



# European Training Charter in Clinical Neuroradiology

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## "Chapter VI"

### Foreword

The European Society of Neuroradiology, Diagnostic and Interventional, (ESNR) has formulated, in conjunction with the Union of European Medical Specialists (UEMS) Radiology Section, Division of Neuroradiology, a charter for training in Clinical Neuroradiology.

This document sets out standards and guidelines for training in Clinical neuroradiology (CNR) within EU with the aim to acquire specialist competence in CNR. The aim is that this curriculum in CNR will constitute an approved training program in all countries within the European Union. It is recognised that there are a number of structural and operational differences in the health care systems, appointment procedures and training systems in these different countries.

The purpose of this document is to define a training charter in clinical neuroradiology.

### Article 1: Goal of training program

This document provides the basis for the development of a harmonised, comprehensive, structured and balanced training program in CNR. The training includes, where applicable, the specialist training in Clinical Radiology.

#### 1.1 The primary goal

- To provide the trainee with a broad knowledge base, the procedural skills and experience as well as professional judgement and self-criticism needed for *independent* practice in Clinical Neuroradiology (CNR).

#### 1.2 Definition and scope of Clinical neuroradiology

- Neuroradiology is a branch of medicine concerned with both diagnostic imaging and interventional procedures related to brain, spine and spinal cord, head, neck, and organs of special senses in adults and children.

The aim of specific training in neuroradiology is to prepare a specialist for a career in which his/her clinical and research time will be devoted to diagnosis and treatment of diseases of the areas cited above using imaging modalities.

A neuroradiologist will also be expected to adopt and develop new imaging and interventional methods, to disseminate neuroradiological knowledge and, from a basis of strong clinical background, be able to discuss with the referring clinicians the diagnosis and treatment.



### 1.3 General rules on monitoring and accreditation

#### 1.3.1 Monitoring authority

- National professional licensing bodies (responsible for the recognition of medical specialists in individual countries) may recognise training programs in CNR using UEMS standards based on this training charter.

#### 1.3.2 Accreditation of training program

- Authorization to train the candidates within a program of CNR can only be granted or renewed if the applying program documents a minimum annual activity. Projected activity is permitted during the development phase of a service. An agreed intermediate level of activity *may* be defined by the *accrediting authority* for each applying institution.
- The teaching program must be associated with a neuroscience institution, or network of such institutions, with all the appropriate related specialities represented.
- The institution's patient population must be diverse from which a broad experience in CNR can be obtained.
- Authorization to train in CNR is valid for a limited time only and may be renewed.
- Identification, visitation and subsequent recognition of a training program is a procedure, supervised by the UEMS and coordinated by the UEMS Division of Neuroradiology.

### Article 2: General aspects of training in Clinical neuroradiology

#### 2.1 Selection for and access to the speciality

##### 2.1.1

- Applicants must have a valid licence to practice medicine within their respective country; this licence has to be recognised by the country where he/she will train.

##### 2.1.2

- After appointment of a trainee, a training agreement should be entered into by the Director of the Program and trainee and duly signed by both. The agreement should define – in terms of education and training – the relationships, duties and obligations on each side.

#### 2.2 Duration and content of Education and Training

- The overall purpose of training in CNR is to reach the goals set out in this Training Charter and the time this takes is of secondary importance.
- The education and training needed to become a fully trained specialist physician with specialist competence in Clinical Neuroradiology is in most cases 7 years full time studies within accredited programs in radiology and neuroradiology.
- The training program consists of three components:
  - The content of the first three years is a structured programme for radiological anatomy, disease manifestations and core radiological skills, the "common trunk" (ref to Radiology Charter).
  - Parts of the fourth and fifth year of training in Clinical Radiology may be spent in training within all areas of neuroradiology with a focus on diagnostic neuroradiology. This training may lead to an experience defined as "special interest" in neuroradiology.



- The third component of the training in neuroradiology is a "Fellowship" training during which the trainee is full time in training within neuroradiology. The length of this fellowship training is two years. However, this time may be reduced if knowledge and skills acquired in neuroradiology during specialist training within a Clinical Radiology programme can be documented and proven.
- Although the order of training in most cases will start with the common trunk, alternative orders of the training components are conceivable, as long as basic general radiology and in-depths neuroradiology training are guaranteed.
- The trainee will become a specialist with competence in neuroradiology at the end of the three components of the full training programme.
- The training will focus on diagnostic neuroradiology and should include initial training in the special areas of paediatric, functional and head & neck neuroradiology and interventional neuroradiology.
- It is possible that in some nations training in neuroradiology will require additional training over and above the five years described above.
- In Portugal there is an independent national accredited training program for the Neuroradiology Specialty, including diagnostic and interventional Neuroradiology. These graduates are certified as Neuroradiologists (Neuroradiology Specialists). Being a neuroscience based program followed by a diagnostic and interventional neuroradiology training, the graduates are not certified as Radiologists but as Neuroradiologists.

### **2.2.1 Neuroradiologist with added and "particular qualification"**

- Areas of specific and added competence within the field of Neuroradiology includes, paediatric neuroradiology, spinal neuroradiology and advanced diagnostic neuroradiology
- Training in endovascular interventional neuroradiology (INR) is over and above training in diagnostic neuroradiology and requires additional training with the aim to obtain "particular qualification" in INR.
- UEMS has formulated a Training Charter for "particular qualification" in INR.
- Regulations for training in fields defined as added competence in neuroradiology are the subject of specific charters.

## **2.3 Curriculum of general and specific training periods**

### **2.3.1 Training Curriculum**

- The trainee is expected to attend all graduate and postgraduate teaching, covering the curriculum as outlined in this document.

### **2.3.2 Network of institutions**

- A training program is based on a formalized network of accredited institutions/departments coordinated by the program director making rotation periods in these institutions/departments necessary. These rotations should be organized in such a way as to give trainees *guaranteed* training according to the curriculum. See below Article 4.



### **2.3.3 Trainee Portfolio - CV**

- Trainees should keep a Trainee Portfolio or log-book, containing details of previous training posts, examinations passed, lists of publications and presentations at meetings, courses attended, cumulative procedural totals and copies of assessment forms of the different training periods.

## **Article 3: Specific aspects of training in Clinical neuroradiology**

### **3.1 Educational and Training program**

#### **3.1.1 General objectives of training**

- The overall objective is to prepare the resident in training to become a competent and independently practicing neuroradiologist in a pure clinical or university setting.
- A specialist physician with competence in CNR shall:
  - be familiar with the core curriculum and have the skill and knowledge to independently perform, conduct, consult, interpret and communicate with referring physicians and patients regarding common neuroradiological diagnostic procedures.
  - have acquired knowledge in basic and clinical neurosciences, including neuroanatomy, neurobiology, pathophysiology and natural history of neurological disorders.
  - have the skill and knowledge to advise other clinicians and to carry the main responsibility for how the diagnostic methods are used within the domain of CNR.
  - shall, with a scientific approach, understand and master the diagnostic and therapeutic methods used within the domain of clinical neuroradiology and shall well understand their development, strengths, weaknesses and risks.
  - take the responsibility to train new specialists in neuroradiology, and specialists in training within other specialities, in the strengths, weaknesses and risks of the diagnostic and therapeutic methods used within the domain of clinical neuroradiology.
- Research should be encouraged and time and facilities made available during training.

#### **3.1.2 Knowledge-based Objectives**

- The level of education and training should be structured along the established levels of knowledge and skill:
  - A. A body of knowledge well mastered by the specialist. Diagnostic or therapeutic procedure that is understood, performed, interpreted, and communicated independently without assistance.
  - B. A body of knowledge well known to the specialist. Diagnostic or therapeutic procedure that can be understood, performed, interpreted, and communicated with assistance of a senior colleague
  - C. A body of knowledge familiar to the specialist. Diagnostic or therapeutic procedure that is familiar to the specialist but not to be performed interpreted or communicated independently by the specialist.



### **3.1.2.1 Basic neuroscience**

- Neuroanatomy – including embryology and functional anatomy
  - to have a good knowledge (level B) of the embryology, morphological and functional anatomy and physiology of skull, brain, head & neck, spine, spinal cord, peripheral nervous system and the cerebro-spinal vascular system.
- Patho-physiology
  - to well master (level A) the pathology and pathophysiology of diseases, trauma, development and normal aging and malformations of all structures mentioned above in adults and children.
  - to have basic knowledge (level C) in pathophysiological conditions, indications and contraindications, complications and adverse events in Interventional Neuroradiology.

### **3.1.2.2. Clinical Neuroscience**

- Clinical history and patient assessment (level C)
- Symptomatology (level B)
- Communications (level A)
  - To discuss the indications and contraindications for diagnostic procedures
  - To appropriately report diagnostic procedures
  - To consult and to communicate with other clinicians
  - Mandatory and regular clinical rounds and conferences
  - To communicate with residents in training
  - To communicate with patients and relatives
  - To communicate with hospital staff and administration

### **3.1.2.4 Imaging Technology and Radiation**

The objective is:

- to master (level A) the physiological, technical, mathematical and statistical principles, strengths and weaknesses of common neuroradiological diagnostic and interventional procedures.
- to master (level A), to neuroradiology relevant, radio-physics, radiation biology and radiation protection, for staff and patient alike, and have knowledge of the laws governing the use of medical radiation.



### 3.1.2.5. Diagnostic Neuroradiology

The objective is:

- to master neuroanatomy as it is represented on imaging – radiological neuroanatomy (level A).
- to be able to select optimal diagnostic procedure using knowledge of indications, contraindications and limitations of CNR procedures (level A)
- to be able to perform and interpret diagnostic CNR procedures (level A)
- to use a scientific approach and master (level A) the interpretation and evaluation of the common neuroradiological procedures and to professionally communicate the results to referring physicians.
- to have deep understanding (level A) of the importance and value of diagnostic neuroradiology in the clinical care for the patient.
- to have a deep understanding (level A) of post-therapeutic conditions and be able to evaluate the result of surgical, medical and other interventional procedures.
- to recognise and have a deep understanding (level A) of complications and side effects, and their consequences, related to diagnostic and therapeutic procedures.
- to have knowledge about the indications, contraindications, limits of:
  - conventional radiology (level A)
  - computed tomography (level A)
  - magnetic resonance incl. diffusion (level A)
  - conventional angiography (level C)
  - endovascular procedures in INR (level C)
  - myelography (level B)
  - cranial and cervical ultrasonography (level C)
  - radio nuclide investigations (level C)
  - to have good knowledge (level B) in the indications, contraindications and most important limitations and weaknesses of methods used in functional neuroradiology
- to have knowledge in special paediatric applications within neuroradiology:
  - foetal neuroradiology (level C)
  - the normal development of the brain (level A)
  - neonatal neuroradiology (level B)
  - neuro-metabolic diseases (level B)
  - malformations (level A)
  - child abuse (level A)
  - radiation protection (level A)
- to have knowledge in special head & neck applications within clinical neuroradiology:
  - tumours of the head & neck (level A)
  - vascular diseases of head & neck (level A)
  - malformations of head & neck (level B)
  - inflammatory diseases of head & neck (level B)
  - the embryology of head & neck (level B)
- to have knowledge and management regarding all aspects of contrast materials, including interactions and complications, as they are used in CNR and INR.



### **3.1.2.6. Technical and non-interpretive objectives in CNR**

The objective is:

- to have good knowledge in patient care (level A) and be able to evaluate the clinical status of the patient prior to, during and after a diagnostic procedure.
- to master (level A) and be able to explain to the patient the benefits and risks of techniques used and obtain informed consent where applicable
- to have basic knowledge (level C) of clinical management in neuro-intensive care

### **3.1.2.7 Clinical Components**

- The clinical and educational experience must include the following clinical components:
  - regular clinical rounds and conferences in related disciplines;
  - sufficient volume of adult and paediatric patients
  - adequate volume of invasive diagnostic procedures;

### **3.1.2.8 Didactic components**

- The clinical and educational experience must include the following didactic components:
  - to ideally attend a full cycle of the European Course in Neuroradiology, or similar accredited teaching activities
  - conferences with related departments on a regular basis with case presentation and discussion;
  - attendance of at a meeting or accredited postgraduate course in neuroradiology
  - preparation of clinically or pathologically proved cases for inclusion in the teaching file
  - daily film reading conferences
  - presentation of scientific material
  - ability to teach neuroradiology to peers and residents in other disciplines

### **3.1.2.9 Additional skills**

The objective is:

- for the trainee to participate in departmental quality control (evaluation of professional practices, risk management, morbidity-mortality conferences, cost-effectiveness etc.);
- for the trainee to get basic knowledge (level C) of the management of a neuroradiological department in terms of organisation (such as scheduling etc);
- for the trainee to attend local extramural conferences and national or international meetings and appropriate postgraduate courses in Neuroradiology while in training.

### **3.1.2.10. Attitude and Ethics in CNR**

The objective is:

- to be able to make independent and well founded decisions (level A) in matters of medical-ethical nature within clinical neuroradiology:
- to acquire communication skills (level A) necessary for:
  - to assess priorities and implement optimization when recourses are limited
  - in limiting diagnostic efforts
  - to understand implications and priorities in management of incidentally discovered or associated lesions
  - to manage medical risks and incidents
  - to understand medical legal implications pertaining to CNR

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- regular departmental and interdisciplinary conferences including regular reviews of morbidity and mortality
- to acquire communication skills (level A) necessary for:
  - discussion of indications and contraindications for diagnostic (level A) and interventional procedures (level B)
  - appropriate reporting of diagnostic procedures
  - to consult with clinicians
  - to consult with residents in training
  - to communicate with patients

### 3.2 Research

- The educational environment should encourage (level C) trainees to undertake investigative study in relevant clinical or basic sciences subject areas.
  - Trainees may participate in research projects conducted by the faculty or other trainees or may undertake a project as principal investigators.
  - Trainees should learn the fundamentals of the experimental design, performance and interpretation of results.
  - Trainees should acquire a basic knowledge of medical statistics and epidemiology
  - Trainees should learn how to develop and complete a project.
  - Trainees should be encouraged to submit their work for presentation at national or international meetings and to publish in scientific journals.
  - Trainees should understand ethical aspects and what constitute conflicts of interest

### 3.3 Training log-book and periodic progress assessment of trainees

#### 3.3.1 Log-book during CNR training

- Each trainee must keep a personal Log-book for documentation of procedural experience. The trainee will have to demonstrate that he/she has participated in a wide spectrum of CNR procedures which should include a balance of supervisor assisted and personally performed procedures, clinical rounds and image interpretations under supervision. Log-book entries must be monitored by regular inspection and signed off by the appropriate supervisor. The log-book must be available at Board and other summative examinations.

#### 3.3.2 Evaluation of trainee

- The program director, in consultation with the co-directors and faculty, must evaluate the competence and progress of each trainee at least once annually. The evaluation includes an assessment of the trainee's knowledge, technical skills, attitudes and interpersonal relationships as well as decision-making skills and clinical management skills. These evaluations should be documented and discussed with each trainee.





## **Article 4: Requirements for training institutions/departments**

### **4.1 Requirements regarding equipment and educational facilities**

- The optimal training program in CNR must take place in an institution or?? in a network of institutions/departments operating in accordance with the UEMS recommendations for good practice in CNR. When a CNR training program is organized in a network of institutions/departments, the unit for CNR constitutes the core surrounded by clinical and diagnostic units in neuroscience.
- To qualify as a training program the following conditions must be fulfilled.
  - The director and co-directors (neuroradiology and radiology) must have senior appointments in recognised training institutions that may be affiliated with academic institutions or other non-profit organisations.
  - The network should ideally be involved in active research in CNR
  - There should be ready access to general medical and neuroradiological texts and periodicals. Computerized literature search facilities should be available.
  - All state-of-art imaging modalities should be available.
- The CNR core must fulfil the following conditions
  - The faculty of the training program must include at least two members practicing CNR full time.
  - The proportion of trainers in CNR to trainees should ideally be 1:1 but must not exceed the ratio of 1:3.
  - The CNR case load must be significant.
  - The CNR case mix must be such that all aspects of neuroradiological imaging is satisfied, including diagnostic issues in patients with conditions and diseases within neurosurgery, neurology, head-and neck and paediatric and neonatal neurology.

## **Article 5: Requirements for training program director and faculty**

### **5.1 Program Director, Co-directors and Faculty**

- **Program director**
  - The director of a training program must be certified, according to national regulations, in neuroradiology or, if applicable, in radiology.
  - The program director must be a well experienced and academically active clinical neuroradiologist.
  - The program director must have a senior academic appointment or a senior leading position in the non-profit training institution.
  - The program director and co-directors in agreement are responsible for enforcing the Training Charter, selecting and supervising the trainee and faculty members.
  - The program director is coordinating the network which constitutes the training program.
  - The program director is expected to ensure that the program is of required academic standard.
  - The training program must comply with the special requirements for residency training in neuroradiology as set down by this UEMS training charter and the program director should seek accreditation of the program by the appropriate external authority



- **Program co-director & faculty**

- An institution/network accredited for education and training in neuroradiology may have one or more program co-directors responsible for radiology, diagnostic, interventional, paediatric or functional neuroradiology.
- A co-director in a network must be well experienced and academically active clinical radiologist or neuroradiologist.
- The faculty must include at least one additional full-time member with expertise in the field of Neuroradiology.
- The faculty will provide supervision of trainees.
- Trainees must be given an opportunity to provide a documented evaluation of the program, director, co-directors and faculty at least once annually.

**Article 6: Certification of specialist competence**

- The program director is responsible for certification of the training and acquired specialist competence dependent on a properly executed accreditation and visitation process.
- UEMS strongly encourages a final board examination. If an examination is offered, coming UEMS guidelines should be considered and followed.
- The national regional authority is the responsible body for any recognition and certification of specialist competence in each country.

**Article 7:**

**Maintenance of competence.**

- Specialist competence in CNR is regulated in UEMS Charter on Continuing Professional Development . '01

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This Charter was unanimously approved by the UEMS Division of Neuroradiology in their meeting 2011-02-04.

This Charter was, conditioned on changes in Articles 1 and 2.2 to harmonize with changes in the "Revised European Training Charter for Clinical Radiology" dated February 2011, unanimously approved by the UEMS Section of Radiology in their meeting 2011-03-05.

**This Charter was unanimously approved by the UEMS Council in their meeting 2011-10-08 in Naples.**

