Wireless Devices and Children

A recent report by the French health authority ANSES on the exposure of children to radio-frequency electromagnetic fields[1] is the latest in a series of government and expert health reports that have looked into whether there is any evidence of adverse health effects for children from the use of mobile or wireless devices.

The ANSES report, like those that preceded it, did not find such evidence. For instance, the U.S. Food and Drug Administration (FDA) currently states on its website[2] that:

> *…scientific evidence does not show a danger to users of wireless phones, including children and teenagers.*

The Health Council of the Netherlands[3], which has also looked into this issue, has concluded:

> *There is no scientific evidence for a negative influence of exposure to electromagnetic fields of mobile telephones, base station antennas or Wi-Fi equipment on the development and functioning of the brain and on health in children.*

These conclusions are consistent with the advice of the WHO, as outlined in Fact Sheet 193[4]:

> *Present scientific evidence does not indicate the need for any special precautions for the use of mobile phones. If individuals are concerned, they might choose to limit their own or their children's RF Exposure by limiting the length of calls, or by using "hands-free" devices to keep mobile phones away from the head and body.*

Research has also been undertaken to assess whether there are differences between the absorption of RF in adults or children. Papers by Schönborn et al.[5], Kuster and Balzano[6], Hornbach et al.[7] and Meir et al.[8] have found that there are no significant differences between the absorption of RF in adults or children. Gandhi and Kang[9] and Bit-Babik et al.[10] have reported similar SAR patterns in adult and children heads, in contrast to the results shown in a much earlier study by Gandhi et al.[11] which were due to improper scaling of the size and color. Foster and Chou[12] have also

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[1] AVIS de l'Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail relatif à l'expertise « Exposition aux radiofréquences et santé des enfants »

[2] http://www.fda.gov/radiation-emittingproducts/radiationemittingproductsandprocedures/homebusinessandentertainment/cellphones/ucm116331.htm (accessed on the 18 July 2016)

[3] Health Council of the Netherlands, 2011, *Influence of radiofrequency telecommunication signals on children's brains*. The Hague: Health Council of the Netherlands, 2011; publication no. 2011/20E. ISBN 978-90-5549-859-8

[4] http://www.who.int/mediacentre/factsheets/fs193/en/ (accessed 18 July 2016)

[5] Schonborn F., Burkhardt M., Kuster N. Differences In Energy Absorption Between Heads Of Adults And Children in the Near Field Of Sources. Health Physics, Vol. 74, Pg. 160 - 168, 1998

[6] Kuster N And Balzano Q. , Energy Absorption Mechanism by Biological Bodies in The Near Field Of Dipole Antennas Above 300 MHz. IEEE Transactions On Vehicular Technology, Vol. 41, No. 1, February 1992

[7] Hombach V., Meier K., Burkhardt M., Kuhn E., And Kuster N., The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz. IEEE Transactions On Microwave Theory and Techniques, Vol. 44, No. I0, October 1996

[8] Meier K., Hombach V., K¨Astle R.Tay R., Kuster N., The Dependence Of Electromagnetic Energy Absorption Upon Human-Head Modeling At 1800 MHz. IEEE Transactions on Microwave Theory and Techniques, Vol. 45, No. 11, November 1997

[9] Gandhi O And Kang G. 2002. Some Present Problems And A Proposed Experimental Phantom For SAR Compliance Testing For Cellular Telephones At 835 And 1900 MHz *Phys. Med. Biol.* 47: 1501–18.

[10] Bit-Babik G, Guy A W, Chou C K, Faraone A, Kanda M, Gessner A, Wang J And Fujiwara O. 2005. Simulation of Exposure and SAR Estimation for Adult and Child Heads Exposed to Radiofrequency Energy from Portable Communication Devices *Radiat. Res.* 163: 580–90.

[11] Gandhi O P, Lazzi G, and Furse C. 1996. Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 And 1900 MHz *IEEE Trans. Microw. Theory Tech.* 44**:** 1884–97.

reviewed the dosimetry and concluded that, relevant to compliance of handsets with regulatory limits, there is no clear evidence for age-related differences in exposure in terms of peak spatial average SAR in the head.

The ANSES report did note, as did Health Canada in the revision of their Safety Code 6[13], that there was a chance that under some circumstances the standardized reference levels (i.e., surrogate exposure limits used in lieu of basic exposure restrictions in order to simplify exposure evaluations) may not be conservative enough for small children and babies and that changes in the standards might be necessary to ensure consistency. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) is currently undertaking a review of the standards and has already noted that they are looking at this issue, although the relevant scenarios that have been theorised as justifying such a change were based on certain “worst-case exposure conditions”[14].

In summary, the weight of scientific evidence remains that there is no evidence of any adverse health effects from the use of mobile phones or wireless devices. Consistent with the WHO advice, for parents or individuals who are concerned, there remain a number of options to limit their or their children's exposure, by limiting the use of the device, the length of calls, or by using "hands-free" devices to keep devices away from the head and body.

While the political and scientific discussion will continue, it is clear that parents are deciding for themselves whether their children should use a mobile phone or not. By and large they appear to be allowing their use because of the perceived benefits in terms of safety and security that mobile phones provide for both children and parents.

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[12] Foster K R, and C-K Chou. 2014. Are Children More Exposed to Radio Frequency Energy From Mobile Phones Than Adults? *IEEE Access* vol. 2, pp. 1497-1509.

[13] http://www.hc-sc.gc.ca/ewh-semt/consult/_2014/safety_code_6-code_securite_6/final_finale-eng.php

[14] Findlay RP, Lee AK, Dimbylow PJ. FDTD calculations of SAR for child voxel models in different postures between 10 MHz and 3 GHz. Radiat. Prot. Dosimetry 135:226-231, 2009.