

## **Recommendations from the Association for European Paediatric Cardiology for training in Fetal Cardiology**

The following document provides guidelines for training of pediatric cardiologists in fetal cardiology. It is based on recommendations for fetal cardiology prepared in 2004 by the AEPC Fetal Working Group (1), Standards for Training in Paediatric Echocardiography prepared by the AEPC Working Group on Cardiac Imaging in 2005 (2) and American College of Cardiology/American Heart Association Clinical Competence Statement on Echocardiography in 2003 (3).

### **Training in fetal cardiology**

#### **Introduction**

Fetal cardiology occupies a unique position within the field of congenital heart disease because in most countries the screening for cardiac defects and the practice of fetal cardiology is shared between technicians, midwives, specialists in obstetrics, fetal medicine and paediatric cardiology in close cooperation with a multidisciplinary team including the neonatologists, geneticists, paediatric and cardiac surgeons.

In many countries there is still poor ascertainment of congenital heart disease at primary screening and there is a real and urgent need for improved

training of all who work in this field. However, this document aims to update only the general requirements for training in fetal cardiology for paediatric cardiologists. This was originally produced by the Fetal Working Group (FWG) of AEPC in 2004 (1). It is recognised that a comprehensive set of guidelines covering the needs of all specialties is beyond the scope of this document.

We would endorse the creation of an exit examination to allow demonstration and independent verification of competency at two levels; “Advanced” and “Expert” This could be run by the Fetal Working Group of the Association for European Paediatric Cardiology.

### **Levels of Training**

We propose two levels of training

#### ***Level 1 “Advanced level”***

This level should be obtained by pediatric cardiologists in training and is required for recognition as a general European paediatric cardiologist. It is designed to ensure these cardiologists will be able to examine the fetal heart from time to time in their future posts. After completed training the candidate should be able to distinguish between the normal and abnormal heart and to make a reasonably comprehensive diagnosis of fetal heart defects including Doppler interpretation of fetal hemodynamics.

#### ***Level 2 “Expert level”***

This is the level of a fully trained, practicing fetal cardiologist whose major role is the detection, diagnosis and management of fetal cardiovascular disease. It

is the level required to be an expert in a subspecialty in European paediatric cardiology. The fetal cardiology specialist is capable of high diagnostic accuracy, can give an informed prognosis, has the requisite skills in counselling, and recognises the limitations of her/his own knowledge and experience. The specialist should also have the ability to effectively communicate with and understand the role of other relevant subspecialties, such as fetal medicine, obstetrics and clinical genetics.

### **Training Requirements for each level**

#### **Level 1**

##### **Required knowledge**

It is assumed that the candidate has already attained competence in the use of ultrasound in the examination of the paediatric heart including an understanding of sequential segmental analysis.

In addition the candidate should exhibit knowledge of:

1. The physical principles of safety of ultrasound during fetal scanning:
2. The range of probes used in fetal echocardiography
3. How to adjust settings for proper evaluation of the fetal cardiovascular system
4. How to evaluate number of fetuses, fetal position and the most important fetal measurements

5. The basic differences between the fetal and neonatal circulation and how to examine and interpret umbilical, venous duct, arterial duct and middle cerebral artery flow waveforms.

### **Training schedule**

The duration of training will depend on the through-put of the unit but the candidate should:

1. Perform at least 50 normal fetal scans with evaluation of:
  - a. Number of fetuses
  - b. Fetal position
  - c. Fetal biometry, such as biparietal diameter, femoral length, and abdominal circumference
  - d. Doppler of umbilical vessels, arterial and venous ducts and middle cerebral artery
2. Demonstrate cardiac anatomy in at least 30 fetuses:
  - a. Situs
  - b. Sequential segmental analysis
  - c. Assessment of physiology using colour Doppler, pulsed Doppler and M-mode
3. Evaluate abnormal fetal echocardiography results:
  - a. Assist in the prospective evaluation of a minimum of 20 cardiac abnormalities

- b. Independently evaluate a minimum of 30 cardiac abnormalities off – line from retrospective records
  - c. Attend the first counselling session of at least 5 families diagnosed with heart disease in their fetus.
  - d. Understand the indications for referral to a specialised fetal medicine unit for an advanced assessment
4. Attend fetal cardiology courses:
- a. One basic fetal echocardiography course including morphology
  - b. One combined fetal echocardiography and fetal medicine course

## **Level 2**

### **Required knowledge**

To become Level 2 certified in fetal cardiology the candidate should be a fully trained paediatric cardiologist who has passed Level 1 training. In addition the candidate should:

1. Have more advanced knowledge of obstetric scanning:
  - a. Ultrasound markers of chromosomal and genetic disorders in pregnancy

- b. Common extracardiac defects which can co-exist with congenital heart defects
  - c. Diagnosis of other fetal problems, such as hydrops and twin-to-twin transfusion syndrome
2. Have basic knowledge of clinical genetics:
    - a. When and how the karyotype can be obtained including success rate and risk.
    - b. Molecular techniques in modern genetics, and use in fetal cardiology (e.g. microdeletion of 22q11)
    - c. Association between fetal cardiac defects and genetic syndromes
  3. Be familiar with rules for termination of pregnancy for country of practice
  4. Be capable of independent parental counselling
  5. Possess up-to-date knowledge of pediatric cardiology practice:
    - a. Short and long term results of postnatal surgical or catheter based treatment for different heart defects
    - b. Impact of extra-cardiac malformations on results of treatment
  6. Be familiar with fetal therapy for arrhythmia and structural heart defects:
    - a. Anti-arrhythmic drugs, dosage, monitoring and side effects
    - b. Knowledge of proposed patient selection, current results and technique of performing fetal catheter intervention

7. Be familiar with issues of management:
  - a. Decision making concerning place, time and mode of delivery (in close co-operation with the obstetrician)
  - b. Prenatal planning of postnatal assessment and treatment, such as prostaglandin therapy and Rashkind septostomy
  
8. Have knowledge of choices of fetal therapy in non-cardiac disease leading to heart failure, for example:
  - a. Anemia
  - b. Twin-to-twin transfusion syndrome
  - c. Diaphragmatic hernia

### **Training schedule**

Requirements to obtain and maintain Level 2 specialisation

1. Expected workload/experience:
  - a. Work for at least 3 years in a unit performing at least 200 fetal echocardiograms per year, including at least 30 fetuses with cardiac abnormality per year (structural and functional)
  - b. Experience in evaluation of fetal heart anatomy in the first trimester of pregnancy (11 – 14 weeks)
  
2. Education and assessing quality of screening:
  - a. Organising lectures and courses (for obstetricians and cardiologists)

- b. Active role in (for example) evaluating / updating / setting standards for local and national screening programs for fetal heart scanning

## References

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2. Mertens L, Helbing W, Sieverding L, Daniels O on behalf of The Working Group on Cardiac Imaging of the Association for European Paediatric Cardiology. Standards for training in paediatric echocardiography. *Cardiol Young* 2005; 15: 441-42.
3. Clinical Competence Statement on Echocardiography; A Report of the American College of Cardiology/American Heart Association/American College of Physicians—American Society of Internal Medicine Task Force on Clinical Competence. *Circulation* 2003;107:1068 (Fetal Echocardiography part H)