

National Toxicology Program
National Institutes of Health
Public Health Service
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Comments from SWEDISH RADIATION PROTECTION FOUNDATION on draft reports:

1. NTP TECHNICAL REPORT ON THE TOXICOLOGY AND CARCINOGENESIS STUDIES IN Hsd: SPRAGUE DAWLEY SD RATS EXPOSED TO WHOLE-BODY RADIO FREQUENCY RADIATION AT A FREQUENCY (900 MHz) AND MODULATIONS (GSM AND CDMA) USED BY CELL PHONES, published

and

2. NTP TECHNICAL REPORT ON THE TOXICOLOGY AND CARCINOGENESIS STUDIES IN B6C3F1/N MICE EXPOSED TO WHOLE-BODY RADIO FREQUENCY RADIATION AT A FREQUENCY (1,900 MHz) AND MODULATIONS (GSM AND CDMA) USED BY CELL PHONES, published

1. Exposure to 900 MHz

At the 14-week interim evaluation, there were increased incidences of right ventricular cardiomyopathy in the heart of male rats following exposure to GSM- and CDMA-modulated cell phone RFR compared to sham controls. 2 years exposure to GSM- or CDMA-modulated cell phone RFR gave increases in the incidences of **malignant schwannoma** in the heart of male rats as well as significantly increased incidences of right ventricular **cardiomyopathy** in male and female rats. There were also increases of **malignant glioma** in the brain, adenomas in the **pituitary gland** (pars distalis), and pheochromocytomas of the **adrenal** medulla and marginal responses in the **prostate gland**, granular cell **tumors of the brain**, and a response in the **liver**. Increased incidences of **thyroid** gland C-cell hyperplasia in all groups of GSM-exposed female rats was observed.

2. Exposure to 1900 MHz

Observed fibrosarcoma, sarcoma, or malignant fibrous histiocytoma in the **skin** and the incidences of alveolar/bronchiolar adenoma or carcinoma (combined) in the **lung**. There was also found increased numbers of malignant **lymphoma** (all organs) and hepatoblastoma of the **liver**.

These results confirm that cell phone radiation is carcinogenic. Previous results during the last decade show nearly consistently increased risks for tumor on the acoustic nerve and malignant glioma among the most exposed cell phone users. However most studies have only studied increased risk for glioma, meningioma or acoustic neuroma and very little information is available for other cancers that might be related to cell phone exposure. All well performed case-control studies with sufficient latency time and usage show increased risks for glioma or acoustic neuroma and some also for meningioma. In view of the massive roll out of transmitters and base stations, there are very few studies of cancer risks for the highest exposed groups, and no study whatsoever for those living very near (within 50 meters) in the direct beam and same height from base stations. However, several studies show increased risks for people living within 300-500 meters (Eger et al. 2004; Wolf et Wolf 2004; [Eger et Neppe 2009](#); [Dode et al. 2011](#)).

Meta analyses:

2017: Increased risk of brain tumor from cell phone use. [Prasad et al. 2017](#)

2017: Increased risk of brain tumor from cell phone use. [Bortkiewicz et al. 2017](#)

2017: Increased risk of glioma from cell phone use. Hill Criteria on association met by scientific research. RF radiation should be regarded as a human carcinogen causing glioma [Carlberg et Hardell 2017](#)

Case control studies:

2017: Increased risk of glioma from cell phone use. Interphone Canada. [Mormoli et al. 2017](#)

2014: Increased risk for glioma and meningioma from cell phone use. [Coureau et al. 2014](#).

2013: Increased risk of brain tumor from cell phone and cordless phone use. [Hardell et al. 2013](#).

2010, 2011: (Interphone) Increased risk of glioma for the most exposed users, corresponding to normal use today. Increased risks for glioma varying from 40%-380% for users with more than 1640 hours in total. Results might be underestimated due to misclassification of exposure (cordless phone users were considered non-exposed). [Interphone 2010](#); [Cardis et al. 2011](#)

2011: Regular users of mobile phones (children and adolescents) were (not statistically significantly) more likely to have been diagnosed with brain tumors compared with nonusers (OR = 1.36; 95% CI = 0.92 to 2.02). Most OR:s are above 1. Statistically significant increased risk (+115%) for children or adolescents with

longest subscription. Study most likely underestimated risks due to serious misclassification of cordless phone exposure (reduced to only first 3 years of exposure). [Aydin et al. 2011](#)

Acoustic neuroma

2011: Interphone 180% increased risk for most exposed users with longest latency. [Interphone 2011](#)

2013: More than doubled risk for most exposed cell phone users. [Hardell et al. 2013](#)

2013: Increased risk for heaviest exposed users + 46% for heaviest users of cell phones and + 67% increased risk for heaviest users of cordless phones. [Pettersson et al. 2014](#)

2011: Increased risk of acoustic neuroma. [Sato et al. 2011](#)

Are we seeing an increase of these cancers in the population?

Several of the cancers that were observed in the exposed animals in the NTP study are on the rise during the last decade according to the cancer registry in Sweden. During this time period, use of cell phones has also increased tremendously. There are conflicting reports on brain tumor incidence in Swedish registries and the cancer registry is reported to have [underreporting problems](#). The Swedish Radiation Protection Foundation has compiled data from Swedish official cancer registry :

Malignant gliomas are increasing according to the [cancer registry and](#) mainly among men aged 50 + years (in NTP the gliomas appeared in male animals). This age group most probably include individuals with longest period of cell phone use.

Pituitary tumors are rising. [Diagram](#)

Thyroid cancers are rising very sharply since 2010. This may very well be an effect of heavy use of “smart phones” with antenna configuration that expose the neck more than previous models. [Diagram](#)

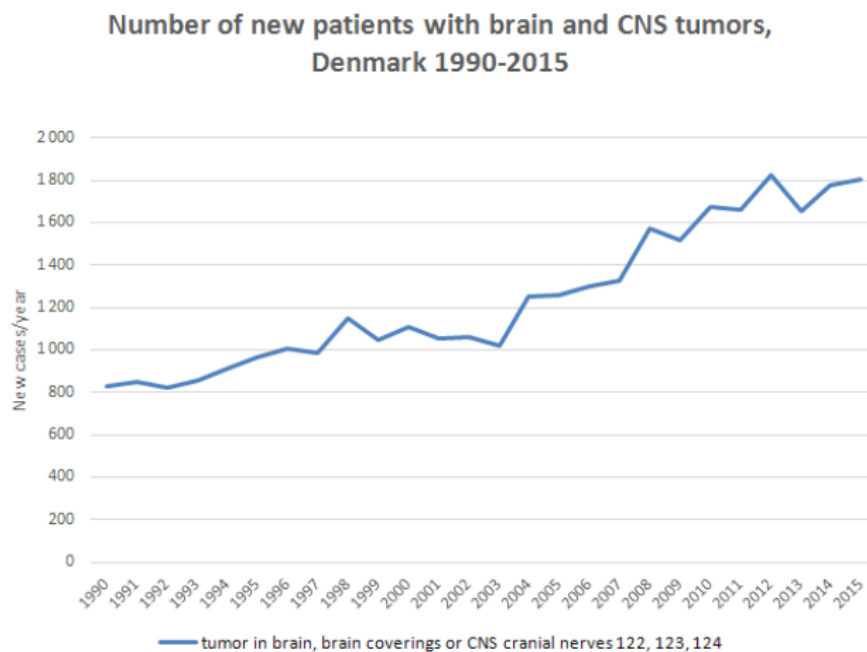
Cancers of the **mouth** are also on the rise. This might also reflect the fact that the mouth is also highly exposed to radiofrequency radiation from the cell phones. Unfortunately studies have investigated association with mouth cancers and cell phone use. [Diagram](#)

Cancers in the **skin**: Malignant melanoma is increasing at a faster rate since around 2005 also among the young between 20-49 years. [Diagram](#)

Source: Swedish Cancer Registry, [Link](#)

In the Swedish Patient Registry, there is a clear increase during the last decade in number of **treated brain tumor patients**/per year. In 2016 157 % more brain tumor patients were treated compared to 2001. (4092 in 2016 versus 1736 in 2001). [Diagram](#) . [Source](#)

In Denmark there is an increasing number of new brain tumor cases/year since 2003:



Source: Danish Cancer Registry

Comments on statements in the draft report NTP part 1

Page 27: "Overall, the exposure level from base stations is very small compared to exposure from the handheld devices.". This is not entirely correct. In many cases when people live close to cell phone antennas/transmitters the transmitters are be the largest contributor due to non-stop 24/7 exposure. Also previous studies show that less exposure might be as harmful as higher exposure, i. e. window-effects and no straight dose-response curve one example is [Salford et al. 2003](#).

Page 31: Regarding mechanism: It should be added that most studies (93 of 100 studies by 2015) showed that radiofrequency radiation cause oxidative stress. [Yakymenko et al. 2015](#)

Page 35: Quote “Studies in humans have failed to demonstrate any consistent adverse health effects in cell phone RFR-exposed populations. There are reports of some exposed individuals that complain of acute, subjective effects following exposure to cell phone RFR, including headaches, fatigue, skin itching, and sensations of heat (Frey, 1998; Chia *et al.*, 2000; Hocking and Westerman, 2000; Sandström *et al.*, 2001; Santini *et al.*, 2002a,b). However, these have primarily been reported in people that consider themselves electrosensitive, and not in the general population...No effects of cell phone RFR on the neuroendocrine system, auditory and vestibular systems, or consistent effects on cognitive performance have been reported in humans.”

These statements are not correct:

1. Many studies have reported adverse health effects in cell phone exposed populations. In a field where there are huge economic interests and industry funds quite many studies, consistent results are not to be expected. The industry funding aspect should be considered as a potential bias to reported results. Here are some examples (not all) of studies showing effects (headache, sleep deprivation, fatigue, depression etc.) among people (adults as well as children adolescents) that are not considering themselves as electrosensitive:

Meta-analysis (Wang *et al.* 2017) show headache significantly associated with mobile phone use. [Wang *et al.* 2017](#); [Cho *et al.* 2016](#); [Durusoy 2017](#); [Shabazi-Gahrouiee *et al.* 2014](#); [Min Kuong Chu 2011](#); [Söderqvist *et al.* 2008](#); [Mortazavi *et al.* 2011](#); [Buchner *et al.* 2011](#); [Heinrich *et al.* 2010](#); [Hillert *et al.* 2008](#); [Stalin *et al.* 2016](#); [Schoeni *et al.* 2015](#); [Zheng *et al.* 2015](#); [Chang-Ta Chiu *et al.* 2013](#); [Shrivastava *et al.* 2014](#); [Redmayne *et al.* 2013](#); [Gulati *et al.* 2016](#)

2. There are many studies showing negative effects on cognitive performance: French authority ANSES concluded in an extensive expert report 2016 that exposure to radiation from wireless technology do have negative effects on cognitive performance in children. [ANSES 2016](#). Other examples of studies: [Schoeni *et al.* 2015](#); [Yogesh *et al.* 2015](#) There are many animal studies confirming effects on memory and learning.

Page 34: Animal studies: Most animal cancer studies have potential bias in terms of industry funding, an aspect that should be considered in research outcomes. In 2015 a German study found that 3G radiation promoted tumors at very low exposure (0,04 W/kg) [Lerchl *et al.* 2015](#). In 1992 [Chou *et al.*](#) reported increased tumor incidence in 2,45 GHz long term exposed animals.

Page 35: Case-control studies since IARC classification have confirmed a relationship between brain tumors and mobile phone use (see previous list page 1). Also the Interphone study was together with Hardell studies the basis for classifying radiofrequency radiation as Group 2B.

The cohort-studies referred (Johansen *et al.*, 2001; Schüz *et al.*, 2006, 2011) in the draft report are from one single research group and is in fact one single study updated several times. It is uninformative as to health risks from cell phone use due to serious misclassification of exposure. The study's 200 000 by far heaviest users (corporate users) were excluded and most likely ended up in the unexposed control group. Also all heavy users that started to use a cell phone after 1995. "*...flaws and shortcomings make this study unreliable and make impossible to draw any valid conclusions*". Dariusz [Leszczynski](#) ; [EHT trust](#); [Mona Nilsson](#)

Page 37: A majority of (64 of 76) DNA comet assay studies report significant effects. [Safeemr.com](#)

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Swedish Radiation Protection Foundation