



مستشفى الملك فيصل التخصصي ومركز الأبحاث
King Faisal Specialist Hospital & Research Centre
Gen. Org. مؤسسة عامة



RADIATION PROTECTION OFFICERS TRAINING IN SAUDI ARABIA: CURRENT STATUS AND FUTURE PERSPECTIVES

OMAR NOOR, MSC.
HEALTH PHYSICIST
BIOMEDICAL PHYSICS DEPARTMENT
KING FAISAL SPECIALIST HOSPITAL AND RESEARCH CENTRE

Outlines

Introduction

Licensing of RPOs

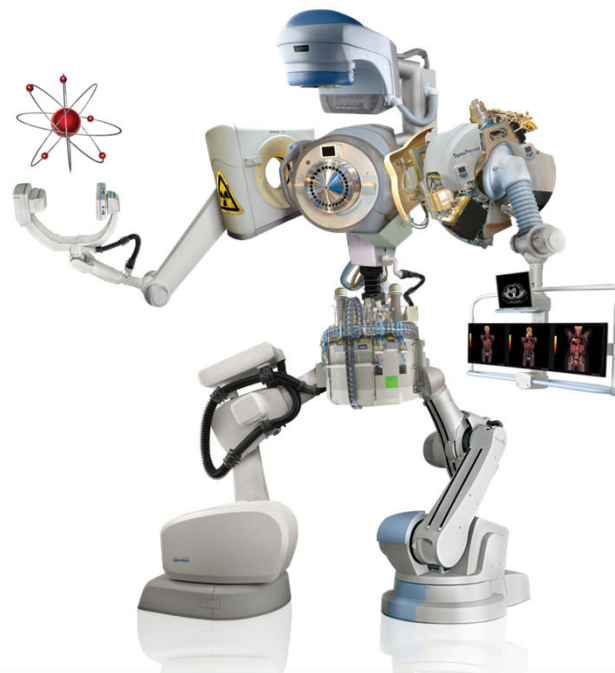
Licensing Institutions for RPO Training

RPO Training at KFSH&RC

- Aims and Objectives
- Syllabus and course Material
- Teaching philosophy
- Training Assessment

Advance RPO training

National E-Learning RPO program





Introduction

- Increase in Radiation Application in Saudi Arabia
 - From 2010 to 2017: an increase of 2000 RW that are monitored by the Health Physics Section of KFSH&RC
- Increase in the number of non-compliances issued by the regulator
- Bonn Call-for-Action – **Action 4**
 - Strengthen radiation protection education and training of health professionals



Licensing of RPOs

Regulatory Body – **King Abdullah City for Atomic and Renewable Energy (KA.CARE)**

RPO must be licensed by KA.CARE

Previous License requirement;

- High school diploma
- Medical report
- Letter of employment
- Passing the RPO exam (70%)
- Payment of exam's fee (\$80)

License expires after 2 years

Renewal requirements:

- Submission of renewal application



Licensing of RPOs

Current Requirements

- **Bachelor Degree in Science, Engineering or Health Sciences**
- **Attendance of an RPO training course (30 Hrs)**
- **Passing the RPO exam (70%) (+85% RPE)**
- **Medical Report**
- **Payment of exams' fee (\$80)**

License expires after 2 years

Renewal requirements:

- **Attending RPO training (30 Hrs)**
- **submitting appropriate applications**



Licensing of RPOs

- Type of RPO License:
 - Diagnostic Radiology
 - Radiotherapy
 - Nuclear Medicine
 - Nuclear Gauges
 - Transportation
 - Gamma Irradiators
 - Research
 - Detection and Measurements



- Only two different licenses are permitted per individual



Licensing Institutions for RPO Training

- Medical vs Industrial
- Minimum of 5 lecturers
 - PhD/ MSc with 5 years of related experience
 - BSc with 10 years of related experience
- Minimum of 30 hours
- Maximum of 100 participants per training

RPO Training at KFSH&RC



BIOMEDICAL PHYSICS DEPARTMENT

MEDICAL RADIATION SAFETY OFFICER COURSE

9 - 13 RAMADAN 1438 (4 - 8 JUNE 2017) / 9 AM - 3 PM

Venue: Room 304, Research Centre, KFSH&RC, Riyadh, Saudi Arabia
Course Director: Mehenna Arib, PhD



PROGRAM HIGHLIGHTS

- 40 hours of lectures covering fundamental and advance topics in radiation protection
- 5 hours of Hands on workshops on various health physics applications
- Certificate of completion will be awarded to attendees
- Course taught by experts in radiation safety
- **Special Bonus: Extra tutorials on 12 June 2017**

WHO SHOULD PARTICIPATE

- Radiation safety officers
- Health and medical physicists
- Nuclear medicine and medical imaging professionals
- Radiologic technologists and radiologists
- Environmental health and safety and industrial hygiene professionals
- Biologists, chemists, pharmacists, and other researchers using radionuclides
- Facility managers at laboratories utilizing radioactive materials



COVERED TOPICS

- Nuclear Structure & Radioactivity, Radiation Physics, Quantities and Units
- Radiation Exposure, Biological Effects of Radiation,
- Radiation Detection and Measurements
- National and International Regulations and Radiation Protection Standards
- Radioactive Materials Handling, Transportation, Inventory Control, and Waste Management
- Good Management Practices for Radiation Safety Program



REGISTRATION / COURSE FEE

	Early Bird (before 30 May 2017)	Regular
• Students	SR 2,000	SR 2,500
• Professionals	SR 2,500	SR 3,000



For registration and further information, please contact us at:
Research Centre Training and Education Office
Tel. : (011) 464 7272 | Ext.: 32971 - 32916 | Mobile : 0505656033
Email: Lsultan@kshrc.edu.sa





Aim of RPO Training Program

- Acquire the **knowledge** of basic concepts and principles of **ionizing radiation** and its **instrumentation**
- Gain a clear **understanding, skill, and attitude** on radiation protection practices
- Understand the national and international **standards** and **regulations** on radiation protection





Course Objectives

Upon completion the participant will be able to identify the:

- a) Nature of ionizing radiation
- b) Types of biological effects of ionizing radiation
- c) Quantities and units used for measurement of radiation
- d) Devices used to monitor personnel monitoring devices
- e) Basic principles of reducing exposure to radiation
- f) Precautions that should be taken to minimize potential fetal exposures
- g) Recommended management procedures for pregnant radiation workers and the pregnant patient
- h) ALARA concept
- i) Required radiation safety training for all personnel
- j) Required audits, radiation surveys, calibrations and equipment performance evaluations





Targeted Audience

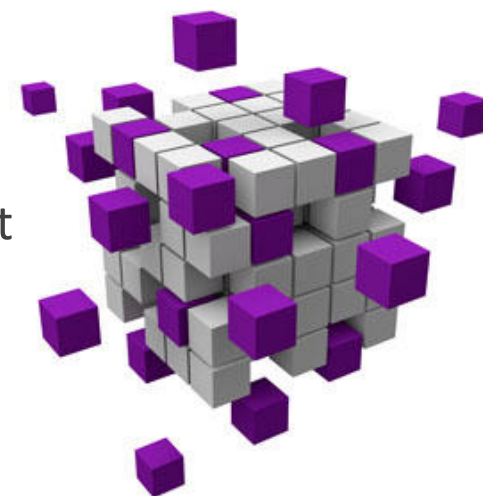
- **Radiation safety officers (50%)**
- Health and medical physicists (10%)
- Nuclear medicine and medical imaging professionals (10%)
- Radiologic technologists and radiologists (5%)
- Medical Doctors (5%)
- Students/ Recent Graduates (10%)
- Others (10%)





Program Layout

- 34 hours training program – 6 hrs (additional day after a week)
- Lectures duration: 45 – 60 minutes (60%)
- Workshops duration: 1 – 2 hours (30%)
- Scientific visits: 45– 60 minutes (10%)
- 3 breaks per day; Morning, Lunch and after noon
- 2 activities per day; problem solving, workshop, scientific visit
- Evaluation test before and after the course





Syllabus and course Material

Adapted material from the IAEA Post Graduate Course in Radiation Protection

Module 1: **Basic Knowledge**

Module 2: **Radiation Protection**

Module 3: **Radiation Protection Infrastructure**

Module 4: **Radiation Protection for specific Industries**



Technical Visits

- Radiotherapy Facility
- Secondary Standard Dosimetry Laboratory - Radiotherapy Bunker
- Radiopharmaceutical and Cyclotron Facility
- Radioactive Warehouse
- Gamma Irradiation/ Sterilization Facility



Problem Solving Sessions

- 4 hours problem solving sessions
- Participants driven
- Full day of problem solving sessions – bonus
- Office Hours – Q&A sessions



	Day 1 Sunday 4 June	Day 2 Monday 5 June	Day 3 Tuesday 6 June	Day 4 Wednesday 7 June	Day 5 Thursday 8 June
09:30 - 10:15	Introduction & Evaluation Test Mehenna Arib	Mod 1.7. Radiation Detection and Measurements Mehenna Arib	Mod 2.1. Principle of Radiation Protection Belal Mofтах	Mod. 3.1. Ionizing Radiation Legislation and Regulations XXXXXXX	Evaluation Test
10:15 - 11:00	Mod 1.2 Structure of the Matter & Radiation Sources Omar Noor	Mod 2.2. Protection from External Radiation Hazard Mehenna Arib	Mod 3.4. Emergency Response Planning Shada Wadi Alramahi	Mod 4.3. Radiation Protection in Radiotherapy 1 / 2 Belal Mofтах	Problem-Solving Session Ibrahim Al-Gain
11:00 - 11:10	Morning Break				
11:10 - 11:55	Mod 1.3 Radioactivity Refaat Al-Mazrou	Mod 2.3. Protection from Internal Radiation Hazard Omar Noor	Mod 3.2. Transportation, Storage & Safe Handling of Radioactive Waste Fareed Mayhoub	Mod 4.3. Radiation Protection in Radiotherapy 2 / 2 Shada Wadi Alramahi	Problem-Solving Session III Mehenna Arib
11:55 - 12:15	Prayer Break				
12:15 - 13:00	Mod 1.4 Interaction of Radiation with Matter Belal Mofтах	Mod 2.4. Personal Dosimetry Ibrahim Al-Gain	Mod 4.1 Radiation Protection in Nuclear Medicine 1 / 2 Ahnaf Arafat	Mod 4.2. Radiation Protection in Diagnostic Radiology 1 / 2 Ibrahim Enazi	Case study Shada, Refaat
13:00 - 13:45	Mod 1.5. Radiation Quantities and Units Omar Noor	Mod 2.5. Use of Radiation Monitoring Instruments Mehenna Arib	Mod 4.1 Radiation Protection in Nuclear Medicine 2 / 2 Ahnaf Arafat	Mod 4.2. Radiation Protection in Diagnostic Radiology 2 / 2 Ibrahim Enazi	Technical visits I Radiopharmaceutical and Cyclotron Department Fareed, Ibrahim
13:45 - 14:00	Break				
14:00 - 14:45	Mod 1.6. Biological Effect of Radiations Ghazi Alsbeih	WORKSHOP 1 Calibration and usage of Survey Meters Mehenna, Heba, Mariam	WORKSHOP 3 I-131 therapy & waste Fareed, Nour, Sara	WORKSHOP 5 Diagnostic Radiology and Shielding Verification Mehenna, Mariam, Nour	Technical visits II Radiotherapy Facility Sheda, Belal
14:45 - 15:30	Problem-Solving Session I O. Noor	WORKSHOP 2 Personal Dosimetry Fareed, Ibrahim, Shaima	WORKSHOP 4 Nuclear Med. Facility survey and assessment Ahnaf, Refaat, Shaima	WORKSHOP 6 Diagnostic Radiology Facility survey and assessment Fareed, Omar, Heba	Overall evaluation Certificates of Attendance Closing Ceremony

Course Evaluation and Assessments

Assessments

- Anonymous assessments
- Two assessments (before and after the course)
- Total of 30 questions
- Average of 2 questions per lecture
- Multiple choice
- Straightforward with few challenging questions
- Provides the speakers with an idea about the participants background
- Used as a mean of evaluating the speaker and the training overall



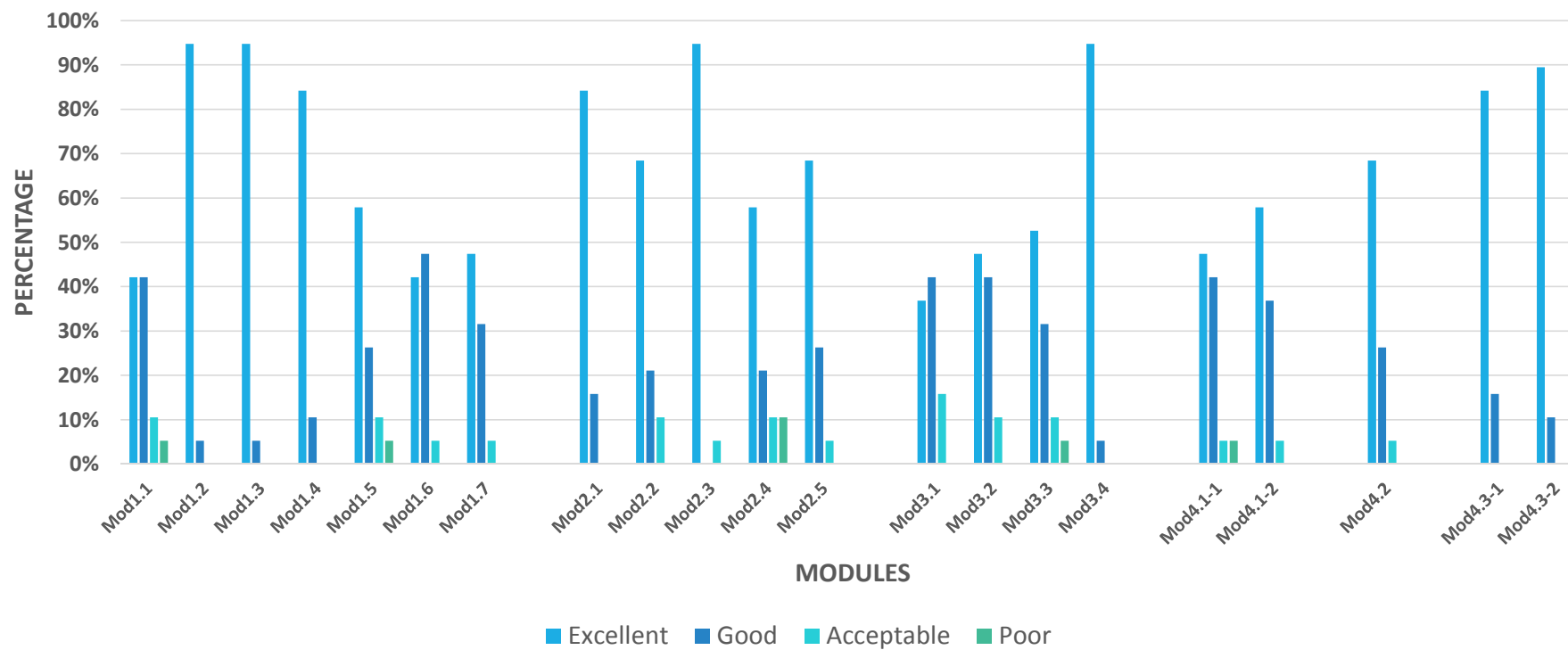


Training Assessment

- Average score in the initial assessment is around 50%
- On average a 25% shift by the end of the RSO Course
- Minimum score range between 10 – 20 %
- Strong correlation between the speaker evaluation and the post assessment test
- Significant improvement in lectures with hands-on components
- Early morning lectures generally had a better rate of improvement compared to after lunch or at the end of the day



Training Assessment





Speakers Evaluation

- By students performance in the assessment after the course (30%)
- Students evaluation (40%)
- Course director evaluation (30%)
 - Teaching plan
 - Utilization of teaching tools
 - Time managements
- Evaluation are submitted to speakers for analysis and reflection
- Speakers are requested to attend a training on developing teaching skills



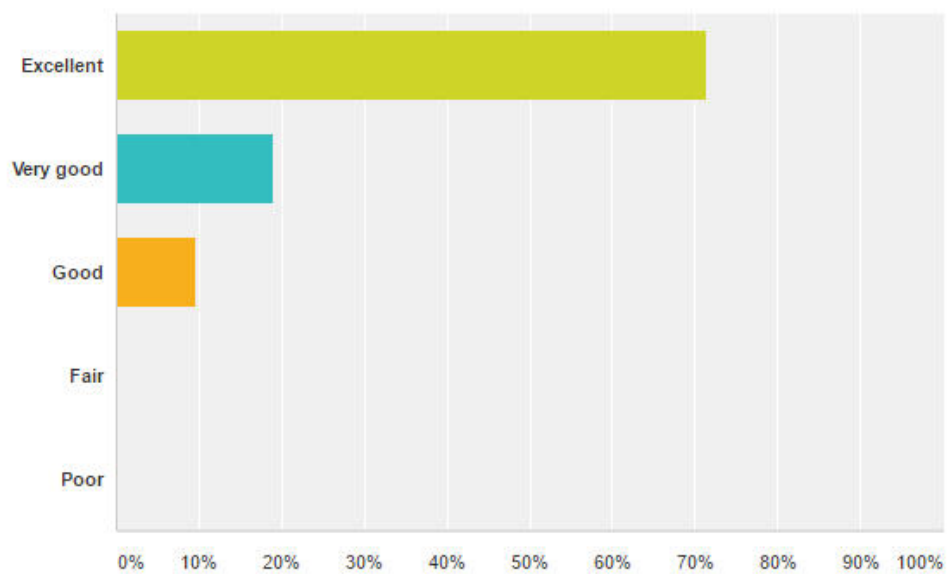


Training Evaluation



Overall, how would you rate the RSO course?

Answered: 21 Skipped: 0

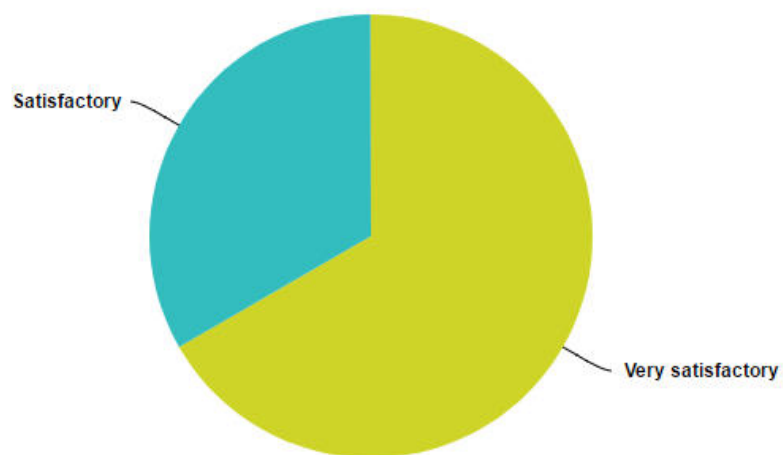




Training Evaluation

The workshops were

Answered: 21 Skipped: 0



Answer Choices

- Very satisfactory
- Satisfactory
- Unsatisfactory

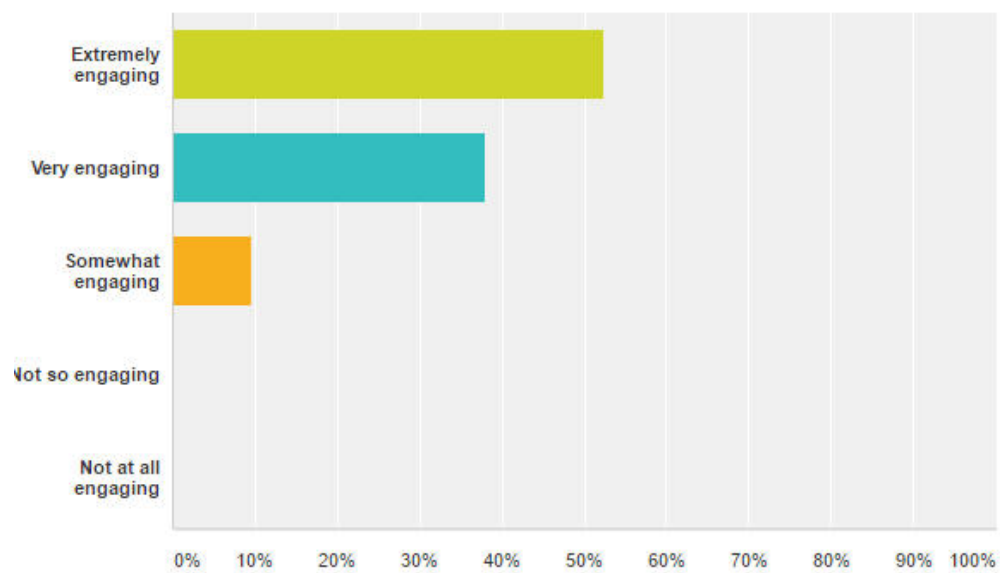
Total



Training Evaluation

How engaging were the speakers at the RSO course?

Answered: 21 Skipped: 0





Participants Feedback

- Minimize the time of course
- Keep the lectures with the workshop in the same day & every day.
- More practice for exam
- Assign a group leader for the workshops
- Start the daily earlier and the dismissal earlier
- Creating a WhatsApp Group



مستشفى الملك فيصل التخصصي ومركز الأبحاث
King Faisal Specialist Hospital & Research Centre
Riyadh, Saudi Arabia



CERTIFICATE OF ATTENDANCE

THIS IS TO CERTIFY THAT

ATTENDED A 40 HOURS OF A

RADIATION SAFETY OFFICER COURSE

HELD DURING THE PERIOD

1 - 5 MUHARRAM 1438 (2 - 6 OCTOBER 2016)

AT

KING FAISAL SPECIALIST HOSPITAL & RESEARCH CENTRE,
BIOMEDICAL PHYSICS DEPARTMENT
RIYADH, SAUDI ARABIA

Belal Mofleh, PhD

Chairman
Biomedical Physics Department
Research Centre, KFSH&RC

Arib Mehenna, PhD

Chief Health Physicist
Biomedical Physics Department
Research Centre, KFSH&RC

Ali, Al-Dalaan, MBA-IT
Executive Director
Executive Administration for Radiation
Protection and Safety, SFDA

TRAP, 30 MAY - JUNE 2, 2017

This certificate is issued under the training service license () issued by the National Center for Radiation Protection







Advance RPO Training



Targeted Audience

- Geared toward RPOs with minimum of 5 years or
- RSO with MSc or PhD in Nuclear Engineering/ Medical/Health Physics or related programs
- Participants who get 90 % or higher in the pre Evaluation Assessment





Proposed Training Program

- First two days will be shared with the basic RPO training
- Shielding calculation and shielding verification (6 hours)
 - Theoretical lectures reviewing Publications and international standards/ recommendations
 - Shielding verification exercise of existing facilities (**Practical session**)
- Radiation Protection Program/ Manual (3 hours)
 - Developing procedures
 - Record keeping
 - Auditing (**Practical session**)



Proposed Training Program

- Training the Trainers (6 hours)
 - Training program design
 - How adults learn
 - Design of handout material
 - Utilization of online training modules
 - Delivering lectures in RP (**Practical Session**)

- Handling Radiation Emergencies (3 hours)
 - Design of emergency plans
 - Planning for Emergency Drills
 - Handling a Radiological Emergency Accident (**Practical Session**)

Establishment of a National E-Learning RP Training program



E-Learning RP Training program

- IAEA Approved Technical Cooperation Project for 2018/2019
- Development of an E-Learning training in Radiation Protection focusing in Medical Applications
- The training will be made available to;
 - all health care professionals
 - Patients undergoing radiation diagnosis/ therapy
 - Concerned members of the public
- Various level of intensity and complexity
- Based on the current E-Learning RP training program at KFSH&RC



E-Learning RP Training program

Courses

[Browse](#)

[Catalogue Search](#)

[Course Calendar](#)

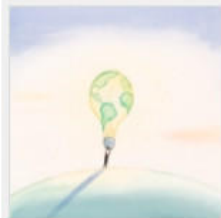
[Top](#) > [Professionals](#) > [Radiation Safety Training](#)

Catalogue Content Results 1 - 14 of 14

Title

Radiation Safety For Referring Physicians
Radiation Safety For Y-90 (Zevalin) Therapy
Radiation Safety in Blood Bank
Radiation Safety in Cath. Lab. (Technologists)
Radiation Safety in Computed Tomography
Radiation Safety in Cyclotron
Radiation Safety in Dentistry
Radiation Safety in Fluoroscopy, Angiography, Radiography & Cath. Lab. (Nurses)
Radiation Safety in Fluoroscopy, Angiography & Radiography (Technologists)
Radiation Safety In Iodine-131 Therapy
Radiation Safety in Laboratory
Radiation Safety in Nuclear Medicine
Radiation safety in PET CT
Radiation Safety In Radiotherapy

National Learning DDO Knowledge Centre



Radiation Safety in Nuclear Medicine

🌐 Online, 🕒 No deadline

Radiation Safety In Nuclear Medicine

Launch



To-do

← Go To Current Learning

Modules

Overview

TOOLS

Personal Notebook

RECORDS

Certification

Records/Transcript

EVALUATION

Peer Comments

COMMUNICATION

All News

Getting Started

Posted on 13-Nov-2012, by System Administrator

1. Start the module by clicking on the Launch button.
2. To evaluate this course click on the Evaluation link (The completion of the course evaluation is Optional).
3. To print the certificate go to the certification link available on the left side of the iLearn portal (a copy of the certificate will be sent to your Hospital email...[Read More >>](#))

Evaluation

Please take the evaluation after completing the course.

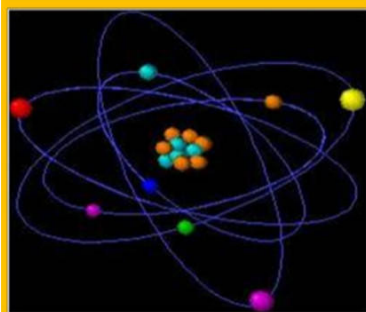
[Radiation Safety Modules Evaluation](#) Incomplete



RADIATION PROTECTION IN NUCLEAR MEDICINE

RADIOACTIVITY & RADIATION

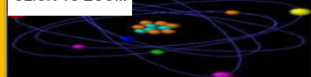
- All matter in our environment is composed of atoms.
- Most atoms on the earth are stable.
- Some atoms are unstable (**Radioactive**), giving off energy in the form of radiation in order to reach a stable state.
- An example for radioactive atoms is Carbon-14 which exists in all living things, Iodine-131 and Yttrium-90
- When outer electrons of the atom absorb radiation energy they leave the atom and the atom becomes **ionized**.



ATOMIC STRUCTURE

Most atoms on the earth are stable (Ref. 1)

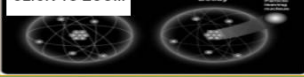
CLICK TO ZOOM



ATOMIC STRUCTURE

Most atoms on the earth are stable (Ref. 1)

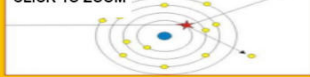
CLICK TO ZOOM



Radioactive Decay

Some atoms are unstable (Radioactive), giving off energy in the form of radiation in order to reach a stable state (Ref. 1)

CLICK TO ZOOM



Ionization

Electrons of the atom absorb radiation energy they leave the atom and the atom becomes ionized (Ref. 1)

POSITION: 1/46

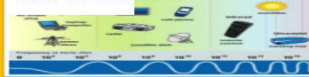


RADIATION PROTECTION IN NUCLEAR MEDICINE

TYPES & SOURCES OF RADIATION

- There are two types of radiation:
 - **Ionizing radiation** (example: X , Gamma rays and Beta particles)
 - **Non Ionizing Radiation** (Example: Radio Waves and Micro waves)
- The sources of radiation are:
 - **Natural Radiation Background** (Amounts of radioactive substances naturally occur in soil, rocks, plants, animals and in our own bodies).
 - **Man-Made** Sources of radiation are radioactive materials produced in nuclear reactors (Iodine-131, Yttrium-90) and radiation producing equipment (x-ray machines and accelerators)
- Radiation can be produced either from radioactive atoms (used in nuclear medicine) or using electrical machines (used in diagnostic x-ray machines).

CLICK TO ZOOM



NON IONIZING RADIATION

Some atoms are unstable (Radioactive), giving off energy in the form of radiation in order to reach a stable state (Ref. 1)

CLICK TO ZOOM



IONIZING RADIATION

Ionizing radiation used in medicine is produced either from radioactive materials or from radiation producing machines (Ref. 1)

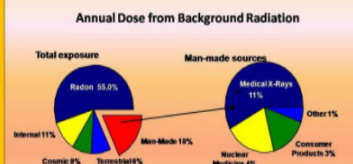
CLICK TO ZOOM



IONIZING RADIATION

Ionizing radiation used in medicine is produced either from radioactive materials or from radiation producing machines (Ref. 1)

POSITION: 2/46



Total US average dose equivalent = 3.6 millisievert/year

IONIZING RADIATION

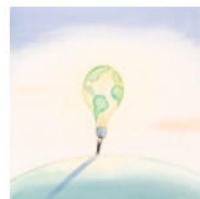
Ionizing radiation used in medicine is produced either from radioactive materials or from radiation producing Machines (Ref. 1)



RADIATION SAFETY TRAINING COURSE

RADIATION SAFETY IN RADIATION THERAPY

START MODULE ▶



Radiation Safety In Radiotherapy

by KFSH&RC (Gen.Org.)

★☆☆☆☆ 1 Reviews

Radiation Safety In Radiotherapy

Learning Type: Online

Subject: Safety

Language: English

Who Should Take This: • Physicians, Physicists, engineers, therapists, Technologists and Nurses working in radiotherapy departments.

Objectives: • Learning the target audience how to protect him/her self, staff, patients and general public from exposure to ionizing radiation in radiation therapy departments.

More Information:

Support Contact:

Sessions: Radiation Safety In Radiotherapy

Seats: Unlimited

Enrol

Close

▲
to top of page

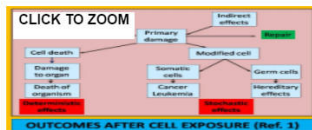
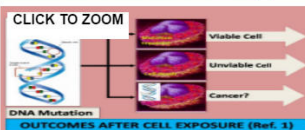
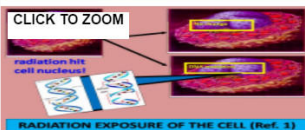
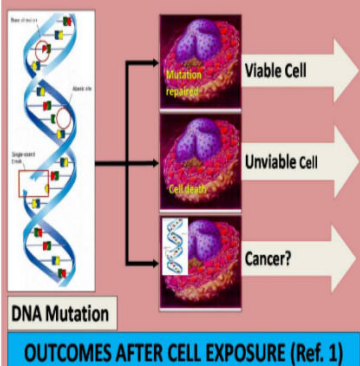




RADIATION PROTECTION IN RADIATION THERAPY

BIOLOGICAL EFFECTS OF RADIATION

- Cell nucleus containing **DNA** is the **most sensitive** part to radiation in the cell.
- **Chronic Exposure** to radiation (exposure to low levels of radiation over a period of years) may lead to a slight increase in the probability of cancer incidence and leukemia (**Stochastic Effects**).
- **Acute Exposure** to radiation (exposures to high levels of radiation in a short time) may produce the same effects faster and may also cause hair loss, skin burns, radiation sickness or even death (**Deterministic Effects**).
- Radiation may also increase the risk of **genetic abnormalities** (**Hereditary Effects**).

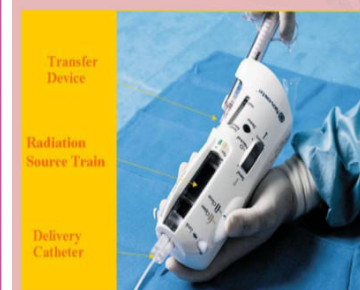


POSITION: 5/46

RADIATION PROTECTION IN RADIATION THERAPY

RADIATION PROTECTION DURING BRACHYTHERAPY

- Brachytherapy treatments may involve placing the source directly against the diseased tissue (direct loading) or placing a source into applicators or tubes for a prescribed time (after loading).
- Brachytherapy using high dose rate sources must be carried out in a controlled environment where:
 - Staff must remain outside the room during the treatments.
 - The treatment room must be fitted with interlocked doors and warning signs.



BETA CATH. SYSTEM (NOVOSTE)
(Ref.1)



POSITION: 22/46

RADIATION PROTECTION IN NUCLEAR MEDICINE

Credited question

The three practical basic principles for radiation protection are:

Select all correct variants

- Maximize the distance from the radioactive source.
- Minimize the time of exposure to radiation.
- Use appropriate shielding.

Attempts: 1



POSITION: 31/46





Conclusion

- Some positive changes from the regulatory body i.e. RPO requirements
- The current RPO Training has proven to be effective
- More effort is needed to improve the teaching skills of some our lecturers (TTT)
- improving and Finalizing the advance RPO training course
- Seek international support (IAEA) in the development of the National e-learning program in radiation protection

