 95% CI 0.69 to 1.08 for epithelioid subtype) and tumours with PD-L1 expression of $\geq 1\%$ (HR=0.69, 95% CI 0.55 to 0.87 vs. HR=0.94, 95% CI 0.62 to 1.40 in patients with expression $< 1\%$), primarily due to inferior effect of chemotherapy in these subgroups.²

Kaplan-Meier curves for overall survival in all patients (A), patients with epithelioid (B) and non-epithelioid (C) tumour histology²



© Lancet 2021

Summary of secondary endpoints analysis²

Secondary endpoint	Nivolumab + ipilimumab	Chemotherapy
Median PFS (months, 95% CI)	6.8 (5.6 to 7.4)	7.2 (6.9 to 8.0)
	HR=1.00 (95% CI 0.82 to 1.21)	
ORR (% , 95% CI)	40 (34.1 to 45.4)	43 (37.1 to 48.5)
Median time to response (months, IQR)	2.7 (1.45 to 3.27)	2.5 (1.41 to 3.02)
Median duration of response (months, 95% CI)	11 (8.1 to 16.5)	6.7 (5.3 to 7.1)
Disease control rate (% , 95% CI)	77 (71.4 to 81.2)	85 (80.6 to 88.9)

Toxicity

Treatment-related adverse events were reported in 79% of patients receiving nivolumab plus ipilimumab and 82% of those receiving chemotherapy. Grade 3-4 toxicities were similar in both groups (30% in nivolumab plus ipilimumab, and 32% in chemotherapy group). The most common serious adverse event experienced with nivolumab plus ipilimumab regimen was colitis.²

Treatment discontinuation due to adverse events occurred in 23% of patients in the nivolumab plus ipilimumab group vs 16% in the chemotherapy group. There were 3 treatment-related deaths (1% of total deaths) in the nivolumab plus ipilimumab arm (pneumonitis, encephalitis, and heart failure) and 1 treatment-related death (<1% of total deaths) in the comparator arm (myelosuppression).²

Treatment-related adverse events²

	Nivolumab plus ipilimumab group (n=300)			Chemotherapy group (n=284)		
	Grade 1-2	Grade 3	Grade 4	Grade 1-2	Grade 3	Grade 4
Any	148 (49%)	79 (26%)	12 (4%)	141 (50%)	73 (26%)	18 (6%)
Diarrhoea	52 (17%)	10 (3%)	0	19 (7%)	2 (1%)	0
Pruritus	46 (15%)	3 (1%)	0	1 (<1%)	0	0
Rash	40 (13%)	3 (1%)	0	15 (5%)	0	0
Fatigue	38 (13%)	3 (1%)	0	50 (18%)	5 (2%)	0
Hypothyroidism	32 (11%)	0	0	0	0	0
Nausea	29 (10%)	1 (<1%)	0	97 (34%)	7 (2%)	0
Anaemia	5 (2%)	1 (<1%)	0	70 (25%)	32 (11%)	0
Decreased appetite	27 (9%)	2 (1%)	0	48 (17%)	2 (1%)	0
Constipation	12 (4%)	0	0	41 (14%)	1 (<1%)	0
Vomiting	8 (3%)	0	0	35 (12%)	6 (2%)	0
Asthenia	25 (8%)	0	0	32 (11%)	12 (4%)	0
Increased lipase	7 (2%)	11 (4%)	2 (1%)	0	1 (<1%)	0
Colitis	3 (1%)	7 (2%)	0	1 (<1%)	1 (<1%)	0
Increased amylase	10 (3%)	6 (2%)	1 (<1%)	1 (<1%)	0	0
Thrombocytopenia	0	2 (1%)	0	16 (6%)	4 (1%)	6 (2%)
Neutropenia	0	1 (<1%)	1 (<1%)	28 (10%)	31 (11%)	12 (4%)

Data are n (%). Safety was assessed in all patients who received at least one dose of study drug. Treatment-related adverse events with an incidence of $\geq 10\%$ in any group or grade 3 or 4 severity with an incidence of $\geq 2\%$ in any group are shown. All grade 3 and 4 events are listed in the appendix (pp 13-16). Treatment-related adverse events included those reported between the first dose of study drug and 30 days after the last dose of study drug. *Only events that led to death within 24 h were documented as grade 5 and reported as deaths. Events leading to death >24 h after onset are reported with the worst grade before death.

Table 3: Summary of treatment-related adverse events in all treated patients*

© Lancet 2021

References

- 1 Larkin, J., V. Chiarion-Sileni, R. Gonzalez, et al. 2015. "Combined Nivolumab and Ipilimumab or Monotherapy in Untreated Melanoma." *N Engl J Med* 373(1):23-34.
- 2 Baas, P., A. Scherpereel, A. K. Nowak, et al. 2021. "First-line nivolumab plus ipilimumab in unresectable malignant pleural mesothelioma (CheckMate 743): a multicentre, randomised, open-label, phase 3 trial." *Lancet* 397(10272):375-386.
- 3 Tsao, A., P. Baas; A. Nowak et al. 2020. Evaluation of flat dosing for nivolumab + ipilimumab in first-line unresectable malignant pleural mesothelioma: CheckMate 743. *Annals of Oncology* (2020) 31 (suppl_7): S1441-S1451. [10.1016/annonc/annonc392](https://doi.org/10.1016/annonc/annonc392)
- 4 Hotta, K., N. Fujimoto, T. Kozuki, et al. 2020. "Nivolumab for the treatment of unresectable pleural mesothelioma." *Expert Opin Biol Ther* 20(2):109-114.
- 5 NCCN Clinical Practice Guidelines in Oncology - Malignant Pleural Mesothelioma - NCCN Evidence Blocks™ - Version 2.2021

History

Version 2

Date	Summary of changes
13/04/2022	Protocol updated based on the consensus gained at the immunotherapy reference committee meeting held on 4 th of March 2022. The following changes have been made across all immune checkpoint inhibitor protocols:

Date	Summary of changes
	<ul style="list-style-type: none"> Clinical information- general irAEs, hepatitis and HIV, and fertility blocks updated. Individual irAE-related blocks removed. New block (baseline investigations) added. Patient information- pregnancy and breastfeeding block in general advice section updated. <p>Version number increased to V.2.</p>
20/05/2022	Protocol reviewed electronically by Medical Oncology Reference Committee. No change. Next review in 2 years.
21/11/2022	Blood test clinical information updated to include "Repeat FBC, EUC, LFTs and BSL prior to each treatment".

Version 1

Date	Summary of changes
30/08/2021	New protocol approved by Medical Oncology Reference Committee. Review in 1 year.

The information contained in this protocol is based on the highest level of available evidence and consensus of the eviQ reference committee regarding their views of currently accepted approaches to treatment. Any clinician (medical oncologist, haematologist, radiation oncologist, medical physicist, radiation therapist, pharmacist or nurse) seeking to apply or consult this protocol is expected to use independent clinical judgement in the context of individual clinical circumstances to determine any patient's care or treatment. While eviQ endeavours to link to reliable sources that provide accurate information, eviQ and the Cancer Institute NSW do not endorse or accept responsibility for the accuracy, currency, reliability or correctness of the content of linked external information sources. Use is subject to eviQ's disclaimer available at www.eviQ.org.au

First approved: 30 August 2021

Last reviewed: 20 May 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/4013>

09 Aug 2023

Patient information - Mesothelioma - Ipilimumab and nivolumab - flat dosing

Patient's name:

Your treatment

It is important to understand that ipilimumab and nivolumab are not traditional chemotherapy drugs and have a different way of working. They are immunotherapy treatments (also called anticancer drugs) that work with your immune system to detect and destroy cancer cells. Immunotherapy can potentially affect any organ of the body.

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

Ipilimumab and nivolumab

This treatment cycle is repeated every 42 days. You will have up to 2 years of treatment with nivolumab (every 3 weeks) and ipilimumab (every 6 weeks).

Day	Treatment	How it is given	How long it takes
1	Nivolumab (<i>nee-vol-u-mab</i>)	By a drip into a vein	About 2 hours
	Ipilimumab (<i>ipi-lim-u-mab</i>)		
22	Nivolumab	By a drip into a vein	About 60 minutes

Prior to your treatment tell your doctor if you are taking any other medicines (e.g. corticosteroids, immunosuppressive therapy), have or ever had chronic liver infections e.g. hepatitis B (HBV) or C (HCV), human immunodeficiency virus (HIV) or an organ transplant.

When to get help



It is important that you tell your doctor or nurse immediately if you develop any of the symptoms listed below in the side effects section. If you can't contact your doctor or nurse, go to your nearest hospital Emergency Department for help.

Emergency contact details

Ask your doctor or nurse from your treating team who to contact if you have a problem

Daytime:

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
- 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

Treatment delays

There may 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. Your doctor will explain if you need any 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

- **Steroids:** you may be given some steroid tablets to help reduce immune-related side effects. Your doctor or nurse will tell you how and when to take the steroids. You may need to monitor your blood sugar levels closely while you are taking steroids. If you have diabetes, your diabetic medication may need to be adjusted because of the effects of steroids. Speak to your diabetes advisor.

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.

Immunotherapy may cause serious immune reactions against your own body. These are called immune-related adverse events. They may occur during your treatment, or after your treatment has ended. Immunotherapy can affect many parts of your body. Some side effects can cause severe or life threatening conditions, so even mild side effects must be reported immediately. Do not try to treat these symptoms yourself without talking to your doctor or nurse first. You will be given an information pack at the start of your treatment. This contains an alert card which you should carry with you at all times. Bring this alert card with you to hospital, especially if you are unwell or attending the emergency department.

Immune related side effects

Heart problems

- You may get:
 - chest pain or tightness
 - shortness of breath
 - swelling of your ankles
 - an abnormal heartbeat.
- Heart problems are uncommon but potentially fatal. If heart problems were to occur, symptoms usually start within the first 3 months of treatment, but can happen at any time even after the treatment has finished.
- 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.**

Bowel and stomach inflammation	<ul style="list-style-type: none"> • You may get: <ul style="list-style-type: none"> ◦ bowel motions (stools, poo) that are more frequent or more liquid (diarrhoea) ◦ blood or mucous in your stool ◦ dark, tarry, or sticky bowel motions ◦ bloating, cramping, pain or tenderness in your stomach area. • Inform your doctor or nurse immediately if you get diarrhoea • Take your anti-diarrhoeal or steroid medication as directed by your doctor. • Drink plenty of fluids (unless you are on a fluid restriction). • Eat and drink small amounts more often. • Avoid spicy foods, dairy products, high fibre foods, and coffee. • Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if your diarrhoea is not controlled despite taking anti-diarrhoea medicine, severe stomach pains and bloating, and/or if you feel dizzy or light-headed.
Blood problems	<ul style="list-style-type: none"> • Blood problems are infrequent but can be serious. • You may feel dizzy, light-headed, tired, weak and appear more pale than usual. • You may get: <ul style="list-style-type: none"> • dark, tarry bowel motions (stools, poo) • blood in your urine or not urinating as often • dark-coloured urine • yellowing of the whites of your eyes, and/or your skin • pinpoint red spots on your skin • unexplained bleeding • major bruising • a fever • shortness of breath • a severe headache • confusion • faster heartbeat than normal • Tell your doctor or nurse immediately or go to the nearest hospital Emergency Department if it has been longer than 12 hours since you have emptied your bladder or if you get any of the symptoms listed above.
Liver damage	<ul style="list-style-type: none"> • You may get: <ul style="list-style-type: none"> ◦ fatigue ◦ severe nausea and vomiting ◦ weight loss ◦ bruising or bleeding more easily ◦ pain or tenderness on the right side of your stomach area ◦ dark coloured urine ◦ yellowing of the whites of your eyes and/or your skin ◦ itchy skin ◦ drowsiness • You will have regular blood tests to check how well your liver is working. • Take your steroid medication as directed by your doctor. • Tell your doctor or nurse as soon as possible if you notice that your urine is a dark colour, the whites of your eyes or skin look yellow, if you have unexplained bruising or bleeding or if you have severe stomach pain.
Muscle and joint problems	<ul style="list-style-type: none"> • You may get: <ul style="list-style-type: none"> • muscle or joint stiffness, especially after a period of rest • muscle weakness • pain in your muscles or joints • joint swelling • tiredness • headaches • Take your pain relief or steroid medication as directed by your doctor. • Tell your doctor or nurse as soon as possible if you get any of the symptoms listed above.

<p>Nervous system problems</p>	<ul style="list-style-type: none"> • Nervous system changes are rare, but can be serious. • You may get: <ul style="list-style-type: none"> ◦ headaches ◦ fever ◦ stiff neck ◦ confusion or difficulty concentrating ◦ dizziness or drowsiness ◦ loss of consciousness ◦ muscle weakness or pain ◦ numbness or tingling in your hands or feet ◦ jerky movements. • Take your steroid medication as directed by your doctor. • Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the symptoms listed above.
<p>Eye problems</p>	<ul style="list-style-type: none"> • You may get: <ul style="list-style-type: none"> ◦ eye pain ◦ itchy eyes ◦ red or swollen eyes ◦ blurred or change in vision ◦ change in colour vision ◦ watery or gritty eyes ◦ dry eyes ◦ sensitivity to light. • Protect your eyes from the weather (sun and wind) by wearing sunglasses. • Use your eye drops or take your steroid medication as directed by your doctor. • Tell your doctor or nurse as soon as possible if you get any of the symptoms listed above.
<p>Hormone problems</p>	<ul style="list-style-type: none"> • Hormone changes are infrequent, but can be serious. • You may get: <ul style="list-style-type: none"> ◦ headaches ◦ tiredness, dizziness or fainting ◦ abnormal heartbeat (faster than usual) ◦ a feeling of being hot or cold more easily ◦ excessive sweating ◦ weight changes ◦ a deepened voice ◦ irregular or absent periods ◦ nausea and vomiting ◦ thirsty and need to urinate more often than normal ◦ high blood sugar levels ◦ pain in your stomach area ◦ muscle pain or weakness ◦ difficulty sleeping ◦ agitated more easily ◦ changes in your mood or behaviour, such as decreased sex drive or irritability. • Take your hormone or steroid medication as directed by your doctor. • Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you feel confused, weak, dizzy, or faint, or get sudden pain in your lower back or legs.

<p>Lung problems</p>	<ul style="list-style-type: none"> • You may get: <ul style="list-style-type: none"> ◦ shortness of breath ◦ difficulty breathing ◦ faster heartbeat than normal ◦ chest pain ◦ new or worsening cough ◦ fever. • Your doctor will monitor how well your lungs are working during your treatment. • Take your steroid medication as directed by your doctor. • Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have chest pain or become short of breath.
<p>Kidney damage</p>	<ul style="list-style-type: none"> • This treatment can cause changes to how your kidneys work. • You may get: <ul style="list-style-type: none"> ◦ a feeling of needing to urinate less often than normal ◦ blood in your urine ◦ swollen hands and feet ◦ loss of appetite. • You will have regular blood tests to check how well your kidneys are working. • You may need to drink more fluids while you are having treatment. Your doctor or nurse will tell you if you need to do this. • Take your steroid medication as directed by your doctor. • Tell your doctor or nurse as soon as possible if you notice that your urine changes colour or you don't need to empty your bladder as often.
<p>Skin rash</p>	<ul style="list-style-type: none"> • You may get <ul style="list-style-type: none"> ◦ a red rash ◦ a bumpy rash ◦ dry and itchy skin ◦ skin peeling or blisters. ◦ if you have had previous radiation therapy to an area this effect may be worse • Moisturise your skin with a gentle non-perfumed moisturising cream like sorbolene or aqueous cream. • Avoid scratching your skin. • Avoid wearing tight fitting clothing • Protect your skin from the sun by wearing sun-protective clothing, a wide-brimmed hat, sunglasses and sunscreen of SPF 50 or higher. • Take your antihistamine medication or apply your steroid cream as directed by your doctor. • Tell your doctor or nurse as soon as possible if you notice any changes to the rash like pain or pus forming.

Thyroid problems

Thyroid problems are common with this treatment. The most common problem is an underactive thyroid gland (hypothyroidism), occasionally you may get an overactive thyroid gland (hyperthyroidism).

- If you have an **underactive** thyroid, you may get:
 - fatigue and low energy levels
 - depression
 - slow heart rate
 - unexplained weight gain
 - intolerance to cold temperatures
 - fatigued and aching muscles
 - dry, coarse skin
 - puffy face
 - hair loss
 - constipation
 - problems with concentration
 - changes in your periods
- If you have an **overactive** thyroid, you may get
 - abnormal heartbeat (faster than usual)
 - a feeling of being hot or cold more easily
 - excessive sweating
 - difficulty sleeping
 - anxiety, nervousness or agitated more easily
 - diarrhoea
 - changes in your periods
- You will have regular blood tests to check how well your thyroid is working.
- Take your hormone or steroid medication as directed by your doctor.
- Tell your doctor or nurse if you get any of the symptoms listed above.

Non-immune related side effects

Nausea and vomiting	<ul style="list-style-type: none">• You may feel sick (nausea) or be sick (vomit).• 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.• Anti-sickness medication is usually not needed but may help in some people.• 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.
Appetite loss (anorexia)	<ul style="list-style-type: none">• You may not feel like eating.• Try to avoid drinking fluids at meal times.• Try to eat small meals or snacks regularly throughout the day.• Try to eat food that is high in protein and calories.• If you are worried about how much food you can eat, or if you are losing weight, ask to speak to a dietitian.
Tiredness and lack of energy (fatigue)	<ul style="list-style-type: none">• 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.
Headache	<ul style="list-style-type: none">• 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.

General advice for people having cancer treatment

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 treatments.
- 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.
- Don't have **any** vaccinations without talking to the doctor who is managing your cancer treatment.
- People you live with should be fully vaccinated, 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

- While you are receiving this treatment it is important that you try to maintain a healthy diet.
- 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.

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.

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.

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.

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 Lung Foundation Australia on 1800 654 301

Mesothelioma information

- Asbestos Diseases Foundation of Australia Inc. (ADFA) – adfa.org.au
- Lung Foundation Australia – lungfoundation.com.au
- Lungevity – lungevity.org
- The Lung Cancer Network (formerly the Kylie Johnston Foundation) – lungcancernetwork.com.au/

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

