Radiofrequency radiation in five Vancouver schools: exposure standards not exceeded

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The rapid growth of the cellular telephone industry has resulted in the installation of numerous “base stations” or radio transmitters to relay telephone calls. Base-station antennas are mounted on free-standing towers or attached to rooftops or the sides of buildings. Many communities are concerned about the possible health risks associated with the emission of radiofrequency (RF) radiation from these antennas.

In 1997 a base-station antenna was installed in a church cross located across the street from an elementary school in Vancouver. Some of the parents of the students became concerned that the RF radiation from this and other antennas could affect their children’s health. In response, we conducted a survey of RF radiation in and around 5 schools selected in consultation with the concerned parents. Three of these schools were selected because they had a cellular telephone base-station antenna on or near the school property. The others, which were not located near a base station, were selected as controls.

Although the purpose of the survey was to determine the actual levels of RF radiation in the analog (first-generation cellular phone) and personal communication services (PCS, the new generation of digital cellular phone) cellular base-station frequency bands, measurements also covered AM, FM and TV broadcast frequencies where possible. We present a brief report of the survey findings and compare the results with the exposure limits outlined in Health Canada’s Safety Code 6.1

The RF radiation exposure limits specified in the code are based on a review of the scientific research conducted over the past 30 years on the health effects of RF radiation exposure. Effects of exposure at levels well above the limits include burns, cataracts, behavioural changes and damage to the central nervous system.2 These effects could occur at very high environmental levels of RF radiation, such as on the axis of a high-power stationary radar antenna at a few metres from the source, which is unlikely to exist in the general environment. No health effects from chronic exposure to RF radiation below the limits defined in the safety code have been conclusively demonstrated.

The dose of RF radiation is related to the energy absorbed per unit mass. Unfortunately, dose measurements are possible only under well-controlled laboratory conditions. For the purposes of our survey, the “power density” of the radiation, expressed as microwatts per square metre (µW/m²), was taken as a practical indicator of exposure. More than 160 measurements were carried out at the selected schools at indoor and outdoor sites frequented by both staff and students.

The measured power densities did not exceed the safety code limits (Table 1). In light of the current scientific understanding of the risks of RF radiation exposures, we conclude that the levels measured during our study posed no health risk to the students, school staff or the general public in or around the 5 Vancouver schools involved.

### Table 1: Maximum measured power densities of radiofrequency radiation in areas accessible by staff and students in 5 Vancouver schools

<table>
<thead>
<tr>
<th>Frequency band</th>
<th>School 1*</th>
<th>School 2†</th>
<th>School 3‡</th>
<th>School 4§</th>
<th>School 5§</th>
<th>Safety Code 6 limit†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog</td>
<td>0.10</td>
<td>25 600</td>
<td>2250</td>
<td>0.12</td>
<td>2.90</td>
<td>5.9 million</td>
</tr>
<tr>
<td>PCS</td>
<td>1620</td>
<td>NA</td>
<td>0.23</td>
<td>0.25</td>
<td>0.51</td>
<td>10 million</td>
</tr>
<tr>
<td>FM</td>
<td>442</td>
<td>NA</td>
<td>37.1</td>
<td>51.0</td>
<td>87.2</td>
<td>208 million</td>
</tr>
<tr>
<td>TV</td>
<td>6</td>
<td>NA</td>
<td>9.16</td>
<td>0.64</td>
<td>0.99</td>
<td>2 million</td>
</tr>
<tr>
<td></td>
<td>0.61</td>
<td>NA</td>
<td>0.05</td>
<td>0.012</td>
<td>0.011</td>
<td>2 million</td>
</tr>
</tbody>
</table>

Note: PCS = personal communication services (digital cellular phone service), analog = first-generation cellular phone service, NA = data not available because of measurement time limitation.

*PCS antenna across street.
†Analog antenna on school roof.
‡Analog antenna on school roof.
§No antenna in vicinity.

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Alleviating nausea and emesis by Pavlovian conditioning

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Prescribed antiemetic drugs, used to counteract nausea and emesis from radiation, chemotherapy and potentially life-threatening hyperemesis gravidarum, increase patients’ drug burden and are often only partially effective. Our laboratory has found that an antisickness response — that is, a homeostatic “antisickness” aftereffect of sickness — can be conditioned, thus alleviating nausea and emesis without drugs.1 This conditioning is accomplished by “forward pairing” of a nonemetogenic cue and an emeto-