Introduction
Specialists in movement disorders possess specialized knowledge in the science, clinical evaluation and management of conditions that affect the basal ganglia and its direct or indirect connections to the cortex, subcortex, brainstem and spinal cord. This field encompasses knowledge of the pathophysiology, pathology, diagnosis, and treatment of these disorders at a level that is significantly beyond the training and knowledge of a general neurologist.

I. Definition of Movement Disorders
The specialty of Movement Disorder neurology focuses on a large number of neurological disorders that share the common clinical feature of involuntary movements of either hypo- or hyperkinetic character. Movement disorders are classified first phenomenologically and then etiologically. The involuntary movements generally occur in the absence of weakness, and therefore these disorders were originally termed extrapyramidal, although this term has been largely dropped from current nosography. In terms of phenomenology, hypokinetic movement disorders include Parkinson’s disease, several other conditions with Parkinsonian features, and rare disorders like stiff-person syndrome. The large number of hyperkinetic movement disorders is divided in several categories including tremors, chorea, dystonia, tics, stereotypies and myoclonus.

Movement disorders are also classified by their causative process, and include neurodegenerative, genetic, infectious, metabolic, nutritional, toxicological, and vascular etiologies. As such, movement disorders may be considered primary when they occur as an isolated neurological syndrome or secondary when they occur as part of a larger process of known cause. Importantly, because many
movement disorders are drug-induced and iatrogenic in etiology, experts must be particularly aware of the agents that are associated with their induction.

Movement disorder neurology encompasses several aspects of basic science, including neuroepidemiology, molecular biology, neurochemistry and neuropharmacology as well as neurophysiology. In addition, because most movement disorders are chronic conditions, treatment expertise also incorporates elements of neurorehabilitation. With the increasing emphasis on neurosurgical interventions for the treatment of Parkinson’s disease, dystonia and various forms of tremor, movement disorder specialists must be skilled in identifying candidates for surgery and regularly participate in pre- and post-operative neurological management. Because some movement disorders have typical magnetic resonance imaging patterns, especially various secondary movement disorders, neuroimaging expertise also closely integrates in the daily practice of movement disorders as a neurological specialty.

II. Core Content of Movement Disorder Fellowships

A. Goals and Objective

1. The major goals of the University of California, San Diego Movement Disorder curriculum are:
   • develop a specialized teaching program in the areas of:
     ➢ patient care
     ➢ clinical and/or basic science research
     ➢ teaching
     ➢ education in Movement Disorder

2. The major objectives of the University of California, San Diego Movement Disorder curriculum are:
   • delineate training that will develop expertise in:
     ➢ recognition
     ➢ diagnosis
     ➢ treatment
- Exposure to the following areas of neurology, neurobiology and allied disciplines are recommended as they apply specifically to Movement Disorders:
  - Management of patients with Movement Disorders
  - Management of emergencies in Movement Disorders
  - Psychiatry for interface of movement disorders in primary psychiatric conditions, drug-induced movement disorders, and psychogenic movement disorders
  - Neurorehabilitation for Movement Disorders
  - Neuroimaging: MR, CT, PET patterns in Movement Disorders
  - Neuroepidemiology: population patterns and epidemiological issues relative to Movement Disorders
  - Molecular biology, neuropharmacology, neurochemistry, and neurophysiology of Movement Disorders
  - Neurosurgery in the context of interventions for Movement Disorders
  - Cellular biology as it relates to primary neurodegeneration, apoptosis, and trophic influences on cell function
  - Neurological Education: teaching experience for physicians, health professionals, patients and the public in Movement Disorders

B. Prerequisites for Training
Fellowships in the University of California, San Diego Movement Disorders are post-residency positions that are reserved for licensed physicians in Movement Disorders who have successfully completed accredited neurology residency.

C. Duration of Training
Subspecialty training in Movement Disorder shall consist of 12 months of full-time training, beginning after satisfactory completion of a residency program accredited by
the Accreditation Council for Graduate Medical Education (ACGME). The program may elect to extend the training for an additional 12 months if requested and approved by the program director.

D. Training Program

1. Institutional Requirement

The University of California, San Diego Movement Disorder fellowship is conducted under the auspices of an approved neurology residency training program within an accredited medical school a hospital affiliated with a medical school, or a non-medical school environment that meets all other requirements. The fellowship has the support of the Chair of the Department of Neurosciences and appropriate personnel of our institution. The training institution has inpatient services, outpatient services, a critical care unit, neuroimaging facilities, neurorehabilitation unit, and clinical or basic research laboratories applicable to Movement Disorders. We qualify as a site for Movement Disorder fellowship training as we have an active patient care, research and educational activities. Our clinical faculty has close interaction with the fellows and include at present the following movement disorder neurologists: Drs. Lessig, Corey-Bloom, Song and Friedman, and Dr Barba as neurosurgeon, a multidisciplinary neurorehabilitation team specialists, and neuropsychology (Dr. Filoteo). Laboratory scientists include Drs. Eliezer Masliah, Al La Spada, Stuart Lipton, and Edward Koo.

2. Training Program Faculty

a. Program Director (PD). Our PD, Dr, Irene Litvan, is a board certified neurologist and Movement Disorder specialist with significant clinical, research, educational and administrative ability to direct our fellowship program, fulfilling American Academy of Neurology (AAN) guidelines. Dr. Litvan is a recognized leader in the field of Movement Disorder neurology. She is a full-time faculty member at the University of California, San Diego and is available on a regular basis to interact
directly with and supervise the fellow’s progress.

b. Primary Faculty. Our primary training program faculty, Dr. Lessig, Song, Corey-Bloom, and Friedman, are neurologists who are board certified and Movement Disorder specialists. They spend the majority of their neurological commitment in the study and treatment of Movement Disorders. They have sufficient protected time, administrative support and commitment to mentor fellows. We have access to sufficient patients and the ability to teach fellows. Our fellowship program has several full time faculty besides the Program Director to provide a diverse and in-depth fellowship experience.

c. Support Faculty. Our institutional faculty include clinical specialists in neurosurgery, neuroimaging, neurorehabilitation, neurobehavior and neuropsychology, neuroepidemiology, critical care medicine, and psychology. Basic science and research faculty relate to the above fields and also include specialists in molecular biology, neurotoxicology, neuropharmacology, neurochemistry, neurophysiology and related areas. Most of our faculty are members of UCSD, and have a commitment to training fellows. Several basic science support faculty can be directly involved in the Movement Disorder fellowship mentorship.

E. Method of Teaching

Fellows will be trained clinically through direct patient contact in both inpatient and outpatient Movement Disorder clinics. They will be supervised by trained faculty in the Movement Disorder clinic who will provide opportunities to evaluate all types of movement disorders. (See section L -Curriculum necessities)

They will also be involved in:
• teaching conferences
• symposia
• seminars
• lectures

that focus on Movement Disorders. They will learn through reading assignments. The focal point of the general Movement Disorder training will be clinical experiences of one-on-one mentorship by the PD and primary faculty. Special areas of subspecialty training will be arranged by work with the support faculty.

F. Timetable for training

The University of California, San Diego Movement Disorder fellowships will last a minimum of one year and will be longer for individual programs. In the one-year fellowship, nine months must be involved with full-time direct patient care (including inpatient and outpatient).

G. Methods of Evaluation of the Trainee

Our PD or designated primary faculty member will be responsible for meeting with the fellow at least every three months to provide regular feedback on performance and to advise the fellow about strengths and weaknesses. The information on performance will be obtained by contact with the faculty and staff involved with the fellow over the past months since the prior evaluation. A final written evaluation will be provided by the PD at the end of the fellowship. This evaluation will verify that the fellow has demonstrated sufficient professional ability to practice competently and independently in the area of Movement Disorder neurology. This final document will be part of the fellow’s permanent record retained by the institution.
H. Methods of Evaluating the Fellowship Training Process

In the absence of a formal Movement Disorder board certification mechanism or oversight group whose purpose is to monitor and evaluate Movement Disorder fellowship programs, a self-evaluation program must be instituted within each program. This process may take several forms:

1. Yearly meetings for faculty to critique the perceived strengths and weaknesses of training and to solicit suggestions for upgrading or improving the program

2. Annual feedback from fellows who are in the program as well as those who have completed the program and are now in their careers. This process can be open-ended with a letter from each fellow, or be documented in a standard form.

3. Outside reviewers may be invited to visit the program and critique it with a written list of suggestions for improvements

4. Other quality assurance methods, including number of fellows who pass their Neurology boards, academic or practice positions secured by graduates of the fellowship program, number of publications, research grants obtained, or practice success in the first years after fellowship training.

5. Continuing education is essential throughout the fellowship (see below) and the fellow is responsible for documenting the educational activity and delivering those documents to the PD. Documents on this evaluation process should be kept as part of the program file on the Movement Disorder fellowship.
I. Mechanisms for feedback
Fellows will complete evaluations of the faculty and curriculum at least every three months during the fellowship. In addition, the PD or designated primary faculty member will be available in between these meetings to discuss any concerns by the fellow or other staff members regarding the fellowship.

J. Methods for upgrading knowledge
The faculty and fellows within the program will participate in continuing education in order to expand their knowledge base and remain up-to-date in their expertise of Movement Disorders. Activities to accomplish this goal may include:
1. Active participation in clinical discussion, rounds and conferences that stimulate discussion and scholarship
2. Participation in journal clubs and research conferences
3. Active participation in professional and scientific societies at the local, regional, national or international level particularly in the form of attendance to meetings and publication of materials in their respective journals.
4. Participation in clinical or basic science research programs in Movement Disorders or its related neurobiology.
5. Participation in continuing medical education (see below)

K. Overview of the UCSD Movement Disorder Program
The University of California, San Diego Movement Disorder Program is a referral center that serves Southern California movement disorder patients and families clinical, research and outreach needs. It includes specialized multidisciplinary team of movement disorder specialists (Drs. Litvan, Lessig, Corey-Bloom, Song and Friedman), neurosurgery (Dr. Barba), neurorehabilitation team specialists, and neuropsychology (Dr. Filoteo).
Laboratory scientists include Drs. Eliezer Masliah, Al La Spada, Stuart Lipton, and Edward Koo. The neurorehabilitation team of specialists include a devoted speech and language pathologist, occupational, physical therapists. All therapists are specialized in their respective areas and in PD management. All members of the multidisciplinary team have developed standardized specialty evaluations that are recorded in a comprehensive database for both clinical and research purposes.

Its location in Perlman Clinic and VA, allows for an efficient and comprehensive approach for the care of patients and families that include state-of-the art diagnosis, evaluations, pharmacological and rehabilitation therapies, research opportunities, education, and ongoing support to improve patients and families quality of life.

Our long-standing research program includes federal and industry funded projects to better understand, diagnose, and effectively manage patients with movement disorders. Areas of active clinical research include biological markers for Parkinsonian Disorders, etiopathogenesis of Parkinson’s disease, pathophysiology, pharmacologic, surgical, rehabilitation therapeutic approaches. Our research projects are multidisciplinary and translational and include multi-site clinical and basic science researchers.

Our Movement Disorder Program has a strong commitment to teaching fellows, residents, medical and Ph.D. students, and has an educational and outreach program for patients, caregivers and healthcare providers. Our fellowship provides the unique opportunity to learn how to care and do research in patients with movement disorders and dementia, commonly found in the community and in academia.

Our multidisciplinary team, including the fellows, actively engage the community in health care education and events aimed towards increasing awareness in movement disorders and maintains a close working relationship
with local Parkinson’s disease (Parkinson Association of San Diego, PASD) and dystonia support groups. Talks to lay public and health professionals are regularly given. Our program allows fellows to have a full experience as they can learn how to best manage movement disorder patients in academic, private outpatient as well as emergency situations, have first hand experience in basic and clinical research, as well as in education.

I. Selection criteria

Our selection committee members are professors and researchers at the University of California, San Diego and are independently selected based on their field of expertise, prior experience working with fellows in a mentoring capacity and collaborative research projects which the fellow would gain invaluable research experience in movement disorders and dementia.

M. Continuing Medical Education needed

At least 20 hours of Category 1 of continuing education in Movement Disorders must be completed annually by the Movement Disorder fellow. (See below AAN recommended curriculum)

N. Curriculum necessities

I. Anatomy, neurochemistry and neurophysiology of the basal ganglia

- Basal gangliar connections
- Intrastriatal structures
- Additional brain stem-cortical loops
- Basal gangliar interactions with the cerebellum
- Neurotransmitter chemistry and pharmacology: Dopamine, Acetylcholine/, Gamma-aminobutyric acid (GABA), Glutamate Norepinephrine, Serotonin
- Neurophysiological patterns of basal ganglia function
- Anatomical, neurochemical and physiological hypotheses related to hypokinesia and hyperkinesia
II. **Clinical Evaluation of Movement Disorders**

- Skills to recognize and document patterns of clinical findings in movement disorders when the patient is at rest
- Skills to perform a complete general neurological examination
- Skills to perform a focused examination for movement disorders including turning, rest, assuming a posture, doing a task
- Skills to recognize and document patterns of clinical findings in movement disorders when the patient maintains a posture
- Skills to recognize and document patterns of clinical findings in movement disorders when the patient executes a task
- Skills to evaluate tone
- Skills to evaluate walking
- Familiarity and ability to apply standardized rating scales for movement disorders
- Skills to recognize and document non-neurological findings typical of movement disorders
- Expertise in the definition and recognition of the following neurological phenomena
  - Hypokinesia (akinesia and bradykinesia)
  - Hyperkinesia
  - Tremor
  - Chorea
  - Choreoathetosis
  - Ballism
  - Tics
  - Stereotypies
  - Akathisia
  - Myoclonus
  - Hemifacial Spasm
III. Diagnosis, treatment, and scientific understanding of neurological disorders that are considered within the specialty of Movement Disorder neurology. For each of the entities listed below, the following areas of training must be covered:

- Pathogenesis and Pathophysiology: including molecular biology and genetic issues
- Epidemiology and risk factors
- Clinical features
- Diagnostic evaluation: neuroimaging, laboratory studies
- Differential diagnosis
- Treatment pharmacological, surgical, and rehabilitative
- Prognosis and natural history
- Current areas of research
- Hypokinetic Movement Disorders
  - Parkinson’s disease
  - Atypical Parkinsonian Disorders to include:
    - (Multiple system atrophy, Progressive supranuclear palsy, Corticobasal degeneration, Dementia with Lewy bodies)
- Hyperkinetic Movement Disorders to include:
  - Huntington’s disease
  - Other forms of chorea
  - Tardive dyskinesia
  - Primary and secondary dystonias
  - Gilles de la Tourette and other tic disorders
  - Stereotypies seen in primary psychiatric and neurological conditions
➢ Painful legs/moving toes
➢ Action and non-rest tremors
➢ Essential or familial tremor
➢ Physiological tremor
➢ Drug-induced tremors
➢ Tremors of metabolic and medical illnesses
➢ Rubral tremor and tremors seen in cerebellar disorders
➢ Wilson’s disease
➢ Hemifacial spasm
➢ Myoclonus/Startle syndromes
➢ Gait disorders
➢ Spinal cerebellar ataxias and other forms of ataxias
➢ Paroxysmal dyskinesias
➢ Restless leg syndrome
➢ Akathisia
➢ Drug-induced movement disorders

IV. Special Procedures

Techniques of chemical denervation such as botulinum toxin and other agents, deep brain stimulation.

*This document is based on the American Academy of Neurology Guidelines for fellowship training in Movement Disorders.