

Cell phones damage DNA radically more than high-voltage lines

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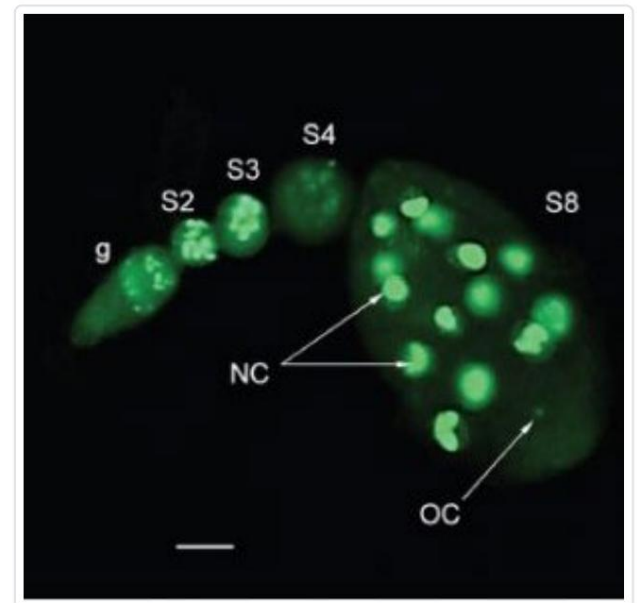
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Electrosmog

[A very important new study¹](#) summarizes the mechanisms involved in DNA damage caused indirectly by cell phone radiation. It demonstrates that the extreme variability in the intensity and waveform of wireless communication signals (microwave-type radio frequencies) is at the origin of the observed biological effects. The waves trigger the opening of variable voltage ion channels in cell membranes which become overloaded with calcium. These membranes open and close whenever a change greater than 30% in their tension occurs. All physiological cellular effects are initiated by changes in ionic concentrations mediated by the gating of ion channels.

Author Dimitris Panagopoulos reviewed studies carried out by his research group, from 2006 to 2016, comparing genetic damage caused by six different types of electromagnetic fields (EMF) on fruit fly (or vinegar) eggs *Drosophila melanogaster*. It found that EMFs from cell phones are more damaging than other types of EMFs, including magnetic fields from power lines. They cause greater DNA fragmentation and were significantly more bioactive, even at much shorter exposure times.

Cell phone radiation has been shown to be even more damaging than cytotoxic (harmful to cells) chemical agents. While these chemical agents only caused damage at certain stages of egg development, cell phone radiation was found to cause damage at ALL stages of egg development and egg mutations. Hereditary DNA that could be passed on to the next generation.



Fragmented DNA from *Drosophila* ovary cells exposed to 900 MHz GSM waves. ©

Dimitris Panagopoulos

The results were statistically significant: •

There was 35.77% more DNA damage caused by exposure to GSM cell phone frequency 1800 megahertz (MHz) after 36 minutes compared to unexposed eggs (**p-value** <0.0005 refuting the likelihood of this being chance), • and 50.16%

more DNA damage resulted from exposure to GSM 900 MHz frequency in 36 minutes compared to unexposed eggs ($p < 0.0002$); • on the other

hand, the authors observed only 7.5% ($p < 0.001$) of DNA damage following exposure for 120 hours to 60 Hz magnetic fields comparable to those of power lines.

Although all sources of electromagnetic fields investigated in the studies were non-ionizing and therefore could not cause direct DNA damage, this was caused by the release into cells of oxidative free radicals or hydrolytic enzymes such as deoxyribonucleases.

The study found that the most important physical parameters of EMF driving bioactivity are: 1) **polarization** (in combination with **spatio-temporal coherence**), 2)

ELF extremely low frequency components (pulsation, modulation, etc.), 3) field/

radiation intensity, 4) exposure

duration, 5) field

variability.

The crucial parameter of intense bioactivity appears to be the extreme variability of polarized signals, mainly due to large, unpredictable intensity changes. This applies to all forms of microwave wireless communication, including **2nd, 3rd and 4th generations of cellular phones, DECT cordless phones and Wi-Fi.**

According to Panagopoulos, the results of these studies are applicable to mammals, including humans, because "all cells of insects (including *Drosophila*) and mammals (including humans) have the same type of cell membranes, teeming with billions of identical free ions like calcium (Ca^{+2}), potassium (K^{+}), sodium (Na^{+}), etc., triggering and accompanying all cellular events, and presenting the same types of intracellular organelles, such as mitochondria, ribosomes, endoplasmic reticulum, nucleus containing the genomic DNA of the cell with the same basic structure, etc. These similarities at the cellular level between all animals are more fundamental than differences in volume, mass, shape, macroscopic functions, intelligence, etc., since all health effects are initiated at the cellular level. It is therefore reasonable to assume that a cellular effect caused by EMF in *Drosophila* (e.g. DNA damage) may also occur in the human organism. »

The importance of exposure variability implies the need to define safety standards for exposure to electromagnetic fields not only based on frequency components and average intensity values (which is currently the case in the United States). United States and other countries), but also depending on maximum and minimum intensity, frequency variations, pulsed or continuous wave, modulation and polarization.

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