

POSTGRADUATE TRAINING PROGRAM IN CARDIAC ELECTROPHYSIOLOGY AND PACING



FACULTY POSTGRADUATE TRAINING IN CARDIAC ELECTROPHYSIOLOGY AND PACING

FACULTY:



Prof. dr. Carlo de Asmundis
Program Director
Department Head Heart Rhythm Management Center, UZ Brussels



Prof. dr. Gian Battista Chierchia
Program Co-director
Atrial Fibrillation Program Coordinator



Prof. dr. Mark La Meir
Program Director Arrhythmia Cardiac Surgery
Department Head Cardiac Surgery, UZ Brussels



Prof. em. dr. Pedro Brugada
Program Co-director
Scientific Director, Center for Cardiac & Vascular Diseases, UZ Brussels

SATELLITE PARTNERS:

- ZN Antwerp (B)** | Prof. dr. Yves De Greef
Clinique Pasteur, Toulouse (F) | Prof. dr. Serge Boveda
University Milan (I) | Prof. dr. Claudio Tondo
University Svizzera Italiana, Lugano (S) | Prof. dr. Giulio Conte

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POSTGRADUATE

Number of ECTS-CR: 60
Years of study: 2
Brussels Health Campus (UZ Brussel, Jette)

POSTGRADUATE	ECTS-CR*	HOURS
Hands-on training and clinical practice	20 CR	600 hrs
Research	20 CR	600 hrs
Self-study	10 CR	300 hrs
Congress participation and publications	4 CR	120 hrs
Interdisciplinary seminars Physiology and Electrophysiology	3 CR	90 hrs
Weekly seminars Heart Rhythm Management Center (HRMC)	3 CR	90 hrs
TOTAAL	60 CR	1800 hrs

*ECTS-CR: European Credit Transfer System-Credits

BACKGROUND

Cardiac Arrhythmias management is rapidly developing as a subspecialty within cardiology that is devoted to the diagnosis and the treatment of cardiac rhythm disorders, including invasive evaluation of their mechanisms, controlled destruction of arrhythmogenic myocardium by percutaneous catheters, and implantation of cardiac rhythm management devices. Catheter ablation is the therapy of choice for most supraventricular tachycardias. More than 100 000 interventions are performed every year in Europe. Device implantation for arrhythmia treatment, sudden death prevention, and cardiac resynchronization are practiced regularly nowadays, and are performed in more than 200 000 patients in Europe per year. The increase in the indications and the number of all of these procedures depicts the present scenario by emerging indications, an increasing number of invasive procedures, and the establishment of new practicing units and professionals. Nevertheless, these procedures require cardiologists with comprehensive knowledge of cardiac arrhythmias disorders and who are trained in cardiovascular catheter manipulation, heart electrical signal recording and interpretation, and device implantation and follow-up to ensure both patient's safety and quality. Thus, it appears to be imperative to promote and ensure sufficient and homogeneous training and qualification in cardiac arrhythmias management amongst these professionals.

In addition, the European Council of Ministers adopted a recommendation on the development and implementation of systems on 30 September 1997 to improve the quality and homogeneity of Health Care Services. The recommendation stated that quality systems must be publicly controlled through objective external evaluation by independent organizations. Although training and accreditation programmes are conducted both nationally and regionally, coordination at the European level is needed for two reasons in particular:

Transnational cooperation is not well organized resulting in the duplication of work and an inability to compare work implemented in different countries due to unnecessary methodological variations. The development of a uniform and consistent set of standards will provide a good tool to facilitate qualified health services and ensure free movement across barriers, both for professionals and for patients. These two reasons are even more relevant nowadays due to the development experienced by the European health care systems, the increasing national integration of the European Union, and the challenges currently arising, such as increased management autonomy, inter country invoicing, and competition between Health Care centers. These reasons supported the commitment of the European Society of Cardiology (ESC), through the European Heart Rhythm Association (EHRA), in organizing such a European system together with the Registries of European certified units, professionals, and activities. A European program in this field will be of utmost interest and will represent a harmonized and uniform way to ensure high standards of excellence.

The Postgraduate Training in Cardiac Electrophysiology and Pacing is offered at the UZ Brussel and Vrije Universiteit Brussel under the direction of Prof. dr. Carlo de Asmundis, Head of HRMC UZ Brussels. Since a few years the Postgraduate Program is also open for Cardiac Surgeons/Rhythmologists, under the supervision of Prof. dr. Mark La Meir, Head of Cardiac Surgery UZ Brussels. This practical and theoretical postgraduate training fills the gap in education that is required for the good practice of Clinical Electrophysiology and Pacing and prepares the Fellows for a successful certification. Fellows in Cardiac Electrophysiology and Pacing have been trained for over 35 years now. It helped them to obtain very important cardiology positions in centers all over the world.

The academic centre of the HRMC department is an EHRA Recognised Training Center (ERTC) in Cardiac pacing, ICD's and invasive cardiac electrophysiology.



The HRMC department also participates in the European Network performing the ESC ElecTRa (European Lead ConTRolled Registry) and is member of the European Reference Network for Rare Diseases (ERN GUARD-HEART / Heart Diseases).



PROGRAM OBJECTIVES AND ORGANIZATION

Fellows train in the Postgraduate Program in Cardiac Electrophysiology and Pacing to achieve excellence in all areas of arrhythmia and pacing management. Trainees develop expertise in the diagnosis and management of arrhythmias disorders, including invasive and non-invasive testing, and all therapeutic modalities including medical management, device implantation and follow-up, catheter ablation and clinical cardio-genetic. Fellows participate in all activities of the Heart Rhythm Management Center, UZ Brussel. They meet arrhythmia patients in both inpatient and outpatient settings to observe, diagnose, manage and judge the effectiveness of treatments for these patients. Fellows are given the opportunity to assume continuing and increasing responsibility for both acutely and chronically ill patients to learn the natural history of a wide variety of cardiac arrhythmias and how to treat them.

Fellows are given increasing responsibility in invasive procedures in the EP laboratory. These procedures include diagnostic EP studies, arrhythmia mapping, catheter ablation for supraventricular, atrial fibrillation and ventricular tachycardias, and pacemaker, ICD and cardiac resynchronization therapy device implantations. Fellows also participate in non-invasive procedures including cardioversions, tilt table tests, and device tests. Fellows participate to consulting on patients with arrhythmias and implanted devices in the intensive care units and other inpatient units. The fellows rotate among each of the EP faculty clinics as well as the outpatient device clinic, thus affording trainees the opportunity to observe and manage patients longitudinally, and to gain experience with device follow-up and management. Most of the Postgraduate fellowship training occurs in the UZ Brussel University Hospital. This experience broadens the patient base for fellowship training, and provides fellows an opportunity to strengthen their teaching skills as they work with resident, students, young doctors less knowledgeable than they are regarding arrhythmia management.

The fellowship is part of the main medical teaching program of our University this experience is designed to dovetail seamlessly with the program on the Medical School to achieve common educational goals. The Postgraduate Training Program is designed to ensure that fellows acquire not only the cognitive knowledge and procedural skills required for excellence in clinical cardiac electrophysiology, but that they develop excellence in interpersonal skills, professional attitudes, and humanistic qualities required of a practitioner in this subspecialty. The clinical training integrates patients' medical problems with health promotion and cultural, socioeconomic, ethical, occupational, environmental, and behavioural issues into the learning experience, such that the importance of humanistic qualities is emphasized throughout the fellowship. The fellowship is designed to provide trainees with an educational experience that is broad and deep. In addition to the extensive direct clinical exposure, a variety of didactic and investigative opportunities are provided during the fellowship.

A bi-weekly EP service meeting, attended by all EP faculty, fellows and staff, is used for didactic teaching, discussion of recent cases and complications, presentations of fellows' research, and journal club on a rotating basis. Fellows are also expected to attend weekly Cardiology Grand Rounds and Cardiology fellows' Core Curriculum, Research, and Clinical conferences. Each EP fellow is given a clinical research project to carry out during the training program and the opportunity to present this work at national meetings and in manuscript form. Fellows can also participate in basic science, outcomes, and public health research during their training.

Moreover, the program was recently opened for Cardiac Surgeons/Rhythmologists. The 2016 European Society of Cardiology guidelines for the management of atrial fibrillation (AF) recommends integrated care in the treatment of AF and follows a patient-centred, multidisciplinary team approach. This multidisciplinary collaboration between at least a cardiothoracic surgeon having AF knowledge and experience, an EP experienced in the catheter-based management of AF, as well as a dedicated nurse involved in patient care should be structured in a heart team with weekly meetings. Non-invasive cardiologists, interventional cardiologists, neurologists (AF-related ischemic or haemorrhagic stroke), and medical providers from other disciplines can be asked to join if needed. This workflow is not only there to improve patient outcomes by optimizing the treatment and restoring sinus rhythm, but most importantly to limit the potential risks associated with the choice of procedure, thereby minimizing complication rates. The hybrid atrial fibrillation surgical ablation for example is a procedure as defined in the 2012 HRS/EHRA/ECAS expert consensus statement on catheter and surgical ablation of AF is a joint AF ablation procedure, which is a part of a single "joint" procedure or performed as 2 pre-planned separate ablation procedures separated by no more than 6 months of time.¹ According to the 2017 AATS Expert Consensus Guidelines, examining surgical ablation for AF, hybrid procedures in symptomatic patients with AF in whom medical treatment or percutaneous catheter ablation have failed received a Class IIb level of evidence: B-NR. Interestingly the authors also stated that "It is reasonable to perform stand-alone surgical ablation for pulmonary vein isolation (PVI) in patients with symptomatic paroxysmal AF and small left atria."

POSTGRADUATE FACULTY, SUPERVISION, AND FELLOW EVALUATION, FACILITIES

The core faculty for the Postgraduate program includes Prof. dr. Carlo de Asmundis, who directs the EP fellowship training and the HRMC Department, Prof. dr. Gian Battista Chierchia, Director of Atrial Fibrillation Program, Prof. dr. Mark La Meir, Director of the Cardiac Surgery Department. Since 2018 there is a close collaboration with the following satellite partners: **ZN Antwerp, Belgium** (Prof. dr. Yves De Greef), **Clinique Pasteur Toulouse, France** (Prof. dr. Serge Boveda), the **University of Milan, Italy** (Prof. dr. Claudio Tondo) and the **University Svizzera Italiana in Lugano, Switzerland** (Prof. dr. Giulio Conte). As additional faculty the cardiogenetic center of the University Hospital UZ Brussel/VUB is involved in the training of the fellows.

Fellows are supervised by the faculty in all clinical activities. Each procedure is closely supervised by one of the EP faculty. Consults are supervised by the on-service EP attending for that week. Each outpatient and device clinic is staffed and supervised by an EP attending. Procedures performed at EP laboratory are supervised by EP faculty member or, cardiologists who are highly experienced in this procedure. Fellows are carefully evaluated by the faculty in terms of their medical knowledge, provision of medical care, skills in history taking and physical examination, clinical judgment, medical decision making, technical competency, teaching and communications skills, humanistic qualities, professional attitudes and behavior, and commitment to scholarship. Faculties base their evaluation on direct observation of fellows' activities in the outpatient center, during inpatients consultations, and during EP lab-based procedures. Each fellow's performance is reviewed by each faculty member quarterly and documented in CALI on line, a web-based database application from our University (www.vub.be). The program director meets with each fellow to discuss progress and career plans at least semi-annually. Performance is evaluated such that expectations of technical competency and cognitive growth increase as the fellow progresses through the training program.

In the first 6 months of the training program, fellows will participate primarily in standard pacemaker and ICD implants, diagnostic EP studies, and less complex ablation procedures, including slow-pathway ablation, His bundle ablation, and ablation of simple accessory pathways and the typical form of atrial flutter. As fellows establish competency in these procedures, they will then participate in more complex procedures, including implantation of cardiac resynchronization devices and ablation of atypical atrial flutters, atrial fibrillation, and ventricular tachycardia. During all phases of the 2-year fellowship program, fellows also participate in all non-procedural aspects of inpatient and outpatient arrhythmia management.

To ensure that you acquire adequate knowledge and develop your technical skills, your performance will be monitored carefully during the course of the program training. The Heart Rhythm Management Center started its activities at the university Hospital UZ Brussel during spring 2007. In less than six months, clinical activity has rocketed to the #1 position in Belgium, and has been paralleled by important scientific production. Emerging fields of activity are multidisciplinary (clinical) and translational (research) programs in collaboration with the departments of Genetics, Pediatrics, Neonatology, Geriatrics, Neurology, as well as a fundamental research program in Physiology. The large scope of clinical activities, fuelled by increasing patient demand in Belgium and elsewhere, together with the presence of a state-of-the-art infrastructure and a research-stimulating multidisciplinary academic environment unique in Europe, as well as the intrinsic qualities of Professor dr. Pedro Brugada and his team, are a unique opportunity for the Vrije Universiteit Brussel to implement this academic training program.

The Postgraduate training program takes full advantage of the excellent facilities dedicated to the Electrophysiology service at University Hospital UZ Brussel. This includes one biplane fluoroscopy lab, one stereotaxis Lab, and Hybrid monoplane fluoroscopy lab each with digital recording system, programmable stimulator, RF generator, and 3D mapping systems (Rhythmia, Emite, Carto). The department also has a dedicated non-fluoro lab for cardioversions, tilt table tests, and ICD tests. The EP service has dedicated space in the Outpatient Center for patient evaluation and device follow-up.

During the clinical electrophysiology training year, you will spend 10 months in the EP lab and 2 months in the Pace lab, as well as 1/2 half day per week in the outpatient Heart Rhythm Management Center. Clinical Electrophysiology fellows serve as 2nd EP call (with EP staff first call) for the service for one week out of six. Timely evaluations are done by the general cardiology fellow on call and supervised directly by the consultant. The clinical cardiac EP fellow covers post-procedure patients including those that they would have done procedures on personally and the device troubleshooting and programming services on weeknights or the week they are on 2nd call. In addition, the clinical cardiac EP fellow covers a cardiac devices control call for the cardiology service one Weekend every five/six weeks.

CURRICULUM

The Postgraduate Cardiac Electrophysiology and Pacing Curriculum is organized around the European Society of Cardiology consensus and guidelines defined by the Accreditation Council of the European Heart Rhythm Association. Methods of assessment have also been developed to more completely address the defined competencies.

The competencies are summarized:

PATIENT CARE:

Fellows are expected to provide patient care that is compassionate, appropriate and effective for the promotion of health, prevention of illness, treatment of disease and care at the end of life. Gather accurate, essential information from all sources, including medical interviews, physical examination, records, and diagnostic/therapeutic procedures. Make informed recommendations about preventive, diagnostic, and therapeutic options and interventions that are based on clinical judgment, scientific evidence, and patient preferences. Develop, negotiate and implement patient management plans. Perform competently the diagnostic and therapeutic procedures considered essential to the practice of Clinical Cardiac Electrophysiology.

MEDICAL KNOWLEDGE:

Fellows are expected to demonstrate knowledge of established and evolving biomedical, clinical and social sciences, and demonstrate the application of their knowledge to patient care and education of others. Apply an open-minded and analytical approach to acquiring new knowledge. Develop clinically applicable knowledge of the basic and clinical sciences that underlie the practice of Clinical Cardiac Electrophysiology. Apply this knowledge in developing critical thinking, clinical and technical problem solving, and clinical decision-making skills. Access and critically evaluate current medical information and scientific evidence and modify knowledge base accordingly.

PRACTICE-BASED LEARNING AND IMPROVEMENT:

Fellows are expected to be able to use scientific methods and evidence to investigate, evaluate, and improve their patient care practices. Identify areas for improvement and implement strategies to improve knowledge, skills, attitudes, and processes of care. Analyse and evaluate practice experiences and implement strategies to continually improve the quality of the practice of Clinical Cardiac Electrophysiology. Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care. Use information technology or other available methodologies to access and manage information and support patient care decisions and personal education.

INTERPERSONAL SKILLS AND COMMUNICATION:

Fellows are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of health care teams. Provide effective and professional specialist consultation to other physicians and health care professionals and sustain therapeutic and ethically sound professional relationships with patients, their families, and colleagues. Use effective listening, nonverbal, questioning, and narrative skills to communicate with patients and families. Interact with consultants in a respectful and appropriate fashion. Maintain comprehensive, timely, and legible medical records.

PROFESSIONALISM:

Fellows are expected to demonstrate behaviours that reflect a commitment to continuous professional development, ethical practice, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society. Demonstrate respect, compassion, integrity, and altruism in their relationships with patients, families, and colleagues. Demonstrate sensitivity and responsiveness to patients and colleagues, including gender, age, culture, religion, sexual preference, socioeconomic status, beliefs, behaviours and disabilities. Adhere to principles of confidentiality, scientific/academic integrity, and informed consent. Recognize and identify deficiencies in peer performance. Develop a clear understanding of the complex and challenging relationships in Clinical Cardiac Electrophysiology between clinician/providers, hospitals and industry; understand the inherent conflicts of interest in many relationships with industry and its representatives, and develop strategies to ensure clear boundaries that are designed to uncompromisingly prioritize high quality patient care.

SYSTEMS-BASED PRACTICE:

This postgraduate course is given in English.

Fellows are expected to demonstrate an understanding of the contexts and systems in which health care is provided, and demonstrate the ability to apply this knowledge to improve and optimize health care. Understand, access, and utilize the resources and providers necessary to provide optimal care. Understand the limitations and opportunities inherent in various practice types and delivery systems, and develop strategies to optimize care for the individual patient. Given the high costs of many treatments, fellows are expected to apply evidence-based, cost-conscious strategies to prevention, diagnosis, and treatment selection in cardiac electrophysiology. Collaborate with other members of the health care team to assist patients in dealing effectively with complex systems and to improve systematic processes of care.

The curriculum is reviewed at least semi-annually in a curriculum committee meeting that includes the program director, key faculty, and the fellows. The following activities within the fellowship program provide learning and teaching opportunities for the trainee in clinical cardiac electrophysiology and pacing.

The HRMC has 3 full-time dedicated cath-labs and 1 hybrid cath-lab to perform EP-procedures. We have several 3D electronanatomical mapping systems (Carto, Ensite, Rhythmia, Acutus, EPD Kodex, ...). Moreover we use single shot ablation devices daily (Cryo, PVAc, Helios, Polaris, ...). We have an intense pacing activity with also a dedicated program for lead extraction (Sprectranetrics, Cook, ...). Based on our daily activity we are able to offer each fellow at least 2 procedures per day as first/second operator. Fellows spend four days per week in the EP/Pace laboratories performing a variety of procedures that include complex ablation atrial fibrillation ventricular tachycardia and ventricular fibrillation and advanced device procedures including resynchronization therapy lead extraction and ablation and devices in patients with congenital heart disease. A half day continuity clinic may be combined with extra time in EP procedures or outpatient device troubleshooting or research.

The collaborative relationship between attending physician and trainee in the delivery of patient care is at the core of this Program; the provision of high-quality patient care is the fundamental vehicle for teaching and learning of all the required competencies. In the development of educational objectives direct patient care is broadly and somewhat arbitrarily divided into those three loci of care where the particular skills required of the successful sub-specialist in cardiac electrophysiology and pacing differ: Out-Patient clinic including implantable device follow up clinic Hospital, including coronary, medical and surgical intensive care units and the emergency department, Electrophysiology Laboratory, Teaching conferences are convened at the institutional, departmental and section level and all contribute to the educational experience of the cardiac electrophysiology trainee; Electrophysiology weekly Lecture Series, Division of Cardiology Grand Rounds, Electrophysiology Morbidity and Mortality, Division of Electrophysiology ECG teaching conferences, Arrhythmia Service Journal club.

During the clinical training year, time is available to complete research projects and undertake smaller projects including case reports. Our fellows typically publish two to three peer reviewed publications during their clinical year and complete prior research projects. We encourage individuals without significant electrophysiology experience in their fellowship to participate in a comprehensive program that involves research and extended clinical training for two to three years (PhD program).

An optional funded year of research training (PhD program) is possible where translational animal laboratory or basis clinical electrophysiology experience is possible.

APPLICATION PROCEDURE

- It is mandatory to have a MD before applying; the fellowship is for full trained cardiologist with the objective of obtaining skills in interventional cardiac electrophysiology and cardiac pacing. Residents in cardiology can also be considered.
- The Fellows have to apply via mail to the course coordinator prof. dr. Carlo de Asmundis (HRMC@uzbrussel.be). A complete application must include: Curriculum Vitae, Copy of Identity document, two Letters of Recommendation and a copy of the MD diploma.
- Before starting the course it is mandatory for the accepted fellow to have obtained full official recognition of his medical doctor and cardiological diplomas in Belgium. The fellow will not be allowed to practice in our center if the latter is not fulfilled.
- Fellows from an European Union Country have to apply to recognition of their diplomas at our Federal Public Service of Health. This procedure can take up to 6 months.
- Fellows having graduated outside of the European Union, have to apply for temporary recognition from the Belgian Health Authorities according to the procedure of Art. 146 of the Federal Public Service of Health. They also have to prove their basic knowledge of Dutch and their application for recognition has to be submitted in Dutch following the temporary degree recognition art 49ter. They have to be able to submit a certificate of knowledge of the Dutch language (level B) with their dossier. More information on this procedure can be found on the website of our Health Authorities: www.health.belgium.be. This procedure can take up to 9 months.
- No salary and/or grant will be paid by our institution. Any financial matter (including grants from the European Heart Rhythm Association or from any other institution) is to be arranged by the fellow himself, as well as all travelling and accommodation in Brussels.
- The registration fee at the university is € 200,00/year.

SYLLABUS OF SPECIFIC TOPICS

A. CLINICAL EXPERIENCE

1. Techniques for evaluating patients with
 - a. sinus node dysfunction
 - b. atrioventricular (AV) and intraventricular block
 - c. supraventricular and ventricular tachyarrhythmias
 - d. unexplained syncope
 - e. aborted sudden cardiac death
 - f. palpitations
 - g. atrial fibrillation
 - h. Wolff-Parkinson-White (WPW) syndrome
 - i. Brugada Syndrome, long QT syndrome or other channelopathies
2. Clinical experiences involving
 - a. EP consultation to physicians in other disciplines.
 - b. care of patients in the cardiac care unit, emergency room, or other intensive care settings.
 - c. care of the patient before and after an electrophysiological procedure.
 - d. care of patients with postoperative arrhythmias.
 - e. outpatient follow-up of patients treated with drugs, devices, or surgery.
 - f. electrocardiography--proficiency in the interpretation of the standard 12-lead ECG, stress testing, ambulatory ECG recording, signal-averaged ECG, event recording patient activated ECGs, Ajmaline or other drugs provocative test.
 - g. care of patients with temporary and permanent pacemakers.
 - h. care of patients with ICDs and CRT devices.

B. TECHNICAL AND OTHER SKILLS

1. Acquire skill in the interpretation of
 - a. activation sequence mapping recordings.
 - b. invasive intracardiac electrophysiological studies, including endocardial electrogram recording.
 - c. relevant imaging studies, including X-rays and MRI scans.
 - d. tilt testing.
 - e. electrocardiograms and ambulatory ECG recordings.
 - f. continuous in-hospital ECG recording.
 - g. signal-averaged ECG recordings.
 - h. stress test ECG recordings.
 - i. stored electrograms retrieved from implanted devices.
2. Acquire skill in the performance of clinical cardiac electrophysiological studies, including:
 - a. Electrode catheter introduction
 - b. Electrode catheter positioning in atria, ventricles, coronary sinus, His bundle area, and pulmonary artery
 - c. Stimulating techniques to obtain conduction times and refractory periods and to initiate and terminate tachycardias
 - d. Recording techniques, including an understanding of amplifiers, filters, and signal processors
 - e. Measurement and interpretation of data
3. Acquire proficiency in catheter ablation procedures, including AV nodal re-entrant tachycardia and accessory pathway modification, atrial tachycardia and atrial flutter, AV junctional ablation and modification, ventricular tachycardia ablation, and ablation procedures for atrial fibrillation including pulmonary vein isolation.

4. Acquire proficiency in device procedures, including pacemaker and ICD insertion and programming. This includes acquiring skill in:
 - a. Lead placement, including cardiac resynchronization leads
 - b. Fashioning device pockets
 - c. Device programming
 - d. Non-invasive programmed stimulation for arrhythmia induction through the device
 - e. Defibrillation threshold testing
 - f. Final prescription of anti-tachycardia pacing and defibrillation therapies
5. Hybrid Ablation together with Cardiac Surgery

C. CORE CURRICULUM LECTURE SERIES

1. EP Procedures, vascular access, catheters, sheaths, basic measurements
2. Electrical Engineering for EP – Filters, amplifiers, noise, etc.
3. Complications in the EP Laboratory: What Are They and How Do You Avoid Them
4. Pacemakers – Physiology, timing cycles, programming, troubleshooting
5. ICDs – Devices, leads, waveforms, DFT, ULV, ATP, programming, troubleshooting
6. Lead extraction – Indications and techniques
7. Pharmacology and Proarrhythmia
8. Syncope – Mechanisms, differential diagnosis
9. SVT – Differential diagnosis, EP lab diagnostic manoeuvres
10. Accessory pathways and AVNRT – Ablation strategies
11. Arrhythmia Mechanisms I – Automaticity and Triggered activity
12. Arrhythmia Mechanisms 2 - Re-entry, entrainment, ablation strategies for re-entrant VT
13. Cardiac anatomy for the electrophysiologist
14. 3D and electroanatomical mapping
15. Atrial flutter and Atrial tachycardia – Mechanisms, ablation strategies
16. Atrial fibrillation – Mechanisms, ablation strategies
17. Inherited Arrhythmias – ARVD, Sarcoid, HOCM, Long QT, Short QT, Brugada syndrome
18. Non-invasive Testing and Risk Stratification – Holters, Event monitors, SAECG, HRV, T wave alternans
19. Ablation modalities – RF, Cryo, Microwave, Focused ultrasound
20. Pediatric Arrhythmias

Heart Rhythm Management Center, Vrije Universiteit Brussel
Cardiovascular Department, Universitair Ziekenhuis Brussel
Laarbeeklaan, 101 - B1090 Brussels, Belgium.

