



Όρια έκθεσης EMF



Παραθέτονται Παρακάτω διεθνείς παραδοχές ορίων ΗΜΠ. Όρια Υψηλών Συχνοτήτων μονάδα μέτρησης $\mu\text{W}/\text{m}^2$ 600 to 3000 MHz

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| $\mu\text{W}/\text{m}^2$ | Οργανισμός |
|--------------------------|--|
| 1,000-100,000 | In the vicinity of cell towers (up to 400 m) |
| 2,000-20,000 | Cordless phones (DECT/GHz technology) (1 m distance) |
| 1,000-10,000 | Wi-Fi router/access point/PC card (50 cm distance) |
| 170 | Seletun Consensus Statement (2010) Precautionary recommendation http://iemfa.org/index.php/publications/seletun-resolution |
| 100 | Working Group of EU STOA Panel (2001) Precautionary recommendation http://www.europarl.europa.eu/stoa/publications/studies/20000703_en.pdf BioInitiative Working Group (2007) Precautionary recommendation for indoor environment http://www.bioinitiative.org/report/index.htm BUND (Friends of the Earth Germany) (2008) Precautionary recommendation for hazard protection |
| 10 | Health Department of the Federal State of Salzburg (Austria 2002) BUND (Friends of the Earth Germany) (2008) |
| 3-6 | BioInitiative Working Group 2012 |
| < 0.1 | Building Biology Evaluation Guidelines (SBM-2008) |
| 0.001 | Minimum level required to maintain connection with cell phone handset |
| < 0.000 0001 | Natural background |

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Μετατροπή μονάδων μέτρησης $0.1 \text{ W}/\text{m}^2 = 100 \text{ mW}/\text{m}^2 = 100,000 \mu\text{W}/\text{m}^2 = 10 \mu\text{W}/\text{cm}^2$





Όρια Μαγνητικού Πεδίου απο ρεύματα 50Hz Χαμ,Συχν. (B) σε nT ΝανοΤέσλα



| σε nT | Οργανισμός |
|--|-----------------------------|
| 200 | NCRP |
| 300-400 | WHO |
| 200 | TCO |
| <200 | argeTQ |
| <100 | ÖKOPASS |
| <100 | BioInitiative Working Group |
| 100-500 | Ισχυρα |
| > 500 | Πολύ ισχυρα |
| Τιμές πάνω απο 250nT χρήζουν Θωράκισης | |
| < 0.0002 | Natural background |

Μετατροπή μονάδων μέτρησης 1nT (νανοΤεσλα)= 10^{-9} T (τέσλα)





Όρια Ένταση Ηλεκτρικού Πεδίου (E) Εναλλ. Ρεύματος (50Hz) (B) σε V/m



| σε V/m | Οργανισμός |
|---------------------------------------|-----------------------------|
| 10 | NCRP |
| 10 | WHO |
| 10 | TCO |
| <10 | argeTQ |
| <10 | ÖKOPASS |
| <10 | BioInitiative Working Group |
| 1,5-10 | Ισχυρα |
| > 10 | Πολύ ισχυρα |
| Τιμές πάνω απο10V/m χρήζουν Θωράκισης | |
| < 0.0001 | Natural background |

Μετατροπή μονάδων μέτρησης 1V/m Βόλτ ανα Μέτρο






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| Power Density | Reported Biological Effects | References: Primary/(Secondary) |
|-------------------------------------|--|-------------------------------------|
| 0.00001 $\mu\text{W}/\text{m}^2$ | Altered EEG in human subjects | Brise 1978 (Firstenberg, Bevington) |
| 0.0001 $\mu\text{W}/\text{m}^2$ | Effects on immune system in mice | Bundyuk 1994 (Firstenberg) |
| 0.0002 $\mu\text{W}/\text{m}^2$ | Stimulation of ovulation in chickens | Kondra 1970 (Firstenberg) |
| 0.05 $\mu\text{W}/\text{m}^2$ | Effect on cell growth in yeast | Grundler 1992 (Firstenberg) |
| 0.1 $\mu\text{W}/\text{m}^2$ | Conditioned “avoidance” reflex in rats | Kositsky 2001 (Firstenberg) |
| ~7 $\mu\text{W}/\text{m}^2$ | (0.05V/m) Adverse health effects around GSM 1800 | Eger / Naila study (Bevington) |
| 20 $\mu\text{W}/\text{m}^2$ | Sleep disorders, abnormal blood pressure, nervousness, weakness, fatigue, limb pain, joint pain, digestive problems, fewer schoolchildren promoted—controlled study near a shortwave transmitter | Altpeter 1995, 1997 (Firstenberg) |
| 20 to 7000 $\mu\text{W}/\text{m}^2$ | Behavior disorders, increased health problems, and reduced milk yield in cows near TV and cell phone transmission antenna | Loscher W, Kas G 1998 (Lai) |
| 100 $\mu\text{W}/\text{m}^2$ | A study of medical complaints of people with long-term exposure in their | Oberfranken 2005 |






homes: Over 100 $\mu\text{W}/\text{m}^2$ only 5-6% of the sample (172 people) did not experience adverse health effects.

 600 $\mu\text{W}/\text{m}^2$

Altered EEG, disturbed carbohydrate metabolism, enlarged adrenals, altered adrenal hormone levels, structural changes in liver, spleen, testes, and brain—in white rats and rabbits Dumanskij 1974 (Firstenberg)

 600 $\mu\text{W}/\text{m}^2$


Slowing of the heart, change in EEG in rabbits Serkyuk, reported in McRee 1980 (Firstenberg)




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 1 mW/m^2


(0.6V/m) X3 cancer rate at <400m from Eger (Naila study) 2004 a phone mast (Bevington)

 1 to 18 mW/m^2


Decreased life span, impaired reproduction, structural and developmental abnormalities in duckweed plants Magone 1996 (Firstenberg)

 1.3 mW/m^2


Decreased cell growth (human epithelial amnion cells) Kwee 1997 (Firstenberg)

 1.68 – 10.53 mW/m^2

Irreversible infertility in mice after 5 generations of exposure to RFR from "antenna park" Magras & Xenos, 1997 (Sage, Lai)

 1.6 mW/m^2 (0.78V/m)

Skrunda radar (Latvia) affects children's memory, attention, motor function Kolodynski, 1996 (Sage, Bevington)

 <2.7 mW/m^2

(<1V/m) <350m phone mast: x4 cancer, x10 female cancer Wolf & Wolf 2004 (Bevington)



- <math><2.7 \text{ mW/m}^2</math> ($<1\text{V/m}</math>) 3G phone mast: cognitive impairment, muscular pains, headaches, dizziness, Zwamborn 2003 (Bevington)$
- $\sim 2.7\text{mW/m}^2$ to 6.0 mW/m^2 ($\sim 1.0\text{-}1.5 \text{ V/m}</math>) $< 400\text{m}</math> phone mast : x3 risk of cancer 10 years Navarro 2003, Oberfeld 2004, Santini 2002 (Bevington)$$
- $2 - 80 \text{ mW/m}^2$ Two-fold increase in childhood leukemia / RFR exposure to AM/FM towers Hocking, 1996 (Sage, Lai)
- $3\text{-}16.4 \text{ mW/m}^2$ Children exposed to 154 to 162 MHz had a reduction in memory/attention, motor function, and reflexes compared to controls (Santini)
- 6 mW/m^2 Change in calcium ion efflux from brain tissue Dutta 1986 (Firstenberg)
- 6 mW/m^2 Cardiac arrhythmias and sometimes cardiac arrest (frogs) Frey 1968 (Firstenberg)
- 8 and 80 mW/m^2 Increased activity of alkaline phosphatase activity in guinea pigs ($2375 \text{ MHz}</math>) Pashovkina MS et al, 2000 (Lai)$
- 10 mW/m^2 Whole body microwave irradiation of male mice caused a significant effect on the immune system Fesenko, 1999 (Sage, Lai)
- 10 mW/m^2 Irradiation (5 hours) with low-power microwaves stimulates the immune potential of macrophages Novoselova, 1999 (Sage, Lai)














- 10 mW/m^2 Headache, dizziness, irritability, Simonenko 1998 (Firstenberg)
















fatigue, weakn and T cells ess,
insomnia, chest pain, difficulty
breathing, indigestion (humans—
occupational exposure)

-  10 mW/m² Stimulation of white cells in guinea pigs Shandala 1978 (Firstenberg)
-  10 – 24 mW/m² Chronic irradiation of American Embassy in Moscow of 600 MHz to 9.5 GHz resulted in increased risk of leukemia and uterine cancer (Santini)
-  13 - 57 mW/m² Two-fold increase in leukemia in adults from AM RF exposure Dolk, 1997 (Sage)
-  20 mW/m² “Microwave hearing”—clicking, buzzing, chirping, hissing, or high-pitched tones Frey 1963, 1969,1971, 1973, 1988, Justeson 1979, Olsen 1980, Wieske 1963, Lin 1978 (Firstenberg)
-  25 mW/m² Breakdown of blood-brain barrier (used a digital cellular phone to provide the radiation) Salford 1997 (Firstenberg)
-  ~40 mW/m² Altered white blood cell activity in schoolchildren Chiang 1989 (Firstenberg)
-  ~20-40 mW/m² Direct effect of RFR on ion channels in cells/opening of acetycholine channels D'Inzeo, 1988 (Sage)
-  40-100 mW/m² Visual reaction time in children is slowed//lower memory function in tests Chiang, 1989 (Sage)
-  ~50 – 100 mW/m² (4.3-6.1V/m) x10 leukaemia, x6 NHL Szmigielski 1996 (Bevington)
-  50 mW/m² Exposure of pregnant rats to GSM-like 940 MHz radiation results in aberrant expression of bone morphogenetic proteins in the kidneys of newborn rats Pyrpasopoulou et al, 2004 (Panagopoulos-Margaritis)
-  50-1200 mW/m² Increased mortality of avian embryos Xenos and Magras, 2003 (Panagopoulos-Margaritis)





| | | |
|--|--|---|
|  50 mW/m ² | Biochemical and histological changes in liver, heart, kidney, and brain tissue | Belokrinitskiy 1982 (Firstenberg) |
|  50 - 100 mW/m ² | Impaired nervous system activity | Dumansky, 1974 (Sage, Bevington) |
|  50 mW/m ² | Leukemia, skin melanoma and bladder cancer near TV and FM transmitter | Dolk 1997 (Firstenberg) |
|  66 mW/m ² | (5V/m) Decreased sperm count | Adey 1982 (Bevington) |
|  100 mW/m ² | Decreased size of litter, increased number of stillborns in mice | Il'Chevich (reported in McRee 1980) (Firstenberg) |
|  100 mW/m ² | Redistribution of metals in the lungs, brain, heart, liver, kidney, muscles, spleen, bones, skin, blood | Shutenko 1981 (Firstenberg) |
|  100 mW/m ² (0.0027 W/Kg SAR) | Changes in active avoidance conditioned reflex (behavioral change) after 0.5 hour exposure | Navakatikian, 1994 (Sage) |
|  100-200 mW/m ² | Increase in micronuclei (abberant DNA form) found in workers chronically exposed to microwaves at 1250-1350 MHz. | Garaj-Vrhovac, 1999 (Sage, Bevington) |
|  100 - 250 mW/m ² | Changes in the hippocampus of the brain | Belokrinitsky, 1982 (Sage) |
|  200 mW/m ² | 900 MHz pulsed with 217 Hz result in slight transient elevation in cortisol production | Mann, K et al 1998 (Lai) |
|  300 mW/m ² (0.015 W/Kg SAR) | Immune system effects - elevation of PFC count (antibody-producing cells) | Veyret, 1991 (Sage) |



- 500 mW/m2 An 18% reduction in REM sleep (important to memory and learning functions) Mann, 1996 (Sage)
- 1000mW/m2 Changes in immune system function Elekes, 1996 (Sage)
- 1000 mW/m2 (0.027 W/Kg SAR) A 24% drop in testosterone after 6 hours exposure Navakatikian, 1994 (Sage)



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Θωρακίζουμε κτηρια και ανιχνεύουμε Ηλεκτρομαγνητικά πεδια που βάλουν περιοχές, κτηρια και οικισμούς λόγω υπαρξης πάρκων κεραιών στην περιοχή

