

## MEDICAL PHYSICS EDUCATION AND TRAINING IN EGYPT

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**Abstract:** The aim of this paper was to investigate the current status of education and training programs for medical physics in Egypt. Most Medical Physicists work in Radiotherapy and Nuclear Medicine and medical Imaging departments in University Teaching Hospitals, Institutions and private centers. Medical physics education in Egypt is provided at biophysics departments of 18 universities as master MSc and doctorate PhD levels program. Egypt has infrastructure for medical imaging, radiation therapy and radiation protection including the private and public centers.

**Keywords:** medical physics, education program, infrastructure, Medical equipment

### I. INTRODUCTION

Medical physics is a profession classified by the International Labor Organization in 2011 [1]. The role and responsibility of the medical physicist refer to medical exposure, patient protection and safety. Specialized education, clinical training and competencies are required for the clinically qualified medical physicist [2].

**Table (1): Universities offered Academic Education**

University Name	Postgraduate program
Cairo	-Radiation Physics Diploma -Health Physics Diploma. - Medical Biophysics MSc, PhD
Ain Shams	- Health Physics Diploma. - Medical Biophysics MSc, PhD
Al-Azhar	-Radiation Physics Diploma, MSc, PhD
Helwan	- Medical Biophysics MSc, PhD
Alexandria	-Radiation Physics Diploma, MSc, PhD
Mansoura	-Medical Biophysics MSc, PhD
Port Said	-Radiation Physics Diploma
Suez Canal	-Medical Biophysics MSc, PhD
Tanta	-Radiation Physics Diploma, MSc, PhD
Menoufia	-Radiation Physics Diploma, MSc, PhD
Assiut	-Medical Biophysics MSc, PhD
Aswan	-Radiation Medical Physics Diploma
Fayoum	-Medical Biophysics MSc, PhD
Sohag	-Radiation Medical Physics Diploma
Minia	-Medical Biophysics MSc, PhD
South Valley	-Radiation Physics MSc, PhD

The recognition of medical physicists remains a challenge in Egypt [3]. The existing educational program is to produce scientific elites specialized in medical physics that have the ability to keep abreast of the tremendous recent developments in basic and medical sciences and activating the research and technical role of the medical physicist in the hospitals of universities of Egypt and other specialized medical centers, to deepen the academic study of applied medical physics and directly link it to the needs and requirements of the labor market, and produce a new generation with broad knowledge in understanding the physical sciences closely associated with direct clinical work to serve patients, develop health care and create specialized academic schools with practical experience in medical physics. The educational situation (course syllabus, number of faculty members, number of PhD and MSc students and sub-fields offered in the department) and the professional situation (work experience, workplaces of medical physicists, postgraduate degrees that were granted and the amount of therapy and imaging equipment). The Universities offered academic education shown in table 1. [4]

### II. INFRASTRUCTURE

It has infrastructure for medical imaging, radiation therapy and radiation protection including the private and public centers, where the equipment's for medical imaging facilities and radiation therapy are listed as shown in table 2 [5, 6]. Most medical physicists (65%) work in the radiotherapy physics sub-specialty. Also, about 24% in nuclear medicine and little number of medical physicists in medical imaging sub-specialty as operators for MRI and CT machines and distribution of medical physicists in Egypt listed as shown in table 3 [7].

### III. REGULATION OF MEDICAL PHYSICS

Most medical physicists work in radiotherapy and nuclear medicine and medical imaging departments in university teaching hospitals, institutions and private centers. medical physics education in Egypt is provided at more than 12 universities as master MSc and doctorate PhD program levels in most physics / biophysics departments, faculties of science, e.g. Cairo university, Ain Shams university, Al Azhar university, Mansoura university, Alexandria university, Helwan university, Fayom university, Banha university, Suez Canal

university, Port Said university and Assiout university, where medical physics students graduate every year (1).

**Table (2): Medical equipment's for medical imaging and radiation therapy**

Equipment	Total
SPECT/CT	15
SPECT	72
PET/CT	52
Dose calibrators	238
Co-60 EBRT	18
Linear Accelerator	92
MRI	230
CT	725
Mammography	185
Standard Radiology	3852
Interventional	622

**Table (3): Distribution of medical physicists in Egypt**

Medical Physicists	Total
Radiotherapy (Qualified+ Under supervision)	232
Nuclear Medicine	56
Radiology (operators)	86
Total	374

#### IV. EDUCATION AND TRAINING

Medical physics education and training started in Egypt, three decades ago. The structural organization of the program divided into two parts; the first one academic Part, It is a specialized course in medical physics taught by a group of distinguished professors in this specialization in addition to that during this period the student training one day a week in one of the specialized medical centers and clinical research institutes. The second one is practical part, where the student is trained in medical imaging and diagnostic equipment, nuclear medicine facilities, radiation therapy, health physics, radiation protection.

#### V. CONCLUSION

Medical physics training and practice has seen steady progress over the past 21 years .The formation of the recorder files for Medical Physicists and Egyptian Association for Medical Physics has been a major step in helping to establish medical physics carriers .The process of establishing such organizations and recognition by the

respective of Egyptian Ministry of Health and Population, that participated in this project. Overall, however, they have proven to be an effective channel to facilitate education, training, and research in all universities in Egypt. Survey shows that the number of the medical physicists in the Egypt was almost doubled during the past 10 years. This achievement requires special congratulations to all

colleagues who supported and worked for the development of the medical physics profession in the Egypt.

#### REFERENCES

1. Smith PHS, Nusslin F: Benefits to medical physics from the recent inclusion of medical physicistes in the international classification of standard occupations. (ISCO-08), Med. Phys. Int 2013, 10-14.
2. International Atomic Energy Agency: Role and responsibility and education and training requirement for clinically qualified medical physicists, Human Health Series No.25, 2013, IAEA Vienna.
3. Meghzifene A: Call for recognition of medical physics profession, The Lancet 377, 1-2, 2011.
4. Supreme Council of Universities, Cairo, Egypt.
5. Executive Office for the Prevention of Ionizing Radiation, Ministry of Health and Population, Cairo, Egypt.
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