CLINICAL UPDATE

# No link between cellular-phone use and brain tumours?

**Inskip PD, Tarone RE, Hatch EE, Wilcosky TC, Shapiro WR, Selker RG, et al. Cellular-telephone use and brain tumors. *N Engl J Med* 2001;344(2):79-86.**

**Background:** Primary intracranial neoplasms of the nervous system are uncommon. Patients with these tumours often present dramatically with seizures or hemiparesis. Virtually nothing is known about what causes them. The only risk factor identified so far is irradiation of the cranium, which has been shown to be associated with an increased incidence of glial tumours and meningiomas.[1] Because irradiation is associated with these tumours, any device that emits any form of electromagnetic radiation has come under scrutiny. Cellular telephones send and receive electromagnetic radiation at frequencies of about 1000 MHz.

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**Question:** Does the use of hand-held cellular telephones increase the risk of brain tumours or accelerate the growth of subclinical tumours?

**Design:** A multihospital study in the United States enrolled 782 patients with a primary intracranial glioma, meningioma or acoustic neuroma between June 1994 and August 1998. The patients were compared with 799 matched control patients with nonmalignant conditions who were admitted to the same hospitals. Matching was done for hospital, age, sex, race or ethnic group, and proximity of residence to the hospital. Trained research nurses administered standardized questionnaires.

**Results:** Of the control subjects 29% reported having used a hand-held cellular telephone at least 5 times. Use of the devices in this group increased from about 18% in 1994 to over 40% in 1998. Younger individuals were more likely than older subjects to use the devices. When compared with subjects who never or very rarely used a cellular telephone, the relative risks associated with a cumulative use of more than 100 hours were 0.9 for glioma (95% confidence interval [CI] 0.5–1.6), 0.7 for meningioma (95% CI 0.3–1.7) and 1.4 for acoustic neuroma (95% CI 0.6–3.5). All of the 95% CIs included 1 and were thus nonsignificant. Tumours did not occur disproportionately often on the side of the head on which the phone was typically used. Extensive additional analyses using subsets of the control population, demographic variables, handedness and history of radiotherapy to the head did not substantially alter the risk estimates.

**Commentary:** This study should allay but not completely eliminate concerns that hand-held cellular phones can cause brain tumours. As the authors point out, the confidence intervals are relatively wide, and they do not exclude, for example, a 350% increase in the risk of acoustic neuroma associated with cumulative use of 100 hours or more. Although it may be difficult to design a larger study because of the relative rarity of some of these tumours, much larger samples would be needed to reduce these confidence intervals and arrive at more precise risk estimates.

**Practice implications:** It would seem reasonable to reassure patients that the use of hand-held cellular telephones is not associated with an increased risk of intracranial tumours. Physicians may also be able to help concerned patients by providing information about electromagnetic waves and their possible biological effects. This issue has been recently and succinctly reviewed by House.[2] The electromagnetic spectrum is a continuum of wavelengths. At higher frequencies (shorter wavelengths) are gamma rays and x-rays, which have sufficient energy to ionize tissue. Exposure to such frequencies has been proved to be associated with the development of some tumours.

Although unlikely to result in cancer, nonionizing radiation can cause vibration and rotation of molecules. In addition, there are thermal effects at radiofrequency levels. It has been postulated that the use of cellular telephones may result in a slight increase in the temperature of proximal tissue and may be a causal pathway, at least theoretically, for the development of a tumour or the accelerated growth of an existing one.[3] Lastly, unconfirmed animal studies suggest that an increase in DNA strand breaks occurs after acute exposure,[3] thus providing another possible mechanism. None of these mechanisms is thought likely to cause disease in humans, at least at current exposure levels.

Finally, the cellular telephones used by the patients and the control subjects in this study were mainly of the older, analogue type. New digital cellular telephones operate at lower frequencies and thus are theoretically less likely to damage tissue. — *John Hoey*, CMAJ

## References

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2. House R. Radiofrequency radiation exposure and other environmental concerns [editorial]. *CMAJ* 1999;160(9):1318-9. Available: www.cma.ca/cmaj/vol-160/issue-9/1318.htm
3. Trichopoulos D, Adami HO. Cellular telephones and brain tumors [editorial]. *N Engl J Med* 2001;344(2):133-4.