

Protective Measures to Minimize the Electromagnetic Radiation

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Abstract

Electromagnetic fields are present everywhere in our environment but are invisible to the human eye. Exposure to electromagnetic fields from cell phones and other appliances may hurt our health. There are easy ways to minimize the exposure. Different types of shielding fabrics are available in the market to protect us from electromagnetic radiations. This paper presents some protective measures to reduce the harmful effects of the electromagnetic fields and radiation.

Keywords: Electromagnetic fields, our health, protective measures, shielding fabrics.

1. Introduction

The electromagnetic spectrum encompasses both natural and human-made sources of electromagnetic fields. Exposure to electromagnetic fields is not a new phenomenon. However, during the 20th century, environmental exposure to man-made electromagnetic fields has been steadily increasing as growing electricity demand, ever-advancing technologies and changes in social behaviour have created more and more artificial sources. Everyone is affected by electromagnetic radiation and radio frequency radiation from all appliances, cell phones, wifi, cordless phones, computers, laptops, and television waves, just to name a few. These causes invisible threats to our health. Prolonged exposure to EMFs has been shown to cause physiological change in human tissues and according to some researchers is linked to cancer, leukemia, neuro-degenerative disorders and all manner of diseases. There are certain easy measures that we can follow in our daily life to minimize the exposure of such electromagnetic fields and radiations.

2. Electromagnetic Fields

Electric fields are created by differences in voltage: the higher the voltage, the stronger will be the resultant field. Magnetic fields are created when electric current flows: the greater the current, the stronger the magnetic field. It is a field of force associated with a moving electric charge equivalent to an electric field and a magnetic field at right angles to each other and to the direction of propagation. Electromagnetic fields (EMF) are commonly found around high voltage power lines; neighbourhood transmission lines; grounding systems that protect residents from lightning, electric shock that can result from faulty appliances; the operation of common electrical appliances, including microwave ovens, electric ranges, aquariums, table fans, electric space heaters, computer monitors, electric clocks, clock radios, heated waterbeds, electric blankets, hair dryers, cellular phones, video display terminals (VDTs).

3. Protective Measures for Commonly Used Appliances

When talking on cell phone, the safest way is speakerphone mode with the phone a hand's length away. It still emits some radiation, but better than holding the phone to our head. A Bluetooth emitter will deliver lower levels of microwave radiation than the cell phone, but more than the wired headset. When the phone is not in use, the headset is turned off. It is better not to keep the phone turned on next to our body throughout the day, or the cell phone is to be positioned in such a way so that the antenna, which emits radiation, is facing away from us. We can try to use the phone when there are maximum number of bars, indicating the best reception. When signal quality is poor, cell phone emits more radiation. Also, we may avoid using cell phone in elevators, cars, trains or planes because cell phones draw more power, and emit more radiation, in enclosed metal spaces. When at home, it is good to use a wired landline and not a very powerful digital enhanced cordless telecommunications (DECT) phones—the kind with a base station and satellite handsets. Cordless phones connected to a landline can emit radiation much like cell phones. If there is a wireless router in the house, it can be kept in a little-used room and out of the bedroom (or turned off altogether at night). Also, vanishing cell phones, wireless phones and computers from the bedroom makes it free from electronic radiation. If we are worried about “dirty electricity,” we can use a battery-powered alarm clock and make sure that extension cords or power strips do not sit under or around the bed and also avoid electric blankets and wired mattress warmers. Main electrical and circuit breaker panels give off high EMF within 3 to 4 feet. So, let's stay away from the circuit breaker. Whenever possible, connecting the internet with an ethernet cord and not a wireless router, using a wired printer, as well as wired computer peripherals like mouse, keyboard are good options. While in airport and the like, we may disable the computer's wireless connectivity software, including Bluetooth; otherwise, the computer will continuously send out electronic “handshakes,” exposing us to more EMFs..

The baby monitors, often configured to sit right under the bed or the mattress, emit radiation comparable to a cell phone. Beware of radio-frequency-based smart meters, as they emit electromagnetic radiation. While buying a TV, choose an LCD (liquid

crystal display) instead of plasma or the old CRT (cathode ray tube) models because LCDs emit much less radiation, and plasmas can give off transient pollution on your electrical wiring. It is good to use a wired internet, a wired home security system, and wired entertainment systems instead of wireless. If we are using wifi, it is better to disconnect during sleeping and keep the router away from desk and children's room.

It is safer to use LED or incandescent bulbs instead of compact fluorescent bulbs (CFL) and dimmer switches; because a CFL repeatedly turns itself on and off to save energy. If our kitchen counter is cluttered with a coffeepot, slow cooker, food processor, or other convenient culinary appliances, keep them unplugged whenever we are not using them. Same goes for alarm clocks, lamps, iPod chargers and other various devices around our home. Anything plugged into an electrical outlet—even a lamp—emits an EMF; if unplugged, it will not. Many laptops produce a strong electromagnetic field, especially when we use one while it's plugged into an outlet (that means the battery is charging close to where our hands are). It is better off unplugging and using the laptop on battery power, then staying away from it while it recharges. If we suspect that our home has high-EMF fields, we can ask the utility company for a room-by-room survey. It's usually free. Hot spots can be completely shielded with special coverings. If we find high levels of dirty electricity, we can install filters (capacitors) that plug into electrical outlets. Most laptops are not grounded, even when working off plug-in power. Ungrounded electronics may emit high electric fields or raise body voltage. Adding grounding could be the answer. By increasing our distance from the laptop, we can greatly reduce EMF and RF exposure. Magnetic fields from laptop base should be reduced. As computer manufacturers build computers that use less electricity more efficiently, lower EMFs are generated.

4. Shielding Fabrics

Different types of shielding fabrics are available in the market to protect us from the harmful effects of electromagnetic fields and radiations. Shielding fabrics with a natural look & feel are used for: bedding, drapes, clothing, grounding, tents. Mesh-type shielding fabrics are used for: screens, canopies, windows, sheer curtains, enclosures. High tech & industrial conductive fabrics are used for: pouches, wall covering, gaskets, grounding, liners. Other fabric-like shielding materials are used for: connections, fasteners, sealing leaks, closures, nique situations.

A fabric made with bamboo fiber and silver offers exceptionally high RF shielding performance. It is perfect for making microwave shielding anti-radiation pajamas, shirts, hoods, curtains or sheets. Polyester/cotton blended with microfine stainless steel fibers creates a low cost, tough fabric similar to khaki. . Pure Silver coated onto nylon is a very conductive, high shielding performance fabric. It is commonly used for electric field shielding, microwave shielding, anti-static surface RF shielding jacket, hat, garment liner, Faraday enclosure, window drapes or appliance cover. Carbon is conductive in some forms, and a very good microwave absorber. A low cost microwave absorber sheet laminated with plastic is made by using non-woven nearly-pure carbon fibers can achieve both good microwave shielding and high absorption.

Dust is reduced and skin contact is not a problem. A fabric with pure cotton on one side and silver on other side can shield common RF frequencies. It is great for drapes, bedding, grounding and clothing.

Pure 100% surgical stainless steel knitted into a shielding fabric is as strong as steel! It permits good air flow, light transmission, resists corrosion, and also washable. It can be used for grounding, shielding, conductive surfaces and indoor/outdoor shielded window screens. A polyester substrate (for superior strength and handling), plated with nickel and copper (for excellent shielding and low corrosion), then coated on one side with a non-conductive hot melt adhesive so that we can iron it on to cotton, wood, glass or paper, or roll it into a tube and heat seal the seam acts as a high quality flame retardant fabric for radiofrequency and microwave shielding. It also blocks virtually all ELF & VLF electric fields when grounded; great for shielding extension cords and computer cables, connected strips can make a sheet shield under the bed, liner for drapes, line a vest or a hat to protect our vital organs from radiowaves and electric fields. But it doesn't breathe well, and Nickel may cause skin irritation, so it is to be lined with cotton if using against the skin.

A multi-metallized fabric made with polyester, nickel, copper and nickel-copper alloy is good far field and near field RF shielding. A stainless steel wire knitted with polyester yarn creates a stretchy fabric that is easy to touch and wash, but wears tough. It is great for static control, computer covers, overgarments, costume material for museums, renaissance fairs, theatrical productions, halloween and school plays. Woven pure copper, fine wire mesh is useful for RF and electric field shielding, Faraday cages and grounding. It can be soldered and also very decorative, but susceptible to tarnish. It will turn brown, then green, when exposed to the environment, so definitely not for exterior use.

Extremely thin silver coated copper wires spun with cotton or polyester yarns gives excellent radiofrequency shielding (cellphones and cell tower radiation, cordless phones, wi-fi, radar, microwave oven leakage, TV broadcast etc). It is washable, comfortable, and durable fabric with the look and feel of normal fabric. Some laundry detergents are bad for the shielding fabrics and also cause an undesirable odor. Special laundry eco-detergents (e.g. texcare) will not react with silver or stainless steel shielding fabrics and thus preserves the shielding performance, saves the environment and also suitable for many allergy sufferers. A soft fabric made with rayon and silver gives 90% or better RF attenuation.

If we wish to knit our own shielding garments, we can do so by Knitting Silver Yarn. Silver kills a number of bacteria, including those that cause odor, has excellent thermal properties, is nontoxic and is perfect for those suffering from diabetes, arthritis and sensitive skin. Real Silver, twisted with Nylon for strength, can be used alone or with another yarn of our choice at the same time to get the more common bulkier effect. It provides good conductivity and modest RF shielding, depending on how tight we knit. We can make hats, scarves, sweaters, socks, afghans and just about anything we can knit or crochet by hand. Nickel, copper and cobalt coated nylon fabric offers excellent RF shielding properties. It is used to seal gaps, seams, and edges of shielding

fabrics, paints or plastics. Also it can be used to create conductive pathways on surfaces or add shielding to cables and flexible conduits.

Computers and TVs produce at least two types of EMF radiation: Electric fields and Magnetic fields. We can use any electric shielding that works equally well with a monitor or TV, as long as the proper size is selected. Magnetic shields are suitable for small shields on magnets, motors, speakers and appliances such as refrigerators, vacuum cleaners, for lining car floor or firewall etc. In industry, magnetic shielding foil is used to shield delicate electronic components from EMFs. It is 80% Nickel alloy. This foil is used to form magnetic barriers on cellular phones, microwave ovens, doorbell transformers, VDTs, buried wiring, and more. An extra thick high-efficiency magnetic alloy plates provide superior shielding for electric circuit boxes, side by side computer users, and any situation where a flat shielding material on a wall, floor, or ceiling is needed. It can be mounted with ordinary nails or screws, or sandwiched between the studs and dry-wall.

Laptops emit a high magnetic field from the base, and also heat. Heat and radiation attenuating pad for laptops acts as a shield between magnetic field radiation source and the part of our body below the shield. A layer of high-tech radiation shielding material incorporated into the pad contains the field and reduces heat by increasing dissipation to the environment- and away from our body and the laptop. In combination with a remote keyboard, we can make a narrow 5 sided shielding box, open at the back and use a magnetic shielding foil. Since most of the magnetic field from a laptop comes from the base, there is less need to shield the screen. Two to three linear feet of foil material is all that is needed for most size laptops. If the laptop tends to heat up, we have to make the shield large enough to allow adequate ventilation. In addition to increasing your distance from the desktop tower, we may wrap the tower in magnetic shielding foil to reduce magnetic field emissions and seal the seams with duct tape leaving some opening for air circulation and access for cables. A computer cage completely surrounds the monitor in a protective shield. It is very useful when people are positioned near the back or side of computer monitors. It can be also used for TVs and microwave ovens. Shielded gloves form a conductive enclosure and effectively shield electric fields while using a computer keyboard, laptop, cell phone or other electronic devices. Apron made with shielding fabric gives neck to hip protection for pregnant women, computer and microwave oven users, TV or radio station workers, research and hospital workers, or anywhere people exposed to RF radiation. Brain coat, shielded cap, scarf, shielding headband, eye shield face shield, body shielding blouse, pants, under garments, gloves, socks etc are useful for whole body protection.

5. Conclusion

Electromagnetic radiation of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of radiation, and the levels will continue to increase as technology advances. The growing amount of

instances related to adverse health effects is becoming more difficult to deny. However it is critical that members of the public take the time to learn about EMF and EMR exposure to various fields and demand cabled, cleaner and healthier alternatives. As Raphael Siket said “ Improving the air you breathe, the water you drink and the products you use, Benefits the life you lead, the generations to come and the planet as a whole”

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