LETTER TO THE EDITOR

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Thyroiditis and inflammatory bowel disease associated with 50 Hz magnetic field exposure

Dear Sir,

The health effects of electromagnetic fields are controversial. A case of the onset of thyroiditis and inflammatory bowel disease subsequent to prolonged, intense exposure to 50 Hz magnetic fields is presented.

In 1989, the female patient, then aged 46 years, became manager of a shopping centre and occupied the same office for 7 years. Around 1995, a computer was installed near her office and showed extensive flicker on the screen. In November 1996, a survey of electromagnetic fields was conducted using an Emdex II magnetic field meter. It was found that her office was situated immediately above the 50 Hz (22 kV) substation for the shopping centre and three busbars carrying high current were situated below the floor of her office. The magnetic field from the substation was found to be 1000–1400 mG at 0.5 m above the floor where her chair was placed, and up to 3400 mG at floor level (the field was not measured at her neck height when sitting, but is estimated to have been ~600 mG). The Australian public exposure limit is 1000 mG [1]. Thus, her pelvic contents were overexposed daily at work for 7 years. When first seen (by me) in 1997, she reported that since around 1990 she had intermittent weekly episodes of pain in the right iliac fossa, resulting in a loose bowel motion, but no blood was seen; the episodes were associated with walking exercise. On examination, she was slightly tender in the right iliac fossa. In 1997, she was also found to have a thyroid microsome antibody titre of 6400, indicating an autoimmune thyroid disorder. Because of her intense exposures, and the classification of magnetic fields as a possible carcinogen [2], she was extensively monitored including colonoscopy. On review in November 2001, she said she had no abdominal symptoms. In 2003, she was asymptomatic, but on colonoscopy a ‘cobblestone’ pattern was seen in the caecum. A biopsy showed mildly active chronic inflammatory bowel disease (IBS), with no evidence of dysplasia. Her mother had a goitre; there is no family history of inflammatory bowel disease.

There are no previous reports of thyroiditis or IBS in relation to 50 Hz electromagnetic fields, although thyroiditis and IBS are clinically associated [3]. The safety standard is intended to prevent magnetic fields inducing currents in the body, which may cause stimulation of excitable tissues such as nerve and muscle [1]. In her case, it is suggested the chronic daily overexposures stimulated the smooth muscle or myenteric plexus of the bowel, contributing to her episodes of pain in the right iliac fossa from 1990, and could possibly have initiated her inflammatory bowel disease and autoimmune thyroiditis. Tuncel et al. [4] have shown 5 mT (50 000 mG) 50 Hz fields can affect E-cadherin and weaken cell adhesion mechanisms in a rat colon tumour model. This may have caused a ‘leaky’ bowel mucosa, permitting entry of foreign antigens, which is an initial step in the causation of inflammatory bowel disease [3], and possibly secondary exposure to antigens, which, noting the familial predisposition, may have caused an immune cross-reaction to the thyroid. There have been few studies of the effects of 50 Hz magnetic fields on immune function, and the results have been inconsistent [5].

Acknowledgement

This letter is submitted with the consent of the patient.

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References