**Echocardiography course**

**Adult course (transthoracic course)**

Khartoum 2011

**STUDENT LEARNING OUTCOMES/LEARNING OBJECTIVES**

Upon completion of this course the student will be able to:

1. Identify all pertinent anatomic and two-dimensional cardiac structures in the normal heart, including the coronary arteries and wall segments, and define the function of each structure.
2. Discuss normal hemodynamic parameters, including intra-cardiac pressure and oxygen saturation.
3. Identify the electrophysiological pathways, their functions, and the normal QRS complex and its relation to mechanical systole and diastole.
4. Identify and measure Doppler waveforms across normal anatomy
5. Perform a full echocardiography exam and write an initial report of the study

**General Course Subjects:**

6. **2D & M-mode Anatomy** : identify basic two-dimensional and M-mode anatomy and the structures contained within each image displaye
7. **2D and M-mode Measurements.** - perform basic two dimensional and M-mode measurements for each structure.

8. **Perform basic LV linear measurement calculations**

9. **Spectral and Color Doppler** - identify direction of and velocity information given in the color and spectral Doppler images/waveforms.

10. **Basic Doppler Calculations**: perform basic Doppler calculations - i.e.- stroke volume cardiac output and valve areas

11. **Cardiac Physiology** - explain the electrical and mechanical events within the Cardiac cycle.

12. **Cardiac Hemodynamics** - explain pressure generation and application in normal and abnormal subjects

13. **Basic EKG and Auscultation**: describe the normal EKG and commonly encountered abnormal EKG findings. Explain normal and abnormal heart sounds and their relationship to the cardiac cycle.

14. **LV Systolic Function**: Describe basic echocardiographic measurement parameters assess LV systolic function.

15. **LV Diastolic Function** - Describe basic echocardiographic measurement parameters To assess LV diastolic function. Recognize and categorize the stages of diastolic dysfunction

16. **Pharmacology**- Name basic cardiac medications and their affect on the heart. Cite Medications given for the most commonly encountered cardiac abnormalities -i.e., CHF- arrhythmias, etc.

17. **Normal Examination** - Describe the recommended views and measurements in the complete normal transthoracic echocardiogram.
LECTURES

1. Physics and ultrasound:-

Study the ultrasound production and detection and how to perform two dimensional technique (2D), cross sectional (M-mode) and Doppler (continuous wave, pulse wave, colour flow mapping), the echo techniques in common clinical use.

2. Anatomy and physiology:-

Basic anatomy of the heart in practical section and advance anatomy of the heart (endocardium, myocardium, pericardium, muscles, valves and great vessels) location and function of any part of the heart.

3. Pathology:-

The disease of the heart (congenital- rheumatic- degenerative... etc.) and abnormal clinical and symptoms and who should have an echo.

4. Normal echo:-

The appearance of the heart in ultrasound and how to get conventional views (Parasternal, apical, subcostal). Study the normal anatomy, dimensions and functions of the chambers and valves.

5. Clinical indication and quality assurance:

The indication for echocardiographic examination and how to fill in a request form.

6. Aortic valve:-

The location of the aortic valve and its function, the technique that can be used to study it and the pathology of the of the aortic valve (aortic stenosis, aortic regurgitation, bicuspid AV) congenital, rheumatic, degenerative, inflammatory disease and causes and how to assess the severity of the disease.

Mitral Valve:- .1

The anatomy of the mitral valve and its function, the technique that can be used to study it and the pathological problem of the mitral valve (mitral stenosis, mitral regurgitation) congenital, rheumatic, degenerative, inflammatory disease and causes and how to assess the severity of the disease.

7. Tricuspid Valve and Pulmonary V:-
The anatomy of the tricuspid and pulmonary valve and their function, the technique that can be used to study it and the pathological problem of the tricuspid and pulmonary valve (tricuspid stenosis, tricuspid regurgitation, pulmonary stenosis, pulmonary regurgitation) congenital, rheumatic, degenerative, inflammatory disease and causes and how to assess the severity of its dysfunction.

8. **LV and RV**:-
The anatomy of each chamber and function, the normal (size, mass, volume) Findings and pathology.

9. **Pericardium**:-

Normal anatomy of pericardium. And how to distinguish between pericardial effusion and pleural effusion, cardiac tamponade, constrictive pericarditis, pericardiocentesis, congenital pericardial disease and tumors.

10. **Echo in ACS and MI**:-

The role of echocardiography in establishing the diagnosis of MI, location, and extent of MI. Diagnosing mechanical complications of infarction, and providing prognostic information that is important for risk stratification.

11. **Physical and pharmacological stress echo**:

Indications, contraindications, and practical applications of Stress Echo> Also study patient preparation, equipment, monitoring and termination criteria.

12. **CHD in adult** :-

Shunts (ASD, VSD, PDA) and how to assess it by bubble contrast, bicuspid aortic valve, aortic coarctation and other congenital valve abnormalities.

13. **Rheumatic**:-

The clinical indications and symptoms of rheumatic disease and its and how to assess valvular involvement by echo.
14. **Cardiomyopathy**:-
How to differentiate between hypertrophic cardiomyopathy, dilated cardiomyopathy, restrictive cardiomyopathy, LV non compaction and myocarditis.

15. **Bubble studies**:-
Echo contrast agent and how we used in right side of the heart and left side of the heart, quantity and quality of it, application of contrast echo.

16. **Endocarditis** :-
Clinical features and symptoms, causes and how to assess by the echo.

17. **IHD** :-
The feature of ischemic heart disease in echo and the segment of LV in left parasternal short axis view and how to differentiate between the hypokinesia, Akinesia, dyskinesia and aneurysm of wall motion.

18. **Hypertensive and pulmonary heart disease** :-
Why we do echo to hypertensive patient and what we find, the relationship between hypertension and LVH.

19. **Stroke and TIA’S** :-
The importance of echo to detect the stroke and transient ischemic attack and to detect the direct source of embolism from an intra-cardiac mass, thrombus, tumor, vegetation and what is the indication to do echo.

20. **Cardiac messes** :-
The types of masses and indication to do echo, how to assess it by the echo and causes

21. **Disease of great vessels** :-
Disease of the aorta, aortic dilatation, Marfan’s syndrome, aortic dissection, aortic coarctation, sinus of valsalva aneurysm, pulmonary stenosis and other congenital disease.
22. **Pregnant patient** :-

Indication, normal echo finding in a pregnant patient and the rule of echo in detection of peripartum cardiomyopathy and the grade of risk associated with cardiac lesions.

23. **Emergency echo** :-

The rule of echo to detect aortic dissection, pericardium effusion and tamponade, pulmonary embolism and assess the right side of

Other topics to be covered at practical lassies

1. clinical indication and quality assurance
2. Examination
3. Echo in ACS and MI
4. Complication of MI
5. Post ischemic DCM
6. Congenital heart disease The heart and endocrine disease
7. Muscle disease and the heart (dystrophies).
8. Rheumatic heart disease
9. Stress echo
11. Aortic dissection and trauma.
12. Acute and chronic respiratory disease.
14. Role of echo in AF /flutter.
15. SCD.
Final assessment:

The program will be including lecture, tutorials and hands on session, each of the above subjects will be conducted in details including normal and pathological disease. There will be also video reviews and presentation of clinical scenarios. At the end of course there will be written, video reviews and practical examination. Successful candidates will be certified in accordance with the BSE recommendations

1/ Year One:
By the end of year one the candidate will have a written exam in the form of multiple choice questions which will constitute 70% of the final score, 30% will be granted to the supervisors report. Pass mark is 60%. Those who would fail will be transferred to the next year but will sit the first year exam in the second year and has to pass both tests to be awarded the degree.

2/ year Two:
By the end of year 2 the candidate will have a final multiple choice questions exam which constitutes 40% of the final score.
Candidates will undergo a practical exam as well this will constitute 40 % of the final score.
20 % will be allocated to the supervisors report.
Successful candidates will be awarded the diploma in cardiac pacing and those who fails will re-sit for a final substitute exam in 3 months time.
LECTURES

Year One:-

1. Physics and ultrasound (2 hours)
2. Anatomy and physiology (2 hours)
3. Pathology (2 hours)
4. Normal echo (2 hours)
5. Clinical indication and quality assurance (1 hour)
6. Aortic valve (2 hours)
7. Mitral Valve (2 hours)
8. Tricuspid Valve and Pulmonary V (2 hours)
9. LV and RV (2 hours)
10. Pericardium (2 hours)
11. Echo in ACS and MI
12. Physical and pharmacological stress echo (2 hours)
13. CHD in adult (2 hours)
14. Rheumatic Heart Disease (2 hours)
15. clinical indication and quality assurance (2 hours)
16. Examination (2 hours)
17. Echo in ACS and MI (2 hours)
18. Complication of MI (2 hours)
19. Post ischemic DCM (2 hours)
20. Congenital heart disease The heart and endocrine disease (2 hours)


**Year Two:-**

1. Cardiomyopathy (2hours)
2. Endocarditis (2hours)
3. IHD (2hours)
4. Hypertensive and pulmonary heart diseasev (2hours)
5. Stroke and TIA’S (2hours)
6. Cardiac masses (2hours)
7. Disease of great vessels (2hours)
8. Pregnant Females (2hours)
9. Emergency echo (2hours)
10. Muscle disease and the heart (dystrophies). (2hours)
11. Rheumatic heart disease (2hours)
12. Stress echo (2hours)
13. Vascular and systemic disease. (2hours)
14. Aortic dissection and trauma. (2hours)
15. Acute and chronic respiratory disease. (2hours)
16. Aging changing. (2hours)
17. Role of echo in AF /flutter. (2hours)
18. SCD. (2hours)
19. Heart transplant (2hours)