Death rates peaked during the second year of exposure.

Fig. 16. Distribution of the number of deaths by neoplasia versus duration of exposure since the date that the first antenna in each analyzed CT came into operation.

Insects are remarkably resistant to ionizing radiation and radioactivity. They appear to be much more sensitive to the effects of microwave radio frequency exposures.

In a recent study, fruit flies were exposed to 10 μW/cm² of GSM 900 MHz or 1800 MHz digital RF. This exposure level is 100 times lower than the FCC Guidelines of 1000 μW/cm². Exposures were for one single exposure intervals per day for five days, ranging from 1 to 21 minutes per day.


Even at one minute of exposure per day, a significant decrease in fertility is seen.

Fig. 2. Reproductive capacity (mean number of F1 pupae per maternal fly) of groups exposed to DCS 1800MHz radiation for different daily exposure durations (1, 6, 11, 16, and 21 min) for five consecutive days, and of sham-exposed groups (no exposure).

Impaired Fertility in Female Mice

In one study, mice were kept in cages in a VHF/UHF antenna park in Thessaloniki, Greece. Power densities ranged between 0.168 to 1.053 μW/cm² [reported as 168 – 1053 nanowatts/cm²]

This is about 1000 times lower than the FCC Guidelines of 600–1000 μW/cm²

With repeated matings, litter size decreased, until by the 5th mating, all the dams were infertile.

This infertility was irreversible.

Magras IN, Xenos TD. RF radiation-induced changes in the prenatal development of mice. Bioelectromagnetics (1997); 18(6):455-461.
Reduced sperm production in male Wistar rats exposed to 10 GHz microwave RF.

$0.21 \text{ mW/cm}^2 = \text{one fifth of the FCC Guidelines of } 1 \text{ mW/cm}^2$

OTHER EFFECTS: Increases in reactive oxygen species, increased free radical formation, decreased activity of glutathione peroxidase and superoxide dismutase, DNA strand breakage, increased apoptosis (cell death) in sperm cells, distortion of sperm structure, reduced testosterone levels, shrinkage of seminiferous tubules and testicular size, decreased number and weight of progeny.


WiFi Exposure Damages Sperm With Oxidant Stress.

The rats were exposed to a Standard WiFi gateway, 24 hours a day for 20 days.

**HSCORE** = histological staining in testes for 8–OH–20–dG
[8-hydroxy–20-deoxyguanosine, byproduct of DNA damage]

**Serum 8–OH–20–dG (ng/ml)** [byproduct of DNA damage]

**TBS** = testicular biopsy score

9 = Much spermatogenesis, but germinal epithelium disorganized with marked sloughing or obliteration of lumen

**GPX** = glutathione peroxidase, an antioxidant (consumed by oxidative stress in exposed rats).

Impaired Fertility in Birds

In Valladido, Spain, a study compared the productivity of storks nesting closer and farther from a cell phone tower site.

30 nests within 200 meters of the antennae, were compared with 30 nests greater than 300 meters from the antennae.


Productivity was significantly reduced in birds in the high exposure group.

Average electric field intensity on nests within 200m = 2.36±0.82 V/m (~ 1.48 μW/cm²)

This is more than 400 times less than the FCC Guidelines of 600–1000 μW/cm²

Average electric field intensity on nests further than 300m = 0.53 ± 0.82 V/m (~ 0.07 μW/cm²).

Impaired Fertility in Amphibians

Eggs and tadpoles of the European common frog (Rana temporaria) were exposed to RF/EMF from several cell towers located at a distance of 140 meters.

Duration of exposure was 2 months (from egg phase to advanced tadpole stage).

Control groups were placed in same conditions, but contained in a faraday cage that shielded the eggs from RF exposure.


Impaired Fertility in Amphibians

<table>
<thead>
<tr>
<th>Mortality (%)</th>
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<tbody>
<tr>
<td>Control (in Faraday cage)</td>
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Exposure intensity 1.8 to 3.5 V/m (~ 0.8–3.2 μW/cm²).

This is 200 times less than the FCC Guidelines of 600–1000 μW/cm².

[In the exposed group (n = 70), low coordination of movements and asynchronous growth was observed in living specimens, resulting in both big and small tadpoles. In the control group (n = 70), growth was normal.]

Sperm counts have been dropping worldwide for the last several decades. (e.g. In New Zealand, 2.5% per year for the last 20 years).

Pesticides have been implicated.

Some evidence suggests that microwave RF exposure may also play a role.


Cell Phone Transmissions Decrease Sperm Motility in Vitro

Samples of human sperm received 5 minutes exposure, 10 cm from a transmitting GSM 900 MHz cell phone. Average power density of exposure: 20 μW/cm²

This is 30 times less than the FCC Exposure Guideline of 600 μW/cm²

(Y axis = values in %)

Semen analysis performed on 371 men at a university clinic.

Health questionnaire included query of cell phone use habits.
(Y axis = values in %)


Three hundred sixty-one men undergoing infertility evaluation were divided into four groups according to their active cell phone use:
group A: no use; group B: <2 h/day; group C: 2-4 h/day; and group D: >4 h/day.

With greater than two hours a day of reported talk time, significant reduction in sperm count, motility, viability, and % normal morphology were observed.

[One can assume that with texting rather than talking, the data might be even worse . . . as the phone antenna will be closer to the testes.]

Isothermal Exposure to 1.8 GHz RF Damages Sperm

Sperm exposed for 16 hours in vitro to 1.8 GHz (SAR = 27.5 W/kg) @ 21ºC (isothermal conditions).

Sperm damage correlates with increased free radical (ROS) production.

Values in %.


1.8 GHz RF Degrades Sperm Quality In Vitro

1.8 GHz RF at various intensities for 16 hours @ 21ºC
This is an isothermal exposure
Sperm vitality and motility are significantly detraded at SAR = 1 W/kg and above

Figure 2. RF-EMR exposure reduces motility and vitality of human spermatozoa, in an SAR dependent manner. Percoll-purified spermatozoa (5 x 10⁶ cells) were suspended in 1 ml BWW in a 35 mm Petri dish and placed within the waveguide while control cells (closed circles) were placed outside the waveguide. Cells in the waveguide were exposed to 1.8 GHz RF-EMR at SAR levels of 0.4, 1.0 2.8 4.3 10.1 and 27.5 W/kg (open circles) for 16 h at 21ºC. Both vitality and motility were reduced in a dose dependent manner.

A. Vitality was significantly reduced at a SAR of 1.0 W/kg from 89% ±3% to 65% ±1% (*p<0.01).

B. Motility was also significantly reduced at a SAR of 1.0 W/kg from 86% ±2% to 68% ±2% (*p<0.05). All results are based on 4 independent samples.
A. ROS generation (DHE response) was significantly increased from control levels after exposure to 1.0 W/kg (*p, 0.05) and above (**p, 0.001).

C. In order to control for thermal effects, the impact of temperature of cellular ROS generation was monitored; a significant increase in ROS generation was observed as temperatures rose above 40°C (p,0.001).

Figure 3. RF-EMR induces ROS generation in human spermatozoa, in an SAR-dependent manner unrelated to thermal effects.


Oxidative Damage To Sperm DNA From 1.8 GHz RF Exposure

1.8 GHz RF x 16 hours @ 21°C isothermal.

A) As the power levels were increased, the amount of oxidative DNA damage expressed also increased. A significant amount of oxidative DNA damage was observed in cells exposed to 2.8 W/kg (*p,0.05) RF–EMR and above (**p,0.01; ***p,0.001).

B) The levels of 8–OH–dG expression were positively correlated with the levels of ROS generation by the mitochondria (R2 = 0.727).

Figure 4. RF-EMR induces oxidative DNA damage in human spermatozoa.

A) Significant levels of DNA fragmentation were observed in exposed spermatozoa at 2.8 W/kg (*p,0.05) and above (**p,0.001).

B) DNA fragmentation was positively correlated with ROS production by the mitochondria as monitored by MSR. (R² = 0.861).

Figure 5. RF-EMR induces DNA fragmentation in human spermatozoa.

Motile spermatozoa in semen were incubated at room temperature, 3 cm below laptop computer (e.g. lap distance) 4 hours of exposure.

Control incubated in similar conditions, without presence of the computer.


Power density ranged 0.45 to 1.05 μW/cm²

[This is roughly 1000 times less than the FCC exposure limit of 1000 μW/cm²]