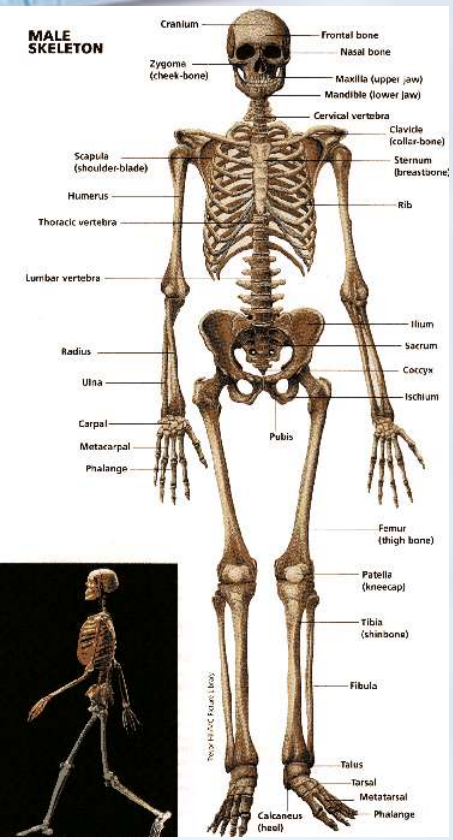
بسم الله الرحمن الرحيم

DIAGNOSTIC SERVICES

An Overview By

Dr. Fuad Hameed Rai

RADIOLOGY AND IMAGING



- **Services and Procedures**
- Imaging tests and procedures are fast and cost-effective methods of viewing the internal organs and structures of the body. They can help diagnose a health problem quickly, accurately and with less discomfort.

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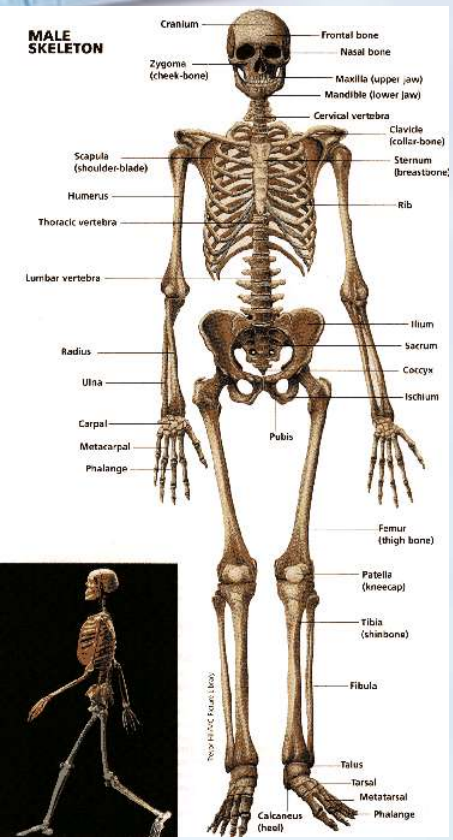

- **Services and Procedures**
- A good Radiology and Imaging Department delivers high-quality, diagnostic expertise with convenience of patients. The staff should be friendly, caring and should ensure a positive experience.

Bone Density

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BONE DENSITY

- Bone mineral density (BMD) is a test that measures the amount of calcium in a specific region of the bones. From this information, an estimate of the strength of your bones can be made. Every day, physicians use x-rays to view and evaluate bone fractures and other injuries of the musculoskeletal system.

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- **BONE DENSITY (Cont)**
- However, a plain x-ray test is not the best way to assess bone density. To detect osteoporosis accurately, doctors use an enhanced form of x-ray technology called dual-energy x-ray absorptiometry (**DXA** or **DEXA**).

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- **BONE DENSITY (Cont)**
- DEXA is a quick, painless procedure for measuring bone loss. It is most often used to diagnose osteoporosis, with bone density measurements of the lower back and hips mainly taken.

COMPUTED TOMOGRAPHY SCAN

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- **COMPUTED TOMOGRAPHY SCAN (CT or CAT Scan)**
- A computed tomography (CT) scan (also called a computerized axial tomography, or CAT scan) is a special type of X-ray that can produce detailed pictures of structures inside the body.

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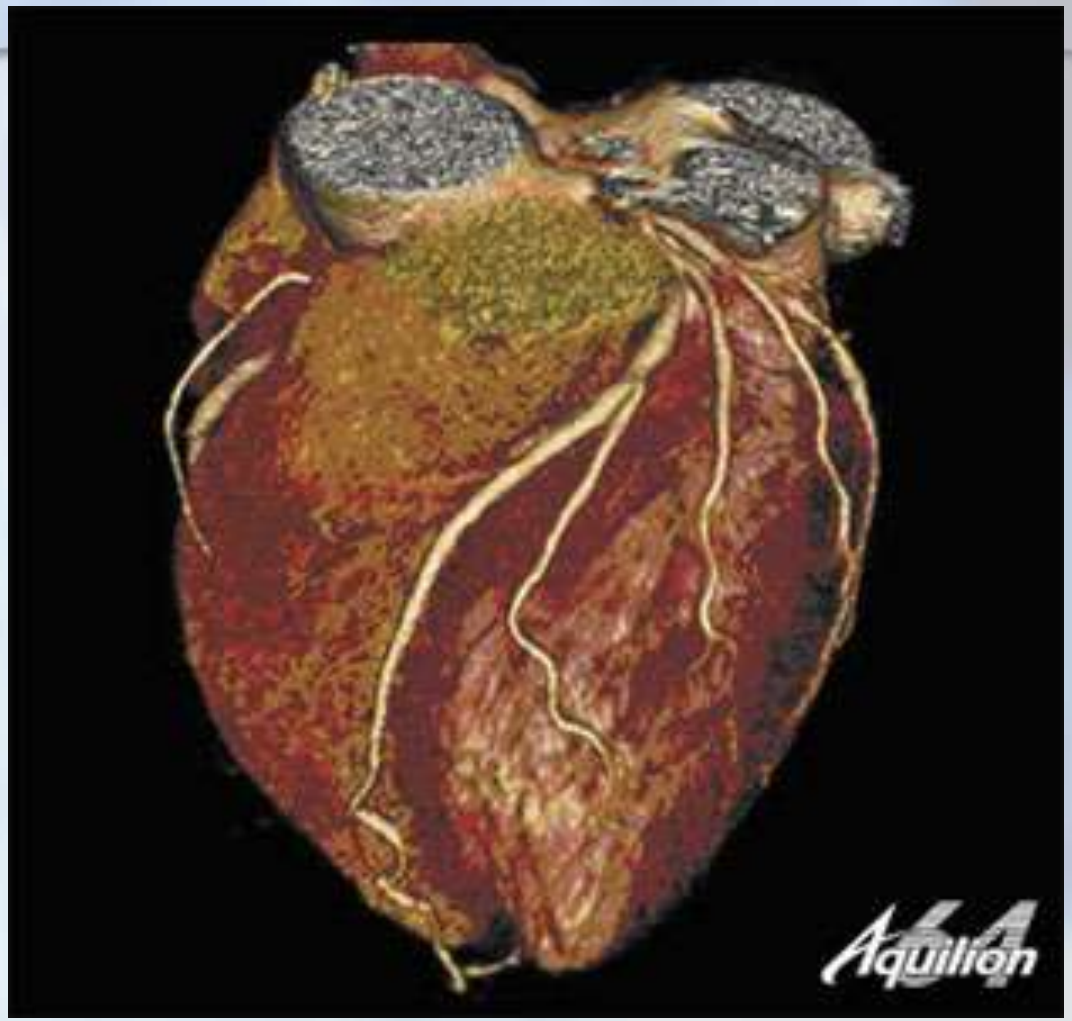
- **COMPUTED TOMOGRAPHY SCAN (Cont)**
- CT scanning can be used to obtain information about almost any body organ, blood vessels, the abdominal cavity, bones and the spinal cord. A CT scan produces clearer pictures of internal organs than a regular X-ray.

A 64 Slice CT Scanner Image



64 Slice CT Scanner

Dual Source CT Scanner

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X-RAY

X-Ray

- **X-RAY**
- X-rays are a form of radiation that can pass through most objects, including the human body. When X-rays strike a piece of photographic film, they produce a picture.

X-Ray Image

Mobile X-Ray

X-RAY FLUOROSCOPY SYSTEM

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- **FLUOROSCOPY**
- Fluoroscopy uses a continuous beam of X-rays to evaluate structures and movement within the body, such as blood traveling through a blood vessel, the diaphragm moving up and down, or food moving through the digestive tract.

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- **FLUOROSCOPY (Cont)**
- A contrast material that shows up on X-rays can be injected or swallowed during fluoroscopy to outline blood vessels or organs.

Fluoroscopy Imaging

Fluoroscopy System

MAGNETIC RESONANCE IMAGING(MRI)

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- **MAGNETIC RESONANCE IMAGING(MRI)**
- Magnetic Resonance Imaging (MRI) is a test that uses a magnetic field and pulses of radio wave energy to provide pictures of organs and structures inside the body.

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- **MAGNETIC RESONANCE IMAGING (Cont)**
- MRI can detect changes in the normal structure and characteristics of organs or other tissues, which may indicate diseases caused by trauma, infection, inflammation or tumors.

MRI Image

Open MRI

MAMMOGRAPHY

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- **MAMMOGRAPHY**
- Mammography is the most accurate method of detecting breast cancer today. Women who follow a regimen of monthly breast self-exams, annual exams by their doctors and annual mammograms after age 40 can increase their breast cancer survival rates up to 97 percent.

RADIOLOGY AND IMAGING

- **MAMMOGRAPHY (Cont)**
- Mammography is an X-ray test of the breasts used to diagnose breast cancer. The resulting X-ray picture is called a mammogram. A mammogram is done to help screen for or diagnose breast cancer. Many small tumors can be seen on a mammogram before they can be felt by a woman or her doctor.

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- **MAMMOGRAPHY (Cont)**
- The Computer-Aided Detection (CAD) System utilizes breakthrough software technology to highlight potential areas of concern. The system provides radiologists a second review when reading a mammogram on an electronic Mammagraph™ report, which calls attention to subtle changes in tissue that may indicate the presence of cancer.

Mammography Under Progress

POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAHY (PET/CT scan)

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- **POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAHY (PET/CT scan)**

- **PET/CT scans merge metabolic detection with computerized imaging to precisely identify problem areas in the body.**

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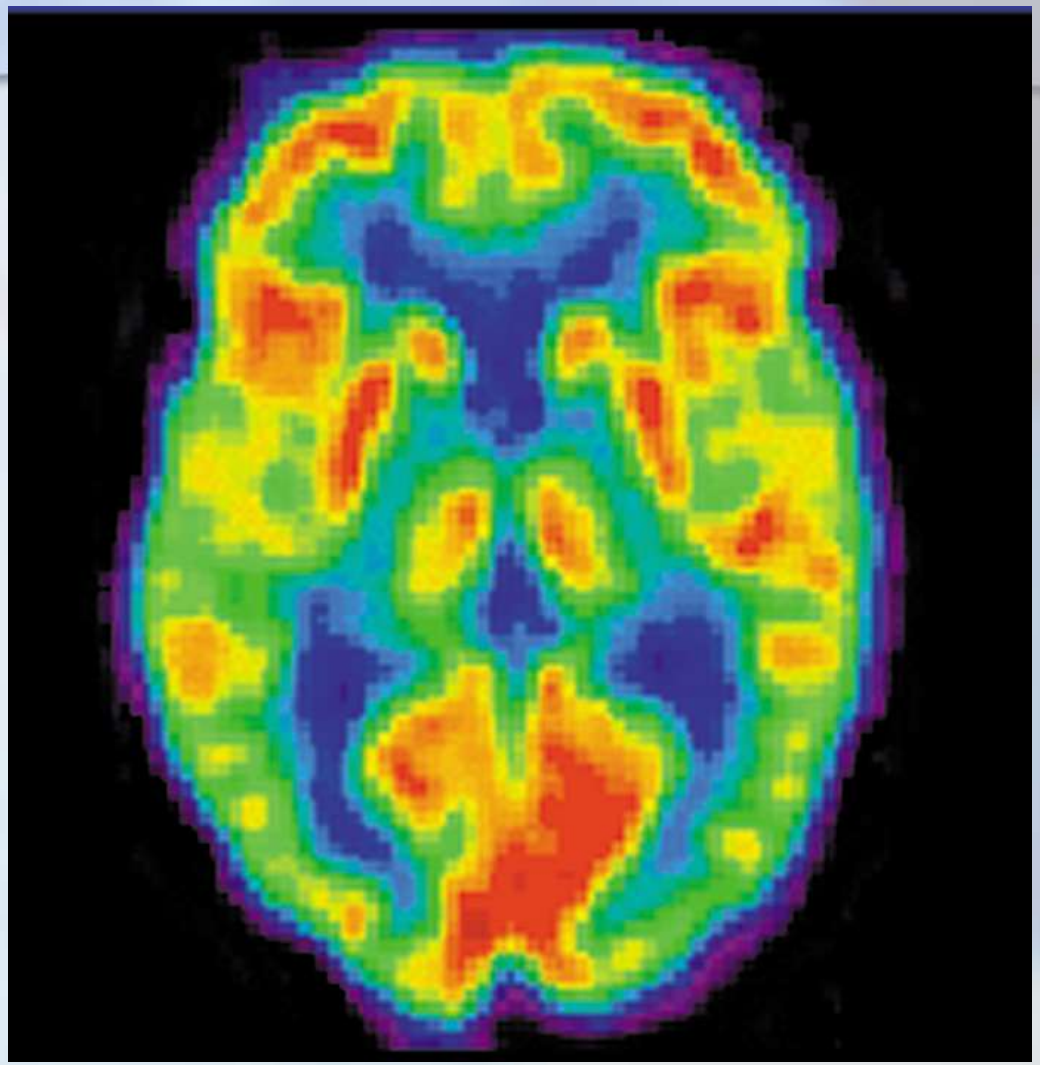
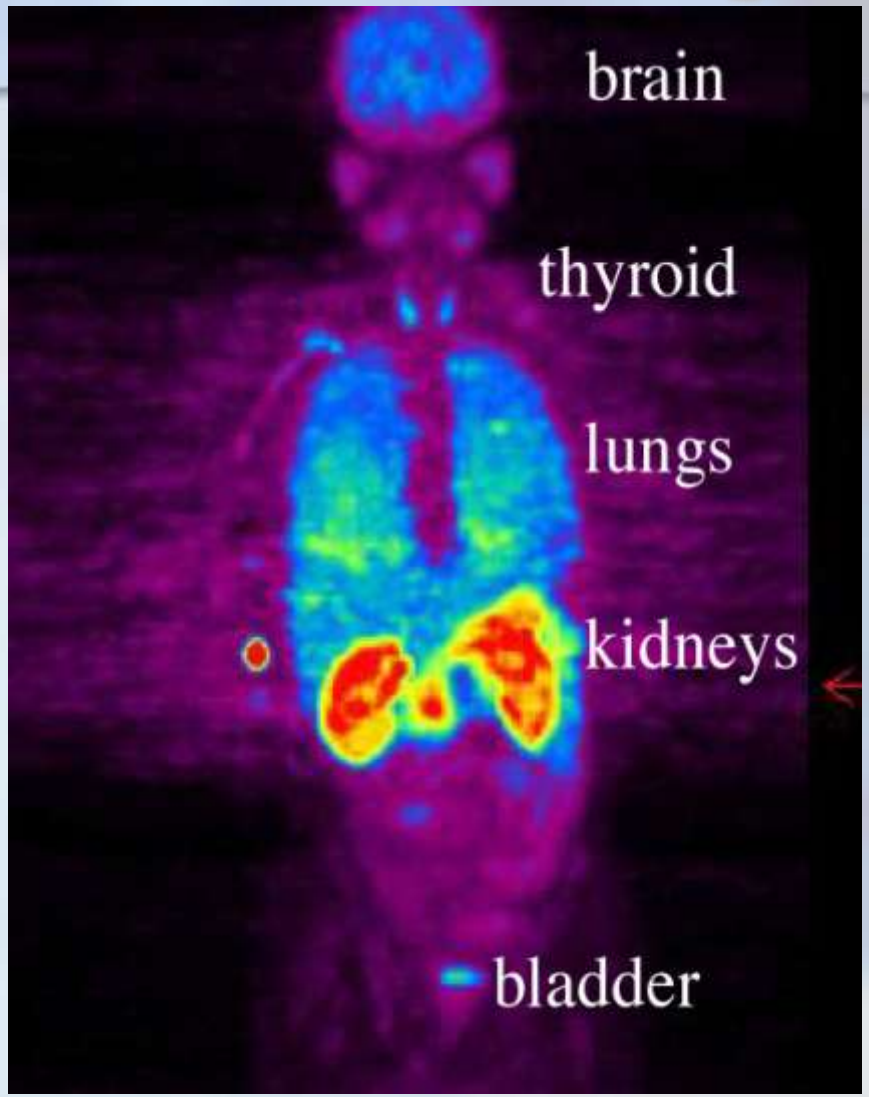
- **POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAHY (Cont)**
- **PET provides the metabolic information, and CT simultaneously takes multiple images to create a map of the body. This helps pinpoint the location of cancerous tumors or metabolic activity in the brain.**

PET Scan Image



PET Scan Image



NUCLEAR MEDICINE

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- **NUCLEAR MEDICINE**
- **Nuclear medicine uses computer technology and radioactive substances to produce images of the body and treat disease. It is particularly useful for detecting tumors, aneurysms, irregular blood flow to tissues and inadequate functioning of certain organs.**

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- **NUCLEAR MEDICINE (Cont)**
- **Before an examination, the patient is given a radioactive tracer to make tissues visible on the scans. Bones, organs, glands and blood vessels each use a different radioactive compound as a tracer, which is either ingested or injected, depending on the type of test.**

RADIOLOGY AND IMAGING

- **NUCLEAR MEDICINE (Cont)**
- **The radioisotopes have very low radiation levels that decay in minutes or hours and do not harm the body.**

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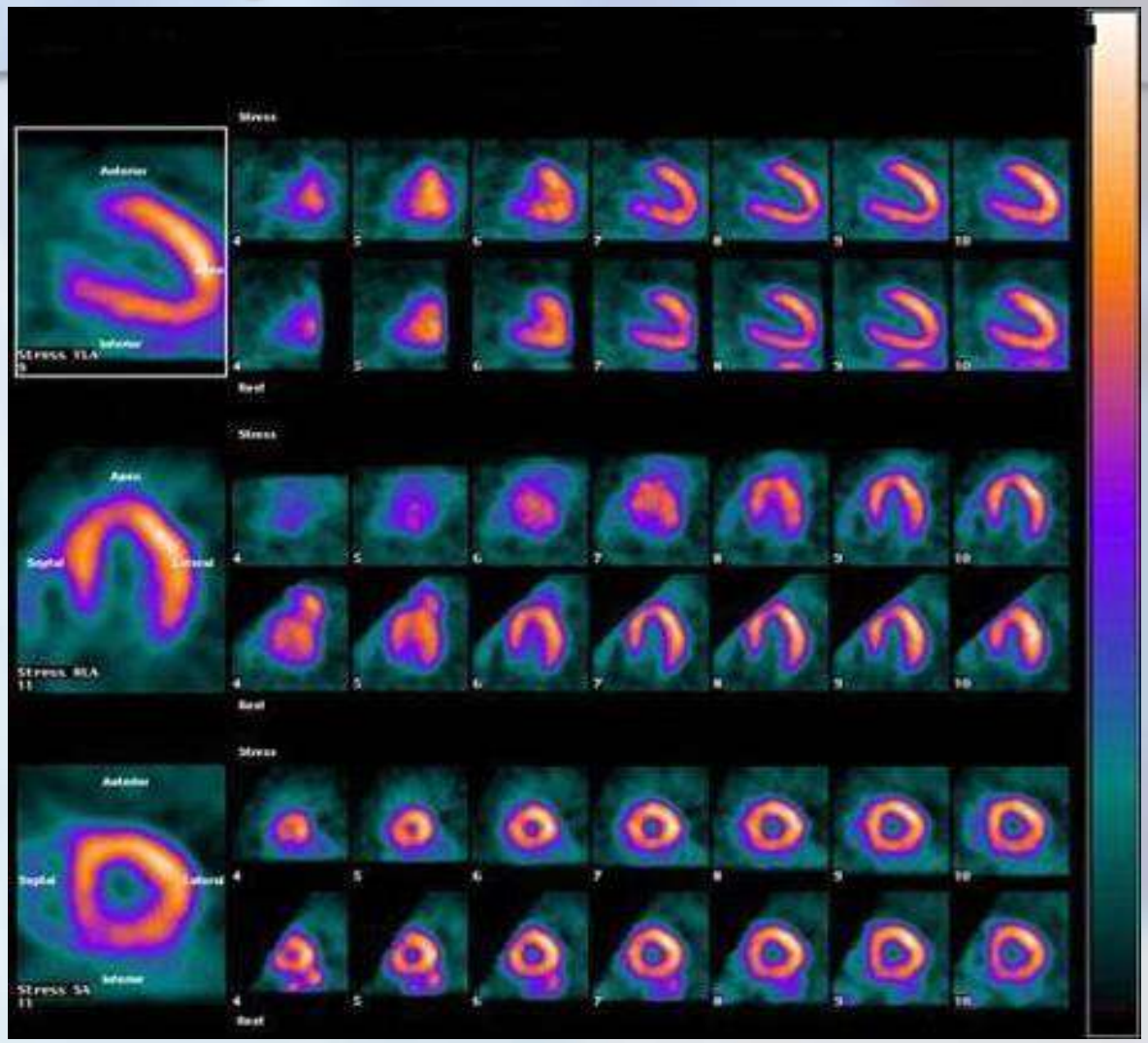
- **NUCLEAR MEDICINE (Cont)**
- **Common uses of nuclear medicine include diagnosis and treatment of hyperthyroidism (Grave's disease) and with cardiac stress tests to analyze heart function, bone scans for orthopedic injuries, lung scans for blood clots and liver and gallbladder procedures to diagnose abnormal function or blockages.**

Example of two day Tc-Sesta normal stress and resting cardiac nuclear medicine study.



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ULTRASOUND

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Ultrasound

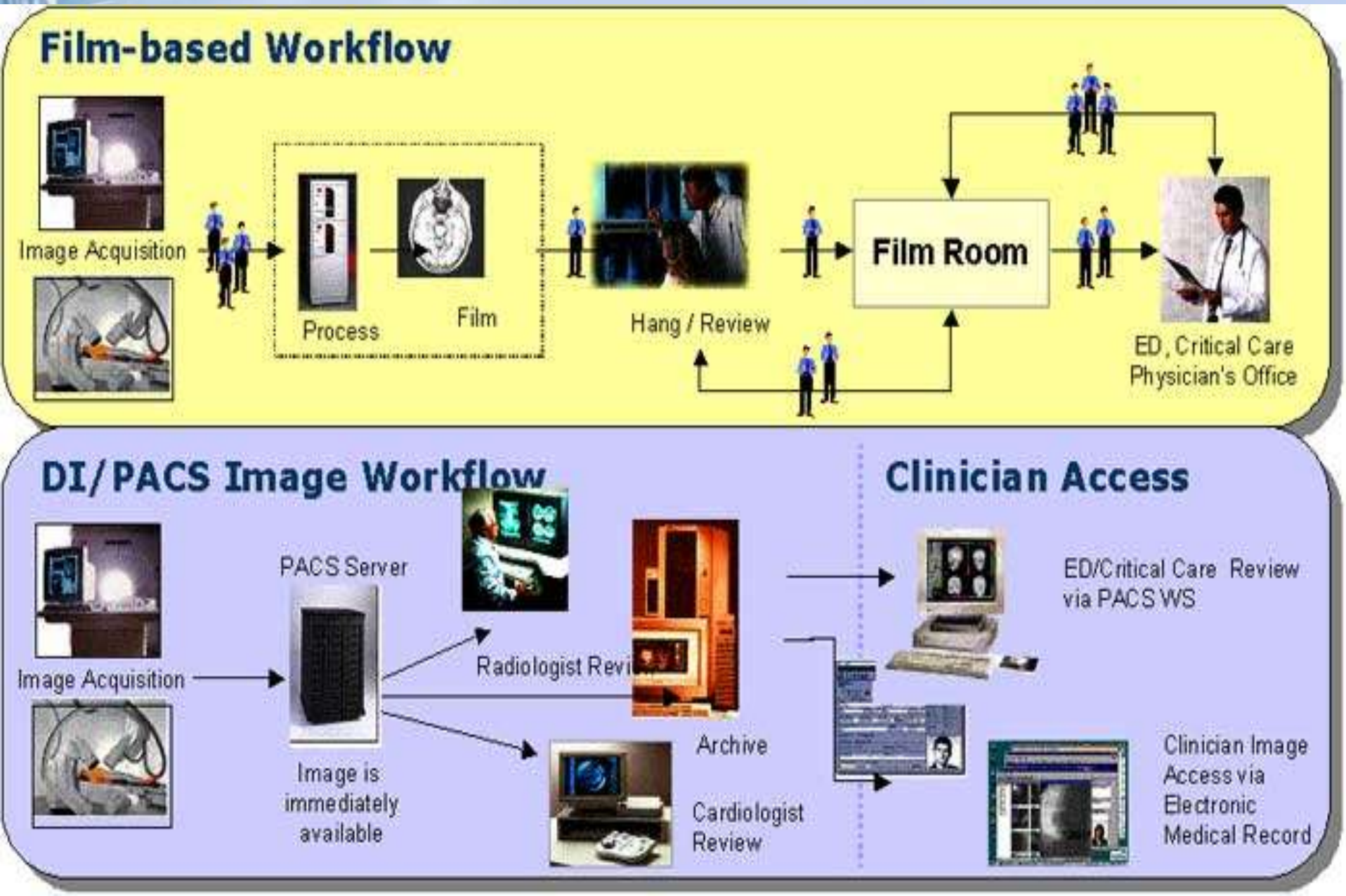
- **ULTRASOUND**
- Ultrasound is a procedure that uses high-frequency sound waves to show what is inside your body. Unlike an X-ray, an ultrasound exam does not use radiation. Instead, a small microphone-like transducer is placed on the area of interest. High frequency sound waves are emitted and produce echoes from the internal tissues and organs. The transducer converts the echoes to electric signals to create an image.

2 D Ultrasound Image

Color Doppler Ultrasound

3 D Ultrasound Image

There are various other Diagnostic equipments which are not discussed here.

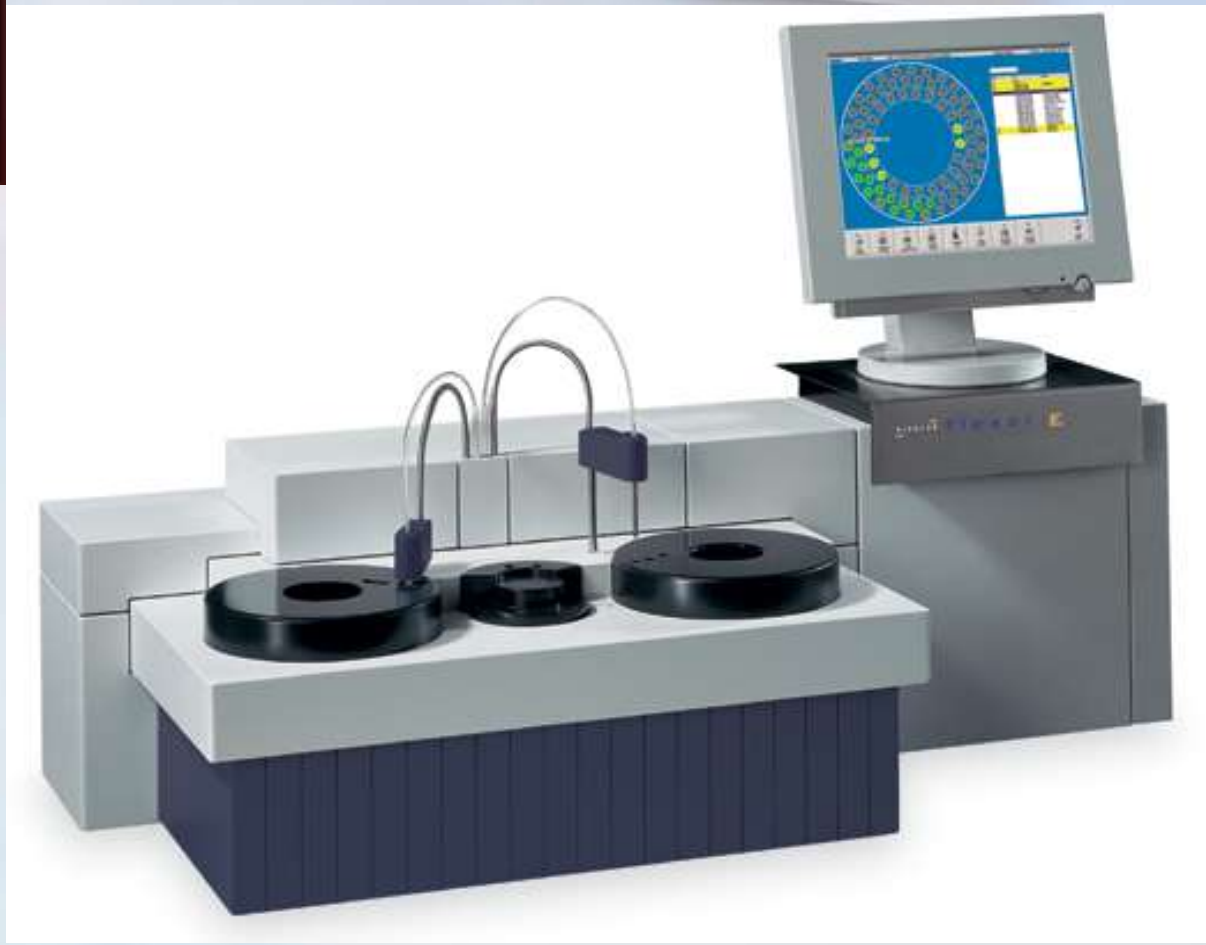

Film-based Workflow
Image Acquisition
Process
Film
Hang / Review
Film Room
ED, Critical Care
Physician's Office
DI/PACS Image Workflow
Clinician Access
Image Acquisition
PACS Server
Image is
immediately
available
Radiologist Revi
Archive
Cardiologist
Review
ED/Critical Care Review
via PACS WS
Clinician Image
Access via
Electronic
Medical Record


CLINICAL
LABORATORY

LAB SECTIONS

- Chemistry
- Hematology
- Special Chemistry / Immunology
- Microbiology
- Histopathology
- Molecular Biology
- Serology
- Genetics

Chemistry Analyzers



Hematology Analyzers

Special Chemistry / Immunology

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Microbiology

Histopathology

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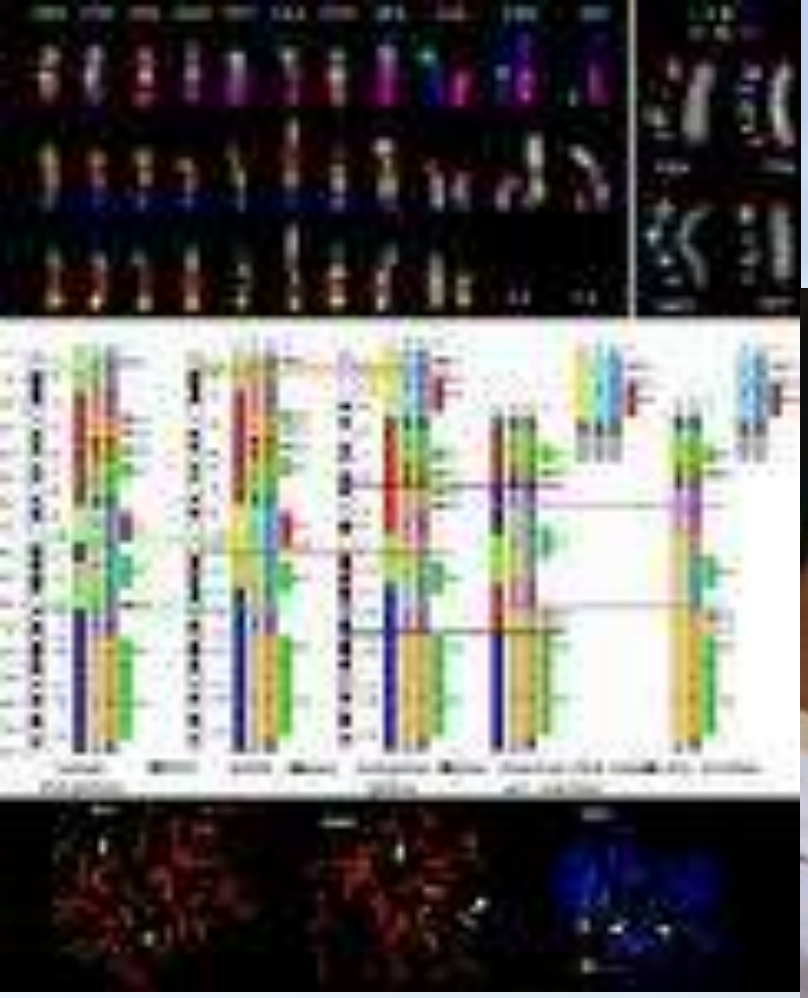
Molecular biology

Genetics



Serology

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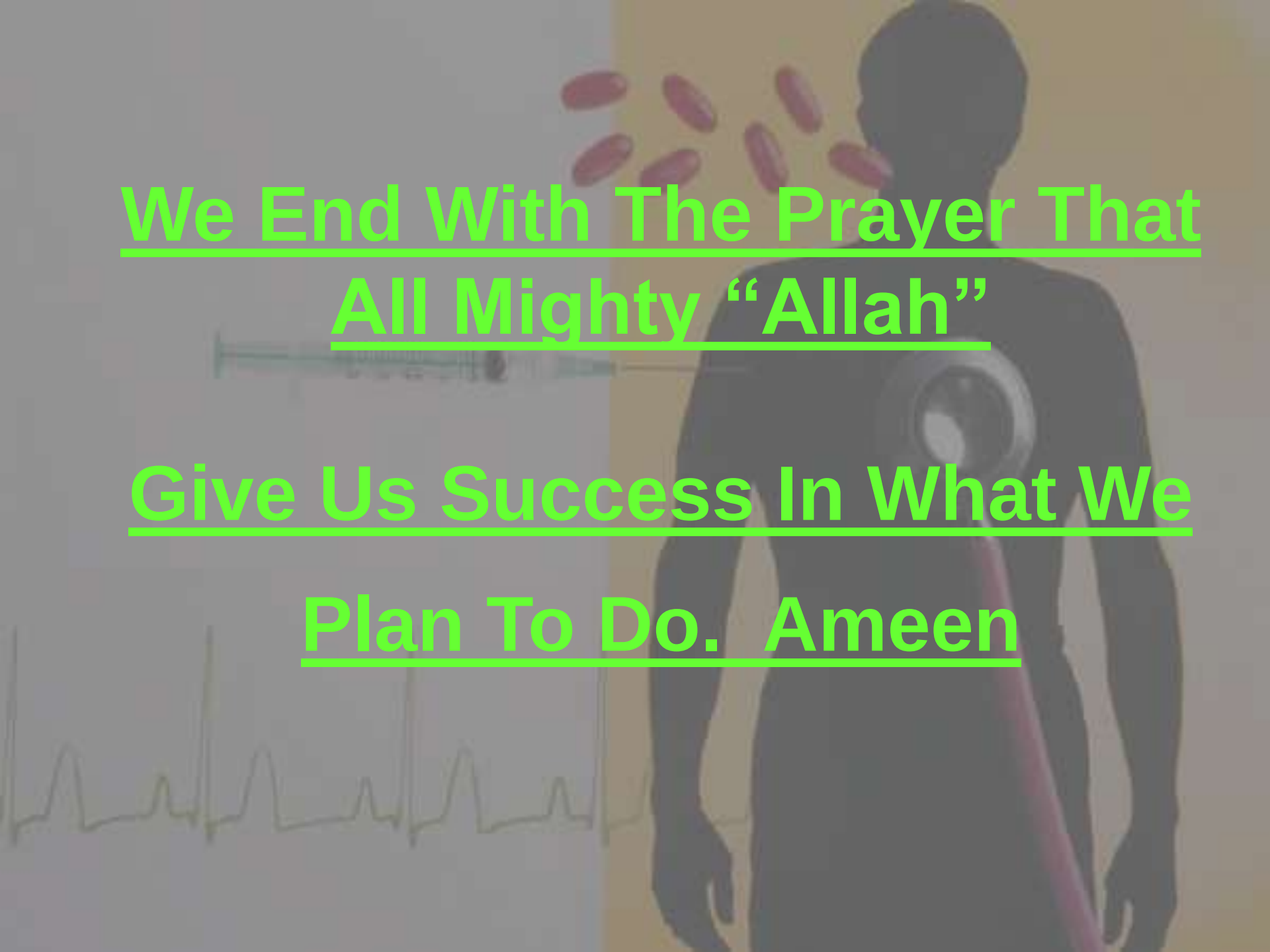

We End With The Prayer That All Mighty “Allah”

Give Us Success In What We Plan To Do. Ameen

Questions ?

Presenter:

Dr. Fuad Hameed Rai

Presently

- Chief Medical Advisor Maroof International Hospital
- Country Representative Perinatal Education Program South Africa
- Health Ambassador National Centre For Sexual And Reproductive Health (http://www.gfmer.ch/GFMER_members/Fuad_Rai.htm)

Formerly

Medical Superintendent Shalamar Teaching Hospital

Managing Director Hospital Waste management (G) ltd

Chief Operating Officer Himont International (Pvt) Ltd