

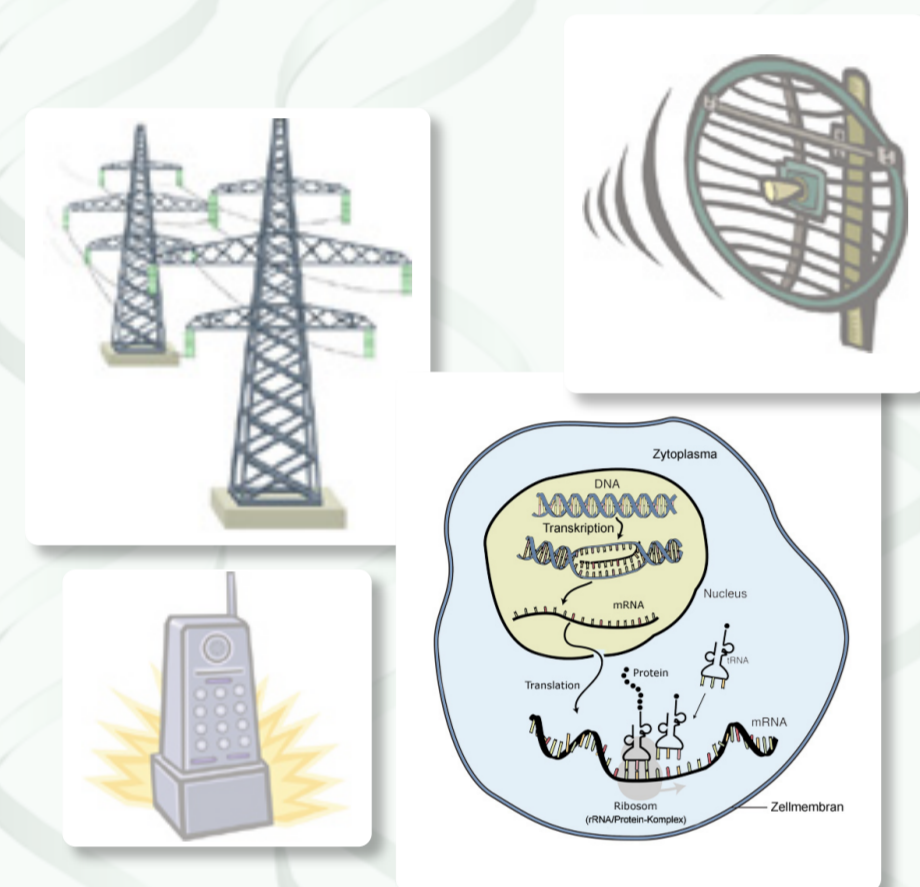
**DNA/RNA/GENE Functional changes**

More inflammation  
Earlier death  
Reduced growth  
More tumor potential

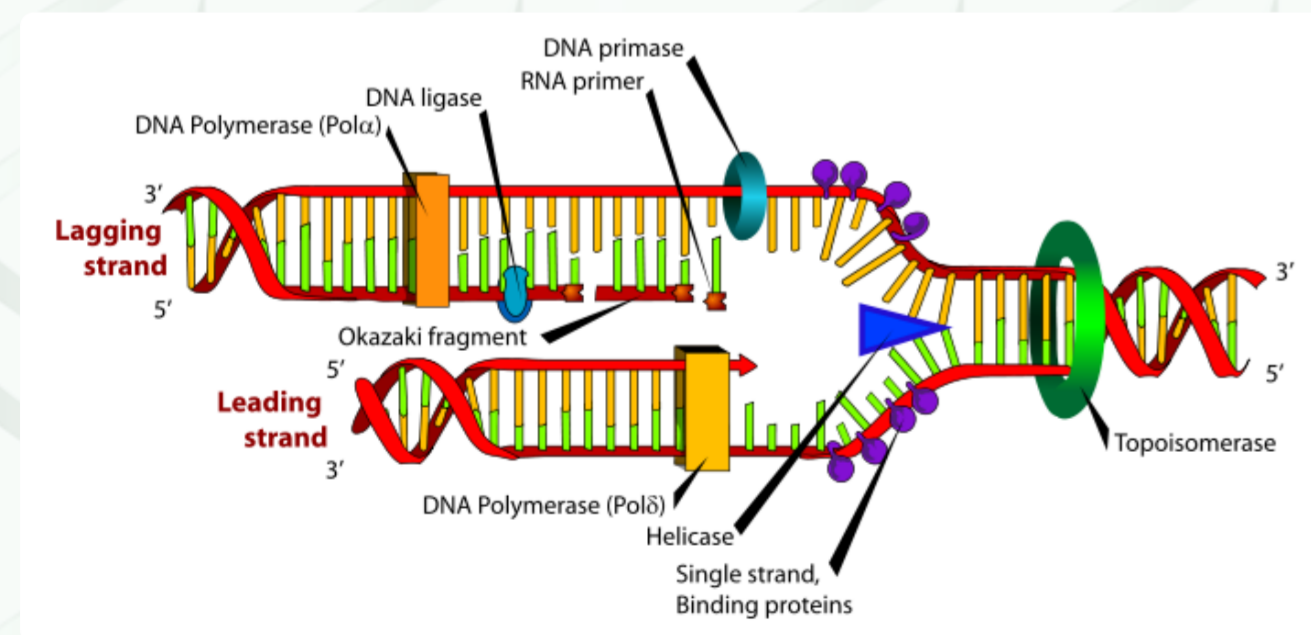
"There is no consistent pattern that radiofrequency radiation exposure could induce genetic damages/changes in cells and organisms. However, one can conclude that under certain conditions of exposure, radiofrequency radiation is genotoxic....critical genetic mutations in one single cell are sufficient to lead to cancer..."  
Henry Lai

**DNA/RNA/GENE Structural changes**

Single strand breaks  
Double strand breaks  
Slower repair  
Formation of micronuclei  
Sister chromatid exchanges



EMF penetrates and affects cellular structures



**THE FENTON REACTION**

This is a reaction between iron (present in body tissues, especially the brain) and hydrogen peroxide (a product of oxidation, high in tissues with many active mitochondria) to make highly reactive hydroxyl radicals. This is believed by some to be an explanation for the particular tissues most sensitive to free radical DNA damage from EMF (with its effect on iron and magnetite) and carcinogenesis.

- [Audio Presentations on DNA damage](#)
- [BioInitiative 2014: Genotoxic Effects](#)
- [Dr. Phillips: EMF, DNA damage survey](#)
- [BioInitiative 2012 Cellular Stress Response](#)
- [Video: Dr. Phillips, EMF and DNA Damage](#)
- [Video: Dr. Lai on Cell Phones Damage DNA](#)
- [Dr. Phillips, DNA Damage and Cancer Connection](#)

- Other links
- [TSA Scanners Shred DNA](#)
  - [Terahertz radiation affects DNA](#)

[Insights into genotoxic effects of EMF](#)

[Dr. Martin Blank, video on DNA breaks](#)

★ [Brochure: How Susceptible are Genes? Article, mobile phones, DNA strand-breakage](#)

[Panagopoulos: Health Impacts, Microwaves](#)

[Mobile phones break DNA, scramble genomes](#)

[DNA based EMF exposure dosimetry proposed](#)

[Brief intro. to study, DNA collapse in electric field](#)

[EMF Health-effect Research: Genes and DNA Studies](#)

[DNA-Destroying Chip Being Embedded into Mobile Phones](#)

[Special DNA Concerns for Children \(Dr. Blank\)](#)



**DIFFICULTY ASSESSING DNA EFFECTS**

Molecules are small  
Effects appear to be nonlinear  
There are few experts in assessment techniques  
Descriptions of experimental protocols are often poor  
Very small changes may be highly significant

DNA damage:  
Dr. Lai's work,  
Dr. Phillips' work

**EMF AND DNA: LEARNING FROM HENRY LAI, MARTIN BLANK, JERRY PHILLIPS AND OTHERS...**



**New studies**



- [Low level MW genotoxic DNA, repair downregulated](#)
- [ELF and DNA strand breaks](#)
- [ELF workers, DNA, oxi. stress](#)
- [Phone mode induced DNA damage](#)
- [Mobile phone base station, DNA damage](#)

DNA, RNA activation without damage

- [Inflammation increased](#)
- [Increased stress response](#)
- [Oncogene overexpression](#)
- [Terahertz changes gene expression](#)
- [PEF alters DNA migration pattern](#)
- [Increased transcription, apoptosis factors](#)
- [mRNA upregulation, injury-associated proteins](#)
- [BioInitiative 2012: Activation of the Stress Response](#)
- [Scientists switch mouse genes on and off with radio waves](#)

[New hypothesis: DNA is a fractal antenna, sensitive to EMF](#)  
[Map on DNA Antenna](#)

**Studies**

- [ELF, strand breaks](#)
- [Mitochondrial DNA](#)
- [Microglial activation](#)
- [Increase in micronuclei](#)
- [Review of early studies](#)
- [ELF, DNA fragmentation](#)
- [RF/MW poor DNA repair](#)
- ★ [ELF, DNA damage, rats](#)
- [Inhibition of DNA synthesis](#)
- [Mutagenic effect on rat brain](#)
- [Alteration during cell division](#)
- [Nuclear substance alterations](#)
- [ELF, chromosomal aberrations](#)
- ★ [ELF, DNA damage, welders](#)
- [Increased mutagenicity of X-ray](#)
- [ME, DNA, chromosomal damage](#)
- [Terahertz waves tear apart DNA](#)
- [Increase in chromatid exchanges](#)
- [Membrane not required for study](#)
- [ELF, EMF transcription, translation](#)
- [Mobile phone, sperm DNA damage](#)
- [MW, astrocytes, DNA fragmentation](#)
- [RF/MW mammal spermatozoa DNA](#)
- [RF/MW Non-thermal DNA breakage](#)
- [Computers, Wi-Fi, DNA fragmentation](#)
- [Discussion of care required in studies](#)
- [ELF, DNA single, double strand breaks](#)
- [ELF, mouse embryo, DNA fragmentation](#)
- [ELF, human lymphocyte chromatin effect](#)
- [Mobile phone, human hair root, DNA break](#)
- [ELF-EMF, oxidative stress, DNA, apoptosis](#)
- [ELF, chromosome gene transposition activity](#)
- [Genotoxic effect of RF on mouse brain, DNA](#)
- [60 Hz, DNA double-strand breaks, apoptosis](#)
- [Increased mutagenicity of hydrogen peroxide](#)
- [Hair root, DNA strand breakage, mobile phone](#)
- [Mobile phones, epigenetic alterations in WBCs](#)
- [Genotoxic effects in fibroblasts, not lymphocytes](#)
- ★ [ELF and RF both damage DNA, but differently](#)

Home: [Oscillatorium](#)  
Newest version [this map](#)  
Date of this update: 09-08-15

[Video: Dr. Olle Johansson on DNA damage to future generations](#)