Pembrolizumab carboplatin nab-paclitaxel EC/AC for early breast cancer

Indication

Triple negative breast cancer (neoadjuvant), stage cT1c N1-2 or cT2-4d N0-2

Regimen details

Drug	Dosage	Route	Frequency
Pembrolizumab	200mg	IV	3-weekly
	Or 395mg	SC	3-weekly
Nab-Paclitaxel	200mg/m²	IV	3-weekly
Carboplatin	AUC5 (Max dose 790mg)	IV	3-weekly
For 4 cycles, followed by:			
Pembrolizumab	200mg	IV	3-weekly
	Or 395mg	SC	3-weekly
Doxorubicin*	60mg/m²	IV	3-weekly
Cyclophosphamide	600mg/m²	IV	3-weekly
For 4 cycles, followed by:			
Pembrolizumab	400mg	IV	6-weekly
	Or 790mg	SC	6-weekly
For a further 5 cycles			

*or epirubicin 90mg/m²

Cycle frequency

As above

Number of cycles

As above

Administration

Pembrolizumab subcutaneous

Inject into the subcutaneous tissue of the thigh or abdomen, avoiding the 5 cm area around the navel. Do not inject into skin that is damaged, sore, bruised, scarred, scaly, or has red patches. Rotate injection sites for subsequent injections.

- Inject 395mg over 1 minute
- Inject 790mg over 2 minutes

Pembrolizumab intravenous

Pembrolizumab is to be given before chemotherapy, via a 0.2µm in-line filter in 100ml 0.9% sodium chloride over 30 minutes

Nab-paclitaxel

Nab-paclitaxel is to be given after pembrolizumab and before carboplatin

Administer nab-paclitaxel via a 15µm filter, do not use 0.2µm in-line filters

Carboplatin

Carboplatin is given in 500ml 5% glucose over 1 hour

Patients must be monitored for infusion reactions

Epirubicin/doxorubicin and cyclophosphamide

Epirubicin/doxorubicin and cyclophosphamide are given into the side port of a fast-flowing drip

Pre-medication

Non routinely given

Emetogenicity

Carboplatin/nab-paclitaxel: moderate
Pembrolizumab alone: minimal

Additional supportive medication

Pegfilgrastim 6mg subcutaneous 24 hours after chemotherapy on cycles 1-8

Extravasation

Pembrolizumab – neutral
Nab-Paclitaxel – vesicant
Carboplatin – irritant
Doxorubicin/epirubicin – vesicant
Cyclophosphamide - neutral

Investigations – pre first cycle

Investigation	Validity period
FBC	14 days
U+E (including creatinine)	14 days
LFT inc AST	14 days
Thyroid function	14 days
Glucose	14 days
Calcium	14 days
Cortisol	Baseline
Luteinising hormone	Baseline
Follicle stimulating hormone	Baseline
Testosterone	Baseline
MUGA/echocardiogram	Before doxorubicin/epirubicin

Investigations –pre subsequent cycles

FBC U&Es and LFTs – before each dose of chemotherapy
Magnesium once a month, random glucose or BM once a month
TFTs every 6 weeks
Consultation every three weeks

Standard limits for administration to go ahead

If blood results not within range, authorisation to administer **must** be given by prescriber/ consultant.

Investigation	Limit
Neutrophil count (day 1)	≥ 1.0 x 10^9/L
Platelet count (day 1)	≥ 100 x 10^9/L
Creatinine clearance	≥ 60 mL/min
Bilirubin	≤ 1.5 x ULN
AST	< 1.5 x ULN

Dose modifications

Haematological toxicity:

Lancashire & South Cumbria Cancer Network
Systemic Anticancer Treatment Protocol

Cycles 1-4
In the event of haematological toxicity, delay day 1 treatment for 7 days

If treatment is delayed for 2 weeks, or if platelets fall below 25, reduce carboplatin dose by 25%

Cycles 5-6
In the event of haematological toxicity, delay day 1 treatment for 7 days

If treatment is delayed for 2 weeks, or if febrile neutropenia occurs, reduce dose of doxorubicin (or epirubicin) and cyclophosphamide by 25%

Non-haematological toxicity:

<table>
<tr><td>Renal</td><td>Carboplatin: review serum creatinine result at each cycle, recalculate carboplatin dose if creatinine has increased by >20%</td></tr>
<tr><td>Hepatic</td><td>
<table>
<tr><td></td><td>Epirubicin/Doxorubicin</td><td>Cyclophosphamide</td></tr>
<tr><td>Bilirubin µmol/L</td><td>Dose</td><td>Dose</td></tr>
<tr><td>24 to 50</td><td>50%</td><td>100%</td></tr>
<tr><td>51 to 85</td><td>25%</td><td>75%</td></tr>
<tr><td>Above 85</td><td>Omit</td><td>Omit</td></tr>
</table>

Nab-Paclitaxel
Reduce dose by 20% if bilirubin 1.5-5x ULN and AST <10x ULN
Discontinue if bilirubin >5x ULN or AST >10x ULN</td></tr>
<tr><td>Peripheral Neuropathy</td><td>NCI-CTC grade 2 peripheral neuropathy withhold nab-paclitaxel only until the neuropathy recovers to grade 1 then reduce dose by 10mg/m2 If NCI-CTC grade 3 peripheral neuropathy occurs, discontinue nab-paclitaxel and proceed to EC part of regimen</td></tr>
<tr><td>Myalgia/Arthralgia</td><td>Often co-exist, usually grade 1 or 2. Manage with reassurance that the condition is self-limiting. NSAIDs may be considered but they may be ineffective</td></tr>
<tr><td>Infusion reactions</td><td>Carboplatin & nab-paclitaxel:
Consult network guidelines for managing hypersensitivity reactions and rechallenge

Pembrolizumab:
Discontinue pembrolizumab in the event of a grade 3 or 4 infusion reaction</td></tr>
<tr><td>Mucositis</td><td>Reduce epirubicin/doxorubicin by 20% in the event of grade 3 or 4 mucositis</td></tr>
</table>

Immunotherapy related toxicities

Immunotherapy toxicities should be aggressively managed as can cause permanent and life-threatening complications. Refer to UKONS and ESMO guidance for treatment of immune related toxicities. Available at:
https://www.healthierlsc.co.uk/canceralliance/chemotherapy-protocols/immunotherapy-toxicity-guidelines

Adverse effects –

for full details consult product literature/ reference texts

Nausea
Alopecia
Anemia
Neutropenia
Fatigue
Diarrhoea
Elevated liver enzymes
Vomiting
Asthenia
Constipation
Rash
Peripheral neuropathy
Infusion reactions
Hypothyroidism
Hyperthyroidism
Skin reaction
Adrenal insufficiency

Significant drug interactions

– for full details consult product literature/ reference texts

Warfarin/coumarin anticoagulants: increased or fluctuating anticoagulant effects. Avoid if possible, consider switching patient to a low molecular weight heparin during treatment or if the patient continues taking an oral anticoagulant monitor the INR at least once a week and adjust dose accordingly.

Phenytoin: requires close monitoring if using concurrently.

Cyclophosphamide
Amiodarone: increased risk of pulmonary fibrosis – avoid if possible
Azathioprine: increased risk of hepatotoxicity
Clozapine: increased risk of agranulocytosis – avoid concomitant use
CYP2B6 and CYP3A4 inhibitors (Nevirapin, Ritonavir): co-administration may reduce the efficacy of cyclophosphamide
Digoxin tablets: reduced absorption – give as liquid form
Indapamide: prolonged leucopenia is possible - avoid
Itraconazole: may increase adverse effects of cyclophosphamide
Grapefruit juice: decreased or delayed activation of cyclophosphamide. Patients should be advised to avoid grapefruit juice for 48 hours before and on day of cyclophosphamide dose

Carboplatin
Aminoglycoside antibiotics: increased risk of nephrotoxicity and ototoxicity
Clozapine: increased risk of agranulocytosis, avoid concomitant use
Diuretics: increased risk of nephrotoxicity and ototoxicity
Nephrotoxic drugs: increased nephrotoxicity; not recommended
Phenytoin: carboplatin reduces absorption and efficacy of phenytoin
Yellow fever vaccine: contraindicated

Nab-Paclitaxel:
Clozapine: increased risk of agranulocytosis.
Paclitaxel is a CYP 2C8/9 and CYP 3A4 substrate. Drug levels may be increased by inhibitors of these enzymes and decreased by inducers of these enzymes.

Additional comments

References

Schmid et al. Pembrolizumab for Early Triple-Negative Breast Cancer N Engl J Med 2020; 382:810-821

THIS PROTOCOL HAS BEEN DIRECTED BY DR HOGG, LEAD ONCOLOGIST FOR BREAST CANCER

RESPONSIBILITY FOR THIS PROTOCOL LIES WITH THE HEAD OF SERVICE

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