Natural electromagnetic fields

The first defence that man-made electromagnetic (EM) environments must be harmless is that the energy levels in our broadcasts, from analogue radio and TV to digital mobile communications, is too low to be noticeable by living organisms. The hypothesis is that the only interaction is via absorption of electromagnetic radiation by one means or another, the EM energy being converted into kinetic energy, and resulting in a rise in temperature, too much of which is known to be harmful. Certainly we have no organ for 'receiving' and decoding the information as do radios, televisions or mobile phones – so are our TV, radio and phone broadcasts just so much random energy to us?

There are four aspects to electromagnetic radiation to consider together:

- the amount of energy (number of photons) being emitted – see our dosimetry page for non-linear response
- its frequency (or wavelength) – which may be more-or-less fixed, as in a TV channel
- variations in frequency or amplitude – either natural, or in order to carry information
- patterns or repetitions – either natural, a result of co-interference, or used to structure information being carried, as in mobile phone channels.

This is important, because much argument about what to include in provocation experiments (eg exposing volunteers to mobile phone radiation) revolves around *how* EM radiation might be harmful or beneficial. If, for example, the harm lies in interference between sources (including reflections from a single source) then a pure single radiation beam will not provoke a response. Similarly, if the patterns or structures present harm, pure carrier waves will not provoke a response.

Similarly, the whole concept of geopathic stress (diseases such as cancer being caused by natural non-ionising radiation – we are not talking about natural radon gas, for example, here), is based on natural electromagnetic fields from the earth's geology and/or underground streams having an effect on people's health under chronic (repeated, long-term) exposure.

Do living things respond at all to electromagnetic fields, and if so, how?

Analogies can be quite irrelevant, but this one may well hold true. You attend a concert (whatever your taste – an orchestra, a folk band, a heavy metal rave!), and if it's good, you get involved and soon your feet are tapping, or you're moving to it in some other way: even dancing. This isn't because it is loud (though younger readers may partly disagree!), and it isn't because you like the frequencies in the chords, or that middle C turns you on. No, *the response is to patterns*, that innate and universal ability in living things so sharply evidenced by our ability to recognise people's faces at a glance. Pattern recognitions are the way we survive, that are what are defeated by camouflage, and it is patterns, or beat, or rhythm, in music that sets your feet tapping.

In fact different beats, such as martial music, or Mozart 6-8 music, give rise to different emotions. Why? This is quite different from the high frequency devices used to deter cats or teenagers. The latter is just a bad noise giving rise to discomfort so that teenageers (with a higher rage of hearing) don't hang about. But play Mozart at a railway station and people just calm down anyway.

There may be clues in what we know about human body electrical frequencies. What we call 'brain waves' are in fact permeating the body, it's just that they are most easily measured from the brain as electro-encephalograms (EEG). Do these frequencies matter, and why are they there and the same in all of us? States of consciousness, relaxation, wakefulness, creativity etc. are reflected in the dominant frequencies, described in bands as delta, theta, beta and alpha. We know when these are altered, our ability to sleep naturally, concentrate etc. are affected. In fact there are devices available, or even audio recordings, that can draw the brain's frequencies towards those of an external source in a process known as entrainment, or resonance. Resonance is a key word here, because very little energy in a source can produce an increasing amplitude of response in another object: such as a tuning fork making a tuned violin string sound loudly.

The next important discovery was that there are natural electromagnetic frequencies 'ringing' around the planet. We know that electrical and magnetic fields are part of nature, we have the spectacular aurora borealis, and we know that electrical storms occur constantly, above the clouds as well as in lightning to earth. The invention of radio soon proved the existence and reflective effect of the charged layer in the atmosphere called the ionosphere. All this activity, however, is not just random noise. Because the spherical 'shell' between the earth and the ionosphere is a fairly constant average size, the electrical activity sets up an electromagnetic resonant standing wave. And because the size is a fairly constant average, the frequencies and harmonics (multiple resonant frequencies) can be detected and measured. What may or may not seem surprising, given millions of years of evolution, is that these frequences, named Schumann resonance after their discoverer, are in the frequency range of 'brain waves'. The coincidence is not unreasonably assumed to mean that these few natural EM frequencies, subtle as they are, relate to our well-being within the natural environment. In fact it has been claimed that used in spacecraft, these frequencies restore a sense of well-being for astronauts outside the earth's resonating atmospheric cavity. Perhaps our cells use and need this as part of their communication processes.

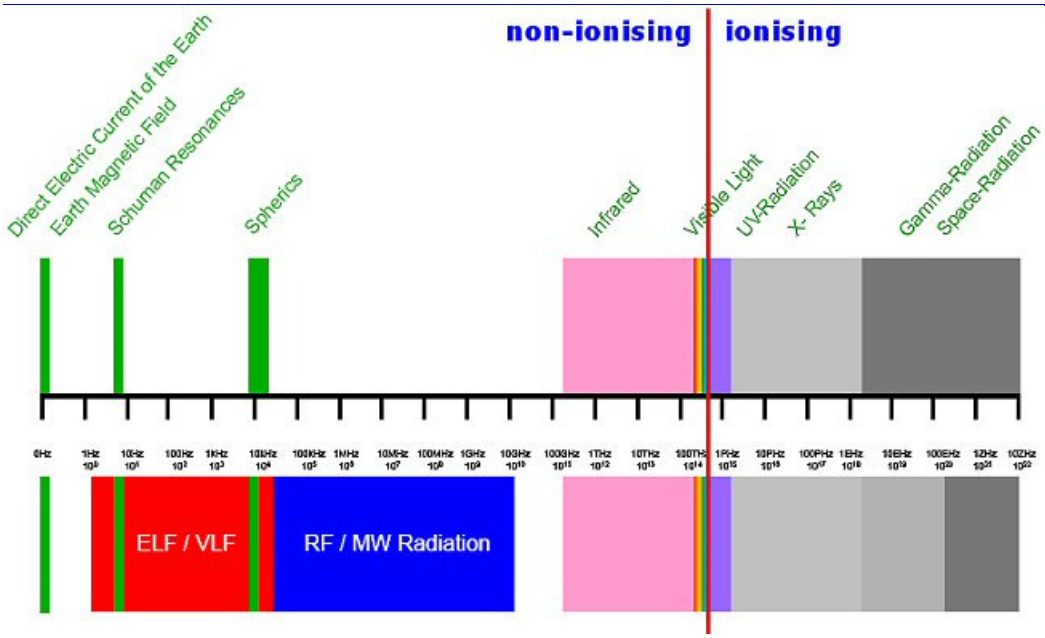
These natural frequencies, then, would appear to be an area where even subtle natural EM environments are best kept protected.

Natural and man-made: does it matter?

Time for another analogy. I can ride a bicycle in a straight line, in fact I can ride (on a quiet day) along the white line in the middle of the road. That's straight, isn't it? Well, if I tried riding with my wheels in a tramline, I would soon fall over! The earth's natural frequencies, and our 'brain waves', are not rigid, but constantly fluctuating, like my bicycle front wheel (you can see this in the snow). So perhaps rigid patterns, like the structures in mobile phone signals that often lie in the brain range, end up tramlining our cells and interrupting their natural 'wobble', or pulling them onto different frequencies than those that are needed.

After the Victorians had their period of enthusiasm for electricity as a 'vital force', the role of electricity and magnetism in biology was rejected for a while. In more recent times, therapeutic use (of pulsed electromagnetic fields, for example) is commonplace – such as for bones that refuse to mend. More broadly, 'energy medicine' (based on ideas of systemic balance and communication throughout the body by EM energy rather than just chemical interactions) is still frowned on by establishment medicine, but has sound scientific roots for understanding electricity and magnetism and its role in living organisms. What we cannot say any more is that EM fields can heal but that they cannot harm. Nature, in the planet we evolved on, and in the bodies we have, has given us an electromagnetic existence. It is this natural environment that we have very recently swamped with our electromagnetic fields, with novel energies, frequencies, variations and patterns, so much so that what was once an empty natural EM spectrum is now entirely occupied.

The electromagnetic spectrum: natural frequencies shown in the top sequence, man-made radiation sources now fill all the gaps (lower sequence)



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