

Maternal Cell Contamination, Molecular Analysis

Lisa McDaniel, PhD., ABMG Fellow; Marcy Hoffmann, PhD., Director, Molecular Diagnostic Laboratory; Danbin Xu, M.D., PhD., Co-Director, Molecular Diagnostic Laboratory

TEST UPDATE

Quick Facts

- ▶ **Maternal cell contamination (MCC) in fetal samples poses a risk for prenatal misdiagnosis.**
- ▶ **CMGS recommends that MCC studies should be carried out as a companion test for molecular-based prenatal testing.**
- ▶ **MCC could potentially be detected in fetal samples from CVS, amniotic fluid, or cord blood.**
- ▶ **A Maternal sample and a fetal sample should be analyzed simultaneously.**
- ▶ **At least 5 polymorphic loci are used for data analysis.**
- ▶ **The limit of detection of this assay is a maternal cell contribution of at least 5%.**

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CLINICAL APPLICATION

- Maternal Cell Contamination (MCC) study serves as a companion test for molecular or biochemical based prenatal diagnostic tests.
- The MCC assay is used to assess the possible presence of maternal DNA in the prenatal DNA sample, which may compromise the validity of the prenatal result.
- When MCC is detected, prenatal test results should be interpreted with caution because the maternal DNA may mask the results of any genetic testing performed on the fetal DNA.
- MCC should be assessed in DNA samples from chorionic villus (CVS, cultured or uncultured), amniotic fluid (cultured or uncultured), fetal blood from the umbilical cord (cord blood), or products of conception (POC), in parallel with a maternal sample.

CLINICAL BACKGROUND

- The presence of maternal cell contamination (MCC) in fetal samples poses a risk for prenatal misdiagnosis when using molecular techniques to detect pathogenic variations.
- MCC of amniotic fluid, chorionic villus, or fetal blood is a possible consequence of the techniques employed to collect these specimen types. Molecular testing is usually performed on DNA extracted directly from one of these tissues.
- The Clinical Molecular Genetics Society (CMGS) recommends that specimens submitted for molecular prenatal testing should have a MCC study performed to rule out contamination that may compromise the prenatal test results. In addition, any sample used in biochemical prenatal testing should also be tested for MCC.
- MCC should be assessed from the same DNA sample used for prenatal testing. In addition, the maternal sample should be analyzed in parallel with the prenatal sample.
- Sensitive molecular testing methods have identified the presence of a maternal contribution in approximately 10% of the uncultured amniotic fluid, ~17% of which had no evidence of visible blood staining^{3,4}.

TECHNICAL NOTES

- The detection of low level MCC may not invalidate the prenatal test result. A significant level of contamination is defined as equal to, or greater than, the minimum level of MCC that would affect the results of the specific prenatal molecular assay. Therefore, the prenatal test result and its corresponding sensitivity should be considered alongside the MCC assay result and its respective sensitivity to determine the significance of the maternal contribution in the prenatal specimen.
- Polymorphic repeat loci from different human chromosomes are amplified by PCR and the PCR products are analyzed by capillary electrophoresis. Data from at least 5 polymorphic repeats are used for the analysis.
- This test has a detection limit of 5% maternal cell contamination.

TEST INFORMATION

DESCRIPTION Maternal Cell Contamination, Molecular Analysis

METHOD Microsatellite PCR and fragment analysis.

ORDER CODE MCCMA

CPT CODE 83891, 83900X2, 83901X26, 83909X2, 83912

SPECIMEN REQUIREMENTS Extracted fetal DNA; Fetal cells from amniotic fluid (cultured or uncultured), CVS, or cord blood; maternal whole blood in EDTA tube.

For detailed specimen requirements, please refer to the PAML Test Directory at www.paml.com.

COMMENTS MCC not detected; MCC detected.

SELECTED REFERENCES

1. Allen, S., Mountford, R., Butler, A., Mann, K. and B. Treacy. Practice guidelines for the Testing for maternal cell contamination (MCC) in prenatal samples for molecular studies. Guidelines ratified by the UK Clinical Molecular Genetics Society (16th April, 2008)
2. Schrijver, I., Cherny, S.C., and Zehnder, J.L. Testing for Maternal Cell Contamination in Prenatal Samples. *Journal of Molecular Diagnostics* 2007, 9(3):394-400.
3. Stoiilkovic-Mikic, T., Mann, K., Docherty, Z., and Oqilivie, C.M. Maternal cell contamination of prenatal samples assessed by QF-PCR genotyping. *Prenatal Diagnosis* 2005, 25(1):79-83.
4. Winsor, E.J.T., Silver, M.P., Theve, R., Wright, M., and Ward, B.E. Maternal cell contamination in uncultured amniotic fluid. *Prenatal Diagnosis* 1996, 16(1):49-54.

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