The education of medical physicists can be divided into three stages. After a first step of training the physicist up to a basic standard (B.Sc.) in Physics, Mathematics and other relevant topics in Physical Sciences, the second stage is a postgraduate qualification (minimum a Masters degree in Medical Physics or equivalent). The third stage is in-service training in hospitals.

A minimum of two years of professional work, including on-the-job clinical training, is required.

Medical Physicists at Expert Level (Medical Physics Experts) After completing the above steps, the physicist can be recognised as a medical physicist. To reach a senior level as a Medical Physics Expert (MPE) further education and training is required to Level 8 of the European Qualification Framework (EQF), i.e. doctoral level or equivalent in Medical Physics.

The mission of the Federation is to harmonize and advance medical physics both in its professional clinical and scientific expression throughout Europe, to strengthen and make more effective the activities of the national organizations by bringing about and maintaining systematic exchange of professional and scientific information, by the formulation of common policies, and by promoting education and training programs.

This process is detailed in the European Commission Radiation Protection report No. 174 “European Guidelines on Medical Physics Expert” (MPE Guidelines). It is important to note that the presence of Medical Physicists at Expert level in hospitals is REQUIRED by EU directive 2013-59-Euratom.

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Medical Physicist

Medical Physics is an internationally recognised applied science in healthcare. It is concerned with the application of the principles, concepts, methods and techniques of physics to medicine. Medical physicists are post-graduate scientists, who work in many different areas of healthcare managing and delivering services and carrying out research and development.

Mission Statement of the healthcare profession “Medical Physicist”

“Medical Physicists will contribute to maintaining and improving the quality, safety and cost-effectiveness of healthcare services through patient-oriented activities requiring expert action, involvement or advice regarding the specification, selection, acceptance testing, commissioning, quality assurance/control and optimised clinical use of medical devices and regarding patient risks and protection from associated physical agents (e.g., x-rays, electromagnetic fields, laser light, radionuclides) including the prevention of unintended or accidental exposures; all activities will be based on current best evidence or own scientific research when the available evidence is not sufficient. The scope includes risks to volunteers in biomedical research, carers and comforters. The scope often includes risks to workers and public particularly when these impact patient risk.”

SPECIALITIES

Medical physicists most commonly work in one of four areas: diagnostic and interventional radiology, radiotherapy (radiation oncology), nuclear medicine and radiation protection. While research and teaching is also part of the role of the medical physicist.

Diagnostic and Interventional Radiology
Medical physicists typically deal with areas of testing, use optimization, and quality assurance of medical imaging devices used in radiography, fluoroscopy, mammography, angiography, and computed tomography, ultrasound, and MRI. They are heavily engaged with radiation protection issues such as radiation exposure monitoring and dosimetry. Imaging physicists are also engaged in clinical areas including for research and teaching.

Radiotherapy (Radiation Oncology)
In this area, medical physicists work as an important part of an oncology team that implements a treatment plan. Medical physicists review plans developed by dosimetrists and verify that the treatment plans are safe and effective, based on their knowledge of physics and human biology. Like medical physicists involved in imaging, those involved in treatment oversee the safe application of radiation by confirming that machinery is calibrated correctly and delivering the correct dosage of radiation to the correct position in the patient throughout the treatment.

Nuclear medicine
As part of a nuclear medical team that includes physicians and technicians, medical physicists evaluate the physical aspects of nuclear medical applications. Medical physicists use their knowledge of the possible effects of radiation on patients to develop accurate estimates for the lowest effective dosage. These physicists also have expertise in interpreting images and in analyzing data produced during administration of nuclear medical procedures.

Radiation Protection
Medical physicists understand how radiation can affect the human body and the environment, and what doses of radiation are dangerous. At hospitals and other medical facilities, they help to protect workers, patients, and visitors by ensuring that facilities using radiation sources are doing so safely. They are responsible for evaluating radiation safety procedures, monitoring possible radiation exposure, and ensuring that the facility complies with government regulations on radiation safety. Medical physicists also work as instructors or train others in radiation safety.

Other areas
Medical physicists also participate in medical research, teach or train other professionals, or work as consultants. As researchers, medical physicists work in a variety of areas relating to the application of physics to healthcare, including research related to radiation applied to medicine, physiological measurement, medical applications of computers, and developing imaging equipment and technologies. As educators, medical physicists instruct or train other medical physicists, medical doctors and students, and other healthcare workers.