

Studies of health effects of mobile phone masts

The studies below indicate increased risks of cancer amongst residents living near mobile phone masts and a range of symptoms associated with living near a phone mast (Click on the study for more details):

[Need help understanding the studies?...](#)

[Glossary..](#) **Studies on cancer in vicinity of a mobile phone base station**

[Eger H, Hagen K U, Lucas B, Vogel P, Voit H \(2004\), Einfluss der räumlichen Nähe von Mobilfunksendeanlagen auf die Krebsinzidenz, Umwelt-Medizin-Gesellschaft, 17. Jahrgang, Ausgabe 4/2004, S. 273-356](#)

In the years 1999 until 2004, after five and more years of use of the phone mast, the risk of cancer for the people in

the vicinity of the phone mast was three time the risk for the people living far away.

—

**Wolf R M.D., Wolf D M.D. (2004),
Increase incidence of cancer near a
cellphone transmitter station,
International Journal of Cancer
Prevention, vol. 1, nr. 2, April 2004.**

This epidemiological study examined people living within 350m of a long-established mast in the town of Netanya. They found a four fold increase in cancer compared with the general population of Israel and a ten fold increase in cancer in women

compared with those outside the 350m zone in Netanya.□ □

Authors' comments:

-

"The measured level of RF radiation (power density) in the area was low; far below the current guidelines based on the thermal effects of RF exposure. We suggest, therefore, that the current guidelines be re-evaluated.

-

"The enormous short latency period; less than 2 years, indicates that if there is a real causal association between RF radiation emitted from the cell-phone base station and the cancer cases (which we strongly believe there is), then the RF radiation should have a very strong promoting effect on cancer at very low radiation!"

-

"Although the possibility remains that

this clustering of cancer cases in one year was a chance event, the unusual sex pattern of these cases, the 6 different cancer kinds, and the fact that only one patient smoked make this possibility very improbable and remote. It should be noted that 7 out of 8 cancer cases were women, like in the work of Maskarinec¹ who found 6 out of 7 leukemia cases in proximity to radio towers to occur in girls. Such unusual appearances of cancer cases due to one accused factor on two completely different occasions is alarming.

-

"We are aware of at least 2 areas in which a drastic increase in the incidence of cancer cases occurred near a cell-phone antenna, however, the setup was not suitable for a well design study of those cases. In one of them (which also got publication in the daily newspapers) there were 6 out of 7 cancer cases in women working in a store in close proximity to a cell-phone antenna.

-

"In conclusion, the results of this study showed that there was a significantly greater incidence of cancers of all kinds within the vicinity of a cell-phone transmitter station."

Laboratory studies

[Nittby H, Brun A, Eberhardt J, Malmgren L, Persson BR, Salford LG. 2009 Pathophysiology. 2009 Aug;16\(2-3\):103-12. Epub 2009 Apr 2: Increased blood-brain](#)

barrier permeability in
mammalian brain 7 days after
exposure to the radiation from a
GSM-900 mobile phone.

Department of Neurosurgery,
Lund University, The Rausing
Laboratory and Lund University
Hospital, S-22185, Lund,
Sweden.

Findings in agreement with
earlier studies seeing increased
BBB permeability immediately

and 14 days after exposure.
PMID: 19345073 [PubMed - in
process]

**Leif G. Salford et al.
(2003): Nerve Cell Damage in
Mammalian Brain after
Exposure to Microwaves
from GSM Mobile Phones.**

Found highly significant ($p < 0.002$) evidence for neuronal damage in the cortex, hippocampus, and basal

ganglia in the brains of exposed rats.

Researchers chose 12-26-week-old rats because they are comparable in relative age with human teenagers and have growing brains.

Eberhardt JL, Persson BR, Brun AE, Salford LG, Malmgren LO. Department

of Medical Radiation
Physics, Lund University
Hospital, Lund, Sweden. B
lood-brain barrier
permeability and nerve cell
damage in rat brain 14 and
28 days after exposure to
microwaves from GSM
**mobile phones. **

**Investigated the effects of
global system for mobile
communication (GSM)**

microwave exposure on the permeability of the blood-brain barrier and signs of neuronal damage in rats using a real GSM programmable mobile phone in the 900 MHz band. Ninety-six non-anaesthetized rats were either exposed to microwaves or sham exposed in TEM-cells for 2 h at specific absorption rates of average

whole-body Specific Absorption Rates (SAR) of 0.12, 1.2, 12, or 120 mW/kg. The rats were sacrificed after a recovery time of either 14 or 28 d, following exposure and the extravazation of albumin, its uptake into neurons, and occurrence of damaged neurons was assessed.

Albumin extravazation and also its uptake into neurons was seen to be enhanced after 14 d (Kruskal Wallis test: $p = 0.02$ and 0.002 , respectively), but not after a 28 d recovery period. The occurrence of dark neurons in the rat brains, on the other hand, was enhanced later, after 28 d ($p = 0.02$). Furthermore, in the 28-d brain samples, neuronal albumin uptake was

significantly correlated to occurrence of damaged neurons (Spearman $r = 0.41$; $p < 0.01$).

Studies on symptoms in vicinity of a mobile phone base station

Santini R, Seigne M,
Bonhomme-Faivre L
(2002), Investigations on
the health of people living
near mobile telephone
relay stations: Incidence
according to distance and
sex, Pathol Biol (Paris),
2002 Jul; 50(6):369-73

In France 530 people took part. They listed up to 18 symptoms which decreased with distance from base station.

This study, published in the French journal PATHOLOGIE BIOLOGIE was the first published study looking at the non-specific health symptoms of

people living near cellular phone base stations. The report describes a number of effects including tiredness, headache, nausea, sleep disruption, depression, loss of memory, loss of appetite and libido decrease, and concludes that it is

advisable that mobile phone base stations are not sited closer than 300m to populations. □ Comparisons of complaints frequencies in relation with distance from base station and sex, show significant (p < 0.05) for those living 300 m or not exposed to base station, till 300 m for tiredness, 200 m for

headache, sleep disturbance, discomfort, etc. 100 m for irritability, depression, loss of memory, dizziness, libido decrease, etc. Women significantly more often than men ($p < 0.05$) complained of headache, nausea, loss of appetite, sleep

**disturbance,
depression, discomfort
and visual
perturbations.**

**Santini Report Part II,
2003.R. Santini, P.
Santini, J. M. Danze, P.
Le Ruz, M. Seigne,
Symptoms**

experienced by people
in vicinity of base
stations: II /
Incidences of age,
duration of exposure,
location of subjects in
relation to the
antennas and other
electromagnetic
factors **PATHOLOGIE**
BIOLOGIE (2003, 51:
412-415)

This is the second part of the above study. Results show significant increase (p 5 years. Other electromagnetic factors (electrical transformers,

**radio-television,
transmitters,...) have
effects on the
frequency of some
symptoms reported by
the subjects.**

**It indicates that the
age of the exposed
subjects is a factor**

which increases the sensitivity to some of the non specific health symptoms studied, and that being positioned facing the antennas is most harmful for some of the studied symptoms, particularly up to 100m away. The study concludes by

reiterating that that it would be advisable not to establish mobile telephony stations within 300m of populations.

—

Navarro E A, Segura J, Portoles M,

Comez-Perretta C
(2003), The
Microwave Syndrom:
A Preliminary Study
in Spain,
Electromagnetic
Biology and
Medicine, Vol. 22,
Issue 2, 2003

Study took place in Spain, Murcia. 101 subjects. Listed 18 symptoms which fell off with distance from the base station.

The present results demonstrate a significant correlation between several symptoms of what is

called microwave sickness and the microwave power density associated with the Base Station located on a hill at the edge of the town. Symptoms and signs include headache, fatigue, irritability, loss of appetite,

**sleepiness,
difficulties in
concentration or
memory, depression,
and emotional
instability.**

**Oberfeld G, Navarro
A E, Portoles M,
Maestu C, Gomez**

Perretta C (2004),
The microwave
syndrome - further
aspects of a Spanish
study, presented at
an International
Conference in Kos
(Greece), 2004

**This study found
significant ill-health**

effects in those living in the vicinity of two GSM mobile phone base stations. The strongest five associations found are depressive tendency, fatigue, sleeping disorder,

difficulty in concentration and cardiovascular problems. Based on the data of this study the advice would be to strive for levels not higher than 0.02 V/m for the sum total, which

is equal to a power density of 0.0001 $\mu\text{W}/\text{cm}^2$ or 1 $\mu\text{W}/\text{m}^2$, which is the indoor exposure value for GSM base stations proposed on empirical evidence by the Public Health Office of the

Government of Salzburg in 2002.

Hutter HP,
Moshammer H,
Wallner P, Kundi M.
Subjective
symptoms,
sleeping problems,
and cognitive

performance in
subjects living near
mobile phone base
stations. Occup
Environ Med. 2006
May;63(5):307-13.
Occup Environ
Med. 2006
May;63(5):298-9.

In a cross-sectional study of randomly selected inhabitants living in urban and rural areas for more than one year near to 10 selected base

**stations, 365
subjects were
investigated.
Several cognitive
tests were
performed, and
wellbeing and
sleep quality were
assessed. Field
strength of**

**high-frequency
electromagnetic
fields (HF-EMF)
was measured in
the bedrooms of
336 households.
RESULTS: Total
HF-EMF and
exposure related to
mobile**

**telecommunication
were far below
recommended
levels (max. 4.1
mW/m²). Distance
from antennae was
24-600 m in the
rural area and
20-250 m in the
urban area.**

Average power density was slightly higher in the rural area (0.05 mW/m²) than in the urban area (0.02 mW/m²). Despite the influence of confounding variables, including

fear of adverse effects from exposure to HF-EMF from the base station, there was a significant relation of some symptoms to measured power density; this was

**highest for
headaches.**

**Perceptual speed
increased, while
accuracy**

decreased

**insignificantly with
increasing**

exposure levels.

There was no

**significant effect
on sleep quality.
CONCLUSION:
Despite very low
exposure to
HF-EMF, effects on
wellbeing and
performance
cannot be ruled
out, as shown by**

**recently obtained
experimental
results; however,
mechanisms of
action at these low
levels are unknown
.**

Abdel-Rassoul G,
El-Fateh OA,
Salem MA, Michael
A, Farahat F,
El-Batanouny M,
Salem E.
Neurobehavioral
effects among
inhabitants around

mobile phone
base stations.
Neurotoxicology.
2007
Mar;28(2):434-40.
Epub 2006 Aug 1.

A cross-sectional

**study was
conducted on (85)
inhabitants living
nearby the first
mobile phone
station antenna in
Menoufiya
governorate,
Egypt, 37 are**

**living in a building
under the station
antenna while 48
opposite the
station. A control
group (80)
participants were
matched with the
exposed for age,**

**sex, occupation
and educational
level. All
participants
completed a
structured
questionnaire
containing:
personal,**

**educational and
medical histories;
general and
neurological
examinations;
neurobehavioral
test battery
(NBTB) in addition
to Eysenck**

**personality
questionnaire
(EPQ). RESULTS:
The prevalence of
neuropsychiatric
complaints as
headache (23.5%),
memory changes
(28.2%), dizziness**

(18.8%), tremors (9.4%), depressive symptoms (21.7%), and sleep disturbance (23.5%) were significantly higher among exposed

**inhabitants than
controls: (10%),
(5%), (5%), (0%),
(8.8%) and (10%),
respectively
($P < 0.05$). The
NBTB indicated
that the exposed
inhabitants**

exhibited a significantly lower performance than controls in one of the tests of attention and short-term auditory memory [Paced Auditory

**Serial Addition
Test (PASAT)].
Also, the
inhabitants
opposite the
station exhibited a
lower performance
in the problem
solving test (block**

design) than those under the station. All inhabitants exhibited a better performance in the two tests of visuomotor speed (Digit symbol and Trailmaking B) and

**one test of
attention
(Trailmaking A)
than controls. The
last available
measures of RFR
emitted from the
first mobile phone
base station**

**antennas in
Menoufiya
governorate were
less than the
allowable standard
level.**

**CONCLUSIONS
AND
RECOMMENDATIO**

**NS: Inhabitants
living nearby
mobile phone base
stations are at risk
for developing
neuropsychiatric
problems and
some changes in
the performance of**

**neurobehavioral
functions either by
facilitation or
inhibition. So,
revision of
standard
guidelines for
public exposure to
RER from mobile**

**phone base
station antennas
and using of NBTB
for regular
assessment and
early detection of
biological effects
among inhabitants
around the**

**stations are
recommended.**

Thomas S,
Kuhnlein A,
Heinrich S, Praml
G, Nowak D, von
Kries R, Radon K

Epidemiological
Study
(cross-sectional
study) **Personal**
exposure to
mobile phone
frequencies and
well-being in
adults: a

cross-sectional
study based on
dosimetry.
epidemiol.
Bioelectromagnet
ics 2008; 29 (6):
463 - 470

Results/conclusion: Exposure levels were far below the ICNIRP reference level in a range from 0.13 % to 0.56 % of the ICNIRP reference level during

waking hours. The
mostly reported
chronic
symptoms were
sleeping
disorders (58 %)
and fatigue (21
%), the mostly
reported acute

**symptom was
fatigue in the
evening (43 %).
No statistically
significant
association
between personal
exposure to
mobile phone**

frequencies and chronic or acute symptoms was found.

Limitations (according to author): The sample size was relatively small.

**The bedtime
exposure levels
has to be
excluded from
analyses because
the valid
measurements of
the dosimeter can
only be obtained**

if the dosimeter is moved.

Exposure very low. Daily average 0.24 W/m²

Blettner et al.
Mobile phone

base stations

and adverse

health effects:

Phase 1: A

population-based

cross-sectional

study in

Germany Occup

Environ

Med.2008

**Participants who
are concerned
about or attribute
adverse health
effects to mobile
phone base**

stations and those living in the vicinity of a mobile phone base station (500 m) reported slightly more health complaints than

others.

Conclusions: A substantial proportion of the German population is concerned about adverse health effects caused by

**exposure from
mobile phone
base stations.
The observed
slightly higher
prevalence of
health
complaints near
base stations can**

**however not be
fully explained by
attributions or
concerns.**

**Note: In phase 1
a significant effect
of distance from
base station**

(<500m) on well
being was found

Bortkiewicz A,
Zmyslony M,
Szyjkowska A,
Gadzicka E
(2004),

Subjective
symptoms
reported by
people living in
the vicinity of
cellular phone
base stations,
Med Pr. 2004; 55

(4):345-51

**People living in
the vicinity of
base stations
report various
complaints**

**mostly of the
circulatory
system, but also
of sleep
disturbances,
irritability,
depression,
blurred vision,**

**concentration
difficulties,
nausea, lack of
appetite,
headache and
vertigo. The
performed
studies showed**

**the relationship
between the
incidence of
individual
symptoms, the
level of
exposure, and
the distance**

between a residential area and a base station. This association was observed in both groups of persons, those

who linked their complaints with the presence of the base station and those who did not notice such a relation.

See also Studies
relating to
children's
exposure to
chronic low level
electro-magnetic
radiation

H. Chiang

a;#160; G. D.

Yao a;#160; Q.

S. Fang

b;#160; K. Q.
Wang c;#160;
D. Z. Lu d; Y. K.
Zhou d. Health
Effects of
Environmental
Electromagnetic
Fields. Journal

Electromagnetic
Biology and
Medicine,
Volume 8, Issue
1 1989, pages
127 - 131

Subjects included
nursery school
children, 3rd year
secondary school
children, college
students and
military personnel
exposed to

pulsed
microwave
radiation and AM
radio waves.
Investigated the
effects of
exposure to
environmental

electromagnetic
fields (EMFs) in
1170 subjects.

Neutrophil
phagocytosis was
enhanced in the
low-intensity
exposure groups,

but reduced significantly at relatively high intensities. Visual reaction time was prolonged and the scores of short-term

memory tests
were lower in
some
high-intensity
exposure groups.
The data indicate
that chronic
exposure to

EMFs are associated with significant changes in some physiological parameters including the central nervous

and immune
systems in man.
Changes in white
blood cells
function,
prolonged
reaction time,
lower short-term

memory scores
were identified at
power densities
of 0-4 m W/cm²
in school
students (Chiang
et al 1989).

Röösl M,

Moser M,

Baldinini Y,

Meier M,

Braun-Fahrländ

er: Symptoms

of ill health
ascribed to
electromagneti
c field
exposure--a
questionnaire
survey. Ins
titute of Social

and Preventive

Medicine,

University of

Basel, Basel,

Switzerland.

Roeoesli@ispm

.unibe.ch

C.

Int J Hyg

Environ Health.

2004

Feb;207(2):141-

50.Links

From June

**2001, health
questionnaires
were
distributed to
people who
complained
about
symptoms of ill**

health which they ascribed to exposure to electromagnetic fields (EMF). The objective of the survey was to gain a better

**knowledge of
the anxieties of
complainants,
to obtain hints
of possible
problems and
of actions that
should be taken**

**to solve the
problems. The
survey was not
designed to
establish a
causal
association
between**

**exposure to
EMF and
symptoms of ill
health. Within
one year, 429
questionnaires
were returned
of which 394**

persons
reported
symptoms.

Waldmann-Se

Isam C., Jul
2005,
Documented
Health Damage
under the
Influence of
High
Frequency

Electromagneti c Fields

**Evaluation of
356 subjects in
Oberfranken all**

**subject to
long-term
exposure to
radiation found
a range of
reported
symptoms**

Germann, P
(2004),
Einfluss der
Mobilfunkbela
stung auf die
Retikulocytenr
eifung,

vorläufige
Bewertung
anhand von
1000
Analysen. Juli
2004.
Significant

effects of G S
M phone mast
on blood
structure,
Germany 2004.

**Blood was
drawn from
1018 persons
before a GSM
mobile phone
base station
was installed**

**and again 6 to
12 months
after it was
turned on.
Significant
changes in the
blood have**

**been
observed. The
results of the
reticulocyte
studies show
that significant
effects appear**

**in humans as a
direct cause of
pulsed E M F,
that can also
be found in
scientific
literature in**

**vitro and in
vivo (in fact
biological
effects to
lymphocytes,
granulocytes
to bone growth**

and the bone marrow).

Radiofreque
ncy (RF)

sickness in
the Lilienfeld
Study: an
effect of
modulated
microwaves?
Johnson

Liakouris AG.
Twin Streams
Educational
Center, Inc.,
Carrboro,
North
Carolina,

USA. Arch

Environ

Health. 1998

May-Jun;53(3)

:236-8.

**The author
reviewed U.S.
literature,
which
revealed that
research
results are**

**sufficiently
consistent to
warrant
further
inquiry. A
review of
statistically**

**significant
health effects
noted in the
Lilienfeld
Study
provided
evidence that**

**the
disregarded
health
conditions
match the
cluster
attributed to**

**the
radiofrequenc
y sickness
syndrome,
thus
establishing a
possible**

**correlation
between
health effects
and chronic
exposure to
low-intensity,
modulated**

**microwave
radiation. The
author
discusses
these health
effects
relative to (a)**

**exposure
parameters
recorded at
the U.S.
Embassy in
Moscow and
(b) the Soviet**

**10-microwatt
safety
standard for
the public.
Given the
evidence, new
research-with**

**current
knowledge
and
technology-is
proposed.**

Zwamborn A

P M, Vossen

S H J A, Van

Leersum B J

A M, Ouwens

M A, Makel W

N. (2003),

Effects of
Global
Communicati
on System
radiofrequen
cy fields on
Well-Being

and Cognitive
Functions of
human
subjects with
and without
subjective
complaints.

Netherlands
Organisation
for Applied
Scientific
Research
(TNO)
FEL-03-C148

(2003).

In two
groups
(hypersensiti

**ve and
non-hypersen
sitive
subjects)
exposure to
UMTS had a
negative**

**influence on
well-being in
both groups.
Cognitive
function was
consistently
affected in**

**both groups
exposed to
GSM and
UMTS.**

—

Regel SJ,

Negovetic S,

Röööslī M,

Berdiñas V,

Schuderer J,

Huss A, Lott

U, Kuster N,

Achermann

P. Environ

Health

Perspect.

2006

Aug; 14(8):1

270-5

**UMTS base
station-like
exposure,
well-being,**

**and cognitive
performance.
The reported
effects on
brain
functioning
were**

**marginal and
may have
occurred by
chance. Peak
spatial
absorption in
brain tissue**

**was
considerably
smaller than
during use of
a mobile
phone. No
conclusions**

**can be drawn
regarding
short-term
effects of cell
phone
exposure or
the effects of**

**long-term
base
station-like
exposure on
human
health.**

Eltiti S,

Wallace D,

Ridgewell A,

Zougkou K,

Russo R,

Sepulveda F,

Mirshekar-Sy

ahkal D,

Rasor P,

Deeble R,

**Fox E. Doe
s short-term
exposure to
mobile
phone base
station**

signals

increase

symptoms in

individuals

who report

sensitivity to

electromagn
etic fields? A
double-blind
randomized
provocation
study. #160;

Envi

ron Health

Perspect.

2007

Nov; 115(11):

1603-8.

Short-term exposure to a typical

**GSM base
station-like
signal did
not affect
well-being or
physiologica**

**I functions in
sensitive or
control
individuals.
Sensitive
individuals**

**reported
elevated
levels of
arousal
when
exposed to a**

**UMTS signal.
Further
analysis,
however,
indicated
that this**

**difference
was likely to
be due to the
effect of
order of
exposure**

**rather than
the exposure
itself. □**

**This study
has been
widely
criticised.**

GSM base
stations:
short-term
effects on

well-being.&

#160;

Augner C,

Florian M,

Pauser G,

Oberfeld G,

Hacker GW.
IGGMB,
Research
Institute for
Frontier
Questions of

Medicine

and

Biotechnolo

gy,

Landeskran

kenhaus

Salzburg,
University
Clinics of
the
Paracelsus
Medical

Private
University,
Salzburg,
Austria.
Bioelectrom
agnetics.

2009

Jan;30(1):73

-80

PMID:

18803247

[PubMed - in
process]

The
purpose of

**this study
was to
examine the
effects of
short-term
GSM (Global**

System for Mobile Communications) cellular phone base station

RF-EMF (radiofrequency electromagnetic fields) exposure on

**psychologic
al symptoms
(good mood,
alertness,
calmness)
as measured**

**by a
standardized
well-being
questionnaire.
e.**

**Concluded
that
short-term
exposure to
GSM base
station**

**signals may
have an
impact on
well-being
by reducing
psychologic**

al arousal.

