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The Present State of Microwave Radiation and the Brain

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Introduction

Radiation dose is a measure of the amount of ionizing radiation absorbed by a person or an object. Ionizing radiation refers to high-energy particles or waves that have the ability to remove electrons from atoms and molecules, leading to ionization. This type of radiation can come from natural sources such as cosmic rays and radon gas, or from man-made sources such as medical procedures and nuclear power plants. The amount of ionizing radiation absorbed by a person or an object is measured in units called sieverts (Sv) or millisieverts (mSv).Radiation dose is an important concept in radiation protection as it helps to assess the potential health risks associated with exposure to ionizing radiation. The risk of health effects from ionizing radiation depends on the dose received and the type of radiation. Generally, high doses of ionizing radiation can cause immediate health effects such as radiation sickness, while long-term effects such as cancer may occur from exposure to lower doses over a longer period of time [1].

The adverse health effects of using depleted uranium (DU) weapons are the subject of ongoing debate. Secondary electrons interact directly or indirectly with living cell DNA to produce the biological effects of gamma radiation. The probability that high-atomic-number particles will absorb X-rays and gamma rays with energies below about 200 keV is inversely proportional to the third or fourth power of the atomic number. The more heavily ionizing the electrons, the more preferentially low-energy recoil electrons are produced; In the immediate vicinity of the particles, these increase dose. Particles of DU in the human body, it has been claimed, would produce dose enhancement by a factor of 500–1000 when exposed to naturally occurring background gamma radiation. This would add a significant radiation dose to the dose received from the DU's inherent radioactivity. Using the Monte Carlo code EGSnrc, we were able to accurately estimate the likely maximum dose enhancement brought on by the body's exposure to uranium particles of micrometer size in this study [2]. We discovered that, despite the fact that the dose enhancement is significant of the order of 1–10 it is much smaller than was previously suggested.

The frequency of an electromagnetic wave can be anywhere from 300 GHz to 3 kHz. Radio waves are frequently utilized as envelope signals on wavelength and radio communication channels for the purpose of observing astronomical objects. Short-range radio waves are what make up microwaves. They fall under the radio wave subclass category. The frequency range of microwaves is 300 MHz to 300 GHz. Because water molecules have a resonance frequency in the microwave range, microwave ovens frequently use microwaves [3]. Microwaves are utilized in navigation, astronomy, radar and spectroscopy. As a result, microwaves have become an essential component of our day-to-day lives thanks to the development of cutting-edge electronics and novel systems based on microwaves. More specifically, the growing number of radio-wave-based applications has prompted research into the biological effects of those applications. The possible mechanisms and interactions of radiation with biological systems are synthesized in the following review.

Description

There are different types of radiation dose, including effective dose, equivalent dose and absorbed dose. Effective dose is a measure of the overall radiation dose to the entire body, taking into account the type of radiation and the sensitivity of different organs to radiation. It is expressed in units of sieverts (Sv) or millisieverts (mSv). Equivalent dose is a measure of the radiation dose received by a specific organ or tissue, taking into account the type of radiation and the sensitivity of that tissue to radiation. It is expressed in units of sieverts (Sv) or millisieverts (mSv). Absorbed dose is a measure of the amount of energy absorbed by a specific tissue or organ from ionizing radiation. It is expressed in units of grays (Gy) or millisieverts (mSv).The International Commission on Radiological Protection (ICRP) provides guidance on radiation dose limits for occupational exposure and public exposure. For occupational exposure, the recommended annual effective dose limit is 20 millisieverts (mSv) per year averaged over five years, with a maximum of 50 mSv in any one year. The recommended annual equivalent dose limit for the lens of the eye is 20 mSv and the recommended annual equivalent dose limit for the skin and extremities is 500 mSv. For public exposure, the recommended annual effective dose limit is 1 mSv per year, with a maximum of 5 mSv in any one year [4].

Medical imaging procedures are a common source of ionizing radiation exposure for the general public. These procedures include X-rays, computed tomography (CT) scans and nuclear medicine imaging studies. The amount of radiation dose from these procedures varies depending on the type of procedure and the specific equipment used. In general, the radiation dose from medical imaging procedures is relatively low and the benefits of the procedure usually outweigh the risks associated with the radiation dose.However, it is important to be aware of the potential risks associated with radiation exposure from medical imaging procedures, particularly for individuals who may undergo multiple procedures over time. The risk of cancer from radiation exposure is cumulative, meaning that each exposure adds to the total dose received over a lifetime. Therefore, it is important to minimize unnecessary medical imaging procedures and to use alternative imaging techniques when appropriate [5].

Conclusion

In addition to medical imaging procedures, radiation dose is also a concern for individuals who work with radioactive materials or who are exposed to radiation in other occupational settings such as nuclear power plants. These individuals may be required to wear personal protective equipment and to follow specific safety procedures to minimize their radiation exposure. The general public may also be exposed to radiation from environmental sources such as cosmic radiation and radon gas.

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Conflict of Interest

None.

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