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LETTER TO THE EDITOR

Ionizing Radiation: Are Radiology Professionals at Risk?

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Dear Editor,

A number of scientific discoveries towards the end of the 19th century brought a greater understanding of radiation and, in particular, its harmful effects [1]. Nevertheless, radiation has become a useful tool in modern medicine and science. Ionizing radiation, in particular, is an effective diagnostic technique used in medical imaging [2]. Examples of ionizing radiation include high-energy ultraviolet radiation, X-rays, neutrons, gamma rays, alpha particles, and beta particles [3]. Ionizing radiation comes from a variety of natural sources which include cosmic radiation from space and environmental radiation from rocks and soil. The term “background radiation” is used to describe these radiation sources. Nuclear energy sources, and medical equipment, for example, X-ray machines, CT scanners, and mammography, as well as industrial equipment used for scientific study and measurement, are all examples of artificial sources of ionizing radiation [3]. Ionizing radiation has numerous uses in industry, agriculture, research, and medicine. However, when radiation doses exceed a particular threshold, severe health problems may develop, including skin burns or acute radiation syndrome. Even at low doses, prolonged ionizing radiation can result in cancer [4]. Short-term exposure to radiation doses of 10 Sv and higher can affect the normal functioning of organs and tissues within the body and continued exposure can lead to death [5].

Radiology professionals made up a sizable portion of the working population exposed to radiation from man-made sources and were among the first occupational groups to be subjected to ionizing radiation [6, 7]. To ensure that exposure to ionized radiation is prevented, radiology professionals make use of protective equipment which includes physical protection *via* gloves, eye protection, masks, face shields, gowns, lead aprons, thyroid shields, and personal radiation dosimeters [8].

Caseload and exposure to ionizing radiation appear to vary depending upon country. In South Korea, male professionals were more frequently involved in interventional radiology, portable X-rays, and CT scans, whereas female professionals performed most mammography procedures. The average yearly effective dose for male and female professionals in South Korea for example, was 2.3 mSv and 1.3 mSv, respectively [9]. Despite receiving lower radiation doses than males, female professionals had a greater risk of radiation-related cancers. Women's increased risk of breast and thyroid cancer was the main cause of their higher lifetime attributable risk (LAR). In most other cancer locations, men had greater LARs than women [10].

Several studies have shown that being exposed to medical radiation increases the risk of thyroid carcinoma, bone marrow suppression, cataract, infertility, and congenital disabilities [11 - 13]. Different radiation-related disorders have different threshold doses. For instance, cancer and teratogenic consequences [13] are linked to doses of 100–200 mGy, but cataracts are linked to doses of 500 mGy [14]. Therefore, decreasing radiation exposure among radiology professionals depends greatly on awareness and knowledge of radiation hazards and protective procedures [15].

In Greece, the level of health professionals' general knowledge of the safety of radiation protection was unsatisfactory [16]. There were higher misconceptions about radiation and radiation protection among women and workers with lower levels of education [16]. Recent literature has raised concerns that referring doctors' awareness of radiation doses received during diagnostic radiological procedures was insufficient [17, 18]; that knowledge about radiation dose and risk among radiology professionals is still inadequate [19, 20]; and many radiology practitioners still maintain that X-rays do not immediately generate serious adverse effects [21]. In

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addition, such practitioners are not sufficiently aware of radiation protection [22] or are not using appropriate protection correctly. In Bangladesh, 10% of radiological technologists have some knowledge of the As Low As Reasonably Achievable principle and ionizing radiation; 28% of the technologists did not regularly wear lead aprons at work [23]; and radiation protection equipment is deficient or completely absent in many hospitals [7].

Ultrasound is another diagnostic procedure that is not based on ionizing radiation. This procedure could prevent exposure to ionizing radiation. The most commonly used medical imaging technique for examining the fetus during pregnancy is ultrasound. Furthermore, the diagnosis of lung cancer in clinical practice benefits from using lung ultrasonography [24].

Whilst the impact of radiation is becoming more prevalent, many radiology professionals are still not fully cognizant of the associated health hazards. There needs to be a more concerted effort to promote the importance of appropriate health and safety amongst radiology professionals and a more rigorous approach to the use of protective equipment to prevent exposure to ionizing radiation and its long-term impact on health.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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