



EFSUMB

EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY

'Building a European Ultrasound Community'

MINIMUM TRAINING REQUIREMENTS FOR THE PRACTICE OF MEDICAL ULTRASOUND IN EUROPE

Appendix 14: (CEUS) CONTRAST ENHANCED ULTRASOUND

This curriculum is intended for physicians who perform CEUS scans in a clinical setting. The curriculum includes standards for theoretical and practical skills. Standard skills are graded into 3 levels based on experience and difficulty of the scan or procedure.

Level 1 Training and Practice

In accordance with EFSUMB's Minimal US Training Recommendations, there are three levels of practice of conventional US. Minimum level 2 is recommended before beginning to learn the practice of CEUS. Minimum level 3 is recommended before teaching the practice of CEUS.

Whilst it would be unrealistic to expect every speciality group in every European country to agree upon the precise definitions of the levels of practice, it is hoped that certain principles concerning CEUS examination and documentation techniques may be accepted. Recommendations for the minimum training requirements for CEUS can then be based on these principles.

Level 2 Knowledge Base

The training requisite to this level of practice would be gained during a period of sub-speciality training lead by a level 3 capable CEUS examiner, eventually at an especially appointed CEUS training centre, including bedside practical supervision and off-line screen diagnostic discussions

Practice of CEUS at this level requires the following abilities:

- basic knowledge about contrast agents available in Europe
- in-depth knowledge and understanding of the technology of ultrasound equipment for contrast imaging
- indications and contraindications for the use of CA
- artifacts linked to the use of CA
- to be prepared for the rare advent of an allergoid reaction caused by the CA
- to understand the effect on the CA used by exposure to ultrasound
- knowledge about different ways for application of CA
- to understand the degradation of the CA over time following injection
- to acquire cine clips of the target area in a systematic manner, instantly adjusted to findings in all diagnostic relevant phases
- to assess the technical quality and dependability of the exam
- to recognize and correctly diagnose most pathology of the target lesion or area
- to recognize when the clinical situation or technical conditions of instrumentation require a more experienced practitioner and/or technically superior environment
- to recognize when you have insufficient knowledge and a referral to a more experienced practitioner is required. .
- knowledge of the composition of pharmacological dynamics, pharmacological kinetics and dynamics in Europe



EFSUMB

EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY

'Building a European Ultrasound Community'

After proper education the trainee is able to:

- perform a thorough ultrasound CEUS examination of the liver and/or kidney according to the present EFSUMB Minimum Requirements including documentation of appropriate cine loop storage during all relevant contrast phases
- recognise focal lesions and vascular disorders and be proficient in identifying appropriately the conditions for CEUS investigation.
- recognise effect of treatment by CEUS
- write an appropriate report
- critically compare CEUS findings to other imaging modalities (CT, MRI, PET).

Level 3 Training and Practice

This is an advanced level of practice and it is desirable:

- to give off-line second opinions on exams by level 2 CEUS practitioners
- to perform technically difficult CEUS exams referred by level 2 examiners
- to perform specialized CEUS examinations
- to perform advanced CEUS-guided invasive procedures
- to conduct substantial research in CEUS
- to teach CEUS at all levels
- to be aware of and to pursue developments in CEUS

General recommendations

For each level of ultrasound practice, national and/or European speciality groups should formulate a detailed syllabus with comprehensive recommendations for necessary amounts of practical experience (target numbers) including cine documentation. The documentation of systematically acquired cine clips facilitates off-line assessment of the trainee's practical and diagnostic qualifications, with adjustment of the required training period in the individual case

- Examinations should encompass the full range of pathological conditions of the liver and/or kidney.
- Trainees should attend an appropriate theoretical course before starting practical work. Training phase at the clinical site of level 3 CEUS centre
- Training at level 2 should be supervised by a CEUS experienced practitioner over a time that should be defined by the national societies.
- A log book listing of the types of examinations undertaken should be kept.
- During the course of training the competency assessment sheet (see CEUS Recommendation Appendix 1) should be completed as this will determine in which area(s) the trainee can practice independently
- Appropriate documentation of cine loops. Documented cine loops with pathological findings including a written report should be sent to a level 3 site for re-evaluation.

For a more detailed outline of CEUS technique, tips and tricks look at CEUS Recommendation Appendix 2



EFSUMB

EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY

'Building a European Ultrasound Community'

Maintenance of skills

Having been assessed as competent to practice there will be a need for continued medical education (CME) and continued professional development (CPD) and maintenance of practical skills. Practitioners should:

- After the practical training period it is recommended to get a second opinion on a CEUS examination by communicating with a level 3 site on the basis of stored cine loops for example via internet.
- include CEUS in their ongoing continued medical education (CME)
- participate in multidisciplinary meetings
- keep up to date with relevant literature

Acknowledgements

EFSUMB is very grateful to Dr HP Weskott, Dr. L Thorelius, Prof. R Lencioni and Prof. D Cosgrove for their contributions to this document.

Whilst every attempt has been made to provide accurate and useful information, neither EFSUMB nor members of EFSUMB nor other persons or institutions contributing to the formation of these guidelines make any warranty, express or implied, with regard to accuracy, omissions and usefulness of the information herein. Furthermore, the same parties do not assume liability with respect to the use, or subsequent damages resulting from the use of the information contained in these guidelines'.

[The Minimum Training Requirements for the Practice of Medical Ultrasound published under the EFSUMB Newsletter section in the *Ultraschall in der Medizin*/European Journal of Ultrasound, 2010 31](#)