Test Definition: UNIPD

Uniparental Disomy, Varies

Overview

Useful For

Evaluation of patients presenting with mosaicism, confined placental mosaicism, or Robertsonian translocations

Evaluation of patients presenting with features of disorders known to be associated with uniparental disomy (eg, Russell-Silver syndrome)

Evaluation of disease mechanism in individuals with rare autosomal recessive disease and only one carrier parent

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
CULFB	Fibroblast Culture for Genetic Test	Yes	No
CULAF	Amniotic Fluid Culture/Genetic Test	Yes	No

Genetics Test Information

Specimens from fetus or child and at least one parent are required for testing. Specimens from both parents are recommended for optimal interpretation of the results. Chromosome of interest **must be specified** on request form.

Testing Algorithm

Polymerase chain reaction amplification of microsatellite markers on the chromosome of interest are used to test DNA from the parents and the child for the presence of uniparental disomy.

For prenatal specimens only:
If an amniotic fluid specimen or cultured amniocytes is received, amniotic fluid culture for genetic testing will be performed at an additional charge.
If a chorionic villus specimen or cultured chorionic villi is received, fibroblast culture for a genetic test will be performed at an additional charge.

For more information see:
-Prader-Willi and Angelman Syndromes: Laboratory Approach to Diagnosis
-Beckwith-Wiedemann and Russell-Silver Syndromes: Laboratory Approach to Diagnosis

Special Instructions

- Informed Consent for Genetic Testing
- Prader-Willi and Angelman Syndromes: Laboratory Approach to Diagnosis
- Informed Consent for Genetic Testing (Spanish)
- Molecular Genetics: Uniparental Disomy Patient Information
- Beckwith-Wiedemann and Russell-Silver Syndromes: Laboratory Approach to Diagnosis

Method Name

Polymerase Chain Reaction (PCR)/Microsatellite markers

NY State Available

Yes

Specimen

Specimen Type

Varies

Ordering Guidance

This test is only intended to rule out whole-chromosome uniparental disomy (UPD). If testing is desired to rule out UPD 11 for Beckwith-Wiedemann syndrome or Russell-Silver syndrome, the recommended test is BWRS / Beckwith-Wiedemann Syndrome/Russell-Silver Syndrome, Molecular Analysis, Varies, as it will also detect cases caused by segmental UPD.

Shipping Instructions

Specimen preferred to arrive within 96 hours of collection.

Specimen Required

Specimens from both parents and the child or fetus are recommended for optimal interpretation of results. Each specimen must have a separate order for this test. Only the proband specimen will be charged.
Testing can be performed if only one parent specimen is submitted, however, biparental inheritance and some types of uniparental disomy (UPD) cannot be definitively established in the absence of one parent. Additionally, there is a higher likelihood for uninformative or inconclusive results.
If all required specimens are not received within one month of ordering, testing will be canceled.

Patient Preparation: A previous bone marrow transplant from an allogenic donor will interfere with testing. For instructions for testing patients who have received a bone marrow transplant, call 800-533-1710.

Submit only 1 of the following specimens:

Specimen Type: Whole blood
Preferred: Lavender top (EDTA) or yellow top (ACD)
Acceptable: Any anticoagulant
Specimen Volume: 3 mL
Collection Instructions:
1. Invert several times to mix blood.
2. Send whole blood specimen in original tube. **Do not aliquot.**
Specimen Stability Information: Ambient (preferred) 4 days/Refrigerated

Prenatal Specimens
Due to its complexity, consultation with the laboratory is required for all prenatal testing; call 800-533-1710 to speak

to a genetic counselor.

Specimen Type: Amniotic fluid
Container/Tube: Amniotic fluid container
Specimen Volume: 20 mL
Specimen Stability Information: Refrigerated (preferred)/Ambient
Additional information: If amniotic fluid or culture amniotic fluid is received, CULAF / Culture for Genetic Testing, Amniotic Fluid will be added at an additional charge.

Specimen Type: Chorionic villi (CVS)
Container/Tube: 15-mL tube containing 15 mL of transport media
Specimen Volume: 20 mg
Specimen Stability Information: Refrigerated
Additional Information: If CVS or cultured CVS is received, CULFB / Fibroblast Culture for Biochemical or Molecular Testing will be added at an additional charge.

Acceptable:
Specimen Type: Confluent cultured cells
Container/Tube: T-25 flask
Specimen Volume: 2 Flasks
Collection Instructions: Submit confluent cultured cells from another laboratory.
Specimen Stability Information: Ambient (preferred)/Refrigerated (<24 hours)

Forms

1. **New York Clients-Informed consent is required.** Document on the request form or electronic order that a copy is on file. The following documents are available:
-Informed Consent for Genetic Testing (T576)
-Informed Consent for Genetic Testing-Spanish (T826)
2. Molecular Genetics: Uniparental Disomy Patient Information

Specimen Minimum Volume

Blood: 0.5 mL
Amniotic Fluid: 10 mL
Chorionic Villi: 5 mg

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Varies		

Clinical & Interpretive

Clinical Information

Uniparental disomy (UPD) occurs when a child inherits 2 copies of a chromosome from only one parent and no copies of that chromosome from the other parent. This is typically due to an error in cell division during the formation of egg or sperm cells (meiosis). When an error causing UPD occurs during meiosis I, both chromosome homologs from a single parent are transmitted, resulting in uniparental heterodisomy. When the error causing UPD occurs during meiosis II or as a postzygotic event, and a single parental homolog is transmitted to offspring in duplicate, isodisomy results. Meiotic recombination events within the context of UPD often result in a mixture of regions of heterodisomy and isodisomy.

When UPD occurs, the imbalance of maternal versus paternal genetic information for the involved chromosome can be associated with clinical symptoms in the affected child. However, UPD does not always impart an abnormal clinical phenotype. In fact, while isodisomy can result in disease due to a recessive allele, heterodisomy is not expected to result in an abnormal clinical phenotype unless the involved chromosome or chromosomal segment includes imprinted genes. Imprinted genes demonstrate differential expression depending on parent of origin. Disorders that result from UPD of imprinted genes are not due to a defect in the imprinting mechanism itself, but rather they are due to an unbalanced parental contribution of normally imprinted alleles that results in altered expression of imprinted genes. For example, when maternal UPD 15 occurs (2 copies of the maternal chromosome 15 instead of 1 maternal and 1 paternal copy of chromosome 15), it causes Prader-Willi syndrome due to the lack of paternally expressed genes at the imprinted site.

UPD has been described for many but not all chromosomes. In addition to the rare cases of autosomal recessive disease that result from isodisomy, clinical syndromes associated with UPD have been described for only a few chromosomes, including chromosomes 6, 7, 11, 14, 15 and 20.

UPD cannot be identified by gross cytogenetic analysis and requires molecular DNA-based analysis using multiple polymorphic markers spanning the chromosome of interest.

For optimal interpretation of results, specimens from both parents and the child or fetus are recommended. If only one parent specimen is submitted, testing can be performed; however, biparental inheritance and some types of UPD cannot be definitively established. Additionally, the likelihood for uninformative or inconclusive results is higher.

Reference Values

An interpretive report will be provided.

Interpretation

Microsatellite markers are compared between the proband and parental samples for the chromosome of interest. The pattern of the microsatellite markers will be classified as demonstrating uniparental disomy or biparental inheritance when sufficient informative markers are identified.

Cautions

Test results should be interpreted in the context of clinical findings, family history, and other laboratory data. Errors in the interpretation of results may occur if the information given is inaccurate or incomplete.

This test will detect nonpaternity.

Uniparental disomy (UPD) may not be detected by this assay in cases where there is low-level mosaicism for a particular chromosome.

This test only rules out whole-chromosome UPD and cannot reliably detect cases of segmental UPD. If testing is desired to rule out UPD 11 for Beckwith-Wiedemann syndrome or Russell-Silver syndrome, BWRS / Beckwith-Wiedemann Syndrome/Russell-Silver Syndrome, Molecular Analysis, Varies is the recommended test as it will also detect cases caused by segmental UPD.

Although UPD testing is available for all chromosomes, prenatal testing for UPD for chromosomes other than those associated with known phenotypes should be done only after genetic counseling involving adequate discussion of risks, benefits, and limitations of testing.

Clinical Reference

1. Del Gaudio D, Shinawi M, Astbury C, et al. Diagnostic testing for uniparental disomy: a points to consider statement from the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2020;22(7):1133-1141. doi:10.1038/s41436-020-0782-9
2. Kotzot D, Utermann G. Uniparental disomy (UPD) other than 15: phenotypes and bibliography updated. Am J Med Genet. 2005;136(3):287-305. doi:10.1002/ajmg.a.30483
3. Kotzot D. Prenatal testing for uniparental disomy: indications and clinical relevance. Ultrasound Obstet Gynecol. 2008:31(1):100-105. doi: 10.1002/uog.5133
4. Engel E. A fascination with chromosome rescue in uniparental disomy: Mendelian recessive outlaws and imprinting copyrights infringements. Eur J Hum Genet. 2006;14(11):1158-1169. doi:10.1038/sj.ejhg.5201619

Performance

Method Description

A polymerase chain reaction-based assay, using multiple microsatellite markers (dinucleotide repeats) for the specific chromosome being tested, is used to test DNA from parents and child for the presence of uniparental disomy.(Vnencak-Jones CL. Molecular testing for inherited diseases. Am J Clin Pathol. 1999;112[1 Suppl 1]:S19-S32)

PDF Report

No

Day(s) Performed

Monday and Wednesday

Report Available

5 to 21 days

Specimen Retention Time

Whole blood: 2 weeks (if available); Extracted DNA: 3 months

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

81402 – proband
81402 (if appropriate for parental specimen)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
UNIPD	Uniparental Disomy	36917-3

Result ID	Test Result Name	Result LOINC® Value
53356	Result Summary	50397-9
53357	Result	36917-3
53358	Interpretation	69047-9
53359	Reason for Referral	42349-1
53360	Specimen	31208-2
53361	Source	31208-2
53362	Method	85069-3
53363	Released By	18771-6