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Teton Village WY 83025

ENVIRONMENTAL HEALTH TRUST

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Jennifer Lowry, MD
Chair of the AAP Council on Environmental Health
Director of MAPEHSU
Chief, Section of Toxicology
Pediatrician, Department of Pediatrics
Children's Mercy Hospital
jlowry@cmh.edu

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Dear Dr. Jennifer Lowry,

We were delighted to learn that based on the cancer findings from the National Toxicology Program (NTP) study on cell phone radiofrequency radiation (RFR), the American Academy of Pediatrics has reconfirmed its recommendation to limit exposure of children and teenagers to cell phones and other devices that emit RFR. However, along with that recommendation were four statements that downplayed the significance of the results from the NTP study. We are referring to the Healthy Children.org AAP webpage with Ten Cell Phone Safety Tips.

Our comments provided below are intended to provide clarification on the reliability of available data on cancer risks associated with exposure to cell phone RFR. Based on the accumulating scientific evidence of increased cancer risk from cell phone RFR, it is necessary that health agencies and individuals promote precautionary measures now rather than waiting for absolute proof of human harm.

Statement 1: "*While there was a slight increase in a type of brain tumor, called a glioma, in a small group of people who spent the most total time on cell phone calls in one study, other studies have not found this to be true.*"

Response: In their evaluation of the cancer risk of radiofrequency radiation, an expert working group of the International Agency for Research on Cancer (IARC) noted that brain cancer risks were increased significantly after 10 years of use, and risk levels were greatest on the side of the head on which users held their cell phones. Risks of glioma and acoustic neuroma were increased significantly in the multicenter Interphone case-control study as well as in pooled case control studies of Northern European countries that were included in the Interphone study, and in case control studies by Hardell et al. in Sweden[1][2][3][4][5][6][7][8]. The classification of RFR as a possible human

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[3] INTERPHONE Study Group. (2010). Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Int. J. Epidemiol*, 39(3), 675–94.
[4] INTERPHONE Study Group. (2010). Supplementary Material - Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Int. J. Epidemiol,* 39(3), 675-94.
[5] INTERPHONE Study Group. (2011). Acoustic neuroma risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Cancer Epidemiol,* 35, 453–64.

carcinogen by IARC was based on "positive associations observed between exposure to radiofrequency radiation from wireless phones and glioma, and acoustic neuroma," and for which a causal relationship was considered to be credible[89]. Those associations were not considered to represent "sufficient evidence of carcinogenicity" at that time because recall bias in the case-control studies could not be fully ruled out as a possible contributing factor.

Since the IARC classification additional published studies indicate an association with increased tumor formation[10][11][12][13][14].

Statement 2: "*This study (NTP) was only done on rats. While rats can be good test subjects for medical research, they are not the same as humans. We do not yet know if the same results would occur in people."*

The findings of brain tumors (gliomas) and malignant Schwann cell tumors of the heart in the NTP study, as well as DNA damage in brain cells of exposed animals, present a major public health concern because these tumors occurred in the same types of cells that had been reported to develop into tumors (gliomas and acoustic neuromas) in epidemiological studies of adult cell phone users.

Carcinogenicity studies in rodents are useful for several important reasons: (1) animals and humans exhibit similarities in biological processes of disease induction (that is why animal models are used in preclinical trials of new pharmaceutical agents), (2) it is unethical to intentionally expose humans to agents in order to test for adverse health effects such as cancer, (3) every agent that is known to cause cancer in humans is carcinogenic in animals when adequately tested (IARC, preamble), (4) almost one-third of human carcinogens were identified after carcinogenic effects were found in well-conducted animal studies, (5) animal studies can eliminate the need to wait for a high incidence of human cancers (which may clinically manifest as much as 30 years from time of first exposure) before implementing public health–protective

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[6] Cardis, E. et al. (2011). Risk of brain tumours in relation to estimated RF dose from mobile phones: results from five Interphone countries. *Occup. Environ. Med*, 68(9), 631–40.

[7] Hardell L., Carlberg M.,& Hansson M.K. (2011). Pooled analysis of case-control studies on malignant brain tumours and the use of mobile and cordless phones including living and deceased subjects. *Int J Oncol,* 38(5):1465-74.

[8] Han, Y. Y., Kano, H., Davis, D. L., Niranjan, A., & Lunsford, L. D. (2009). Cell phone use and acoustic neuroma: the need for standardized questionnaires and access to industry data. *Surgical neurology*, *72*(3), 216-222.

[9] International Agency for Research on Cancer. (2011). IARC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans.*Press release*, (208).

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[10] Coureau, G. et al. (2014). Mobile phone use and brain tumours in the CERENAT case-control study. *Occup Environ Med,* 71(7), 514-22.

[11] Lerchl, A., Klose, M., Grote, K., Wilhelm, A. F., Spathmann, O., Fiedler, T., ... & Clemens, M. (2015). Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans. *Biochemical and biophysical research communications*, *459*(4), 585-590.

[12] Hardell, L., & Carlberg, M. (2015). Mobile phone and cordless phone use and the risk for glioma–Analysis of pooled case-control studies in Sweden, 1997–2003 and 2007–2009. *Pathophysiology*, *22*(1), 1-13.

[13] Hardell, L., Carlberg, M., Söderqvist, F., & Mild, K. H. (2013). Case-control study of the association between malignant brain tumours diagnosed between 2007 and 2009 and mobile and cordless phone use. *International Journal of Oncology*, *43*(6), 1833-1845.

[14] Hardell, L., & Carlberg, M. (2013). Using the Hill viewpoints from 1965 for evaluating strengths of evidence of the risk for brain tumors associated with use of mobile and cordless phones. *Reviews on environmental health*, *28*(2-3), 97-106.

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strategies, and (6) the control of exposure conditions in animal studies can eliminate the potential impact of confounding factors on the interpretation of study results.

Statement 3: "*The rats were exposed to very large amounts of radiation—nine hours a day, seven days a week, for two years. This is far more than most people spend holding their cell phones."*

Response: While the exposure limit to RFR by the Federal Communications Commission is 0.08 W/kg averaged over the whole body, the localized exposure limit is 1.6 W/kg averaged over any one gram of tissue. For cell phone users, body tissues located nearest to the phone's antenna receive higher exposures than tissues located distant from the antenna. Thus, when an individual holds a cell phone next to his or her head, exposure to the brain will be much higher than exposures averaged over the whole body. When considering organ-specific risk (e.g., risk to the brain) from cell phones, the important measure of exposure is the 1.6 W/kg value. Cell phone manufacturers provide values for their phone's emissions. Many cell phones emit radiation that can produce local doses near 1.6 W/kg. In the NTP study in which animals were exposed to 1.5, 3, and 6.0 W/kg RFR, exposures in the brain were within 10% of the whole body exposure levels. Therefore, with respect to exposures to the brain, exposures of rats to RFR were similar to or slightly higher than human exposures from cell phones held next to the head.

Experimental carcinogenicity studies are generally conducted in small groups of rodents (approximately 50 animals of each sex and species per exposure or control group), and incidence values of adverse effects are used to assess health risks to potentially millions of exposed people. While an increased incidence of 1% in an experimental study would not be statistically significant, such an increase or even an increase in brain cancer risk of 0.001% in the general population would be dreadful; this concern is particularly pertinent for cell phones as there are more than 250 million cell phone users in the US and more than 4 billion users worldwide. Thus, to identify a hazardous agent, exposure levels in animal studies are often much higher than human exposures, while lower doses are included for analyses of dose-response relationships and assessments of human health risks. The NTP study of RFR could not use exposure intensities much higher than that of cell phones in order to prevent any measurable increases in body temperature. Consequently, the duration of exposure was extended to nine hours a day to determine whether cell phone radiation could cause adverse health effects and to provide data to characterize dose-response relationships for any detected effect and to assess human risk.

Statement 4: "*More male rats developed cancerous tumors after being exposed to the radiation than female rats. Some of the rats who developed tumors lived longer than the control group rats that were not exposed to radiation."*

While the incidence of brain tumors and schwannomas of the heart was greater in exposed male rats than in female rats, these rare and uncommon tumors were observed only in RFR exposed animals of both sexes with none observed in the controls. In addition, pre-cancerous lesions (glial hyperplasia and Schwann cell hyperplasia) were observed only in RFR exposed male and female rats. Observing numerical differences in response between the sexes is common in animal

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carcinogenicity studies as well as in human populations. For example, brain cancer mortality rates are approximately 50% higher in men than in women, and for many human cancers (e.g., colon-rectal, liver, soft tissue including heart, kidney, non-Hodgkin lymphoma, etc.) the incidence and mortality rates are much higher in men than in women. The different response rate between male and female rats in the RFR study does not alter the relevance of the cancer findings from this study.

The criticism that exposed rats lived longer than control rats, which might have affected the tumor findings, is an inaccurate portrayal and interpretation of the data for at least two reasons. First, there was no statistical difference in survival between control male rats and the exposure group with the highest rate of gliomas and heart schwannomas (male rats exposed to CDMA modulated RFR at 6 W/kg). Second, no glial cell hyperplasias (potential pre-cancerous lesions) or heart schwannomas were observed in any control rat, even though glial cell hyperplasia was detected in a CDMA-exposed rat as early at week 58 and heart schwannomas were detected as early as week 70 in exposed rats during the 2-year study. Thus, survival was sufficient to detect tumors or pre-cancerous lesions in control male rats. The exclusive findings of these tumors and pre-cancerous lesions in exposed animals support the carcinogenic potential of RFR in living organisms.

We hope these comments are helpful to you as the AAP develops future recommendations to protect children from adverse effects of RFR. It is also important to note that actively used cell phones are not the exclusive source of exposure to RFR, other sources of daily exposures include cell phones powered on even when not communicating, Wi-Fi devices, cordless phones and cell towers. Babies, toddlers and preschoolers are handed iPads and tablets as toys to play games and watch movies on. Many young children engage in wireless streamed content through devices resting on their laps, yet parents are unaware such Wi-Fi connectivity results in radiofrequency exposure to their bodies.

For children, health risks may be greater than that for adults because of greater penetration and absorption of cell phone radiation in the brains of children and because the developing nervous system of children is more susceptible to tissue damaging agents.

Sincerely,

Ron Melnick PhD
Senior Toxicologist and Director of Special Programs in the Environmental Toxicology Program at the National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health, now retired.

Devra Davis, PhD MPH
President and Founder Environmental Health Trust
Visiting Professor Hebrew University Hadassah Medical Center