

# Short Tandem Repeat (STR) Assays: Bone Marrow Engraftment, Maternal Engraftment, Maternal Cell Contamination and Zygosity Testing

## Description:

Short tandem repeats (STR) are small pieces of highly repetitive DNA sequence. However, the number of repeat units within a specific STR locus can be highly variable between individuals. The highly polymorphic nature of STR loci makes them incredibly useful in a variety of applications such as distinguishing between two individuals during bone marrow transplantation, determining whether a set of twins are monozygotic or dizygotic, detecting maternal engraftment in a child, or identifying maternal cell contamination in a prenatal sample. For these assays, polymerase chain reaction (PCR) with capillary electrophoresis are both utilized to determine the number of repeats at 25 different autosomal STR loci.

## Specimen:

Preferred specimen is 3 mLs of whole blood or bone marrow in lavender top (EDTA) tube. Other acceptable specimens include 3 mLs of whole blood in green top (NaHep) tube and yellow top (ACD) tube, 2 cytobrushes, and amniotic fluid or Chorionic Villi Sampling (CVS) for fetal samples.

White blood cell subcell type study: Cell types available for sorting in the subcell type study are B cell, Myeloid cell, T cell, and NK cell. Requires at least 15 mLs to sort cells in EDTA. Blood is preferred to bone marrow, due to quality of separation. **Please contact the Genetics and Genomics Diagnostic Laboratory to schedule this testing at 513-636-4474.**

**Label all tubes with patient's name, birth date, and date of collection.**

**Note: Specimen from the bone marrow donor as well as from the patient pre-transplant are required for performing the first engraftment testing.**

## Methodology:

This testing can be performed on different specimens according to diagnostic indication:

- Testing on genomic DNA that was isolated from the above stated specimen is performed using the ThermoFisher GlobalFiler PCR Amplification Kit to amplify short tandem repeat (STR) sequences. A total of 24 chromosomal loci were amplified for STR analysis. When available, at least three informative sites were used for chimerism calculations. Please contact the laboratory for detailed methodologies or the list of specific loci used for calculations.
- For patients with multiple donors, previous donors will no longer be calculated if undetected from all patient samples after a period of six months. This may affect the number of informative chromosomal loci.
- White blood cell subcell type study: The Genetics and Genomics Diagnostic Laboratory sort Lymphocyte subsets from specimen and the Cincinnati Children's Hospital Diagnostic Immunology Laboratory run cell counts and purities of the cell sort.

## Sensitivity:

This test determines the allele size with >98% sensitivity at each locus.

## Turn Around Time:

**Engraftment by STR-blood or bone marrow:** 3-5 days

**Engraftment by STR-subcell type:** 5 days

**Zygosity Testing by STR:** 5 days

**Maternal Engraftment by STR:** 5 days

**Maternal Cell Contamination by STR:** 5 days

## Billing and CPT Codes:

**Engraftment by STR- blood or bone marrow:** 81267, 81265

**Engraftment by STR- subcell type:** 81268 (x3)

**Zygoty Testing by STR:** 81265

**Maternal Engraftment by STR:** 81265

**Maternal Cell Contamination by STR:** 81265

Please call 1-866-450-4198 for any pricing or billing questions.

## Results:

Results will be reported to the referring physician or health care provider as specified on the test requisition form.

## Shipping Instructions:

Please enclose test requisition with sample. All information must be completed before sample can be processed. Place samples in Styrofoam mailer and ship at room temperature by overnight Federal Express to arrive Monday through Saturday.

## Ship to:

Genetics and Genomics Diagnostic Laboratory  
3333 Burnet Avenue NRB 1013  
Cincinnati, Ohio, 45229  
513-636-4474

## References:

Clark, J., S. Scott, et al. (2014) "Monitoring of Chimerism following Allogeneic Haematopoietic Stem Cell Transplantation (HSCT): Technical Recommendations for the use of Short Tandem Repeats (STR) based techniques, on behalf of the United Kingdom National External Quality Assessment Service for Leucocyte Immunophenotyping Chimerism Working Group." *British Journal of Haematology* 168:26-37.

Frankel, W., A. Chan, et al. (1996) "Detection of Chimerism and Early Engraftment after Allogeneic Peripheral Blood Stem Cell or Bone Marrow Transplantation by Short Tandem Repeats." *American Journal of Hematology* 52(4): 281-7.

Pindolia, K., N. Janakiraman et al. (1999) "Enhanced Assessment of Allogeneic Bone Marrow Transplant Engraftment using Automated Fluorescent-Based Typing." *Bone Marrow Transplantation* 24(11): 1235-41.

Thyagarajan, B., S. Young, et al. (2009) "Systematic Analysis of Interference due to Stutter in Estimating Chimerism following Hematopoietic Cell Transplantation." *Journal of Clinical Laboratory Analysis* 23(5): 308-13.