Non-ionising radiation risks

Collegium Ramazzini 28 October 2012

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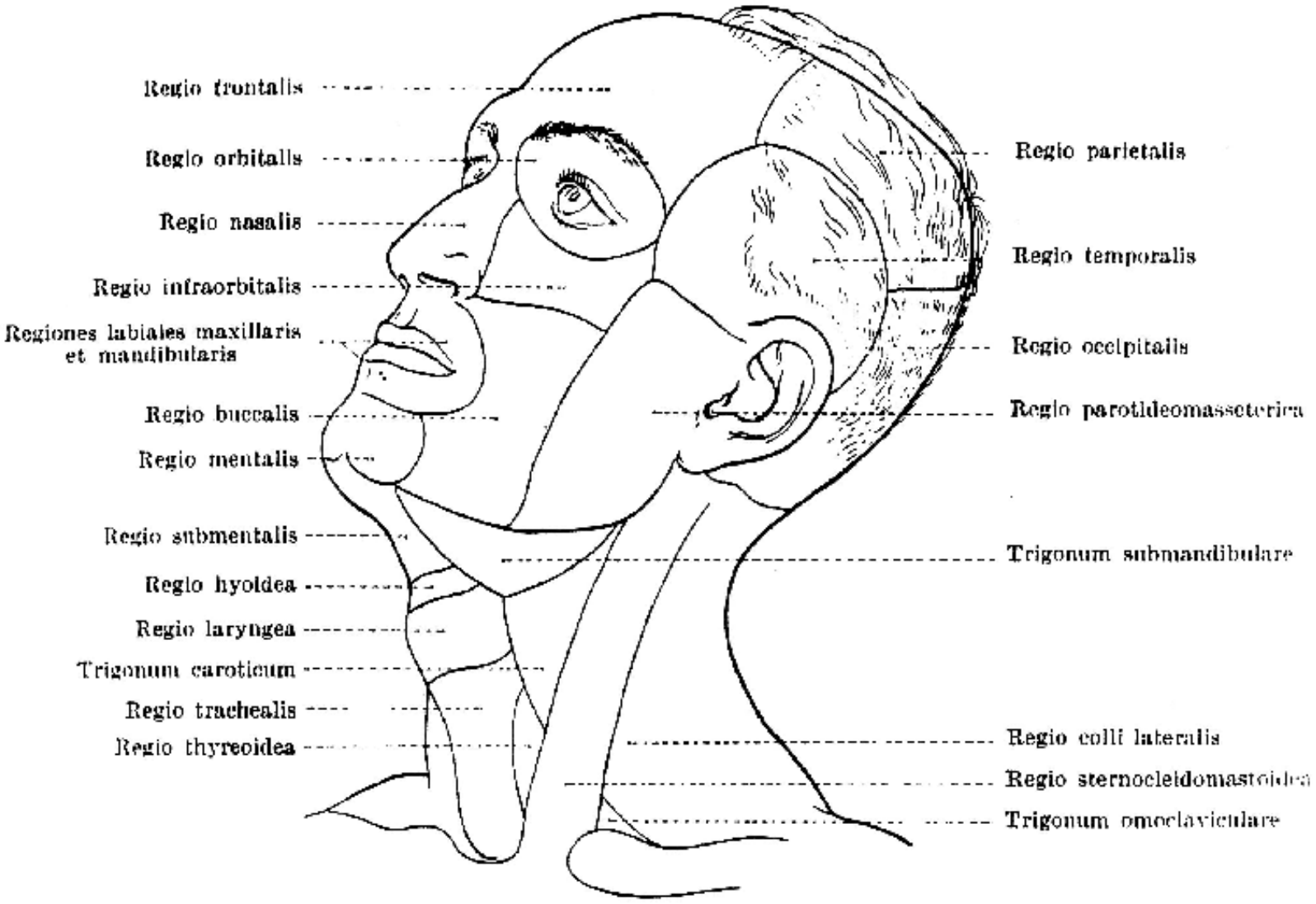
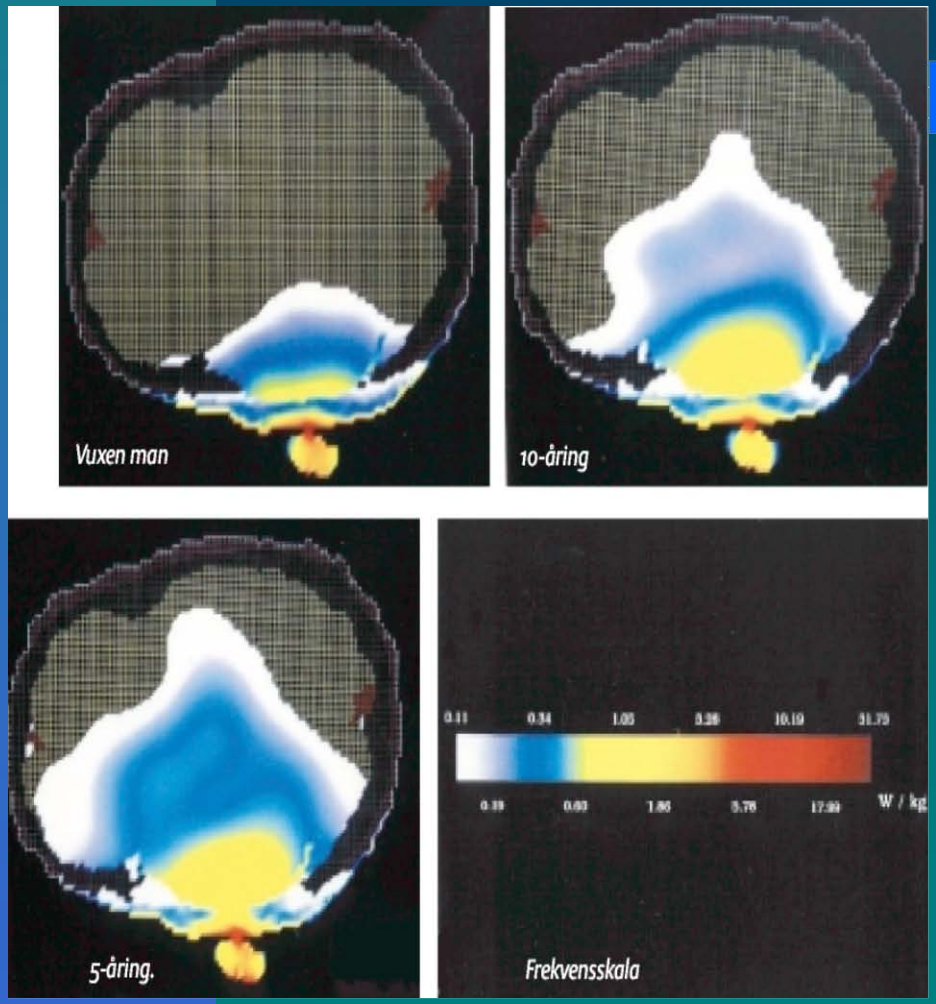


Abb. 77. Die Regionen des Kopfes und Halses; nach His: Die anatomische Nomenklatur 1895.

Distribution of average SAR (%)

	900 MHz	1800 MHz
Right		
-Brainstem	1	0.2
-Cerebellum	12	13
-Frontal	19	14
-Occipital	5	5
-Parietal	9	7
-Temporal	50	60
TOTAL	96.8 %	99.5%
Left	3.2 %	0.5 %

Cardis et al Phys Med Biol 2008;53:2771-2783



Adult man, 10 years child, 5 years child, frequency scale.

GSM phone 835 MHz with SAR in Watt/Kg.

Professor Om Gandhi with courtesy.

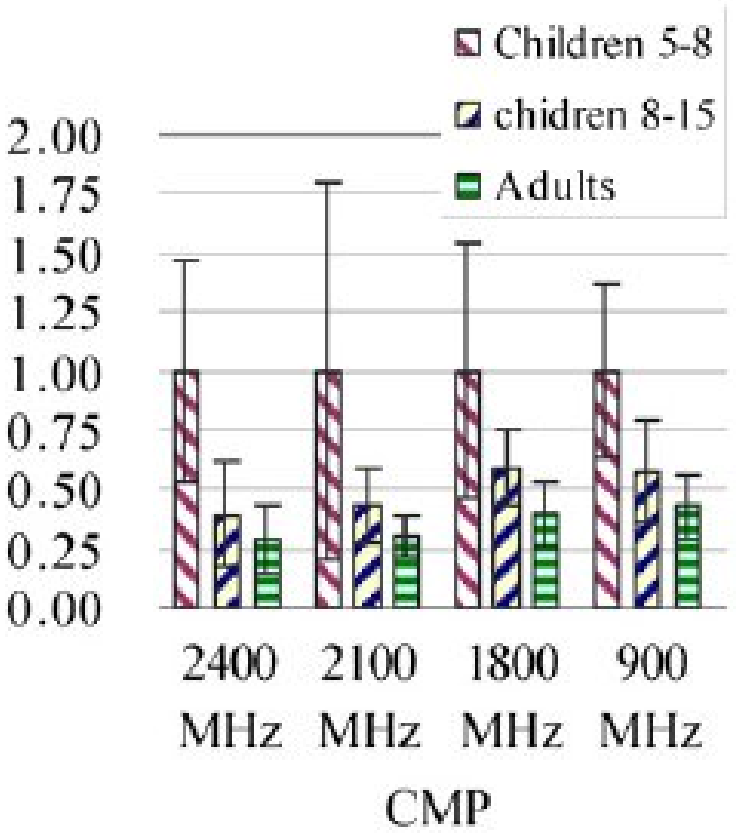


Figure 14. Relative mean MSAR1g in brain tissues of children and adults.

- **Cellular telephones:**

  NMT 450 MHz 1981-2007
  NMT 900 MHz 1986-2000
  (analogue)
  2G GSM 900/1800 MHz 1991-
  (digital)
  3G (UMTS) 1900/2100 MHz 2003-
  4G 800/2600 MHz Currently

  Trumked Radio Comm (TETRA) 380-400 MHz

- **Desktop cordless phones:**

  Analogue (800-900 MHz) 1988-1990's
  Digital (DECT 1900 MHz) 1991-

Use of mobile phones and glioma risk, meta-analysis of Hardell et al (2011b) and Interphone (2010).

	Hardell et al 1997-2003		Interphone 2000-2004		Meta-analysis	
	Ca/Co	OR, CI	Ca/Co	OR, CI	Ca/Co	OR, CI
Latency ≥ 10 years						
-all	88/99	**2.26** (1.60-3.19)	252/232	0.98 (0.76-1.26)	340/331	1.48 (0.65-3.35)
-ipsilateral	57/45	**2.84** (1.82-4.44)	108/82	1.21 (0.82-1.80)	165/127	1.84 (0.80-4.25)
-contralateral	29/29	**2.18** (1.24-3.85)	49/56	0.70 (0.42-1.15)	78/85	1.23 (0.40-3.73)
-temporal lobe	28/99	**2.26** (1.32-3.86)	94/69	1.36 (0.88-2.11)	122/168	**1.71** (1.04-2.81)
Cumulative use ≥ 1640 h						
-all	42/43	**2.31** (1.44-3.70)	210/154	**1.40** (1.03-1.89)	252/197	**1.74** (1.07-2.83)
-ipsilateral	29/21	**2.94** (1.60-5.41)	100/62	**1.96** (1.22-3.16)	129/83	**2.29** (1.56-3.37)
-contralateral	12/12	2.10 (0.90-4.90)	39/31	1.25 (0.64-2.42)	51/43	1.52 (0.90-2.57)
-temporal lobe	14/43	**2.44** (1.21-4.95)	78/47	**1.87** (1.09-3.22)	92/90	**2.06** (1.34-3.17)

Random-effects model used for all meta-analyses, based on test for heterogeneity in the overall (≥10 years and ≥1640 hours) groups.

Use of mobile phones and meningioma risk, meta-analysis of Hardell, Carlberg (2009) and Interphone (2010).

	Hardell et al 1997-2003		Interphone 2000-2004		Meta-analysis	
	Ca/Co	OR, CI	Ca/Co	OR, CI	Ca/Co	OR, CI
Latency ≥ 10 years						
-all	38/99	1.52 (0.98-2.37)	110/112	0.83 (0.61-1.14)	148/211	1.10 (0.61-1.99)
-ipsilateral	18/45	1.59 (0.86-2.95)	40/42	0.88 (0.52-1.47)	58/87	1.16 (0.65-2.06)
-contralateral	12/29	1.57 (0.75-3.31)	20/25	0.58 (0.29-1.16)	32/54	0.95 (0.36-2.51)
-temporal lobe	10/99	**2.46** (1.08-5.60)	12/12	0.60 (0.22-1.62)	22/111	1.25 (0.31-4.98)
Cumulative use ≥ 1640 h						
-all	10/43	0.85 (0.41-1.75)	130/107	1.15 (0.81-1.62)	140/150	1.09 (0.80-1.49)
-ipsilateral	6/21	1.11 (0.42-2.88)	46/35	1.45 (0.80-2.61)	52/56	1.35 (0.81-2.23)
-contralateral	3/12	0.98 (0.26-3.61)	28/28	0.62 (0.31-1.25)	31/40	0.69 (0.37-1.27)
-temporal lobe	1/43	0.52 (0.07-3.95)	21/14	0.94 (0.31-2.86)	22/57	0.82 (0.31-2.17)

Random-effects model used for meta-analyses of ≥10 years, based on test for heterogeneity in the overall group. For meta-analyses of ≥1640 hours no heterogeneity was found; random- and fixed effects models produced identical results.

Use of mobile phones and acoustic neuroma risk, meta-analysis of Hardell, Carlberg (2009) and Interphone (2011).

	Hardell et al 1997-2003		Interphone 2000-2004		Meta-analysis	
	Ca/Co	OR, CI	Ca/Co	OR, CI	Ca/Co	OR, CI
Latency ≥ 10 years						
-all	20/99	**2.93** (1.57-5.46)	68/141	0.76 (0.52-1.11)	88/240	1.46 (0.39-5.47)
-ipsilateral	13/45	**2.97** (1.42-6.21)	44/52	1.18 (0.69-2.04)	57/97	1.81 (0.73-4.45)
-contralateral	6/29	2.38 (0.89-6.35)	17/30	0.69 (0.33-1.42)	23/59	1.22 (0.37-4.11)
Cumulative use ≥ 1640 h						
-all	10/43	**2.86** (1.33-6.14)	77/107	1.32 (0.88-1.97)	87/150	1.81 (0.86-3.81)
-ipsilateral	7/21	**3.10** (1.21-7.95)	47/46	**2.33** (1.23-4.40)	54/67	**2.55** (1.50-4.40)
-contralateral	3/12	2.28 (0.60-8.71)	16/26	0.72 (0.34-1.53)	19/38	1.12 (0.37-3.34)

Random-effects model used for all meta-analyses, based on test for heterogeneity in the overall (≥10 years and ≥1640 hours) groups.

Odds ratio (OR) and 95 % confidence interval (CI) for glioma in different age groups for first use of the wireless phone (Hardell et al 2006b,c, 2010, 2011a).

	Glioma (n=1148)					
	Wireless phone (mobile and cordless phone)		Mobile phone		Cordless phone	
	Ca/Co	OR, CI	Ca/Co	OR, CI	Ca/Co	OR, CI
All ages	670/1267	1.3 (1.1-1.5)	529/963	1.3 (1.1-1.6)	402/762	1.3 (1.1-1.6)
< 20 years old	25/27	2.3 (1.3-4.3)	17/14	3.1 (1.4-6.7)	16/16	2.6 (1.2-5.5)
20-49 years old	377/746	1.3 (1.1-1.6)	315/581	1.4 (1.1-1.7)	206/437	1.2 (0.9-1.5)
>= 50 years old	268/494	1.3 (1.1-1.6)	197/368	1.3 (1.01-1.6)	180/309	1.4 (1.1-1.7)

Odds ratio (OR) and 95 % confidence interval (CI) for glioma in the Interphone study (2010 and Hardell et al (2011b) for the age group 30-59 years. Use of cordless phones disregarded in the Hardell group studies as was done in Interphone.

	Interphone 2010, Appendix 2			Hardell et al 2011b		
	Ca/Co	OR	95 % CI	Ca/Co	OR	95 % CI
Unexposed*	93/159	(1.0)	-	241/660	(1.0)	-
Latency						
2-4 years	460/451	**1.68**	1.16 – 2.41	128/322	1.09	0.84 – 1.41
5-9 years	468/491	**1.54**	1.06 – 2.22	121/258	1.11	0.84 – 1.47
10+ years	190/150	**2.18**	1.43 – 3.31	84/103	**1.75**	1.23 – 2.50

**Unexposed Interphone Appendix 2: Latency 1-1.9 years; unexposed Hardell et al: No use + latency<=1 year.*

IARC

On 31 May 2011 the International Agency for Research on Cancer (IARC) at WHO categorised the radiofrequency electromagnetic fields (RF-EMF) from mobile phones, and from other devices that emit similar non-ionising electromagnetic fields, as a Group 2B, i.e. a ‘possible’, human carcinogen

Group 1, which are ‘**established**’ human
Group 2A, which are ‘**probable**’ carcinogens
Group 2B, which are ‘**possible**’ carcinogens
Group 3, where the agent is ‘**not classifiable**’
Group 4, where the agent is ‘**probably not carcinogenic to humans**’

Some responses to the IARC conclusion

‘To date, no adverse health effects have been established as being caused by mobile phone use’. This was stated in a fact sheet from **WHO** after the IARC decision.

The *Economist* wrote:
‘...your correspondent thinks the whole brouhaha over mobile phones causing brain cancer is monumentally irrelevant compared with all the other things there are to worry about.’

Microwave News wrote:
‘Its **(ICNIRP)** previous chairman, **Anders Ahlbom**, has also registered his opinion that cell phone tumor risks are nonexistent. (He was the lead author of the last ICNIRP review cell of cell phones and cancer.) Another former member, **Maria Blettner,** was the lone dissenting voice in the final vote of the IARC working group. Both Blettner and Ahlbom worked on Interphone.’

CEFALO Aydin et al J Natl Cancer Inst. 2011;103(16):1264-1276.

A multi-centre case-control study in Denmark, Sweden, Norway, and Switzerland. It included children and adolescents aged 7–19 years.

Regular users of mobile phone: OR = 1.36, 95 % CI = 0.92-2.02.

Operator-recorded use for 62 cases and 101 controls, time since first subscription >2.8 years gave OR of 2.15, 95 % CI = 1.07-4.29, with a statistically significant trend (p=0.001).

Use of cordless phones only assessed during the 3 first years!
Such use was included among the ‘unexposed’

The authors summarised that they ‘did not observe that regular use of a mobile phone increased the risk for brain tumours.’ An editorial in the very same journal accompanied that conclusion by stating by that the study showed ‘no increased risk of brain tumours’ Boice JD Jr, Tarone RE. J Natl Cancer Inst. 2011;103(16):1211-1213.
This was echoed by a news release from the Karolinska Institute in Stockholm claiming that the results of no increased risk were ‘reassuring’.

Danish cohort study

Established during 1982-1995, mobile phone subscribers.
N=723,421 identified
N=358,403 (49.5 %) in last updates

a) no individual exposure data (e.g. on cumulative exposure, side of head mostly used, and use of cordless phones);
b) including users of cordless phones in the reference category;
c) no control for use of mobile phones in the population after the establishment of the cohort;
d) no operator-verified data on years of subscription available
e) considerable misclassification of mobile phone use both among subscribers and the reference population since no new subscribers were included in the exposed cohort after 1995

The authors' conclusion that: "*In this update of a large nationwide cohort study of mobile phone use, there were no increased risks of tumours of the central nervous system, providing little evidence for a causal association*" is not soundly based.

Editorial by Ahlbom and Feychting from the Karolinska Institute in Sweden. It began with the statement: *"Evidence is reassuring, but continued monitoring of health registers and prospective cohorts is still warranted."*

Hazard ratio (HR) for survival of patients with glioma

Hardell L, Carlberg M. Use of mobile and cordless phones and survival of patients with glioma. Neuroepidemiology 2013;40:101-108

Latency > 10 years	Glioma	Low-grade (I-II) astrocytoma	Astrocytoma grade IV
Wireless phone	1.2 1.002-1.5 (p=0.02)	0.6 0.3-1.6 (p=0.83)	1.3 1.03-1.7 (p=0.25)
Mobile phone	1.3 1.0005-1.6 (p=0.04)	0.5 0.2-1.5 (p=0.95)	1.3 0.9-1.7 (p=0.37)
Cordless phone	1.3 0.9-1.9 (p=0.07)	0.8 0.2-2.5 (p=0.78)	1.8 1.2-2.8 (p=0.04)

A survival disadvantage for astrocytoma grade IV, but a survival benefit for astrocytoma grade I-II was observed which could be due to exposure related tumour symptoms leading to earlier diagnosis and surgery in that patient group (detection bias).

Brain tumour incidence (yearly increase; APC)

Denmark
2000-2009: men +2.7 %, 95 % CI = +1.1 to 4.3 %;
women +2.9 %, 95 % CI = +0.7 to 5.2 % (NORDCAN).

2001-2010: Age-standardized incidence men +40 %; women +29 % (Sundhedsstyrelsen, 2010).

Norway
1990-2008: 5-19 years boys +3.3 %, 95% CI +0.8 to 5.9 % ;
girls +2.5%, 95% CI +0.2 to 4.9 % (NORDCAN)

Sweden
1970-2007: Astrocytoma age group > 19 years APC +2.16 %, 95 % CI +0.25 to 4.10 % (Hardell and Carlberg 2009).

Nordic countries
1979-2008: men +0.4 %, 95 % CI +0.1 to 0.6 %;
women +0.3 %, 95 % CI +0.1 to 0.5 % (Deltour et al 2012)

Brain tumour incidence (yearly increase; APC)

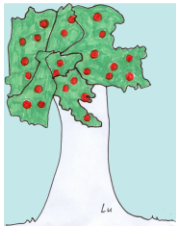
USA
High-grade glioma SEER 1992-2008: +0.64%, 95% CI = +0.33 to 0.95 % (Little et al 2012).

Los Angeles
Glioblastoma multiforme (astrocytoma grade IV) APC
temporal lobe +1.3 % to +2.3 % ($p \leq 0.027$)
frontal lobe +2.4 % to +3.0 % ($p \leq 0.001$) (Zada et al 2012)

Australia
2000-2008: Malignant brain tumours +3.9 %, 95 % CI +2.4 to 5.4 % (Dobes et al 2011).

Shanghai
1983-2007: men +1.2 %, 95 % CI +0.4 to 1.9 %;
women +2.8 %, 95 % CI +2.1 to 3.4 % (Ding and Wang, 2011).

England
1998 to 2007 increasing incidence of brain tumours
temporal lobe men ($p < 0.01$); women ($p < 0.01$)
frontal lobe men ($p < 0.01$); ($p = 0.07$) (de Vocht et al. 2011)



MOBILE PHONES AND HEAD TUMOURS: LINK CONFIRMED BY ITALY'S SUPREME COURT

Italy's Supreme Court (employment section) (Sentence no. 17438, 3-12.10.12) has fully and definitively upheld the decision of Brescia's Court of Appeal regarding the case of a worker (I.M.) suffering from a trigeminal nerve tumor due to intense cell phone use at work (mobile and cordless). The Supreme Court judges:

1) confirmed the validity of the scientific references cited by the CTU (technical consultancy) of Brescia and the plaintiff's consultants: his oncologist and Prof. Levis, former professor in environmental mutagenesis at Padua University and co-founder (epidemiology) of the A.P.P.L.E. Association;

2) once again explained the reasons for the discrepancies between the studies and conclusions dismissive of any phone-use/health link (Interphone Project: IARC, EC, ICNIRP, WHO, but also international and national mobile telephony companies) and the alarming findings of the Hardell group;

3) once more acknowledged the presence of conflict of interest and thus "business bias", so nullifying the results of scientific studies carried out in this context;

4) noted the general principle – applicable to all pathologies and their work-place causes, including those not listed by INAIL – whereby "reasonable certainty" of the cause-effect link, giving rise to a "considerable degree of probability", can in any case be taken into consideration.

This sentence - fruitlessly hindered by researchers of the National Health Institute in Rome and even opposed by the *Procuratore Generale della Repubblica* (Italian Attorney General) in his presentation at the Supreme Court hearing – sets a precedent for other cases of tumor due to workplace exposure, whether to electric and magnetic field/extremely low frequency (EMF/ELF) HT conductors or radiofrequency (mobile and cordless phones, but also radioemitters and radar). It could also open up the way for recognition and compensation regarding a variety of acute pathologies resulting from exposure to EMF, and even pathologies attributable to other environmental agents not "listed" by INAIL.

While this sentence is certainly an important step forward in terms of recognizing the oncological harm that can result from exposure to EMF, it is still unfortunately true that a year on there is still no sign of commitment to a "*campagna di informazione indirizzata ad un uso appropriato e non smodato e indiscriminato del telefono cellulare*" (awareness-raising campaign regarding correct, not excessive, not indiscriminate, cell phone use) demanded of the Health Ministry by the National Health Council through communication no. 226 of 15.11.2011, which followed a TV broadcast (REPORT RAI **www.report.rai.it** 27.11.11) on the subject, a case taken up by various leading newspapers. This commitment was recently acknowledged again, in response to a question put to the Ministry by a lawyer afflicted by a brain tumor following intense, prolonged cell phone use (*La Gazzetta del Mezzogiorno*, 08.10.12).

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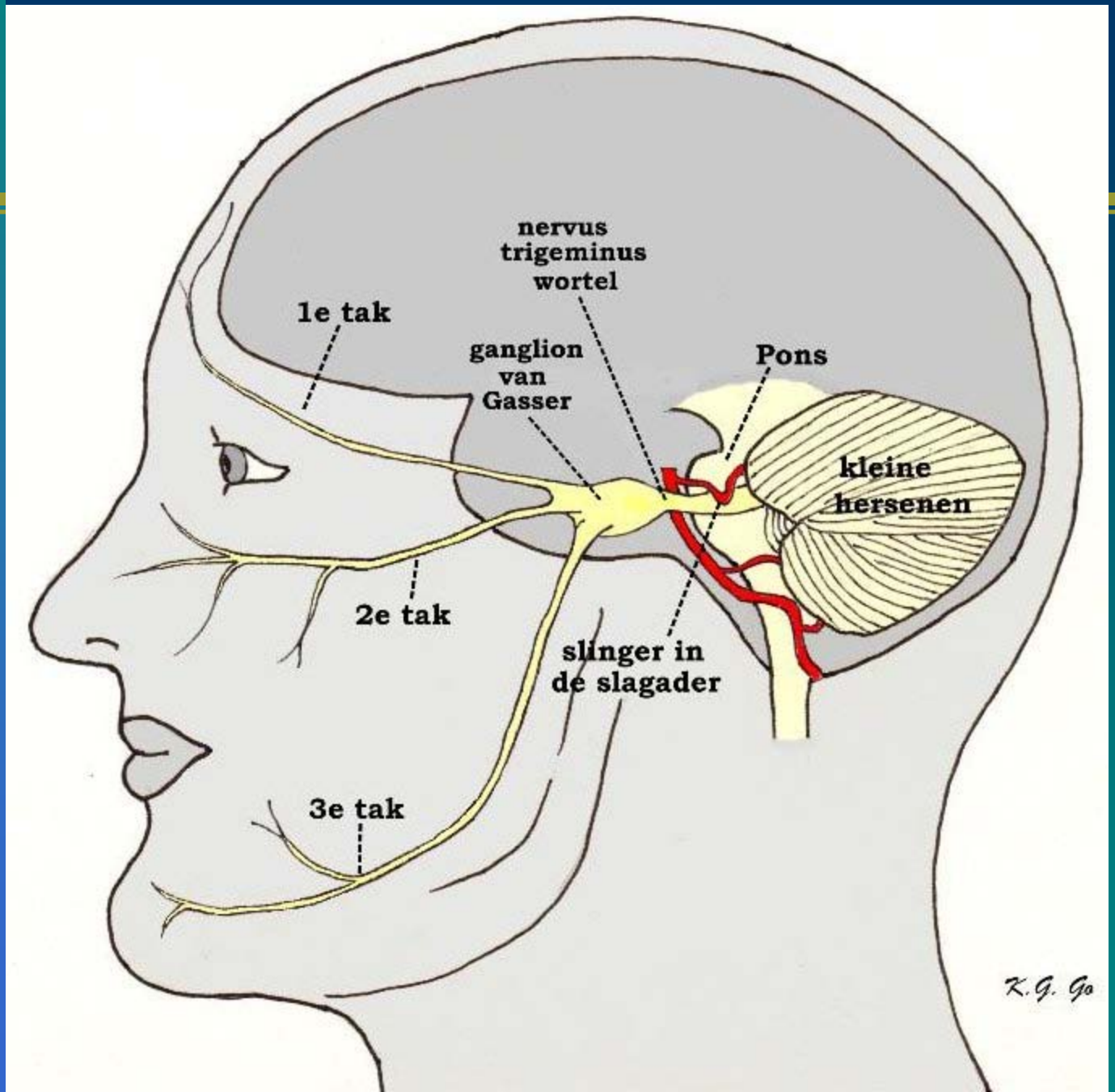
nervus
trigeminus
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1e tak
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de slagader
3e tak
K.G. Go

iPad-2

By me (and an increasing number of researchers) recommended maximum emf density with complex content is below 10 µW/m² (preferably lower) where you are for a long periods, such as in a classroom, at work or at home. This means that an iPad should be totally banned in most environments, if you're going to care about health risks!

The radiation density at the 3G usage and poor coverage can mean levels between 5000 - 100 000 times more than my recommendation.

The radiation at WiFi use is up to about 1000 times higher than my recommendation.

About 2m at the side is the radiation density 3-5 mW/m² in 3G and poor coverage.

WiFi

20 cm in front of the screen is the power densities 3-5 mW/m². 5 cm in front of the screen, it is about 14 mW/m². The radiation do not vary according to the distance to a router, always the same.

NOTE!

Indications for 3G applies to only1-2 marks (out of 5) in signal strength, thus, where there is poor coverage. At 5 selections in the signal strength is radiation lower, under 1 mW/m² with 20 cm distance. Do not use 3G at low coverage!

3G

20 cm in front of the screen is the radiation density 50-280 mW/m². 5 cm in front of the screen is the density between 400-1600 mW/m². At the beginning and end of a telegram there are brief, intense "spikes" which may be above 2 W/m²

2012-04-16 Kalle Hellberg, Maxicom AB Sweden (with more than 50 years work with emf equipment).