# ROLES AND RESPONSIBILITIES OF MEDICAL PHYSICIST IN NUCLEAR MEDICINE DEPARTMENT

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Institute of pathophysiology and nuclear medicine Medical faculty, University of "Cyril and Methodius" Skopje, Macedonia Republic of Macedonia encompasses 25.700 km2, about 2.1 million citizens. There are two public nuclear medicine department and one private. The main department belongs to Clinical center "Mother Theresa", Institute of pathophysiology and nuclear medicine Skopje.

The second Nuclear medicine department is at Bitola Clinical hospital.



#### Equipment

- 4 gama cameras:
- Planar MEDISO
- Two SPECT (Sopha DS7 and SIEMENS ecam)
- SPECT double head (MEDISO DHV)
- Dose calibrators
- Survey meters
- GE double headPET/CT system
- MEDISO DHV







## What is Nuclear Medicine?

 Nuclear medicine is a medical specialty that uses radioactive materials to both diagnose the body and treat disease

 Nuclear medicine imaging documents organ function and structure

![](_page_5_Picture_0.jpeg)

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![](_page_6_Picture_0.jpeg)

![](_page_7_Picture_0.jpeg)

![](_page_8_Picture_0.jpeg)

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#### Dual head MEDISO DHV, 2008

![](_page_9_Picture_1.jpeg)

## Main areas activity in nuclear medicine

Nuclear medicine procedure

• Diagnostic procedure in nuclear medicine which are tests of body function (planar, dynamic, gated studies, SPECT, PET/CT).

![](_page_10_Figure_3.jpeg)

![](_page_11_Picture_0.jpeg)

#### DMSA Tc99m static scan

![](_page_12_Figure_1.jpeg)

# Su coloid Tc 99m liver ap marker 799K ap 799K do 799K

![](_page_14_Picture_0.jpeg)

![](_page_15_Picture_0.jpeg)

#### Whole body MDP Tc99m

Skelet AP-PA 06.09.2006

![](_page_16_Picture_2.jpeg)

![](_page_17_Picture_0.jpeg)

•Therapeutic procedures in which the radiation is used to treat disease (benign and malignant)

• Radionuclide therapy ex. I-131 (hyperthyroidism and thyroid cancer)

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# lodine 131 whole body scan performed after 10 days of delivered dose

- Dosimetry control and monitoring (patients, workers and environment)
- Quality control of equipment
- Radiation protection and safety
- Radioactive waste
- Research and education

# Quality Control of gama camera

- 1. Daily procedures for QC
- Image uniformity
- Background count rate
- System sensitivity
- 2. Weekly or monthly
- Resolution and linearity

# Development and validation of clinical studies

The medical physicist should work closely with the medical staff to provide technical advice relevant to the execution of the studies

#### Teaching

MP should be involved in teaching other professionals particularly in the fields of radiation safety and instrument principles

# More specifically MP in nuclear medicine is involved in:

- Commissioning of new units
- Quality control supervision
- Inspection of technical adjustments and calculation of the manufacturers
- Ensuring the quantitative aspects of the measurements
- Verify the compliance of standard acquisition protocols with DRLs
- Mentoring of technologists and physicians to insure the safe use of the unit

- Collect patient dose data on a regular basis to allow an adaptation of the DRLs
- Patient dose estimation
- Check for image fusion (multi modality)
- Discussion of the results with on-site experts
- Radiation protection when dealing with metabolic therapy.

Personal education as a medical physicist:

1.4 year Bsc. Physics, Faculty of natural sciences, Institute of physics,

1.3 year specialization program at Medical faculty – specialist of nuclear medicine physics

3. Master degree in medical physics thesis titled "Radiation doses to family members of patients treated for hyperthyroidism and thyroid cancer with radioiodine 131"

4. PhD titled "Effective dose estimation and risk assessment in patients treated with iodine <sup>131</sup>I using Monte Carlo simulations"

5. MADEIRA project, EU Commission, 7-th framework

6. **ORAMED** project, EU Commission, 7-th framework

7. Bilateral collaboration between Belgium and Macedonia (IRE and SCK)

8. Implementation of cyclotron unit and PET/CT in the Republic of Macedonia, IAEA, Government of Republic of Macedonia

9. Several others on going projects at IPNM. Sarajevo school of high energy and medical physics, 18-24 May, 2014

# Careers

- Medical Physicist in radiotherapy.
- Medical Physicist in nuclear medicine.
- Radiodiagnostic and interventional radiology.
- Radiation Protection.
- Environmental Protection.
- Dosimetrist.
- Research.
- Education.

## **THANK YOU!**

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