offending agent, recognizing that it may take months for the symptoms to resolve. Even then, patients exposed to dopamine blocking agents may develop a tardive Parkinsonism (i.e., a drug-induced Parkinsonism that persists even after the offending agent is removed). DAT SPECT imaging can be useful in distinguishing drug-induced or tardive Parkinsonism from Parkinson's Disease.

Cerebrovascular disease is a common cause of secondary Parkinsonism. Tremor is uncommon in vascular Parkinsonism; lower extremity bradykinesia and gait difficulties dominate the clinical picture. Patients may have a history of clinical strokes with acute deteriorations followed by plateaus; however, many patients have vascular risk factors and a history of gradual decline.

Tremor

Tremor is a rhythmic, oscillatory movement of a body part. Tremor is classified by its distribution (e.g., voice, limb) and whether it is present at rest, with sustained posture (sustention), or with action. Action tremor can further be classified as an intention tremor, in which the tremor worsens as one approaches target. Intention tremor is characteristic of cerebellar disease. Tremor has multiple etiologies, including medications, alcohol and drug withdrawal, systemic disease (e.g. hyperthyroidism), structural brain lesions, or as a component of a neurodegenerative disease.

Essential tremor is among the most common movement disorders and the most common cause of tremor. Essential tremor has a worldwide prevalence of 2% to 4% with increasing incidence with aging. Clinically it is characterized by postural tremor of the upper extremities. An intention tremor develops with disease progression and may be disabling. Involvement of the head and voice are common. Mild Parkinsonian features (e.g., tremor at rest, rigidity with activation) may develop and can make distinguishing incipient Parkinson's disease challenging. The condition is often familial with an autosomal dominant pattern of inheritance and tends to improve with alcohol ingestion. Propranolol and primidone are of similar benefit (Table 114-5).

Chorea

Chorea is characterized by brief, irregular, random, non-rhythmic movements that flow from one body part to another. It is often associated with athetosis and ballism. These conditions lie on a spectrum of choreic phenomenon with ballism characterized by proximal large amplitude flinging movements on one end, chorea in the middle with lower amplitude random flowing movements and athetosis characterized by slower distal writhing movements on the other. Chorea is often associated with a variety of secondary clinical features detailed in Table 114-6.

There are many etiologies of choreic disorders reflecting a wide variety of processes affecting the basal ganglia and specifically the striatum. Generally, chorea either represents the primary manifestation of an inherited disorder or is acquired secondary to basal ganglia insults due to various comorbid medical conditions, medications or toxins, or structural abnormalities. Table 114-7 summarizes the differential diagnosis of chorea categorized by genetic and acquired causes.

Huntington's Disease

Huntington's disease (HD) is an autosomal dominant, progressively disabling, and fatal neurodegenerative disease; it is and the most common cause of inherited adult onset chorea. The causative mutation is an expansion of an unstable cytosine-adenine-guanine (CAG) trinucleotide repeat of the IT-15 gene on the short arm of chromosome 4.

HD may emerge at any age, with the peak incidence between 35 and 40 years of age with death occurring 10 to 20 years after onset. Age of onset and rate of progression of the disease are inversely associated with CAG repeat length with the longest repeats associated with juvenile onset disease and a more rapid disease progression.

HD is characterized clinically by the triad of an extrapyramidal movement disorder, progressive cognitive decline (dementia), and an array of behavioral disturbances. Chorea is the prototypical motor manifestation of HD occurring in 90% of patients. Cognitive impairment is invariable in HD and typically progresses from selective deficits in psychomotor, executive, and visuospatial abilities to more global impairment with higher cortical functions usually spared. Psychiatric illness has been recognized as an important feature of HD since George Huntington reported on the "tendency to insanity and suicide."

The juvenile variant of HD, in which age of onset occurs before 20, typically has an akinetic-rigid phenotype and paternal inheritance and only rarely chorea. Paternal inheritance of the HD gene is the rule for onset before the age of 10 and paternal inheritance predominates (about 3 : 1 paternal : maternal) for onset before the age of 20.

TABLE 114-5 TREATMENT OPTIONS FOR ESSENTIAL TREMOR

FIRST LINE	Propranolol Primidone
SECOND LINE	Topirimate Zonisamide Benzodiazepines Other beta-blockers Gabapentin/Pregabalin
MEDICATION FAILURE	Botulinum toxin injections Deep brain stimulation

TABLE 114-6 SECONDARY FEATURES ASSOCIATED WITH CHOREA

ATHETOSIS	Slow, writhing movements of distal limbs
BALLISM	Rapid, flinging movements of proximal limbs
PARAKINESIS	Incorporation of an involuntary movement into a voluntary movement (e.g. crossing and uncrossing of legs, adjusting glasses)
MOTOR IMPERSISTENCE	Inability to maintain tongue protrusion, "milk maid's grip"
PARTIALLY SUPPRESSIBLE	Brief ability to voluntary reduce the severity of movements
DEEP TENDON REFLEX CHANGES	"hung up" or "pendular" reflexes
GAIT DISORDERS	Irregular or dance like gait