

YOUNG NEUROLOGISTS' TRAINING PROGRAM

YNLTP 2

CURRICULUM 2018-2019



1. Introduction

Medtronic Deep Brain Stimulation Therapy (DBS) for movement disorders has gained acceptance and widespread clinical use in recent years. DBS is a key therapy option for movement disorders and is included in international guidelines as a recommendation for Parkinson's disease and other movement disorders.

Typically, centres have an established and experienced multidisciplinary team that works together to offer Medtronic DBS therapies to their patients.

As DBS therapies keep growing, there is a need to increase the centres' capacity of managing and treating patients. Consequently in order to maintain quality care and alleviate the workload, additional neurologists may be required to help manage current DBS patients, whilst also having the opportunity to receive new ones.

For over 25 years, Medtronic has partnered with leading neurologists to help develop and support Medtronic DBS therapies. The objective of this program is to train and develop young neurologists who are committed to the management of patients with movement disorders and considering DBS as a therapy option.

Following the success of the Medtronic Young Neurosurgeons' Training Program, Medtronic is proud to continue in partnership with leading neurologists, the second edition of the **Young Neurologists' Training Program**, consisting of theoretical and practical modules.

1. Objectives

The goal of this program is to provide training in all areas where a need has been identified:

- To teach participants a multidisciplinary approach to DBS therapy, ensuring best clinical outcomes
- To help participants understand the pathophysiology and medical management of Parkinson's disease, dystonia and essential tremor
- To teach participants about patient selection for DBS for movement disorders
- To help understand the role of the neurologist during the DBS surgery
- To develop participants' skills about post-operative patient management including medical management, programming and trouble-shooting techniques
- To provide both theoretical knowledge and hands-on experience through placements in different centres

2. Target Audience

An essential aspect in securing the success of this program is to target the appropriate audience. Neurologists who are committed to the management of patients with movement disorders with a minimum of 6 months experience in DBS patient management.

Selection of Trainees

The candidates can apply by submitting to their Medtronic representative

- Up-to-date CV and photo
- Motivation letter describing their expectations
- Written approval from their centre's supervisor confirming that appropriate leave will be granted

Applications are evaluated by the Steering Committee members and the Medtronic team. Once approved, a contract between the trainee and Medtronic will be signed.

Trainees' Responsibilities during the program

- Commit to fulfilling the program as outlined in this document and in the given time frame of 18 months.
- Submit a report after each completion of a placement. The placement will only be validated when report submission is completed

Registration conditions

The trainee will be asked to participate by an amount of Euro 500. - Upon acceptance of their candidature.

3. Faculty

The Young Neurologist Training Program is developed and delivered by Medtronic in close collaboration with:

Steering Committee:

PD Dr Michael Schüpbach, Course Director, Inselspital Bern (Switzerland)

Prof. Isabelle Durand-Zaleski, University of Paris XII (France)

Dr Alfonso Fasano, Toronto Western Hospital (Canada)

Prof. Joachim K. Krauss, Medical University of Hannover (Germany)

Prof. Patricia Limousin, National Hospital for Neurology and Neurosurgery London (United Kingdom)

Prof. Francesca Morgante, UOS Messina (Italy)

Prof. Elena Moro, CHU Albert Michalon, Grenoble (France)

Prof. Jens Volkmann, Universitätsklinikum Würzburg (Germany)

Mr Ludvic Zrinzo, National Hospital for Neurology and Neurosurgery London (United Kingdom)

Training Centres:

A dedicated website will be available in the coming weeks with complete contact details.

For the placement centres, the Steering Committee has endorsed the following centres. All centres are chosen based on their specific characteristic in delivering the DBS Therapy.

European Centres:

Czech Republic:	Univerzity Generaly Hospital/Czeck- Všeobecná fakultní nemocnice, Prague (Prof Jech)
France:	Centre Hospitalier Universitaire, Grenoble (Prof. Moro)
France:	Hôpital Universitaire Pitié Salpêtrière, Paris (Prof. Vidailhet/Dr Hainque)
Hungary:	Pécsi Tudományegyetem Neurológiai Klinika, Pécs (Dr Kovacs)
Italy:	Az Osped. Univers. San Giovanni, Torino (Prof Lopiano/Prof Lanotte)
Italy:	Agostino Gemelli University Polyclinic, Rome (Prof. Olivi)
Netherlands:	HagaZiekenhuis, The Hague (Dr Contarino)
Portugal:	Centro Hospitalar Lisboa Norte, Lisboa (Prof Ferreira)
Spain:	Hospital Clinico Y Provincial, Barcelona (Dr Valldeoriola)
Sweden:	Skånes universitetssjukhus, Lund (Prof. Widner)
UK:	National Hospital for Neurology and Neurosurgery, London (Prof. Limousin)

Other centres (For local trainees only)

Canada:	Toronto Western Hospital, Toronto (Dr. Fasano)
Colombia:	Clínica Soma, Medellín (Dr. Rueda)
Mexico:	Instituto Nacional de Neurología y Neurocirugía, México City (Dr. Rodriguez)

4. Curriculum Overview

A successful therapy relies on knowledge and skills in the following areas:

- Patient selection
- Patient management
- Programming and management of the post-operative follow-up
- Ability to work multi-disciplinary

To provide this expertise, this training program has a modular format with each module offering training in a variety of topics and formats, including e-learning modules and didactic, hands-on training both in Medtronic's Education & Training facilities in Switzerland and in selected training centres with an assigned clinical training Consultant (Instructor).

All e-learning and training modules are delivered in English, by trainers who specialize in Medtronic DBS therapies.

E-Learning Modules:

- Module 1: Fundamentals of DBS
- Module 2: Fundamentals of Parkinson's Disease
- Module 3: Fundamentals of Dystonia
- Module 4: Fundamentals of Essential Tremor

Training Modules:

- Module 1: Introduction to the fellowship
- Module 2: Fundamentals of Parkinson's Disease
- Module 3: Fundamentals of Dystonia
- Module 4: Fundamentals of Essential Tremor
- Module 5: DBS Patient Management
- Module 6: DBS Surgery and the role of the Neurologist
- Module 7: Programming for DBS
- Module 8: Post-operative Patient Management and living with DBS
- Module 9: The Economic Value of DBS

5. Program Timeline, Duration and Certification

The program consists of nine modules which the first modules are delivered as e-learning essential to complete before attending the hands-on training. The content of the e-learning modules are theoretical concepts and knowledge, important to acquire prior to the classroom training. During the face to face class room training, named Phase I, cases will be discussed to apply the theoretical knowledge. Phase II of the program will consist of practical placements. Candidates will have 18 months to complete the program.

E-Learning

A mandatory e-learning course will open 6 weeks before the Phase I training. The e-learning is an essential step to ensure a basic knowledge and understanding of the therapy. The completion of the e-learning will also support faculty to tailor Phase I training according to the needs of participants and focus on case discussions and knowledge application.

Phase I

Four consecutive days of theoretical training at Medtronic's European Headquarter Training & Education Centre in Switzerland. The attendance to Phase I is mandatory in order to apply for the Phase II placements.

Phase II

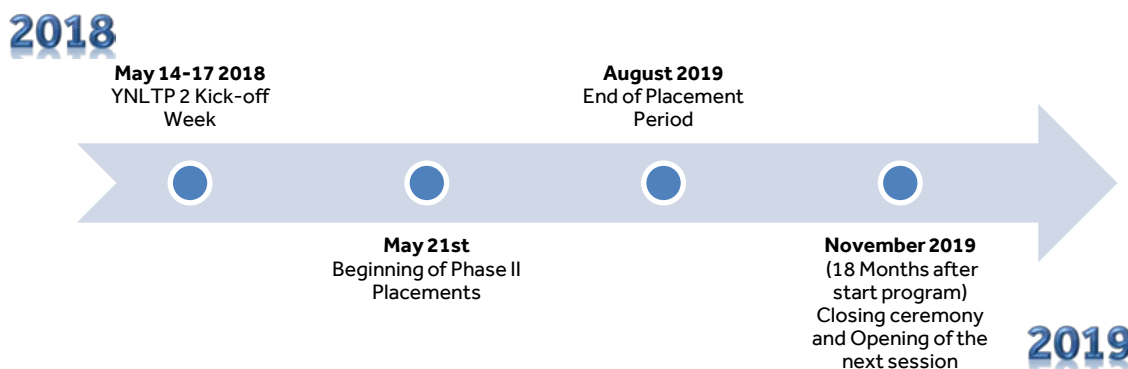
Practical training sessions consisting of 2 separate mandatory placements conducted in the selected Training Centres listed in this document. The duration of each placement will be minimum 3 and maximum 5 consecutive working days. Candidates can select centres within Europe.

Closing Certification and Ceremony

The closing certification and ceremony will take place in Medtronic's Training & Education Centre in Switzerland.

Participants will be allocated into groups and each group will be assigned a case study to prepare in advance. The group will present it to the faculty during the day.

The participants will be presented a certificate to recognize the completion of the program. A networking ceremony will close the Young Neurologist Training Program, where participants will also have the chance to share their experience with the new YNLTP participants.



6. Overview of the modules

Module 1: Fundamentals of DBS (E-Learning)

Overview of the history of functional Neurosurgery

Learning objectives

At the end of the module participants should have a clear understanding of the history of functional neurosurgery, including the advantages and disadvantages of key techniques and the main steps involved in the emergence of DBS.

Overview of current DBS indications

Learning objectives

At the end of the module participants should clearly understand the background, incidence and prevalence, and clinical profile of each of the 'on-label' indications of DBS.

- Parkinson's disease
- Dystonia
- Essential tremor
- Epilepsy
- Obsessive compulsive disorder

Basic anatomy/neuroanatomy of relevant targets

To provide an overview on the basic anatomy relevant to DBS, with specific reference to nuclei that may be target sites for DBS.

- Anatomy of the brain and basal ganglia
- Functionality of nuclei or structures/circuits that may be of interest in management of movement disorders by drugs or by DBS

Learning objectives

At the end of this module, participants will have a reminder of the basic structures relevant to DBS and the role that they play in the mechanism of action.

Mechanism of Action

To provide an up-to-date review on the proposed mechanism of action of DBS.

- Functional circuitry:
 - Models of basal ganglia circuitry (from old established to new elaborate models)
 - A review of the literature on the possible mechanisms of action of DBS
- Electrophysiology theory:
 - Application of current at the cellular level
 - Impact of current on neurons

Learning objectives

At the end of the module participants will have a clear understanding of the proposed mechanisms of action of DBS, including insight into the functional circuitry as it relates to basal ganglia. Participants should also have a grasp of electrophysiology theory and its importance for DBS.

Overview of the Medtronic DBS full body MRI conditionally safe portfolio

To provide an introduction to the products in the Medtronic DBS portfolio and examples of their use in clinical practice.

A basic overview of the range of Medtronic DBS solutions available, including Soletra®, Kinetra® and detailed focus on the Activa® portfolio:

- The attributes and features of each of the devices
- The pros and cons of rechargeable versus non-rechargeable devices
- Indications of each device
- One slide on magnetic resonance imaging (MRI) compatibility and safety

Learning objectives

At the end of the module participants will have a clear understanding of the range of Medtronic DBS solutions available for patients, which devices are best suited for which indications, and the issues surrounding DBS and MRI compatibility.

Module 2: Fundamentals of Parkinsons Disease

Fundamentals of Parkinson's disease (E-learning)

To provide a review of the different onsets and forms of Parkinson's disease, including a review of the epidemiology of the disease.

- Clinical and epidemiological comparison of the different forms of Parkinson's disease, from early age to late age of onset
- Treatment of early stage Parkinson's disease with oral therapies with reference to existing Movement Disorder Society (MDS) and European Federation of Neurological Society (EFNS) guidelines
- Onset of motor complications and indications for advanced therapy
- Typical treatment pathways. including an algorithm of treating mild to advanced Parkinson's disease Windows of opportunity for:
 - Sub thalamic nucleus-deep brain stimulation (STN-DBS)
 - Globus Pallidus pars internal-deep brain stimulation (GPi-DBS)

Learning objectives

At the end of the module participants will have gained knowledge on the different forms of Parkinson's disease, and have an understanding of the MDS and EFNS guidelines relating to early and advanced treatment options. Participants should also have a clear understanding of the positioning of DBS within the treatment pathway.

Identifying the ideal candidate for DBS and the role of the referring clinician

To provide a detailed overview of the referral process for patients with advanced Parkinson's disease.

- Methods of identifying which patients will benefit most from DBS and the clinical variables relevant for patient selection for each of the advanced indications of Parkinson's disease
- Introduction to the EARLYSTIMULUS tool
- The inclusion and exclusion criteria for DBS Indications for STN-DBS or GPi-DBS implantation
- Case studies from clinical practice to highlight the role of the referring clinician in the selection and referral process
- Interactive use of EARLYSTIMULUS tool

Learning objectives

At the end of the module participants will understand the referral process for Parkinson's disease and be able to identify candidates for each DBS target. Participants should also develop familiarity with the EARLYSTIMULUS tool.

Selection of advanced therapies with a focus on DBS and Parkinson's disease, clinical evidence and safety

To provide an overview of the clinical evidence for the selection of patients for advanced therapies (DBS, pump therapies), followed by a closer look at the evidence for DBS.

- A brief overview of the clinical evidence from randomized controlled clinical trials (RCT) for each advanced therapy
- Patient outcomes and clinical improvements in motor symptoms and complications, and quality of life with DBS, with reference to key clinical trials – including the safety and efficacy data from the EARLYSTIM study
- An interactive section using a blank table for participants to complete as the pooled safety data from the key RCTs for DBS treatment and review papers are discussed.

Learning objectives

At the end of the module participants will have gained an overview of the selection of Parkinson's disease patients for advanced therapies. Participants should clearly understand the clinical evidence relating to the safety and efficacy of DBS for Parkinson's disease.

Multidisciplinary team assessment of the patient: assessment of previous treatments, role of the neurologist

Introduction of the members of the multidisciplinary team (MDT). This section will show who is involved in the MDT Team, their roles and the wide range of expertise needed to optimally manage a patient.

Assessment of previous treatments, role of the neurologist

To provide a review of the typical treatment pathway in relation to the MDS and EFNS guidelines, treatment algorithms and best medical practice.

- A detailed account of the treatment pathway including early treatment with oral therapies
- Guidelines and algorithms detailing the treatment of younger versus older patients including:
 - COMT inhibitors, Levodopa, Amantadine, poly-pharmacy, etc....
- Treatment and management of motor complications, dyskinesia and wearing-off
- The role of individual patient choice of therapy
- Case studies illustrating best medical practice
- An opportunity to ask participants for their medical opinion on the case studies
- Considerations for DBS in patients failing best medical practice

Learning objectives

At the end of the module participants will understand the definition of best treatment practice and be able to define when a patient is treatment resistant and has reached the threshold for DBS.

The role of the multidisciplinary team: the levodopa challenge test

To provide an overview of the levodopa challenge test.

- The indication, rationale, withdrawal, challenge and interpretation of the levodopa test
- video case(s)
- The importance of the levodopa challenge test to DBS

Learning objectives

Participants should understand how to use the levodopa challenge test to determine whether a potential patient is suitable for DBS.

The role of the multidisciplinary team: psychiatric and behavioural assessment

Review the multidisciplinary team's (MDT) psychiatric and behavioural assessment of patients and its importance in people with Parkinson's disease who are being considered for DBS.

- Definition of the psychiatric and behavioural assessment
- Who should be involved from the MDT in these assessments?
- Why psychiatric and behavioural assessment are important in patients with Parkinson's disease who are being considered for DBS
- Assessment of mood, anxiety, behavioural disturbances, and impulse control disorders
- Assessment of psychosis, including hallucinations

Learning objectives

At the end of the module participants will understand:

- How to diagnose and assess potential contraindications for DBS
- How potential psychiatric and behavioural parameters can influence the target selection/treatment approach with DBS

The role of the multidisciplinary team: neuropsychological screening and cognition

Review the steps involved in cognitive and neuropsychological assessment in patients with Parkinson's disease who are being considered for DBS.

- A definition of cognitive psychology and how it differs from psychiatric and behavioural assessments
- How to treat psychiatric problems in Parkinson's disease
- How to assess psychiatric treatment in patients being considered for DBS
- Contraindications and their influence on the DBS target selection

Learning objectives

At the end of the module participants will understand:

- How to diagnose and assess potential cognitive or neuropsychological contraindications for DBS
- How neuropsychological and cognitive conditions might be treated in patients receiving DBS
- How potential neuropsychological and cognitive conditions can influence target selection with DBS

Expert panel and case studies: pathophysiology and medical management of Parkinson's disease

The case studies include examples of:

- MRI, cognition, levodopa challenge test, and pre- and post-operative assessment videos
- Usage of the EARLYSTIMULUS tool
- Pathophysiology and medical management of Parkinson's disease, neuroanatomy of relevant targets, and patient selection (EARLYSTIMULUS)

Module 3: Fundamentals of Dystonia

Basics of dystonia (E-Learning)

Detailed review of the different onsets and forms of dystonia, including the new classification of dystonia, and the inclusion and exclusion criteria for selecting patients with dystonia for DBS. This section also covers the overview of the basics and epidemiology of dystonia.

- An overview of the different forms and onsets of dystonia
- An overview of the basics and epidemiology of dystonia
- The most recent system for classifying dystonia
- An overview of the management guidelines for the treatment of dystonia
- Key selection criteria for DBS including:
 - Potential benefit for generalized dystonia
 - Symptoms not adequately controlled with other medications
 - Duration of disease and realistic expectations
- Indications for which DBS is not approved or which are not responsive to DBS
- Selection of the correct DBS target (STN versus GPi)

Learning objectives

At the end of the module participants will understand:

- The most recent classification system for dystonia
- The indications and contraindications for DBS in dystonia
- Target selection for the management of dystonia with DBS

Assessments of previous treatments and rationale to optimise treatment

Review of the different treatment options for dystonias, including a detailed review of best medical treatment. Overview of how previous treatments might impact the selection of patients for DBS.

- A review of the European Federation of Neurological Disorders (EFNS) guidelines on the treatment of dystonias
 - Oral medication options for dystonias
 - Botulinum toxin A treatment for focal dystonia
- Typical treatment pathways including an algorithm of treating early- to late-stage dystonias
- Long-term treatment strategies
- Rationale for optimising medical treatment or proceeding to surgery.
- An overview of how previous treatment might impact on the selection of patients for DBS.
- Clinical evidence for DBS in dystonia
 - Threshold for DBS
 - Definition of 'treatment resistant'

Learning objectives

At the end of the module participants will:

- Understand the definition of best medical treatment

- Be able to define when a patient is treatment resistant and has reached the threshold for DBS and can be considered for DBS
- Understand the clinical evidence for DBS in dystonia

Specific issues related to the management of children

To provide an overview of the specific considerations for DBS use for children and adolescents with dystonia, and in the management of children and adolescents following DBS.

- Pre-operative assessment of children and adolescents for DBS
- Counselling children and their parents
- Providing information in a paediatric setting
- The paediatric patient's perspective:
 - Key problems patients hope DBS will solve
 - Risks of DBS
 - Overcoming barriers (fear of brain surgery)

Learning objectives

At the end of the module the Participants will understand:

- How to conduct a pre-operative assessment
- How to counsel children and their parents and the type of information that can be shared in this setting

Case studies

The case studies include examples of pre- and post-operative assessment videos – to demonstrate the role of DBS in the patient journey.

Module 4: Fundamentals of Essential Tremor

Fundamentals of essential tremor (E-Learning)

Review of the different manifestations of essential tremor, and the inclusion and exclusion criteria for selecting patients with essential tremor for DBS. Overview of the clinical aspects and epidemiology of essential tremor.

- An overview of the different forms and onsets of essential tremor
- An overview of the clinical aspects and epidemiology of essential tremor
- An overview of the management guidelines for the treatment of essential tremor
- Key selection criteria for DBS including:
 - Potential benefit for patients with essential tremor.
 - Symptoms not adequately controlled with medications
 - Duration of disease and realistic expectations
- Essential tremor signs that may be non-responsive to DBS
- Selection of the correct DBS target (VIM versus DRTT)

Learning objectives

At the end of the module participants will understand:

- The indications and contraindications for DBS for essential tremor
- Which target to select for the management of essential tremor with DBS

Assessment of previous treatments and the role of DBS

Review of the different treatment options for essential tremor, including a review of best medical treatment.

- Comparison of the different treatment options for essential tremor from the early to late stages of the disease
- Review of available guidelines on the treatment of essential tremor.
 - Oral medication options for essential tremor
- Typical treatment pathways, including an algorithm of treating early- to late-stage essential tremor
- Rationale for optimising medical treatment or proceeding to surgery
- Clinical evidence for DBS in essential tremor
 - Threshold for DBS
 - Definition of 'treatment resistant'

Learning objectives

At the end of the module participants understand

- The definition of best medical treatment
- Be able to define when a patient is treatment resistant and has reached the threshold for DBS and can be considered for surgery
- Understand the clinical evidence for DBS in essential tremor

Case Studies

The case studies include examples of pre- and post-operative assessment videos – to demonstrate the role of DBS in the patient journey.

Module 5: DBS Patient Management

Talking to patients about DBS and managing expectations

Overview of how to introduce DBS as a treatment option to patients with the key indications (Parkinson's disease, dystonias, and essential tremor), their families, and caregivers.

- Managing patient symptoms and how long-term treatment options may lead to the consideration of DBS
 - Disease progression advancement of motor and non-motor symptoms.
 - Polypharmacy
- Introducing DBS to the patient, their families and caregivers
 - Long-term outlook for the patient and family dynamics
 - Managing expectations
 - Motor and non-motor symptoms
 - Psychosocial preparation
 - Rehabilitation and lifestyle
- The patient's perspective
 - Key problems patients hope DBS will solve
 - The risks of DBS
 - Overcoming barriers (fear of brain surgery)

Learning objectives

At the end of the module participants understand

- How to help patients manage their expectations of DBS for their treatment
- How to help patients understand the risks (behavioural and surgical) of DBS
- How to help patients prepare psychosocially to receive DBS

Main messages to the referrer on how to manage the patient with DBS

Guidelines for referring patients for DBS therapy.

- When to re-refer patients to the specialist centre
- Recognizing a change or worsening in symptoms
- Advice on adjusting concomitant medication
- Consultation with neurologists on adjusting DBS
- Concept of sharing patient care with the DBS implanting centre
- Re-referral of patients at regular intervals
- Monitoring DBS batteries
- Ongoing surveillance of the patient with DBS

Learning objectives

At the end of the module participants will gain an understanding of the referral procedure for patients with DBS who may develop worsening symptoms.

Case studies

Module 6: DBS Surgery and the role of the Neurologist

Preparation for surgery

Review the practical key stages and considerations for DBS surgery for Parkinson's disease, dystonia, and essential tremor.

- Practical preparation for surgery
 - Anticoagulation
 - Screening for comorbidities
 - Choice of trajectories
- Device selection
 - Rechargeable versus non-rechargeable
- Surgical options for DBS
 - Image fusion or image-guided implants
 - Considerations for general anaesthesia
 - Judging of beneficial effects and adverse side effects
 - Reliability of observations
- Psychosocial support in acute phase

Learning objectives

At the end of the module the Participants will understand:

- How to screen for comorbidity or anticoagulation complications
- How to select the most appropriate device for the patient
- The surgical options
- What psychological support the patient may need in the acute phase

The role of the neurologist during surgery: assessment of the awake and asleep patient

Insight into the role of the neurologist prior to and during DBS surgery.

- What the neurologist should expect during the DBS surgical process
 - Intra-operative testing: impedance testing
- Video of a key part of a DBS implantation operation if possible
- Example of an intra-operative MER case and example of an intra-operative MRI case
- Interpretation of signs and symptoms during surgery
- Differentiation between stimulation-induced effects and non-DBS related signs and symptoms
- Participation in a DBS procedure in the virtual surgery room

Learning objectives

At the end of the module the Participants will understand

- The role of the surgeon
- How to interpret signs and symptoms and differentiate between stimulation-induced effects and non-DBS signs/symptoms during DBS surgery
- What to expect during the DBS surgery

Module 7: Programming for DBS

Practical programming of ACTIVA® platform

This session will provide the basics of programming of ACTIVA®

- The basic programming of ACTIVA® amplitude, pulse width, and rate.
- Kinetra® and Soletra®, including the magnetic reed switch.

Learning objectives

At the end of the module, Participants will understand the basic steps involved in the programming of ACTIVA® DBS devices.

- Basic programming
- Therapeutic benefits and management of unwanted effects of stimulation: practical parameter settings
- Choice between unipolar and bipolar programming
- Troubleshooting the DBS system

Advanced programming

An interactive overview of the need, and options available, for advanced programming. This session will enable seeing clinical programming sessions and to observe the controls in patients with complex DBS settings.

- When to use advanced programming
- Advanced programming options, including multiple programs (interleaving)
- Use of multiple electrodes
- Programming by patients/caregivers
- Routine controls in patients with complex DBS settings
- An observational session on clinical programming

Learning objectives

At the end of this module, Participants will have gained insight into advanced programming and which patients would benefit from complex DBS settings.

Therapeutic benefits and management of unwanted effects of stimulation: practical parameter settings

Overview of the therapeutic benefits and how to manage undesirable effects of DBS.

- An overview of the key targets for DBS including:
 - VIM for tremor
 - STN and GPi for Parkinson's disease
 - GPi for dystonia
- Review the therapeutic benefits and how to manage undesirable effects for each target and disorder.

- Demonstration of how to set the best DBS electrode for each of the targets.
- A virtual programming session, including two post-operative programming and five DBS routine controls.

Learning objectives

At the end of this module, Participants will understand how to differentiate between the therapeutic benefits and the unwanted effects associated with each DBS target and disorder.

Troubleshooting with the DBS system

This session is focusing on the troubleshooting procedures for DBS for Parkinson's disease, dystonia and essential tremor.

- Identifying DBS hardware-related issues and strategies for management including:
 - Impedance and connectivity
 - Longevity of the battery
 - How the patients can control their DBS

Learning objectives

At the end of this module, Participants will be able to:

- Identify DBS hardware-related issues
- Develop strategies to manage DBS hardware-related issues

Concept of visual-based programming

To review the Optivise® system in an interactive session, with an opportunity for participants to observe at least one post-operative localization using Optivise®.

- Concept of visual-based programming
- Anatomy and physiology of target structures
- Targeting for neurologists
- Medtronic strategy and vision for the future (to be confirmed)
- Post-operative identification of the implanted anatomical structure.
- Knowledge checking activity: programming or adjusting settings for a patient with side effects

Learning objectives

At the end of this module, Participants will be able to understand

- The concept of visual based programming with Optivise®
- The potential of this approach for the future and Medtronic's commitment to it

Module 8: Post-operative Patient Management and living with DBS

General post-operative management of patients with Parkinson's disease, dystonia and tremor

Review post-operative patient management for DBS in Parkinson's disease, dystonia and essential tremor, in an interactive session.

- How to adjust DBS treatment for patients with Parkinson's disease, dystonia and essential tremor.
 - Timeline for adjusting treatment
 - Case study examples of adjusting DBS treatment
- Follow-up of patients with DBS (for Parkinson's disease, dystonia and essential tremor)
 - Which medications may continue to be given concomitantly or may be prescribed
 - If patients are to remain on medications, by how much can or should these medications be reduced (or increased)?
- Distinguish between side effects of DBS stimulation and those occurring from concomitant medications or withdrawal of concomitant medications
- Understanding how programming selections affect longevity
- Provide a timeframe for follow-up of patients with DBS
 - Highlight the differences between the conditions (e.g., the effects of DBS occur sooner in Parkinson's disease than in dystonia)
- Addressing change of or loss in therapy-understanding system troubleshooting
- Recognising and managing impulsivity and impulse control disorders (ICD)

Learning objectives

At the end of this module, Participants will understand:

- How to adjust DBS post-operatively
- How and when to adjust concomitant treatment for patients
- The timelines involved for adjusting treatment of the key indications (Parkinson's disease, dystonia or essential tremor)
- Distinguish between the side-effects of DBS versus non-DBS symptoms

Long-term management of DBS patients

Overview of the long-term management of patients with DBS, with emphasis on patients with Parkinson's disease.

- Long-term management of Parkinson's disease/dystonia/essential tremor patients with DBS
- Drug adjustment following DBS with regard to motor and non-motor aspects (including impulsivity and suicide risk)
- The role of the referring neurologist
- Physical therapy and speech therapy for patients with DBS
- The use of non-dopaminergic medications in the long-term management of patients
- Issues relating to comorbidity and disease progression
- Replacement of the INS battery

Learning objectives

At the end of this module, participants will understand factors to consider when making decisions about adjusting drugs for a DBS patient over the course of many years. They should also understand how comorbidities and disease progression can impact DBS therapy.

Case Studies

Living with Medtronic DBS

Post-operative care (educating the patient on how to care for their DBS system post implant)

- Use of the Patient Programmer Features (groups/limits) to accelerate optimized parameters
- Understanding how programming selections affect longevity
- Patient activity restrictions

Overview of Electromagnetic Interference:

- What is EMI?
 - Conductive
 - Inductive
 - Radiation
- How are static magnets different from EMI
- How could it affect the device/DBS system?
- What will the patient experience if EMI affects their DBS system?
- How can patients/HCPs mitigate/minimize EMI?
- The consequences of living with a full body MRI conditionally safe DBS system*
- Overview of various aspects of living with Medtronic DBS therapy (Security gates, Wii, Cookers, Microwave, etc....)

* For a listing of indications, contraindications, precautions, MRI compatibility of specific Activa® devices, MRI conditional labelling, warnings and potential adverse events, please refer to the instructions for use.

Learning objectives

At the end of this module the learner will have a general understanding of various types of EMI, how it potentially could affect a patient implanted with DBS and the suggested steps to

minimize this interaction. Learner will also have an understanding of the need for MRI and why only Medtronic DBS makes MRI possible.

Module 9: The economic value of DBS

Health economic basics of DBS

Introduction of some basic concepts of health economics and how these concepts contribute to healthcare decision making. The details of this session will also facilitate further understanding of the economic value of DBS.

Learning objectives

At the end of the module, participants should have a basic understanding of:

- Why the economic evaluation of healthcare interventions is important
- The different ways to evaluate the economic value of interventions like DBS
- How economic evaluation can help answer important questions on treatment choice

The economic value of DBS module

Overview on the key economic evaluations of DBS in the main indications. These economic evaluations will demonstrate how the benefits of DBS for the treatment of patients with Parkinson's disease translate into economic savings for the healthcare system.

Learning objectives

At the end of the module participants will have a basic insight on:

- The key economic evaluations performed on DBS and their limitations
- How the clinical benefits observed in trials translate into economic benefit
- The cost-effectiveness of treatment with DBS
- The value/price of DBS in the healthcare system
- How the benefits of DBS can support healthcare decision making to enable patient access to this effective therapy