TABLE 451e-1 CLASSIFICATION OF THE SPINOCEREBELLAR ATAXIAS (SCA) *(CONTINUED)*

Name	Locus	Phenotype
SCA21 (autosomal dominant)	7p21.3-p15.1	Ataxia, dysarthria, extrapyramidal features of akinesia, rigidity, tremor, cognitive defect; reduced deep tendon reflexes; MRI: cerebellar atrophy, normal basal ganglia and brainstem
SCA22 (autosomal dominant)	1p21-q23; deletion (in frame); V338E; G345V; T377M; allelic with SCA19; KCND3; Kv4.3 channels	Pure cerebellar ataxia; dysarthria; dysphagia; nystagmus; MRI: cerebellar atrophy
SCA23 (autosomal dominant)	20p13-12.3; prodynorphin (PDYN protein); missense R138S; L211S; R212W; R215C	Gait ataxia; dysarthria; extremity ataxia; ocular nystagmus, dysmetria; leg vibration loss; extensor plantar responses; MRI: cerebellar atrophy
SCA25 (autosomal dominant)	2p15-p21	Ataxia, nystagmus; vibratory loss in the feet; pain loss in some; abdominal pain; nausea and vomiting may be prominent; absent ankle reflexes; sensory nerve action potentials are absent; MRI: cerebellar atrophy, normal brainstem
SCA26 (autosomal dominant)	19p13.3	Gait ataxia; extremity ataxia; dysarthria; nystagmus; MRI: cerebellar atrophy
SCA27 (autosomal dominant)	13q34; fibroblast growth factor 14 protein; mutation F145S; produces reduced protein stability	Tremor in extremities and head and orofacial dyskinesia; ataxia of arms > legs, gait ataxia; dysarthria; nystagmus; psychiatric symptoms; cognitive defect; MRI: cerebellar atrophy; genetic testing available
SCA28 (autosomal dominant)	18p11.22-q11.2; ATPase family gene 3- like 2 (AFG3L2 protein) mutations: N432T; S674L; E691K; A694E; R702Q	Extremity and gait ataxia; dysarthria; nystagmus; ophthalmoparesis; leg hyperreflexia and extensor plantar responses; MRI: cerebellar atrophy
SCA30 (autosomal dominant)	4q34.3-q35.1; candidate gene *ODZ3*	Candidate gene *ODZ3;* gait ataxia, dysarthria, saccades; nystagmus, brisk tendon reflexes in legs; MRI: cerebellar atrophy
SCA31 (autosomal dominant)	16q22.1; associated with NEDD4 (BEAN)	Pentanucleotide $(TGGAA)_n$ repeat insertions; previously called SCA4; gait ataxia; limb dysmetria; MRI: cerebellar atrophy
SCA32 (autosomal dominant)	7q32-q33	Ataxia, azoospermia, mental retardation; absent germ cells on testicular biopsy
SCA35 (autosomal dominant)	20p13;TGM6 protein; transglutaminase 6	Ataxia; ocular dysmetria; upper motor neuron signs; extensor plantars; onset fifth decade
SCA36 (autosomal dominant)	20p13; large intronic expansion of GGCCTG (1500–2500); also phe265leu mutation; RNA gain of function; microRNA; MIR 1292 suppression	Ataxia; onset fifth to sixth decades; motor neuron disorder; grouped atrophy (muscle biopsy) fasciculations; increased reflexes; flexor plantars
Prion disease (autosomal dominant)	20p13;pro102leu; ala 117 val mutations; proteinase k resistant form PrP27-30 accumulates in brain; eponym: Gerstmann-Straüssler-Scheinker disease Glu200Lys mutation; increased octapeptide repeats; eponym: Creutzfeldt-Jakob disease	Ataxia; dementia third to seventh decades Ataxia; dementia; rigidity
Multiple hamartoma syndrome (autosomal dominant)	10q23.31; phosphatase and tensin homolog (PTEN); Cowden's; Lhermitte-Duclos syndrome	Skin hamartomas; ataxia; mental retardation; increased intracranial pressure; epilepsy
Cerebellar ataxia, deafness, and narcolepsy (autosomal dominant)	19p13.2; exon 21; missense ala570val; val606phe mutations	Ataxia; deafness; narcolepsy cataplexy; REM sleep disorder
Cerebellar ataxia (nonprogressive) mental retardation (autosomal dominant)	1p36.31-p36.23	Ataxia, mental retardation
Familial dementia with amyloid angiopathy and spastic ataxia (autosomal dominant)	13q14.2; integral membrane protein 2B (ITM2B)	Ataxia; dementia; amyloid angiopathy
Dentatorubropallidoluysian atrophy (autosomal dominant)	12p13.31 with CAG repeats (exonic) Atrophin 1	Ataxia, choreoathetosis, dystonia, seizures, myoclonus, dementia; genetic testing available
Friedreich's ataxia (autosomal recessive)	9q13-q21.1 with intronic GAA repeats, in intron at end of exon 1 Frataxin defective; abnormal regulation of mitochondrial iron metabolism; iron accumulates in mitochondria in yeast mutants	Ataxia, areflexia, extensor plantar responses, position sense deficits, cardiomyopathy, diabetes mellitus, scoliosis, foot deformities; optic atrophy; late-onset form, as late as 50 years with preserved deep tendon reflexes, slower progression, reduced skeletal deformities, associated with an intermediate number of GAA repeats and missense mutations in one allele of frataxin; genetic testing available
Vitamin E deficiency syndrome (autosomal recessive)	8q13.1-q13.3 (α-TTP deficiency)	Same as phenotype that maps to 9q but associated with vitamin E deficiency; genetic testing available
Sensory ataxic neuropathy and ophthalmoparesis (SANDO) with dysarthria (autosomal recessive)	15q25; mutations in DNA polymerase-gamma (*POLG*) gene that leads to mtDNA deletions	Young adult–onset ataxia, sensory neuropathy, ophthalmoparesis, hearing loss, gastric symptoms; a variant of progressive external ophthalmoplegia; MRI: cerebellar and thalamic abnormalities; mildly increased lactate and creatine kinase
Von Hippel-Lindau syndrome (autosomal dominant)	3p26-p25	Cerebellar hemangioblastoma; pheochromocytoma