Bioradiation

1-1 Radiation definition:

Radiation, when broadly defined, includes the entire spectrum of electromagnetic waves : radiowaves, microwaves, infrared, visible light,
ultraviolet, and x-rays and particles.

In physics, radiation is the emission or transmission of energy in the form of waves or particles through space or through a material medium. This
includes:

1-Electromagnetic radiation, such as heat, radio waves, visible light, x-rays, and gamma radiation (γ)

2-particle radiation, such as alpha radiation (α), beta radiation (β), and
neutron radiation (particles of non-zero rest energy)

3-Acoustic radiation, such as ultrasound, sound, and seismic waves (dependent on a physical transmission medium)

4-Gravitational radiation, radiation that takes the form of gravitational
waves, or ripples in the curvature of space-time.

1-2 Ionizing Radiation

Radiation with sufficiently high energy can ionize atoms; that is to say it can knock electrons off atoms and create ions. Ionization occurs when an electron is stripped (or "knocked out") from an electron shell of the atom, which leaves the atom with a net positive

charge. Because living cells and, more importantly, the DNA in those cells can be damaged by this ionization, exposure to ionizing radiation is considered to increase the risk of cancer.

Thus "ionizing radiation" is somewhat artificially separated from particle

radiation and electromagnetic radiation, simply due to its great potential for biological damage. While an individual cell is made of trillions of atoms, only a small fraction of those will be ionized at low to moderate radiation powers.

The probability of ionizing radiation causing cancer is dependent upon the absorbed dose of the radiation, and is a function of the damaging tendency of the type of radiation (equivalent dose) and the sensitivity of the irradiated organism or tissue (effective dose).

1-Ultraviolet radiation

Ultraviolet, of wavelengths from 10 nm to 125 nm, ionizes air molecules,

causing it to be strongly absorbed by air and by ozone (O3) in particular.

2-X-ray

X-rays are electromagnetic waves with a wavelength less than about 10−9 m (greater than 3x1017 Hz and 1,240 eV). X-rays are also totally absorbed by the thickness of the earth's atmosphere, resulting in the prevention of the Xray output of the sun, smaller in quantity than that of UV but nonetheless powerful, from reaching the surface.

3-Gamma radiation

Gamma (γ) radiation consists of photons with a wavelength less than 3x10−11 meters (greater than 1019 Hz and 41.4 keV).

4-Alpha radiation

Alpha particles are helium-4 nuclei (two protons and two neutrons). They interact with matter strongly due to their charges and combined mass, and at their usual velocities only penetrate a few centimeters of air, or a few millimeters of low density material (such as the thin mica material which is specially placed in some Geiger counter tubes to allow alpha particles in).

5-Beta radiation

Beta-minus (β−) radiation consists of an energetic electron. It is more penetrating than alpha radiation, but less than gamma. Beta radiation from radioactive decay can be stopped with a few centimeters of plastic or a few millimeters of metal.

6-Neutron radiation

Neutrons are categorized according to their speed/energy. Neutron radiation consists of free neutrons. These neutrons may be emitted during either spontaneous or induced nuclear fission.

7-Cosmic radiation

There are two sources of high energy particles entering the Earth's atmosphere from outer space: the sun and deep space. The sun continuously emits particles, primarily free protons, in the solar wind, and occasionally augments the flow hugely with coronal mass ejections (CME).