
ORIGINAL COMMUNICATIONS

EVOLVING PERSPECTIVES ON THE EXPOSURE RISKS FROM MAGNETIC FIELDS

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Based on information from suggesting effects of positive and negative polarity on cancer cells, surveys were performed on magnetic resonance imaging devices, as well as other types of equipment capable of producing appreciable magnetic fields. These surveys were performed in areas where there was a potential for both occupational and general public exposure.

Key words • magnetic fields • magnetic resonance imaging • polarity • cancer cells • shielding

According to Davis and Rawls "the North Pole (negative polarity) slowed, controlled, and arrested further development of an active cancer site" and "the South Pole (positive polarity) caused the cancers to become more advanced and then develop, grow, and spread at an accelerated rate."¹

In an attempt to verify the effects of magnetic fields on cancer, an experiment was performed using human

lung carcinoma cells (A-549). The results indicated that a significant decrease in the growth of these cells occurred between 6 and 144 hours when placed in close proximity to the north field of a 3.5 kilogauss magnet (written Personal communication, Philip M. Lorio, February, 1988). This experiment verified the statement that different magnetic field polarities produce different effects; while one polarity produced a decrease in the growth curve, the opposite produced an increase (Figure 1).

The findings of the above-cited experiment prompted us to explore further the effects of magnetic fields, as many devices are capable of producing them. In addition, journalists occasionally report on the magnetic effects of video display terminals used with computers, television sets, electric blankets, and high voltage electric power transmission lines. Therefore, a series of surveys was performed to determine the magnetic field orientation of magnetic resonance imaging (MRI) and other devices.

A preliminary survey made at a large northeast medical-research institution indicated that fairly high magnetic field intensities could be detected in areas adjacent to MRI equipment; this prompted a more elaborate survey of an operating MRI facility.

A survey of a mobile MRI unit (Figure 2) indicated substantial positive polarity (south field) magnetic field intensities at the console; this console was regularly

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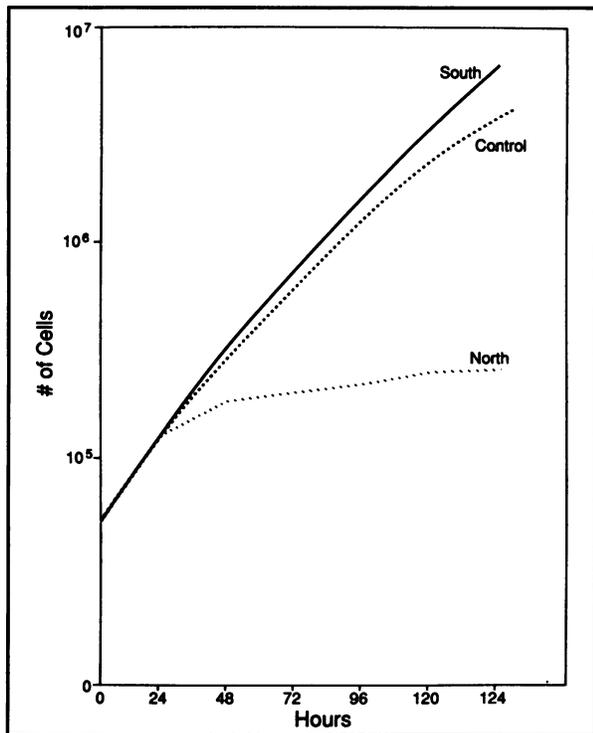


Figure 1. Cell growth vs time control, north and south fields.

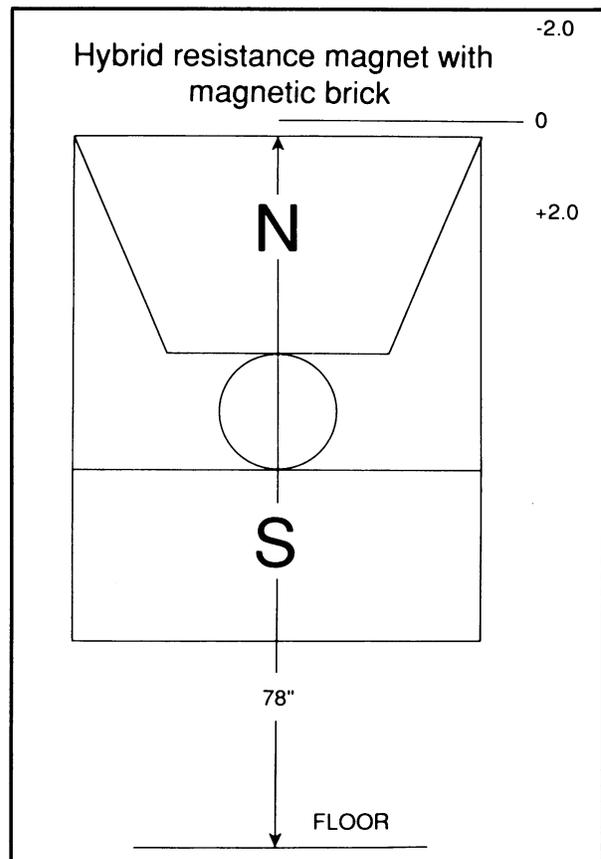


Figure 3. Magnetic field polarity 0.3 Tesla hybrid resistive magnet.

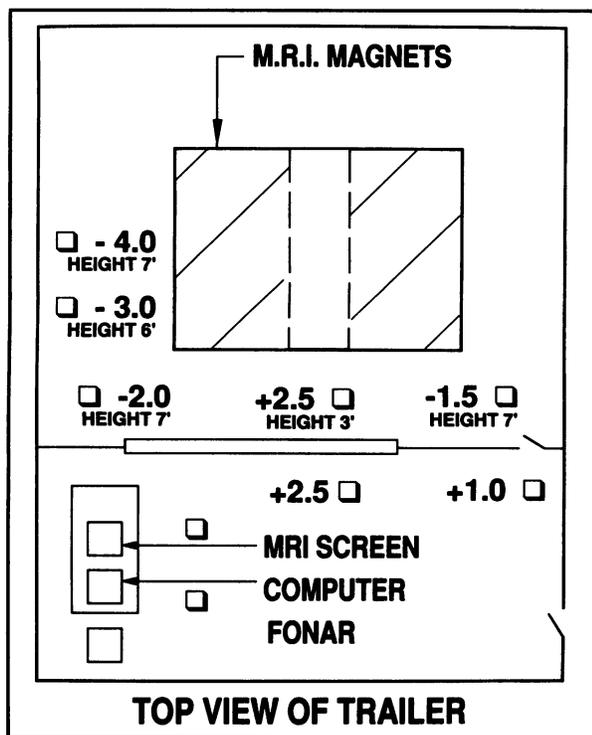


Figure 2. Mobile MRI.

occupied by staff personnel. In the room housing the MRI magnets, the intensity levels were even higher. Areas of both positive polarity and negative polarity (north field) were detected. This unit was a 0.3 Tesla hybrid resistive magnet with magnetic bricks. The magnetic field polarity (Figure 3) is obviously generated by the component shape. Substantial levels were measured outside the trailer (Figure 4), which had a sign reading, "Magnet Hazard."

A survey was conducted of a MRI unit housed in a building on Flatbush Avenue, one of the most famous streets in Brooklyn, and results indicated that the magnetic field polarity was negative (north) in the staff-occupied area (Figure 5). Experimental results indicated this to be a preferential orientation. However, on the outside wall of the building, the magnetic field polarity went from negative to zero to positive. The positive polarity could be detected at the iron picket fence 20 feet from the building wall, on the sidewalk on Flatbush Avenue, and at the bus stop (Figure 6).

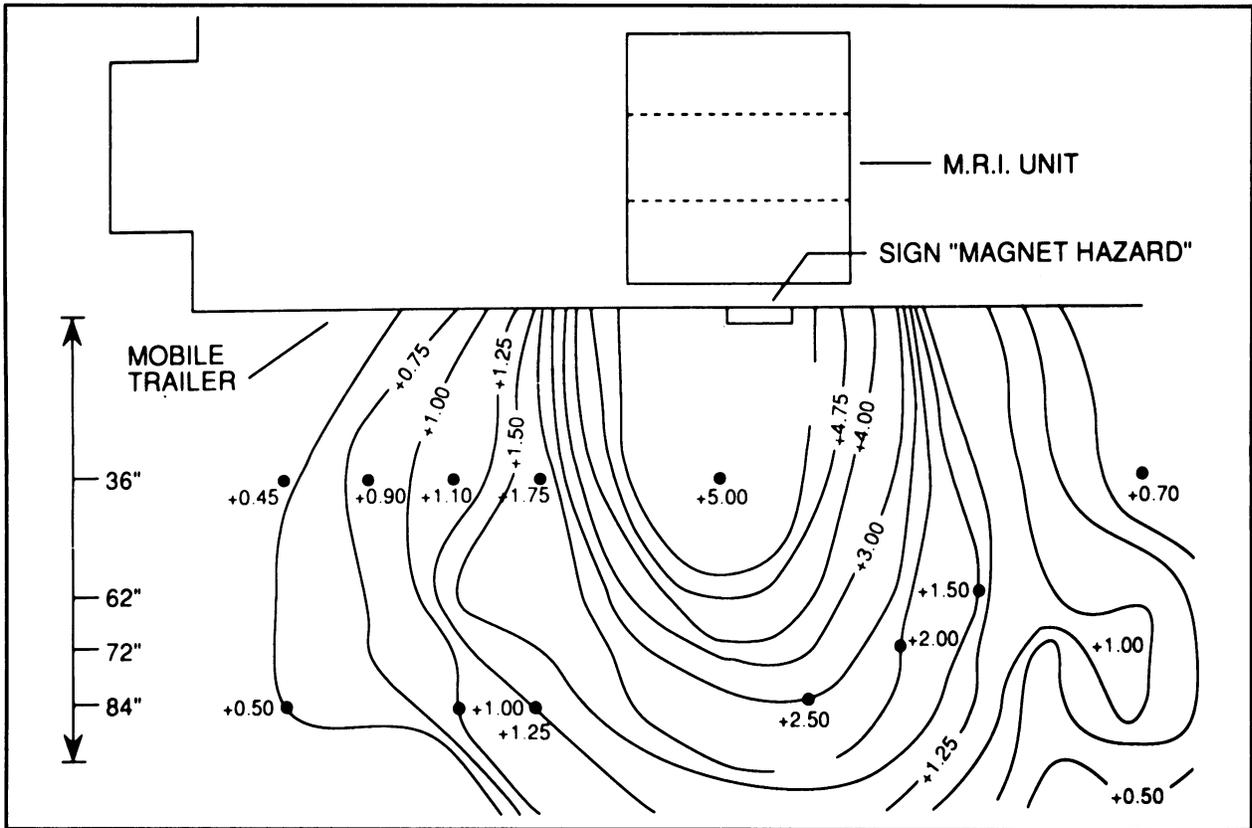


Figure 4. Mobile MRI outside magnetic field mapping.

A similar survey was performed on a teaching MRI and an electron spin paramagnetic resonance (ESR) device at two local colleges. The orientation of the MRI was such that positive polarity was detected in an area of limited occupancy. The survey measurements indicated the same type of symmetry of the polarity of the magnetic field .

At the other college, the ESR, a research instrument, showed similar polarity configuration. However, its orientation was such that the positive polarity magnetic field was detected at the console. Fortunately, this instrument could be reoriented.

The experiment with human lung carcinoma cells verified the statement by Davis and Rawls that there is an increase in the growth curve of human lung carcinoma cells when exposed to positive polarity magnetic fields. Thus, these magnetic field configurations could present potential risks.¹ The designers of these types of installations (eg, MRI, ESR) should consider the effects of the magnetic field and its orientation. The positive fields should be emitted in areas of limited occupancy. If new and old installations

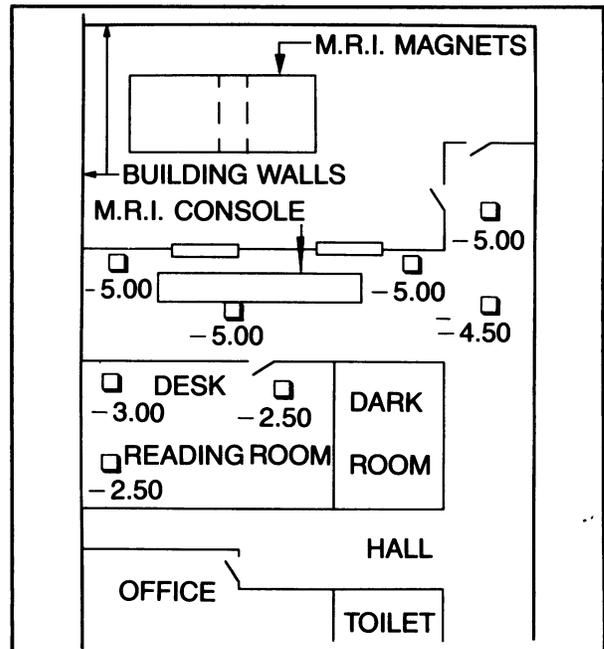


Figure 5. MRI unit housed in a building on Flatbush Avenue. Magnetic field mapping.

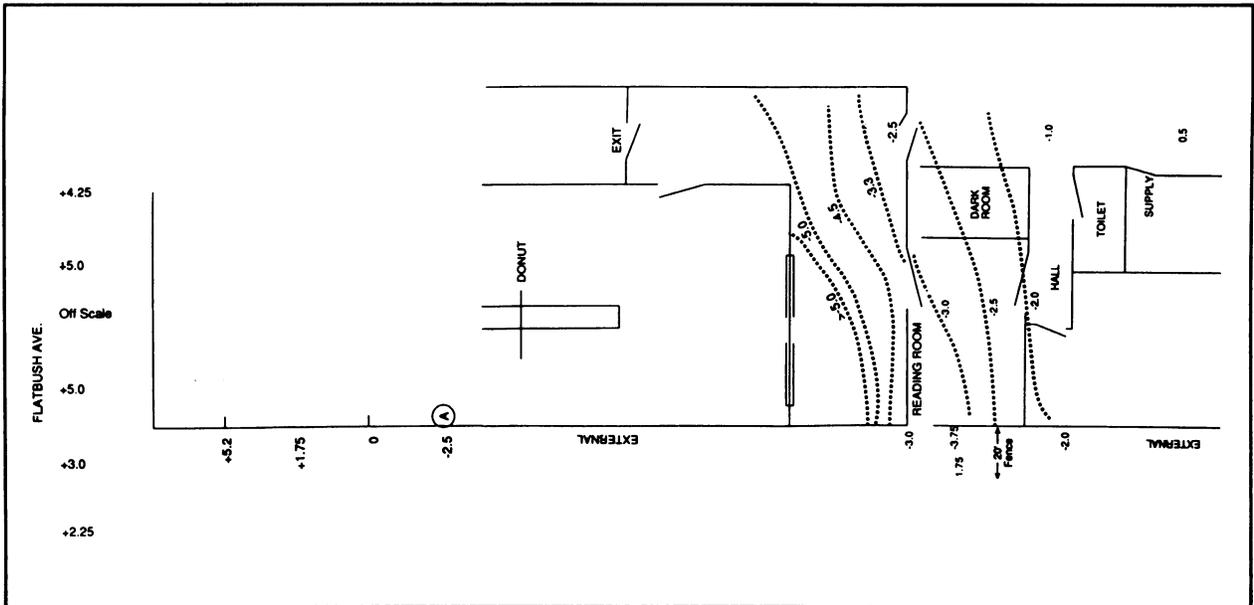


Figure 6. Flatbush Avenue bus stop. Positive magnetic field.

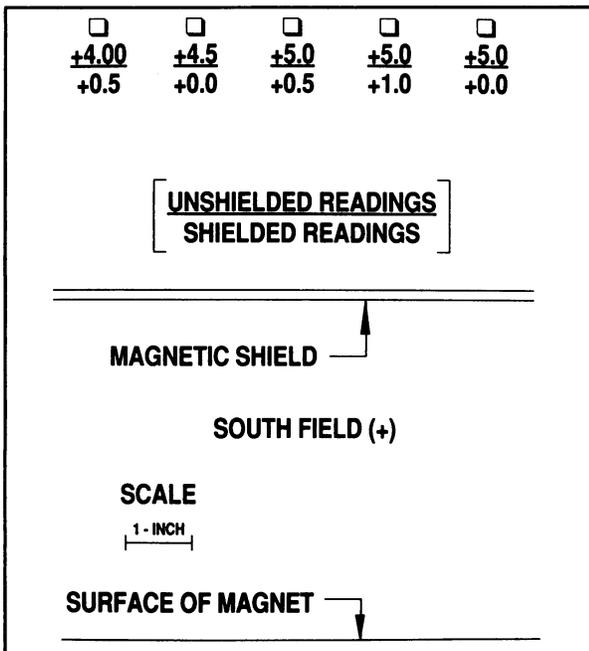


Figure 7. Positive south field reading shielded and unshielded.

cannot be redesigned to reorient the magnetic field configuration, these units should be shielded to negate the positive polarity magnetic field (Figure 7).

Literature Cited

1. Davis R, Rawls WC, Jr. *Magnetism and its effect on the living system*. Kansas City, MO: Acres USA; 1974.

ADDENDUM

Following the submission of this paper, additional tissue culture investigations were conducted using human lung carcinoma cells and mouse embryo fibroblasts. The results were in agreement with Figure 1. This work is the basis for a recent Small Business Innovative Research proposal submitted to the National Cancer Institute to provide an adjuvant modality for cancer treatment.