Comprehensive Carrier Screening

One visit. Many answers. Integrated Genetics can help.

Integrated Genetics offers a comprehensive carrier screening test menu to help support your practice, utilizing testing methodologies that provide high quality and clinically relevant results for severe, early onset, or chronic disease.

Integrated GENETICS
LabCorp Specialty Testing Group

Inheritest℠
CARRIER SCREEN

Broadening your Patients' Options for Genetic Carrier Screening

One Test for Many Diseases

The Inheritest Carrier Screen provides relevant genetic screening for many inherited diseases found throughout the pan-ethnic US population.

- Mutation analysis of over 430 common mutations associated with greater than 90 different inherited diseases, providing comprehensive carrier status for your patients
- Succinct and informative summary reports, providing details about any positive result up front for easy review
- Two specimen options available: blood and saliva

The Inheritest Carrier Screen Disease List

Adenosine Deaminase Deficiency
Alpha-Mannosidosis
Andermann Syndrome
Argininosuccinic Aciduria
Aspartylglucosaminuria
Ataxia-Telangiectasia
Autosomal Recessive Spastic Ataxia of Charlevoix-Saguenay (ARSACS)
Bardet Biedl Syndrome, *BSS1* and *BSS10*-related
Beta Hemoglobinopathies, Hemoglobins C, D, E, O
Beta Thalassemia
Bloom Syndrome*
Canavan Disease*
Cartilage-Hair Hypoplasia
Citrullinemia Type I
Cobalamin C Disease (Methlymalonic Aciduria with Homocystinuria)
Congenital Disorder of Glycosylation Type 1a
Cystic Fibrosis*
Cystinosis
D-Bifunctional Protein Deficiency
Dihydrolipoamide Dehydrogenase Deficiency*
Dihydropyrimidine Dehydrogenase Deficiency
Ethylmalonic Encephalopathy
Familial Dysautonomia*
Familial Hyperinsulinism, *ABCC8*-related*
Familial Mediterranean Fever
Fanconi Anemia Group C*
Galactosemia, *GALT*-related
Gaucher Disease*
Glutaric Acidemia Type I
Glutathione Synthetase Deficiency
Glycine Encephalopathy, *GLDC*-related
Glycogen Storage Disease Type Ia*
Glycogen Storage Disease Types Ib, IIIa, and IIIb
GRACILE Syndrome
Hereditary Fructose Intolerance
HMG-CoA Lyase Deficiency
Holocarboxylase Synthetase Deficiency
Homocystinuria, *CBS*-related
Joubert Syndrome 2*
Junctional Epidermolysis Bullosa, *LAMA3*- *LAMB3*- and *LAMC2*-related
Krabbe Disease
Leigh Syndrome, French-Canadian Type
Long-Chain 3-Hydroxyacyl-CoA Dehydrogenase Deficiency (LCHAD)
Maple Syrup Urine Disease Type 1a and 1b*
Medium-Chain Acyl-CoA Dehydrogenase Deficiency (MCAD)
Metachromatic Leukodystrophy
Methylmalonic Acidemia, *MMAA*, *MMAB*, and *MUT*-related
Mucolipidosis Type IV*
Mucopolysaccharidosis Type I
Nemaline Myopathy, *NEB*-related*
Nephrotic Syndrome, *NPHS1*- and *NPHS2*-related
Neuronal Ceroid-Lipofuscinosis, *CLN3*, *CLN5*, *CLN8*, *PPT1*, and *TPP1*-related
Niemann-Pick Types A and B*
Niemann-Pick Type C, *NPC1* and *NPC2*-related
Nijmegen Breakage Syndrome
Phenylalanine Hydroxylase Deficiency (includes PKU)
Polycystic Kidney Disease, Autosomal Recessive
Pompe Disease
Primary Hyperoxaluria Types 1 and 2
Propionic Acidemia, *PCCA* and *PCCB*-related
Rhizomelic Chondrodysplasia Punctata Type 1
Salla Disease
Sandhoff Disease
Sickle Cell Disease
Sjogren-Larsson Syndrome
Smith-Lemli-Opitz Syndrome
Sulfate Transporter-Related Osteochondrodysplasias (includes Achondrogenesis Type 1B, Atelosteogenesis Type 2, Diastrophic Dysplasia, and Recessive Multiple Epiphyseal Dysplasia)
Tay-Sachs Disease*
Tyrosinemia Type 1
Usher Syndrome Type IF and III*
Walker-Warburg Syndrome, *FKTN*-related*
Wilson Disease
Zellweger Syndrome Spectrum, *PEX1*-related (includes Zellweger Syndrome, Neonatal Adrenoleukodystrophy, and Infantile Refsum Disease)

*Diseases in red are offered in the Inheritest Select product.

Spinal Muscular Atrophy

The Most Common Inherited Cause of Early Childhood Death

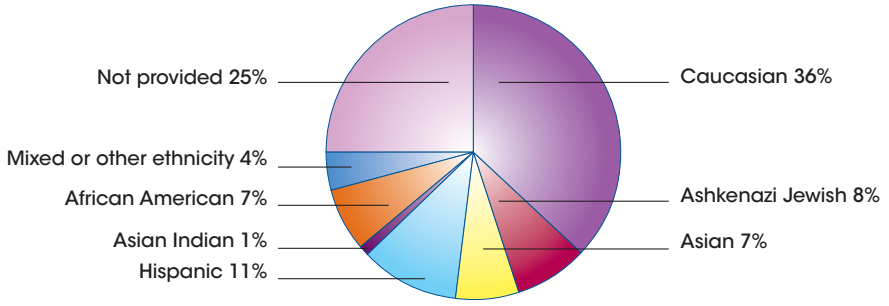
Spinal muscular atrophy is the leading inherited cause of infant death with an incidence of 1 in 11,000 live births.[9] SMA is characterized by the progressive degeneration of the lower motor neurons, muscle weakness, and, in the most common type, respiratory failure by age two.[9] The disease most severely affects the muscles responsible for crawling, walking, swallowing, and head and neck control.

ACMG Guidelines for Spinal Muscular Atrophy
"Because SMA is present in all populations, carrier testing should be offered to all couples regardless of race or ethnicity. Ideally, the testing should be offered before conception or early in pregnancy. The primary goal is to allow carriers to make informed reproductive choices."[10]

SMA Can Occur in All Racial and Ethnic Groups

- SMA is caused by a change in the SMN1 gene.[9]
- Approximately 95% of affected individuals have a homozygous deletion on the SMN1 gene (0 copies of the SMN1 allele).[9]
- In a recent study of over 72,000 samples, representing the pan-ethnic US population, the **general carrier frequency for SMA was found to be 1 in 54.**[9]

Carrier Screening Patient Ethnicity Mix[9]



SMA Carrier Frequencies by Ethnicity

	Carrier Frequency[9]	Detection Rate[9]
Caucasian	1 in 47	94.8%
Asian Indian	1 in 52	90.2%
Asian	1 in 59	93.3%
Ashkenazi Jewish	1 in 67	90.5%
Hispanic	1 in 68	90%
African American	1 in 72	70.5%

Fragile X Syndrome

The Leading Cause of Inherited Mental Retardation

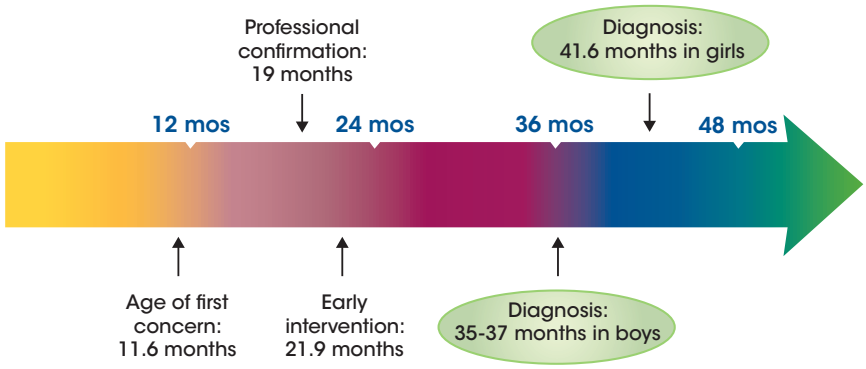
Fragile X syndrome is found across ethnic groups and can occur in families with no history of mental retardation. Fragile X syndrome and other fragile X related disorders are caused by a mutation in the FMR1 gene. The mutation is due to an expansion of an unstable CGG repeat in the DNA which may further expand when passed from one generation to the next.[11]

- 1 in 4,000 males and 1 in 8,000 females are found to be affected with fragile X syndrome.[11]
- Approximately 1 in 260 women and 1 in 800 males in the general population are fragile X carriers.[12]
- Children diagnosed with fragile X syndrome may have developmental delay and may also have symptoms of autism such as learning disabilities, hyperactivity, and behavioral problems.[13]

Undetected Carriers Can Lead to a Delay in Diagnosis

In a survey of 249 families with at least one child with fragile X syndrome, it was shown that diagnosis generally did not occur prior to 3 years of age, although the family was first concerned with developmental issues before the first birthday.[14]

- 27% of families had >10 doctor visits before fragile X testing was ordered.[14]
- Many families had additional children before the diagnosis.[14]



Carrier Screening Makes a Difference for the Patient

A recent study showed that:[11]

- Women "value" being offered the testing regardless of whether or not they decide to have screening at that time.
- Carrier screening in prenatal and preconception settings seems to be an option that is acceptable to many women.
- Prenatal testing acceptance was high for patients identified with a premutation.
- Additionally, approximately 20% of female premutation carriers have Primary Ovarian Insufficiency, which can be a source of infertility in women of reproductive age.

CF*plus*®

***ACOG* recognizes** that, because it is becoming increasingly difficult to assign a single ethnicity, it is reasonable to offer CF screening to all patients.[1]

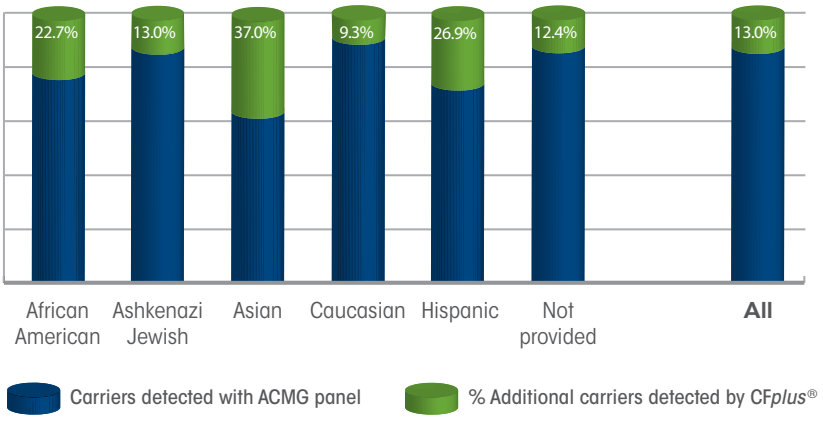
CF*plus* Provides Higher Detection Rates for the Pan-Ethnic US Population

	CF Carrier Risk[1]	ACMG/ACOG 23 Mutation Panel[1]	CF*plus* Mutation Panel[2-6]
Caucasian	1 in 25	88%	93%
African American	1 in 61	64%	81%
Hispanic	1 in 58	72%	78%
Ashkenazi Jewish	1 in 24	94%	97%
Asian	1 in 94	49%	37-55%
Native American	-	-	81%

CF*plus* Detects More Mutations in Many Ethnic Backgrounds

- Approximately **1 in 8** carriers overall, and specifically **1 in 4** Hispanic or African American carriers and 1 in 11 Caucasian carriers, would otherwise be missed using the ACMG 23-mutation panel.[7]
- Approximately 1 in 9 carriers overall, and specifically 1 in 5 Hispanic or African American carriers and 1 in 13 Caucasian carriers, would otherwise be missed using a 32-mutation panel.[7,8]
- 23 of the additional mutations in CF*plus* have been found to be more common than the least common ACMG mutation.[7]

% Additional Carriers Detected by CF*plus*[7]



Experience You Can Trust

- Over 25 years of genetic testing expertise from board certified Molecular Geneticists.
- All mutations included on our carrier screens have been reviewed by our genetic experts and determined to be clinically significant.

Broad Test Offerings

- CF, SMA, and Fragile X screening utilize testing methodologies that provide high quality and clinically relevant results.
- Inheritest Carrier Screen broadens your patients' options for carrier screening, offering testing for over 90 clinically significant diseases.
  - Inheritest Select provides an additional option for patients of Ashkenazi Jewish descent.
  - Tay-Sachs enzymes can be added with any request.
  - Follow-up mutation-specific sequencing is available for partners.
- Prenatal diagnostic testing is available for at-risk pregnancies.

Comprehensive Service Offerings

- Largest genetic counseling network in the country is available to provide comprehensive genetic counseling to patients with positive results through the ***Telegenetic Counseling to You*** program.
  - Patients can be referred to 855-GC-Calls (422-2557) to schedule an appointment.
  - In many cases, Telegenetic Counseling services are available for patients through a televideo or telephone interaction with a genetic counselor.
- Extensive patient service center network allow for easy specimen collection.

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