TO: ATTN:Seattle Sperm Bank

Integrated
GENETICS
LabCorp Specialty Testing Group

Client/Sending Facility:
Seattle Sperm Bank

4915 25th Ave Ne Ste 204
SEATTLE, WA 98105
Ph: (206)588-1484
Fax: (206) 466-4696 WAB-55

LCLS Specimen Number:	**222-129-1005-0**	Account Number:	[redacted]
Patient Name:	**12204, DONOR**	Ordering Physician:	**J OLLIFFE**
Date of Birth:	[redacted]	Specimen Type:	**BLOOD**
Gender:	M	Client Reference:	
Patient ID:		Date Collected:	08/10/2017
Lab Number:	(J17-3002 L	Date Received:	08/11/2017
Indications:	DONOR	Date Reported:	**08/18/2017**

Test: **Chromosome, Blood, Routine**

Cells Counted:	15	Cells Karyotyped:	2
Cells Analyzed:	5	Band Resolution:	550

CYTOGENETIC RESULT: 46,XY

INTERPRETATION: NORMAL MALE KARYOTYPE

Cytogenetic analysis of PHA stimulated cultures has revealed a MALE karyotype with an apparently normal GTG banding pattern in all cells observed.

This result does not exclude the possibility of subtle rearrangements below the resolution of cytogenetics or congenital anomalies due to other etiologies.

Integrated
GENETICS
LabCorp Specialty Testing Group

Client/Sending Facility:
Seattle Sperm Bank

4915 25th Ave Ne Ste 204
SEATTLE, WA 98105
Ph: (206)588-1484
Fax: (206) 466-4696 WAB-55

LCLS Specimen Number:	**222-129-1005-0**	Account Number:	[redacted]
Patient Name:	**12204, DONOR**	Ordering Physician:	**J OLLIFFE**
Date of Birth:	[redacted]	Specimen Type:	**BLOOD**
Gender:	M	Client Reference:	
Patient ID:		Date Collected:	08/10/2017
Lab Number:	(J17-3002 L	Date Received:	08/11/2017

[redacted]

Integrated
GENETICS
LabCorp Specialty Testing Group

Client/Sending Facility:
Seattle Sperm Bank

4915 25th Ave Ne Ste 204
SEATTLE, WA 98105
Ph: (206)588-1484
Fax: (206) 466-4696 WAB-55

LCLS Specimen Number: **222-129-1005-0**
Patient Name: **12204, DONOR**
Date of Birth: [redacted]
Gender: M
Patient ID:
Lab Number: (J17-3002 L

Account Number: [redacted]
Ordering Physician: **J OLLIFFE**
Specimen Type: **BLOOD**
Client Reference:
Date Collected: 08/10/2017
Date Received: 08/11/2017

Hiba Risheg

Hiba Risheg, PhD., FACMG

Patricia Kandalaft, MD
Medical Director
Peter Papenhausen, PhD
National Director of Cytogenetics

Technical component performed by Laboratory Corporation of America Holdings, 550 17th Ave. Suite 200 , SEATTLE , WA , 98122-5789 (206) 861-7050

Professional Component performed by LabCorp/Dynacare CLIA 50D0632667, 550 17th Ave. Suite 200, Seattle WA 98122-5789. Medical Director, Patricia Kandalaft, MD
Integrated Genetics is a brand used by Esoterix Genetic Laboratories, LLC, a wholly-owned subsidiary of Laboratory Corporation of America Holdings.

Counsyl

RESULTS RECIPIENT
SEATTLE SPERM BANK
Attn: Dr. Jeffrey Olliffe
4915 25th Ave NE, Suite 204W
Seattle, WA 98105
Phone: (206) 588-1484
Fax: (206) 466-4696
NPI: 1306838271
Report Date: 08/22/2017

MALE
DONOR 12204
DOB: [redacted]
Ethnicity: East Asian
Sample Type: EDTA Blood
Date of Collection: 08/10/2017
Date Received: 08/11/2017
Date Tested: 08/22/2017
Barcode: 11004212187624
Indication: Egg or sperm donor

FEMALE
N/A

Foresight™ Carrier Screen

POSITIVE: CARRIER

ABOUT THIS TEST

The **Counsyl Foresight Carrier Screen** utilizes sequencing, maximizing coverage across all DNA regions tested, to help you learn about your chance to have a child with a genetic disease.

RESULTS SUMMARY

Risk Details	**DONOR 12204**	**Partner**
Panel Information	Foresight Carrier Screen Universal Panel Minus X-Linked **(102 conditions tested)**	N/A
POSITIVE: CARRIER Hypophosphatasia, Autosomal Recessive **Reproductive Risk: 1 in 630** **Inheritance: Autosomal Recessive**	⊞ **CARRIER*** NM_000478.4(ALPL):c.407G>A (R136H, aka R119H) heterozygote †	The reproductive risk presented is based on a hypothetical pairing with a partner of the same ethnic group. Carrier testing should be considered. See "Next Steps".

†Likely to have a negative impact on gene function.
*Carriers generally do not experience symptoms.

No disease-causing mutations were detected in any other gene tested. A complete list of all conditions tested can be found on page 6.

CLINICAL NOTES

- None

NEXT STEPS

- Carrier testing should be considered for the diseases specified above for the patient's partner, as both parents must be carriers before a child is at high risk of developing the disease.
- Genetic counseling is recommended and patients may wish to discuss any positive results with blood relatives, as there is an increased chance that they are also carriers.

Counsyl has renamed its products effective July 19, 2017. The Family Prep Screen is now the Foresight Carrier Screen. The new names now appear on all communications from Counsyl. If you have any questions, please contact Counsyl directly.

RESULTS RECIPIENT
SEATTLE SPERM BANK
Attn: Dr. Jeffrey Olliffe
NPI: 1306838271
Report Date: 08/22/2017

MALE
DONOR 12204
DOB: [redacted]
Ethnicity: East Asian
Barcode: 11004212187624

FEMALE
N/A

POSITIVE: CARRIER

Hypophosphatasia, Autosomal Recessive

Reproductive risk: 1 in 630
Risk before testing: 1 in 100,000

Gene: ALPL | **Inheritance Pattern:** Autosomal Recessive

Patient	**DONOR 12204**	**No partner tested**
Result	⊞ Carrier	N/A
Variant(s)	NM_000478.4(ALPL):c.407G>A(R136H, aka R119H) heterozygote †	N/A
Methodology	Sequencing with copy number analysis	N/A
Interpretation	This individual is a carrier of hypophosphatasia, autosomal recessive. Carriers generally do not experience symptoms. R119H may be associated with a less severe form of hypophosphatasia, autosomal recessive.	N/A
Detection rate	>99%	N/A
Exons tested	NM_000478:2-12.	N/A

†Likely to have a negative impact on gene function.

What is Hypophosphatasia, Autosomal Recessive?

Hypophosphatasia is an inherited disorder that disrupts a process called mineralization, in which the body deposits minerals like calcium and phosphorus into teeth and bones. Proper mineralization is necessary to make bones strong and rigid, and make teeth strong enough to withstand years of chewing.

Hypophosphatasia can have two types of inheritance patterns: autosomal recessive (symptoms are seen when both disease genes have mutations) or autosomal dominant (symptoms occur when only one of two disease genes has a mutation). With autosomal recessive hypophosphatasia, symptoms can vary greatly depending upon which mutations a person carries. Some forms of the disease are severe while other forms are extremely mild.

The most severe form of hypophosphatasia appears before birth or in early childhood. In many cases, infants are stillborn because their skeletons fail to form. Other affected infants are born with short limbs, soft skull bones, and an abnormally shaped chest caused by soft, weak ribs. Approximately half the infants born with the condition die of respiratory failure in the first few weeks of life. Those who survive may have life-threatening complications such as breathing problems, seizures, or high blood calcium levels leading to kidney damage.

In a less severe form, children show the first signs of the condition by losing their baby teeth before the age of five. As they grow, they may be below average in height, with bowed legs or knock knees, large wrist and ankle joints, and an abnormally shaped skull. They are more prone to broken bones, bone pain, and arthritis. They may have trouble learning to walk or may develop a waddling gait. Their teeth may crack or decay more easily than normal.

The mildest form of the disorder is called odontohypophosphatasia. It only affects the teeth. People with this form of the condition have abnormal tooth development and lose their teeth early, but do not have skeletal abnormalities.

Occasionally, people with hypophosphatasia do not develop any symptoms until middle age. The most common symptoms are early tooth loss and frequent, slow-healing stress fractures in the feet. They may also develop arthritis.

How common is Hypophosphatasia, Autosomal Recessive?

Hypophosphatasia affects approximately 1 in 100,000 people and is most common in Caucasians. The disease is particularly common in a particular Mennonite population in Ontario, Canada, where it affects 1 in 2,500 people.

How is Hypophosphatasia, Autosomal Recessive treated?

Infants with the most severe form of the condition usually require mechanical help to breathe and may need surgery to release pressure within the skull. Vitamin B6 may relieve seizures.

Children and adults with hypophosphatasia should see a dentist every year, beginning at the age of one, to preserve teeth as long as possible. Adults will eventually need false teeth.

Aspirin, ibuprofen, and other pain relievers help with bone pain and arthritis. Although preventing bone fractures is difficult, orthotics may help with common fractures in the feet.

People with the condition should not take bisphosphonates, which are drugs commonly prescribed to treat other bone loss conditions such as osteoporosis. They should also avoid excess vitamin D, which can make calcium build up in the blood.

What is the prognosis for a person with Hypophosphatasia, Autosomal Recessive?

Approximately 50% of infants born with the severe form of the condition will die of respiratory failure in infancy. Exact lifespan for the rest is not known. People with the milder forms of the condition have normal lifespans.

Methods and Limitations

DONOR 12204 [Foresight Carrier Screen]: sequencing with copy number analysis, spinal muscular atrophy, and analysis of homologous regions.

Sequencing with copy number analysis

High-throughput sequencing and read depth-based copy number analysis are used to analyze the listed exons, as well as selected intergenic and intronic regions, of the genes in the Conditions Tested section of the report. The region of interest (ROI) of the test comprises these regions, in addition to the 20 intronic bases flanking each exon. In a minority of cases where genomic features (e.g., long homopolymers) compromise calling fidelity, the affected intronic bases are not included in the ROI. The ROI is sequenced to high coverage and the sequences are compared to standards and references of normal variation. More than 99% of all bases in the ROI are sequenced at greater than the minimum read depth. Mutations may not be detected in areas of lower sequence coverage. Small insertions and deletions may not be as accurately determined as single nucleotide variants. Genes that have closely related pseudogenes may be addressed by a different method. *CFTR* and *DMD* testing includes analysis for both large (exon-level) deletions and duplications with an average sensitivity of 99%, while other genes are only analyzed for large deletions with a sensitivity of >75%. However, the sensitivity may be higher for selected founder deletions. If *GJB2* is tested, two large upstream deletions which overlap *GJB6* and affect the expression of *GJB2*, del(*GJB6*-D13S1830) and del(*GJB6*-D13S1854), are also analyzed. Mosaicism or somatic variants present at low levels may not be detected. If detected, these may not be reported.

Detection rates are determined by using literature to estimate the fraction of disease alleles, weighted by frequency, that the methodology is unable to detect. Detection rates only account for analytical sensitivity and certain variants that have been previously described in the literature may not be reported if there is insufficient evidence for pathogenicity. Detection rates do not account for the disease-specific rates of de novo mutations.

All variants that are a recognized cause of the disease will be reported. In addition, variants that have not previously been established as a recognized cause of disease may be identified. In these cases, only variants classified as "likely" pathogenic are reported. Likely pathogenic variants are described elsewhere in the report as "likely to have a negative impact on gene function". Likely pathogenic variants are evaluated and classified by assessing the nature of the variant and reviewing reports of allele frequencies in cases and controls, functional studies, variant annotation and effect prediction, and segregation studies. Exon level duplications are assumed to be in tandem and are classified according to their predicted effect on the reading frame. Benign variants, variants of uncertain significance, and variants not directly associated with the intended disease phenotype are not reported. Curation summaries of reported variants are available upon request.

Spinal muscular atrophy

Targeted copy number analysis is used to determine the copy number of exon 7 of the *SMN1* gene relative to other genes. Other mutations may interfere with this analysis. Some individuals with two copies of *SMN1* are carriers with two *SMN1* genes on one chromosome and a *SMN1* deletion on the other chromosome. This is more likely in individuals who have 2 copies of the *SMN1* gene and are positive for the g.27134T>G SNP, which affects the reported residual risk; Ashkenazi Jewish or Asian patients with this genotype have a high post-test likelihood of being carriers for SMA and are reported as carriers. The g.27134T>G SNP is only reported in individuals who have 2 copies of *SMN1*.

Analysis of homologous regions

A combination of high-throughput sequencing, read depth-based copy number analysis, and targeted genotyping is used to determine the number of functional gene copies and/or the presence of selected loss of function mutations in certain genes that have homology to other regions. The precise breakpoints of large deletions in these genes cannot be determined, but are estimated from copy number analysis. High numbers of pseudogene copies may interfere with this analysis.

If *CYP21A2* is tested, patients who have one or more additional copies of the *CYP21A2* gene and a loss of function mutation may not actually be a carrier of 21-hydroxylase-deficient congenital adrenal hyperplasia (CAH). Because the true incidence of non-classic CAH is unknown, the residual carrier and reproductive risk numbers on the report are only based on published incidences for classic CAH. However, the published prevalence of non-classic CAH is highest in individuals of Ashkenazi Jewish, Hispanic, Italian, and Yugoslav descent. Therefore, the residual and reproductive risks are likely an underestimate of overall chances for 21-hydroxylase-deficient CAH, especially in the aforementioned populations, as they do not account for non-classic CAH. If *HBA1*/*HBA2* are tested, some individuals with four alpha globin genes may be carriers, with three genes on one chromosome and a deletion on the other chromosome. This and similar, but rare, carrier states, where complementary changes exist in both the gene and a pseudogene, may not be detected by the assay.

Limitations

In an unknown number of cases, nearby genetic variants may interfere with mutation detection. Other possible sources of diagnostic error include sample mix-up, trace contamination, bone marrow transplantation, blood transfusions and technical errors. This test is designed to detect and report germline alterations. While somatic variants present at low levels may be detected, these may not be reported. If more than one variant is detected in a gene, additional studies may be necessary to determine if those variants lie on the same chromosome or different chromosomes. The test does not fully address all inherited forms of intellectual disability, birth defects and genetic disease. A family history of any of these conditions may warrant additional evaluation. Furthermore, not all mutations will be identified in the genes analyzed and additional testing may be beneficial for some patients. For example, individuals of African, Southeast Asian, and Mediterranean ancestry are at increased risk for being carriers for hemoglobinopathies, which can be identified by CBC and hemoglobin electrophoresis or HPLC (*ACOG Practice Bulletin No. 78. Obstet.Gynecol. 2007;109:229-37*).

This test was developed and its performance characteristics determined by Counsyl, Inc. It has not been cleared or approved by the US Food and Drug Administration (FDA). The FDA does not require this test to go through premarket review. This test is used for clinical purposes. It should not be regarded as investigational or for research. This laboratory is certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA) as qualified to perform high-complexity clinical testing. These results are adjunctive to the ordering physician's evaluation. CLIA Number: **#05D1102604**.

LAB DIRECTORS

Hyunseok Kang

H. Peter Kang, MD, MS, FCAP

Conditions Tested

21-hydroxylase-deficient Congenital Adrenal Hyperplasia - Gene: CYP21A2. Autosomal Recessive. Analysis of Homologous Regions. **Variants (13):** CYP21A2 deletion, CYP21A2 duplication, CYP21A2 triplication, G111Vfs*21, I173N, L308FfsX6, P31L, Q319*, Q319*+CYP21A2dup, R357W, V281L, [I237N;V238E;M240K], c.293-13C>G. **Detection Rate:** East Asian 88%.

ABCC8-related Hyperinsulinism - Gene: ABCC8. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000352:1-39. **Detection Rate:** East Asian >99%.

Alkaptonuria - Gene: HGD. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000187:1-14. **Detection Rate:** East Asian >99%.

Alpha Thalassemia - Genes: HBA1, HBA2. Autosomal Recessive. Analysis of Homologous Regions. **Variants (13):** -(alpha)20.5, --BRIT, --MEDI, --MEDII, --SEA, --THAI or --FIL, -alpha3.7, -alpha4.2, HBA1+HBA2 deletion, Hb Constant Spring, anti3.7, anti4.2, del HS-40. **Detection Rate:** East Asian 90%.

Alpha-1 Antitrypsin Deficiency - Gene: SERPINA1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000295:2-5. **Detection Rate:** East Asian >99%.

Alpha-mannosidosis - Gene: MAN2B1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000528:1-23. **Detection Rate:** East Asian >99%.

Alpha-sarcoglycanopathy - Gene: SGCA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000023:1-9. **Detection Rate:** East Asian >99%.

Andermann Syndrome - Gene: SLC12A6. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_133647:1-25. **Detection Rate:** East Asian >99%.

ARSACS - Gene: SACS. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_014363:2-10. **Detection Rate:** East Asian 99%.

Aspartylglycosaminuria - Gene: AGA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000027:1-9. **Detection Rate:** East Asian >99%.

Ataxia with Vitamin E Deficiency - Gene: TTPA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000370:1-5. **Detection Rate:** East Asian >99%.

Ataxia-telangiectasia - Gene: ATM. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000051:2-63. **Detection Rate:** East Asian >99%.

Bardet-Biedl Syndrome, BBS1-related - Gene: BBS1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_024649:1-17. **Detection Rate:** East Asian >99%.

Bardet-Biedl Syndrome, BBS10-related - Gene: BBS10. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_024685:1-2. **Detection Rate:** East Asian >99%.

Beta-sarcoglycanopathy - Gene: SGCB. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000232:1-6. **Detection Rate:** East Asian >99%.

Biotinidase Deficiency - Gene: BTD. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000060:1-4. **Detection Rate:** East Asian >99%.

Bloom Syndrome - Gene: BLM. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000057:2-22. **Detection Rate:** East Asian >99%.

Canavan Disease - Gene: ASPA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000049:1-6. **Detection Rate:** East Asian 98%.

Carnitine Palmitoyltransferase IA Deficiency - Gene: CPT1A. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001876:2-19. **Detection Rate:** East Asian >99%.

Carnitine Palmitoyltransferase II Deficiency - Gene: CPT2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000098:1-5. **Detection Rate:** East Asian >99%.

Cartilage-hair Hypoplasia - Gene: RMRP. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exon:** NR_003051:1. **Detection Rate:** East Asian >99%.

Citrullinemia Type 1 - Gene: ASS1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000050:3-16. **Detection Rate:** East Asian 86%.

CLN3-related Neuronal Ceroid Lipofuscinosis - Gene: CLN3. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001042432:2-16. **Detection Rate:** East Asian >99%.

CLN5-related Neuronal Ceroid Lipofuscinosis - Gene: CLN5. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_006493:1-4. **Detection Rate:** East Asian >99%.

CNGB3-related Achromatopsia - Gene: CNGB3. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_019098:1-18. **Detection Rate:** East Asian >99%.

Cohen Syndrome - Gene: VPS13B. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_017890:2-62. **Detection Rate:** East Asian 97%.

Congenital Disorder of Glycosylation Type Ia - Gene: PMM2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000303:1-8. **Detection Rate:** East Asian >99%.

Congenital Disorder of Glycosylation Type Ib - Gene: MPI. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_002435:1-8. **Detection Rate:** East Asian >99%.

Congenital Finnish Nephrosis - Gene: NPHS1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_004646:1-29. **Detection Rate:** East Asian >99%.

Costeff Optic Atrophy Syndrome - Gene: OPA3. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_025136:1-2. **Detection Rate:** East Asian >99%.

Cystic Fibrosis - Gene: CFTR. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000492:1-27. IVS8-5T allele analysis is only reported in the presence of the R117H mutation. **Detection Rate:** East Asian >99%.

Cystinosis - Gene: CTNS. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_004937:3-12. **Detection Rate:** East Asian >99%.

D-bifunctional Protein Deficiency - Gene: HSD17B4. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000414:1-24. **Detection Rate:** East Asian 98%.

Dihydropyrimidine Dehydrogenase Deficiency - Gene: DPYD. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000110:1-23. **Detection Rate:** East Asian 98%.

Factor XI Deficiency - Gene: F11. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000128:2-15. **Detection Rate:** East Asian >99%.

Familial Dysautonomia - Gene: IKBKAP. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_003640:2-37. **Detection Rate:** East Asian >99%.

Familial Mediterranean Fever - Gene: MEFV. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000243:1-10. **Detection Rate:** East Asian >99%.

Fanconi Anemia Type C - Gene: FANCC. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000136:2-15. **Detection Rate:** East Asian >99%.

FKTN-related Disorders - Gene: FKTN. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001079802:3-11. **Detection Rate:** East Asian 10%.

Galactosemia - Gene: GALT. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000155:1-11. **Detection Rate:** East Asian >99%.

Gaucher Disease - Gene: GBA. Autosomal Recessive. Analysis of Homologous Regions. **Variants (10):** D409V, D448H, IVS2+1G>A, L444P, N370S, R463C, R463H, R496H, V394L, p.L29Afs*18. **Detection Rate:** East Asian 60%.

GJB2-related DFNB1 Nonsyndromic Hearing Loss and Deafness - Gene: GJB2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_004004:1-2. **Detection Rate:** East Asian >99%.

Glutaric Acidemia Type 1 - Gene: GCDH. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000159:2-12. **Detection Rate:** East Asian >99%.

Glycogen Storage Disease Type Ia - Gene: G6PC. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000151:1-5. **Detection Rate:** East Asian >99%.

Glycogen Storage Disease Type Ib - Gene: SLC37A4. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001164277:3-11. **Detection Rate:** East Asian >99%.

Glycogen Storage Disease Type III - Gene: AGL. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000642:2-34. **Detection Rate:** East Asian >99%.

Glycogen Storage Disease Type V - Gene: PYGM. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_005609:1-20. **Detection Rate:** East Asian >99%.

GRACILE Syndrome - Gene: BCS1L. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_004328:3-9. **Detection Rate:** East Asian >99%.

HADHA-related Disorders - Gene: HADHA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000182:1-20. **Detection Rate:** East Asian >99%.

Hb Beta Chain-related Hemoglobinopathy (Including Beta Thalassemia and Sickle Cell Disease) - Gene: HBB. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000518:1-3. **Detection Rate:** East Asian >99%.

Hereditary Fructose Intolerance - **Gene:** ALDOB. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000035:2-9. **Detection Rate:** East Asian >99%.

Herlitz Junctional Epidermolysis Bullosa, LAMA3-related - **Gene:** LAMA3. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000227:1-38. **Detection Rate:** East Asian >99%.

Herlitz Junctional Epidermolysis Bullosa, LAMB3-related - **Gene:** LAMB3. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000228:2-23. **Detection Rate:** East Asian >99%.

Herlitz Junctional Epidermolysis Bullosa, LAMC2-related - **Gene:** LAMC2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_005562:1-23. **Detection Rate:** East Asian >99%.

Hexosaminidase A Deficiency (Including Tay-Sachs Disease) - **Gene:** HEXA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000520:1-14. **Detection Rate:** East Asian >99%.

Homocystinuria Caused by Cystathionine Beta-synthase Deficiency - **Gene:** CBS. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000071:3-17. **Detection Rate:** East Asian >99%.

Hypophosphatasia, Autosomal Recessive - **Gene:** ALPL. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000478:2-12. **Detection Rate:** East Asian >99%.

Inclusion Body Myopathy 2 - **Gene:** GNE. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001128227:1-12. **Detection Rate:** East Asian >99%.

Isovaleric Acidemia - **Gene:** IVD. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_002225:1-12. **Detection Rate:** East Asian >99%.

Joubert Syndrome 2 - **Gene:** TMEM216. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001173990:1-5. **Detection Rate:** East Asian >99%.

Krabbe Disease - **Gene:** GALC. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000153:1-17. **Detection Rate:** East Asian >99%.

Lipoamide Dehydrogenase Deficiency - **Gene:** DLD. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000108:1-14. **Detection Rate:** East Asian >99%.

Maple Syrup Urine Disease Type 1B - **Gene:** BCKDHB. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_183050:1-10. **Detection Rate:** East Asian >99%.

Medium Chain Acyl-CoA Dehydrogenase Deficiency - **Gene:** ACADM. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000016:1-12. **Detection Rate:** East Asian >99%.

Megalencephalic Leukoencephalopathy with Subcortical Cysts - **Gene:** MLC1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_015166:2-12. **Detection Rate:** East Asian >99%.

Metachromatic Leukodystrophy - **Gene:** ARSA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000487:1-8. **Detection Rate:** East Asian >99%.

Mucolipidosis IV - **Gene:** MCOLN1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_020533:1-14. **Detection Rate:** East Asian >99%.

Mucopolysaccharidosis Type I - **Gene:** IDUA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000203:1-14. **Detection Rate:** East Asian >99%.

Muscle-eye-brain Disease - **Gene:** POMGNT1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_017739:2-22. **Detection Rate:** East Asian 96%.

NEB-related Nemaline Myopathy - **Gene:** NEB. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001271208:3-80,117-183. **Detection Rate:** East Asian 92%.

Niemann-Pick Disease Type C - **Gene:** NPC1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000271:1-25. **Detection Rate:** East Asian >99%.

Niemann-Pick Disease, SMPD1-associated - **Gene:** SMPD1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000543:1-6. **Detection Rate:** East Asian >99%.

Nijmegen Breakage Syndrome - **Gene:** NBN. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_002485:1-16. **Detection Rate:** East Asian >99%.

Northern Epilepsy - **Gene:** CLN8. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_018941:2-3. **Detection Rate:** East Asian >99%.

PCDH15-related Disorders - **Gene:** PCDH15. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_033056:2-33. **Detection Rate:** East Asian 93%.

Pendred Syndrome - **Gene:** SLC26A4. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000441:2-21. **Detection Rate:** East Asian >99%.

PEX1-related Zellweger Syndrome Spectrum - **Gene:** PEX1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000466:1-24. **Detection Rate:** East Asian >99%.

Phenylalanine Hydroxylase Deficiency - **Gene:** PAH. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000277:1-13. **Detection Rate:** East Asian >99%.

PKHD1-related Autosomal Recessive Polycystic Kidney Disease - **Gene:** PKHD1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_138694:2-67. **Detection Rate:** East Asian >99%.

Polyglandular Autoimmune Syndrome Type 1 - **Gene:** AIRE. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000383:1-14. **Detection Rate:** East Asian >99%.

Pompe Disease - **Gene:** GAA. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000152:2-20. **Detection Rate:** East Asian >99%.

PPT1-related Neuronal Ceroid Lipofuscinosis - **Gene:** PPT1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000310:1-9. **Detection Rate:** East Asian >99%.

Primary Carnitine Deficiency - **Gene:** SLC22A5. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_003060:1-10. **Detection Rate:** East Asian >99%.

Primary Hyperoxaluria Type 1 - **Gene:** AGXT. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000030:1-11. **Detection Rate:** East Asian >99%.

Primary Hyperoxaluria Type 2 - **Gene:** GRHPR. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_012203:1-9. **Detection Rate:** East Asian >99%.

PROP1-related Combined Pituitary Hormone Deficiency - **Gene:** PROP1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_006261:1-3. **Detection Rate:** East Asian >99%.

Pseudocholinesterase Deficiency - **Gene:** BCHE. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000055:2-4. **Detection Rate:** East Asian >99%.

Pycnodysostosis - **Gene:** CTSK. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000396:2-8. **Detection Rate:** East Asian >99%.

Rhizomelic Chondrodysplasia Punctata Type 1 - **Gene:** PEX7. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000288:1-10. **Detection Rate:** East Asian >99%.

Salla Disease - **Gene:** SLC17A5. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_012434:1-11. **Detection Rate:** East Asian 98%.

Segawa Syndrome - **Gene:** TH. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000360:1-13. **Detection Rate:** East Asian >99%.

Short Chain Acyl-CoA Dehydrogenase Deficiency - **Gene:** ACADS. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000017:1-10. **Detection Rate:** East Asian >99%.

Sjogren-Larsson Syndrome - **Gene:** ALDH3A2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000382:1-10. **Detection Rate:** East Asian 97%.

Smith-Lemli-Opitz Syndrome - **Gene:** DHCR7. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_001360:3-9. **Detection Rate:** East Asian >99%.

Spinal Muscular Atrophy - **Gene:** SMN1. Autosomal Recessive. Spinal Muscular Atrophy. **Variant (1):** SMN1 copy number. **Detection Rate:** East Asian 93%.

Steroid-resistant Nephrotic Syndrome - **Gene:** NPHS2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_014625:1-8. **Detection Rate:** East Asian >99%.

Sulfate Transporter-related Osteochondrodysplasia - **Gene:** SLC26A2. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000112:2-3. **Detection Rate:** East Asian >99%.

TPP1-related Neuronal Ceroid Lipofuscinosis - **Gene:** TPP1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000391:1-13. **Detection Rate:** East Asian >99%.

Tyrosinemia Type I - **Gene:** FAH. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000137:1-14. **Detection Rate:** East Asian >99%.

Usher Syndrome Type 3 - **Gene:** CLRN1. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_174878:1-3. **Detection Rate:** East Asian >99%.

Very Long Chain Acyl-CoA Dehydrogenase Deficiency - **Gene:** ACADVL. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000018:1-20. **Detection Rate:** East Asian >99%.

Wilson Disease - **Gene:** ATP7B. Autosomal Recessive. Sequencing with Copy Number Analysis. **Exons:** NM_000053:1-21. **Detection Rate:** East Asian >99%.

Risk Calculations

Below are the risk calculations for all conditions tested. Since negative results do not completely rule out the possibility of being a carrier, the **residual risk** represents the patient's post-test likelihood of being a carrier and the **reproductive risk** represents the likelihood the patient's future children could inherit each disease. These risks are inherent to all carrier screening tests, may vary by ethnicity, are predicated on a negative family history and are present even after a negative test result. Inaccurate reporting of ethnicity may cause errors in risk calculation. The reproductive risk presented is based on a hypothetical pairing with a partner of the same ethnic group.

†Indicates a positive result. See the full clinical report for interpretation and details.

Disease	DONOR 12204 Residual Risk	Reproductive Risk
21-hydroxylase-deficient Congenital Adrenal Hyperplasia	1 in 590	1 in 170,000
ABCC8-related Hyperinsulinism	1 in 11,000	< 1 in 1,000,000
Alkaptonuria	1 in 39,000	< 1 in 1,000,000
Alpha Thalassemia	Alpha globin status: aa/aa.	Not calculated
Alpha-1 Antitrypsin Deficiency	< 1 in 50,000	< 1 in 1,000,000
Alpha-mannosidosis	1 in 35,000	< 1 in 1,000,000
Alpha-sarcoglycanopathy	1 in 45,000	< 1 in 1,000,000
Andermann Syndrome	< 1 in 50,000	< 1 in 1,000,000
ARSACS	< 1 in 44,000	< 1 in 1,000,000
Aspartylglycosaminuria	< 1 in 50,000	< 1 in 1,000,000
Ataxia with Vitamin E Deficiency	< 1 in 50,000	< 1 in 1,000,000
Ataxia-telangiectasia	1 in 16,000	< 1 in 1,000,000
Bardet-Biedl Syndrome, BBS1-related	1 in 16,000	< 1 in 1,000,000
Bardet-Biedl Syndrome, BBS10-related	1 in 16,000	< 1 in 1,000,000
Beta-sarcoglycanopathy	< 1 in 50,000	< 1 in 1,000,000
Biotinidase Deficiency	1 in 67,000	< 1 in 1,000,000
Bloom Syndrome	< 1 in 50,000	< 1 in 1,000,000
Canavan Disease	< 1 in 31,000	< 1 in 1,000,000
Carnitine Palmitoyltransferase IA Deficiency	< 1 in 50,000	< 1 in 1,000,000
Carnitine Palmitoyltransferase II Deficiency	< 1 in 50,000	< 1 in 1,000,000
Cartilage-hair Hypoplasia	< 1 in 50,000	< 1 in 1,000,000
Citrullinemia Type 1	1 in 860	1 in 410,000
CLN3-related Neuronal Ceroid Lipofuscinosis	1 in 22,000	< 1 in 1,000,000
CLN5-related Neuronal Ceroid Lipofuscinosis	< 1 in 50,000	< 1 in 1,000,000
CNGB3-related Achromatopsia	1 in 11,000	< 1 in 1,000,000
Cohen Syndrome	< 1 in 15,000	< 1 in 1,000,000
Congenital Disorder of Glycosylation Type Ia	1 in 16,000	< 1 in 1,000,000
Congenital Disorder of Glycosylation Type Ib	< 1 in 50,000	< 1 in 1,000,000
Congenital Finnish Nephrosis	< 1 in 50,000	< 1 in 1,000,000
Costeff Optic Atrophy Syndrome	< 1 in 50,000	< 1 in 1,000,000
Cystic Fibrosis	1 in 8,600	< 1 in 1,000,000
Cystinosis	1 in 22,000	< 1 in 1,000,000
D-bifunctional Protein Deficiency	1 in 9,000	< 1 in 1,000,000
Dihydropyrimidine Dehydrogenase Deficiency	< 1 in 29,000	< 1 in 1,000,000
Factor XI Deficiency	< 1 in 50,000	< 1 in 1,000,000
Familial Dysautonomia	< 1 in 50,000	< 1 in 1,000,000
Familial Mediterranean Fever	< 1 in 50,000	< 1 in 1,000,000
Fanconi Anemia Type C	1 in 16,000	< 1 in 1,000,000
FKTN-related Disorders	1 in 210	1 in 160,000
Galactosemia	< 1 in 50,000	< 1 in 1,000,000
Gaucher Disease	1 in 280	1 in 120,000
GJB2-related DFNB1 Nonsyndromic Hearing Loss and Deafness	1 in 10,000	< 1 in 1,000,000
Glutaric Acidemia Type 1	1 in 10,000	< 1 in 1,000,000
Glycogen Storage Disease Type Ia	1 in 18,000	< 1 in 1,000,000
Glycogen Storage Disease Type Ib	1 in 35,000	< 1 in 1,000,000
Glycogen Storage Disease Type III	1 in 16,000	< 1 in 1,000,000
Glycogen Storage Disease Type V	1 in 16,000	< 1 in 1,000,000
GRACILE Syndrome	< 1 in 50,000	< 1 in 1,000,000

Disease	DONOR 12204 Residual Risk	Reproductive Risk
HADHA-related Disorders	1 in 15,000	< 1 in 1,000,000
Hb Beta Chain-related Hemoglobinopathy (Including Beta Thalassemia and Sickle Cell Disease)	1 in 4,300	1 in 740,000
Hereditary Fructose Intolerance	< 1 in 50,000	< 1 in 1,000,000
Herlitz Junctional Epidermolysis Bullosa, LAMA3-related	< 1 in 50,000	< 1 in 1,000,000
Herlitz Junctional Epidermolysis Bullosa, LAMB3-related	< 1 in 50,000	< 1 in 1,000,000
Herlitz Junctional Epidermolysis Bullosa, LAMC2-related	< 1 in 50,000	< 1 in 1,000,000
Hexosaminidase A Deficiency (Including Tay-Sachs Disease)	1 in 30,000	< 1 in 1,000,000
Homocystinuria Caused by Cystathionine Beta-synthase Deficiency	1 in 25,000	< 1 in 1,000,000
Hypophosphatasia, Autosomal Recessive	NM_000478.4(ALPL):c.407G>A(R136H, aka R119H) heterozygote †	1 in 630
Inclusion Body Myopathy 2	< 1 in 50,000	< 1 in 1,000,000
Isovaleric Acidemia	1 in 25,000	< 1 in 1,000,000
Joubert Syndrome 2	< 1 in 50,000	< 1 in 1,000,000
Krabbe Disease	1 in 15,000	< 1 in 1,000,000
Lipoamide Dehydrogenase Deficiency	< 1 in 50,000	< 1 in 1,000,000
Maple Syrup Urine Disease Type 1B	1 in 25,000	< 1 in 1,000,000
Medium Chain Acyl-CoA Dehydrogenase Deficiency	1 in 11,000	< 1 in 1,000,000
Megalencephalic Leukoencephalopathy with Subcortical Cysts	< 1 in 50,000	< 1 in 1,000,000
Metachromatic Leukodystrophy	1 in 20,000	< 1 in 1,000,000
Mucolipidosis IV	< 1 in 50,000	< 1 in 1,000,000
Mucopolysaccharidosis Type I	1 in 47,000	< 1 in 1,000,000
Muscle-eye-brain Disease	< 1 in 12,000	< 1 in 1,000,000
NEB-related Nemaline Myopathy	< 1 in 6,700	< 1 in 1,000,000
Niemann-Pick Disease Type C	1 in 19,000	< 1 in 1,000,000
Niemann-Pick Disease, SMPD1-associated	1 in 25,000	< 1 in 1,000,000
Nijmegen Breakage Syndrome	1 in 16,000	< 1 in 1,000,000
Northern Epilepsy	< 1 in 50,000	< 1 in 1,000,000
PCDH15-related Disorders	1 in 5,300	< 1 in 1,000,000
Pendred Syndrome	1 in 7,000	< 1 in 1,000,000
PEX1-related Zellweger Syndrome Spectrum	1 in 35,000	< 1 in 1,000,000
Phenylalanine Hydroxylase Deficiency	1 in 5,000	1 in 990,000
PKHD1-related Autosomal Recessive Polycystic Kidney Disease	< 1 in 50,000	< 1 in 1,000,000
Polyglandular Autoimmune Syndrome Type 1	< 1 in 50,000	< 1 in 1,000,000
Pompe Disease	1 in 11,000	< 1 in 1,000,000
PPT1-related Neuronal Ceroid Lipofuscinosis	< 1 in 50,000	< 1 in 1,000,000
Primary Carnitine Deficiency	1 in 12,000	< 1 in 1,000,000
Primary Hyperoxaluria Type 1	1 in 35,000	< 1 in 1,000,000
Primary Hyperoxaluria Type 2	< 1 in 50,000	< 1 in 1,000,000
PROP1-related Combined Pituitary Hormone Deficiency	1 in 11,000	< 1 in 1,000,000
Pseudocholinesterase Deficiency (Mild Condition)	1 in 2,700	1 in 300,000
Pycnodysostosis	< 1 in 50,000	< 1 in 1,000,000
Rhizomelic Chondrodysplasia Punctata Type 1	1 in 16,000	< 1 in 1,000,000
Salla Disease	< 1 in 30,000	< 1 in 1,000,000
Segawa Syndrome	< 1 in 50,000	< 1 in 1,000,000
Short Chain Acyl-CoA Dehydrogenase Deficiency	1 in 16,000	< 1 in 1,000,000
Sjogren-Larsson Syndrome	1 in 9,100	< 1 in 1,000,000
Smith-Lemli-Opitz Syndrome	< 1 in 50,000	< 1 in 1,000,000
Spinal Muscular Atrophy	Negative for g.27134T>G SNP SMN1: 2 copies 1 in 700	1 in 150,000
Steroid-resistant Nephrotic Syndrome	1 in 40,000	< 1 in 1,000,000
Sulfate Transporter-related Osteochondrodysplasia	1 in 11,000	< 1 in 1,000,000
TPP1-related Neuronal Ceroid Lipofuscinosis	1 in 30,000	< 1 in 1,000,000
Tyrosinemia Type I	1 in 17,000	< 1 in 1,000,000
Usher Syndrome Type 3	< 1 in 50,000	< 1 in 1,000,000
Very Long Chain Acyl-CoA Dehydrogenase Deficiency	1 in 8,800	< 1 in 1,000,000
Wilson Disease	1 in 5,000	1 in 990,000