



RESULTS RECIPIENT  
**SEATTLE SPERM BANK**  
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 NPI: 1306838271  
 Report Date: 08/05/2019

MALE  
**DONOR 12475**  
 DOB: ██████████  
 Ethnicity: Mixed or Other  
 Caucasian  
 Sample Type: EDTA Blood  
 Date of Collection: 07/30/2019  
 Date Received: 07/31/2019  
 Date Tested: 08/05/2019  
 Barcode: 11004212719062  
 Accession ID: CSLPYUKYGNJHNXX  
 Indication: Egg or sperm donor

# Foresight® Carrier Screen

**POSITIVE: CARRIER**

## ABOUT THIS TEST

The **Myriad 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 12475	Partner
Panel Information	Foresight Carrier Screen Universal Panel Fundamental Plus Panel Fundamental Panel (175 conditions tested)	N/A
<b>POSITIVE: CARRIER</b> <b>Biotinidase Deficiency</b> Reproductive Risk: 1 in 510 Inheritance: Autosomal Recessive	<b>CARRIER*</b> NM_000060.2(BTD):c.1330G>C (D444H) 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".

\*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.

## POSITIVE: CARRIER

# Biotinidase Deficiency

**Reproductive risk: 1 in 510**  
 Risk before testing: 1 in 3,200

Gene: *BTD* | Inheritance Pattern: Autosomal Recessive

<b>Patient</b>	<b>DONOR 12475</b>	<b>No partner tested</b>
<b>Result</b>	Carrier	N/A
<b>Variant(s)</b>	NM_000060.2( <i>BTD</i> ):c.1330G>C(D444H) heterozygote	N/A
<b>Methodology</b>	Sequencing with copy number analysis	N/A
<b>Interpretation</b>	This individual is a carrier of biotinidase deficiency. Carriers generally do not experience symptoms. D444H is a partial biotinidase deficiency mutation.	N/A
<b>Detection rate</b>	>99%	N/A
<b>Exons tested</b>	NM_000060:1-4.	N/A

## What Is Biotinidase Deficiency?

Biotinidase deficiency is a highly treatable inherited disease in which the body cannot process biotin (vitamin B7), due to a deficiency in an enzyme called biotinidase. Biotinidase deficiency is caused by mutations in the *BTD* gene.

### PROFOUND BIOTINIDASE DEFICIENCY

Individuals who have less than 10% of the normal amount of the enzyme biotinidase are said to have profound biotinidase deficiency. Without treatment, their symptoms tend to be significant. Individuals with biotinidase deficiency can experience seizures, poor muscle tone, difficulty with movement and balance, vision loss, hearing loss, skin rashes, breathing problems, hair loss, fungal infections, and intellectual and/or developmental delays. These symptoms often begin after the first few weeks or months of life and can be life-threatening if untreated.

### PARTIAL BIOTINIDASE DEFICIENCY

Individuals who have between 10% and 30% of the normal amounts of biotinidase have a milder form of the disease known as partial biotinidase deficiency. They may experience less-severe symptoms, or they may not show any symptoms until they become ill or stressed.

## How Common Is Biotinidase Deficiency?

The incidence of profound biotinidase deficiency is approximately 1 in 137,000 births. The prevalence of partial biotinidase deficiency is approximately 1 in 110,000 people. Since partial biotinidase deficiency can be mild, it is possible that the true prevalence is more common.

## How Is Biotinidase Deficiency Treated?

Biotinidase deficiency is treated with a biotin pill taken daily by mouth. A physician can determine the proper dosage and adjust that dosage over time if necessary. This treatment is lifelong and highly effective. Both people with profound biotinidase deficiency and partial biotinidase deficiency should take biotin supplements.



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N/A

It is important to start biotin supplementation as soon as possible. Treatment with biotin supplements can help improve some symptoms of biotinidase deficiency. If there is delayed treatment, symptoms such as vision loss, hearing loss, and developmental delay are not reversible.

For people who have vision or hearing loss, vision aids or hearing aids may be helpful. Learning specialists can help patients with intellectual delay learn as effectively as possible.

## What Is the Prognosis for a Person with Biotinidase Deficiency?

With early detection and treatment, a person with biotinidase deficiency can live a completely normal life. If left untreated, the disease can cause life-threatening complications. When the disease is not detected early, patients may experience permanent damage to their hearing, vision, and intellectual ability. In cases where the disease is entirely unrecognized, it can be life-threatening.

## Methods and Limitations

**DONOR 12475 [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. The breakpoints of copy number variants and exons affected are estimated from probe positions. Only exons known to be included in the copy number variant are provided in the name. In some cases, the copy number variant may be larger or smaller than indicated. 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.



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N/A

## 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 Myriad Women's Health, 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**.

## Resources

**GENOME CONNECT** | <http://www.genomeconnect.org>

Patients can share their reports via research registries such as Genome Connect, an online research registry working to build the knowledge base about genetics and health. Genome Connect provides patients, physicians, and researchers an opportunity to share genetic information to support the study of the impact of genetic variation on health conditions.

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### SENIOR LABORATORY DIRECTOR

Jack Ji, PhD, FACMG

Report content approved by Jack Ji, PhD, FACMG on Aug 5, 2019

# Conditions Tested

**11-beta-hydroxylase-deficient Congenital Adrenal Hyperplasia** - Gene: CYP11B1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000497:1-9. **Detection Rate:** Mixed or Other Caucasian 94%.

**6-pyruvoyl-tetrahydropterin Synthase Deficiency** - Gene: PTS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000317:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**ABCC8-related Familial Hyperinsulinism** - Gene: ABCC8. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000352:1-39. **Detection Rate:** Mixed or Other Caucasian >99%.

**Adenosine Deaminase Deficiency** - Gene: ADA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000022:1-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Alpha Thalassemia** - Genes: HBA1, HBA2. Autosomal Recessive. Analysis of homologous regions. Variants (13): -(alpha)20.5, --BRIT, --MEDI, --MEDI1, --SEA, --THAI or --FIL, -alpha3.7, -alpha4.2, HBA1+HBA2 deletion, Hb Constant Spring, anti3.7, anti4.2, del HS-40. **Detection Rate:** Unknown due to rarity of disease.

**Alpha-mannosidosis** - Gene: MAN2B1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000528:1-23. **Detection Rate:** Mixed or Other Caucasian >99%.

**Alpha-sarcoglycanopathy** - Gene: SGCA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000023:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Alstrom Syndrome** - Gene: ALMS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_015120:1-23. **Detection Rate:** Mixed or Other Caucasian >99%.

**AMT-related Glycine Encephalopathy** - Gene: AMT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000481:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Andermann Syndrome** - Gene: SLC12A6. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_133647:1-25. **Detection Rate:** Mixed or Other Caucasian >99%.

**Argininemia** - Gene: ARG1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000045:1-8. **Detection Rate:** Mixed or Other Caucasian 97%.

**Argininosuccinic Aciduria** - Gene: ASL. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001024943:1-16. **Detection Rate:** Mixed or Other Caucasian >99%.

**Aspartylglucosaminuria** - Gene: AGA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000027:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Ataxia with Vitamin E Deficiency** - Gene: TTPA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000370:1-5. **Detection Rate:** Mixed or Other Caucasian >99%.

**Ataxia-telangiectasia** - Gene: ATM. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000051:2-63. **Detection Rate:** Mixed or Other Caucasian 98%.

**ATP7A-related Disorders** - Gene: ATP7A. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000052:2-23. **Detection Rate:** Mixed or Other Caucasian 96%.

**Autoimmune Polyglandular Syndrome Type 1** - Gene: AIRE. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000383:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Autosomal Recessive Osteopetrosis Type 1** - Gene: TCIRG1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_006019:2-20. **Detection Rate:** Mixed or Other Caucasian >99%.

**Autosomal Recessive Polycystic Kidney Disease, PKHD1-related** - Gene: PKHD1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_138694:2-67. **Detection Rate:** Mixed or Other Caucasian >99%.

**Autosomal Recessive Spastic Ataxia of Charlevoix-Saguenay** - Gene: SACS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_014363:2-10. **Detection Rate:** Mixed or Other Caucasian 99%.

**Bardet-Biedl Syndrome, BBS1-related** - Gene: BBS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_024649:1-17. **Detection Rate:** Mixed or Other Caucasian >99%.

**Bardet-Biedl Syndrome, BBS10-related** - Gene: BBS10. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_024685:1-2. **Detection Rate:** Mixed or Other Caucasian >99%.

**Bardet-Biedl Syndrome, BBS12-related** - Gene: BBS12. Autosomal Recessive. Sequencing with copy number analysis. Exon: NM\_152618:2. **Detection Rate:** Mixed or Other Caucasian >99%.

**Bardet-Biedl Syndrome, BBS2-related** - Gene: BBS2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_031885:1-17. **Detection Rate:** Mixed or Other Caucasian >99%.

**BCS1L-related Disorders** - Gene: BCS1L. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_004328:3-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Beta-sarcoglycanopathy** - Gene: SGCB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000232:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**Biotinidase Deficiency** - Gene: BTD. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000060:1-4. **Detection Rate:** Mixed or Other Caucasian >99%.

**Bloom Syndrome** - Gene: BLM. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000057:2-22. **Detection Rate:** Mixed or Other Caucasian >99%.

**Calpainopathy** - Gene: CAPN3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000070:1-24. **Detection Rate:** Mixed or Other Caucasian >99%.

**Canavan Disease** - Gene: ASPA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000049:1-6. **Detection Rate:** Mixed or Other Caucasian 98%.

**Carbamoylphosphate Synthetase I Deficiency** - Gene: CPS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001875:1-38. **Detection Rate:** Mixed or Other Caucasian >99%.

**Carnitine Palmitoyltransferase IA Deficiency** - Gene: CPT1A. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001876:2-19. **Detection Rate:** Mixed or Other Caucasian >99%.

**Carnitine Palmitoyltransferase II Deficiency** - Gene: CPT2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000098:1-5. **Detection Rate:** Mixed or Other Caucasian >99%.

**Cartilage-hair Hypoplasia** - Gene: RMRP. Autosomal Recessive. Sequencing with copy number analysis. Exon: NR\_003051:1. **Detection Rate:** Mixed or Other Caucasian >99%.

**Cerebrotendinous Xanthomatosis** - Gene: CYP27A1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000784:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Citrullinemia Type 1** - Gene: ASS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000050:3-16. **Detection Rate:** Mixed or Other Caucasian >99%.

**CLN3-related Neuronal Ceroid Lipofuscinosis** - Gene: CLN3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001042432:2-16. **Detection Rate:** Mixed or Other Caucasian >99%.

**CLN5-related Neuronal Ceroid Lipofuscinosis** - Gene: CLN5. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_006493:1-4. **Detection Rate:** Mixed or Other Caucasian >99%.

**CLN6-related Neuronal Ceroid Lipofuscinosis** - Gene: CLN6. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_017882:1-7. **Detection Rate:** Mixed or Other Caucasian >99%.

**CLN8-related Neuronal Ceroid Lipofuscinosis** - Gene: CLN8. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_018941:2-3. **Detection Rate:** Mixed or Other Caucasian >99%.

**Cohen Syndrome** - Gene: VPS13B. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_017890:2-62. **Detection Rate:** Mixed or Other Caucasian 97%.

**COL4A3-related Alport Syndrome** - Gene: COL4A3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000091:1-52. **Detection Rate:** Mixed or Other Caucasian 97%.

**COL4A4-related Alport Syndrome** - Gene: COL4A4. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000092:2-48. **Detection Rate:** Mixed or Other Caucasian 98%.

**Combined Pituitary Hormone Deficiency, PROP1-related** - Gene: PROP1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_006261:1-3. **Detection Rate:** Mixed or Other Caucasian >99%.

**Congenital Adrenal Hyperplasia, CYP21A2-related** - Gene: CYP21A2. Autosomal Recessive. Analysis of homologous regions. **Variants (13):** CYP21A2 deletion, CYP21A2 duplication, CYP21A2 triplication, G111Vfs\*21, I173N, L308Ffs\*6, P31L, Q319\*, Q319\*+CYP21A2dup, R357W, V281L, [I237N;V238E;M240K], c.293-13C>G. **Detection Rate:** Mixed or Other Caucasian 96%.

**Congenital Disorder of Glycosylation Type Ia** - Gene: PMM2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000303:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Congenital Disorder of Glycosylation Type Ic** - Gene: ALG6. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_013339:2-15. **Detection Rate:** Mixed or Other Caucasian >99%.

**Congenital Disorder of Glycosylation, MPI-related** - Gene: MPI. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_002435:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Costeff Optic Atrophy Syndrome** - Gene: OPA3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_025136:1-2. **Detection Rate:** Mixed or Other Caucasian >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:** Mixed or Other Caucasian >99%.

**Cystinosis** - Gene: CTNS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_004937:3-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**D-bifunctional Protein Deficiency** - Gene: HSD17B4. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000414:1-24. **Detection Rate:** Mixed or Other Caucasian 98%.

**Delta-sarcoglycanopathy** - Gene: SGCD. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000337:2-9. **Detection Rate:** Mixed or Other Caucasian 99%.

**Dihydrofolate Dehydrogenase Deficiency** - Gene: DLD. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000108:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Dysferlinopathy** - Gene: DYSF. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_003494:1-55. **Detection Rate:** Mixed or Other Caucasian 98%.

**Dystrophinopathy (Including Duchenne/Becker Muscular Dystrophy)** - Gene: DMD. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_004006:1-79. **Detection Rate:** Mixed or Other Caucasian >99%.

**ERCC6-related Disorders** - Gene: ERCC6. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000124:2-21. **Detection Rate:** Mixed or Other Caucasian 99%.

**ERCC8-related Disorders** - Gene: ERCC8. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000082:1-12. **Detection Rate:** Mixed or Other Caucasian 95%.

**EVC-related Ellis-van Creveld Syndrome** - Gene: EVC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_153717:1-21. **Detection Rate:** Mixed or Other Caucasian 96%.

**EVC2-related Ellis-van Creveld Syndrome** - Gene: EVC2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_147127:1-22. **Detection Rate:** Mixed or Other Caucasian >99%.

**Fabry Disease** - Gene: GLA. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000169:1-7. **Detection Rate:** Mixed or Other Caucasian 98%.

**Familial Dysautonomia** - Gene: IKBKAP. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_003640:2-37. **Detection Rate:** Mixed or Other Caucasian >99%.

**Familial Mediterranean Fever** - Gene: MEFV. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000243:1-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**Fanconi Anemia Complementation Group A** - Gene: FANCA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000135:1-43. **Detection Rate:** Mixed or Other Caucasian 92%.

**Fanconi Anemia, FANCC-related** - Gene: FANCC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000136:2-15. **Detection Rate:** Mixed or Other Caucasian >99%.

**FKRP-related Disorders** - Gene: FKRP. Autosomal Recessive. Sequencing with copy number analysis. Exon: NM\_024301:4. **Detection Rate:** Mixed or Other Caucasian >99%.

**FKTN-related Disorders** - Gene: FKTN. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001079802:3-11. **Detection Rate:** Mixed or Other Caucasian >99%.

**Galactokinase Deficiency** - Gene: GALK1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000154:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Galactosemia** - Gene: GALT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000155:1-11. **Detection Rate:** Mixed or Other Caucasian >99%.

**Gamma-sarcoglycanopathy** - Gene: SGCG. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000231:2-8. **Detection Rate:** Mixed or Other Caucasian 88%.

**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:** Mixed or Other Caucasian 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:** Mixed or Other Caucasian >99%.

**GLB1-related Disorders** - Gene: GLB1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000404:1-16. **Detection Rate:** Mixed or Other Caucasian >99%.

**GLDC-related Glycine Encephalopathy** - Gene: GLDC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000170:1-25. **Detection Rate:** Mixed or Other Caucasian 94%.

**Glutaric Acidemia, GCDH-related** - Gene: GCDH. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000159:2-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Glycogen Storage Disease Type Ia** - Gene: G6PC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000151:1-5. **Detection Rate:** Mixed or Other Caucasian >99%.

**Glycogen Storage Disease Type Ib** - Gene: SLC37A4. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001164277:3-11. **Detection Rate:** Mixed or Other Caucasian >99%.

**Glycogen Storage Disease Type III** - Gene: AGL. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000642:2-34. **Detection Rate:** Mixed or Other Caucasian >99%.

**GNE Myopathy** - Gene: GNE. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001128227:1-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**GNPTAB-related Disorders** - Gene: GNPTAB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_024312:1-21. **Detection Rate:** Mixed or Other Caucasian >99%.

**HADHA-related Disorders** - Gene: HADHA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000182:1-20. **Detection Rate:** Mixed or Other Caucasian >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:** Mixed or Other Caucasian >99%.

**Hereditary Fructose Intolerance** - Gene: ALDOB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000035:2-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Herlitz Junctional Epidermolysis Bullosa, LAMB3-related** - Gene: LAMB3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000228:2-23. **Detection Rate:** Mixed or Other Caucasian >99%.

**Hexosaminidase A Deficiency (Including Tay-Sachs Disease)** - Gene: HEXA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000520:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**HMG-CoA Lyase Deficiency** - Gene: HMGCL. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000191:1-9. **Detection Rate:** Mixed or Other Caucasian 98%.

**Holocarboxylase Synthetase Deficiency** - Gene: HLCS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000411:4-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Homocystinuria, CBS-related** - Gene: CBS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000071:3-17. **Detection Rate:** Mixed or Other Caucasian >99%.

**Hydrolethalus Syndrome** - Gene: HYL5L1. Autosomal Recessive. Sequencing with copy number analysis. Exon: NM\_145014:4. **Detection Rate:** Mixed or Other Caucasian >99%.

**Hypophosphatasia - Gene:** ALPL. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000478:2-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Isovaleric Acidemia - Gene:** IVD. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_002225:1-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Joubert Syndrome 2 - Gene:** TMEM216. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001173990:1-5. **Detection Rate:** Mixed or Other Caucasian >99%.

**Junctional Epidermolysis Bullosa, LAMA3-related - Gene:** LAMA3. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000227:1-38. **Detection Rate:** Mixed or Other Caucasian >99%.

**Junctional Epidermolysis Bullosa, LAMC2-related - Gene:** LAMC2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_005562:1-23. **Detection Rate:** Mixed or Other Caucasian >99%.

**KCNJ11-related Familial Hyperinsulinism - Gene:** KCNJ11. Autosomal Recessive. Sequencing with copy number analysis. Exon: NM\_000525:1. **Detection Rate:** Mixed or Other Caucasian >99%.

**Krabbe Disease - Gene:** GALC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000153:1-17. **Detection Rate:** Mixed or Other Caucasian >99%.

**LAMA2-related Muscular Dystrophy - Gene:** LAMA2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000426:1-65. **Detection Rate:** Mixed or Other Caucasian >99%.

**Leigh Syndrome, French-Canadian Type - Gene:** LRPPRC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_133259:1-38. **Detection Rate:** Mixed or Other Caucasian >99%.

**Lipoid Congenital Adrenal Hyperplasia - Gene:** STAR. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000349:1-7. **Detection Rate:** Mixed or Other Caucasian >99%.

**Lysosomal Acid Lipase Deficiency - Gene:** LIPA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000235:2-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**Maple Syrup Urine Disease Type Ia - Gene:** BCKDHA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000709:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Maple Syrup Urine Disease Type Ib - Gene:** BCKDHB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_183050:1-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**Maple Syrup Urine Disease Type II - Gene:** DBT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001918:1-11. **Detection Rate:** Mixed or Other Caucasian 96%.

**Medium Chain Acyl-CoA Dehydrogenase Deficiency - Gene:** ACADM. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000016:1-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Megalencephalic Leukoencephalopathy with Subcortical Cysts - Gene:** MLC1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_015166:2-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**Metachromatic Leukodystrophy - Gene:** ARSA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000487:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Methylmalonic Acidemia, cblA Type - Gene:** MMAA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_172250:2-7. **Detection Rate:** Mixed or Other Caucasian >99%.

**Methylmalonic Acidemia, cblB Type - Gene:** MMAB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_052845:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Methylmalonic Aciduria and Homocystinuria, cblC Type - Gene:** MMACHC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_015506:1-4. **Detection Rate:** Mixed or Other Caucasian >99%.

**MKS1-related Disorders - Gene:** MKS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_017777:1-18. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis III Gamma - Gene:** GNPTG. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_032520:1-11. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis IV - Gene:** MCOLN1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_020533:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis Type I - Gene:** IDUA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000203:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis Type II - Gene:** IDS. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000202:1-9. **Detection Rate:** Mixed or Other Caucasian 88%.

**Mucopolysaccharidosis Type IIIA - Gene:** SGSH. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000199:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis Type IIIB - Gene:** NAGLU. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000263:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**Mucopolysaccharidosis Type IIIC - Gene:** HGSNAT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_152419:1-18. **Detection Rate:** Mixed or Other Caucasian >99%.

**MUT-related Methylmalonic Acidemia - Gene:** MUT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000255:2-13. **Detection Rate:** Mixed or Other Caucasian >99%.

**MYO7A-related Disorders - Gene:** MYO7A. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000260:2-49. **Detection Rate:** Mixed or Other Caucasian >99%.

**NEB-related Nemaline Myopathy - Gene:** NEB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001271208:3-80,117-183. **Detection Rate:** Mixed or Other Caucasian 92%.

**Nephrotic Syndrome, NPHS1-related - Gene:** NPHS1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_004646:1-29. **Detection Rate:** Mixed or Other Caucasian >99%.

**Nephrotic Syndrome, NPHS2-related - Gene:** NPHS2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_014625:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Niemann-Pick Disease Type C1 - Gene:** NPC1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000271:1-25. **Detection Rate:** Mixed or Other Caucasian >99%.

**Niemann-Pick Disease Type C2 - Gene:** NPC2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_006432:1-5. **Detection Rate:** Mixed or Other Caucasian >99%.

**Niemann-Pick Disease, SMPD1-related - Gene:** SMPD1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000543:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**Nijmegen Breakage Syndrome - Gene:** NBN. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_002485:1-16. **Detection Rate:** Mixed or Other Caucasian >99%.

**Ornithine Transcarbamylase Deficiency - Gene:** OTC. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000531:1-10. **Detection Rate:** Mixed or Other Caucasian 97%.

**PCCA-related Propionic Acidemia - Gene:** PCCA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000282:1-24. **Detection Rate:** Mixed or Other Caucasian 95%.

**PCCB-related Propionic Acidemia - Gene:** PCCB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000532:1-15. **Detection Rate:** Mixed or Other Caucasian >99%.

**PCDH15-related Disorders - Gene:** PCDH15. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_033056:2-33. **Detection Rate:** Mixed or Other Caucasian 93%.

**Pendred Syndrome - Gene:** SLC26A4. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000441:2-21. **Detection Rate:** Mixed or Other Caucasian >99%.

**Peroxisome Biogenesis Disorder Type 1 - Gene:** PEX1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000466:1-24. **Detection Rate:** Mixed or Other Caucasian >99%.

**Peroxisome Biogenesis Disorder Type 3 - Gene:** PEX12. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000286:1-3. **Detection Rate:** Mixed or Other Caucasian >99%.

**Peroxisome Biogenesis Disorder Type 4 - Gene:** PEX6. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000287:1-17. **Detection Rate:** Mixed or Other Caucasian 97%.

**Peroxisome Biogenesis Disorder Type 5 - Gene:** PEX2. Autosomal Recessive. Sequencing with copy number analysis. Exon: NM\_000318:4. **Detection Rate:** Mixed or Other Caucasian >99%.



**Peroxisome Biogenesis Disorder Type 6** - Gene: PEX10. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_153818:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**Phenylalanine Hydroxylase Deficiency** - Gene: PAH. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000277:1-13. **Detection Rate:** Mixed or Other Caucasian >99%.

**POMGNT-related Disorders** - Gene: POMGNT1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_017739:2-22. **Detection Rate:** Mixed or Other Caucasian 96%.

**Pompe Disease** - Gene: GAA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000152:2-20. **Detection Rate:** Mixed or Other Caucasian 98%.

**PPT1-related Neuronal Ceroid Lipofuscinosis** - Gene: PPT1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000310:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Primary Carnitine Deficiency** - Gene: SLC22A5. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_003060:1-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**Primary Hyperoxaluria Type 1** - Gene: AGXT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000030:1-11. **Detection Rate:** Mixed or Other Caucasian >99%.

**Primary Hyperoxaluria Type 2** - Gene: GRHPR. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_012203:1-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Primary Hyperoxaluria Type 3** - Gene: HOGA1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_138413:1-7. **Detection Rate:** Mixed or Other Caucasian >99%.

**Pycnodysostosis** - Gene: CTSK. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000396:2-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Pyruvate Carboxylase Deficiency** - Gene: PC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000920:3-22. **Detection Rate:** Mixed or Other Caucasian >99%.

**Rhizomelic Chondrodysplasia Punctata Type 1** - Gene: PEX7. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000288:1-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**RTEL1-related Disorders** - Gene: RTEL1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_032957:2-35. **Detection Rate:** Mixed or Other Caucasian >99%.

**Salla Disease** - Gene: SLC17A5. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_012434:1-11. **Detection Rate:** Mixed or Other Caucasian 98%.

**Sandhoff Disease** - Gene: HEXB. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000521:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Short-chain Acyl-CoA Dehydrogenase Deficiency** - Gene: ACADS. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000017:1-10. **Detection Rate:** Mixed or Other Caucasian >99%.

**Sjogren-Larsson Syndrome** - Gene: ALDH3A2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000382:1-10. **Detection Rate:** Mixed or Other Caucasian 96%.

**SLC26A2-related Disorders** - Gene: SLC26A2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000112:2-3. **Detection Rate:** Mixed or Other Caucasian >99%.

**Smith-Lemli-Opitz Syndrome** - Gene: DHCR7. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001360:3-9. **Detection Rate:** Mixed or Other Caucasian >99%.

**Spastic Paraplegia Type 15** - Gene: ZFYVE26. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_015346:2-42. **Detection Rate:** Mixed or Other Caucasian >99%.

**Spinal Muscular Atrophy** - Gene: SMN1. Autosomal Recessive. Spinal muscular atrophy. Variant (1): SMN1 copy number. **Detection Rate:** Mixed or Other Caucasian 95%.

**Spondylothoracic Dysostosis** - Gene: MESP2. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_001039958:1-2. **Detection Rate:** Mixed or Other Caucasian >99%.

**TGM1-related Autosomal Recessive Congenital Ichthyosis** - Gene: TGM1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000359:2-15. **Detection Rate:** Mixed or Other Caucasian >99%.

**TPP1-related Neuronal Ceroid Lipofuscinosis** - Gene: TPP1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000391:1-13. **Detection Rate:** Mixed or Other Caucasian >99%.

**Tyrosine Hydroxylase Deficiency** - Gene: TH. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_199292:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Tyrosinemia Type I** - Gene: FAH. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000137:1-14. **Detection Rate:** Mixed or Other Caucasian >99%.

**Tyrosinemia Type II** - Gene: TAT. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000353:2-12. **Detection Rate:** Mixed or Other Caucasian >99%.

**USH1C-related Disorders** - Gene: USH1C. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_005709:1-21. **Detection Rate:** Mixed or Other Caucasian >99%.

**USH2A-related Disorders** - Gene: USH2A. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_206933:2-72. **Detection Rate:** Mixed or Other Caucasian 94%.

**Usher Syndrome Type 3** - Gene: CLRN1. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_174878:1-3. **Detection Rate:** Mixed or Other Caucasian >99%.

**Very-long-chain Acyl-CoA Dehydrogenase Deficiency** - Gene: ACADVL. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000018:1-20. **Detection Rate:** Mixed or Other Caucasian >99%.

**Wilson Disease** - Gene: ATP7B. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000053:1-21. **Detection Rate:** Mixed or Other Caucasian >99%.

**X-linked Adrenoleukodystrophy** - Gene: ABCD1. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000033:1-6. **Detection Rate:** Mixed or Other Caucasian 77%.

**X-linked Alport Syndrome** - Gene: COL4A5. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000495:1-51. **Detection Rate:** Mixed or Other Caucasian 95%.

**X-linked Congenital Adrenal Hypoplasia** - Gene: NROB1. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000475:1-2. **Detection Rate:** Mixed or Other Caucasian 99%.

**X-linked Juvenile Retinoschisis** - Gene: RS1. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000330:1-6. **Detection Rate:** Mixed or Other Caucasian 98%.

**X-linked Myotubular Myopathy** - Gene: MTM1. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000252:2-15. **Detection Rate:** Mixed or Other Caucasian 98%.

**X-linked Severe Combined Immunodeficiency** - Gene: IL2RG. X-linked Recessive. Sequencing with copy number analysis. Exons: NM\_000206:1-8. **Detection Rate:** Mixed or Other Caucasian >99%.

**Xeroderma Pigmentosum Group A** - Gene: XPA. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_000380:1-6. **Detection Rate:** Mixed or Other Caucasian >99%.

**Xeroderma Pigmentosum Group C** - Gene: XPC. Autosomal Recessive. Sequencing with copy number analysis. Exons: NM\_004628:1-16. **Detection Rate:** Mixed or Other Caucasian 97%.

## 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 12475 Residual Risk	Reproductive Risk
<b>11-beta-hydroxylase-deficient Congenital Adrenal Hyperplasia</b>	1 in 3,800	< 1 in 1,000,000
<b>6-pyruvoyl-tetrahydropterin Synthase Deficiency</b>	< 1 in 50,000	< 1 in 1,000,000
<b>ABCC8-related Familial Hyperinsulinism</b>	1 in 17,000	< 1 in 1,000,000
<b>Adenosine Deaminase Deficiency</b>	1 in 22,000	< 1 in 1,000,000
<b>Alpha Thalassemia</b>	Alpha globin status: aa/aa.	Not calculated
<b>Alpha-mannosidosis</b>	1 in 35,000	< 1 in 1,000,000
<b>Alpha-sarcoglycanopathy</b>	1 in 45,000	< 1 in 1,000,000
<b>Alstrom Syndrome</b>	< 1 in 50,000	< 1 in 1,000,000
<b>AMT-related Glycine Encephalopathy</b>	1 in 22,000	< 1 in 1,000,000
<b>Andermann Syndrome</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Argininemia</b>	< 1 in 17,000	< 1 in 1,000,000
<b>Argininosuccinic Aciduria</b>	1 in 13,000	< 1 in 1,000,000
<b>Aspartylglucosaminuria</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Ataxia with Vitamin E Deficiency</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Ataxia-telangiectasia</b>	1 in 11,000	< 1 in 1,000,000
<b>ATP7A-related Disorders</b>	< 1 in 1,000,000	1 in 600,000
<b>Autoimmune Polyglandular Syndrome Type 1</b>	1 in 15,000	< 1 in 1,000,000
<b>Autosomal Recessive Osteopetrosis Type 1</b>	1 in 35,000	< 1 in 1,000,000
<b>Autosomal Recessive Polycystic Kidney Disease, PKHD1-related</b>	1 in 8,100	< 1 in 1,000,000
<b>Autosomal Recessive Spastic Ataxia of Charlevoix-Saguenay</b>	< 1 in 44,000	< 1 in 1,000,000
<b>Bardet-Biedl Syndrome, BBS1-related</b>	1 in 32,000	< 1 in 1,000,000
<b>Bardet-Biedl Syndrome, BBS10-related</b>	1 in 42,000	< 1 in 1,000,000
<b>Bardet-Biedl Syndrome, BBS12-related</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Bardet-Biedl Syndrome, BBS2-related</b>	< 1 in 50,000	< 1 in 1,000,000
<b>BCS1L-related Disorders</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Beta-sarcoglycanopathy</b>	1 in 39,000	< 1 in 1,000,000
<b>Biotinidase Deficiency</b>	NM_000060.2(BTD):c.1330G>C(D444H) heterozygote †	1 in 510
<b>Bloom Syndrome</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Calpainopathy</b>	1 in 13,000	< 1 in 1,000,000
<b>Canavan Disease</b>	1 in 9,700	< 1 in 1,000,000
<b>Carbamoylphosphate Synthetase I Deficiency</b>	< 1 in 57,000	< 1 in 1,000,000
<b>Carnitine Palmitoyltransferase IA Deficiency</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Carnitine Palmitoyltransferase II Deficiency</b>	1 in 25,000	< 1 in 1,000,000
<b>Cartilage-hair Hypoplasia</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Cerebrotendinous Xanthomatosis</b>	1 in 11,000	< 1 in 1,000,000
<b>Citrullinemia Type 1</b>	1 in 14,000	< 1 in 1,000,000
<b>CLN3-related Neuronal Ceroid Lipofuscinosis</b>	1 in 8,600	< 1 in 1,000,000
<b>CLN5-related Neuronal Ceroid Lipofuscinosis</b>	< 1 in 50,000	< 1 in 1,000,000
<b>CLN6-related Neuronal Ceroid Lipofuscinosis</b>	1 in 43,000	< 1 in 1,000,000
<b>CLN8-related Neuronal Ceroid Lipofuscinosis</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Cohen Syndrome</b>	< 1 in 15,000	< 1 in 1,000,000
<b>COL4A3-related Alport Syndrome</b>	1 in 6,200	< 1 in 1,000,000
<b>COL4A4-related Alport Syndrome</b>	1 in 12,000	< 1 in 1,000,000
<b>Combined Pituitary Hormone Deficiency, PROP1-related</b>	1 in 6,100	< 1 in 1,000,000
<b>Congenital Adrenal Hyperplasia, CYP21A2-related</b>	1 in 1,300	1 in 280,000
<b>Congenital Disorder of Glycosylation Type Ia</b>	1 in 16,000	< 1 in 1,000,000
<b>Congenital Disorder of Glycosylation Type Ic</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Congenital Disorder of Glycosylation, MPI-related</b>	< 1 in 50,000	< 1 in 1,000,000



RESULTS RECIPIENT  
**SEATTLE SPERM BANK**  
 Attn: Jeffrey Olliffe  
 NPI: 1306838271  
 Report Date: 08/05/2019

MALE  
**DONOR 12475**  
 DOB: [REDACTED]  
 Ethnicity: Mixed or Other  
 Caucasian  
 Barcode: 11004212719062

FEMALE  
 N/A

Disease	DONOR 12475 Residual Risk	Reproductive Risk
Costeff Optic Atrophy Syndrome	< 1 in 50,000	< 1 in 1,000,000
Cystic Fibrosis	1 in 3,000	1 in 360,000
Cystinosis	1 in 22,000	< 1 in 1,000,000
D-bifunctional Protein Deficiency	1 in 9,000	< 1 in 1,000,000
Delta-sarcoglycanopathy	< 1 in 40,000	< 1 in 1,000,000
Dihydroliipoamide Dehydrogenase Deficiency	< 1 in 50,000	< 1 in 1,000,000
Dysferlinopathy	1 in 11,000	< 1 in 1,000,000
Dystrophinopathy (Including Duchenne/Becker Muscular Dystrophy)	Not calculated	Not calculated
ERCC6-related Disorders	1 in 26,000	< 1 in 1,000,000
ERCC8-related Disorders	< 1 in 9,900	< 1 in 1,000,000
EVC-related Ellis-van Creveld Syndrome	1 in 7,500	< 1 in 1,000,000
EVC2-related Ellis-van Creveld Syndrome	< 1 in 50,000	< 1 in 1,000,000
Fabry Disease	< 1 in 1,000,000	1 in 80,000
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 Complementation Group A	1 in 2,800	< 1 in 1,000,000
Fanconi Anemia, FANCC-related	< 1 in 50,000	< 1 in 1,000,000
FKRP-related Disorders	1 in 16,000	< 1 in 1,000,000
FKTN-related Disorders	< 1 in 50,000	< 1 in 1,000,000
Galactokinase Deficiency	1 in 10,000	< 1 in 1,000,000
Galactosemia	1 in 8,600	< 1 in 1,000,000
Gamma-sarcoglycanopathy	1 in 3,000	< 1 in 1,000,000
Gaucher Disease	1 in 260	1 in 110,000
GJB2-related DFNB1 Nonsyndromic Hearing Loss and Deafness	1 in 2,500	1 in 260,000
GLB1-related Disorders	1 in 19,000	< 1 in 1,000,000
GLDC-related Glycine Encephalopathy	1 in 2,800	< 1 in 1,000,000
Glutaric Acidemia, GCDH-related	1 in 16,000	< 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
GNE Myopathy	1 in 23,000	< 1 in 1,000,000
GNPTAB-related Disorders	1 in 32,000	< 1 in 1,000,000
HADHA-related Disorders	1 in 20,000	< 1 in 1,000,000
Hb Beta Chain-related Hemoglobinopathy (Including Beta Thalassemia and Sickle Cell Disease)	1 in 3,100	1 in 390,000
Hereditary Fructose Intolerance	1 in 7,900	< 1 in 1,000,000
Herlitz Junctional Epidermolysis Bullosa, LAMB3-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
HMG-CoA Lyase Deficiency	< 1 in 33,000	< 1 in 1,000,000
Holocarboxylase Synthetase Deficiency	1 in 15,000	< 1 in 1,000,000
Homocystinuria, CBS-related	1 in 9,400	< 1 in 1,000,000
Hydrolethalus Syndrome	< 1 in 50,000	< 1 in 1,000,000
Hypophosphatasia	1 in 27,000	< 1 in 1,000,000
Isovaleric Acidemia	1 in 32,000	< 1 in 1,000,000
Joubert Syndrome 2	< 1 in 50,000	< 1 in 1,000,000
Junctional Epidermolysis Bullosa, LAMA3-related	< 1 in 50,000	< 1 in 1,000,000
Junctional Epidermolysis Bullosa, LAMC2-related	< 1 in 50,000	< 1 in 1,000,000
KCNJ11-related Familial Hyperinsulinism	< 1 in 50,000	< 1 in 1,000,000
Krabbe Disease	1 in 14,000	< 1 in 1,000,000
LAMA2-related Muscular Dystrophy	1 in 34,000	< 1 in 1,000,000
Leigh Syndrome, French-Canadian Type	< 1 in 50,000	< 1 in 1,000,000
Lipoid Congenital Adrenal Hyperplasia	< 1 in 50,000	< 1 in 1,000,000
Lysosomal Acid Lipase Deficiency	1 in 18,000	< 1 in 1,000,000
Maple Syrup Urine Disease Type Ia	1 in 42,000	< 1 in 1,000,000
Maple Syrup Urine Disease Type Ib	1 in 39,000	< 1 in 1,000,000
Maple Syrup Urine Disease Type II	1 in 13,000	< 1 in 1,000,000
Medium Chain Acyl-CoA Dehydrogenase Deficiency	1 in 4,400	1 in 790,000
Megalencephalic Leukoencephalopathy with Subcortical Cysts	< 1 in 50,000	< 1 in 1,000,000
Metachromatic Leukodystrophy	1 in 16,000	< 1 in 1,000,000
Methylmalonic Acidemia, cblA Type	< 1 in 50,000	< 1 in 1,000,000
Methylmalonic Acidemia, cblB Type	1 in 48,000	< 1 in 1,000,000
Methylmalonic Aciduria and Homocystinuria, cblC Type	1 in 16,000	< 1 in 1,000,000



RESULTS RECIPIENT  
**SEATTLE SPERM BANK**  
 Attn: Jeffrey Olliffe  
 NPI: 1306838271  
 Report Date: 08/05/2019

MALE  
**DONOR 12475**  
 DOB: ██████████  
 Ethnicity: Mixed or Other  
 Caucasian  
 Barcode: 11004212719062

FEMALE  
 N/A

Disease	DONOR 12475 Residual Risk	Reproductive Risk
MKS1-related Disorders	< 1 in 50,000	< 1 in 1,000,000
Mucopolipidosis III Gamma	< 1 in 50,000	< 1 in 1,000,000
Mucopolipidosis IV	< 1 in 50,000	< 1 in 1,000,000
Mucopolysaccharidosis Type I	1 in 16,000	< 1 in 1,000,000
Mucopolysaccharidosis Type II	1 in 600,000	1 in 150,000
Mucopolysaccharidosis Type IIIA	1 in 12,000	< 1 in 1,000,000
Mucopolysaccharidosis Type IIIB	1 in 25,000	< 1 in 1,000,000
Mucopolysaccharidosis Type IIIC	1 in 37,000	< 1 in 1,000,000
MUT-related Methylmalonic Acidemia	1 in 26,000	< 1 in 1,000,000
MYO7A-related Disorders	1 in 15,000	< 1 in 1,000,000
NEB-related Nemaline Myopathy	1 in 1,200	1 in 400,000
Nephrotic Syndrome, NPHS1-related	< 1 in 50,000	< 1 in 1,000,000
Nephrotic Syndrome, NPHS2-related	1 in 35,000	< 1 in 1,000,000
Niemann-Pick Disease Type C1	1 in 19,000	< 1 in 1,000,000
Niemann-Pick Disease Type C2	< 1 in 50,000	< 1 in 1,000,000
Niemann-Pick Disease, SMPD1-related	1 in 25,000	< 1 in 1,000,000
Nijmegen Breakage Syndrome	1 in 16,000	< 1 in 1,000,000
Ornithine Transcarbamylase Deficiency	< 1 in 1,000,000	1 in 140,000
PCCA-related Propionic Acidemia	1 in 4,200	< 1 in 1,000,000
PCCB-related Propionic Acidemia	1 in 22,000	< 1 in 1,000,000
PCDH15-related Disorders	1 in 3,300	< 1 in 1,000,000
Pendred Syndrome	1 in 8,200	< 1 in 1,000,000
Peroxisome Biogenesis Disorder Type 1	1 in 16,000	< 1 in 1,000,000
Peroxisome Biogenesis Disorder Type 3	1 in 44,000	< 1 in 1,000,000
Peroxisome Biogenesis Disorder Type 4	1 in 9,300	< 1 in 1,000,000
Peroxisome Biogenesis Disorder Type 5	< 1 in 71,000	< 1 in 1,000,000
Peroxisome Biogenesis Disorder Type 6	< 1 in 50,000	< 1 in 1,000,000
Phenylalanine Hydroxylase Deficiency	1 in 4,800	1 in 940,000
POMGNT-related Disorders	< 1 in 12,000	< 1 in 1,000,000
Pompe Disease	1 in 4,000	< 1 in 1,000,000
PPT1-related Neuronal Ceroid Lipofuscinosis	1 in 7,700	< 1 in 1,000,000
Primary Carnitine Deficiency	1 in 11,000	< 1 in 1,000,000
Primary Hyperoxaluria Type 1	1 in 17,000	< 1 in 1,000,000
Primary Hyperoxaluria Type 2	< 1 in 50,000	< 1 in 1,000,000
Primary Hyperoxaluria Type 3	1 in 13,000	< 1 in 1,000,000
Pycnodysostosis	1 in 43,000	< 1 in 1,000,000
Pyruvate Carboxylase Deficiency	1 in 25,000	< 1 in 1,000,000
Rhizomelic Chondrodysplasia Punctata Type 1	1 in 16,000	< 1 in 1,000,000
RTEL1-related Disorders	< 1 in 50,000	< 1 in 1,000,000
Salla Disease	< 1 in 30,000	< 1 in 1,000,000
Sandhoff Disease	1 in 32,000	< 1 in 1,000,000
Short-chain Acyl-CoA Dehydrogenase Deficiency	1 in 11,000	< 1 in 1,000,000
Sjogren-Larsson Syndrome	< 1 in 12,000	< 1 in 1,000,000
SLC26A2-related Disorders	1 in 16,000	< 1 in 1,000,000
Smith-Lemli-Opitz Syndrome	1 in 9,400	< 1 in 1,000,000
Spastic Paraplegia Type 15	< 1 in 50,000	< 1 in 1,000,000
Spinal Muscular Atrophy	Negative for g.27134T>G SNP SMN1: 2 copies 1 in 770	1 in 110,000
Spondylothoracic Dysostosis	< 1 in 50,000	< 1 in 1,000,000
TGM1-related Autosomal Recessive Congenital Ichthyosis	1 in 22,000	< 1 in 1,000,000
TPP1-related Neuronal Ceroid Lipofuscinosis	1 in 30,000	< 1 in 1,000,000
Tyrosine Hydroxylase Deficiency	< 1 in 50,000	< 1 in 1,000,000
Tyrosinemia Type I	1 in 16,000	< 1 in 1,000,000
Tyrosinemia Type II	1 in 25,000	< 1 in 1,000,000
USH1C-related Disorders	1 in 35,000	< 1 in 1,000,000
USH2A-related Disorders	1 in 2,200	< 1 in 1,000,000
Usher Syndrome Type 3	1 in 41,000	< 1 in 1,000,000
Very-long-chain Acyl-CoA Dehydrogenase Deficiency	1 in 18,000	< 1 in 1,000,000
Wilson Disease	1 in 8,600	< 1 in 1,000,000
X-linked Adrenoleukodystrophy	1 in 90,000	1 in 42,000
X-linked Alport Syndrome	Not calculated	Not calculated



RESULTS RECIPIENT  
**SEATTLE SPERM BANK**  
Attn: Jeffrey Olliffe  
NPI: 1306838271  
Report Date: 08/05/2019

MALE  
**DONOR 12475**  
DOB: [REDACTED]  
Ethnicity: Mixed or Other  
Caucasian  
Barcode: 11004212719062

FEMALE  
N/A

<b>Disease</b>	<b>DONOR 12475 Residual Risk</b>	<b>Reproductive Risk</b>
<b>X-linked Congenital Adrenal Hypoplasia</b>	< 1 in 1,000,000	< 1 in 1,000,000
<b>X-linked Juvenile Retinoschisis</b>	< 1 in 1,000,000	1 in 40,000
<b>X-linked Myotubular Myopathy</b>	Not calculated	Not calculated
<b>X-linked Severe Combined Immunodeficiency</b>	< 1 in 1,000,000	1 in 200,000
<b>Xeroderma Pigmentosum Group A</b>	< 1 in 50,000	< 1 in 1,000,000
<b>Xeroderma Pigmentosum Group C</b>	1 in 7,300	< 1 in 1,000,000