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LETTER TO THE EDITOR

## Illnesses caused by contact currents in showers

Recently, a patient complained of becoming ill in the shower of a vacation home in the California desert, but not in her home in northern California.

There are reports of inappropriate implantable cardioverter-defibrillator shock induced by electromagnetic interference while taking a shower (Fernengel *et al.* 2007). Kavet *et al.* (2000) has written extensively about contact currents that are a characteristic of the residence itself, reflecting its grounding characteristics and electrical supply. The National Institute of Environmental Health Sciences (NIEHS) Working Group 1998 (Kavet *et al.* 2000) associates chronic exposure to contact currents of 18  $\mu\text{A}$  ( $\mu\text{A}$  = microamperes) and above with the development of cancer. The grounded Wye electrical distribution system in North America and the fact that about 70% of neutral return currents now flow down the down ground wire at the transformers assure that most neutral return currents return to the substation via the earth (Final Report of the Science Advisors 1998). This is in violation of the National Electric Safety Code rules 92 D and 215 B, and the California Public Utility Commission Rule 33.2 which forbids the use of the earth for neutral return currents.


Using a Fluke 287 true RMS multimeter with an electrocardiography (ECG) patch over my sternum attached to one lead and the other lead to an outlet ground, I got the following results in the bathroom of my Indio, California residence with the electric service off:

- Sitting on toilet: feet off ground – 4.1  $\mu\text{A}$ 
  - bare feet on floor – 17.3  $\mu\text{A}$
  - hand-touching shower control – 40.5  $\mu\text{A}$
- Showering: hand-touching shower control – 55.0  $\mu\text{A}$

The same pattern of results was present in nearby residences and at the patient's California residence. My California residence is a fourplex built on a concrete slab. All metal connected to the slab, such as door frames and doors, had high contact current levels. The major source of contact current was the natural gas service pipes at the gas meters at each end of the fourplex.

My wood frame home in Olympia WA had high voltage in the down ground and the earth, but no contact currents in the house. The highest reading was 2.5  $\mu\text{A}$ . The floor was supported by vertical 4 × 4s on concrete pads with an asphalt shingle between the wood and concrete. The water and sewer pipes were plastic.

This situation can be remedied by the utilities adding increased current-carrying capacity to their neutral return wires and respecting existing electrical safety codes.

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