

Glossary

Anger camera a common medical imaging device that uses a scintillator connected to a series of photomultipliers

break-even when fusion power produced equals the heating power input

breeder reactors reactors that are designed specifically to make plutonium

breeding reaction process that produces ^{239}Pu

critical mass minimum amount necessary for self-sustained fission of a given nuclide

criticality condition in which a chain reaction easily becomes self-sustaining

fission fragments a daughter nuclei

food irradiation treatment of food with ionizing radiation

free radicals ions with unstable oxygen- or hydrogen-containing molecules

gamma camera another name for an Anger camera

gray (Gy) the SI unit for radiation dose which is defined to be $1\text{ Gy} = 1\text{ J/kg} = 100\text{ rad}$

high dose a dose greater than 1 Sv (100 rem)

hormesis a term used to describe generally favorable biological responses to low exposures of toxins or radiation

ignition when a fusion reaction produces enough energy to be self-sustaining after external energy input is cut off

inertial confinement a technique that aims multiple lasers at tiny fuel pellets evaporating and crushing them to high density

linear hypothesis assumption that risk is directly proportional to risk from high doses

liquid drop model a model of nucleus (only to understand some of its features) in which nucleons in a nucleus act like atoms in a drop

low dose a dose less than 100 mSv (10 rem)

magnetic confinement a technique in which charged particles are trapped in a small region because of difficulty in crossing magnetic field lines

moderate dose a dose from 0.1 Sv to 1 Sv (10 to 100 rem)

neutron-induced fission fission that is initiated after the absorption of neutron

nuclear fission reaction in which a nucleus splits

nuclear fusion a reaction in which two nuclei are combined, or fused, to form a larger nucleus

positron emission tomography (PET) tomography technique that uses β^+ emitters and detects the two annihilation γ rays, aiding in source localization

proton-proton cycle the combined reactions ${}^1\text{H}+{}^1\text{H}\rightarrow{}^2\text{H}+e^++\nu_e$, ${}^1\text{H}+{}^2\text{H}\rightarrow{}^3\text{He}+$, and ${}^3\text{He}+{}^3\text{He}\rightarrow{}^4\text{He}+{}^1\text{H}+{}^1\text{H}$

quality factor same as relative biological effectiveness

rad the ionizing energy deposited per kilogram of tissue

radiolytic products compounds produced due to chemical reactions of free radicals

radiopharmaceutical compound used for medical imaging

radiotherapy the use of ionizing radiation to treat ailments

relative biological effectiveness (RBE) a number that expresses the relative amount of damage that a fixed amount of ionizing radiation of a given type can inflict on biological tissues

roentgen equivalent man (rem) a dose unit more closely related to effects in biological tissue

shielding a technique to limit radiation exposure

sievert the SI equivalent of the rem

single-photon-emission computed tomography (SPECT) tomography performed with γ -emitting radiopharmaceuticals

supercriticality an exponential increase in fissions

tagged process of attaching a radioactive substance to a chemical compound

therapeutic ratio the ratio of abnormal cells killed to normal cells killed