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Short communication

Sleep on the right side—Get cancer on the left?

Örjan Hallberg [a,*], Olle Johansson [b]

[a] *Hallberg Independent Research[1], Polkavägen 14B, 142 65 Trångsund, Sweden*

[b] *The Karolinska Institute, The Experimental Dermatology Unit, Department of Neuroscience, 171 77 Stockholm, Sweden*

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Abstract

Breast cancer frequently occurs in the left breast among both women and men [R. Roychoudhuri, V. Putcha, H. Møller, Cancer and laterality: a study of the five major paired organs (UK), Cancer Causes Control 17 (2006) 655–662; M.T. Goodman, K.H. Tung, L.R. Wilkens, Comparative epidemiology of breast cancer among men and women in the US, 1996 to 2000, Cancer Causes Control 17 (2006) 127–136; C.I. Perkins, J. Hotes, B.A. Kohler, H.L. Howe, Association between breast cancer laterality and tumor location, United States, 1994–1998, Cancer Causes Control 15 (2004) 637–645; H.A. Weiss, S.S. Devesa, L.A. Brinton, Laterality of breast cancer in the United States, Cancer Causes Control 7 (1996) 539–543; A. Ekbom, H.O. Adami, D. Trichopoulos, M. Lambe, C.C. Hsieh, J. Pontén, Epidemiologic correlates of breast cancer laterality (Sweden), Cancer Causes Control 5 (1994) 510–516]. Moreover, recent results showed that the left side of the body is more prone to melanoma than the right side [D.H. Brewster, M.J. Horner, S. Rowan, P. Jelfs, E. de Vries, E. Pukkala, Left-sided excess of invasive cutaneous melanoma in six countries, Eur. J. Cancer 43 (2007) 2634–2637]. Current explanations for left-sided breast cancer include handedness [L. Titus-Ernstoff, P.A. Newcomb, K.M. Egan, et al., Left-handedness in relation to breast cancer risk in postmenopausal women, Epidemiology 11 (2000) 181–184; M.A. Kramer, S. Albrecht, R.A. Miller, Handedness and the laterality of breast cancer in women, Nurs. Res. 34 (1985) 333–337; M.K. Ramadhani, S.G. Elias, P.A. van Noord, D.E. Grobbee, P.H. Peeters, C.S. Uiterwaal, Innate left handedness and risk of breast cancer: case-cohort study, BMJ 331 (2005) 882–883], size difference, nursing preference, and brain structure. However, men are affected even more by left laterality than women, thus many of these explanations are unconvincing. Increasing rates of skin melanoma have been associated with immune-disruptive radiation from FM/TV transmitters [Ö. Hallberg, A theory and model to explain the skin melanoma epidemic, Melanoma Res. 16 (2006) 115–118; Ö. Hallberg, A reduced repair efficiency can explain increasing melanoma rates, Eur. J. Cancer Prev. 17 (2008) 147–152; Ö. Hallberg, O. Johansson, Melanoma incidence and frequency modulation (FM) broadcasting, Arch. Environ. Health 57 (2002) 32–40; Ö. Hallberg, O. Johansson, FM broadcasting exposure time and malignant melanoma incidence, Electromagn. Biol. Med. 24 (2005) 1–8; Ö. Hallberg, Radio TV towers linked to increased risk of melanoma, Report, available at: http://foodconsumer.org/7777/8888/C_ancer_31/120907442007_Exclusive_report_Radio_TV_towers_linked_to_increased_risk_of_melanoma.shtml, 2007 (accessed 2007)]. Geographical areas covered by several transmitters show higher incidences of melanoma than areas covered by one transmitter. Here we show that a high prevalence of breast cancer and melanoma on the left side of the body may be a logical consequence of sleeping in beds having mattresses containing wave-reflecting metal springs. We found that people tend to sleep for longer periods on their right side, apparently to avoid disturbance by the heartbeat. This puts the left side farther away from the field-attenuating influence of the metal springs in the mattress; thus the left side will spend, on average, more time exposed to stronger combined fields from incident and reflected waves. This hypothesis may also explain why body parts farthest away from the mattress (trunk and upper arms for men; lower limbs and hips for women) have higher melanoma rates than the sun-exposed face area. The implications of this study should promote a critical consideration of population exposure to electromagnetic fields, especially during the night.

Keywords: Breast; Cancer; Melanoma; Left side; Laterality; Incidence; Cell repair; Body-resonant; FM radio transmitters; Radiation

1. Introduction

There is no doubt that horizontally polarised radiation emitted from western-type FM broadcasting towers may interfere with a human body at night during sleep. This is

* Corresponding author.
E-mail address: oerjan.hallberg@swipnet.se (Ö. Hallberg).

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a logical consequence of wavelengths normally used for FM and TV broadcasting. A metal-containing mattress may act as a half-wave antenna, thus the central parts of the body may become more exposed to resonant currents than the head and feet are.

Melanoma of the skin appears to be very sensitive to resonant radiation. Long-term disturbance of the immune defence system during sleep may increase the risk of melanoma in the most affected parts of the body. A number of facts support an association between body-resonant radiation and melanoma [10–14]. (1) The melanoma epidemic started in Western countries in parallel to the roll-out of FM/TV transmitters. (2) Melanoma rarely affects children that are less than a half-wave height; girls typically reach the height about one year earlier than boys do. (3) Melanoma is more common in geographical areas that have more than one transmitter, due to the increased probability that the bed will be placed in a resonant direction. (4) Melanoma most commonly affects the hip and thighs for women and the trunk for men, areas that normally are protected from the sun.

We have previously suggested the possibility that resonant electromagnetic fields might have negative effects on the efficiency of the immune and cell repair systems [10–14]. A recent study showed that melanoma occurs approximately 10% more frequently on the left side of the body compared to the right side [6]. In addition, breast cancer exhibited a left lateral predominance of 5–19% (8% overall) for women in Western countries [1–4] and 18% for men in Sweden [5]. Thus, we hypothesized that there may be a common factor underlying both types of cancer.

In this study, we investigated whether radiation at night, sleeping habits, and bed materials might explain the left-sided predominance of these cancers. We reasoned that an observed prevalence of sleeping on either the left or the right side might suggest a lateral difference in health parameters affected by resonant electromagnetic fields. We performed a literature search to provide support for this potential explanation of laterality in cancer. A recent compilation of more than 2000 peer-reviewed, scientific articles clearly shows biological effects from electromagnetic radiation at non-thermal levels [ref. http://www.bioinitiative.org].

2. Methods

We collected data on the incidence of breast cancer in the left and right breasts from the Swedish Cancer Registry over the period of 1970–2006. We calculated the relative rate of involvement in the left and right breasts in newly registered cases to determine whether there was a significant dominance of cancer on one side. We also reviewed similar data on melanoma and breast cancer rates in other countries. In addition, we sought information about sleeping preferences on either side of the body for men and women. The incidence of melanoma and breast cancer in Swedish municipalities was plotted vs. the number of FM radio transmitters covering the area. Finally, breast cancer incidence rates in many countries were related to the melanoma incidence in those countries.

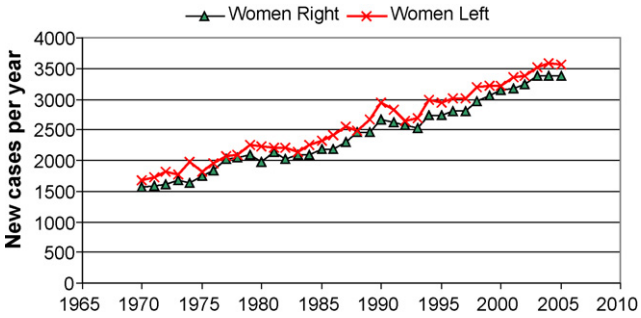

Fig. 1. The annual number of new cases of cancer diagnosed in the left and right breasts of women in Sweden.

3. Results and discussion

Previous reports on the data referenced from Sweden was from the early 1990s, thus we updated the breast cancer laterality data from Sweden up to the year 2006. We found that from 1970 to 2006, 616 men were diagnosed with left breast cancer and 545 with right breast cancer, yielding a ratio of 1.13, or a 13% higher risk on the left side. In the same time period, 96,354 women were diagnosed with left breast cancer and 90,304 with right breast cancer, yielding a ratio of 1.07, or a 7% higher risk on the left side (Fig. 1).

To determine whether there was a preference for sleeping on one side of the body, we reviewed several studies that investigated the sleeping habits of men and women. In a study of whether sleep position influenced placental implantation [15], 497 of 1500 women (33%) preferred to sleep on their right side and 360 (24%) preferred to sleep on their left side. Other studies showed that 47% of men preferred to sleep on their right side and 24% preferred to sleep on their left side [16].

We found that melanoma and breast cancer were more common in municipalities covered by more than one main FM/TV transmitter [11,12] (Fig. 2). We also found that countries with high rates of melanoma also have high rates of breast cancer (Fig. 3). These are so-called developed countries currently using Western FM bandwidths of 87–108 MHz. In contrast, Japan, also a developed country, uses a somewhat lower frequency for their FM-radio, including bandwidths of 76–93 MHz. In Japan, no left laterality for breast cancer was found [5]. Furthermore, the melanoma rate was only about 3% of the rate observed in Sweden, the breast cancer rate was only 40% of the reported rates in the UK and USA, and the prostate cancer rate was only about 10% of the reported rates in the UK and USA.

Basic physics tells us that a structure that is approximately 1.5 m long may become resonant (half-wave resonance) at frequencies of approximately 100 MHz, since half a wave-

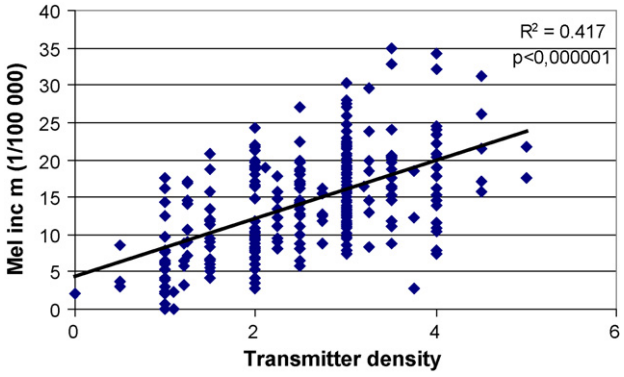

Fig. 2. Melanoma incidence rates in 1989–1993 in 289 Swedish residential areas vs. the number of FM-transmission towers covering the area. A linear regression line has been included. From Ref. [14].

length is 1.5 m. Half-wave resonance reaches a maximum in the middle of the structure. If this structure is resting on (above) a metal bed and is exposed to horizontally polarised waves, the incident wave and a reflected wave will produce a standing wave pattern. The field strength will be almost zero close to the surface of the metal base, but reach a maximum a quarter wavelength (75 cm) above the metal base, another zero at 1.5 m above the metal base and so on. The field strength at the maximum is twice the field strength if the bed was not there, due to summation of the incident and reflected waves. Without such a metal base there will be no standing waves driving currents along and inside the body.

Naturally, our hypothetical model of the reflection from the bed and suggestion of zero field strength at its surface is simplistic. A mattress contains a two-dimensional array of parallel helically wound springs. The electromagnetic fields above such a structure could only be predicted accurately by computer modelling, as could absorption in the body which is close-coupled to the springs. In addition, true field measurements should be employed.

Apart from reviewing published reports on preferences for sleeping on the right or left sides, we also consulted experts at the Sleep Research Institute, Sahlgrenska University Hospital in Gothenburg, Sweden. Data on this issue are currently sparse. However, the general impression is that people prefer to sleep on their right side because (a) there is less weight stress on the heart and (b) the heartbeat is not as loud as when sleeping on the left side.

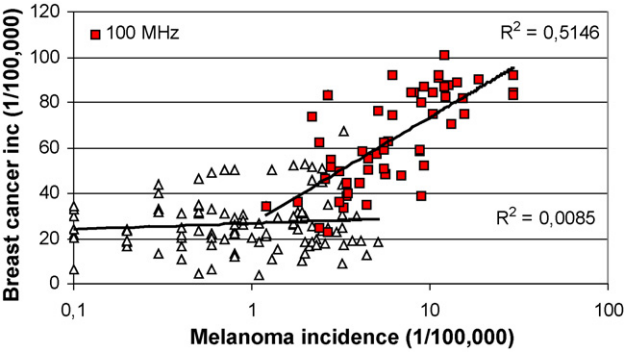

Fig. 3. Breast cancer incidence vs. melanoma incidence in countries that used an FM-bandwidth of 100 MHz (squares) and in other countries that used lower frequencies (triangles). Included are linear regression lines for both groups.

These results suggest that the left side of the body is more often placed farther away from the protective metal bed springs and might therefore, on average, spend more time exposed to body-resonant electromagnetic fields. It is important to emphasise that the proportion of people that say they prefer sleeping on one side is not a measure of the time they actually sleep on that side. A more precise study might further elaborate the relevance of our hypothesis that the predominant sleeping side is associated with cancer laterality. Beds in Western countries normally contain metal springs or something similar that could interfere with electromagnetic fields as mentioned above. In contrast, the 'Shiki Futons' of Japan are mattresses placed directly on the bedroom floor, with no metal parts. Thus, we would not expect to find any left or right laterality of cancer in Japan, due to the lack of metal springs in Japanese beds. Indeed, a recent study showed there was no cancer laterality in a population in Tokyo [5]. It is interesting to note that melanoma most commonly affects the hip or lower limbs in women, and the trunk area in men. Thus, the widest part of the body, and potentially the part farthest away from the bedsprings, seems to be most sensitive to cancer, quite in line with our hypothesis.

However, our hypothesis may not explain all cancer asymmetries. In a study of five paired organs, it was found that lung cancer and testis cancer had right asymmetries that correlated with asymmetries in tissue mass for these organs [1]. Moreover, breast cancer in people under 45 years old showed a slight right laterality among right-handed and a strong left laterality among left-handed people [8]. Breast cancer in older people showed a left laterality, and the odds ratio (OR) was 1.06 for right-handed and 1.20 for left-handed people. In light of these data, it would be interesting to investigate whether left-handed people normally sleep for longer periods on the right side of the body than right-handed people do. Other reports have also noted that left-handed women had higher total breast cancer risk than right-handed women, but no explanation was offered for this anomaly [7–9].

Already in 1959 the issue of breast cancer laterality was brought up by Garfinkel et al. [17] In the USA both FM and TV transmissions had been broadcasting since late 40s in some states. The final massive roll-out of the FM system did not finish until early 70s, though; quite in line with the later increase of melanoma rates compared to European countries.

Fig. 3 shows the association between melanoma rates and breast cancer rates in different countries. It is unlikely that breast cancer is caused by UV-radiation (on the contrary, UV-induced D-vitamin might serve as protection), thus we have reason to question whether UV-radiation alone is the main environmental factor behind the increasing melanoma rates. Fig. 3 shows that the association between melanoma

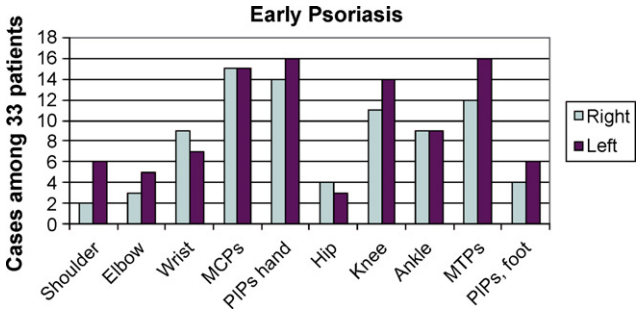

Fig. 4. Left and right incidences of early psoriasis among 33 patients. MCP = metacarpophalangeal, PIP = proximal interphalangeal, MTP = metatarsphalangeal joints. Data from Ref. [18].

and breast cancer is greater in Western developed countries that use FM-band frequencies of 87–108 MHz compared to other countries. Aside from differences in frequencies for FM radio and in the presence or absence of metal springs in beds, there are of course many other differences between populations in Japan and Western countries, related to lifestyle and genetic factors. It will be an exciting task to investigate each to evaluate its possible contribution to the differences in rates of melanoma and breast cancer.

Finally, a study on psoriasis indicated that early psoriasis is more often found on the left side of the body than on the right side [18] (Fig. 4). It would be interesting to investigate whether any improvement of psoriasis would occur by turning the bed to a less resonant direction or by using a non-metal-based futon bed.

4. Conclusions

We conclude that the data on sleeping side preferences, cancer laterality, and a correlation between cancer and FM/TV transmitters for both melanoma and breast cancer support our hypothesis that an immune-disruptive, electromagnetic radiation from broadcasting transmitters in combination with Western-styled metal-based beds contributes to the incidence of cancer.

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