

## **BEP 500 (Bleomycin, Etoposide and Cisplatin)**

### **Indication**

First line chemotherapy for good prognosis metastatic germ cell cancer (non-seminoma, combined or seminoma) – **3 cycles**.

First line chemotherapy for intermediate/poor prognosis metastatic germ cell cancer – **4 cycles** (the 5-day schedule is usually preferred for this group).

### **ICD-10 codes**

Codes pre-fixed with C38, C48, C56, C62, C63, C75.3.

### **Regimen details**

#### **BEP 500 3 days**

| <b>Day</b>  | <b>Drug</b> | <b>Dose</b>           | <b>Route</b> |
|-------------|-------------|-----------------------|--------------|
| 1 and 2     | Cisplatin   | 50mg/m <sup>2</sup>   | IV infusion  |
| 1, 2 and 3  | Etoposide   | 167 mg/m <sup>2</sup> | IV infusion  |
| 2, 9 and 16 | Bleomycin   | 30,000 iu             | IV infusion  |

**OR**

#### **BEP 500 5 days**

| <b>Day</b>  | <b>Drug</b> | <b>Dose</b>           | <b>Route</b> |
|-------------|-------------|-----------------------|--------------|
| 1 – 5       | Cisplatin   | 20mg/m <sup>2</sup>   | IV infusion  |
| 1 – 5       | Etoposide   | 100 mg/m <sup>2</sup> | IV infusion  |
| 2, 9 and 16 | Bleomycin   | 30,000 iu             | IV infusion  |

### **Cycle frequency**

21 days

### **Number of cycles**

3 (good prognosis)

4 (intermediate/poor prognosis)

### **Administration**

Cisplatin is administered in 500mL sodium chloride 0.9% over 60 minutes following the pre and post hydration protocol below.

| Infusion Fluid & Additives                                                                                                                                                                                                                                                                                                                                                                                      | Volume                  | Infusion Time             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|
| Sodium Chloride 0.9%                                                                                                                                                                                                                                                                                                                                                                                            | 1000mL                  | 1 hour                    |
| Mannitol 20%                                                                                                                                                                                                                                                                                                                                                                                                    | 200mL                   | 30 minutes                |
| <b>OR</b>                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                           |
| Mannitol 10%                                                                                                                                                                                                                                                                                                                                                                                                    | 400mL                   | 30 minutes                |
| <p><b>Ensure urine output &gt; 100mL / hour prior to giving cisplatin.</b></p> <p>If a patient develops fluid retention i.e. weight gain &gt;2.5kg or urine output &lt; 100ml/ hour during treatment give a single dose of 20mg furosemide or mannitol (200mL mannitol 20% OR 400mL mannitol 10%). Do not give more than a single dose of either furosemide or mannitol without discussing with consultant.</p> |                         |                           |
| Cisplatin                                                                                                                                                                                                                                                                                                                                                                                                       | 500mL                   | 1 hour                    |
| Sodium Chloride 0.9% + 2g MgSO <sub>4</sub> + 20mmol KCl                                                                                                                                                                                                                                                                                                                                                        | 1000mL                  | 2 hours                   |
| <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                    | <b>2700mL or 2900mL</b> | <b>4 hours 30 minutes</b> |

Note: Patients with magnesium or potassium below the normal range should have 2g MgSO<sub>4</sub> and 20mmol KCl added to the pre-hydration bag and the duration of the infusion increased to 2 hours.  
All patients must be advised to drink at least 2 litres of fluid over the following 24 hours.

Etoposide is administered in 1000-2000mL sodium chloride 0.9% (concentration dependent) and infused over a minimum of 1 hour.

Bleomycin is administered in 100-250mL sodium chloride 0.9% over 15 minutes.

### Pre-medication

Hydrocortisone 100mg IV prior to each bleomycin dose (days 2, 9 and 16)

### Emetogenicity

This regimen has severe emetic potential on days 1 to 3 or days 1 to 5 and mild emetic potential on days 9 and 16.

### Additional supportive medication

Consider allopurinol 300mg OD (100mg OD if CrCl < 20mL/min) for patients with a high tumour burden  
H<sub>2</sub> antagonist or proton pump inhibitor if required.

Mouthwashes as per local policy.

Oral magnesium supplementation between cycles in addition to the intravenous magnesium administered at the time of chemotherapy if required as per local magnesium replacement guidelines.

Anti-emetics as per local policy.

GCSF from day 4 (3 day regime) or day 6 (5 day regime) as per local policy.

### Extravasation

Cisplatin is an exfoliant (Group 4)

Etoposide is an irritant (Group 3)

Bleomycin is neutral (Group 1)

**Investigations – pre first cycle**

| Investigation                                         | Validity period           |
|-------------------------------------------------------|---------------------------|
| FBC                                                   | 14 days                   |
| U+E (including creatinine)                            | 14 days                   |
| LFTS                                                  | 14 days                   |
| Magnesium                                             | 14 days                   |
| AFP, HCG, LDH                                         | 14 days (repeat on day 1) |
| LH, FSH and testosterone                              | 28 days                   |
| Pulmonary Functions Tests (including transfer factor) | 28 days                   |
| CXR and chest auscultation                            | 28 day                    |
| Audiology                                             | 28 days                   |

Consider omitting bleomycin if:

- >50 years of age,
- Impaired renal function (creatinine clearance < 50mL/min)
- Pre-existing lung disease and/or significant smoking history

Consider formal EDTA measurement of creatinine clearance in patients with a low body surface area or calculated CrCl  $\leq$  60ml/min renal function.

Where appropriate offer pre-treatment sperm storage.

**Investigations – pre subsequent cycles**

| Investigation              | Validity period                              |
|----------------------------|----------------------------------------------|
| FBC                        | 96 hours (repeat weekly, prior to bleomycin) |
| U+E (including creatinine) | 7 days                                       |
| LFTS                       | 7 days                                       |
| Magnesium                  | 7 days                                       |
| AFP, HCG, LDH              | 7 days (repeat weekly during treatment)      |
| CXR and chest auscultation | 7 days                                       |

**Repeat PFTs if patient describes dyspnoea or persistent dry cough.**

**Repeat audiology if patient reports hearing loss or persistent tinnitus.**

**Standard limits for administration to go ahead**

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

| Investigation   | Limit                      |
|-----------------|----------------------------|
| WBC             | $\geq 1.5 \times 10^9/L^*$ |
| Neutrophils     | $\geq 0.5 \times 10^9/L^*$ |
| Platelets       | $\geq 75 \times 10^9/L^*$  |
| Calculated CrCl | > 60 ml/min                |
| Bilirubin       | < 1.5 x ULN                |
| AST/ALT         | < 2.5 x ULN                |

\*Prior to day 1 only. As bleomycin is not significantly myelosuppressive do not omit day 9 or 16 based on the FBC alone. If patient is unwell eg with neutropenic sepsis discuss with consultant.

If on day 1 WBC <  $1.5 \times 10^9/L$ , neutrophils <  $0.5 \times 10^9/L$  or platelets <  $75 \times 10^9/L$  delay for 3 days and if recovered resume at full doses. If not, repeat FBC every 3 days and start treatment when counts have recovered. If more than 3 days delay discuss with consultant about modifying etoposide to 75% dose. Modifications of cisplatin or bleomycin dose are not usually required for myelosuppression

If doses are reduced for one cycle, each subsequent cycle should be assessed independently based on the FBC on day 1 of that cycle. Dose modifications for myelosuppression are not usually carried forward to the next cycle.

### Dose modifications

#### • Renal impairment

Full dose cisplatin should be administered if calculated CrCl is > 60mL/min. An EDTA creatinine clearance should be arranged if calculated CrCl falls below this value. Discuss with consultant about modifying dose of cisplatin as below or substituting with carboplatin.

| CrCl (mL/min) | Cisplatin dose                                 |
|---------------|------------------------------------------------|
| >60           | 100%                                           |
| 51 – 60       | 75%                                            |
| 40 – 50       | 50%                                            |
| <40           | Discuss with consultant – consider carboplatin |

| CrCl (mL/min) | Bleomycin dose                |
|---------------|-------------------------------|
| >50           | 100%                          |
| 10-50         | 75%                           |
| <10           | 50% - discuss with consultant |

| CrCl (mL/min) | Etoposide dose                |
|---------------|-------------------------------|
| >50           | 100%                          |
| 15-50         | 75%                           |
| <15           | 50% - discuss with consultant |

#### • Hepatic impairment

| Bilirubin (x ULN) |     | AST/ALT (x ULN) | Etoposide dose                                 |
|-------------------|-----|-----------------|------------------------------------------------|
| <1.5              | and | < 2.5           | 100%                                           |
| 1.5-3.0           | or  | 2.5-4.0         | Discuss with consultant – consider 50 - 75%    |
| >3.0              | or  | > 4.0           | Discuss with consultant – consider 25% or omit |

No dose modification required for cisplatin.

No information regarding use of bleomycin in hepatic impairment (consultant decision)

#### • Other toxicities

##### Pulmonary toxicity:

Discuss with consultant if patient develops dry cough or dyspnoea. PFTs should be repeated and consider organising a high resolution CT scan of the chest. If there is a > 25% drop in transfer factor or radiological changes consistent with bleomycin then discuss with consultant about omitting further doses of bleomycin. High concentrations of oxygen (>30%) should be avoided unless absolutely necessary. Patients should be warned that if they have future general anaesthetics they must inform the anaesthetist that they have received bleomycin. They should be advised against scuba diving.

### Adverse effects - for full details consult product literature/ reference texts

#### • Serious side effects

Myelosuppression

Nephrotoxicity

Ototoxicity

Neurotoxicity

Pulmonary toxicity

Infertility

Long term risk of cardiovascular disease and metabolic syndrome

Osteonecrosis of the hip

- **Frequently occurring side effects**

Myelosuppression

Constipation, diarrhoea

Stomatitis, mucositis

Alopecia

Nausea and vomiting

Anorexia

Fever, rigors, malaise (bleomycin)

- **Other side effects**

Electrolyte disturbances

Fatigue

**Significant drug interactions** – for full details consult product literature/ reference texts

**Warfarin/coumarin anticoagulants:** Avoid use due to elevations in INR. Switch to low molecular weight heparin during treatment.

**Antibiotics:** The renal toxicity of cisplatin is potentiated by aminoglycoside antibacterials (e.g. gentamicin) and amphotericin. Aminoglycosides should be avoided. If aminoglycosides are prescribed, close monitoring of renal function and serum antibiotic levels is required.

**Avoid all nephrotoxic drugs where possible**

**Phenylbutazone, sodium salicylate and salicylic acid:** may displace etoposide from plasma protein binding thereby increasing systemic exposure

**Additional comments**

Encourage patients who smoke to stop – offer referral to smoking cessation services.

This regimen may be given as an inpatient or day case according to local practice.

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**References**

- Summary of Product Characteristics Cisplatin (Hospira) accessed 1 July 2015 via [www.medicines.org.uk](http://www.medicines.org.uk)
- Summary of Product Characteristics Etoposide (Hospira) accessed 1 July 2015 via [www.medicines.org.uk](http://www.medicines.org.uk)
- Summary of Product Characteristics Bleomycin (ProStraken) accessed 1 July 2015 via [www.medicines.org.uk](http://www.medicines.org.uk)
- de Wit R, Roberts JT, Wilkinson PM et al. equivalence of 3xBEP versus 4 cycles and of the 5-day schedule versus 3 days per cycle in good-prognosis germ-cell cancer: a randomised study of the European Organisation for Research and Treatment of Cancer Genitourinary Tract Cancer Cooperative Group and the Medical Research Council. J Clin Oncol. 2001 19:1629-1640
- de Wit R, Roberts JT, Wilkinson PM et al. Final analysis demonstrating the equivalence of 3 BEP vs 4 cycles and the 5 day schedule vs 3 days per cycle in good prognosis germ cell cancer. An EORTC/MRC phase III study. Proc Am Soc Clin Oncol. 2000; 19a: 326a (abstract 1281).

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Date: November 2015

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