



The Cardiac Society of Australia and New Zealand

## Guidelines for sub-specialty training in adult cardiac electrophysiology

A Working Group chaired by Dr Angas Hamer originally developed these guidelines. A/Prof Andrew McGavigan and Dr Hugh McAllister on behalf of the Electrophysiology and Pacing Council conducted a revision of the guidelines.

The guidelines were reviewed by the Continuing Education and Recertification Committee and ratified at the CSANZ Board meeting held on Friday, 31<sup>st</sup> May 2013.

### Introduction

These recommendations reflect the guidelines from the American College of Cardiology and the American Heart Association, in collaboration with the Heart Rhythm Society (formerly the North American Society of Pacing and Electrophysiology) on Training in Specialised Electrophysiology, Cardiac Pacing, and Arrhythmia Management<sup>1</sup>. These guidelines provide a suitable outline of the knowledge and practical experience required in training for a cardiologist to be a Clinical Cardiac Electrophysiologist. However, although the CSANZ has endeavoured to incorporate the substance of these recommendations, this CSANZ guideline has been modified to suit the Australian and New Zealand medical environment.

The scope of Clinical Cardiac Electrophysiology (CCEP) has expanded markedly over the last two decades. With the expansion in the scope of CCEP there has been a need for more extensive training in this area, both in terms of theoretical knowledge but in particular in adequate exposure to the therapeutic techniques that this specialty offers. It should be emphasised that the field of CCEP continues to evolve with the range of arrhythmias being able to be treated with catheter ablation steadily increasing. Individuals already practising in the field of CCEP need to be proactive in keeping abreast of changes in this field.

Increasingly the subspecialty fields of Clinical Cardiac Electrophysiology and Cardiac Implantable Electronic Device (CIED) therapy are converging, and trainees will most often train in both simultaneously. In Australia and New Zealand, this has become the standard pathway and training programmes need to reflect the needs of both sub-specialties. As such, these guidelines should be read in conjunction with those published recently by CSANZ on training requirements for implantation of CIEDs<sup>2</sup>.

### Resources and Facilities of the Training Program

Training programmes in CCEP must be part of a cardiology training programme suitable for advanced training in cardiology with RACP accreditation. For institutions providing CCEP training it is recommended that there be a minimum of two fully trained and active cardiac electrophysiologists in an institution performing a minimum of 120 and preferably 150 electrophysiology cases (including at least 100 ablations) per year. In addition the CIED minimum requirements for implantation training should be met<sup>2</sup>. The program should have regular meetings to discuss cases and regular audit to review morbidity and mortality data.

## Duration and Scope of Training

Introductory exposure to CCEP is an essential part of core training in cardiology. During core training cardiology trainees should acquire knowledge and experience in the diagnosis and treatment of brady and tachyarrhythmias. This should include an understanding of the role and limitations of pharmacological therapy for cardiac arrhythmias, the use and interpretation of non-invasive tests in the diagnosis of arrhythmias (ECG, ambulatory cardiac monitoring, exercise testing for arrhythmia assessment, tilt table testing), the role of catheter ablation in the treatment of cardiac arrhythmias including the potential complications of these procedures and an appreciation of the role of cardiac pacemaker, ICD and resynchronisation therapy.

Subspecialty training in CCEP will involve a minimum of two years of clinical training. We would stress that this is the minimum duration required and that further training is desirable. This may be additional clinical training to gain expertise in a particular area and/or additional research training related to CCEP and/or CIEDs. The *clinical* component of a formal research fellowship may be counted towards clinical training.

## CCEP Training Requirements

From the CCEP standpoint the desired technical and cognitive skills expected from the training period have been summarised nicely by the ACC/AHA document (see Tables 1 and 2, with minor alterations).

It is recommended that each trainee must actively participate in and analyse 150 diagnostic EP procedures (at least 75 of these as primary operator and at least 50 of which should include ablation procedures). Each procedure can serve as experience for more than one trainee. During the training period there should be exposure to a full range of EP procedures. It is recognised that not all centres will perform all EP procedures and additional training may be required for complex procedures such as ablation for atrial fibrillation and ablation of ventricular tachycardia. For training in trans-septal catheterisation, at least 20 procedures as primary operator are recommended. It is recommended that each laboratory maintains a log of all cases and that the number and type of cases studied by each trainee is recorded.

In Australia and New Zealand, combined training in CCEP and CIEDs is the norm and completion of the knowledge and case load requirements of Track II is required<sup>2</sup>. In addition, the ability to evaluate ICD performance at implantation is necessary, and participation in at least 25 ICD implants should be documented. ICD follow-up experience with at least 50 follow-up procedures is required. This can be accomplished within the confines of a combined CCEP and CIED fellowship, but a further period of training may be required if adequate competency or minimum procedural numbers are not reached within either sub-specialty.

## Maintenance of Competence

To assure adequate quality and continued competence, it is recommended that the physician should perform at least 50 electrophysiology procedures per year (of which at least 30 should be radiofrequency ablation procedures). Electrophysiologists performing AF and VT ablation procedures should perform at least 10 of each procedure per year. There is a requirement for all to be proactive in keeping abreast of changes in this field through continuing medical education.

## New Technologies and Techniques

The training required for proficiency in the application of new technologies and techniques, as they come along, will depend on the technology and procedures under consideration, and the expertise of each individual physician. In some cases, application of the emerging techniques and technology will undoubtedly represent a major paradigm shift in interventional approaches, requiring the accumulation of new technical and cognitive skills. Sufficient education and experience to both understand the general operational principles behind that technology, and to ensure sufficient technical abilities for the safe and efficient application of that technology, will be required. The duration of training or number of procedures required in each case will depend on individual circumstances. At all stages of

practice an accurate record of number and type of procedures performed, along with data on outcomes and complications, should be maintained. New or novel procedures may be best undertaken in the setting of clinical trials but if not then regular review of results should be undertaken and compared to published data where possible. Recent examples have been ablation therapies for Atrial Fibrillation and Ventricular Tachycardia, which are now a standard part of CCEP training. A current example might be implantation of LAA occlusion devices.

## References

1. Naccarelli G, Conti JB, Di Marco JP, Tracy CM. Training in Specialised Electrophysiology, Cardiac Pacing, and Arrhythmia Management. JACC 2006 47: 904-910.
2. The Cardiac Society of Australia and New Zealand, [www.csanz.edu.au](http://www.csanz.edu.au)

---

**Table 1. Technical skills required to perform EPS**

---

1. Operational skills to perform right and left heart catheterisation with percutaneous techniques via femoral and other venous and arterial access sites.
  2. Manual dexterity to safely place and manipulate electrode catheters in the appropriate chambers for the arrhythmia under study.
  3. Ability to obtain appropriate recordings from various locations.
  4. Ability to safely perform programmed electrical stimulation.
  5. Ability to recognise and manage procedural complications (for example, vascular or cardiac perforation).
  6. Proficiency in the use of external defibrillation and intravenous cardiac medications.
  7. Proficiency in the appropriate use of sedation during procedures, including airway management.
  8. Proficiency in the testing, interrogation and programming of implantable anti-arrhythmic devices, including pacemakers and defibrillators.
  9. Technical knowledge regarding the use of recording equipment, including knowledge of electrical safety and pertinent radiation-related issues.
- 

**Table 2. Cognitive skills required to perform EPS**

---

1. Knowledge of current indications and contraindications for EP study.
  2. Knowledge of potential complications and management of such complications.
  3. Knowledge of normal and abnormal cardiac anatomy and electrophysiology.
  4. Knowledge of the anatomy and physiology of the normal AV conduction system and accessory pathways.
  5. Understanding of the intracardiac electrocardiographic signals.
  6. Knowledge of various methods of programmed electrical stimulation.
  7. Ability to measure conduction intervals and refractory periods, and understand their significance in normal and pathological states.
  8. Knowledge of the predictive value of electrophysiological testing in patients with various arrhythmias and clinical substrates.
  9. Ability to interpret data derived from electrophysiological testing.
  10. Knowledge of the indications for and complications of therapy with anti-arrhythmic devices.
  11. Knowledge of the pharmacology of anti-arrhythmic drugs and of sympathetic and parasympathetic agonists and antagonists.
  12. Understanding of the technical principles of radiofrequency ablation.
  13. Knowledge of the indications for and complications of ablation therapy.
  14. Detailed knowledge of recent clinical trials that affect the selection of patients for EP study.
-