Supplementary Table. Clinical features of patients with same mutations in KCNQ2.

Mutation	Seizure type	EEG	Diagnosis	Treatment	Prognosis	Source
c.394G>A	Onset at 3d: Focal onset (FBTCS, TS)	2+m: Focal onset seizures IP: Mass MFD, more on the left 6m, 1y, 2y: IP: Normal	SeLNE	Ineffective: VPA Effective: OXC	2y1m: Seizures free since 3m with OXC (Reduction)	Pt1
	TCS, Spasm, pedaling, Oculogyric crysis	MFD	BFNS	MDZ, PB, CBZ	/	11
c.1741C>T	Onset at 6d: Focal onset (FBTCS)	1m: IP: Asymmetric EW in temporal lobe 3+m: IP: Sparse EW 9m, 1y5m: Boundary 2y1m: Normal	SeLNE	Ineffective: / Effective: PB, VPA	2y1m: Seizures free since 4m with VPA (Reduction)	Pt2
	Onset at their 2-6d	/	Onset at their 2-6d	/	Seizures free	16
	Onset at 3d, General TS	/	Onset at 3d, General TS	Effective: PB	Seizures free	17
	Spasms and other seizure types	/	Spasms and other seizure types	/	/	18
c.1918delC	Onset at 7d, Focal onset (TCS, FBTCS)	20d: Normal 24d: Focal onset seizures 30d: Focal onset seizures IP: Frontal and middle line EW 4m: Focal onset seizures, IP: MFD 4+m: IP: Sparse MFD 11+m, 1y10m: Normal	SeLNE	Ineffective: / Effective: PB, OXC	3y1m: Seizures free since 5m, stop treatment	Pt4
	Onset at 0.17m: Afebrile generalized TS	/	BFNS	Effective: PHT	Self-limiting	19
c.1A>G	3+m: / 8+y: Unknown onset (TCS)	3+m: / 8y2m, 11y: IP: MFD 11y5m: IP: EW	SeLIE, EP	Ineffective: NZP Effective: OXC, LEV	Seizures free for many years with OXC in his infancy 9y: LEV+NZP, seizures occasionally	Pt8
	TCS	Atypical SB	DEE	Ineffective: ACTH Effective: TPM	Seizures free	20
	/	/	BFNS	/	/	21
	/	/	DEE	/	/	22
	Onset at 3-5 d Description in Clinvar: DEE with SB,BFNS	/	BFNS	/	/	23
c.998G>A	Onset at 2+m: Unknown onset (TCS)	4+m: IP: Frequent EW at frontal and temporal lobe 11m: IP: Sparse EW at frontal lobe 1y3m, 2y3m, 2y9m: Normal	SeLIE	Ineffective: / Effective: LEV, VPA	2y10m: Seizures free since 5m with VPA	Pt9
	Onset at their 2d-6m	/	BFNS, BFIE, DEE (8 cases in a kindred)		Seizure free before 1y for 7 cases, seizures with ID/DD for one	24
	Onset at 4h, TS,TCS, Effective: LEV	MFD (8 days) Seizures free since 17m	DEE 25	Ineffective: /		25 26
	Onset at 1d, Generalized	/	BFNS	/	/	26
	Onset at 3-7d Clinvar: DEE with SB,BFNS	/	BFNS (2 patients in a kindred)	/	Seizures free	16

Pt, patient; d, days old; w, weeks old; m, months old; y, years old; h, hours old; EP, epilepsy; FBTCS, focal to bilateral tonic-clonic seizure; TS, tonic seizures; TCS, tonic-clonic seizures; FS, focal seizures; CS, clonic seizures; MC, myoclonic jerks; SE, status epilepticus; OS, Ohtahara syndrome; WS, West syndrome; EOEE, early onset epileptic encephalopathy; LGS, Lennox-GastautSyndrome; IP, interictal period; EW, epileptic waves; SlB, slow background; SB, Suppression burst; HS, hypsarrhythmia; SW, slow waves; MFD, multifocal discharges; OXC, oxcarbazepine; PB, phenobarbital; VPA, valproic acid; TPM, topiramate; LTG, lamotrigine; NZP, nitrazepam; PDN, prednisone; VGB, vigabatrin; LEV, levetiracetam; CBZ, carbamazepine, CNZ, clonazepam; PHT, phenytoin; KD, Ketogenic diet; ZNS, zonisamide; PLP, pyridoxal 5'-phosphate; DZP, diazepam; ACTH, adrenocorticotropic hormone; ETX, ethosuximide; CBD, cannabidiol; PGB, pregabalin; LCM, lacosamide; MDZ, midazolam.

Supplementary Table. Continued.

Mutation	Seizure type	EEG	Diagnosis	Treatment	Prognosis	Source
c.1678C>T	Onset at 2d: Focal and general onset (FBTCS, TS, Spasms)	1w: Focal onset seizures 3w: IP: Mass MFD 1m: SB, General onset spasms, Focal onset asymmetric tonic and clustered spasms 3m: HS, IP: Mass MFD 4m: Slow background, IP: Mass MFD 1y3m: Slow background, IP: Sparse MFD 1y8m: IP: Fast background, EW in left frontal lobe	DEE (OS,WS)	Ineffective: LEV Effective: PB, OXC, PDN	1y9m: Seizures free since 5m with OXC+PB	Pt10
	Onset at 2d: Focal and general onset (TS, Spasms)	10d: SB, IP: Mass MFD 4m: IP: SW	DEE (OS)	Ineffective: LEV, KD Effective: VPA, LTG, OXC, NZP	1y1m: Seizures with VPA+LTG+OXC+NZP	Pt14
	Onset at 15d, TS, TCS	MFD and SB (1 months)	DEE (OS)	Ineffective: LEV, PB Effective: TPM	Seizures with TPM	25
	Onset at 3d, Initlal: Tonic extension with clonic movements left hemicorpus and eyelid myoclonia. Evolution: MC with nystagmus, severe spastic quadriplegia Axial hypotonia	Initial: SB with MFD, SW (2m) 4y: MFD and SW	DEE (OS)	VGB, PB, VPA, TPM, PHT, CNZ, ETX, LEV, CBZ	Daily TS with TPM+LEV+VPA	27
	Onset at 16d, asymmetric	SB	DEE (OS)	LEV+TPM	LEV+TPM: seizure free for 1 year	26
	Onset at 3d	/	DEE	/	/	28
	Onset at 3d, MC	SB	DEE (OS)	Ineffective: PB, VGB Effective: TPM	Seizures free since 1m	29
	/	/	DEE	/	/	30
	Clinvar: DEE with SB, DEE, ID/DD with limb dystonia, Neurodevelopmental disorder					
c.683A>G	Onset at 2d, Focal and general onset (FBTCS, Spasms)	12d, 1m: SB, Focal onset seizures 3m: HS, IP:Mass MFD 10m: General onset spasms IP: Diffuse high amplitude slow wave background, mass MFD 1y1m: General onset spasms IP: Multifocal and bursts of short-range high-amplitude spike rhythm 1y5m: General onset spasms IP: Multifocal and bursts of short-range high-amplitude spike wave	DEE (OS,WS)	Ineffective: PB, LEV, VGB Effective: OXC, NZP, PDN, VPA, LTG	1y7m: Seizures reduction with OXC+VPA+NZP+LTG	Pt11
	Onset at 3d, tonic spasms of the upper limbs, opisthotonus, abduction and adduction of the arms and gaze fixation with postictal intense crying.	MFD of low amplitude with mild discontinuation	DEE	Ineffective: LEV, Pyridoxine, PLP, PB, CBZ, CNZ, KD Effective: PTH, OXC	/	31

Pt, patient; d, days old; w, weeks old; m, months old; y, years old; h, hours old; EP, epilepsy; FBTCS, focal to bilateral tonic-clonic seizure; TS, tonic seizures; TCS, tonic-clonic seizures; FS, focal seizures; CS, clonic seizures; MC, myoclonic jerks; SE, status epilepticus; OS, Ohtahara syndrome; WS, West syndrome; EOEE, early onset epileptic encephalopathy; LGS, Lennox-GastautSyndrome; IP, interictal period; EW, epileptic waves; SIB, slow background; SB, Suppression burst; HS, hypsarrhythmia; SW, slow waves; MFD, multifocal discharges; OXC, oxcarbazepine; PB, phenobarbital; VPA, valproic acid; TPM, topiramate; LTG, lamotrigine; NZP, nitrazepam; PDN, prednisone; VGB, vigabatrin; LEV, levetiracetam; CBZ, carbamazepine, CNZ, clonazepam; PHT, phenytoin; KD, Ketogenic diet; ZNS, zonisamide; PLP, pyridoxal 5'-phosphate; DZP, diazepam; ACTH, adrenocorticotropic hormone; ETX, ethosuximide; CBD, cannabidiol; PGB, pregabalin; LCM, lacosamide; MDZ, midazolam.

Supplementary Table. Continued.

Mutation	Seizure type	EEG	Diagnosis	Treatment	Prognosis	Source
c.833T>C	Onset at 2d, Focal and general onset (TS, FBTCS, Spasm, CS)	10d: SB, Focal onset seizures IP: Mass MFD 1.5m: Focal onset seizures IP: Mass MFD, voltage restraint 6m: HS, IP: Mass MFD 9+m: IP: Diffuse high amplitude slow wave background, MFD 10m: HS 1y, 1y4m: IP: Slow background, mass MFD	DEE (OS,WS)	Ineffective: / Effectiveness: PB, TPM, OXC, LTG, VPA, PDN	2y1m: Seizures sometimes with VPA+OXC+LTG	Pt12
	TCS, absence, complex partial seizure with hypotonia, dysphagia, spasticity	Slow and disorganized background, SB	DEE (OS)	/	/	32
	cortical atrophy, and progressive leukoencephalopathy	/	DEE	/	/	33
	/	/	DEE	/	/	22
	Clinvar: DEE					
c.365C>T	Onset at 8h, Focal and general onset (TS, FBTCS)	1d: SB 17d: Focal onset seizures, IP: Mass MFD 1m: IP: Mass MFD 10m, 1y2m: Sparse MFD	DEE (OS)	Ineffective: PB, VPA Effective: OXC	1y2m: seizure free since 2+m with OXC	Pt13
	FS, TC	/	BFNS	PB	Seizure free at 11 weeks	34
	TS, TCS, CS with heat sensitivity	/	/	PB, LTG, LEV	Seizure free at 6 weeks with LTG	
	Eyes rolling back, shaking, then drooling and sleeping	/	/	PB and PTH	Stop ASM at 6y, and seizure once at 7y	
	Description in Clinvar: BFNS, DEE, DEE with SB, KCNQ2-related disorders					
c.868G>A	Onset at 1d, Focal and general onset (TS,Spasm)	1d: SB 3m, 6m, 1y: IP: Slow background, frequent MFD (reduced gradually)	DEE (OS)	Ineffective: TPM, LEV Effective: OXC, VPA, NZP	1y6m: Seizures free with OXC since 3m	Pt15
	TS	Initial: Asymmetrical SB with MFD and multi-focal slow waves Evolution: >8y: Normal	DEE	PB, VGB, CBZ	Seizure free at 2m and stop ASM at 4y	35
	Onset at 1d, TS	58d, SlB, brief suppression Evolution: MFD	EOEE, unclassified	Ineffective: CNZ Effective: Lidocaine, PTH	Seizure free since 2 m	36
	Clinvar: DEE, DEE with SB					

Pt, patient; d, days old; w, weeks old; m, months old; y, years old; h, hours old; EP, epilepsy; FBTCS, focal to bilateral tonic-clonic seizure; TS, tonic seizures; TCS, tonic-clonic seizures; FS, focal seizures; CS, clonic seizures; MC, myoclonic jerks; SE, status epilepticus; OS, Ohtahara syndrome; WS, West syndrome; EOEE, early onset epileptic encephalopathy; LGS, Lennox-GastautSyndrome; IP, interictal period; EW, epileptic waves; SlB, slow background; SB, Suppression burst; HS, hypsarrhythmia; SW, slow waves; MFD, multifocal discharges; OXC, oxcarbazepine; PB, phenobarbital; VPA, valproic acid; TPM, topiramate; LTG, lamotrigine; NZP, nitrazepam; PDN, prednisone; VGB, vigabatrin; LEV, levetiracetam; CBZ, carbamazepine, CNZ, clonazepam; PHT, phenytoin; KD, Ketogenic diet; ZNS, zonisamide; PLP, pyridoxal 5'-phosphate; DZP, diazepam; ACTH, adrenocorticotropic hormone; ETX, ethosuximide; CBD, cannabidiol; PGB, pregabalin; LCM, lacosamide; MDZ, midazolam.

Supplementary Table. Continued.

Mutation	Seizure type	EEG	Diagnosis	Treatment	Prognosis	Source
Seizure free since 2 m	Onset at 2d, Focal and general onset (TS, TCS, Spasm)	1w, 10d, 2w: IP: Mass MFD 24d: SB, IP: Mass MFD 3m: HS	DEE (OS,WS)	Ineffective: PB Effective: OXC, VPA	3m: Seizures with VPA+OXC	Pt16
	/	/	DEE with SB	/	/	8
	Onset in utero, After birth, initlal: jerking of a limb for 4 sec Evolution: TS With macrocephaly, severe asymmetric spastic quadriplegia	10d: Multifocal and bilaterally EW. In sleep, discontinuity with marked attenuation between bursts of EW 5w: Slow background and occasional EW over both temporal regions 1y: Normal	DEE	Ineffective: PB Effective: PTH	Seizure free since 14m with PTH	27
	Onset at1d, With Brain atrophy	/	DEE, WS	/	/	28
	Onset at 3d, TS, autonomic	SB	OS, WS ?, LGS	Ineffective: CBD Effective: PGB, LEV, VPA, KD	Seizure free at 15m, Seizure recur at 2.6y	29
	/	/	DEE	/	/	22
	/ Description in Clinvar: BFNS, DEE, DEE with SB	/	DEE	/	/	37
c.997C>T	Onset at 6m: Focal and general onset (Spasms, TS)	6m: General onset seizures, HS 1y2m: Mass MFD	DEE (WS)	Ineffective: LEV, KD Effective: VPA, OXC	1y5m: Seizures with VPA+OXC	Pt17
	TS	Discontinuous background activity with MFD Monomorphic sharp waves over the right temporal and left central area	/	Ineffective: PB, VitB6, PTH, VGB, VPA, CZB, Sulthiame and LTG Effective: TPM	TPM at 15m seizure free	38
	Initial: Bilateral TCS, right CS Evolution: 0-3y: active epilepsy, motor seizures 3-10y: seizure free 10-20y: monthly FS	Slow waves with asynchronous bilateral spikes and intermittent flattening	DEE	CNZ, PHT	/	35
	Onset at 2d: TS, SE, Evolution: Partial seizure (eyes rolling up)	42d, SlB, brief suppression evolution: MFD in F4 and T3-5	DEE (OS)	Ineffective: DZP, PB, PHT, PLP Effective: VPA, Lidocaine, ZNS	Almost seizures free after ZNS, only one seizure in 10 y	36
	Onset at 2d: TS, simple partial seizure with hypoplasia of corpus callosum	SB, HS	DEE (OS)	VPA, LEV, LCM	Seizures	39
	SB, HS Clinvar: DEE with SB, DEE	DEE (OS)	VPA, LEV, LCM	Seizures		22

Pt, patient; d, days old; w, weeks old; m, months old; y, years old; h, hours old; EP, epilepsy; FBTCS, focal to bilateral tonic-clonic seizure; TS, tonic seizures; TCS, tonic-clonic seizures; FS, focal seizures; CS, clonic seizures; MC, myoclonic jerks; SE, status epilepticus; OS, Ohtahara syndrome; WS, West syndrome; EOEE, early onset epileptic encephalopathy; LGS, Lennox-GastautSyndrome; IP, interictal period; EW, epileptic waves; SlB, slow background; SB, Suppression burst; HS, hypsarrhythmia; SW, slow waves; MFD, multifocal discharges; OXC, oxcarbazepine; PB, phenobarbital; VPA, valproic acid; TPM, topiramate; LTG, lamotrigine; NZP, nitrazepam; PDN, prednisone; VGB, vigabatrin; LEV, levetiracetam; CBZ, carbamazepine, CNZ, clonazepam; PHT, phenytoin; KD, Ketogenic diet; ZNS, zonisamide; PLP, pyridoxal 5'-phosphate; DZP, diazepam; ACTH, adrenocorticotropic hormone; ETX, ethosuximide; CBD, cannabidiol; PGB, pregabalin; LCM, lacosamide; MDZ, midazolam.

Supplementary Table. Continued.

Mutation	Seizure type	EEG	Diagnosis	Treatment	Prognosis	Source
c.830C>T	Onset at 2d, Focal and general onset (TCS, TS, Spasms)	23d: SB, General onset TCS	DEE (OS)	Ineffective: LEV	6m: Seizures free since 3m with PB+OXC	Pt18
		IP: Mass MFD		Effective: OXC, PB		
		1m: IP: Mass MFD				
		5m: Slow background and sparse EW				
	Partial and febrile seizures at onset	/	DEE with severe ID/DD	/	/	40

Pt, patient; d, days old; w, weeks old; m, months old; y, years old; h, hours old; EP, epilepsy; FBTCS, focal to bilateral tonic-clonic seizure; TS, tonic seizures; TCS, tonic-clonic seizures; FS, focal seizures; CS, clonic seizures; MC, myoclonic jerks; SE, status epilepticus; OS, Ohtahara syndrome; WS, West syndrome; EOEE, early onset epileptic encephalopathy; LGS, Lennox-GastautSyndrome; IP, interictal period; EW, epileptic waves; SlB, slow background; SB, Suppression burst; HS, hypsarrhythmia; SW, slow waves; MFD, multifocal discharges; OXC, oxcarbazepine; PB, phenobarbital; VPA, valproic acid; TPM, topiramate; LTG, lamotrigine; NZP, nitrazepam; PDN, prednisone; VGB, vigabatrin; LEV, levetiracetam; CBZ, carbamazepine, CNZ, clonazepam; PHT, phenytoin; KD, Ketogenic diet; ZNS, zonisamide; PLP, pyridoxal 5'-phosphate; DZP, diazepam; ACTH, adrenocorticotropic hormone; ETX, ethosuximide; CBD, cannabidiol; PGB, pregabalin; LCM, lacosamide; MDZ, midazolam.