Neuronal Migration Disorders

Precision Panel

Overview

Neuronal migration disorders are a heterogeneous group of disorders of the nervous system development where there is abnormal migration of neurons in the developing brain. Examples of diseases in this category include lissencephaly, schinzencephaly, porencephaly, agyria, microgyria, polymicrogyria, pachygyria, etc. These disorders share mutations in migration genes that code for proteins involved in the placement of neuronal structures within the organism. Perturbation in neuronal migration result in abnormal lamination, neuronal differentiation defects, abnormal cell morphology and circuit formation, particularly in the cerebral cortex. Ultimately, the result is a disorganized excitatory and inhibitory activity of the brain. More than 25 syndromes resulting from abnormal migration have been identified. Among them exists different patterns of inheritance such as autosomal dominant, recessive and X-linked.

The Igenomix Neuronal Migration Disorders Precision Panel can serve as an accurate and directed diagnostic tool ultimately leading to a better management and prognosis of the disease. It provides a comprehensive analysis of the genes involved in this disease using next-generation sequencing (NGS) to fully understand the spectrum of relevant genes involved.

Indications

The Igenomix Neuronal Migration Disorders Precision Panel is indicated in patients with a clinical suspicion or diagnosis presenting with or without the following manifestations:

- Poor muscle tone
- Poor motor function
- Seizures
- Developmental delay
- Mental retardation
- Failure to thrive
- Feeding difficulties
- Swelling in the extremities
- Small sized head

Clinical Utility

The clinical utility of this panel is:

- The genetic and molecular diagnosis for an accurate clinical diagnosis of a symptomatic patient.

- Early initiation of treatment with a multidisciplinary team in the form of medical care antiepileptic medication and special or supplemental education with physical, occupational and speech therapies.
- Risk assessment and genetic counselling of asymptomatic family members according to the mode of inheritance.
- Improvement of delineation of genotype-phenotype correlation.

Genes & Diseases

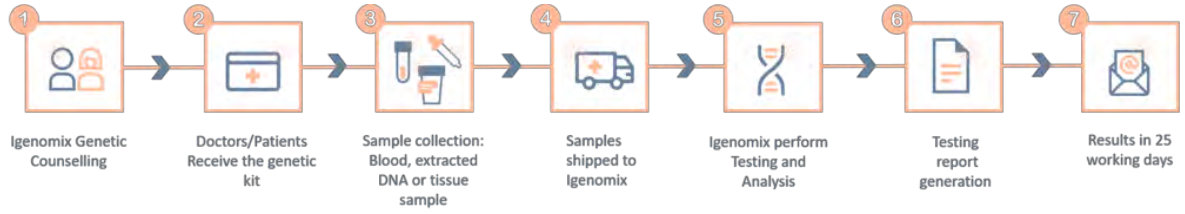
GENE	OMIM DISEASES	INHERITANCE*	%GENE COVERAGE (20X)	HGMD**
ACTB	Baraitser-Winter Syndrome, Dystonia, Becker Nevus Syndrome, Deafness	AD	100	40 of 40
ACTG1	Baraitser-Winter Syndrome, Deafness	AD	98.59	55 of 55
ADGRG1	Polymicrogyria	AR	100	-
AKT3	Megalencephaly, Polymicrogyria, Polydactyly, Hhydrocephalus	AD	99.9	9 of 11
ARF1	Nodular Heterotopia	AD	100	3 of 3
ARFGEF2	Nodular Heterotopia, Microcephaly	AR	100	15 of 15
ARX	Corpus Callosum, Abnormal Genitalia, Epileptic Encephalopathy, Lissencephaly, Mental Retardation, Partington Syndrome, West Syndrome	X,XR,G	81.92	-
ASPM	Microcephaly	AR	99.74	221 of 222
ATP6V0A2	Cutis Laxa, Wrinkly Skin Syndrome	AR	99.99	55 of 55
B3GALNT2	Muscular Dystrophy, Dystroglycanopathy, Intellectual Disability, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	97.14	17 of 17
B4GAT1	Muscular Dystrophy, Dystroglycanopathy, Walker-Warburg Syndrome	AR	-	-
CCND2	Megalencephaly, Polymicrogyria, Polydactyly, Hydrocephalus	AD	99.97	9 of 9
CDK5	Lissencephaly, Cerebellar Hypoplasia	AR	100	5 of 5
CIT	Microcephaly	AR	99.98	17 of 17
COL4A1	Angiopathy, Nephropathy, Aneurysms, Microangiopathy, Leukoencephalopathy, Porencephaly, Hanac Syndrome, Walker-Warburg Syndrome	AD	99.99	173 of 173
COL4A2	Porencephaly	AD	99.93	28 of 28
CRADD	Mental Retardation, Lissencephaly, Intellectual Disability	AR	99.62	6 of 7
CRPPA	Limb-Girdle Muscular Dystrophy, Dystroglycanopathy, Walker-Warburg Syndrome	AR	97.69	-
CSNK2A1	Okur-Chung Neurodevelopmental Syndrome	AD	99.95	23 of 23
CTNNA2	Cortical Dysplasia	AR	99.95	8 of 8
CTU2	Microcephaly, Facial Dysmorphism, Renal Agenesis	AR	99.93	6 of 6
CUL4B	Mental Retardation, Short Stature	X,XR,G	99.77	-
DAG1	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Muscle-Eye-Brain Disease, Leucodystrophy, Walker-Warburg Syndrome	AR	99.98	9 of 9
DCHS1	Mitral Valve Prolapse, Van Maldergem Syndrome, Cerebrofacioarticular Syndrome	AD,AR	99.69	30 of 30
DCX	Lissencephaly	X,G	100	-
DDX3X	Intellectual Developmental Disorder	X,XR,XD,G	99.03	-
DYNC1H1	Charcot-Marie-Tooth Disease, Mental Retardation, Spinal Muscular Atrophy	AD	100	104 of 104
EMX2	Schizencephaly	-	100	5 of 5
ERMARD	Periventricular Nodular Heterotopia, 6q Terminal Deletion Syndrome	AD	99.94	1 of 1
FAT4	Van Maldergem Syndrome, Cerebrofacioarticular Syndrome, Hennekam Syndrome	AR	99.8	41 of 41

FH	Fumarase Deficiency, Leiomyoma, Pheochromocytoma, Paraganglioma	AD,AR	100	229 of 232
FKRP	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Intellectual Disability, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	99.9	157 of 157
FKTN	Cardiomyopathy, Limb Girdle Muscular Dystrophy, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	98	54 of 56
FLNA	Dysplasia, Fg Syndrome, Heterotopia, Intestinal Pseudoobstruction, Melnick-Needles Syndrome, Otopalatodigital Syndrome, Short Bowel Syndrome, Ehlers-Danlos Syndrome	X,XR,XD,G	100	-
FLVCR2	Vasculopathy, Hydranencephaly, Hydrocephaly	AR	99.97	16 of 16
GMPPB	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Intellectual Disability, Myasthenic Syndromes, Glycosylation Defect, Muscle-Eye-Brain Disease	AR	99.95	53 of 53
GPSM2	Chudley-Mccullough Syndrome	AR	100	13 of 13
GRIN1	Neurodevelopmental Disorder, Hyperkinetic Movements, Seizures	AD,AR	100	43 of 43
GRIN2B	Epileptic Encephalopathy, Mental Retardation, West Syndrome	AD	99.99	108 of 108
KATNB1	Lissencephaly, Microcephaly	AR	100	10 of 10
KIF2A	Cortical Dysplasia	AD	99.91	7 of 7
KIF5C	Cortical Dysplasia	AD	99.96	7 of 7
KIF7	Acrocallosal Syndrome, Hydrolethalus Syndrome, Macrocephaly, Multiple Epiphyseal Dysplasia, Orofaciodigital Syndrome	AR	94.91	47 of 50
KIFBP	Goldberg-Shprintzen Syndrome	AR	99.27	-
L1CAM	Corpus Callosum, Masa Syndrome, Hydrocephalus, Stenosis Of The Aqueduct Of Sylvius	X,XR,G	100	-
LAMA2	Limb Girdle Muscular Dystrophy	AR	100	363 of 377
LAMB1	Lissencephaly	AR	99.97	8 of 9
LAMC3	Cortical Malformations	AR	98.72	22 of 22
LARGE1	Limb Girdle Muscular Dystrophy, Intellectual Disability, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	100	-
MACF1	Lissencephaly, Brainstem Malformation	AD	99.94	18 of 18
MED12	Lujan-Fryns Syndrome, Ohdo Syndrome, Opitz-Kaveggia Syndrome, Blepharophimosis-Intellectual Disability Syndrome, Fg Syndrome	X,XR,G	100	-
MEF2C	Mental Retardation, Stereotypic Movements, Epilepsy, Cerebral Malformations, 5q14.3 Microdeletion Syndrome	AD	99.91	43 of 46
MPDZ	Hydrocephalus	AR	99.44	58 of 58
MTOR	Dysplasia Of Taylor, Smith-Kingsmore Syndrome, Macrocephaly, Intellectual Disability, Neurodevelopmental Disorder, Small Thorax Syndrome	AD	99.98	39 of 39
NDE1	Lissencephaly, Hydranencephaly	AR	86.55	12 of 13
NEDD4L	Periventricular Nodular Heterotopia	AD	97.61	10 of 10
NSDHL	Ck Syndrome, Congenital Hemidysplasia, Ichthyosiform Erythroderma	X,XR,XD,G	100	-
OCLN	Pseudo-Torch Syndrome, Intrauterine Infection-Like Syndrome	AR	86.89	15 of 17
PAFAH1B1	Lissencephaly, 17p13.3 Microduplication Syndrome, Miller-Dieker Syndrome	AD	99.95	90 of 92
PHGDH	Neu-Laxova Syndrome, 3-Phosphoglycerate Dehydrogenase Deficiency	AR	100	26 of 26
PI4KA	Polymicrogyria, Cerebellar Hypoplasia, Arthrogryposis	AR	99.76	4 of 4
PIK3CA	Overgrowth, Vascular Malformations, Epidermal Nevus, Cowden Syndrome, Keratosis, Macrocephaly, Megalodactyly, Hemihyperplasia, Lynch Syndrome, Megalencephaly, Polymicrogyria Syndrome, Multiple Cancer Types	AD	99.58	54 of 58
PIK3R2	Megalencephaly, Polymicrogyria, Polydactyly, Hydrocephalus	AD	90.81	7 of 7
POMGNT1	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Retinitis Pigmentosa, Muscle-Eye-Brain Disease, Retinitis Pigmentosa, Walker-Warburg Syndrome	AR	99.91	82 of 83
POMGNT2	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Walker-Warburg Syndrome	AR	100	10 of 10

POMK	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Walker-Warburg Syndrome	AR	99.99	8 of 8
POMT1	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	100	105 of 105
POMT2	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Intellectual Disability, Muscle-Eye-Brain Disease, Walker-Warburg Syndrome	AR	100	74 of 74
PQBP1	Renpenning Syndrome, Hamel Cerebro-Palato-Cardiac Syndrome, Intellectual Disability, Sutherland-Haan Type	X,XR,G	99.99	-
PRUNE1	Neurodevelopmental Disorder, Microcephaly, Hypotonia	AR	99.99	-
RAB18	Warburg Micro Syndrome	AR	100	4 of 4
RAB3GAP1	Warburg Micro Syndrome, Cataract, Intellectual Disability, Hypogonadism	AR	99.94	70 of 70
RAB3GAP2	Martsolf Syndrome, Warburg Micro Syndrome, Spastic Paraplegia, Cataract, Intellectual Disability, Hypogonadism	AR	100	17 of 17
RAC3	Neurodevelopmental Disorder, Structural Brain Anomalies	AD	94.13	5 of 5
RELN	Epilepsy, Lissencephaly	AD,AR	100	70 of 70
RTTN	Microcephaly, Polymicrogyria, Seizures, Dwarfism	AR	99.94	28 of 29
RXYLT1	Limb Girdle Muscular Dystrophy, Dystroglycanopathy, Walker-Warburg Syndrome	AR	99.46	-
SEPSECS	Pontocerebellar Hypoplasia	AR	99.59	15 of 15
SHH	Holoprosencephaly, Microphthalmia, Schizencephaly, Hypoplastic Tibiae, Postaxial Polydactyly, Radial Hemimelia, Syndactyly	AD	99.48	161 of 184
SIX3	Holoprosencephaly, Schizencephaly	AD	99.79	79 of 80
SRD5A3	Congenital Disorder Of Glycosylation, Kahrizi Syndrome	AR	100	15 of 15
SRPX2	Rolandic Epilepsy, Mental Retardation, Polymicrogyria	AD	100	-
TBC1D20	Warburg Micro Syndrome	AR	99.94	6 of 6
TMTC3	Lissencephaly, Nodular Heterotopia	AR	99.04	10 of 10
TUBA1A	Lissencephaly	AD	100	95 of 95
TUBA8	Polymicrogyria, Optic Nerve Hypoplasia	AR	80.97	5 of 5
TUBB	Cortical Dysplasia, Skin Creases	AD	100	8 of 8
TUBB2A	Cortical Dysplasia	AD	81.71	5 of 7
TUBB2B	Cortical Dysplasia, Dysequilibrium Syndrome, Polymicrogyria	AD	84.28	29 of 38
TUBB3	Cortical Dysplasia And Dysgenesis, Fibrosis Of Extraocular Muscles, Pontocerebellar Hypoplasia	AD	99.96	30 of 30
TUBB4A	Dystonia Musculorum Deformans, Leukodystrophy, Dystonia	AD	89.81	44 of 44
TUBG1	Cortical Dysplasia	AD	99.94	10 of 10
VLDLR	Cerebellar Hypoplasia, Mental Retardation, Dysequilibrium Syndrome	AR	100	20 of 20
WDR62	Microcephaly, Cortical Malformations	AR	100	60 of 61
WDR81	Cerebellar Hypoplasia, Mental Retardation, Hydrocephalus, Dysequilibrium Syndrome	AR	99.94	19 of 19
YWHAE	17p13.3 Microduplication Syndrome, Miller-Dieker Syndrome	-	98.99	0 of 1

*Inheritance: AD: Autosomal Dominant; AR: Autosomal Recessive; X: X linked; XLR: X linked Recessive; Mi: Mitochondrial; Mu: Multifactorial.
**Number of clinically relevant mutations according to HGMD

Methodology



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- Get more information about the test.
- Request your kit.
- Request a pick up of the kit after collecting the sample.

References

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