DISORDER	GENE	IEM CODE	OMIM	Developmental delay/Retardation, psychomotor			Motor developmental delay/impairment			Developmental regression			Laboratory markers	Specific treatment	References (PMID)
				Ataxia	Extrapyramidal signs	Spasticity	Ataxia	Extrapyramidal signs	Spasticity	Ataxia	Extrapyramidal signs	Spasticity			
DISORDERS OF NITROGEN-CONTAINING COMPOUNDS															
Disorders of purine metabolism															
Phosphoribosyl pyrophosphate synthetase 1 superactivity	*PRPS1*	IEM0007	300661	x									Uric acid (U, P), Purines (U)	dietary reduction of red and organ meets, fish; Allopurinol 5-10 mg/kg/day; S-adenosylmethionine 30 mg/kg/day	8498830; 27256512; 26089585; 20380929
Adenylosuccinate lyase deficiency	*ADSL*	IEM0009	103050;608222	x									Purines (CSF, U)	individual case reports: ketogenic diet; D-ribose 10 mmol/kg/day (inconsistent)	20177786; 18524658; 11392513; 30933180; 12368987; 9989253; 18649008
Purine nucleoside phosphorylase deficiency	*PNP*	IEM0015	613179;164050	x		x							Purines (U)	Bone marrow transplant; possible phase I/II clinical trial for gene therapy (doi.org/10.14785/lymphosign-2018-0007)	22669887; 6791594; 2439024
Disorders of nucleotide metabolism															
Ribonuclease T2 deficiency	*RNASET2*	IEM0030	612951		x	x							Lymphocytes (CSF), Interferon-α (CSF), Interferon-stimulated genes or interferon signature (PBMC)	N/A	31349848; 15851732
Disorders of glutathione metabolism															
Glutathione synthetase deficiency (5-oxoprolinuria)	*GSS*	IEM0050	266130	x		x							Hemoglobin (B), Reticulocytes (B), Glutathione (RBC), 5-Oxoproline (U)	Na bicarbonate to treat metabolic acidosis, antioxidants (vitamin C, E), avoid drugs like acetylsalycylic acid, phenopbarbital, sulfonamides)	5486400; 25851806; 11445798; 1986110
Disorders of ammonia detoxification															
Ornithine transcarbamylase deficiency	*OTC*	IEM0058	311250	x									Ammonia (B), ASAT/ALAT (P), Urea (P), Amino acids (P), Orotic acid (U)	Dietary protein restriction, citrulline po administration 170 mg/kg/day or 3.8g/m2/day (in acute phase Arginine IV infusion 200 mg/kg or 4000 mg/m2); NH3 scavengers (in acute phase Na phenylacetate and Na benzoate, for chronic management Na phenylbutyrate <20 kg: ≤250mg/kg/dc,d >20 kg: 5g/m2/d maximum: 12g/day); liver transplantation; gene therapy in clinical trials	25958381; 23780642
Argininosuccinate synthetase deficiency (Citrullinemia type I)	*ASS1*	IEM0059	215700	x									Ammonia (B), ASAT/ALAT (P), Urea (P), Amino acids (P), Orotic acid (U)	Dietary protein restriction, essential amino acid supplementation, po Arginine <20 kg: 100-300mg/kg/d, >20 kg: 2.5-6g/m2/d maximum: 6g/d; NH3 scavengers (in acute phase Na phenylacetate and Na benzoate, for chronic management Na phenylbutyrate <20 kg: ≤250mg/kg/d, >20 kg: 5g/m2/d maximum: 12g/day; Buphenyl or Glycerol phenylbutyrate); liver transplantation	12542919; 11847065; 21989980; 23780642
Argininosuccinate lyase deficiency	*ASL*	IEM0060	207900	x									Ammonia (B), ASAT/ALAT (P), Urea (P), Amino acids (P, U), Orotic acid (U)	Dietary protein restriction, essential amino acid supplementation; L-Arginine <20 kg: 100-300mg/kg/d >20 kg: 2.5-6g/m2/d maximum: 6g/d; Na benzoate 250mg/kg/d maximum: 12g/d	28251416; 23780642
Arginase 1 deficiency	*ARG1*	IEM0061	207800	x		x							Ammonia (B), ASAT/ALAT (P), Urea (P), Amino acids (P), Orotic acid (U)	Dietary protein restriction, essential amino acid supplementation; Na phenylbutyrate <20 kg: ≤250mg/kg/dc >20 kg: 5g/m2/d maximum: 12g/day; Na benzoate 250mg/kg/d maximum: 12g/d	22964440; 32606543; 23780642; DOI: 10.23937/2378-3001/1410074; doi: 10.1097/MD.0000000000021634; DOI: 10.4103/JPN.JPN_1_19;
Mitochondrial ornithine transporter deficiency (HHH syndrome)	*SLC25A15*	IEM0062	238970	x		xx							Ammonia (B), ASAT/ALAT (P), Urea (P), Amino acids (P, U), Orotic acid (U)	Dietary protein restriction, essential amino acid supplementation; Na benzoate 250mg/kg/d maximum: 12g/d; Na phenylbutyrate 250mg/kg/d maximum: 12g/d; L-Arginine <20 kg: 100-200mg/kg/d >20 kg: 2.5-6g/m2/d maximum: 6g/d; L-Citrulline 100-200mg/kg/d maximum: 6g/d	31443672; 1291165
Disorders of monoamine metabolism															
Aromatic L-amino acid decarboxylase deficiency	*DDC*	IEM0077	608643	x	x	x							SHIAA/HVA (CSF), 3OMD (CSF, DOPB), Prolactin (P)	Pyridoxine, dopa agonist, MAO inhibitor, central anticholinergic	31935764; 28100251; 15079002
Dopamine-serotonin vesicular transport (VMAT2) defect	*SLC18A2*	IEM0081	193001	x	x	x							SHIAA/HVA (U, CSF), Prolactin (P)	Dopa-agonist	23363473
Disorders of phenylalanine and tetrahydrobiopterin metabolism															
6-Pyruvoyl-tetrahydropterin synthase deficiency	*PTS*	IEM0085	261640		x	x							Amino acids (P), Pterins (DBS, U, CSF), SHIAA/HVA (CSF)	Tetrahydrobiopterin, L-dopa/dopa carboxylase inhibitor; 5-hydroxytrypptophan; +/- folinic acid	15984017; DOI: 10.15761/CMR.1000148; 32456656; 18332253; 16601879
Sepiapterin reductase deficiency	*SPR*	IEM0086	182125		x	x							Sepiapterin (U, CSF), SHIAA/HVA (CSF)	Tetrahydrobiopterin, L-dopa/dopa carboxylase inhibitor; 5-hydroxytrypptophan; MAO inhibitor, serotonin reuptake inhibitor, dopamine agonist, anticholinergics, melatonin	11443547; 11443547; 17074599
DNAJC12-deficient hyperphenylalaninemia	*DNAJC12*	IEM0089	606060		x								Amino acids (P), Pterins (DBS, U, CSF), SHIAA/HVA (CSF)	BH4, L-dopa/carbidopa, 5-hydroxytryptophan	28132689; 28794131; 32519510
Disorders of sulfur amino acid and sulfide metabolism															
Cystathionine beta-synthase deficiency	*CBS*	IEM0102	236200		x								Amino acids (P); Homocysteine (P)	Pyridoxine 10 mg/kg/day (max 500 mg/day); vitamin B12, folate, low protein diet, +/- cysteine; betaine 50 mg/kg twice daily up to 150-200 mg/kg/day; enzyme therapy in clinical trials	28503581; 3404194
Sufite oxidase deficiency	*SUOX*	IEM0105	272300	x	x	x							Amino acids (P), Homocysteine, total (P), Sulfite (U), Pipecolic acid (CSF, U)	trials of dietary therapy (no proven benefit) low-protein diet restricted in cysteine and methionine; experimental (with minimal or no benefits): betaine, thiamine, cysteamine, penicillamin	16025295; 302914; 31870341;24384336; 32802950
Mitochondrial sulfur dioxygenase deficiency	*ETHE1*	IEM0106	602473;608451		x	x							Organic acid (U), Acylcarnitines (P), Thiosulphate (P), Lactate (B)	Trials of antioxidants (CoQ10, Riboflavin), experimental therapy (no proven benefit) with N-acetylcystein, Metronidazole; Orthotopic liver transplant	32923369; 1683940; 8283379; 30864297
Disorders of branched-chain amino acid metabolism															
Maple syrup urine disease type 1a/b	*BCKDHA, BCKDHB*	IEM0108	248600	x	x	x							Amino acids (P), Organic acids (U)	Dietary leucine restriction, BCAA-free medical foods, judicious supplementation with isoleucine and valine, hemodialysis/hemofiltration, trial of enteral thiamine 50-100 mg/day, divided 2x/day 4 week trial, Transplantation of allogeneic liver tissue	7181520; 30957186; 7883996; 7107873
Maple syrup urine disease type 2	*DBT*	IEM0110	248600	x	x	x							Amino acids (P), Organic acids (U)	Dietary leucine restriction, BCAA-free medical foods, judicious supplementation with isoleucine and valine, hemodialysis/hemofiltration, trial of enteral thiamine 50-100 mg/day, divided 2x/day 4 week trial, Transplantation of allogeneic liver tissue	32515140; 1547285
Pyruvate dehydrogenase complex deficiency E3	*DLD*	IEM0111	248600	x	x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), Acylglycines (U), ASAT/ALAT (P), CK (P), Lactate (P), Ammonia (P), Glucose (S), Urinalysis	Protein/BCAA restriction; trial of ketogenic/high-fat diet; DCA supplementation (50-75 mg/kg/day); thiamine, CoQ10, Riboflavin, Lipoic acid, biotin	11687750; 23290025
Isovaleryl-CoA dehydrogenase deficiency	*IVD*	IEM0113	243500	x		x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), Acylglycines (U), ASAT/ALAT (P), CK (P), Lactate (P), Ammonia (P), Glucose (S), Urinalysis	Protein restricted diet; Carnitine 50-100 mg/kg/day; Glycine 150-259 mg/kg/day	6549017; 3385530; 16602101
3-Methylcrotonyl-CoA carboxylase 1 deficiency	*MCCC1*	IEM0116	210200			x							Organic acids (U), Acylcarnitines (DBS, P)	In symptomatic patients +/- protein restriction; +/- carnitine	27033733; 22642865
3-Methylcrotonyl-CoA carboxylase 2 deficiency	*MCCC2*	IEM0117	210200			x							Organic acids (U), Acylcarnitines (DBS, P)	In symptomatic patients +/- protein restriction; +/- biotin	1293382; 8831079
3-Methylglutaconyl-CoA hydratase deficiency	*AUH*	IEM0118	250950	x		xx							Organic acids (U), Acylcarnitines (DBS, P)	Protein restriction, L-carnitine	9762598; 3082934; 12434311
3-Hydroxyisobutyryl-CoA deacylase deficiency	*HIBCH*	IEM0120	250620	x	x								Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P)	Moderate protein restricted diet	30111474; 26717663; 30847210
2-Methyl-3-hydroxybutyryl-CoA dehydrogenase deficiency	*HSD17B10*	IEM0121	300438	x	x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P)	Protein restricted diet, L-Carnitine	12112118; 10832746; 11102558
Propionyl-CoA-carboxylase deficiency	*PCCA; PCCB*	IEM0124	232000	x	xx	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P)	Low protein diet, L-Carnitine 100-200 mg/kg/day, Metronidazole 10-20 mg/kg/day alternating 1-2 weeks, +/-NH3 scavengers (Carbaglu, Na benzoate), acute management of hyerammonemic crises	10488817; 7726381; 1418175
Methylmalonyl-CoA mutase deficiency	*MUT*	IEM0127	251000	x	xx	xx							Amino acids (P), Organic acids (U), MMA (S), Acylcarnitines (DBS, P)	Low protein diet, L-Carnitine 100-200 mg/kg/day, vitamin B12, acute management of hyerammonemic crises, orthotopic liver transplant	9713004; 29158924; 3193307; 3767321
Combined MMA and MA	*ACSF3*	IEM0128	614245		x								Organic acids (U), MMA (S)	mild protein restriction, cobalamin, low dose carnitine	27817865; 21841779
Malonyl-CoA decarboxylase deficiency	*MLYCD*	IEM0129	248360		x								Organic acids (U), Acylcarnitines (DBS, P), Lactate (P), Glucose (S), Lipid panel (S)	low fat, high carbohydrate diet, MCT oil, low dose L-carnitine	24613099
Disorders of proline and ornithine metabolism															

DISORDER	GENE	IEM CODE	OMIM	Developmental delay/Retardation, psychomotor			Motor developmental delay/impairment			Developmental regression			Laboratory markers	Specific treatment	References (PMID)
Pyrroline-5-carboxylate synthetase deficiency, cutis laxa phenotype 3	*ALDH18A1*	IEM0137	219150		x	x							Amino acids (P), Ammonia (P)	Arginine 150 mg/kg/day	26026163; 32798076; 29915212
Pyrroline-5-carboxylate reductase 2 deficiency	*PYCR2*	IEM0140	616420			x							DNA		27130255; 27130255
Disorders of β- and γ-amino acids															
Beta-ureidopropionase deficiency	*UPB1*	IEM0150	613161;606673		x								Purines and pyrimidines (U)		30608453
GABA transaminase deficiency	*ABAT*	IEM0152	137150;613163			xx							GABA (CSF), Beta-Alanine (CSF), Homocarnosine (CSF)		28411234; 20052547
Succinic semialdehyde dehydrogenase deficiency	*ALDH5A1*	IEM0153	271980;610045	x	x								Organic acids (U)	Vigabatrin (no proven benefit)	31117962; 17438226; 25246302
Disorders of glutamate metabolism															
Mitochondrial glutamate carrier 1 deficiency	*SLC25A22*	IEM0166	609304			x							Glutamate oxidation (FB)		19780765; 15592994
Astroglial glutamate aspartate transporter deficiency	*SLC1A2*	IEM0168	617105		x	x							DNA		30937933
Ionotropic glutamate receptor NMDA type subunit 1 dysregulation	*GRIN1*	IEM0169	614254;617820		xx	xx							DNA		25864721; 27164704
Ionotropic glutamate receptor AMPA type subunit 4 dysregulation	*GRIA4*	IEM0174	617864			xx							DNA		29220673
Metabotropic glutamate receptor 1 deficiency	*GRM1*	IEM0176	614831		x	x							DNA		22901947
Disorders of serine metabolism															
Phosphoglycerate dehydrogenase deficiency	*PHGDH*	IEM0181	606879;601851		x	x							Amino acids (CSF, P), 5-Methyl-THF (CSF)	L-serine (500-700 mg/kg/day); glycine (200 mg/kg/day)	8758134; 23463425; 26610677
ASCT1 transporter deficiency	*SLC1A4*	IEM0184	616657			x			x				DNA		31763347; 31763347; DOI: 10.24966/GGS-2485/100017
Disorders of glycine metabolism															
Glycine encephalopathy due to glycine decarboxylase deficiency	*GLDC*	IEM0185	238300	x		x							Amino acids (P, CSF)	Na benzoate 200-550 mg/kg/day to max 750 mg/kg/day or 5.5 g/m2 BSA in adults up to 16.5 g/m2/day in severe cases; dextrometorphan 3 to 15 mg/kg/day or ketamine	32421718; doi.org/10.2217/14796708.1.5.621; 15557500; 16157495
Glycine encephalopathy due to aminomethyltransferase deficiency	*AMT*	IEM0186	605899			x							Amino acids (P, CSF)	Na benzoate 200-550 mg/kg/day to max 750 mg/kg/day or 5.5 g/m2 BSA in adults up to 16.5 g/m2/day in severe cases; dextrometorphan 3 to 15 mg/kg/day or ketamine	15557500; 16157495
Glycine transporter 1 deficiency	*SLC6A9*	IEM0187	617301			x							Amino acids (P, CSF)		27773429
Glycine encephalopathy due to H protein deficiency	*GCSH*	IEM1120	605899	x		x							Amino acids (P, CSF)		6780675; 1671321
DISORDERS OF VITAMINS, COFACTORS, METALS AND MINERALS															
Disorders of lipoic acid and iron-sulfur metabolism															
Lipoyltransferase 1 deficiency	*LIPT1*	IEM0194	616299		x	xx							Lactate (P), Organic acids (U)		24341803
BOLA3 deficiency	*BOLA3*	IEM0196	614299		x	xx							Amino acids (CSF, P), Lactate (P)		24334290
ISCA1 deficiency	*ISCA1*	IEM0199	617613			x							Amino acids (CSF, P), Lactate (P)		30113620; 29623423
Ferredoxin reductase deficiency	*FDXR*	IEM0203	617717	x		x							Complexes I - IV activity (muscle); DNA		29040572
Disorders of cobalamin metabolism															
Adenosylcobalamin and methylcobalamin synthesis defect - cblF	*LMBRD1*	IEM0211	277380		x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), tHcy (P), SAM/SAH (P), Blood count	Hydroxycobalamin 1 mg IM daily	19136951; 31377012
Adenosylcobalamin and methylcobalamin synthesis defect - cblJ	*ABCD4*	IEM0212	614857		x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), tHcy (P), SAM/SAH (P)	Hydroxycobalamin 1 mg IM daily	31377012
Adenosylcobalamin and methylcobalamin synthesis defect - cblC	*MMACHC*	IEM0213	277400		x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), SAM/SAH (P), Blood count	Hydroxycobalamin 1 mg IM daily, betaine 250 mg/kg/day; folinic acid 5-30 mg/day; L-carnitine 50-200 mg/kg/day; no protein restriction; maintain normal methionine levels (+/- supplementation)	31203424; 31092259
Methylmalonic aciduria and homocystinuria, cblC type, digenic	*MMACHC; PRDX1*	IEM0214	609831;176763		x	x							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), SAM/SAH (P), Blood count	Hydroxycobalamin 1 mg IM daily	29396438
Methionine synthase reductase deficiency-cblE	*MTRR*	IEM0216	236270	x		x							Amino acids (P), Organic acids (U), tHcy (P), SAM/SAH (P)	Hydroxycobalamin 1 mg IM daily, betaine 250 mg/kg/day; folinic acid 5-30 mg/day	9427140; 2688421
Methionine synthase deficiency - cblG	*MTR*	IEM0217	250940	x		x							Amino acids (P), Organic acids (U), tHcy (P), SAM/SAH (P)	Hydroxycobalamin 1 mg IM daily, betaine 250 mg/kg/day; folinic acid 5-30 mg/day	9683607; 2688421
Disorders of folate metabolism															
Folate receptor alpha deficiency	*FOLR1*	IEM0222	613068							x	x	xx	5-Methyltetrahydrofolate (CSF), Folate (S)	Folinic acid 5 mg/kg/day	19732866
Methylenetetrahydrofolate reductase deficiency	*MTHFR*	IEM0223	236250							x			Amino acids (P), Homocysteine (P), 5-Methyltetrahydrofolate (CSF), Folate (S)	Betaine (9000 mg/day), folinic acid (45 mg/day), vitamin B12 (1000 mg/week), vitamin B6 (300 mg/day) and profilactic acetylsalicylic acid (100 mg/day).	29284203
Disorders of biotin metabolism															
Biotinidase deficiency	*BTD*	IEM0227	253260	x									Organic acids (U), Acylcarnitines (DBS, P)	Biotin 5-10 mg/day	15224716; 11952077
Holocarboxylase synthetase deficiency	*HLCS*	IEM0228	253270	x									Organic acids (U), Acylcarnitines (DBS, P), Lactate (P)	Biotin 10-20 mg/day (up to 40 mg/day)	6811711
Disorders of pyridoxine metabolism															
Pyridox(am)ine 5´-phosphate oxidase deficiency	*PNPO*	IEM0250	610090		x								Amino acids (P), B6 vitaminers (P, CSF), HVA/4HIAA (CSF), Vanillinlactic acid (U)	Pyridoxal phosphate 30 mg/kg/day	24645144
Disorders of copper metabolism															
Menkes disease	*ATP7A*	IEM0280	309400	x		x							Copper (S), Ceruloplasmin (S)	Copper chloride or L-histidine 350-500 ug/day IV or SC	27878136; 28298846
Disorders of magnesium metabolism															
KCNJ10 deficiency	*KCNJ10*	IEM0313	600791;612780	x									Calcium (P), Magnesium (P), Potassium (P), Steroids (P)		19289823
Disorders of carbohydrate transport and absorption															
Glucose transporter 1 deficiency	*SLC2A1*	IEM0314	;601042;61484 7	x	x	x							Glucose (P,CSF)	Ketogenic diet, clinical trials with triheptanoin	24200040; 19901175; 27725288
DISORDERS OF CARBOHYDRATES															
Disorders of the pentose phosphate pathway and polyol metabolism															
Ribose-5-phosphate isomerase deficiency	*RPIA*	IEM0328	608611			x							Polyols (U, P, CSF)		14988808
Disorders of gluconeogenesis															
Pyruvate carboxylase deficiency	*PC*	IEM0372	266150	x	x	x							Lactate (P), Pyruvate (P), Amino acids (P)		412860
MITOCHONDRIAL DISORDERS OF ENERGY METABOLISM															
Disorders of pyruvate metabolism															
Pyruvate dehydrogenase complex deficiency E1a	*PDHA1*	IEM0389	312170		x	x							Lactate (P), Pyruvate (P), Amino acids (P)	Ketogenic diet	15473177; 22079328; 33092611; 23021068
Pyruvate dehydrogenase E1β subunit deficiency	*PDHB*	IEM0390	179060		x	x							Lactate (P), Pyruvate (P), Amino acids (P)	Ketogenic diet	22079328; 23021068
Dihydrolipoyl transacetylase deficiency	*DLAT*	IEM0391	245348		x								Lactate (P), Pyruvate (P), Amino acids (P)	Ketogenic diet	22079328; 16049940; 23021068
Pyruvate dehydrogenase E3 binding protein deficiency	*PDHX*	IEM0392	245349	x	x								Lactate (P), Pyruvate (P), Amino acids (P)	Ketogenic diet	22079328; 33092611
Pyruvate dehydrogenase phosphatase deficiency	*PDP1*	IEM0393	608782		x								Lactate (P), Pyruvate (P), Amino acids (P)	Ketogenic diet	31392110; 15855260
Disorders of the Krebs cycle															
Mitochondrial aconitase deficiency	*ACO2*	IEM0396	614559		x								cis-Aconitate (P), Isocitrate (P)		29577077; 30689204
ATP-specific succinyl-CoA ligase β subunit deficiency	*SUCLA2*	IEM0399	612073	x	x	x							Lactate (P), Pyruvate (P), Organic acids (U), MMA (S), Acylcarnitines (P)		17301081; 26409464; 26475597
GTP-specific succinyl-CoA ligase α subunit deficiency	*SUCLG1*	IEM0400	245400	x	x	x							Lactate (P), Pyruvate (P), Organic acids (U), MMA (S), Acylcarnitines (P)		26475597
Fumarase deficiency	*FH*	IEM0401	606812		x	x							Organic acids (U)		24182348; 21560188
Mitochondrial malate dehydrogenase deficiency, tumoral phenotype	*MDH2*	IEM1246	617339		x								Lactate (CSF, P), Organic acids (U)		27989324
Disorders of thiamine metabolism															
2-Oxoglutaric aciduria	*OGDH*	IEM1137	203740		x	x							Glucose (P), Lactate (P), Pyruvate (P), Organic acids (U)		32383294
Disorders of mitochondrial carriers															
Aspartate-glutamate carrier 1 deficiency	*SLC25A12*	IEM0408	612949			xx							Lactate (P), N-Acetyl aspartarte (CNS)		19641205
Disorders of complex I subunits															
NDUFS1 deficiency	*NDUFS1*	IEM0415	618229	x									Lactate (P)		20382551
NDUFA12 deficiency	*NDUFA12*	IEM0426	618244		x			x					Lactate (P)		21617257
NDUFA13 deficiency	*NDUFA13*	IEM1141			x	x							Lactate (P)		25901006
Disorders of complex I assembly															
NUBPL deficiency	*NUBPL*	IEM0444	618242	x									Lactate (P)		31917109; 23553477
TIMMDC1 deficiency	*TIMMDC1*	IEM1076	615534		x								Lactate (P)		28604674
Disorders of complex III subunits															
UQCRQ deficiency	*UQCRQ*	IEM1143	615159	x	xx	x							Lactate (P)		18439546

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Disorders of complex IV assembly and ancillary proteins															
SCO2 deficiency	*SCO2*	IEM0474	604377;608908		xx								Lactate (P)		23407777
SURF1 deficiency	*SURF1*	IEM0475	256000;616684	x									Lactate (P)		23829769
LRPPRC deficiency	*LRPPRC*	IEM0476	220111	x									Lactate (P)		
PET100 deficiency	*PET100*	IEM0478	220110			x							Lactate (P,CSF)		24462369
FASTKD2 deficiency	*FASTKD2*	IEM0479	220110		xx								Lactate (P)		18771761
Cytochrome C oxidase assembly factor 7 deficiency	*COA7*	IEM1088	220110	x									DNA		29718187
NDUFA4 deficiency	*NDUFA4*	IEM1149			xx	xx							Lactate (P,CSF)		23746447
Disorders of complex V subunits															
Mitochondrial ATP synthase F0 subunit 6 deficiency	*MTATP6*	IEM0484		x	xx	x							Lactate (P,CSF); Organic acids (U)		9762610; 21749722
Disorders of complex V assembly															
Mitochondrial ATP synthase F1 assembly factor 2 deficiency	*ATPAF2*	IEM1151	604273			x							Lactate (P,CSF); Organic acids (U)		14757859
Disorders of mitochondrial DNA depletion, multiple deletion, or intergenomic communication															
Mitochondrial DNA polymerase gamma catalytic subunit deficiency	*POLG*	IEM0491	203700	x									Lactate (P); Organic acids (U)		21357833
Disorders of mitochondrial transcription and RNA transcript processing															
tRNA isopentenyl transferase deficiency	*TRIT1*	IEM0512	617873		xx	x							DNA		28185376
Disorders of mitochondrial translation factors															
Mitochondrial elongation factor G2 deficiency	*GFM2*	IEM0526	606544			x							Lactate (MRS)		29075935
Disorders of mitochondrial tRNA incorporation and recycling															
Mitochondrial alanyl-tRNA synthetase deficiency	*AARS2*	IEM0552	614096;615889	x				x					Lactate (P)		24808023; 31099476
Mitochondrial arginine-tRNA synthetase deficiency	*RARS2*	IEM0553	611523			x							Lactate (P)		27061686; 29881806
Mitochondrial glutamyl-tRNA synthetase deficiency	*EARS2*	IEM0557	614924		x	x							Lactate (P), Alpha-fetoprotein (S), ASAT/ALAT (P)		22492562
Mitochondrial phenylalanyl-tRNA synthetase deficiency	*FARS2*	IEM0562	614946			x							Organic acids (U), Amino acids (P), Lactate (P,CSF)		30177229
Mitochondrial valyl-tRNA synthetase deficiency	*VARS2*	IEM0565	615917		x	x							Lactate (P), Blood count		29314548
Mitochondrial tryptophanyl-tRNA synthetase deficiency	*WARS2*	IEM0566	617710	x	x	x							Lactate (P)		28905505
Prolyl tRNA synthetase deficiency	*PARS2*	IEM1078	612036			x							Lactate (P,CSF)		29410512; 29915213
Mitochondrial asparaginyl-tRNA synthetase deficiency	*NARS2*	IEM0554	616239			x							Lactate (P)		28077841
Disorders of mitochondrial fusion															
Methylglutaconic aciduria type III (Costeff syndrome)	*OPA3*	IEM0578	258501	x		xx							Organic acids (U)		11668429; 12126933; 25201222
Disorders of mitochondrial phospholipid metabolism															
MEGDEL syndrome	*SERAC1*	IEM0582	614739		xx	xx							Lactate (P), Organic acids (U), Filipin staining		29205472; 16527507
Disorders of mitochondrial protein quality control															
Mitochondrial processing peptidase β deficiency	*PMPCB*	IEM0592	617954							x	x	x	Lactate (P)		29576218
Mitochondrial intermediate peptidase deficiency	*MIPEP*	IEM0593	617228		x	x							Lactate (P)		27799064
HSP60 deficiency	*HSPD1*	IEM0598	612233;605280			x							Lactate (P), Organic acids (U)		32532876
Other disorders of mitochondrial homeostasis															
Trafficking kinesin-binding protein 1 deficiency	*TRAK1*	IEM0614	608112			x			x				DNA		28364549
Mitochondrial thioredoxin 2 deficiency	*TXN2*	IEM1162	616811		x	x							Lactate (P,CSF)		26626369
DISORDERS OF LIPIDS															
Disorders of ketone body metabolism															
Beta-ketothiolase deficiency	*ACAT1*	IEM0643	203750	x		xx							Amino acids (P), Organic acids (U), Acylcarnitines (DBS, P), Lactate (P), Acetoacetate (P, U), 3-Hydroxy-n-butyric acid (P, U)	Mildly restricted protein intake, avoidance of fat-rich (ketogenic) diet, and L-carnitine therapy if carnitine levels low. Acute management of metabolic crisis with IV glucose	28726122; 23818432; 11161836
Cytosolic acetoacetyl-CoA thiolase deficiency	*ACAT2*	IEM1169	100678	x			x						Lactate (P), Pyruvate (P)	?Low fat diet	20597
Disorders of non-mitochondrial phospholipid metabolism															
Phosphatidic acid-preferrin phospholipase 2 deficiency	*DDHD2*	IEM0671	609340			xxx							DNA		23176823
CTP-phosphoethanolamine cytidylyltransferase 2 deficiency	*PCYT2*	IEM1103	618770			xx							DNA		31637422
Ethanolaminephosphotransferase 1 deficiency	*SELENOI*	IEM1174	607915			x							DNA		28052917
Disorders of non-lysosomal sphingolipid metabolism															
Sphingosine-1-phosphate lyase deficiency	*SGPL1*	IEM0682	617575	x									ACTH (P), Glucose (P), Triglycerides (S), Albumin (U)		30517686
Sphingolipid-1-delta (4)-desaturase deficiency	*DEGS1*	IEM1102	618404		x	xxx							Dihydroceramide (P)		31186544
Alkaline ceramidase 3 deficiency	*ACER3*	IEM1178	617762								x	x	DNA		26792856
Disorders of palmitoylation															
Neuronal ceroid lipofuscinosis type 1	*PPT1*	IEM0689	256730							x	x	x	Enzyme activity (WBC, FB, DBS)		4371326
Disorders of phosphoinositide metabolism															
Phosphatidylinositol 3-kinase regulatory subunit 2 superactivity	*PIK3R2*	IEM0701	603387			x							DNA		17675034
Phosphatidylinositol 4,5-bisphosphate phospholipase C β1 deficiency	*PLCB1*	IEM0707	613722			x						x	DNA		20833646
Disorders of cholesterol biosynthesis															
Mevalonate kinase deficiency	*MVK*	IEM0740	610377	x									Organic acids (U), Leukotrienes (U)	Inflammatory control (non-steroidal anti-inflammatory drugs, corticosteroids, IL-1 targeting biologic agents, TNF-alpha blockade, allogenic stem cell transplantation)	2850914; 10401001
STORAGE DISORDERS															
Disorders of autophagy															
VAC14 deficiency	*VAC14*	IEM1250	617054						x		x		DNA		27292112
AP4S1 deficiency	*AP4S1*	IEM1232	607243			xx							DNA		21620353
AP4B1 deficiency	*AP4B1*	IEM1233	607245		x	xx							DNA		21620353; 24781758
AP4M1 deficiency	*AP4M1*	IEM1234	602296			x							DNA		19559397; 24700674
ALS2 deficiency	*ALS2*	IEM1239	607225			x			x				DNA		12919135; 12145748; 16718699
Neuronal ceroid lipofuscinosis															
Neuronal ceroid lipofuscinosis type 7	*MFSD8*	IEM0825	610951							x	x	x	DNA	Antisense oligonucleotide (N=1)	19177532; 19277732
Neuronal ceroid lipofuscinosis type 10	*CTSD*	IEM0827	610127							x		x	Cathepsin D (DBS,FB,WBC)		16685649; 16670177
Sphingolipidoses															
Glucocerebrosidase deficiency (Gaucher disease)	*GBA*	IEM0832	230800	x	x								Enzyme activity (WBC)	Enzyme replacement therapy, substrate reduction, bone marrow transplantation	11814305; 12970647; 25435509
Oligosaccharidoses															
Mucolipidosis type I (Sialidosis)	*NEU1*	IEM0848	256550	x		x							Enzyme activity (WBC), Oligosaccharides (U)		11063730
Mucolipidoses															
Mucolipin 1 deficiency	*MCOLN1*	IEM0857	252650		x								Phospholipids (U), Gastrin (S)		29449188; 20159435
Disorders of lysosomal transport or sorting															
Salla disease	*SLC17A5*	IEM0874	604369	x		x							Enzyme (FB), Oligosaccharide (U)		10947946; 12121352
DISORDERS OF PEROXISOMES AND OXALATE															
Disorders of plasmalogen synthesis															
Fatty Acyl-CoA reductase 1deficiency	*FAR1*	IEM0881	616154			x							Plasmalogens (RBC		25439727
Disorders of peroxisomal β-oxidation															
Peroxisomal acyl-CoA oxidase 1 deficiency	*ACOX1*	IEM0884	264470	x		x							ASAT/ALAT (P), Organic acids (U), Very-long-chain fatty acids (S), Vitamins (S), Plasmalogens (RBC), Coagulation factors (P), Pipecolic acid (S,U)		33234382; 21964664
CONGENITAL DISORDERS OF GLYCOSYLATION															
Disorders of N-linked glycosylation															
PMM2-CDG	*PMM2*	IEM0908	601785	x	x								Sialotransferins (S), ASAT/ALAT (P), Coagulation factors (P)		25497157, 28425223; 30293989
ALG13-CDG	*ALG13*	IEM0912	300884		x	x							Sialotransferins (S)		26482601
ALG11-CDG	*ALG11*	IEM0916	613661			x							Sialotransferins (S), Lactate (P), Ammonia (B), Prolactin (S)		30676690

DISORDER	GENE	IEM CODE	OMIM	Developmental delay/Retardation, psychomotor			Motor developmental delay/impairment			Developmental regression			Laboratory markers	Specific treatment	References (PMID)
ALG3-CDG	*ALG3*	IEM0918	601110			x							AST/ALT (P), Sialotransferins (S)		10581255
ALG6-CDG	*ALG6*	IEM0921	603147			x							Sialotransferins (S)		10832578
Disorders of O-mannosylation															
B4GAT1-CDG	*B4GAT1*	IEM0943	615287			x							CK (P)		23877401
Disorders of glycolipid glycosylation															
ST3GAL5-CDG	*ST3GAL5*	IEM0987	609056								x		GM3 ganglioside (P), Lactosylceramide (P)		27232954
Disorders of dolichol metabolism															
NUS1-CDG	*NUS1*	IEM0992	617082			xx							Dolichols (FB)		25066056
DPM1-CDG	*DPM1*	IEM0995	608799	x									Sialotransferins (S), CK (P)		16641202, 23856421
MPDU1-CDG	*MPDU1*	IEM0998	609180	x									Sialotransferins (S)		11733556, 11733564
Glycosylation disorders of vesicular trafficking															
COG2-CDG	*COG2*	IEM1199	606974			x							Sialotransferins (S), Cooper (S), Ceruloplasmin (S)		24784932
COG5-CDG	*COG5*	IEM1015	613612	x									Sialotransferins (S), Apo-CIII (S)		19690088, 23228021
COG6-CDG	*COG6*	IEM1016	606977;614576	x									AST/ALT (P), CK (P), Lactate (P), Sialotransferins (S), Vitamins A, D, E, K (S)		26260076
COG8-CDG	*COG8*	IEM1018	611182	x									Sialotransferins (S), Apo-CIII (S)		17220172