



جامعة المستقبل  
AL MUSTAQBAL UNIVERSITY

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**MedicalPhysics**

**Lecture: (4)**

**Subject: Safety Procedures for Workers Using X-rays  
and MRI Machines**

**3dr Stage**

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## Introduction

Workers in medical imaging fields, such as X-rays and MRI, are exposed to radiation and magnetic risks that require strict safety measures. This lecture will cover the main hazards and protection methods

### **First: Safety Procedures While Using X-rays**

1-

#### **Understanding X-ray Risks .**

X-rays are a form of ionizing radiation that can harm tissues and cells if •  
.exposure levels are high  
Potential risks include cumulative radiation exposure and an increased •  
long-term risk of cancer

2-

#### **Protection Measures for Workers .**

##### **:Minimizing Exposure Time •**

.Use X-rays only when medically necessary •  
Workers should avoid staying in the examination room during imaging •  
.unless necessary

##### **:Increasing Distance from the Radiation Source •**

.Stay as far as possible from the X-ray source •  
.Use remote-control techniques to operate the machines •



## :Using Protective Barriers •

- .Wear lead aprons and thyroid shields when required •
- .Install lead-lined glass shields between workers and X-ray machines •

### APPLICABLE SCOPE





### **:Personal Monitoring •**

- .Regularly wear radiation dose badges (dosimeters) to track exposure levels •
- Adhere to maximum allowable radiation limits (20 mSv annually, according •
- to international recommendations)



### **-3-**

#### **Workplace Design .**

- Ensure X-ray rooms are equipped with walls containing radiation-blocking •
- .materials like lead
- .Place warning signs on doors to prevent entry during imaging sessions •



## **Second: Safety Procedures While Using MRI Machines**

**1-**

### **Understanding MRI Risks**

- .MRI machines use strong magnetic fields and radio waves •
- :Potential risks include •
- .Strong attraction of metallic objects to the magnet •
- .Heating of tissues due to radio waves •
- .Interference with medical devices such as pacemakers •

**2-**

### **Protection Measures for Workers**

#### **:Screening Individuals and Equipment •**

- .Ensure workers and patients are free of any metallic objects •
- Prevent metallic medical devices, such as watches and phones, from •
- .entering the imaging area



#### **:Following Safety Zones •**

- Divide the area around the machine into safe zones (e.g., restricted magnetic •
- .field zones)

- Adhere to guidelines for accessing imaging areas •

#### **:Training •**



Train workers on the risks associated with magnetic fields and emergency •  
.procedures  
Understand how the magnetic field interacts with medical devices and •  
handle them carefully

**Emergency Procedures •**

Install emergency stop buttons to turn off the magnetic field in dangerous •  
.situations  
.Plan for quick and safe evacuation of patients or workers during incidents •

### **Third: General Safety Practices**

Adhere to regular maintenance schedules for devices to ensure safe •  
.operation  
Ensure proper ventilation to reduce exposure to gases from some devices •  
(e.g., cooling gases in MRI machines)  
Provide periodic awareness programs for workers on the latest standards •  
.and procedures

## **Conclusion**

Workplace safety when using X-rays and MRI machines requires awareness, continuous training, and adherence to preventive measures. The primary goal is to protect workers and patients from potential harm while maintaining the quality of medical services

### **Multiple-Choice Questions (MCQs)**



- 1 .What is the primary risk of working with X-rays?
  - a) Magnetic attraction of metals
  - b) Ionizing radiation exposure
  - c) High temperatures near the machine
  - d) Electrical shocks
  
- 2 .Which of the following is a recommended safety practice for workers using X-rays?
  - a) Wearing a steel helmet
  - b) Staying in the examination room during imaging
  - c) Using lead aprons and thyroid shields
  - d) Keeping metallic objects near the machine
  
- 3 .What device is used to monitor a worker's radiation exposure?
  - a) Dosimeter
  - b) Thermometer
  - c) Barometer
  - d) Magnetometer



4 .What material is typically used to shield against X-rays?

- a) Aluminum
- b) Lead
- c) Plastic
- d) Iron

5 .Which is NOT a risk associated with MRI machines?

- a) Heating of tissues
- b) Magnetic attraction of metals
- c) Ionizing radiation exposure
- d) Interference with medical devices