



Radiography

DENTALELLE TUTORING
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COMMON UNITS of Radiation Measurement -

Roentgen (R)

The Roentgen is a unit used to measure a quantity called **exposure**. It is a measure of the ionizations of the molecules in a mass of air. This can only be used to describe an amount of gamma and X-rays, and only in air. The main advantage of this unit is that it is easy to measure directly, but it is limited because it is only for deposition in air, and only for gamma and x rays. One Roentgen is equal depositing to 2.58×10^{-4} coulombs per kg of dry air.

RAD (Radiation Absorbed Dose)

The RAD is a unit used to measure a quantity called **absorbed dose**. This relates to the amount of energy actually absorbed in some material. The unit RAD can be used for any type of radiation, but it does not describe the biological effects of the different radiations. One RAD is defined as the absorption of 100 ergs per gram of material.

REM (Roentgen Equivalent Man)

The rem is a unit used to derive a quantity called **equivalent dose**. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. Equivalent dose is often expressed in terms of thousandths of a rem, or millirem.

COMMON UNITS of Radiation Measurement - SI - INTERNATIONAL STANDARD

Gray (Gy)

The gray is a unit used to measure a quantity called **absorbed dose**. This relates to the amount of energy actually absorbed in some material. One gray is equal to one joule of energy deposited in one kg of a material. The unit gray can be used for any type of radiation, but it does not describe the biological effects of the different radiations. Absorbed dose is often expressed in terms of hundredths of a gray, or centi-grays. One gray is equivalent to 100 RAD.

Sievert (Sv)

The Sievert is a unit used to derive a quantity called **equivalent dose**. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. Equivalent dose is often expressed in terms of millionths of a Sievert, or micro-Sievert. To determine equivalent dose (Sv), multiply absorbed dose (Gy) by a quality factor (Q) that is unique to the of incident radiation. One Sievert is equivalent to 100 rem.

Chronic dose

A chronic dose means a person received a radiation dose over a long period of time.

Acute dose

An acute dose means a person received a radiation dose over a short period of time.

Somatic effects

Somatic effects are effects from some agent, like radiation that are seen in the individual who receives the agent.

Genetic effects

Genetic effects are effects from some agent that are seen in the offspring of the individual who received the agent. The agent must be encountered pre-conception.

Teratogenic effects

Teratogenic effects are effects from some agent that are seen in the offspring of the individual who received the agent. The agent must be encountered during the gestation period.

Stochastic effects

Stochastic effects are effects that occur on a random basis with its effect being independent of the size of dose. The effect typically has no threshold and is based on probabilities, with the chances of seeing the effect increasing with dose. Cancer is thought to be a stochastic effect.

Non-stochastic effect

Non-stochastic effects are effects that can be related directly to the dose received. The effect is more severe with a higher dose, i.e., the burn gets worse as dose increases. It typically has a threshold, below which the effect will not occur. A skin burn from radiation is a non-stochastic effect.