

# Mobiltelefonanvändning och risken för hjärntumörer

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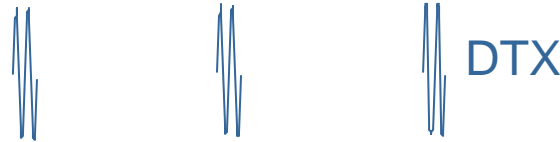
och

Inst för Naturvetenskap, Örebro universitet

# I dag:

## GSM

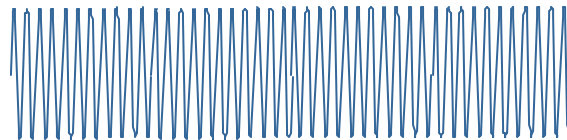
900 eller 1800 MHz



Uteffekten beror på avståndet till basstationen (0,0004- 0,25 W)

## NMT

450 MHz

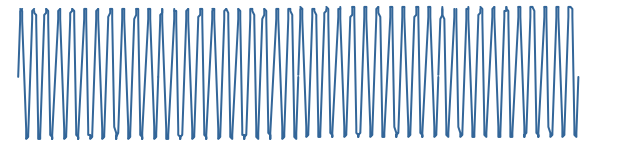


Uteffekten ca 1 W

# I morgon:

## UMTS

1900 MHz



Liknande DTX

Uteffekt < 0,02- 0,25 W

Snabbare effektreglering än GSM

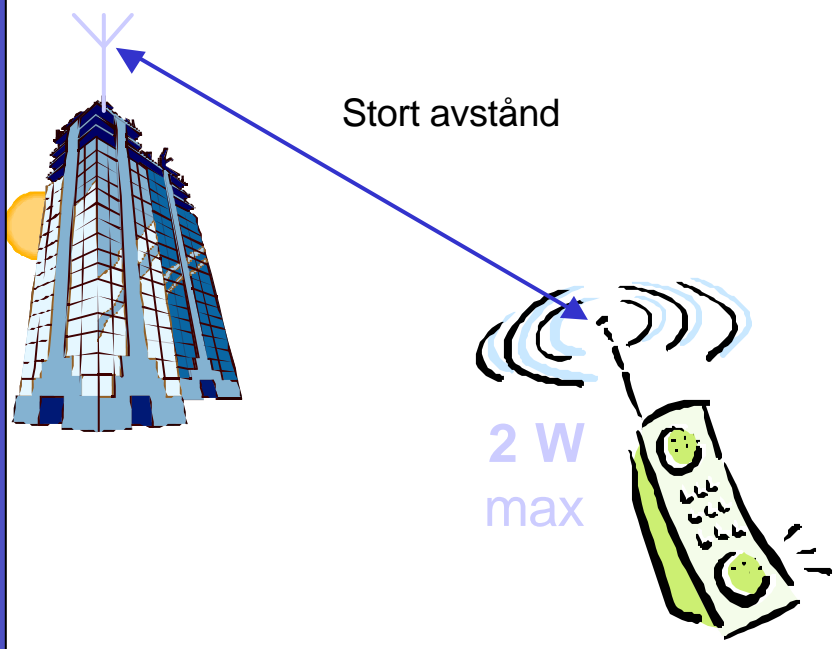
GSM = Global system for Mobile Communication

UMTS = Universal Mobile Telecommunication System, även kallat 3G.

# Effektkontroll

**Mobilen använder inte högre effekt än vad som är nödvändigt!**

- Stort avstånd - hög effekt
- Litet avstånd - låg effekt



Mobilen kan sända även om  
inget samtal pågår!

# När sänder mobilen?

## Attach



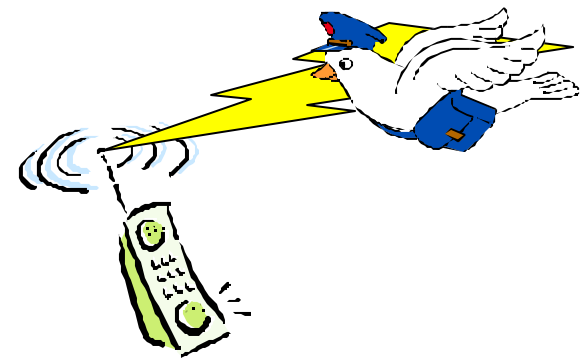
## Location Update



## Detach



## Incoming Message



## Periodic Location Update



# Specific Absorbtion Rate, SAR

Anger hur mycket energi som man absorberar per tidsenhet och massenhet

SAR ges i enheten watt/kg, W/kg

# Exempel på biologiska effekter

	SAR (W/kg)
Missbildning på foster	15
Låg fostervikt	10 - 15
Funktionella störning hos foster	2 - 3
Temporär sterilitet	5 - 6
Beteendeförändringar	1 - 2
Hormonella ändringar	1
ELF mod signal Ca-utflöde	0.001
Cancer promotion ?	2 - 3
Komb. effekt med droger	1 - 2

**Klara icke önskvärda effekter vid SAR > 4 W/kg**

**ICNIRP: Säkerhetsfaktor 10 för yrkesverksamma  
ger gränsvärde för helkroppsexponering på**

**SAR < 0.4 W/kg**

**För allmänheten ytterligare faktor 5,**

**SAR < 0.08 W/kg**

# Exponering av del av kropp:

**Grumling av linsen (katarakt) behövs ca 100 W/kg**

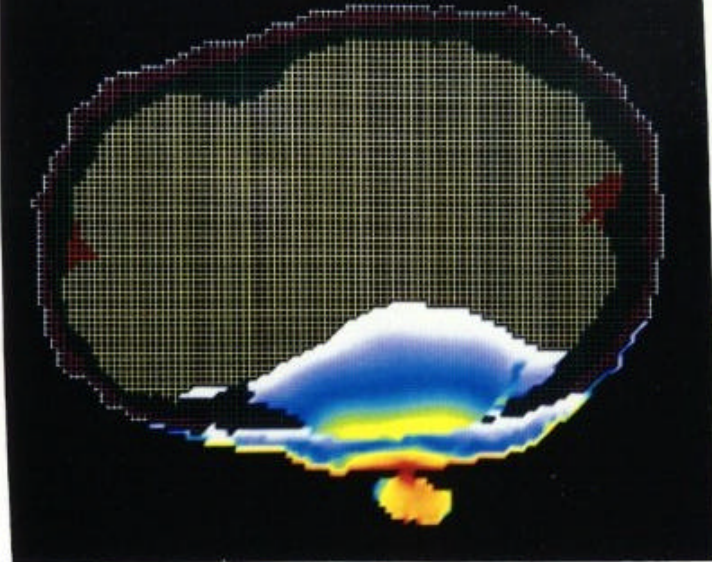
**Ögongloben ca 10 gr**

**Säkerhetsfaktor 10 ger gräns:**

**SAR 10 W/kg över 10 g**

**Allmänheten lägg på ytterligare säkerhetsfaktor 5  
vilket ger lokal SAR = 2 W/kg.**

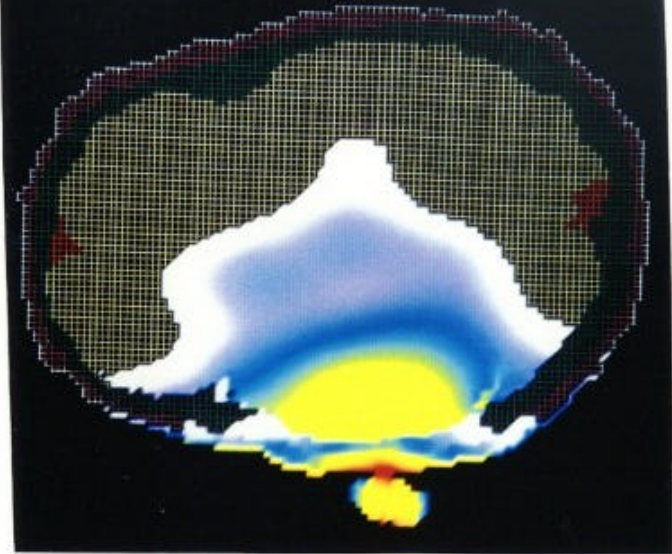
**Detta har blivit ”mobiltelefongränsvärdet” .**



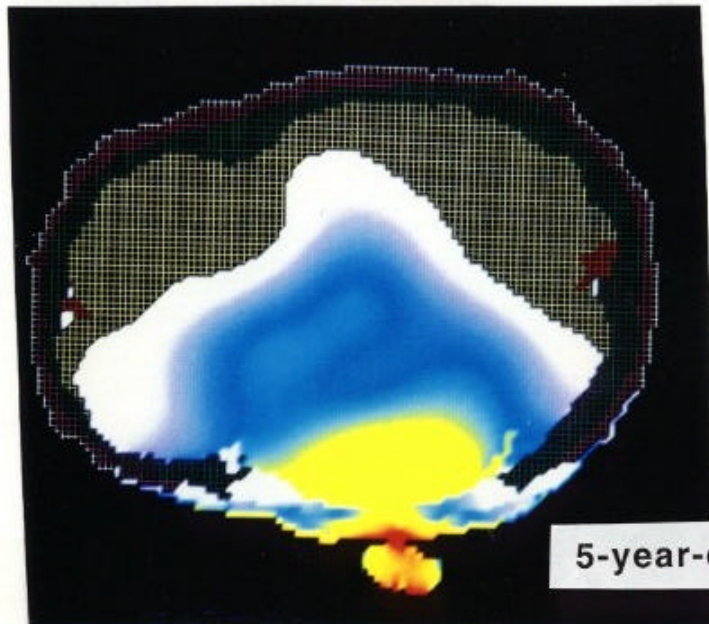
Adult male

835 MHz

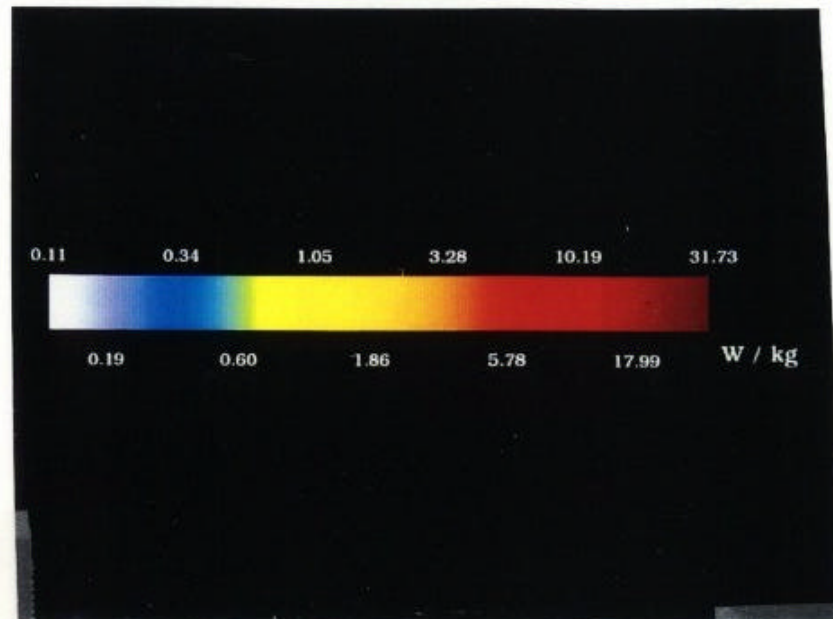
$P_{in} = 600 \text{ mW}$



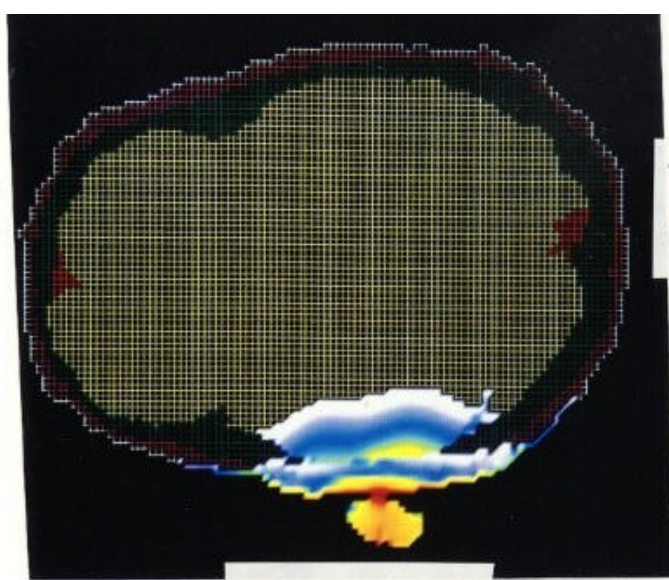
10-year-old



5-year-old

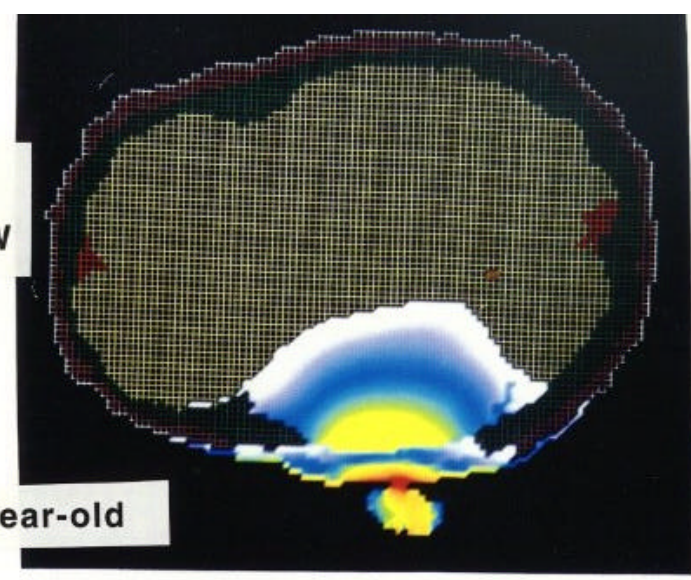


Energy deposition for models of an adult and 10- and 5-year old children for a cellular telephone at 835 MHz. Radiated power = 600 mW [from O. P. Gandhi et al., *IEEE Trans. Microwave Theory & Techniques* 44, p. 1992-1996]

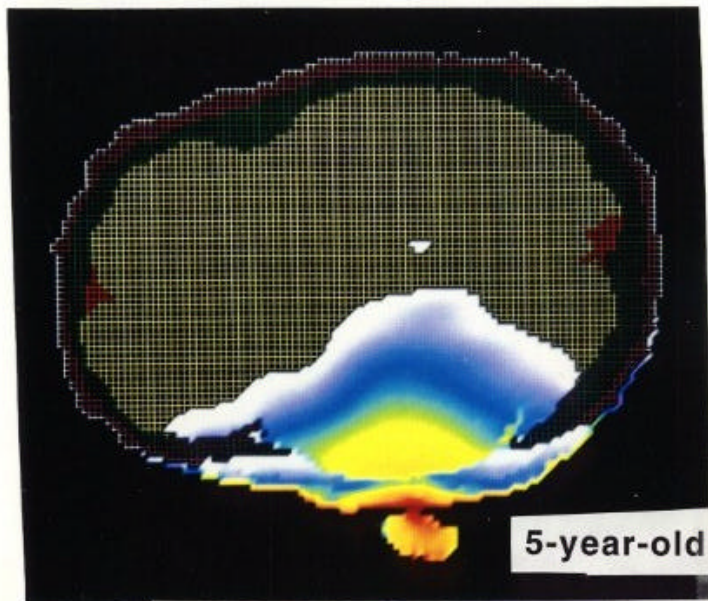


Adult male

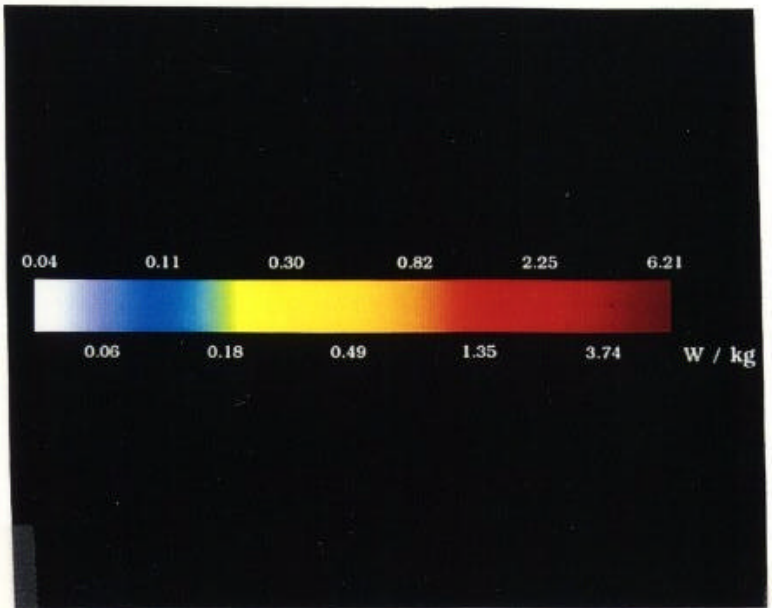
1900 MHz  
 $P_{in} = 125 \text{ mW}$



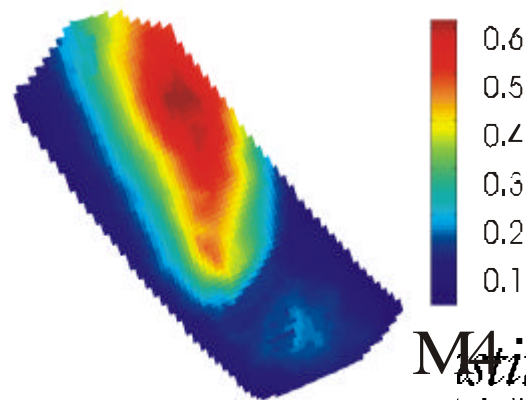
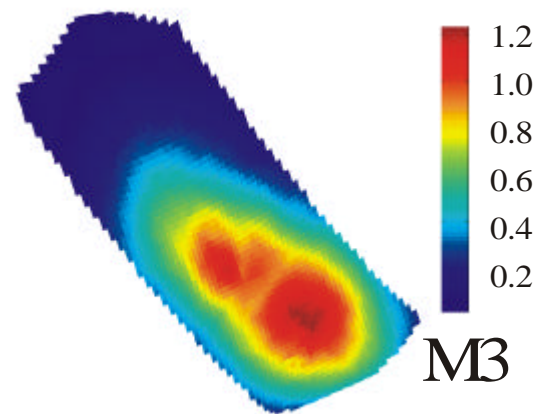
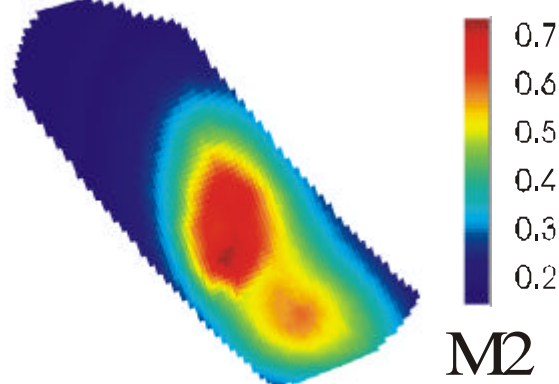
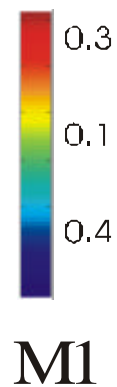
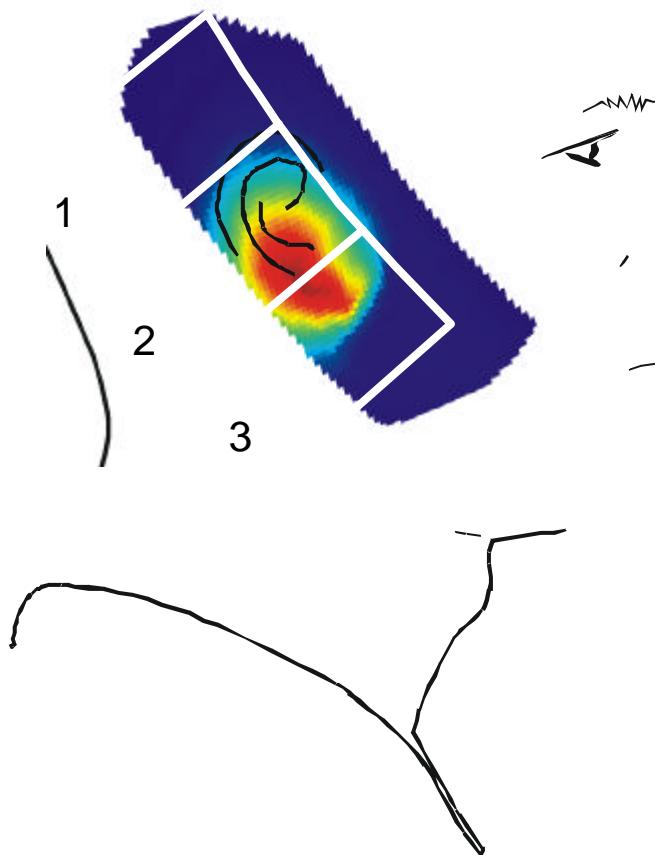
10-year-old



5-year-old



Energy deposition for models of an adult and 10- and 5-year old children for a cellular telephone at 1900 MHz. Radiated power = 125 mW [from O. P. Gandhi et al., *IEEE Trans.*



# Gert Anger, Sthm: SAR and transmitted power for 21 mobile phones

The Bioelectromagnetics Society 25th Annual Meeting  
Wailea, Maui, Hawaii, June 22-27, 2003

Highest SAR values ranged from 0.49 to 1.7 W/kg.

Emitted power (TCP) 900 ranged from 0.19 to 0.49 W  
1800 MHz: range 0.056 to 0.26 W

Ratio SAR/TCP for 900 MHz phones: 0.24 - 2.9 W/kg/W  
1800 MHz: 0.76 - 5.4 W/kg/W

# Biologiska effekter vid låga nivåer

Finns flera undersökningar som visar på biologiska effekter vid låga SAR värden, sk icke termiska nivåer:

Repacholi – transgenic mice och lymfom,

Kwee cellprofilering,

Litovitz heat shock protein aktivering,

dePomerai hsp hos rundmask,

dePomerai amyloid fibril formation

Salford-Persson blod-hjärnbarriären

Ny genomgång av data behövs.





(a)



(b)

Figure 1

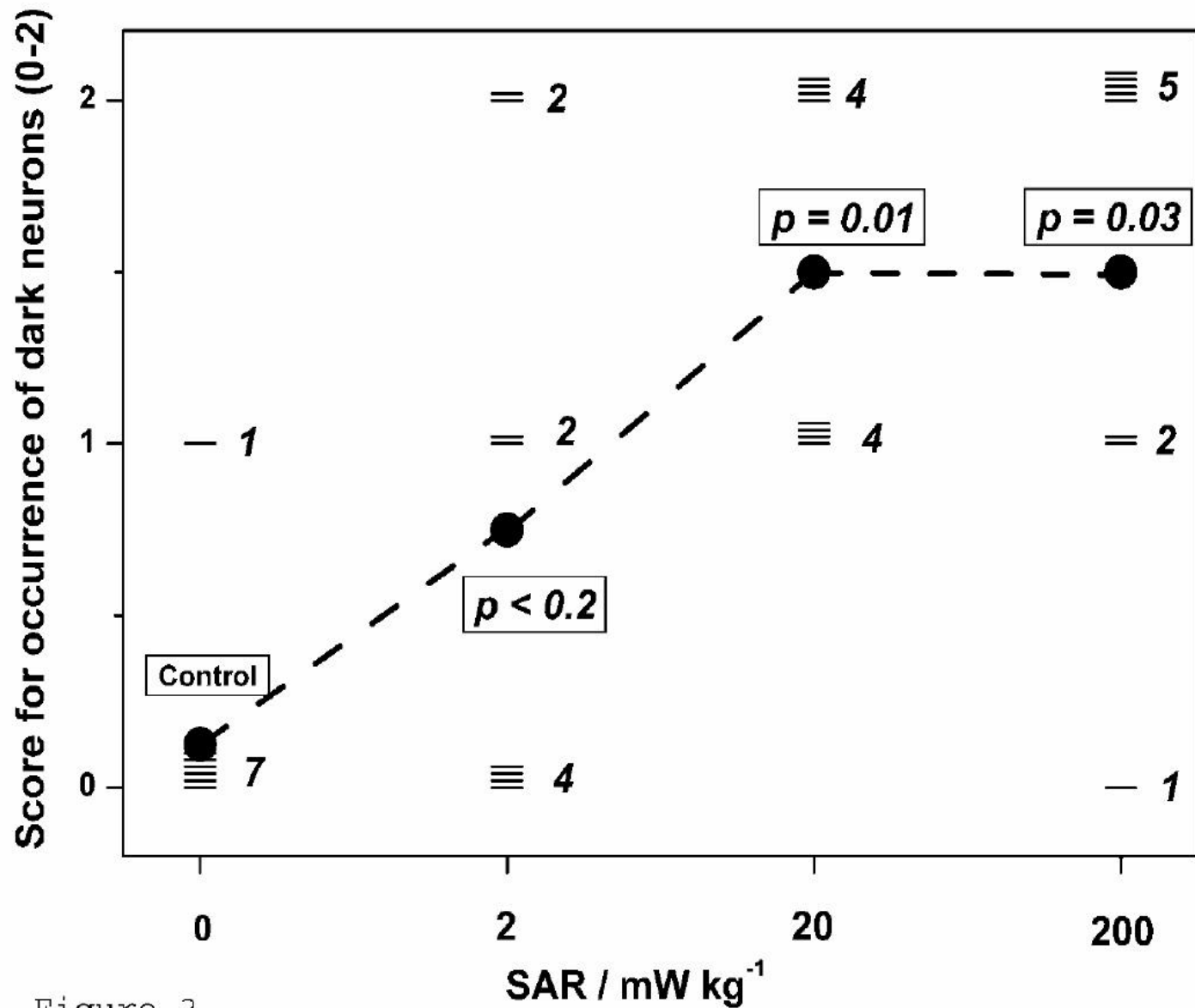


Figure 3

# Mobiltelefoner och hjärntumörer

**Muscat et al, 2000: Tumörer vanligare på samma sida: 26 vs 15**

**Inskip et al, 2001: Endast 17 pat med >15 min/dag mer än 3 år**

**Stang et al, 2001: Ögoncancer, men bara 6 fall med > 3 år**

**Auvinen et al 2002: 398 fall, 5 kontroller per fall, diagnosår 1996  
användningstid 2-3 år NMT, < 1 år GSM**

**Gliom NMT OR= 2,1 (1,3-3,4)**

**GSM OR=1,0 (0,5-2,0)**

**OR för trend 1,2 per år (1,1 - 1,5)**

# Mobile phones and brain tumours

Hardell et al, 1999. Int J Oncology 15, 113-116

209 cases, 425 controls, 1994-96

No increased risk overall.

Tumours in temporal or occipital lobe:

Right side OR= 2.45 (95%CI: 0,8-7.8)

Left side OR= 2.40 (95%CI: 0,5-11)

Total 13 cases out of which 12 used NMT.

Hardell et al. Eur J Cancer Prevent 10, pp 523-9, 2001

Multivariate analys

Ipsilateral use OR= 2.62 (95%CI: 1.02-6.71)

Contralateral OR= 0.97 (95%CI: 0.36-2.59)

**1617 cases/controls  
collected 1997-2000**

```
graph TD; A([1617 cases/controls collected 1997-2000]) --> B[Discordant pair analyses  
Eur J Cancer Prev 11: 377-86, 2002  
Unmatched analyses, unexposed controls. Inter J Oncol 22: 399-407, 2003.  
Malignant tumours, unmatched  
Int J Radiat Biol 78: 931-6, 2002  
Acoustic neuroma, unmatched  
Neuroepidemiol 22: 124-9, 2003]; A --> C[OR for different age groups, EBEA 2003, Arch Environ. Health, in press  
OR for urban vs rural, Occup Environ Med, accepted  
Combined exp to NMT, GSM and cordless. Eur J Cancer Prev, accepted];
```

**Discordant pair analyses  
Eur J Cancer Prev 11: 377-86, 2002**

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controls. Inter J Oncol 22: 399-407,  
2003.**

**Malignant tumours, unmatched  
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**OR for different age  
groups, EBEA 2003,  
Arch Environ. Health,  
in press**

**OR for urban vs rural,  
Occup Environ Med,  
accepted**

**Combined exp to NMT,  
GSM and cordless.  
Eur J Cancer Prev,  
accepted**

Hardell et al, 2002. Europ J Cancer Prev.

A case-control study of patients, 20-80 years, brain tumour diagnosed 1997 –30 June 2000. All alive at the study and histopathology verified brain tumour.

**Total reported 2 561**

- Metastasis or other localization  
than brain based on oncology center reports 133**
- Other localization or diagnosis  
than brain based on neuroradiology records 99**
- Other year than study period for diagnosis 58**
- Histopathology missing 4**
- Not resident in study area 14**
- Deceased 540**
- Refused by treating physician to be included 35**
- Unknown address 2**
- Not capable to participate for medical  
reasons as reported by case or relative 59**

**Total included in study 1 617**

Exp. assessed by questionnaire, answered by 1 429 (88%) cases and 1 470 (91%) controls.

**Hardell et al, 2003: Some further aspects on cellular and cordless telephones and brain tumours. Internat J Oncol 22: 399-408**

**1 year latency**

**Analogue phones: OR 1.3, 95% KI 1.04-1.6**

**Digital OR 1.0, 95% KI 0.9-1.2**

**Cordless phones OR 1.1, 95% KI 0.9-1.3**

.

**5 year latency**

**Analogue phones: OR 1.4, 95% KI 1.01-1.9**

**Digital OR 1.1, 95% KI 0.8-1.6**

**Cordless phones OR 1.4, 95% KI 1.1-1.8**

**10 year latency**

**Analogue phones: OR 1.6 95% KI 1.1-2.4**

**Digital**

**Cordless phones OR 1.1, 95% KI 0.5-2.6**

**Table 2. Overall results.**

	<b>&gt;1 year latency</b>		
	<b>Ca/Co</b>	<b>OR</b>	<b>CI</b>
<b>Analogue</b>	<b>247/218</b>	<b>1.3</b>	<b>1.04-1.6</b>
<b>&lt;85 h</b>	<b>134/115</b>	<b>1.3</b>	<b>0.99-1.7</b>
<b>&gt;85 h</b>	<b>113/103</b>	<b>1.3</b>	<b>0.96-1.8</b>
<b>Digital</b>	<b>423/433</b>	<b>1.0</b>	<b>0.9-1.2</b>
<b>&lt;55 h</b>	<b>230/217</b>	<b>1.1</b>	<b>0.9-1.4</b>
<b>&gt;55 h</b>	<b>193/216</b>	<b>0.9</b>	<b>0.7-1.2</b>
<b>Cordless</b>	<b>402/396</b>	<b>1.1</b>	<b>0.9-1.3</b>
<b>&lt;183 h</b>	<b>183/208</b>	<b>0.9</b>	<b>0.7-1.2</b>
<b>&gt;183 h</b>	<b>219/188</b>	<b>1.2</b>	<b>0.98-1.5</b>

**Table 2. Overall results.**

	<b>&gt;5 year latency</b>		
	<b>Ca/Co</b>	<b>OR</b>	<b>CI</b>
<b>Analogue</b>	<b>160/135</b>	<b>1.4</b>	<b>1.04-1.8</b>
<b>&lt;85 h</b>	<b>69/51</b>	<b>1.5</b>	<b>1.03-2.2</b>
<b>&gt;85 h</b>	<b>91/84</b>	<b>1.3</b>	<b>0.9-1.7</b>
<b>Digital</b>	<b>66/66</b>	<b>1.1</b>	<b>0.8-1.6</b>
<b>&lt;55 h</b>	<b>17/26</b>	<b>0.7</b>	<b>0.4-1.3</b>
<b>&gt;55 h</b>	<b>49/40</b>	<b>1.4</b>	<b>0.9-2.1</b>
<b>Cordless</b>	<b>164/129</b>	<b>1.4</b>	<b>1.1-1.8</b>
<b>&lt;183 h</b>	<b>50/47</b>	<b>1.2</b>	<b>0.8-1.8</b>
<b>&gt;183 h</b>	<b>114/82</b>	<b>1.5</b>	<b>1.1-2.1</b>

**Table 2. Overall results.**

	<b>&gt;10 year latency</b>		
	<b>Ca/Co</b>	<b>OR</b>	<b>CI</b>
<b>Analogue</b>	<b>61/44</b>	<b>1.6</b>	<b>1.1-2.4</b>
<b>&lt;85 h</b>	<b>12/13</b>	<b>1.1</b>	<b>0.5-2.3</b>
<b>&gt;85 h</b>	<b>49/31</b>	<b>1.9</b>	<b>1.2-3.0</b>
<b>Digital</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>&lt;55 h</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>&gt;55 h</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Cordless</b>	<b>10/10</b>	<b>1.1</b>	<b>0.5-2.6</b>
<b>&lt;183 h</b>	<b>0/5</b>	<b>-</b>	<b>-</b>
<b>&gt;183 h</b>	<b>10/5</b>	<b>2.1</b>	<b>0.7-6.3</b>

**Tabell 3. Tinningregionen (temporal).**

	Analog			Digital			Trådlös		
	Fall/ Kontr	OR	KI	Fall/ Kontr	OR	KI	Fall/ Kontr	OR	KI
>1 års latens	84/45	2.1	1.3-3.3	113/104	1.1	0.8-1.6	111/100	1.1	0.8-1.5
>5 års latens	52/28	2.2	1.3-3.8	17/11	1.6	0.7-3.6	50/28	1.8	1.1-3.1
>10 års latens	19/7	3.1	1.2-7.7	-	-	-	3/3	1.0	0.2-5.1

# Tabell 4a. Exponering i förhållande till tumörläge.

Ipsilateral=samma sida, kontralateral=motsatt sida

Lokalisation/Typ av telefon	Alla Fall/Kontr OR (95 % KI)	Ipsilateral Fall/Kontr OR (95 % KI)	Kontralateral Fall/Kontr OR (95 %KI)	Ipsi-/kontralateral Fall/Kontr OR (95 % KI)
<b>Hjärnan (alla)</b>				
<b>Analog</b>	247/218 1.3 1.04-1.6	121/73 1.7 1.2-2.3	68/72 1.0 0.7-1.4	22/21 1.1 0.6-2.0
<b>Digital</b>	423/433 1.0 0.9-1.3	182/132 1.3 1.02-1.8	138/142 0.9 0.7-1.2	44/43 1.0 0.6-1.6
<b>Trådlös</b>	402/396 1.1 0.9-1.3	173/135 1.2 0.9-1.6	127/136 0.9 0.7-1.2	39/34 1.1 0.7-1.8

# Tabell 5c. Odds rat och 95% konfidensintervall för olika tumörtyper.

Ipsilateral=samma sida, kontralateral= motsatt sida

Lokalisation/Typ av telefon	Alla Fall/Kontr OR (95 % KI)	Ipsilateral Fall/Kontr OR (95 % KI)	Kontra-lateral Fall/Kontr OR (95 %KI)	Ipsi-/kontralateral Fall/Kontr OR (95 % KI)
<b>Astrocytom (hög-gradigt)</b>				
<b>Analog</b>	<b>63/52 1.4 0.8-2.2</b>	<b>40/24 2.0 1.1-3.6</b>	<b>17/17 1.1 0.5-2.4</b>	<b>6/8 1.0 0.3-3.0</b>
<b>Digital</b>	<b>115/89 1.4 0.96-2.1</b>	<b>62/40 1.9 1.1-3.1</b>	<b>31/29 1.1 0.6-2.0</b>	<b>15/11 1.8 0.8-4.4</b>
<b>Trådlös</b>	<b>99/76 1.4 0.9-2.1</b>	<b>53/35 1.7 1.01-2.9</b>	<b>32/26 1.3 0.7-2.5</b>	<b>9/8 1.3 0.5-3.7</b>

## Tabell 5d. Odds rat och 95% konfidensintervall för olika tymörtyper.

Ipsilateral=samma sida, kontralateral= motsatt sida

Lokalisation/Typ av telefon	Alla Fall/Kontr OR (95 % KI)	Ipsilateral Fall/Kontr OR (95 % KI)	Kontra-lateral Fall/Kontr OR (95 %KI)	Ipsi-/kontralateral Fall/Kontr OR (95 % KI)
<b>Akusticusneurinom (tumör på hörselnerven)</b>				
<b>Analog</b>	<b>47/15 4.4 2.1-9.2</b>	<b>23/7 4.2 1.6-11</b>	<b>18/7 3.7 1.4-9.8</b>	<b>5/1 5.6 0.6-52</b>
<b>Digital</b>	<b>51/44 1.4 0.8-2.4</b>	<b>21/16 1.5 0.7-3.2</b>	<b>23/19 1.6 0.8-3.4</b>	<b>7/9 0.9 0.3-2.7</b>
<b>Trådlös</b>	<b>50/44 1.4 0.8-2.3</b>	<b>27/21 1.3 0.7-2.7</b>	<b>15/19 1.1 0.5-2.3</b>	<b>8/3 3.2 0.8-13</b>

**Tabell 6c. Riskökning (odds rat) per år av användning.**

	<b>Akusticus- neurinom, alla</b>  OR (95 % KI)	<b>Akusticus- neurinom, ipsilateral</b>  OR (95 % KI)
<b>Analog</b>	<b>1.29</b> <b>1.11-1.50</b>	<b>1.38</b> <b>1.10-1.74</b>
<b>Digital</b>	<b>1.05</b> <b>0.92-1.21</b>	<b>1.13</b> <b>0.94-1.37</b>
<b>Trådlös</b>	<b>1.10</b> <b>1.003-1.21</b>	<b>1.10</b> <b>0.98-1.23</b>

**Tabell 7a. Antal år av användning.**

<b>Lokalisation/Typ av telefon</b>	<b>&gt;1-5 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;5-10 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;10 år Fall/Kontr OR (95 % KI)</b>
<b>Alla tumörer</b>			
<b>Analog</b>	<b>137/135 1.2 0.9-1.5</b>	<b>79/68 1.3 0.9-1.9</b>	<b>31/15 2.4 1.3-4.5</b>
<b>Digital</b>	<b>358/371 1.0 0.8-1.2</b>	<b>65/62 1.1 0.8-1.6</b>	<b>- - -</b>
<b>Trådlös</b>	<b>259/285 1.0 0.8-1.2</b>	<b>134/104 1.4 1.04-1.8</b>	<b>9/7 1.3 0.5-3.6</b>

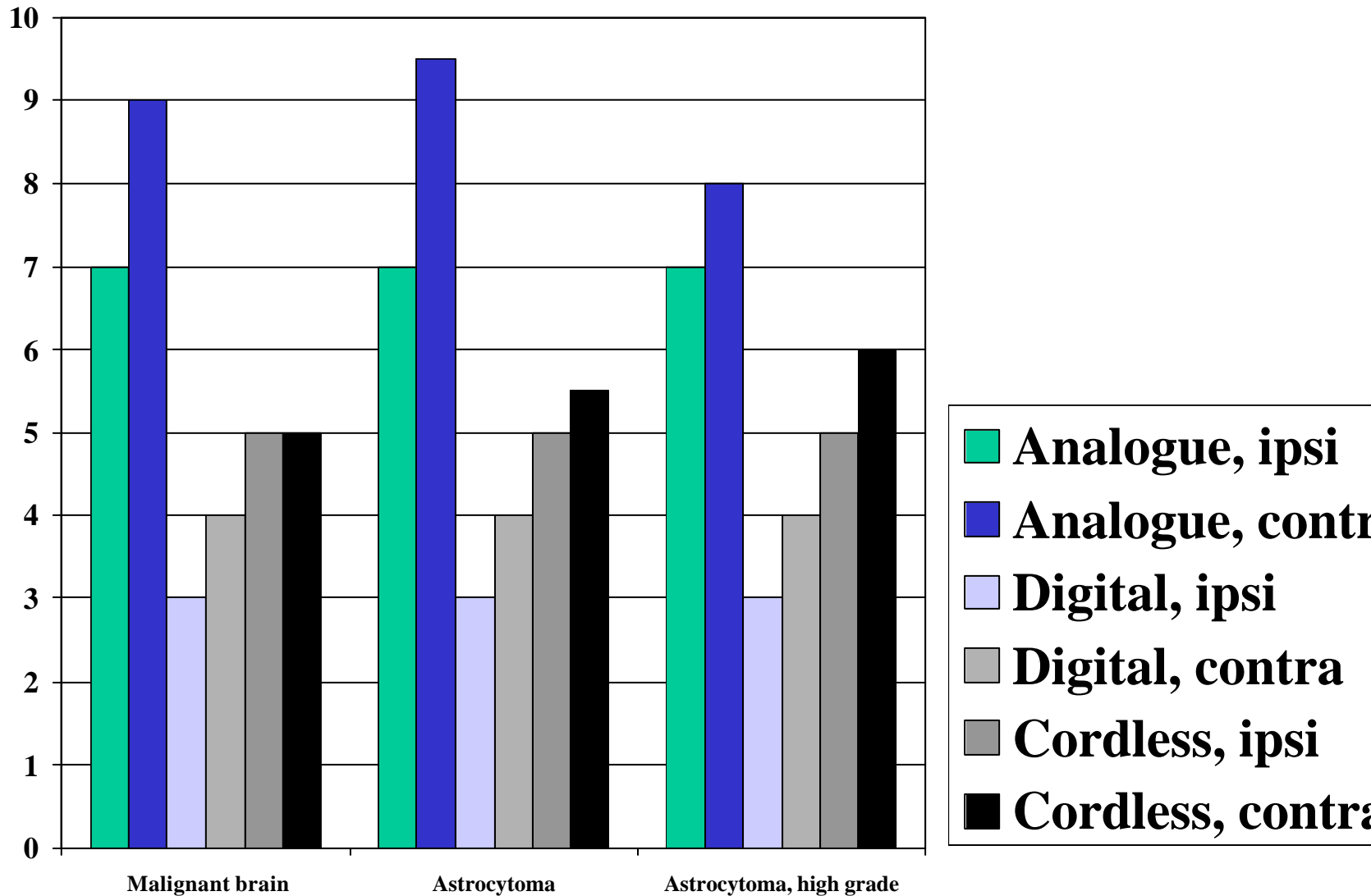
**Tabell 7b. Antal år av användning.**

<b>Lokalisation/Typ av telefon</b>	<b>&gt;1-5 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;5-10 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;10 år Fall/Kontr OR (95 % KI)</b>
<b>Astrocytom, ipsilateral</b>			
<b>Analog</b>	<b>24/16 1.7 0.9-3.5</b>	<b>15/13 1.4 0.6-3.1</b>	<b>8/1 9.4 1.2-77</b>
<b>Digital</b>	<b>56/40 1.6 1.002-2.7</b>	<b>21/11 2.4 1.1-5.3</b>	<b>- - -</b>
<b>Trådlös</b>	<b>42/27 1.7 1.0042-3.0</b>	<b>26/16 1.9 0.9-3.7</b>	<b>1/0 - -</b>

**Tabell 7c. Antal år av användning**

<b>Lokalisation/Typ av telefon</b>	<b>&gt;1-5 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;5-10 år Fall/Kontr OR (95 % KI)</b>	<b>&gt;10 år Fall/Kontr OR (95 % KI)</b>
<b>Akusticusneurinom</b>			
<b>Analog</b>	<b>29/12 3.5 1.5-7.8</b>	<b>15/3 6.9 1.8-26</b>	<b>3/0 - -</b>
<b>Digital</b>	<b>45/39 1.4 0.8-2.4</b>	<b>6/5 1.5 0.4-5.1</b>	<b>- - -</b>
<b>Trådlös</b>	<b>29/35 1.0 0.5-1.8</b>	<b>18/8 2.8 1.1-7.2</b>	<b>3/1 3.6 0.4-36</b>

# Median latency periods (years) for ipsilateral and contralateral use of cellular and cordless phones.

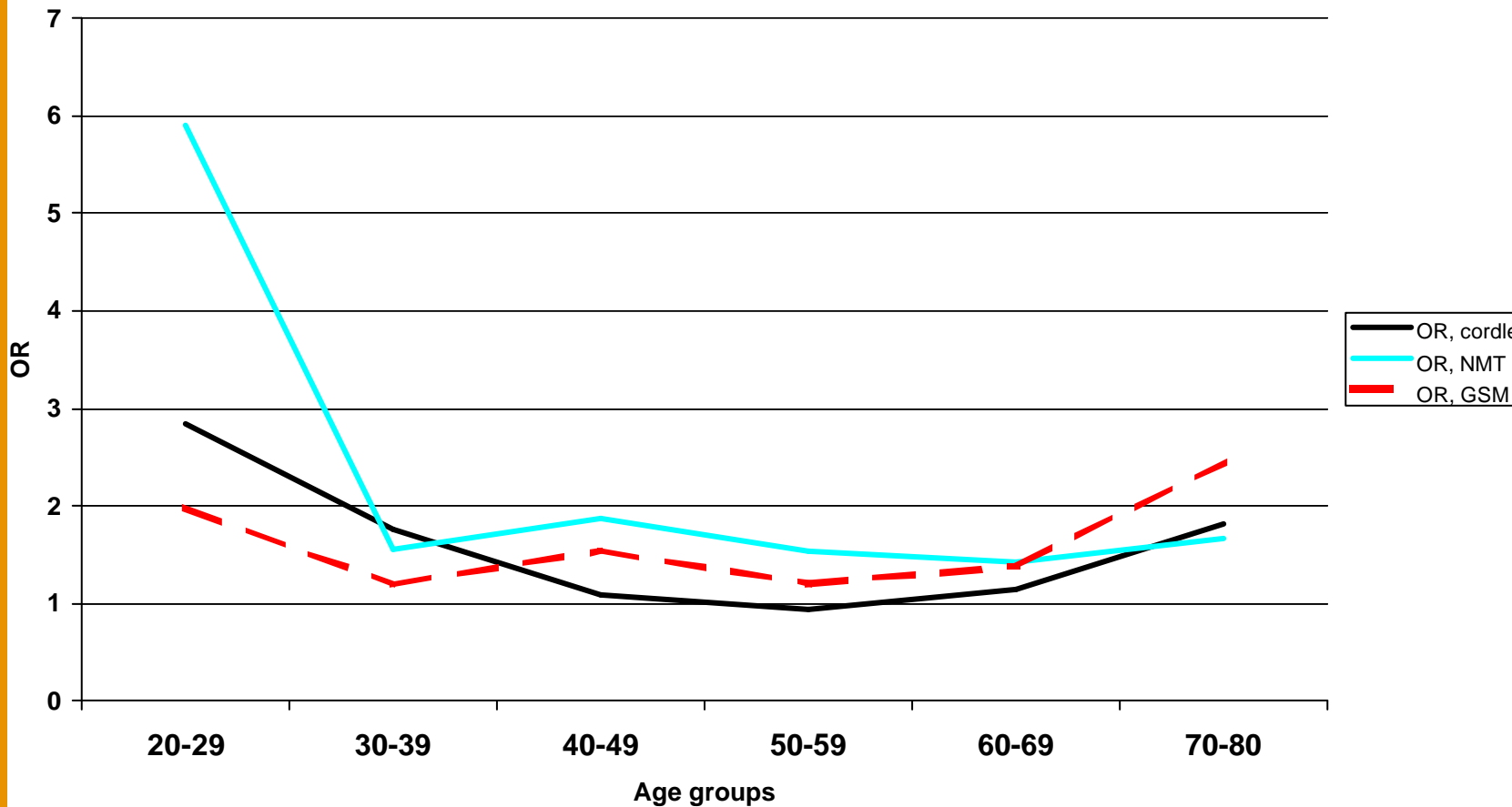


There has been much debate in the media if young persons might be more sensitive to microwave emissions from cellular phones than older ones. As to carcinogenesis this has support from reports on atomic bomb survivors indicating that the risk was highest in children and teenagers for leukemia (1,2), breast cancer (3) and thyroid cancer (4).

To elucidate this matter we have made further analysis of our recent study (5-8) and analysed the association of brain tumours and the use of cellular or cordless phones in different age groups.

Arch Environ Health accepted for publication, Dec 2003.

# Different age groups, NMT, GSM, cordless phone, ipsilateral exp.



Age group/Type of telephone OR (95 % CI)	All Ca/Co	Ipsilateral Ca/Co	Contralat. Ca/Co	Ipsi-/contra Ca/Co
<b>Analogue phone</b>				
All ages, total	247/218 1.31 1.04-1.64	121/73 1.65 1.19-2.30	68/72 0.97 0.67-1.40	22/21 1.08 0.58-2.01
20-29	12/8 1.68 0.60-4.74	6/1 <b>5.91</b> 0.63-55	2/5 0.29 0.04-1.90	2/1 1.60 0.13-20
30-39	32/35 0.97 0.49-1.93	18/9 <b>1.56</b> 0.58-4.18	6/11 0.44 0.14-1.40	4/5 0.48 0.10-2.27
40-49	58/50 1.20 0.73-1.97	31/16 <b>1.87</b> 0.91-3.86	13/22 0.52 0.23-1.17	7/1 8.91 0.99-80
50-59	98/81 1.43 0.97-2.11	43/30 <b>1.54</b> 0.89-2.69	34/23 1.67 0.90-3.10	6/8 0.86 0.28-2.63
60-69	38/37 1.29 0.75-2.19	18/14 <b>1.42</b> 0.65-3.08	11/8 1.56 0.60-4.07	2/5 0.43 0.08-2.35
70-80	9/7 1.56 0.54-4.55	5/3 <b>1.66</b> 0.37-7.46	2/3 0.66 0.10-4.30	1/1 1.18 0.07-21

Age group/Type of telephone OR (95 % CI)	All Ca/Co	Ipsilateral Ca/Co	Contralat. Ca/Co	Ipsi-/contra Ca/Co
<b>Digital phone</b>				
All ages, total	423/433 1.04 0.87-1.25	182/132 1.34 1.02-1.75	138/142 0.93 0.71-1.22	44/43 1.01 0.65-1.58
20-29	34/31 1.53 0.76-3.07	13/7 <b>1.98</b> 0.64-6.18	7/5 1.32 0.34-5.03	7/4 2.10 0.51-8.63
30-39	68/66 1.10 0.65-1.87	29/24 <b>1.19</b> 0.57-2.49	18/18 0.82 0.36-1.85	8/8 0.72 0.23-2.28
40-49	107/104 1.06 0.71-1.57	47/28 <b>1.54</b> 0.85-2.81	39/43 0.88 0.51-1.53	8/9 0.83 0.30-2.29
50-59	148/160 0.95 0.69-1.30	64/53 <b>1.20</b> 0.77-1.88	55/55 0.91 0.58-1.44	13/17 0.82 0.37-1.78
60-69	55/64 1.01 0.65-1.56	24/18 <b>1.38</b> 0.70-2.73	14/17 0.88 0.41-1.87	8/5 1.86 0.59-5.91
70-80	11/8 1.56 0.60-4.10	5/2 <b>2.45</b> 0.44-13.5	5/4 1.19 0.30-4.65	0/0 - -

Age group/Type of telephone OR (95 % CI)	All Ca/Co	Ipsilateral Ca/Co	Contralat. Ca/Co	Ipsi-/contra Ca/Co
<b>Cordless phone</b>				
All ages, total	402/396 1.08 0.90-1.30	173/135 1.21 0.93-1.58	127/136 0.91 0.69-1.21	39/34 1.12 0.69-1.81
20-29	34/30 1.40 0.71-2.76	17/7 <b>2.84</b> 0.94-8.52	8/10 0.79 0.26-2.42	2/3 0.80 0.11-5.85
30-39	65/53 1.28 0.75-2.20	31/15 <b>1.75</b> 0.80-3.79	15/20 0.64 0.28-1.45	8/5 1.23 0.35-4.31
40-49	103/105 0.99 0.67-1.48	42/36 <b>1.08</b> 0.61-1.92	36/39 0.85 0.48-1.51	8/10 0.73 0.27-1.95
50-59	122/135 0.92 0.67-1.27	48/49 <b>0.94</b> 0.59-1.51	42/49 0.78 0.48-1.26	18/9 1.99 0.85-4.67
60-69	55/57 1.09 0.70-1.68	27/24 <b>1.14</b> 0.62-2.09	19/13 1.61 0.76-3.42	3/4 0.88 0.19-4.03
70-80	23/16 1.61 0.81-3.20	8/4 <b>1.82</b> 0.53-6.28	7/5 1.23 0.37-4.09	0/3 - -

# How to combine different exposures?

A person has been using:

NMT analogue phone

GSM 900 phone

cordless phone

## How should we add the use of these different phones?

First attempt could be:

Add the number of hours of use with each phone type, regardless of output power.

Second attempt:

Apply weight factors according to power output:

NMT= 1 W, GSM= 0.25 W, cordless= 0.01 W

Then add the hours of use with these weighting factors.

**No weighting factor applied. Total number of hours (NMT+GSM+cordless phone). Unmatched, adjusted for age, gender and SEI. Unexposed groups for comparison. Median number of hours among the controls used as cut-off.**

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Hours &lt; 152</b>	<b>341/357</b>	<b>1.02</b>	<b>0.85 – 1.23</b>
<b>Hours &gt; 152</b>	<b>375/356</b>	<b>1.13</b>	<b>0.93 – 1.36</b>

*Five years latency:*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Hours &lt; 152</b>	<b>88/77</b>	<b>1.27</b>	<b>0.91 – 1.76</b>
<b>Hours &gt; 152</b>	<b>233/195</b>	<b>1.34</b>	<b>1.06 – 1.68</b>

*Ten years latency:*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Hours &lt; 152</b>	<b>8/9</b>	<b>0.99</b>	<b>0.38 – 2.61</b>
<b>Hours &gt; 152</b>	<b>61/42</b>	<b>1.69</b>	<b>1.11 – 2.58</b>

**Score (NMT=1, GSM=0.1, cordless telephone=0.01). Unmatched, adjusted for age, gender and SEI. Unexposed groups for comparison. Median score among the controls used as cut-off**

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 10.97</b>	<b>350/357</b>	<b>1.04</b>	<b>0.87 – 1.25</b>
<b>Score &gt; 10.97</b>	<b>366/356</b>	<b>1.10</b>	<b>0.91 – 1.34</b>

*Five years latency (divided after the median of all controls):*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 10.97</b>	<b>79/68</b>	<b>1.27</b>	<b>0.90 – 1.79</b>
<b>Score &gt; 10.97</b>	<b>242/204</b>	<b>1.33</b>	<b>1.06 – 1.68</b>

*Ten years latency ((divided after the median of all controls):*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 10.97</b>	<b>1/3</b>	<b>0.36</b>	<b>0.04 – 3.46</b>
<b>Score &gt; 10.97</b>	<b>68/48</b>	<b>1.64</b>	<b>1.10 – 2.45</b>

**Score (NMT=1, GSM=0.1, cordless telephone=0.01). Unmatched, adjusted for age, gender and SEI. Unexposed groups for comparison. Median score among the controls at each latency used as cut-off**

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 10.97</b>	<b>350/357</b>	<b>1.04</b>	<b>0.87 – 1.25</b>
<b>Score &gt; 10.97</b>	<b>366/356</b>	<b>1.10</b>	<b>0.91 – 1.34</b>

*Five years latency (divided after the median of all controls):*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 46.8</b>	<b>167/136</b>	<b>1.34</b>	<b>1.04 – 1.72</b>
<b>Score &gt; 46.8</b>	<b>154/136</b>	<b>1.29</b>	<b>0.98 – 1.70</b>

*Ten years latency (divided after the median of all controls):*

	<b>Case/control</b>	<b>OR</b>	<b>95 % CI</b>
<b>Score &lt; 166.1</b>	<b>29/26</b>	<b>1.24</b>	<b>0.72 – 2.15</b>
<b>Score &gt; 166.1</b>	<b>40/25</b>	<b>1.92</b>	<b>1.14 – 3.26</b>

Other studies:

Salivary gland tumours, 267 cases/ 1053 controls  
Occup Environ Med 61: 675-9, 2004.

No effect!

Ongoing:

Continued collection of brain tumour cases,  
2000-2004, so far 700 cases

Non-Hodgkin's lymphoma

910 cases/1016 controls, analyses in progress

# HC Christensen et al. Cellular Telephone Use and Risk of Acoustic Neuroma

**Amer J Epidemiol 159: 277-83, 2004**

Case control study 141 patients, 20-69 years, diagnosed Sept 1 2000 – Aug 31 2002. 107 cases detailed info

Used regularly OR = 0,90 (95%CI 0,51-1,57)

45 ca/97 co

10 years since first use, OR = 0,22 (95%CI 0,04-1.11)

2 ca/15 co

Mean size of tumours 1,66 cm<sup>3</sup> for regular users and 1,39 cm<sup>3</sup> non-users (P=0.03)

**Lönn et al, Epidemiology 15: 653-9, 2004**

**Mobile phone use and the risk of Acoustic Neuroma**

Case control study, 20-69 years at diagnose, ac. ne. during 1999-2002. Detailed info on 148 cases, 604 controls.

Regular use (once per week!) OR = 1.0 (95%CI 0,6-1,5)  
(89 cases, 356 controls)

Ipsilateral, duration of use, ten years,  
OR = 3,1 (95%CI 1,2-8,4) (9 cases 12 controls)

Ipsilateral, ten years since start OR = 3,9 (95%CI 1,6-95)  
(12 cases, 15 controls)

To read more:

Hansson Mild K, Hardell L, Kundi M, and Mattsson M-O.  
Mobile telephone and cancer: Is there really no evidence of  
an association? (Review). *Internat J Mol Medicine*, 12,  
pp 67-72, 2003

Kundi M, Hansson Mild K, Hardell L, Mattsson M-O.  
Mobile telephones and cancer – a review of epidemiological  
evidence. *Journal of Toxicology and Environmental Health*,  
Part B, 7: 351-384, 2004