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RADIATION WASTE DISPOSAL IN FEDERAL TEACHING HUSPITAL ABAKALIKI

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INTRODUCTION

All forms of radiations can be generally be traced to either naturally occurring or man-made (artificial) radiation. These sources released radioactive materials to air as particles or gases as a result of natural forces and from human, industrial, medical and scientific activities. Lower level radioactive or research waste (LLW) is radioactively contaminated industrial or research waste such as paper, rags, plastic-bags, protective clothing card board, packaging materials, organic fluid, water treatment residues and reagents. Hospitals, medical schools, universities, radiochemical and radiopharmaceutical manufactures and research laboratories are other users of radioactive materials which produce low level waste. Due to medical application of radioisotopes for diagnostic and therapeutic purposes in hospitals, the radiation from those sources subsequently becomes radioactive waste. Isotopes of iodine (1-128) and 1-127) emit gamma radiation and beta radiation and it is used for the monitoring of thyroid glands. Gamma rays and iodine-131 are used respectively for the detection of brain tumor or broken bones or other flaws in the body and also for thyroid tissue. Exposure to radiation could cause leukemia, chromosomal breakage, bone necrosis, bone cancer, mutation of gene, cataracts of the eye lens etc. the main ways of protecting the cell is to shield it from exposure to ionizing radiation. Thus, exposure to artificial radiation is found especially in the field of radiology such as in the area of x-ray diagnosis and radiotherapy. Medical related exposure constitutes, by far, the largest man-made radiation does to which man is subjected to. This has a global yearly average does of 0.3msv. In this work the radiation level of hospital wastes was determined in Ebonyi State.

AIMS AND OBJECTIVES

There are a lot of benefits associated with radiation like earlier mentioned under gamma radiation which helps treat cancerous cells (even though it can cause cancer as well in normal cells in high intensity radiation). But radiation helps diagnose illnesses by the use of x-rays and treat illnesses such as hyperthyroidism and cancer Radiation helps kill bacteria as well as preserve food without chemicals and refrigeration. It's plays an important role in making things like smoke detectors to even making Ice cream. In addition and work of are to help figure out the age of ancient objects through carbon dating. There are so many different ways radiation us in our day to day lives that it would be very hard for me to list here. However, if you go back to the main page you can learn about one of the most important sways radiation helps us, which is through nuclear power.

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LITERATURE REVIEW

The nature of the radiation was successfully investigated by Ernest Ruther for. Like Marie curie, he was a skillful and imaginative scientist, and in 1899 he showed that there were three distinct types of radiation namely alpha (a) radiation, beta (b) radiation and gamma (y) radiation. Radiation is the energy emitted by particle example atoms that are unstable. There are both natural and man-made form of radiation. National radiation, which is about 85% of where our exposure to radiation comes directly from the sun. Man-made radiation, which account for the rest of the 15% comes from the television to the x-rays we take at the orthopedic or the dentist. An atom is unstable because it is going through a process called decaying which in course of this process it emits radiation informs of rays and /or particles before it finally become stable. The length of the decaying process varies among the isotopes and depend on the atoms, though can range from billions of years to fractions of seconds (for example Uranium).

TYPES OF EMITTED RADIATION

While there are several different types of radiation being emitted there are four principle types from the decay of radioactive isotopes namely: alpha particle, beta particles, gamma rays and neutrons.

ALPHA PARTICLES

An alpha particle is a positively charged particle that is emitted in the radioactive decay of some unstable atoms. It is made up of two protons and two neutrons (essentially like a helium atom). Because of its size, it is heavier and slower-moving than other emissions of the radioactive decay. Alpha particles do not penetrate far into a material and can be stopped quite easily, for example by a sheet of paper. However they are capable of breaking chemical bonds when they strike a molecule because of their size, mass and charge and therefore can cause biological and chemical damage.

NETA PARTICLES

A beta particle is another particle that is emitted during a directive decay of some unstable atoms. They can be either positively (positron) or negatively (negation/Election) most negatively charged beta particle occur from natural occurring radioactive decay which positively charged beta particles can penetrate farther than alpha particles, though that depends again on where the particle is released and what type of materials is being penetrated. However they can be stopped fairly easily by a sheet of aluminum. The difference between positions and electrons is that positrons are less penetrating than electrons because they interact with an electron and both particles can penetrate the skin. (and several layers of tissue), it is considered both external hazard, though people can be shielded from beta radiation by the use of layers of metals and plastics.

GAMA RAYS

Gamma rays are very strong electromagnetic wave and it has no weight and travels at the speed of light (about $3.00x10^8$m/s). Therefore compared to alpha particle and beta particle it

is much more faster and penetrating. It is emitted when a nucleus transmission from a higher energy level to a lower energy level. Also, another type of electromagnetic radiation needs to be mention here are x-rays which are emitted by an atomic electron changing energy levels. The penetration level of gamma ray is reduced by the intensity and distance of the penetration. Low intensity of gamma radiation can damage living cells and cause cancer which high level of gamma radiation several feet of material like concrete and lead is needed to prevent penetration. This is also why gamma radiation is used in treatment also cancer called radiotherapy, in which the cancer cells are targeted by a beam of gamma radiation.

NEUTRONS

Free neutrons outside an atom unstable and usually have a half life of ten minutes they weigh about ¼ of the mass of an alpha particles but 2000 times larger than that of a beta particle, since it has in charge and it only reacts the atoms nuclei, it can penetrate. Further charged particles and it is very hard to determine it's location. Since they play an important role in nuclear fission of free neutrons since they sustain the nuclear fission chain power) it is considered as health hazard like gamma radiation, and may be even more so activation which is the ability of neutron radiation to induce radioactively which is the ability of neutron radiation to induce radioactively in most substances it encounters. This include body tissues of the people who interact with it. In addition that is why this process accounts for much of the radioactive material that is released during a detonation of a detonation of a nuclear weapon. Protection from shielding that is based on charged particle a light nuclei (for example hydrogen). The most effective material are water polyethylene, paraffin wax, or concrete-in which large amount of water is chemically bounds to it.

MEDICAL APPLICATION OF NUCLEAR RADIATION

In medical nuclear is used for both diagnostic and therapeutic purposes. Though the normal isotope of an element cannot be system, the absorption metallic uptake, movement to particular sites etc of a radioactive isotope can be traced without operating on the system or in any interfering with its functioning and constitutes the basis for the use of radioactive isotopes as tractors. A few application of tracers techniques include, the use of radio nuclide p for the accurate location of a brain tumor. This is possible because it tend to absorbs an excessive amount of phosphorous from the blood stream thus it the radio isotope P substituted for stable phosphorous in the food eaten by a patient there will be an increase in the concentration of radioactively in the tumor. The position and size of the tumor may then be determine by means of the tumor may then be determined by means of a Geiger counter without exploratory. The thyroid glands acts as regulation for the supply of iodine to the human body. Virtual all the iodine ingested and absorbed by the gut is taken up by the thyroid. This stored iodine is used to (form the hormones thyroxmines and di-iodoty rosine) which are then circulated through the body. A patient suffering from hyperthyroidism has an over-active thyroid which absorbs two much iodine two quickly and thus produces an excessive amount of hormone. This condition can be diagnosed by feeding the patient with a measured dose of radioactive iodine^{131} I given by mouth, and comparing the activity in the region of the thyroid gland with that observed for a normal person. The occurrence of

hemorrhage and its location can be identified using the radioactive isotope is taken up by the red blood cells. In this application, 51cr-labelledblood is injected into the patient. With normal blood circulation, the activity is dispersed uniformly throughout the circulating system. If hemorrhage is occurring, the radioactivity markedly increase at some regions of body, and the rate at which the activity increases is an indication of the volume of blood being lost. Heart conditions can be investigated by means of tracers element 13Ba which have a half life of 127 seconds. This radioelement is injected into the subclavian vein and enters the right ventricle almost immediately. The tracer can be following by means of counters. The observed pattern can be compared with a norm patter, giving information on the condition of the heart and lung of the patient.

MATERIAL AND METHOD

In this research work, does rate meter 6150AD (Auto mess) was used to measure radiation does rate emitting from waste dumps in five major hospitals and clinics in Ebonyi State Nigeria. The dose rate meter 6150AD is a digital radiation meter which incorporates the working principle of the Geiger Muller tube for radiation detection and measurement. The Geiger Muller tube generates a pulse of electrical current each time radiation passes through the tube and causes ionization. The dose rate meter counts ionizing events and display the result on the liquid crystal display (LCD). The dose rate meter was held one mete above the waste dumps and twenty readings taken for each of the dump. Three major waste dumps were identified and used for the experiment at each hospital/clinic. Readings were taking morning and evening fro three days in each hospital at an average of 8 hours per day. The five hospital and clinics in Ebonyi State selected for this research work in include Federal Medical Centre (FMC) Abakaliki, Ebonyi State University Teaching Hospital (EBSUTH) Abakaliki Mile 4 Hospital Ndubia. These are major hospitals in Ebonyi State which also caters for patients from the neighboring states. Some solid wastes generated from these hospitals included; card boards, papers, plastics, clothes, glass, bottles, sterilizing agent, chemicals, x-ray films, reagents and bones as well as disposables.

CONCLUSION

This research work suggest that waste dumps in hospitals and clinics in Ebonyi State have low level radioactivity, which may not ne harmful to man or animals.

REFERENCES

Steadman, P. and Hodgkinson, S. (1990); Nuclear Disasters and the built Environment, Butter Worth and Co. (Publishers) Ltd pp68.

Marvin Resnic (2005); Low Level Radiation Waste. American. Journal of Environmental and Health Weekly, Vol 32, pp68.

Bush berg, J.T., Seibert J.A., Leidholdt, E.M., and Boone, J.M. (2002); The Essential Physics of Medical Imaging, Second Edition, Wolter Kluer Company. pp 178-180.

Paul J.E. Mohammed A.R. and Sodee D.B (1979); Nuclear Medicine Technology, 3rd Ed. London Macmillan Education Limited, pp287-393.

Ike, E.E; Jwanbot, D.I; Solomon, A.O. (2002), Monitoring Alpha and Beta particles in mine sites in Jos and Environs. Nig. Journ. of phys; Vol. 14 (1) pp86-89. international atomic Energy agency (1986). Facts about low-level radiation exposure, IAEA publication NO.A.N.E. 985-06482.