

# Radiation Sources in medicine diagnostic Radiology

## Mammography



**IAEA**

International Atomic Energy Agency

Day 7 – Lecture 2(1)

# Objective

- To become familiar with mammography x-ray systems.
- To become familiar with specific radiation risks associated with this equipment.

# Contents

- Description and physical characteristics of mammography systems.
- Equipment malfunction affecting radiation protection.

# Mammography

Mammography is presently the **most reliable method** for detecting lesions in the breast. It:

- requires **high standards of image quality and equipment performance** because the contrast between normal and pathological areas in the breast is extremely low;
- is performed on **symptomatic** (medically referred) patients as well as on **asymptomatic** women who satisfy selection criteria for approved breast cancer screening programmes. Such programmes are common in many countries.

# Specific requirements

Mammography shall be carried out using dedicated, special purpose x-ray equipment with:

- generators capable of relatively low x-ray tube potentials: e.g. 25-30 kV peak;
- x-ray tubes with a molybdenum or rhodium target (anode) and Mo or Rh filtration. In modern mammography units different anode / filter combinations are available;
- the use of an anti-scatter grid and automatic exposure control (AEC) system are strongly recommended.

# Specific requirements (cont)

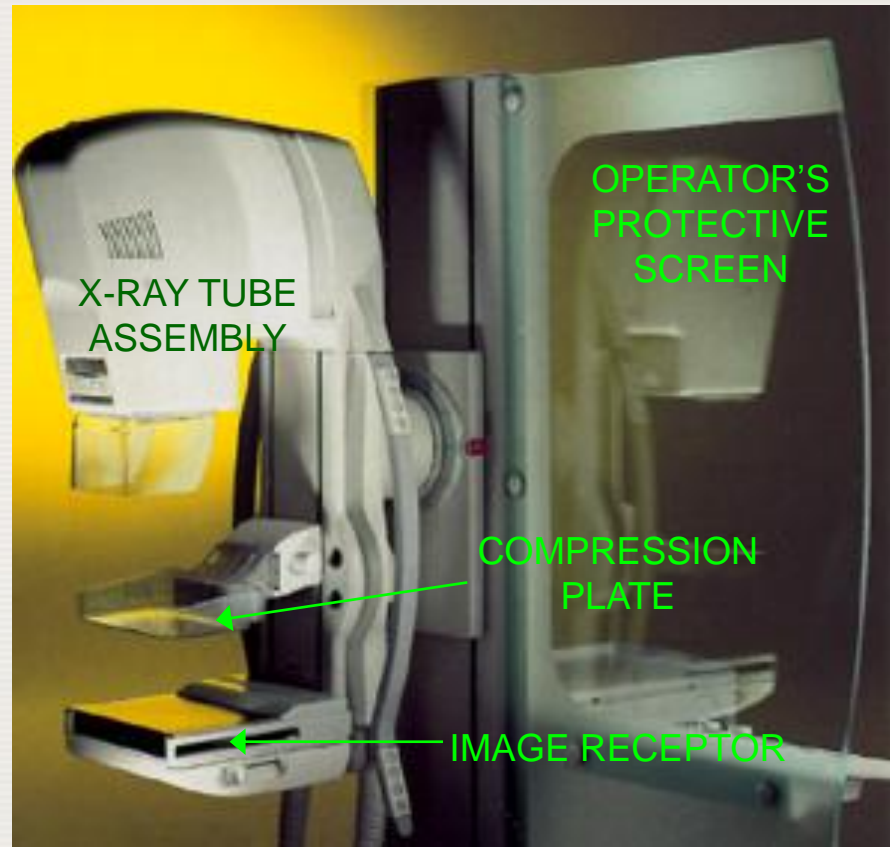
- Radiolucent **breast compression** device - the application of firm compression to the breast during mammography provides immobilisation, reduces tissue thickness and ensures greater uniformity in thickness.

Compression contributes to **improved image quality** by minimizing blurring and by reducing both the exposure required and the intensity of scattered radiation.

- A standard **breast phantom** approximating an average breast (designed to standard specifications) for equipment performance checks and estimation of the **mean glandular dose (MGD)**.

# Mammographic Equipment

Special (dedicated)  
equipment  
for mammography



# Malfunctions affecting radiation protection

Basically the same as for general x-ray systems (see previous lectures) but tests performed and measuring instruments used must be adapted to the characteristics of mammography systems, e.g.

- inaccuracy and inconsistency of the x-ray tube voltage and radiation output;
- misalignment between the x-ray beam and the image receptor, non-uniformity of the x-ray field;
- unsatisfactory film storage conditions, image development and viewing conditions
- improperly calibrated AEC, etc.