

## Decreasing Rates of Brain Cancer – A Worrying Trend?

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### Abstract

We wanted to address the difference noticed in brain tumor risks between the ipsilateral side and the contralateral side of the brain relative to the side used for a mobile phone and to discuss possible implications. Data from different cancer types were reviewed to see how well trends fit expected responses to changes in cell damages and changes in DNA repair capacity (DRC), respectively. We found that recent studies show that brain cancer rates on the ipsilateral side of the brain have odds ratios >1 while on the contralateral side <1. We also noticed that mortality in melanoma and lung cancer rates increased rapidly after the roll-out of body-resonant FM broadcasting in 1955, while the incidence started to increase a few years later. The fact that the melanoma and lung cancer mortality started to increase before the incidence increased is a strong indication of a DRC reduction from 1955, leading to an initial prevalence-based mortality increase rather than an increase in cell damage rates. The increased incidence of ipsilateral brain cancer during recent years is a similarly strong indication of an increased rate of brain cell damages in these areas, in concert with a general initial DRC improvement, due to a concomitant cell damage-based stimulation of the immune system, leading at first to a contralateral incidence reduction. Since a large proportion of the population likely already has got ipsilateral cell damages due to heavy mobile phone use, future brain cancer rates need to be followed carefully for coming decades. An initial contralateral incidence reduction may, thus, be something to really worry about.

**Keywords:** Brain; Cancer; Incidence; Damage; Repair; Immune system

### Introduction

There has been an increase in tumours detected in the central nervous system (CNS) during the second half of the 20<sup>th</sup> century. It has been speculated that this rise is associated with the modern society's use of electricity in different forms [1]. During recent years, the possible connection between mobile phone use and brain cancer has been addressed frequently in medical journals and media. In June 2011, the International Agency for Research on Cancer (IARC) classified radiofrequency electromagnetic fields, e.g. from mobile telephony, as "possible carcinogens" (class 2B), the same class as e.g. DDT. One reason for this classification was that some rare cancer types are more frequently found on the ipsilateral side of the brain, i.e. the same side a mobile phone is usually held against. Several reports have concluded that long-term use results in a significantly increased risk for brain tumours on this side, and the expert group within the IARC concluded it was no longer possible to ignore or disregard these findings as a matter of coincidence.

The reports, highlighted by cooperative research within the Interphone study, also pointed out that most studies found that there tended to be a significantly reduced risk for brain cancer on the contralateral side of the brain [2]. This finding has not been debated nearly as much as the increasing risks on the ipsilateral side. It is the objective of this report to discuss the possible implications of this finding, and to draw some conclusions about how it may affect future brain cancer trends.

### Materials and Methods

If the cancer risk after many years of cell phone use is significantly increased for the ipsilateral side of the brain, then we must assume the initial cell damage occurred several years before the tumour was diagnosed, due to expected latency. It is also logical to expect that this cell damage may develop in the brains of nearly all cell phones users, especially those living in rural areas where the output power from the

cell phone is often at its maximum level due to the long distance to base stations. It has been reported that hearing problems and brain cancer have increased most rapidly in these areas over recent years [3-5].

It is speculated that cell damages, caused by external environmental factors in a specific part of the brain, initially may alert immune and repair systems to more efficiently address cell damage throughout the CNS. Thus, if cell damage occurs on the side of the brain exposed to the mobile phone, the tumour risk for the contralateral side of the brain may decrease as may the risk for cancer in non-brain parts of the CNS also do. In a study of lung cancer and DNA repair capacity (DRC) it was noticed that heavy smokers tended to have more proficient DRC than lighter smokers, suggesting "that cigarette smoking may, in fact, stimulate DRC in response to DNA damage caused by tobacco carcinogens." [6]. Parallel to this, one might expect that local brain cell damages stimulate a more efficient DRC for the whole brain long before damaged cells develop into a tumour.

In case weak body-resonant radiation, such as FM broadcasting, suddenly hits a whole population from 1955, then cell repair efficiency may decrease while the radiation is not capable of creating new cell damages. Reduced repair efficiency is then assumed to immediately increase the mortality trend among skin cancer patients while it takes longer time to notice a trend-break in new melanoma cases.

The hypothesis is then that local brain cell damages might stimulate cell repair in the whole brain and initially reduce the total cancer risk until the local damage later on may develop into cancer. Whole-

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body reduced repair efficiency without cell damages may at first cause increased cancer mortality and later on increased incidence. Data from brain cancer epidemiology studies and trends in melanoma and lung cancer rates were reviewed to see if they support this hypothesis or not.

## Results and Discussion

As discussed, the Interphone study clearly reported on the reduced risk for brain cancer on the contralateral side of the brain. Already in 2005, Lönn et al. presented the Swedish contribution to the Interphone study [7]. According to that report the odds ratio for glioma was  $<1$  for all mobile phone users, indicating a protective effect, as pointed by Sam Milham also in 2005 [8]. The Swedish cancer registry in addition reported fast dropping rates for non-brain CNS cancers, as shown in Figure 1. Decreasing rates of brain CNS cancer is currently being reported from both Sweden and the USA, [9].

It was recently reported that the incidence of malignant melanomas in the head region has increased quickly over the last few years in Nordic countries [10], especially on the ears. Since the skin is even more closely in contact with mobile phones than the brain, this is not a surprise and should be seen as a warning sign. Traditionally, epidemiologists have considered increased cell damage as the one and only cause of increasing cancer trends; while, environmentally induced changes in immune and repair efficiencies are rarely modelled. Due to latency effects, increased rates of cell damage will cause cancer after a long time, while reduced or improved immune and repair systems will result in increased or reduced incidence rates over a much shorter time scale [11,12]. Already in 2004 the current authors highlighted the fact that melanoma mortality started to increase from 1955, melanoma incidence from 1960 and that sun charter travels started to increase from 1962 [13] (Figure 2). The official picture given by the authorities is, on the contrary, that increasing sun tanning habits have caused increasing incidence of melanoma and presumably later on increasing mortality as shown in figure 3.

Figure 2 shows that a disturbed immune and repair function immediately can cause an increased mortality among cancer patients. Figure 4 shows that both melanoma and lung cancer incidences in the Nordic countries can be described by simple exponential functions added to the stable levels reported before 1955, (Table 1). The increase after 1955 for both cancer forms are presumably due to reduced immune and cell repair efficiency from that year. Wei et al. showed in 2003 that a low capacity for DNA repair may be the underlying molecular mechanism for sporadic melanomas [14]. Logically, a suddenly improved repair system activity, alerted and stimulated by

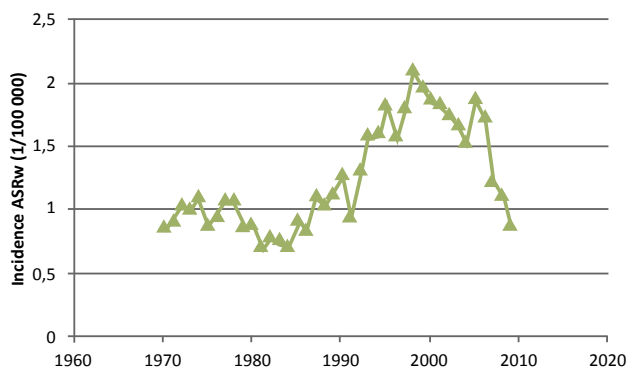


Figure 1: The incidence of non-brain CNS tumors in Sweden.

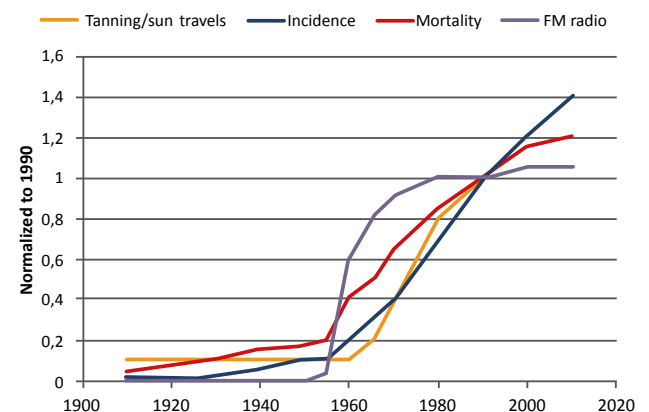


Figure 2: Melanoma mortality, incidence and sun charter travel habits according to Swedish data. Included is also the area covered by potentially immune-disturbing FM broadcasting [9].

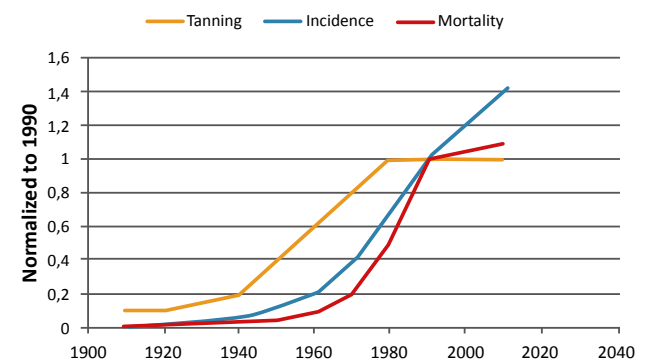


Figure 3: The expected logical order of sun tanning, increasing melanoma incidence and later on increased mortality does not fit reported data shown in Figure 2.

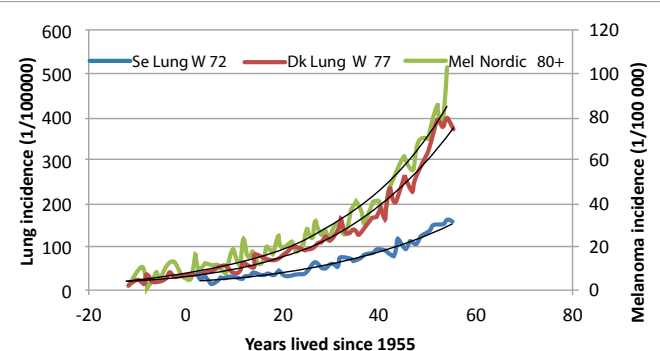


Figure 4: Lung cancer incidences are increasing exponentially in Nordic countries as shown for women aged 72 and 77. The same applies to melanoma incidence for men and women aged 80+ years since 1955.

local cell damages in a part of the brain, may also at first manifest itself as an initially reduced incidence of cancer in the rest of the brain. This effect may even be a consequence of a direct radiation-dependent stimulation of the immune system, thus not necessarily mediated via local cell damage [12].

However, a sudden decrease in the cancer rate of the contralateral side of the brain may be a sign of slowly progressing cancer development

| Description  | Model                     |
|--|---------------------------|
| Lung cancer incidence in Sweden, women, 70-74 years of age     | $y = 20 + 5,1431e0,0639x$ |
| Lung cancer incidence in Denmark, women, 75-79 years of age    | $y = 24 + 11,933e0,066x$  |
| Melanoma incidence in Nordic countries, men and women aged 80+ | $y = 7,5+3,35e0,0595x$    |

**Table 1:** Exponential models describing lung cancer and melanoma incidence among elderly in the Nordic countries since 1955.

on the ipsilateral side, possibly prevalent in a large portion of the population already today.

Conclusions

Reassuring reports on the healthiness of mobile phone use, issued or supported by the mobile phone industry, may be nothing but an illusion. In fact, the results of the reports may warn of a silent, but on-going, brain and skin cancer incidence increase that may turn epidemic in the future.

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