Cancer versus FM radio polarization types

Örjan Hallberg✠

In 2002, a detailed analysis of skin melanoma in 289 Swedish municipalities showed a strong association with the number of horizontally polarized main FM transmitters covering a municipality. Basic antenna theory says that body-resonance and standing waves cannot appear above a metal spring mattress unless the electric field is horizontally polarized. To test the hypothesis that body-resonant radiation can cause increased cancer risk in other European countries, I collected and analysed reported data from 24 countries, among which six were using vertical polarization. The results showed a strong association between cancer risk and the use of horizontally polarized FM broadcasting radiation, whereas vertical polarization seemed to cause no health effects. This information should form the basis for initiating relevant corrective actions by responsible authorities. ***European Journal of Cancer Prevention*** **25:357–360 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.**

European Journal of Cancer Prevention 2016, **25**:357–360

Keywords: body-resonant, FM, horizontal, immune system, polarization, radiation, vertical

Hallberg Independent Research, Sköndalsvägen, Sköndal, Sweden

Correspondence to Patricia Odhult, Hallberg Independent Research, Sköndalsvägen, Sköndal, Sweden
E-mail: patriciaodhult@gmail.com

✠Deceased.

Received 28 October 2015 **Accepted** 9 January 2016

Background

In 2002, the first study on the association between skin melanoma and exposure to body-resonant radiation from FM broadcasting main transmitters was published. It was followed in 2004 by a more detailed study on melanoma incidence over time and the roll-out of the FM broadcasting network in Sweden.

In 2005, the first trend modelling for melanoma was presented, followed the next year by a paper titled: 'A theory and model to explain the skin melanoma epidemic'. In 2008, another model paper was published explaining that 'a reduced repair efficiency can explain increasing melanoma rates'.

In 2010, the first paper was presented, explaining the fact that breast cancer and melanoma are more prevalent in the left than in the right side of the body. This paper was followed the same year by a study showing that breast cancer and melanoma are strongly correlated with the use of metal spring mattresses in different parts of the world.

In 2012, basic principles of an exponential response to a suddenly increased cancer risk were posted at Nature Proceedings. This principal approach was later used to model cancer trends for melanoma mortality, melanoma incidence, lung cancer, and also Alzheimer's mortality, with good results.

Introduction

In 2002, we presented cancer incidence data from the 289 Swedish municipalities (communes) showing a remarkably strong association with the number of main FM transmitters covering each commune (Hallberg and Johansson, 2002). This association was assumed to result from the increasing probability of sleeping in a body-resonant direction to a main FM transmitter with the number of transmitters covering a commune.

In Sweden, we use only horizontally polarized main transmitters for FM broadcasting. The country has around 60 such transmitters, more densely located in the southern than northern part. Horizontally polarized radiowaves are plane waves that tend to drive currents in parallel to the ground – that is, the currents move back and forth horizontally. As the sleeping position is also always horizontal, this gives a high probability of sleeping in resonance with such waves because the half wave lengths at an 87–108 MHz range from 174 to 140 cm. This ability to catch standing waves implies that the FM band is absorbed by the human body around five times more efficiently than all other frequencies, as WHO has described (World Health Organization, 2006).

Several model studies on cancer trends have clearly indicated that the increasing cancer rates over time can easily be explained by a sudden reduction in cell repair capacity affecting all ages from a specific year, such as 1955 for skin melanoma (Hallberg, 2015). Figure 4 of that model paper also gives the expected future reduction in melanoma incidence if the carcinogenic main transmitters in Sweden were to be closed down by year 2017, as is planned for Norway.

Thus, the aim of the current study was to evaluate whether horizontally polarized FM broadcasting radiation is also associated with increased cancer rates in other European countries. Of particular interest was to identify

0959-8278 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

DOI: 10.1097/CEJ.0000000000000224

Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

countries (if any) that use only main transmitters with vertically polarized radiation. The hypothesis, according to the basic antenna theory (Kraus, 1988), is that little to no health effect will be seen at body-resonant frequencies from such transmitters, even for people sleeping on metal spring mattresses.

Methods

Twenty-four European countries were approached through e-mails to their spectrum administration authorities. These countries were asked to release information about the number of main FM broadcasting transmitters with output power (event-related potential) of at least 15 kW, or less if no such transmitters were in use. We also enquired about their use of vertically polarized main transmitters. Out of these 24 countries, six (including the French island, Martinique) declared only using vertically polarized main transmitters. Sixteen countries had more than 50% of their transmitters operating in the horizontal mode, including 12 countries using more than 90% of main transmitters in the horizontal mode.

Results

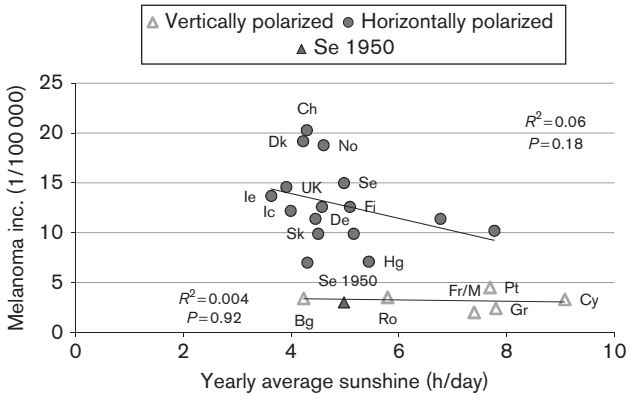
Data received from the European countries were used to investigate a possible association between different cancer types and various environmental factors, such as sunshine hours per day, density of horizontally polarized FM transmitters in a country, and smoking prevalence. A separate report on that study has been submitted elsewhere (Hallberg Ö, unpublished observation).

Figure 1 gives the reported incidence of skin melanoma for the two groups of polarization types. It shows clearly that countries using only vertical polarization still have low melanoma incidence rates, in the same range as was present in Sweden before FM broadcasting became widespread after 1955. If we look at all cancers together, except for lung cancer, we can see a similar picture. Figure 2 indicates that vertically polarized countries on average have almost 100 fewer cases per 100 000 person-years.

A look into mortality rates for melanoma gives the same picture (Fig. 3). Because body-resonant currents are associated with both skin melanoma and breast cancer, it was also of interest to examine differences in breast cancer incidence between countries using 'horizontal' and those using 'vertical' polarization. As the data in Fig. 4 illustrate, countries using vertical polarization had a reduced breast cancer incidence compared with countries using horizontal polarization.

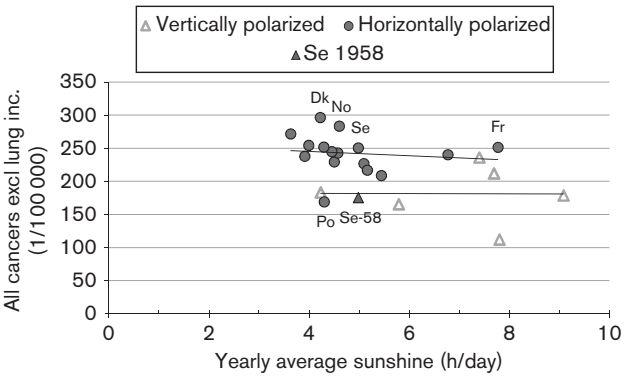
On the basis of basic antenna theory, the left side of the body would be expected to have a higher incidence of breast cancer compared with the right side because most

Fig. 1



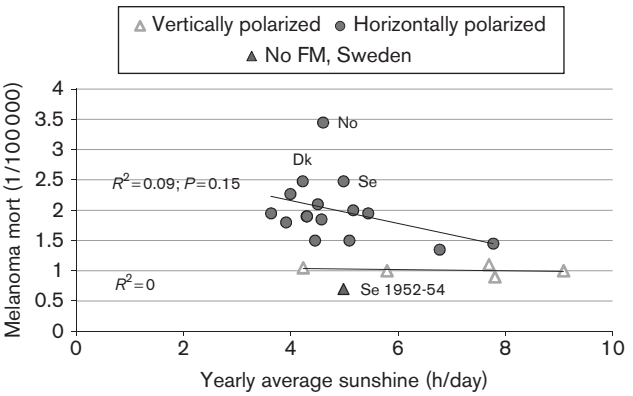
Melanoma incidence in European countries using either greater than 90% horizontally (named) or over 50% (rest) or 100% vertically polarized FM broadcasting plotted versus average sunshine hours per day. inc., increase.

Fig. 2



All cancers except lung cancer versus daily daylight hours and FM radio polarization. The low incidence for Poland is a logical consequence of its late FM start (87–108 MHz) in 1992. inc., increase.

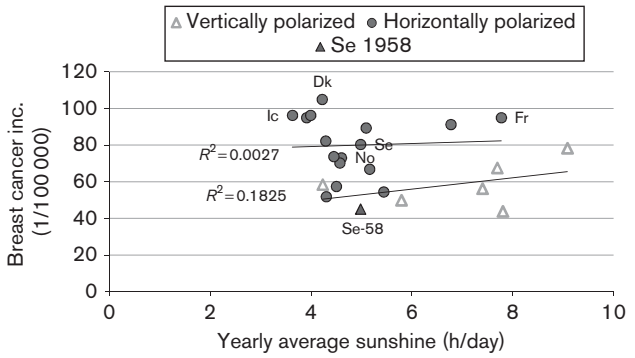
Fig. 3



Melanoma mortality plotted versus the average sunshine hours per day for countries using horizontal and vertical FM polarization. mort, mortality.

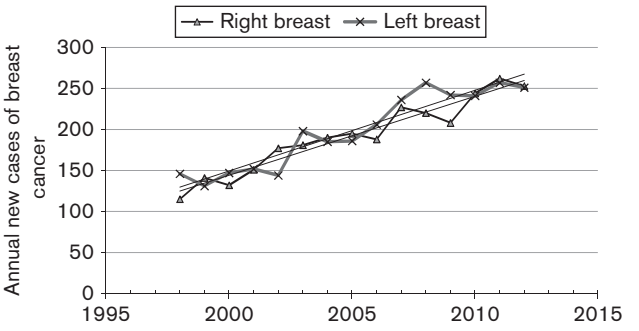
Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

Fig. 4



Breast cancer incidence as reported for countries using horizontal and vertical polorization relative to average sunshine hours per day. inc., increase.

Figure 6



In Cyprus, breast cancer has been equally distributed between the left and right breasts.

people tend to sleep for more hours on the right side (Hallberg and Johansson, 2010). According to the same theory, we should actually not expect to see any main difference in left–right cancers if the broadcasting is using only vertically polarized waves, even if people sleep on metal spring mattresses. Figure 5 shows the significant difference between the number of breast cancer cases per year in Sweden for the left and the right breast. A corresponding graph (Fig. 6) from a country using 'vertical' polarization, Cyprus, does not indicate any dominant laterality of breast cancer, just as expected.

Discussion

The basic antenna theory states that a plane wave that is reflected from a metal structure will undergo a 180° phase shift because of the high conductance in metal compared with space. Thus, close to the metal, incoming and reflected waves will cancel out while adding together further up from the structure. Theoretically, we could find a maximum field strength a quarter of a wavelength above the structure (e.g. 75 cm), but the important factor is that the field strength will increase by this distance above the mattress. This increase can also be verified very simply using a field detector device, which is quite silent just above the spring mattress but will start sounding higher up (Hallberg *et al.*, 2014).

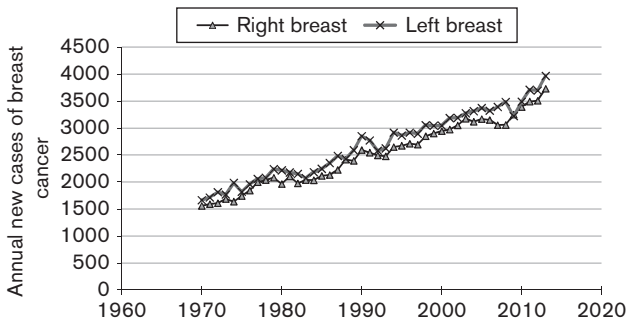
In 2010, a report was published (Hallberg and Johansson, 2010) addressing the consequences of placement of the heart in the left part of the torso. To avoid disturbing heartbeats during sleep, people tend to sleep for longer hours on the right side rather than on the left side. Consequently, on average, the left side of the body will be exposed to stronger field strengths for more hours than the right side.

Thus, if induced weak currents continue to go back and forth along our bodies throughout the night, we should expect to see more cancer cases on the left side compared with the right side of the body. Figure 5 shows that breast cancer has been reported to be sited in the left breast more often than in the right every year in Sweden since 1970, whereas Fig. 6 indicates, as expected, that vertical polarization does not hit one side of the body any more than the other side.

The same scenario has also been reported for skin melanoma (e.g. Brewster *et al.*, 2007). With regard to lung cancer, however, the picture is a bit more complicated because our left lung volume is only about three-fourths the volume of the right lung. Without this factor taken into consideration, lung cancer appears to be predominant in the right lung. However, taking the volume difference into consideration shows that lung cancer is also more prevalent per lung volume on the left side.

This apparent left-sided association with these cancers is in accordance with the hypothesis of a nightly disturbed immune system in countries using horizontally polarized FM transmitters in combination with high usage of metal spring mattresses (Hallberg, 2010). Countries using vertical polarization have much lower cancer rates, in the same order as that in Sweden before we rolled out the

Fig. 5



In Sweden, breast cancer has been more frequent in the left breast than in the right breast for many years (Hallberg *et al.*, 2014).

Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

FM broadcasting from 1955. In addition, the fact that this is the case even if inhabitants tend to sleep on metal spring mattresses provides support for the main hypothesis of a disturbed immune and cell repair system.

Conclusion

Data collected to date suggest that horizontally polarized main transmitters carry more carcinogenic risk than vertically polarized transmitters. Identifying a factor such as this one makes practical corrective action possible, such as a change to vertically polarized main transmitters or ceasing to use this body-resonant bandwidth and instead introducing digital audio broadcasting.

We suggest that these results support the need for more research on the effects of body-resonant and immune-disturbing radiation, which did not occur after our first report in 2002; indeed, the research area was excluded from further research funding in Sweden.

Acknowledgements

The author thanks Per Wallander MSc for invaluable input on this study with regard to the basic antenna theory and its practical implications for better understanding cancer statistics around the world. Associate professor Olle Johansson, Karolinska Institute, Sweden is gratefully acknowledged for all of his support since our first paper on the subject was published in 2002. Dr Pavlos Pavlou, Ministry of Health, Cyprus is gratefully acknowledged for providing data on breast cancer and melanoma laterality as reported from Cyprus. This study was financed by internal funds within Hallberg Independent Research.

Conflicts of interest

There are no conflicts of interest.

References

Brewster DH, Horner MJ, Rowan S, Jelfs P, de Vries E, Pukkala E (2007). Left-sided excess of invasive cutaneous melanoma in six countries. *Eur J Cancer* **43**:2634–2637.

Hallberg Ö (2010). Bed types and cancer incidence. Letter to the Editor. *Pathophysiology* **17**:161.

Hallberg Ö (2015). An exponential melanoma trend model. *Int J Stat Med Res* **4**:65–71.

Hallberg Ö, Johansson O (2002). Melanoma incidence and frequency modulation (FM) broadcasting. *Arch Environ Health* **57**:32–40.

Hallberg O, Johansson O (2010). Sleep on the right side – Get cancer on the left? *Pathophysiology* **17**:157–160.

Hallberg Ö, Huttunen P, Johansson O (2014). Cancer incidence vs. population average sleep duration on spring mattresses. *ASMS* **2**:1–15.

Kraus JD (1988). Gradient, divergence and curl in rectangular, cylindrical and spherical coordinates. In: Stephen W, editor. *Antennas*. New-York: McGraw Hill Company. p. 894.

World Health Organization (2006). Electromagnetic fields and public health. Facts sheet #304. Available at: *http://www.who.int/peh-emf/publications/facts/fs304/en/index.html*. [Accessed 4 January 2014].

Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.