

The dangers of radio isotopes

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Dangers of Radioisotopes: when radiation collides with molecules In living cells It can damage them. If the DNA In the nucleus of a cell is damaged, the cell may become cancerous. The cell then goes out of control, divides rapidly and causes serious health problems. Radiation warning symbol The greater the dose of radiation a cell gets, the greater the chance that the cell will become cancerous. However, very high doses of radiation can kill the cell completely. We use this property of radiation to kill cancer cells, and also harmful bacteria and other micro-organisms.

The hazard symbol is shown on containers of radioactive substances to warn of the danger. Alpha, beta and gamma radiation The degree to which each different type of radiation is most dangerous to the body depends on whether the source is outside or inside the body. If the radioactive source is inside the body, perhaps after being swallowed or breathed in: Alpha radiation is the most dangerous because it is easily absorbed by cells. Beta and gamma radiation are not as dangerous because they are less likely to be absorbed by a cell and will usually just pass right through it.

If the radioactive source is outside the body: Alpha radiation is not as dangerous because it is unlikely to reach living cells inside the body. Beta and gamma radiation are the most dangerous sources because they can penetrate the skin and damage the cells inside. Radioactive rays are penetrating and ionizing and can therefore destroy living cells. Small doses of radiation over an extended period may cause cancer and eventually death. Strong doses can kill instantly. Marie Curie and Enrico Fermi died due to exposure to radiation. Several precautions should be observed while handling radioisotopes. Some of these are listed in the following:- 1 .

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No radioactive substance should be handled with bare hands. Alpha and beta emitters can be handled using thick gloves. Gamma ray emitters must be handled only by remote control that is by mechanical means Gamma rays are the most dangerous and over exposure can lead to serious biological damage. 2. Radioactive materials must be stored In thick lead containers. 3. Reactor and laboratories dealing with and conducting experiments with radioactive metals must be surrounded with thick concrete lined with lead. . People working with radioactive Isotopes must wear protective clothing which Is left in the laboratory.

The workers must be checked regularly with dosimeters. and appropriate measures should be taken in cases of overdose. 5. Radioactive waste must be sealed and buried deep in the ground. 'Of3 LOCK ra010active stock materials ana sealed sources In a secured contalner or a secured storage area when not in use. A stock material is radioactive material as provided by the vendor and does not include material withdrawn from the original stock for experimental use. Do not leave radioactive materials unsecured in an unattended lab, even for a short time, unless the lab is locked.

Supervise visitors to the lab. When visitors who are not accompanied by authorized lab personnel enter the lab, find out who they are and why they are there. If you discover that radioactive material is missing or lost and cannot be accounted for, notify EHS no later than the next business day. Keeping Radiation Exposure ALARA (top) The acronym ALARA, which stands for As Low As Reasonably Achievable, means that radiation workers should make every reasonable effort to keep radiation exposures s far below regulatory dose limits as practical.

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Adhering to the following practices can help keep radiation doses ALARA. Be familiar with the properties of the radioisotope to be used and with any precautions and concerns specific to that radioisotope and material. (See Appendix B for detailed information about the radioisotopes most commonly used at the University). Unfamiliar radioisotope procedures should be rehearsed before radioactive material is actually used. Wear protective clothing. Wear radiation monitor badges when appropriate. Have all the necessary materials and equipment available and ready at the start of a procedure.

For those radioisotopes with significant external radiation levels, use remote handling tools, such as tongs, to limit direct handling of stock and sample vials. Survey frequently and extensively. Don't assume that contamination will only be found on the bench top. Clean up contamination in the work area promptly. Change gloves and lab coats as they become contaminated. Work in a hood during procedures using volatile materials such as I-125 or millicurie amounts of S-35 methionine/cysteine. Cover radioactive waste cans at all times and store waste cans away from areas in which people spend substantial amounts of time.

Provide shielding for waste cans with significant external radiation levels. Do not store contaminated materials, including gels, at any desk area. Survey yourself and your clothing when radioisotope work is finished and before leaving the lab. Protective Clothing (top) Lab accidents often involve spills or splashes which can readily contaminate exposed wrists, legs and feet. For any work with an open radioactive source, wear: gloves (the longest length

available) a full-length lab coat (worn closed with sleeves rolled down) close-toed shoes.