

**Which is the electromagnetic field component causing the long term health (chronic) effects?
A possible explanation, theory, detection**

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Planck's Principle

***A new scientific truth does not triumph by convincing its
opponents and making them to see the light, but rather
because its opponents eventually die and a new generation
grows up that is familiarly with it.***

Max Planck (1858- 1947)

- **GENERAL CONSIDERATIONS**

- Whether in as much as the electric field is concerned it was concluded by the international scientific community since the 90's that there are no direct biological effects, only physiological effects caused by densities of the currents higher than 2 mA/sq.m. induced into the human body. A different situation is met when considering the impact of the magnetic component of the electromagnetic field of industrial frequency.
- The maximal values recommended for the magnetic flux density in professional and residential exposure situations have been established by international and national organizations. ICNIRP, IEEE and the European Community propose the limit of 100 μ T and 500 μ T for the residential exposure and the quasi-permanent professional exposure, respectively; these limits have been determined starting from the physiologic effect of the magnetic field based on a maximum density of current induced into the human body of 2 mA/sq.m., under the conditions of different safety factors for the two types of exposure. Higher values of the limit may be accepted in the case of a short time professional exposure. The mentioned limits are considered valid for most countries, as resulted from the Eurelectric synthesis [1, 2].
- However, the impact of the magnetic field is not only instantaneously, but long term biologically, too, inducing the development of some diseases or the aggravation of some anterior diseases in the case of exposure to relatively low values of the magnetic flux density. Thus, as resulting from the conclusions of California Health Report – June 2002 [3] in situations of exposure to very low values of the magnetic flux density ranked between 0.2 and 1.2 μ T, a decrease of the immune capacity of the human body occurs due to the decrease in melatonin secretion.
- An EU conducted « The Reflex study »[4] investigated the effects of radiation on animal and human cells in laboratory conditions confirmed that even the weakest electric and electromagnetic fields have a biological impact. There were detected breaks in DNA chains in specimens exposed to fields with one hundred thousands lower intensities than the maximum allowable ones.
- From the newer ELF- EMF studies (2007- 2012) [5] resulted that 81% (35 studies) show effects and 19% (8 studies) do not show effects. The genotoxic effects of radiofrequency radiation and of ELF- EMF appear very similar, an explanation being that “DNA appears to possess the two structural characteristics of fractal antennas, electronic conduction and self symmetry”, showing:.

- increased risk of genetic damage among electrical workers ;
- 50 Hz magnetic field affect chromatin conformation and 53 BP1 foci in human lymphocytes ;
- ELF-EMF a mild oxidative stressor and DNA damage inducer ;
- Significant induction of cytogenetic damage in peripheral lymphocytes of electrical workers ;
- DNA double strand breaks in human lens epithelial cells in vitro for longer duration.
- There have to be mentioned the countries where much lower maximum levels of magnetic flux densities are mandatory, i.e.[1] :
 - Brasil- sao Paulo- 3 μT for new , 10 μT for old facilities;
 - Costa Rica 15 μT ;
 - Israel 1 μT ;
 - Italy- 3 μT new, 10 μT old;
 - The Netherlands 0.4 μT long duration children;
 - Norway 0.4 μT homes and children new;
 - Slovenia – 10 μT ,
 - Swiss 1 μT .
- Six significant effects or mechanisms of ELF radiation upon human health were identified through initial research on this topic, including but not limited to [6]:
 - human mental functioning, influence and control
 - disruption of cellular metabolism,
 - suppression of the immune system,
 - genetic modification and/or NA effects,
 - influence upon free radical formation,
 - cyclotronic resonance

- The vectorial part of the wave equation (derived from the Maxwell equations)
- By using the Laplace operator the well-known wave equation, according to the rules of vector analysis, can be taken apart in two parts: in the vectorial part (rot rot \mathbf{E}), which results from the Maxwell equations and in a scalar part (grad div \mathbf{E}), according to which the divergence of a field pointer is a scalar. We have to ask ourselves, which properties has this wave part, which founds a scalar wave?

Laplace-operator	rot $\mathbf{E} = 0$: longitudinal wave	div $\mathbf{E} = 0$: transversal wave	$c =$ speed of light
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$$\Delta \mathbf{E} = \text{grad div } \mathbf{E} - \text{rot rot } \mathbf{E} = \frac{1}{c^2} \frac{\delta^2 \mathbf{E}}{\delta t^2}$$

Div $\mathbf{E} \neq 0$ is a scalar \Rightarrow scalar wave!

$\mathbf{E} = -\text{grad } \varphi$:

- (1) ~~grad div $\mathbf{E} = -\text{grad} \frac{1}{c^2} \frac{\delta^2 \varphi}{\delta t^2}$~~
- (2) $\text{div } \mathbf{E} = -\text{div grad } \varphi$
- (3) $\text{div } \mathbf{E} = \rho/\epsilon$

plasma wave:

$$\Delta \varphi = \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2} - \frac{\rho}{\epsilon}$$

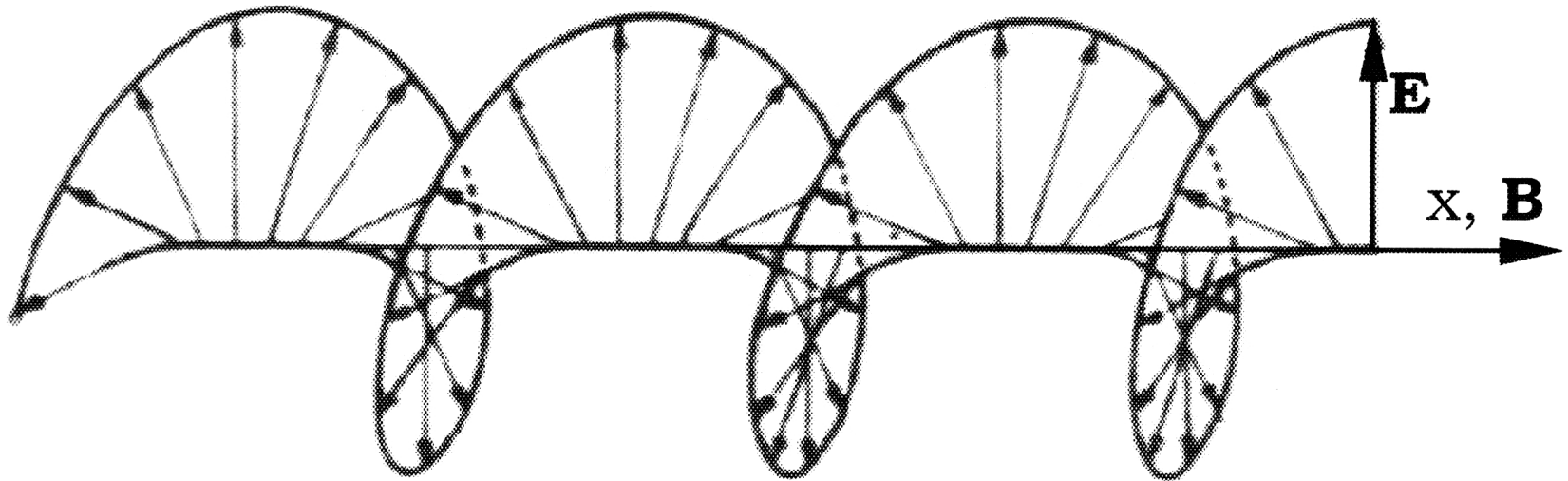


Fig. 3. The left polarized wave [24]

But the DNA-B is double stranded and the strands are electrically connected through the bases, resulting a scalar magnetic field along the DNA axis. Because of the helical structure of the vortex field, the field lines are open, not closed [24], winding the screw forward compared to a circular polarized wave (Fig. 3).

Based on the detailed dimensions involved in the DNA strands as shown in Fig. 4, it is possible to calculate the wave length. Prof. K. Meyl used two methods getting a result of 126 nm \pm 6 nm. But the DNA wave has to rotate around the 6 histons, which correspond to 378 nm, or this is the UV wave length discovered by F. Popp.

Prof. H. Heine found that during the communication the cells build channels in the connective tissue, the channels collapsing thereafter. The channels have hyperboloid structures [24].

In the presence of a scalar longitudinal wave the cells may come to resonance, getting energy and informations from other cells or from outside. There are three conditions: the same frequency, different algebraic signs and the same wave shape. Each cell is sending an unic scalar wave to be received by a complementary cell, by resonance.

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