MaterniT21® PLUS Lab Report

Sequenom Laboratories
3595 John Hopkins Court
Sequenom Laboratories
CLIA #: 05D2015356 CAP #: 7527138
Lab Director: Phillip Cacheris, MD, PhD

Final Report

MaterniT® 21 PLUS (Core) + ESS Twin Gestation

877.821.7266

Ordering Provider:	TEST, CCF-DR	Patient:	**TEST**
Provider Location:	Sequenom - LCA	DOB:	TEST
Provider Phone:		Specimen:	TEST
Date Ordered:	06/16/2013	Fetal Fraction:	11%
Date Collected:	06/11/2013	Gestational Age ≥ 9w:	Yes
Date Received:	06/16/2013	External Accession:	
Order ID:	ORD_TEST	Referral Clinician:	
Patient ID:		Date Reported:	**06/01/2021 04:51 PM PT**

Test Result

Positive

Trisomy 18

Lab Director Comments

This is a reported twin gestation. This specimen showed an increased representation of chromosome 18, suggestive of trisomy 18. In the context of a twin gestation, data from this sample suggests aneuploidy affecting one fetus, though the possibility of two affected fetuses cannot be ruled out. (Rafalko et al, PLOS ONE 2021) Results should be interpreted in the context of chorionicity and other clinical information. Genetic counseling and confirmatory diagnostic testing are recommended.

Additionally, Y chromosome material was detected. Based on the amount of Y material present, the probability of male/female twins is 93.4% and male/male twins is 6.6%. (Rafalko et al, PLOS ONE 2021) Results should be interpreted in the context of chorionicity and other clinical information.

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Result Table

Content	Result
FETAL SEX	**Consistent with Male**
AUTOSOMAL ANEUPLOIDIES	
Trisomy 21 (Down syndrome)	**Negative**
Trisomy 18 (Edwards syndrome)	**Positive T18 PPV*: 90%**
Trisomy 13 (Patau syndrome)	**Negative**
SEX CHROMOSOME ANEUPLOIDIES	
Monosomy X (Turner syndrome)	**Not Validated**
XYY (Jacob's syndrome)	**Not Validated**
XXY (Klinefelter syndrome)	**Not Validated**
XXX (Triple X syndrome)	**Not Validated**
SELECT WHOLE CHROMOSOMES	
Trisomy 16	**Not Detected**
Trisomy 22	**Not Detected**
SELECT MICRODELETIONS	
22q11 deletion (associated with DiGeorge syndrome)	**Not Detected**
15q11 deletion (associated with Prader-Willi / Angelman syndrome)	**Not Detected**
11q23 deletion (associated with Jacobsen syndrome)	**Not Detected**
8q24 deletion (associated with Langer-Giedion syndrome)	**Not Detected**
5p15 deletion (associated with Cri-du-chat syndrome)	**Not Detected**
4p16 deletion (associated with Wolf-Hirschhorn syndrome)	**Not Detected**
1p36 deletion syndrome	**Not Detected**

Positive Predictive Value

* Positive Predictive Value (PPV) estimates the probability that a pregnancy with a positive test result is in fact an affected pregnancy. The PPV for this patient was calculated only using maternal age and gestational age[1], test performance[2] and the standard PPV formula.

For a more accurate and individualized PPV calculation, include additional clinical information from the patient's clinical history (which may include serum screen results, personal/family history, ultrasound findings, etc.), and refer to the table below.

***A Priori* Risk (1:X)**	10	20	30	40	50	100	200	300	400	500	1000	1500	2000	2500	3000	5000
PPV (%) TRISOMY 18	96.5	92.9	89.6	86.5	83.6	71.6	55.7	45.5	38.5	33.4	20.0	14.3	11.1	9.1	7.7	4.8

Negative Predictive Value

The Negative Predictive Value (NPV) for trisomy 21, 18, and 13 is greater than 99%. The NPV for SCA and ESS cannot be calculated as SCA and ESS are only reported when an abnormality is detected.

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About the Test

The MaterniT® 21 PLUS laboratory-developed test (LDT) analyzes circulating cell-free DNA from a maternal blood sample. The test is indicated for use in pregnant women with increased risk for fetal chromosomal aneuploidy. Validation data on twin pregnancies is limited and the ability of this test to detect aneuploidy in a triplet pregnancy has not yet been validated.

Test Method

Circulating cell-free DNA was purified from the plasma component of maternal blood. The extracted DNA was then converted into a genomic DNA library for aneuploidy analysis of chromosomes 21, 18, and 13 via next generation sequencing.[3] Optional findings based on the test order include sex chromosome aneuploidy (SCA)[2], and enhanced sequencing series (ESS)[4], which will only be reported on as an additional finding when an abnormality is detected. SCA testing includes information on X and Y representation, while ESS testing includes deletions in selected regions (22q, 15q, 11q, 8q, 5p, 4p, 1p) and trisomy of chromosomes 16 and 22.

Performance

The performance characteristics of the MaterniT® 21 PLUS laboratory-developed test (LDT) have been determined in a clinical validation study with pregnant women at increased risk for fetal chromosomal aneuploidy.[2],[3],[4],[5]

Y-Chromosome (Fetal Sex)	**Accuracy: 99.4%**	
Region (associated syndrome)	**Estimated Sensitivity****	**Estimated Specificity**
Trisomy 21 (Down Syndrome)	99.1%	99.9%
Trisomy 18 (Edwards Syndrome)	>99.9%	99.6%
Trisomy 13 (Patau Syndrome)	91.7%	99.7%
Sex Chromosome Aneuploidies (singleton gestation only)	96.2%	99.7%

* As reported in ISCA database nstd37 [http://dbsearch.clinicalgenome.org/search/]

** Sensitivity estimated across the observed size distribution of each syndrome [per ISCA database nstd37] and across the range of fetal fractions observed in routine clinical NIPT. Actual sensitivity can also be influenced by other factors such as the size of the event, total sequence counts, amplification bias, or sequence bias.

Limitations of the Test

While the results of these tests are highly accurate, discordant results, including inaccurate fetal sex prediction, may occur due to placental, maternal, or fetal mosaicism or neoplasm; vanishing twin; prior maternal organ transplant; or other causes. Sex chromosomal aneuploidies are not reportable for known multiple gestations. These tests are screening tests and not diagnostic; they do not replace the accuracy and precision of prenatal diagnosis with CVS or amniocentesis. A patient with a positive test result should be referred for genetic counseling and offered invasive prenatal diagnosis for confirmation of test results.[6] A negative result does not ensure an unaffected pregnancy nor does it exclude the possibility of other chromosomal abnormalities or birth defects which are not a part of these tests. An uninformative result may be reported, the causes of which may include, but are not limited to, insufficient sequencing coverage, noise or artifacts in the region, amplification or sequencing bias, or insufficient fetal fraction. These tests are not intended to identify pregnancies at risk for neural tube defects or ventral wall defects. Testing for whole chromosome abnormalities (including sex chromosomes) and for subchromosomal abnormalities could lead to the potential discovery of both fetal and maternal genomic abnormalities that could have major, minor, or no, clinical significance. Evaluating the significance of a positive or a non-reportable result may involve both invasive testing and additional studies on the mother. Such investigations may lead to a diagnosis of maternal chromosomal or subchromosomal abnormalities, which on occasion may be associated with benign or malignant maternal neoplasms. These tests may not accurately identify fetal triploidy, balanced rearrangements, or the precise location of subchromosomal duplications or deletions; these may be detected by prenatal diagnosis with CVS or amniocentesis. The ability to report results may be impacted by maternal BMI, maternal weight, maternal systemic lupus erythematosus (SLE) and/or by certain pharmaceutical agents such as low molecular weight heparin (for example: Lovenox®, Xaparin®, Clexane® and Fragmin®). The results of this testing, including the benefits and limitations, should be discussed with a qualified healthcare provider. Pregnancy management decisions, including termination of the pregnancy, should not be based on the results of these tests alone. The healthcare provider is responsible for the use of this information in the management of their patient.

Note

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration. This laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA) as qualified to perform high complexity clinical laboratory testing and accredited by the College of American Pathologists (CAP).

References

1. Snijders RJ, et al. *Fetal Diag.* 1995;10(6):356-367.
2. Mazloom AR, et al. *Prenat Diag.* 2013;33(6):591-597.
3. Palomaki GE, et al. *Genet Med.* 2012;14(3):296-305.
4. Zhao C, et al. *Clin Chem.* 2015 Apr;61(4):608-616.
5. Palomaki GE, et al. *Genet Med.* 2011;13(11):913-920.
6. ACOG/SMFM Joint Committee Opinion No. 545, Dec 2012.

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