DOWNLOAD PDF RADIATION IN EVERYDAY LIFE

Chapter 1 : Catalyst: Radiation in Everyday Life - ABC TV Science

In addition, there are thousands of substances in our everyday life besides radiation that can also cause cancer, including tobacco smoke, ultraviolet light, asbestos, some chemical dyes, fungal toxins in food, viruses, and even heat.

Examples Of Electromagnetic Radiation In Everyday Life Here are 10 examples of electromagnetic radiation which we come across daily and the harmful effects that result from it: This type of radiation derives from what our eyes perceive as a clear, observable field of view. We receive EM radiation as information over various wavelengths and frequencies through waves or particles, which ultimately form the electromagnetic spectrum. Other forms of visible light waves come from artificial illumination and photography devices. An excellent example of light waves radiation that you can see is the light from the screen that you look at while reading this information. One of its most important properties is color, which is also an inherent feature of the human eye. The effects of visible light radiation vary according to their range and exposure. On one hand, visible light waves are responsible for life on earth, as they boost natural processes like photosynthesis. On the other hand, they can cause photodegradation and thermal damage. In humans, light waves ensure proper biological functioning and stable mental health. Otherwise, too much light wave radiation produces macular degeneration in your eyes and temporary skin conditions. Radio Broadcasting Waves Radio waves are the basic frequencies used in communications. They are often distributed by a transmitter and vary in wavelength, which may be anywhere between: The World Health Organization has often referred to radio waves radiation as possibly carcinogenic. Furthermore, intense exposure to radio waves may lead to leukemia and other health disorders. The jury is still out on whether radio waves radiation produces adverse side effects like cancer for sure. What we know so far is that our bodies take in these waves as if they were the antennas of radio sets. Long-term exposure increases thermal radiation and may trigger headaches, vision problems, sleep disruption and even memory loss. Radio waves are also the lowest frequencies in the electromagnetic spectrum, and stars, lightning, and sparks often produce them. However, our exposure to them is rare and inconsistent enough to avoid possible harmful effects. Cell Phone Radiation Waves Another form of communication that uses radio waves is cell phone transmission. Whether you have a smartphone or an older non-intuitive model of mobile phone, you are bound to use it at least once per day. In fact, it is currently estimated that the number of cell phone users exceeds 5 billion users globally. It has been suggested that the radiation produced by cell phones could lead to cancer and the formation of terminal brain tumors. Nevertheless, the medical studies conducted on this matter have not produced enough evidence to support the claim carcinogenic effects of mobile phone technologies. The only palpable effect of radiofrequency is heating. You might notice a slight thermal reaction of your skin and ears every time you speak on your cell phone for more than 20 minutes. This harmless side effect has led some to believe that regular mobile phone use can lead to cancer through this thermal effect. However, since radio waves emitted by smartphones are a form of non-ionizing radiation, similar to radio antennas, there is a minimal risk of causing adverse health consequences similar to those produced by x-rays or radon. The FCC urges manufacturers to refrain from producing cell phones that surpass 1. Fortunately, most of the smartphones produced nowadays are way below this safety line. Wifi and Bluetooth Waves WiFi is one of the most used technologies in everyday life. Whether you have a wireless router at home or you use the one at work, you are bound to connect to speedy wireless internet almost every day of the week. Wireless routers are also present in cafes, restaurants, and libraries. Even public open spaces like parks, beaches and concert arenas employ this technology. Studies have shown that wireless internet might produce harmful side effects for human health. However, this has been argued against. The same goes for Bluetooth radio waves that also form a frequent mode of communication and device-pairing technology. WiFi routers and Bluetooth terminals have a risk of producing harmful side effects on your health. Extensive exposure to wifi and bluetooth radiation waves emitted by these technologies can also cause mild headaches, sleep disruption and slight dizziness. If you want to ensure higher protection for you and your family against potential dangers of WiFi and Bluetooth technologies, you can employ several practices in your everyday life. Some of them include disconnecting the WiFi router at night and spend more time outside in open, natural

areas. TV Broadcasting Waves Television radiation has been a constant part of our everyday lives since the s. It is one of the oldest forms of human-made radiation, and the rise in deaths related to cancer and tumors has been widely related to it for many years now. Although several clinical studies suggest that there is a minimal risk that TV radiation can produce terminal diseases, some people are still considering it a harmful presence in their homes. The theory that you can absorb harmful radiation from your TV is generated by the possibility that old television sets may release X-ray waves. The cathode ray tube CRT technology had a minimal chance of producing X-rays. This phenomenon happened when electrons traveling at high voltage would hit an obstacle in vacuum. Older generations were aware of this issue, which is why we people were often advised to keep a safe distance from their television sets. Nowadays, CRT technology is rarely used and redundant. Even households have adapted to modern safety circuits and regulated power supplies that turn TV harmful radiation into an implausible myth. Therefore, they do not represent a significant risk to your health. Again, as it is the case with most devices that emit radio waves, intense exposure may lead to migraines, restlessness, and dizziness. Microwaves Microwaves are primarily used for cooking. Almost every household uses a microwave oven to heat or defrost food, and this device has become a common kitchen appliance all over the world since the s. When you heat your meal in a microwave oven, the water molecules absorb microwave radiation and generate a thermal increase that also kills any present bacteria. Since the only form of energy transmitted to your food is heat, there is a minimal risk of contamination or radiation that can affect your health. The only way that microwaves can hurt you is by exposing yourself to high levels, which may cause painful burns. The parts of your body that are extremely sensitive to microwaves are your eyes and testes since their low blood circulation cannot disperse the excess heat quick enough to prevent injury. Your best safety precaution against microwaves is to avoid using an oven that has a damaged door, and which does not ensure optimal enclosure. Microwave radiation is also used in communication and satellite transmissions. Because they have a low frequency and long wavelength, they can penetrate clouds, smoke and rain easier than visible light waves. This is one of the main reasons why microwaves are used to transmit signals into space orbit. Read my article on microwave radiation. Infrared Waves Infrared waves are set somewhere between visible light waves and microwaves. Some of them are slightly visible in everyday life, such as the one emitting from your TV remote or the smoke detector, which are virtually harmless. Infrared radiation is only harmful to the human body when it exceeds wavelengths longer than nm. From this point on, they can produce severe damage to your eyes. Glass manufacturers and iron-welders are susceptible to cataracts in their eyes due to the thermal effect produced by intense infrared waves. Again, the distance between you and the source of heavy infrared radiation is crucial. This is the reason why workers use high levels of protection, while bystanders are required to wear plastic goggles or simply look away. Long-term exposure to infrared radiation can produce cellular degeneration and premature skin aging. I have an article on low emf portable infrared saunas which you may like to check out. Ultraviolet Rays We receive a generous amount of ultraviolet UV light from the sun on a daily basis. It has a wavelength that is shorter than visible light, and it can penetrate soft tissue with ease. If you expose yourself to strong ultraviolet radiation you risk sunburns, eye cataracts, cellular damage and even skin cancer. Ultraviolet radiation has been the subject of intense clinical research. Several studies have concluded that prolonged exposure to UV rays can increase the risk of developing skin melanoma and premature aging. The first signs of too much UV radiation are wrinkles, dry skin, spots, moles, and freckles. The damage produced by ultraviolet rays builds up during an entire lifetime, and early symptoms of damaged epidermis may only be visible at a later date. Mild UV rays are also generated by security marking devices and fluorescent lamps that are used to detect forged bank notes. Additionally, powerful telescopes use UV radiation to observe faraway stars and galaxies. X-Ray Waves In the electromagnetic spectrum, the UV rays are followed by shorter wavelength radiation like X-ray waves, which are also known as ionization radiation. This type of waves is dangerous for human health, especially when you are overly exposed to it. X-rays can easily penetrate soft tissue in the human body, which is why they are used in medical procedures to read the condition of bones. During this process, the level of radiation is kept at a minimum level to prevent cell degeneration and possible mutations. Clinical studies have revealed that prolonged exposure to X-ray radiation translates into a high risk of developing cancer. Even mild exposure to X-rays may produce harmful effects on

your health. For example, if you undergo X-ray treatments on a regular basis, you risk suffering from strong headaches, joint aches, skin damage and slow sperm motility. Additional to medical purposes, X-rays are also used for observing the internal structure of objects that are difficult to see with an open eye. Airport security scanners also use them to ensure that their safety regulations are respected by passengers. Gamma Rays Gamma rays have an even shorter wavelength than X-rays and the last ones in the electromagnetic spectrum. They use ionizing radiation to penetrate any type of material. They also create charged radicals to ease their traveling, which some consider being the cause for DNA mutations during cancer treatments that involve their use. Their cell-penetrating power is the reason why gamma rays are sometimes used to kill cancer cells. Some clinical tests revealed that the destructive force produced by gamma radiation can alternatively repair genetic material. Studies suggest that this healing effect is possible through long-term exposure to small doses of gamma rays than by subjecting a patient to one-time treatments with high doses. Additionally, gamma rays are used to sterilize foods and medical equipment. Scientists have observed the formation of Gamma rays during powerful nuclear explosions and cosmically at the formation of supernovas.

Chapter 2 : Uses of the Electromagnetic Spectrum in Daily Life by on Prezi

Radiation as a medical cure has valid uses and definite dangers to the human body. We use radiation for diagnosis (as in x-rays) and for therapy (as in cancer treatment), but the benefits must be.

Although they might be familiar with the use of radiation to diagnose disease and treat cancer, many people, when they hear the terms "radioactive" and "radiation," tend to think of mushroom clouds and the monster mutants that inhabit the world of science fiction movies and comic books. Careful analyses can identify and quantify the radioactive material in just about anything. This document describes a few of the more commonly encountered and familiar consumer products that can contain sufficient radioactive material for it to be distinguished from background with a simple handheld radiation survey meter. Smoke Detectors Most residential smoke detectors contain a low-activity americium source. Alpha particles emitted by the americium ionize the air, making the air conductive. Any smoke particles that enter the unit reduce the current and set off an alarm. Despite the fact that these devices save lives, the question "are smoke detectors safe? The answer, of course, is "yes, they are safe. Watches and Clocks Modern watches and clocks sometimes use a small quantity of hydrogen-3 tritium or promethium as a source of light. Older for example, pre watches and clocks used radium as a source of light. If these older timepieces are opened and the dial or hands handled, some of the radium could be picked up and possibly ingested. As such, caution should be exercised when handling these items. In many cases, the activity is concentrated in the glaze. Unless there is a large quantity of the material, readings above background are unlikely. Glass Glassware, especially antique glassware with a yellow or greenish color, can contain easily detectable quantities of uranium. Such uranium-containing glass is often referred to as canary or Vaseline glass. In part, collectors like uranium glass for the attractive glow that is produced when the glass is exposed to a black light. Even ordinary glass can contain high-enough levels of potassium or thorium to be detectable with a survey instrument. Older camera lenses ss often employed coatings of thorium to alter the index of refraction. Fertilizer Commercial fertilizers are designed to provide varying levels of potassium, phosphorous, and nitrogen. Such fertilizers can be measurably radioactive for two reasons: Food Food contains a variety of different types and amounts of naturally occurring radioactive materials. Although the relatively small quantities of food in the home contain too little radioactivity for the latter to be readily detectable, bulk shipments of food have been known to set off the alarms of radiation monitors at border crossings. One exception would be low-sodium salt substitutes that often contain enough potassium to double the background count rate of a radiation detector. Gas Lantern Mantles While it is less common than it once was, some brands of gas lantern mantles incorporate thorium In fact, it is the heating of the thorium by the burning gas that is responsible for the emission of light. Such mantles are sufficiently radioactive that they are often used as a check source for radiation detectors. Antique Radioactive Curative Claims In the past, primarily through , a wide range of radioactive products were sold as cure-alls, for example, radium-containing pills, pads, solutions, and devices designed to add radon to drinking water. The states generally have regulatory authority over these devices. In some cases, a state might even require that these devices be registered or licensed. Most such devices are relatively harmless, but occasionally one can be encountered that contains potentially hazardous levels of radium. If there is any question about the safety of such devices, the public is strongly encouraged to contact the state radiation-control program for advice. The information posted on this web page is intended as general reference information only. Specific facts and circumstances may affect the applicability of concepts, materials, and information described herein. The information provided is not a substitute for professional advice and should not be relied upon in the absence of such professional advice. To the best of our knowledge, answers are correct at the time they are posted. Be advised that over time, requirements could change, new data could be made available, and Internet links could change, affecting the correctness of the answers. Answers are the professional opinions of the expert responding to each question; they do not necessarily represent the position of the Health Physics Society.

Chapter 3 : Examples of Convection That are Commonly Observed in Everyday Life

Trace amounts of radiation stemming from the ongoing nuclear crisis in Japan have been detected across the U.S., and many Americans are concerned Life. Healthy Home 9 Everyday Sources of.

BY Miss Cellania June 8, Radiation as a medical cure has valid uses and definite dangers to the human body. We use radiation for diagnosis as in x-rays and for therapy as in cancer treatment , but the benefits must be carefully weighed against the costs. Once upon a time, radiation in different forms was new and wondrous and had a million uses -medications, cosmetics, industrial applications, and even entertainment. It was only later that the danger became evident. Radioactive Toothpaste What could possibly make your smile brighter than radioactive toothpaste? A German firm called the Auer Company Auergesellschaft diverted thorium supplies from the Nazi atomic program in when it became clear that Germany would not win the war. The forward-thinking company saw the future of nuclear materials in cosmetics and developed Doramad radioactive toothpaste. Besides the usual wonderful benefits of radiation, the marketing mentioned that radiation would hinder bacteria in the mouth. Shoe-fitting Fluoroscope The radiation from x-rays was not considered particularly dangerous to humans when the machine was first invented. From the s to the s, children were encouraged to have their shoe size determined "scientifically" by putting their feet into an x-ray fluoroscope at the shoe store. The shoe salesman and the customer could both see the bones in the foot and be bombarded by leaking radiation. They continued to be used in Europe for years afterward. Alfred Curie was no relation to either Marie or Pierre Curie, but his name sold French women on the idea of radioactive cosmetics. Curie along with Alexis Moussali developed a line of beauty products under the name Tho-radia. The line included face cream, soap, powder, and even toothpaste containing thorium and radium. Although they were expensive, Tho-radia product were a hit in Paris, and therefore popular everywhere else. Dorothy Gray Salon Cold Cream was not marketed as containing any radioactive material, but this television ad is a bit shocking to modern audiences. The model is covered with radioactive dirt to show how well the cold cream removes it. At least we hope it did. Radithor Radithor was a cure-all patent medicine consisting of distilled water and two isotopes of radium. Advertisements called it "Perpetual Sunshine". Radithor was only one of many radioactive elixirs sold to alleviate pain and cure all manner of maladies. According to this article from , a popular advocate of Radithor developed holes in his bones and skull, and his entire jaw had to be removed as it had deteriorated badly, just before he died of radiation poisoning. Image by Flickr user Somewhat Frank. Radium Emanators If you needed more radioactive water than could be supplied by patent medicines, you could make your own with any of dozens of devices produced to add radiation to water. This Radium Emanator was sold in the s. It had uranium embedded in the cement core, which would leach into the water overnight. Radium Clock Dials Radium paint was special in that it tended to glow in the dark. The obvious use for this was for clock dials , so they could be seen with the lights out. Young women were hired in the s to paint the numbers and hands on these clocks. The painters needed a very fine point on their brushes, so they would pull the brush fibers between their lips to keep the point. The amount of radium in each clock or watch was rather weak, but the painters in the factories absorbed so much that many died of radiation poisoning and related cancers, and others suffered from various radiation-induced disorders, particularly bone loss in the jaw. Five of the " Radium Girls " sued the company, U. Radium for damages, a case which led to stricter safety standards for the use of radium in industry. Radon Health Mines Although natural radon emissions have been designated as a health hazard and limits of safe exposure are set, some people still believe in the health benefits of radon. For these people, a vacation to a spa just for this purpose can be arranged. These spas were opened in the s at abandoned mining sites in Montana where radon seeps out in unusual amounts. Similar facilities are open in Europe as well. The high price was the reason for the disappearance of these kits rather than the danger of the materials. You could buy less expensive kits for your youngster in the sixties, such as the Atomic Energy Lab which only had one kind of uranium, but also contained radium. The device came with paper soaked in radium, which you inserted into the case and exposed, screen-side up, to your testicles or other glands. Vita Radium Suppositories Another way to introduce radium to your vital glands was in a suppository

form. Vita Radium Suppositories were guaranteed to contain radium, which sounded like a good thing at the time. Some ads contained euphemisms such as "vitality" alluding to a promised increase in sexual potency, while other ads targeting both men and women promised global benefits for anything that ailed you. Uranium Glass Beginning around years ago, uranium salts were combined with silica before it was melted to create pretty yellow-green glass dishes. Most of these uranium glass dishes are valuable antiques now, and this is why you may see people carry black lights into an antique shop or flea market -they are testing for actual uranium content as opposed to later recreations. Image by Wikimedia Commons user Z Vesoulis.

Chapter 4 : What is Radiation - World Nuclear Association

A majority of radiation exposure in everyday life come from background radiation happening in the environment naturally. However, you also get exposed to radiation when you undergo specific medical tests like x-ray and CT scan etc.

Alpha particles are large, powerful subatomic particles that are very destructive to human cells; however, they tend to lose their energy quickly, limiting their ability to penetrate materials. There are many ways in which science successfully uses alpha radiation in a beneficial way. Cancer Treatment Alpha radiation is used to treat various forms of cancer. This process, called unsealed source radiotherapy, involves inserting tiny amounts of radium into cancerous masses. The alpha particles destroy cancer cells but lack the penetrating ability to damage the surrounding healthy cells. Radium has mostly been replaced by Safer, more effective radiation sources, such as cobalt Xofigo, the brand name of Radium, is still used to treat bone cancer. Static Eliminator Alpha radiation from polonium is used to eliminate static electricity in industrial applications. The positive charge of the alpha particles attracts free electrons, thus reducing the potential for local static electricity. This process is common in paper mills, for example. The alpha particles from americium bombard air molecules, knocking electrons free. These electrons are then used to create an electrical current. Smoke particles disrupt this current, triggering an alarm. Spacecraft Power Radioisotope thermoelectric generators are used to power a wide array of satellites and spacecraft, including Pioneer 10 and 11 and Voyager 1 and 2. These devices function like a battery, with the benefit of a long life span. Plutonium serves as the fuel source, producing alpha radiation resulting in heat, which is converted to electricity. Pacemaker Battery Alpha radiation is used as an energy source to power heart pacemakers. Plutonium is used as the fuel source for such batteries; with a half-life of 88 years, this source of power provides a long lifespan for pacemakers. However, due to their toxicity, difficulties with patients in traveling, and problems with disposal, they are no longer used. Strontium is typically used as the fuel source. These alpha-powered systems enable unmanned operations for long periods of time without the need for servicing. Local opposition to the use of radiation is prompting the air force to replace many of these devices with alternative power sources, such as diesel-solar hybrid generators. Heating Devices Alpha radiation is used to provide heating for spacecraft. Unlike radioisotope thermoelectric generators that convert heat to electricity, radioisotope thermal generators make direct use of the heat generated by alpha decay. Coast Guard Buoys The U. Coast Guard uses alpha radiation to power some of their oceanic buoys. Like in many of the other applications, the alpha radiation provides a power source with a long lifespan. Strontium is the typical power source for these buoys. Oil Well Equipment The oil industry uses alpha radiation to power some of their offshore equipment. This provides a long-lasting power source for remotely located devices that have limited access to crews. Strontium is the typical fuel source for such batteries. Seismic and Oceanographic Devices Alpha radiation is also used to power a wide array of seismic and other oceanographic devices. These unmanned devices are often located in isolated locations, such as on the ocean floor, which limits the practicality of short-term batteries. Strontium is the most common material used in these alpha decay batteries.

Chapter 5 : Radiation Answers - Mission Statement

Top 5 Sources of Radiation in Everyday Life Posted on by in Blog, Radiation with Comments Off on Top 5 Sources of Radiation in Everyday Life Radiation is a very broad term - both naturally occurring and man-made - but it is widely recognized as something you want to avoid, especially in high doses.

When atoms decay, they emit three types of radiation, alpha, beta and gamma. The alpha and beta radiation consist of actual matter that shoots off the atom, while gamma rays are electromagnetic waves. All three kinds of radiation are potentially hazardous to living tissue, but some more than others, as will be explained later on. Properties of Alpha Radiation The first type of radiation, Alpha, consists of two neutrons and two protons bound together to the nucleus of a Helium atom. Though the least powerful of the three types of radiation, alpha particles are nonetheless the most densely ionizing of the three. That means when alpha rays can cause mutations in any living tissue they come into contact with, potentially causing unusual chemical reactions in the cell and possible cancer. A case of alpha radiation poisoning made international news a few years ago when Russian dissident Alexander Litvinenko was believed to have been poisoned with it by the Russian spy service. Uses of Alpha Radiation Smoke detector warning label Source Alpha particles are most commonly used in smoke alarms. These alarms contain a tiny amount of decaying Americium between two sheets of metal. The decaying Americium emits alpha radiation. A small electric current is then passed through one of the sheets and into the second one. When the field of alpha radiation is blocked by smoke, the alarm goes off. This alpha radiation is not harmful because it is very localised and any radiation that might escape would be stopped quickly in the air and would be extremely difficult to get into your body. Properties of Beta Radiation Beta radiation consists of an electron and is characterized by its high energy and speed. Beta radiation is more hazardous because, like alpha radiation, it can cause ionisation of living cells. Unlike alpha radiation, though, beta radiation has the capacity to pass through living cells, though it can be stopped by an aluminum sheet. A particle of beta radiation can cause spontaneous mutation and cancer when it comes into contact with DNA. Uses of Beta Radiation Beta radiation is mainly used in industrial processes such as paper mills and aluminium foil production. A beta radiation source is placed above the sheets coming out of the machines while a Geiger counter, or radiation reader, is placed underneath. The purpose of this is to test the thickness of the sheets. Because the beta radiation can only partially penetrate aluminium foil, if the readings on the Geiger counter are too low, it means that the aluminium foil is too thick and that the presses are adjusted to make the sheets thinner. Likewise, if the Geiger reading is too high, the presses are adjusted to make the sheets thicker. The blue glow produced in some nuclear power plant pools is due to high speed beta particles moving faster than that of light traveling through water. Properties of Gamma Radiation Gamma rays are high frequency, extremely-short-wavelength electromagnetic waves with no mass and no charge. They are emitted by a decaying nucleus, that expels the gamma rays in an effort to become more stable as an atom. Gamma rays have the most energy and can penetrate substances up to a few centimetres of lead or a few metres of concrete. Even with such intense barriers, some radiation may still get through because of how small the rays are. They are likely to be emitted alongside alpha and beta radiation, though some isotopes emit gamma radiation exclusively. Uses of Gamma Radiation Gamma rays are the most useful type of radiation because they can kill off living cells easily, without lingering there. They are therefore often used to fight cancer and to sterilise food, and kinds of medical equipment that would either melt or become compromised by bleaches and other disinfectants. Gamma rays are also used to detect leaking pipes. In those situations, a gamma ray source is placed into the substance flowing through the pipe. Then, someone with a Geiger-Muller tube above-ground will measure the radiation given off. The leak will be identified wherever the count on the Geiger-Muller tube spikes, indicating a large presence of gamma radiation coming out of the pipes. Uses of Alpha, Beta, and Gamma Radiation: Radiocarbon Dating Source Radiocarbon dating is used to determine the age of once-living tissue, including objects like string, rope, and boats, all of which were made from living tissue. The radioactive isotope measured in carbon dating is carbon, which is produced when cosmic rays act on nitrogen in the upper atmosphere. Only one in every ,, carbon atoms are carbon, but they are easily detected. All living

cells take up carbon, whether from photosynthesis or eating other living cells. When a living cell dies, it stops taking in carbon, because it stops photosynthesising or eating, and then gradually over time the carbon decays and is no longer found in the tissue. Carbon emits beta particles and gamma rays. The half-life of carbon the time in which it takes from the radiation emitted from the source to be halved works out to be 5, years. There are, of course, limitations and inaccuracies to carbon dating. For example we make the assumption that the amount of carbon in the atmosphere back when the tissue was living, is the same as nowadays. I hope this article has helped you understand nuclear radiation. If you have any questions, suggestions or issues please leave a comment below no sign up required and I will try to answer it either on the comments section or update the article to incorporate it! End of article quiz.

Chapter 6 : Is Anything We Use in Everyday Life Radioactive?

The word radiation merely means that energy is transferred in a straight line from a source to some other place which is often, but not necessarily, in all directions away from the source.

This kind of radiation is emitted during nuclear reactions and from X-rays. For other types of non-ionizing radiation â€" such as radiofrequency waves from microwaves, cell phones, and Wi-Fi â€" scientists have been conflicted on how they cause mutations. To put things in perspective, exposure to a dose of 1,, millirem mrem would be immediately lethal, but even nuclear reactor meltdowns such as Chernobyl and Fukushima do not give off this amount per individual. Long-term effects of residual reactive material pose the serious health risk. Americans average between mrem per year. Your lifestyle and where you live can increase or decrease this number. Yes, where you live in the continental United States affects this number. Apart from uprooting to a new city, you can begin to minimize your exposure to radiation by being informed of these 5 everyday sources of radiation: Television The average American over the age of 2 watches 4. The electrical conductivity in TV sets and computer monitors gives off a minimal amount of X-rays: However, there are more urgent health hazards such as obesity if you pass several hours per day immobile in front of a screen. Radon A colorless, odorless gas given off by decaying uranium seeps into the foundation of one out of 15 American homes and takes up residency in their basements. Luckily, you can test your house for high levels of radon and take the necessary steps to protect your family from this gas by consulting www. Medical Imaging Obviously one does not undergo medical imaging procedures on a daily basis, but as the most common source of exposure for Americans beyond normal background radiation, medical imaging bodes mentioning. Medical imaging procedures such as dental or chest X-rays send 10 mrem to the patient. Mammograms log in at mrem per image, and CT scans can deliver up to 1, Cell phones Cell phones emit radiofrequency waves, a non-ionizing form of radiation, albeit at a low enough dose that there are no established health effects. Smoking It should come as no surprise that cigarettes causes health problems even beyond the carcinogens in the tar component of smoke your body takes in with each inhale. Heavy smokers increase their radiation exposure by mrem per year â€" more than doubling or even tripling their exposure compared to non-smokers. Keep in mind that most these quotidian objects and personal habits expose you to what, in the end, is a minimal amount of radiation.

Chapter 7 : 11 Ways We Used Radiation in Everyday Life | Mental Floss

Radiation - it's everywhere! All of us are exposed to ionising radiation every day. It's in our bodies, the air we breathe, the food we eat and the bricks we use to build our houses.

Small cardboard piece or old playing card Water Method: Heat water in a pot and pour it in one of the bottles. Add a few drops of food color to the warm water. Now, fill the other bottle with cold water. Place the cardboard piece on the cold water bottle and flip it upside down. Place this bottle on the other bottle and slowly remove the cardboard piece. You will see that the hot water rises in the bottle that contained cold water. This displacement of the liquid is due to convection currents. Use a prominent food color so that the displacement is clearly visible. A number of real-life applications use the above principle. Also, this mode of heat transfer can be seen in many natural phenomena. Here we look at some examples of convection. Land and Sea Breeze Land Breeze The hot air or the fluid that is at a higher temperature displaces the fluid at a lower temperature. The formation of breeze on land or sea is an example of convection. You may have observed that the land near the sea is warmer in the afternoon than in the evening. This warm air rises by the principle of convection, and is replaced by cooler air. Similarly, during the night, the air near the sea is warmer than that at the shore. Radiator Yes, a radiator is an application of convection currents. In the radiator, the heating element is placed at the bottom of the machine. Thus, the warm air from this heating element is replaced by cold air. Refrigerator The freezer unit of a fridge is placed at the top. The reason behind this is that the warm air inside the refrigerator will rise up but the colder air in the freezer region will sink and keep the lower portion of the fridge warm. Air Conditioner The cooling unit in an air conditioner is placed at the top. Thus, warm air rises up to the cooling unit, it is replaced by cold air, and the room is cooled. Boiling Water Boiling water in a bowl also operates on the convection principle. When the water starts getting heated, the water molecules expand and move in the pot. Thus, heat is transferred to other parts of the pot and the cold water starts sinking while the warm water rises. Hot Air Balloon The main reason behind hot air balloons staying up in air for long, is related to the convection principle. The air inside the balloon is continuously heated, which makes it warmer. This warm air rises and the balloon too. Thunderstorm Warm water from the oceans rises up in the air and turns into saturated water drops that form clouds. When this process continues, the smaller clouds collide with each other and bigger clouds are formed. Upon reaching the final growth stage, cumulonimbus clouds or thunderstorms are formed. Hot Air Popper It has a fan, a heating element, and a vent. When the popper is powered on, the fan blows air on the heating element via the vent. The air becomes warm and thus rises. Popcorn kernels are placed just above the heating element. The hot air rises and the popcorn kernels are heated. This is how we get our delicious popcorn. Convection Oven In a convection oven, the principle of forced convection is used. The air in the compartment is forced to heat by using heating elements. Due to this heating, the air molecules expand and move. The food inside is cooked due to this warm air. Steaming Beverage The simplest example of convection is a steaming beverage. You may have observed steam coming out of a cup of hot tea or coffee. Due to the heat of the fluid, the warm air rises up. This warm air is the steam. Air-cooled engines are cooled by convection currents in their water pipes. The engine, on running for a long time, gets heated. The heat that is dissipated needs to be cooled so as to keep the engine running. The engine is covered by a water jacket that is heated. Due to this heating, warm water flows through the pipes encircling the engine. These pipes have fans due to which the warm water is cooled. This warm water, by the convection principle, sinks down, thus cooling the engine.

Chapter 8 : 10 Examples Of Electromagnetic Radiation In Everyday Life

A Geiger counter is an example of a tool for measuring ionizing radiation. Radiation is an everyday phenomenon as you can see from the above examples and information.

All of us are exposed to ionising radiation every day. On average, Australians are exposed to about 2 millisieverts mSv each year from natural sources. This is equivalent to the amount of radiation received from 75 chest X-rays. In addition to these natural sources of radiation, artificial sources including medical procedures and nuclear accidents can add to our overall yearly dose. Radiation health effects are unlikely at low levels however the likelihood of an increased risk of cancer goes up as the radiation dose increases. The annual dose limit for public exposure to ionising radiation in Australia is 1 mSv per year from sources arising from human activities and 20 mSv per year for people who work with radiation. How much radiation were the Catalyst crew exposed to in Japan? During their five day filming trip around Fukushima Prefecture, the Catalyst crew wore personal dosimeters to record their individual dose. Most of their time was spent outside the evacuated areas. Each crew member received an average radiation dose of 0. This is on the verge of the minimal detectable limit for their dosimeters and represents about twice as much as the dose from one chest X-ray. Or to put it another way, they probably received about the same amount of cosmic radiation while flying to Japan and back. Come fly with me! Cosmic radiation is also background radiation and it increases with altitude. When flying from Melbourne to Brisbane the radiation dose is about 0. A domestic airline pilot is exposed to a cosmic radiation dose of up to 2 mSv per year. Ready to rock The largest source of background radiation exposure comes from natural radioactivity in rocks and soil, known as terrestrial radiation. The same goes for those granite bench tops in your kitchen although the dose is minuscule. Naturally occurring radon gas can accumulate in confined spaces such as many of the tourist caves in south-east Australia. Naturally occurring potassium is known to accumulate in foods at very low levels. Bananas, vegetables, tea, coffee beans, chocolate and even superfoods like chia seeds all contain radioactivity but some foods, like nuts are more radioactive than others. The brazil nut tree takes up radium as a substitute of barium since the two elements are chemically very similar. Barium is essential for the vitality of the tree but sadly lacking in the Amazon Valley where the brazil nuts are grown. There is approximately 0. X-rated A routine chest X-ray has an effective radiation dose of 0. A dental X-ray has an even smaller dose rate of 0. CT scanners require larger amounts of radiation to form their images. A single CT of the chest can produce a dose of up to 7 mSv. This is equivalent to 3 years of background radiation or an increased risk of lifetime cancer of 1 in 1, to 1 in 10, For these reasons, doctors are careful to weigh up the risks of the radiation dose against the benefit that the procedure will provide.

Chapter 9 : The Truth About Everyday Radiation Exposure - Healthy Living Center - Everyday Health

The Truth About Everyday Radiation Exposure. You may be surprised to learn that you encounter far more radiation in your daily life than what's blown across the Pacific Ocean from damaged Japanese.

Radiation is energy travelling through space. Sunshine is one of the most familiar forms of radiation. It delivers light, heat and suntans. While enjoying and depending on it, we control our exposure to it. Beyond ultraviolet radiation from the sun are higher-energy kinds of radiation which are used in medicine and which we all get in low doses from space, from the air, and from the earth and rocks. Collectively we can refer to these kinds of radiation as ionising radiation. It can cause damage to matter, particularly living tissue. At high levels it is therefore dangerous, so it is necessary to control our exposure. While we cannot feel this radiation, it is readily detected and measured, and exposure can easily be monitored. Furthermore, many people owe their lives and health to such radiation produced artificially. Medical and dental X-rays discern hidden problems. Other kinds of ionising radiation are used to diagnose ailments, and some people are treated with radiation to cure disease. Ionising radiation, such as occurs from uranium ores and nuclear wastes, is part of our human environment, and always has been so. At high levels it is hazardous, but at low levels such as we all experience naturally, it is harmless. Considerable effort is devoted to ensuring that those working with nuclear power are not exposed to harmful levels of radiation from it. Standards for the general public are set about 20 times lower still, well below the levels normally experienced by any of us from natural sources. Background radiation is that ionizing radiation which is naturally and inevitably present in our environment. Levels of this can vary greatly. People living in granite areas or on mineralised sands receive more terrestrial radiation than others, while people living or working at high altitudes receive more cosmic radiation. Radioactivity in material Apart from the normal measures of mass and volume, the amount of radioactive material is measured in Becquerel Bq , which enables us to compare the typical radioactivity of some natural and other materials. A Becquerel is one atomic decay per second, so a household smoke detector with 30, Bq contains enough americium to produce that many disintegrations per second. A kilogram of coffee or granite might have Bq of activity, and an adult human Bq. Each atomic disintegration produces some ionising radiation. Ionising radiation â€" alpha, beta and gamma Ionising radiation comes from the nuclei of atoms, the basic building blocks of matter. Most atoms are stable, but certain atoms change or disintegrate into totally new atoms. An unstable atom has excess internal energy, with the result that the nucleus can undergo a spontaneous change. We all experience radiation from natural sources every day An unstable nucleus emits excess energy as radiation in the form of gamma rays or fast-moving sub-atomic particles. If it decays with emission of an alpha or beta particle, it becomes a new element and may emit gamma rays at the same time. One can describe the emissions as gamma, beta and alpha radiation. All the time, the atom is progressing in one or more steps towards a stable state where it is no longer radioactive. Alpha particles consist of two protons and two neutrons, in the form of atomic nuclei. Alpha particles are doubly charged arising from the charge of the two protons. This charge and the relatively slow speed and high mass of alpha particles means that they interact more readily with matter than beta particles or gamma rays and lose their energy quickly. They therefore have little penetrating power and can be stopped by the first layer of skin or a sheet of paper. But inside the body they can inflict more severe biological damage than other types of radiation. Beta particles are fast-moving electrons ejected from the nuclei of many kinds of radioactive atoms. These particles are singly charged the charge of an electron , are lighter and ejected at a much higher speed than alpha particles. They can penetrate up to 1 to 2 centimetres of water or human flesh. They can be stopped by a sheet of aluminium a few millimetres thick. Gamma rays, like light, represent energy transmitted in a wave without the movement of material, just like heat and light. Gamma rays and X-rays are virtually identical except that X-rays are produced artificially rather than coming from the atomic nucleus. But unlike light, these rays have great penetrating power and can pass through the human body. Mass in the form of concrete, lead or water is used to shield us from them. The effective dose of all these kinds of radiation is measured in a unit called the Sievert, although most doses are in millisieverts mSv â€" one-thousandth of a Sievert. We each receive about

2 mSv per year from natural background, and maybe more from medical procedures. Anything less than about mSv is harmless.