**DARATUMUMAB MONOTHERAPY**

**INDICATION**

Relapsed/refractory multiple myeloma in patients who have received at least three prior lines of therapy including a proteasome inhibitor (PI) and an immunomodulatory agent and who have demonstrated disease progression/refractoriness with the last therapy.

This regime is funded via **CDF interim Funding**. Requires **Blueteq** Application

**TREATMENT INTENT**

Disease modification

**GENERAL PRE-ASSESSMENT**

1. Ensure all the following staging investigations are done:
   - FBC & film
   - Clotting screen
   - U&E
   - LFTs
   - Calcium
   - Albumin
   - Uric acid
   - CRP
   - Baseline random blood glucose level
   - Virology: EBV, CMV, Hep B, Hep C, HIV serology
   - Consider annual flu and pneumococcal vaccination pre therapy
   - Calculated creatinine clearance (CrCl), urine protein/creatinine ratio
   - Electrophoresis and immunofixation for quantitation of serum paraprotein and immunoglobulins.
   - Serum free light chain assay (Freelite)
   - β2 microglobulin
   - LDH
   - Myeloma FISH should be performed in all patients at diagnosis, and in selected patients at relapse/progression to help guide treatment decisions. Samples should be sent to **Wessex Regional Genetic Laboratory**
   
   Salisbury NHS Foundation Trust
   Salisbury District Hospital
   Salisbury
   Wiltshire, SP2 8BJ
   
   - Urine pregnancy testing for pre-menopausal women younger than 55 before each cycle.
   - Send a "group and save" sample to transfusion and inform patient and transfusion laboratory that patient is due to commence Daratumumab. Patient will require red cell phenotyping as cross match fails due to binding of Daratumumab to red cells.
   - Imaging as per NICE/network guidance and clinical presentation
Additional Investigations

- Plasma viscosity if hyperviscosity suspected
- If allogeneic transplant an option: Tissue typing of patient and siblings and CMV serology

2. Counselling about risks in pregnancy - There are no human data to inform a risk with use of daratumumab during pregnancy. However, Immunoglobulin G1 (IgG1) monoclonal antibodies are transferred across the placenta. Women of child-bearing potential should use effective contraception during, and for 3 months after cessation of daratumumab treatment.

3. Consent - ensure patient has received adequate verbal and written information regarding their disease, treatment and potential side effects. Document in medical notes all information that has been given.

4. Fertility - all patients should be offered fertility advice, as appropriate.

5. Hydration - fluid intake of at least 3 litres /day should be attempted.


8. Treatment must be agreed at the relevant MDT.

REGIMEN-SPECIFIC PRE-ASSESSMENT

1. You may have to arrange for patient admission with the first infusion of daratumumab, where an extended duration of infusion is anticipated due to prior infusion-related reactions. Some day units are able to accommodate Cycle 1 Day 1, thus avoiding admission. Alternatively, to facilitate administration in the outpatient setting, the first prescribed 16 mg/kg dose at Week 1 may be split over two consecutive days i.e. 8 mg/kg on Day 1 and Day 2 respectively.

2. Ensure patients are given a Patient ID Card for daratumumab and are instructed to carry this for 6 months after stopping treatment.

3. Advise patients to inform their other HCPs that they have received daratumumab, particularly before a transfusion and to show their patient ID card to healthcare professionals that treat them.

4. From cycle 2 onwards, patients may qualify for rapid rate infusion. See MM.48 (Daratumumab Rapid Rate Infusion) for further information.
**DRUG REGIMEN**

**Cycles 1 & 2**

<table>
<thead>
<tr>
<th>Pre-meds&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Paracetamol 1g PO, Montelukast 10mg PO on <em>(cycle 1 only)</em>, Chlorphenamine 10 mg IV, Dexamethasone 20mg IV bolus or PO (give IV prior to the first infusion) (can be reduced to 12mg IV bolus or PO following the second infusion)</th>
<th>To be given 30 minutes prior to daratumumab infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daratumumab&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16mg/kg Intravenous infusion</td>
<td>Days 1, 8, 15 and 22</td>
</tr>
<tr>
<td>Post-infusion&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Dexamethasone 4mg PO</td>
<td>Days 2, 3, 9, 10, 16, 17 and 23, 24 i.e. For two days starting the day after daratumumab infusion to reduce the risk of delayed infusion reactions</td>
</tr>
</tbody>
</table>

<sup>a</sup>On the first week of cycle 1, there is an option to administer daratumumab as a split dose at 8mg/kg intravenous infusion, on days 1 and 2 of the first week.

<sup>b</sup>If daratumumab on the first week of therapy is administered as a split dose (8mg/kg days 1 and 2), the same pre-meds given on day 1 must also be given on day 2. Dexamethasone dose given as part of pre-meds on days 1 and 2 of the first week must be kept at 20mg.

<sup>c</sup>If daratumumab on the first week of therapy is administered as a split dose (8mg/kg days 1 and 2), post-infusion dexamethasone must be given at 4mg on day 3 only.

**Cycles 3 to 6**

<table>
<thead>
<tr>
<th>Pre-meds</th>
<th>Paracetamol 1g PO, Chlorphenamine 10 mg IV, Dexamethasone 12mg IV bolus or PO</th>
<th>To be given 30 minutes prior to daratumumab infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daratumumab</td>
<td>16mg/kg Intravenous infusion</td>
<td>Days 1 and 15</td>
</tr>
<tr>
<td>Post-infusion</td>
<td>Dexamethasone 4mg PO</td>
<td>Days 2, 3 and 16, 17 i.e. For two days starting the day after daratumumab infusion to reduce the risk of delayed infusion reactions</td>
</tr>
</tbody>
</table>
Cycle 7 - Onwards

<table>
<thead>
<tr>
<th>Pre-meds</th>
<th>Paracetamol 1g PO, Chlorphenamine 10 mg IV, Dexamethasone 12mg IV bolus or PO</th>
<th>To be given 30 minutes prior to daratumumab infusion</th>
</tr>
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<tbody>
<tr>
<td><strong>Daratumumab</strong></td>
<td>16mg/kg Intravenous infusion</td>
<td>Days 1</td>
</tr>
<tr>
<td><strong>Post-infusion</strong></td>
<td>Dexamethasone 4mg PO</td>
<td>Days 2 and 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i.e. For two days starting the day after daratumumab infusion to reduce the risk of delayed infusion reactions</td>
</tr>
</tbody>
</table>

**Additional Post-medications:** the use of post-infusion medications (e.g. inhaled corticosteroids, short and long acting bronchodilators) should be considered for patients with a history of chronic obstructive pulmonary disease to manage respiratory complications should they occur. Following the first four infusions, if the patient experiences no major IRRs, these inhaled post-infusion medications may be discontinued at the discretion of the physician.

**INFUSION RATES**

Administer via an infusion set equipped with a 0.2 μm in-line filter at the appropriate infusion rate. Consider incremental escalation of the infusion rate only in the absence of infusion reactions with the previous infusion.

<table>
<thead>
<tr>
<th>Dilution volume</th>
<th>Initial rate (first hour)</th>
<th>Rate increment</th>
<th>Maximum rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sodium chloride 0.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>First week</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1 (full dosing 16mg/kg) C1D1: 1000 mL</td>
<td>50 mL/hour</td>
<td>50 mL/hour every hour</td>
<td>200 mL/hour</td>
</tr>
<tr>
<td>Option 2 (split dosing 8mg/kg) C1D1: 500 mL</td>
<td>50 mL/hour</td>
<td>50 mL/hour every hour</td>
<td>200 mL/hour</td>
</tr>
<tr>
<td>Option 2 (split dosing 8mg/kg) C1D2: 500 mL</td>
<td>50 mL/hour</td>
<td>50 mL/hour every hour</td>
<td>200 mL/hour</td>
</tr>
<tr>
<td><strong>Second week</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td>500 mL</td>
<td>50 mL/hour</td>
<td>200 mL/hour</td>
</tr>
<tr>
<td><strong>Third and subsequent weeks</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td>500 mL</td>
<td>100 mL/hour</td>
<td>200 mL/hour</td>
</tr>
</tbody>
</table>

<sup>a</sup> Incremental escalation of the infusion rate should be considered only in the absence of infusion reactions. **There is an option to administer daratumumab as a split dose at 8mg/kg intravenous infusion, on days 1 and 2 of the first week**

<sup>b</sup> A dilution volume of 500 mL should be used only if there were no ≥ Grade 1 IRRs during the first 3 hours of the first infusion. Otherwise, continue to use a dilution volume of 1000 mL and
instructions for the first infusion.

- A modified initial rate for subsequent infusions (i.e. third infusion onwards) should only be used only if there were no ≥ Grade 1 IRRs during a final infusion rate of ≥ 100 mL/hr in the first two infusions. Otherwise, use instructions for the second infusion.

Notes:
1. For guidance on infusion rates in the case of infusion related reactions. See the managing infusion reactions section below.
2. From cycle 2 onwards, patients may qualify for rapid rate infusion. See MM.48 (Daratumumab Rapid Rate Infusion) for further information. Rapid Rate infusion is currently unlicensed.

CYCLE FREQUENCY
The cycle is repeated every 28 days until disease progression.

DOSE MODIFICATIONS

Renal and Hepatic Impairment

<table>
<thead>
<tr>
<th>Renal</th>
<th>Hepatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal studies of daratumumab in patients with renal impairment have been conducted. Based on population PK analyses no dosage adjustment is necessary for patients with renal impairment.</td>
<td>No formal studies of daratumumab in patients with hepatic impairment have been conducted. Based on population PK analyses, no dosage adjustments are necessary for patients with hepatic impairment</td>
</tr>
</tbody>
</table>

INVESTIGATIONS – during treatment
- FBC, U&Es, LFTs, Ca++, glucose – every 3 - 4 weeks.
- Ig’s, paraprotein, usually monthly after first 2 months, Freelite assay if appropriate.
- Consider bone marrow assessment after four cycles for non-secretory Myeloma.

CONCURRENT MEDICATIONS
- Allopurinol 300 mg daily for 7 days for cycle 1 only
- Prophylactic aciclovir 200 mg TDS (consider reducing to 200mg BD if CrCl<10ml/min) for the duration of treatment and for 3 months afterwards.
- Prophylactic fluconazole 50mg OD.
- Consider prophylactic co-trimoxazole 960mg OD on M/W/F if heavily pre-treated or previous autograft.
- Proton pump inhibitor or H2 antagonist at clinician’s discretion on days of steroids
- Bone protection as per NSSG Bone Protection protocol MM.3
EMETIC RISK
Low risk

EXTRAVASATION RISK
Neutral

ADVERSE EFFECTS / REGIMEN SPECIFIC COMPLICATIONS

- **Interference with Serological Testing**
  Daratumumab binds to CD38 on red blood cells (RBCs) and results in a positive Indirect Antiglobulin Test (Coombs test). Daratumumab-mediated positive indirect antiglobulin test may persist for up to 6 months after the last daratumumab infusion. Daratumumab bound to RBCs masks detection of antibodies to minor antigens in the patient’s serum. The determination of a patient’s ABO and Rh blood type are not impacted.

  I. Blood Transfusion must be notified of this interference with serological testing and Blood Bank must be notified that a patient has received daratumumab.

  II. Patients must be typed and screened prior to starting daratumumab.

  III. Important information on safety and risk minimisation of Daratumumab and interference with Blood Compatability Testing can be found of the summary of product characteristics on the following links:


  IV. Ensure patients are given a Patient ID Card for daratumumab and are instructed to carry this for 6 months after stopping treatment.

  V. Ask patients to tell their other HCPs that they have received daratumumab, particularly before a transfusion and to show their patient ID card to healthcare professionals that treat them.

- **Interference with Determination of Complete Response**
  Daratumumab is a human IgG kappa monoclonal antibody detectable on both the serum protein electrophoresis (SPE) and immunofixation (IFE) assays used for the clinical monitoring of endogenous M-protein. This interference can impact the determination of complete response and of disease progression in all patients with IgG kappa myeloma. On an adhoc basis DIRA assay (removes interference) can be organised through Janssen if required.

- **Contraception**
  To avoid exposure to the fetus, women of reproductive potential should use effective contraception during treatment and for 3 months after cessation of daratumumab treatment.
**Infusion reactions**

- Daratumumab can cause severe infusion-related reactions (IRR). Approximately half of all patients treated have experienced a reaction, the majority of IRRs occur at the first infusion. Infusion reactions can also occur with subsequent infusions. Nearly all reactions occurred during infusion or within 4 hours of completing daratumumab. Prior to the introduction of post-infusion medication in clinical trials, infusion reactions occurred up to 48 hours after infusion.

- Severe reactions have occurred, including bronchospasm, hypoxia, dyspnoea, and hypertension. Signs and symptoms may include respiratory symptoms, such as cough, wheezing, larynx and throat tightness and irritation, laryngeal oedema, pulmonary oedema, nasal congestion, and allergic rhinitis. Less common symptoms were hypotension, headache, rash, urticaria, pruritus, nausea, vomiting, and chills.

- Pre-meds must be given 1 hour before the infusion. Patients must be monitored during the entire infusion.

- To reduce the risk of delayed infusion reactions, corticosteroids are given to all patients on the first and second day after all infusions

- Patients with a history of obstructive pulmonary disorders may require additional post-infusion medications to manage respiratory complications. Consider prescribing short- and long-acting bronchodilators and inhaled corticosteroids for patients with obstructive pulmonary disorders.

**Managing Infusion related reactions**

For infusion reactions of any grade/severity, immediately interrupt the infusion and manage symptoms. The infusion rate should be reduced when re-starting the infusion as outlined below. Management of infusion reactions may further require treatment discontinuation as outlined below.

<table>
<thead>
<tr>
<th>IRR grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1-2 (mild to moderate)</td>
<td>Once symptoms resolve, resume the infusion at no more than half the rate at which the reaction occurred. If the patient does not experience any further reaction symptoms, infusion rate escalation may resume at increments and intervals as appropriate up to the maximum rate of 200 mL/hour.</td>
</tr>
<tr>
<td>Grade 3 (severe)</td>
<td>Once symptoms resolve consider restarting the infusion at no more than half the rate at which the reaction occurred. If the patient does not experience additional symptoms, resume infusion rate escalation at increments and intervals as appropriate. Permanently discontinue treatment upon the third occurrence of a Grade 3 or greater reaction.</td>
</tr>
<tr>
<td>Grade 4 (life threatening)</td>
<td>Permanently discontinue treatment.</td>
</tr>
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</table>
• **Risk of reactivation of hepatitis B virus (MHRA 2019):**

Hepatitis B virus reactivation has been reported in patients treated with daratumumab, including several fatal cases worldwide.

All patients must be screened for hepatitis B virus before initiation of daratumumab; patients with unknown serology who are already on treatment should also be screened.

Monitoring is required for patients with positive serology for clinical and laboratory signs of hepatitis B reactivation during treatment, and for at least 6 months following the end of daratumumab treatment.

Patients with positive serology need to be advised to seek medical help immediately if they experience signs and symptoms suggestive of hepatitis B virus reactivation.

Treatment with daratumumab should be stopped in patients with hepatitis B virus reactivation; appropriate treatment needs to be instituted in consultation with experts in the treatment of hepatitis B virus infection; consult with experts before resuming daratumumab in patients with adequately controlled viral reactivation.

Suspected adverse drug reactions associated with daratumumab need to be reported to the Yellow Card Scheme.

• **Other common adverse effects:** Fatigue, allergic rhinitis, pyrexia, nasopharyngitis, URTI, cough, GI disorders (nausea, constipation, diarrhoea), headache, neutropenia and hypertension have also been reported. The most common serious adverse reactions were pneumonia, and pyrexia.

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**TREATMENT RELATED MORTALITY**

<5%

**REFERENCES**


2. Food and Drug Administration. 2015. DARZALEX (daratumumab) Full Prescribing Information. Online. Available at: [http://www.accessdata.fda.gov/drugsatfda_docs/label/2015/761036s000lbl.pdf](http://www.accessdata.fda.gov/drugsatfda_docs/label/2015/761036s000lbl.pdf) (last accessed: 05.01.2016)

4. Darzalex ® (Daratumumab), eMC UK Summary of Product Characteristics for Janssen,02 January 2019


<table>
<thead>
<tr>
<th>Name</th>
<th>Revision</th>
<th>Date</th>
<th>Version</th>
<th>Review date</th>
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<tr>
<td>Nadjoua Maouché</td>
<td>Co-trimoxazole to concomitant medication section. Re-wording of infusion rates</td>
<td>May 2016</td>
<td>1.1</td>
<td>May 2018</td>
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<td>Manuela Sultanova Service Coordinator</td>
<td>Formatting</td>
<td>May 2016</td>
<td>1.2</td>
<td>May 2018</td>
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<td>Faouzi Djebbari (Haematology Pharmacist)</td>
<td>Updated hepatic impairment, concurrent medication and references</td>
<td>June 2017</td>
<td>1.3</td>
<td>June 2018</td>
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<tr>
<td>Faouzi Djebbari (Haematology Pharmacist)</td>
<td>Split dosing of first daratumumab dose</td>
<td>March 2019</td>
<td>2.1</td>
<td>June 2020</td>
</tr>
<tr>
<td>Protocol Review Day 2019</td>
<td>Pre-assessment, split dosing of first daratumumab dose, infusion rates and references</td>
<td>June 2019</td>
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<td>June 2020</td>
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<tr>
<td>Faouzi Djebbari (Haematology Pharmacist)</td>
<td>Addition of MHRA drug alert</td>
<td>October 2019</td>
<td>2.3</td>
<td>June 2020</td>
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