Acta Scientific Applied Physics

Volume 2 Issue 6 June 2022

Editorial

Medical Physics and the Health Benefits of the Population

Mititelu Magdalena*

Department of Clinical Laboratory and Food Safety, Faculty of Pharmacy, University of Medicine and Pharmacy Carol, Davila, Bucharest, Romania

***Corresponding Author:** Mititelu Magdalena, Department of Clinical Laboratory and Food Safety, Faculty of Pharmacy, University of Medicine and Pharmacy Carol, Davila, Bucharest, Romania.

Received: March 19, 2022

Published: April 20, 2022

Medical physics has become an essential field for diagnosing and treating many complicated conditions. Medical physics is the field of medicine that uses the principle, methods and techniques of physics in medical practice and research for the prevention, diagnosis and treatment of human diseases with a specific goal of improving human health and well-being. Numerous branches of medical physics have been developed at present with applications in radiological oncology, medical imaging, nuclear medicine, medical radiology, physiological measurements.

Magnetic resonance imaging (MRI), for example, has now become the main diagnostic technique used in the routine identification of various diseases, replacing, especially in developed countries, the computed tomography (CT). The advantages of using this type of examination are multiple, starting from the fact that it is a non-invasive technique, it does not use ionizing radiation (it uses strong magnetic fields, radio waves and field gradients) and reaching a very high resolution in terms of tissue investigation. Magnetic resonance imaging can provide functional as well as morphological information, the results being based on numerous tissue parameters. MRI is the chosen investigative tool for neurological cancers because it has a better resolution than CT and provides a better view of the posterior fossa.

Magnetic resonance angiography involves the examination of blood vessels after the introduction of radiopaque substances, and is used for vessels in the head and neck area (vertebral arteries and carotid artery), to monitor any areas of constriction or dilation. At the level of the abdomen, the arteries that ensure the vascularization of the kidney are examined.

Nuclear medicine is considered a modern specialty that uses radioactive substances for the diagnosis and treatment of oncological, endocrinological and other diseases. Nuclear imaging provides unique information, which often cannot be obtained by other imaging methods, and offers the possibility of detecting the pathology in the early stages. Nuclear medicine investigations are indispensable in obtaining a definite diagnosis and in establishing the optimal therapeutic conduct for the patient, as well as in monitoring the lesions and evaluating the response to treatment in the case of cancer patients.

The basic principle of nuclear medicine explorations is to introduce a radioactive substance into the patient's body (usually orally or intravenously). Thus, the patient becomes a radiation emitter. This radiation is captured by a detector, while a computer processes the information obtained, and an image of the distribution of the radioactive substance in the body is displayed on a monitor. The most important radioactive substances (radioactive isotopes or radioisotopes) used in nuclear medicine are Technetium 99m (metastable) and Iodine 131. Technetium 99m is the most widely used radioisotope for scintigraphy, while Iodine 131 is mainly used for treatment. Because radioactive iodine has a high affinity for the thyroid, it is easy to guess that its main use is to treat thyroid cancer. Regarding the side effects of using Technetium 99m, it should be noted that it is very well tolerated by the body, very rarely causes allergic reactions and can be used even in the new-born. The only absolute contraindication to scintigraphy is pregnancy.

Exploration of nuclear medicine (scintigraphy) was one of the most widely used techniques of the twentieth century, being

considered the pinnacle of imaging investigations along with classical radiological explorations. After the 1970s, with the development of ultrasound, computed tomography, and magnetic resonance imaging, the applications of nuclear medicine declined considerably, but now, thanks to new discoveries such as SPECT (Single-photon emission computed tomography) and PET (Positron emission tomography), nuclear medicine is regaining its place among the top investigations. Nuclear medicine often provides additional information that complements other imaging techniques.