# Post Bone Marrow Transplant Monitoring of Host/Donor Chimerism

**Background**
Short Tandem Repeat (STR) analysis used to define donor chimerism (sensitivity of 1-5%). However, if leukaemia specific markers for the detection of minimal residue disease are available (i.e. fusion genes), these are generally more sensitive than SNP analysis.
Lineage specific chimerism STR analysis is performed on DNA from sorted peripheral blood T cells or disease specific cell subsets such as CD34 is more sensitive then whole blood chimerism. In particular, a decrease in donor T-cells specific chimerism is highly predictive of pending graft failure whereas an increase in host-derived CD34 expressing cells can predict pending relapse of a stem cell disorder.
Peripheral blood analysis is generally more useful than bone marrow and lineage specific chimerism should be considered the assay of choice in the non-myeloablative setting, especially when combined with donor lymphocyte infusions (DLI) as early patterns of cell specific chimerism may not only predict relapse but also graft-versus-host disease (GVHD).

**Samples**
*Pre transplant*
Send 4mls EDTA peripheral blood, from both host and donor at the time of work up. Request on EPR 'Post BMT Chimerism Monitoring' and indicate in the clinical details that this is the **pre BMT** sample for either **donor** or **recipient** (At present there is no 'pre BMT' option on EPR)

*Post transplant*
PERIPHERAL BLOOD MONITORING OF CD3 CHIMERISM
This is mandatory in all patients receiving conditioning regimens containing ATG or Alemtuzumab. Results are used to guide withdrawal of immunosuppression because mixed CD3 chimerism can commonly occur with this protocol. Patients with falling donor CD3 Chimerism (<80%), more than 100 days post-transplant, immunosuppression should be rapidly tailed over a few weeks if possible (not possible in the presence of GvHD). If this fails to improve CD3 chimerism then DLIs may be given, although these should generally only be given more than 12 months post-transplant, except for selected patients at high risk of relapse.

PERIPHERAL BLOOD MONITORING OF WHOLE BLOOD CHIMERISM
In most patients this may alert to possible disease relapse, although some patients may develop mixed whole blood chimerism in the absence of relapse. Patients should be assessed for disease relapse according to standard methods. In the absence of relapse, donor lymphocytes infusions may be considered as for cases of mixed CD3 chimerism.

Request the test on EPR 'Post BMT Chimerism Monitoring' for CD3 and Whole Blood and send 10mls EDTA (2 bottles) peripheral blood at 3, 6, 9, 12, 18 and 24 months post BMT, consider monitoring for longer in myeloproliferative disorders. Please note that there is a careset for 3, 6, 9, and 12 months which includes other tests due at these time points.

BONE MARROW CHIMERISM

Bone marrow chimerism is a useful technique for monitoring for disease relapse. It is not necessary if there is a molecular marker for monitoring disease e.g. BCR-ABL monitoring for Ph+ ALL and CML. It may be performed on CD34 subsets.

Bone marrow 2mls EDTA should also be sent at 3, 6, 9 and 12 months post BMT if BM aspirate is being performed. Consider BM aspirate at 18 and 24 months in presence of a quantitative molecular marker.
For cell specific chimerism, samples should not be more than 72 hours old.

**Send samples to:**
Thames Valley Haemato Molecular Diagnostics Service **(**TVHMDS)
Level 4, John Radcliffe Hospital
Oxford
The results should be available in a few weeks on the hospital electronic patient result system (EPR).

**Enquiries:** Tel**:** 01865 572769 molecularhaem.oxfordgenetics@ouh.nhs.uk

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**Audit:** These processes are subject to the OxBMT audit programme

**Circulation**
NSSG Haematology Website

**Review**

| Name | Revision | Date | Version | Review date |
|---|---|---|---|---|
| Dr Andy Peniket, Consultant | Up date | July 2012 | 2.0 | July 2014 |
| Dr Robert Danby, Consultant | Update, references | Jan 2016 | 2.1 | January 2018 |
| Dr James Davies, Consultant | Minor amendments | Oct 2020 | 2.2 | October 2022 |
| Denise Wareham, Specialist Nurse | Additions about EPR | Jan 2021 | 2.3 | Jan 2023 |
| Francesca Toselli, BMT Specialist Nurse | Updated “enquiries” contact details | June 2023 | 2.4 | June 2025 |
| Francesca Toselli, BMT Specialist Nurse | Minor updates | October 2025 | 2.5 | October 2027 |