

ELECTROMAGNETIC FIELDS FROM
MOBILE PHONES: HEALTH EFFECT
ON CHILDREN AND TEENAGERS



RESOLUTION OF
RUSSIAN NATIONAL COMMITTEE ON NON-
IONIZING RADIATION PROTECTION

April 2011, Moscow

This Resolution was approved by members of the Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP) at its Committee session on 3 March 2011. The Resolution evolved from scientific statements adopted by RNCNIRP in 2001, 2004, 2007, 2008 and 2009, taking into account contemporary views and actual scientific data. The Resolution represents a viewpoint of the professional scientific community and is meant for public dissemination, for the consumers of the mobile telecommunications services, as well as for the legislative and executive authorities who develop and implement health protection, environmental, communication, scientific and safety policies.

On behalf of members of RNCNIRP

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RUSSIAN NATIONAL COMMITTEE ON NON-IONIZING RADIATION PROTECTION

Resolution:

ELECTROMAGNETIC FIELDS FROM MOBILE PHONES: HEALTH EFFECT ON CHILDREN AND TEENAGERS

The world-wide dissemination of mobile telecommunications has resulted in new sources of large-scale population exposure to radio-frequency (RF) electromagnetic fields (EMF) since 2000. At present, mobile phones dominate among the mobile communication services used by the population.

By the end of 2010, there were 219.3 million mobile phone SIM cards registered in Russian network operators [1]. The mobile phone penetration rate (expressed as the number of SIM cards registered per 100 people) has reached to about 150% in Russia, and exceeded 200% in the Moscow Region. According to ROSSTAT (Federal State Statistics Service of Russian Federation), there were about 15 million children and teenagers (ages from 5 to 19) living in Russia at the end of 2010 [2]. They all are presumed to be a target group for marketing for telecommunication service providers, mobile phone vendors and others.

Prevention childhood and juvenile diseases from exposure to EMF sources is of paramount social and economic importance. It is one of the bases for public health policy for the nation in the near and long-term future. This problem has been already recognized by the international community: in May 2011, the World Health Organization (WHO) will be organizing the Second International Conference: “Non-ionizing Radiation and Children’s Health” dedicated to health protection of children exposed to EMF sources of various frequency ranges. It is WHO’s opinion that a “child is more vulnerable to environmental factors” [3]. WHO considers that studies aimed at determining if there are risks to children’s health from exposure to EMF is a top priority.

Governments and public organizations of all technologically developed countries strive to protect children’s health by legislative and economic methods. They conduct special studies to assess effects from EMF [4]. EU documents suggest inadequacy of the current scientific base and the inconsistency between existing safety standards and popula-

tion exposure to EMF. Requirements for application of the precautionary principle have been formulated [5].

The Russian population is, to some extent, aware of the potential effects from RF EMF from mobile phones. According to a sociological survey conducted by the Russian Public Opinion Research Center (VCIOM) in 2010, “the percentage of those agreeing that use of a mobile phone may affect human health is 73%” [6].

Since 2001, the RNCNIRP has been studying the problem of possible health effects in children from RF EMF generated by mobile phones and is concerned about possible effects on children’s health [7, 8, 9]. This position of the Committee has been taken into account in the obligatory Sanitary Rule of the Russian Federation “Hygienic Requirements for Placement and Operation of Onshore Mobile Radio Devices” SanPiN 2.1.8/2.2.4.1190-03, p.6.9 [10].

RNCNIRP ASSESSMENT AND STATISTICAL DATA ON MORBIDITY OF CHILDREN AND TEENAGERS

In April 2008, the RNCNIRP reviewed the short-term and long-term effects of mobile phone use for children. In particular, it reviewed possible decrease of intellectual abilities and cognition together with possible increases in susceptibility to epileptic fits, “acquired dementia” and degeneration of cerebral nervous structures [11]. The results of clinical studies have shown that chronic exposure to RF EMF may lead to borderline psychosomatic disorders [12, 13, 14, 15, 16]. In 2010, a number of papers published in Russian and foreign peer-reviewed journals showed a response to RF EMF exposure from the immune system [17, 18].

Unfortunately, statistical data published in 2009 and 2010 by ROSSTAT and UNICEF show that, since 2000 there has been a steady growth in the incidence of childhood diseases identified by RNCNIRP as “possible diseases” from mobile phone use [19, 20]. Of particular concern is the morbidity increase among young people aged 15 to 19 years (it is very likely that most of them are mobile phone users for a long period of time). Compared to 2009, the number of CNS disorders among 15 to 17 year-old has grown by 85%, the number of individuals with epilepsy or epileptic syndrome has grown by 36%, the number of “mental retardation” cases has grown by 11%, and the number of blood

disorders and immune status disorders has grown by 82%. In group of children aged less than 14 years there was a 64% growth in the number of blood disorders and immune status disorders, and 58% growth in nervous disorders. The number of patients aged 15 to 17 years old having consultations and treatment due to CNS disorders has grown by 72%.

Because of this the RNCNIRP considers it important to conduct a scientific study to determine whether the growth in morbidity resulted from EMF exposure from mobile phone use or whether it was caused by other factors.

According to RNCNIRP, assessment of health effects from the mobile phone use by children should include the results of epidemiological studies, experimental studies on volunteers and the results of animal and cellular studies. The results of long-term studies conducted by a group of Swedish scientists have demonstrated a considerably increased risk of brain cancer among people who started to use mobile phones before 20 years old [21, 22, 23]. In children, the amount of so-called stem cells is larger than in adults and the stem cells were shown to be the most sensitive to RF EMF exposure, which may be one of the reasons why children are so susceptible to electromagnetic exposure [24]. The information on possible blood-brain barrier disturbances, cerebral bio-electric activity disturbances and structural disturbances of brain neurons from EMF exposure should also be taken into account for assessment of mobile phone safety [25, 26, 27].

Human brain and the nervous system tissues directly perceive EMF and react irrespective of its intensity, and in certain cases it depends on EMF modulation. This feature distinguishes EMF from all other environmental factors and complicates human health risk assessment for EMF exposure.

BASIC POSTULATES FOR DETERMINATION RISKS FOR CHILDREN AND TEENAGERS FROM EXPOSURE TO ELECTROMAGNETIC FIELDS

Analysis of scientific peer-reviewed national and international publications as well as analysis of actual population exposure to EMF have allowed the RNCNIRP to formulate 10 postulates - basic statements serving as a basis for assessment of risks to children's and teenager's health from exposure to EMF from all types of modern mobile

phones, irrespective of their communication standard. These statements are sufficient for the development and implementation of urgent supplementary precautionary measures.

1. For the first time in human evolution, the brain is daily exposed to modulated EMF at all developmental stages.
2. Absorption of EMF in a child's brain is greater than in adult phone users; larger brain areas including those responsible for intellectual development are exposed in a child's brain.
3. A child's brain is undergoing development and its intellectual functions are maturing thus it is more susceptible to environmental hazards than adult's brain.
4. Mobile phone is a source of EMF exposure that may result in health effects. The exposure to EMF from mobile phones is not controlled; the duration, time and frequency of mobile phone use are not limited. Mobile phone is an uncontrolled source of harmful exposure.
5. A child, due to its perception features, is unable to recognize the mobile phone as the source of harmful EMF exposure.
6. The existing basic standards for RF EMF had been established before the large-scale dissemination of the mobile radio-telecommunications and are not accounted for the current daily RF exposure of human brain in the near-zone of mobile phone antenna. At present, there are no scientific data on possible effects from chronic long-term exposure of human brain to EMF (especially, in children and adolescents).
7. The Sanitary Rule "Hygienic Requirements for Placement and Operation of Onshore Mobile Radio Devices" (SanPiN 2.1.8/2.2.4.1190-03) recommend limitation of mobile phone use by children and adolescents (p.6.9). However, mobile phone users are not informed about the necessity of reasonable limitation of its usage.
8. Declaration of a mobile phone safety included in the "User's Guide", as a rule, is based on recommendations of a public organization registered outside Russia, which has no legal and moral responsibility for possible health effects. These recommendations are out of date and no longer correspond to the current exposure situation to RF EMF from mobile phones.

9. The Specific Absorption Rate (SAR) used for declaration of a mobile phone safety, equal to 2 W/kg averaged over ten grams of brain tissue, in the opinion of the RNCNIRP, cannot be viewed as sufficiently scientifically grounded in this case, and its use does not guarantee protection of childhood and juvenile health.

10. Global changes in the electromagnetic background caused by the development of modern mobile technologies, is an evolutionary factor requiring adaptation of children and adolescents to this harmful environmental factor.

Thus, for the first time in the human history, children using mobile telecommunications along with the adult population are included into the health risk group due to the RF EMF exposure. A situation has emerged that cumulative EMF exposure of children may be comparable to adult exposure and may be equal to the levels of occupational exposure of workers. At the same time, the society, with all its administrative and social structures, remain in a "waiting" position.

PRIORITY MEASURES AIMED AT PROTECTION OF CHILDREN AND TEENAGERS

Taking into account the RNCNIRP position and the precautionary measures suggested by WHO, the Committee considers that urgent measures must be taken because of the inability of children to recognize the harm from the mobile phone use and that a mobile phone itself can be considered as an uncontrolled source of harmful exposure.

1. It is required that the information that a mobile phone is a source of RF EMF is clearly shown on the phone's body (or any other telecommunication device).

2. It is required that the "User's Guide" contains information that a mobile phone (personal wireless communication tool using electromagnetic communication method, etc.) is a source of harmful RF EMF exposure. Usage of a mobile phone by children and adolescents under 18 years old is not recommended by the Sanitary Rule SanPiN 2.1.8/2.2.4.1190-03, and mobile phone use requires implementation of precautionary measures in order to prevent health risks. Mobile phone use by pregnant women is not recommended in order to prevent risk for a fetus.

3. The easiest way to reduce RF EMF exposure is to move the mobile phone away from one's head during the phone call which may be achieved by using the hands-free sets

(protection by distance). Shortening the call duration is another way to reduce the exposure (protection by time).

4. The RNCNIRP considers it is reasonable to develop mobile phones with reduced EMF exposure (with hands-free sets, included limitation functions, such as limitation of the number of daily phone calls, possibility of forced limitation of phone call duration, etc.).

5. It is required to include courses on mobile phones use and issues concerning EMF exposure in the educational program in schools.

6. It is reasonable to set limits on mobile telecommunications use by children and adolescents, including ban on all types of advertisement of mobile telecommunications for children (teenagers) and with their participation.

7. The RNCNIRP is ready to assist the mass-media in their awareness-raising work and educational activities in the area of EMF and, in particular, to provide information about the newest research of the impact of EMF on human health and the measures to curb the negative impact of this physical agent.

8. Better safety criteria for children and teenagers are required in the nearest term. Features of the developing organism should be taken into account, as well as the significance of bioelectric processes for human life and activities, present and future conditions of EMF, prospects of technological and technical development should be addressed in a document of legal status.

9. Development of a funded national program for studying possible health effects from chronic EMF exposure of the developing brain is necessary.

REFERENCES

1. AC&M Consulting <http://www.acm-consulting.com/news-and-data/market-news.html>
2. The Demographic Yearbook of Russia. 2010, Rosstat – M., 2010, 525 pages
3. WHO, Backgrounder № 3, April 2003
4. Fragopoulou A., Grigoriev Yu., Johansson O. et al. Scientific Panel on Electromagnetic Field Health Risks: Consensus Points, Recommendations, and Rationales.// Reviews On Environmental Health 2010, 25, No. 4, 1-11 p.
5. European Parliament Resolution, 02 April 2009, p.2
6. Assessment of Popular Opinion about Electromagnetic Emission and Cellular Communication Standards. Analytical Report upon the Findings of All-Russian VCIOM Poll (Omnibus), 56 pages, Moscow, 2010
7. Cellular Communications and Children's Health. Memorandum of Annual Conference "Cellular Communications and Health", Moscow, 20-22 September 2004. In Almanac of Russian National Committee for Non-Ionizing Radiation Protection, 2004-2005, M. 2006b, p.70
8. Cellular Communications and Delayed Action. Opinion of the Russian National Committee for Non-Ionizing Radiation Protection (February 2007). In Almanac of the Russian National Committee for Non-Ionizing Radiation Protection, 2004-2005, M. 2007, p.194
9. Lukianova S.N., Grigoriev Yu.G., Grigoriev O.A., Merkulov A.V.. Dependence of Biological Effects of Radio Frequency Electromagnetic Field of Non-Thermal Intensity from Human Electroencephalogram Typology. Radiation Biology. Radiation Ecology. 2010. Volume 50. No.6
10. Hygienic Requirements for Placement and Operation of Onshore Mobile Radio Devices. Current Sanitary Regulations and Standards of the Russian Federation (San-PiN) 2.1.8/2.2.4.1190-03. Moscow, Federal Center for State Sanitary and Epidemiological Supervision of the Ministry for Health Protection of the Russian Federation, 2003. 27 pages

11. Children and Mobile Phones: Health of the Future Generations is at Stake. In Almanac of the Russian National Committee for Non-Ionizing Radiation Protection, Moscow, 2008, p.116-117
12. Grigoryev Yu.G.. Electromagnetic Fields of Cellular Phones and Health of Children and Teenagers (A Situation Requiring Urgent Measures). Radiation Medicine. Radiation Ecology. 2005, Volume 45, No.4, pages 442-450.
13. K.K.Yakhnin, N.H.Amirov. Detection of Borderline Neuropsychic Disorders of Persons Exposed to Physical Factors of Industrial Environment. / Labor Medicine and Industrial Ecology, No.7, 1994, p.8-11
14. Social Psychiatry Manual, Edited by T.B.Dmitrieva. Moscow, Medicine, 2001, p.458
15. Parcernyak S.A.. Stress, Vegetative Neuroses, Psychosomatics. St.-Petersburg, A.B.K., 2002, p.384
16. Grigoriev Yu.G., Grigoriev O.A.. Primary Scientific Results of International Conference: "Cellular Communications and Health: Medico-Biological and Social Aspects". In Almanac of the Russian National Committee for Non-Ionizing Radiation Protection, 2004-2005 // Collected Works. Moscow, ALANA Publishers House, 2006. pages 66-69
17. Grigoriev Yu.G., Grigoriev O.A., A.A. Ivanov et al. Confirmation studies of Soviet research on immunological effects of microwaves: Russian immunology results. Bioelectromagnetics. 2010. Vol. 31, № 8 , p. 589-602.
18. Autoimmune Processes after Prolonged Exposure to Low Intensity Electromagnetic Fields (Experiment Results): Statement 1. Mobile Communications and Alteration of the Electromagnetic Human Environment. The Need of Additional Justification of the Existing Hygienic Standards. Radiation Biology. Radiation Ecology. 2010. Volume 50, No.1, p.5-11.
19. Children in Russia. 2009: Statistical Almanac. UNICEF, ROSSTAT. Moscow: Informational and Publishing Center "Russian Statistics", 2009, 121 pages
20. Young People in Russia. 2010: Statistical Almanac. UNICEF, ROSSTAT. Moscow: Informational and Publishing Center "Russian Statistics", 2010, 166 pages
21. Hardell L. Brain tumor studies. //Int. conference "EMF and Health – A Global Issue", London, Sep. 8-9, 2008.

22. Hardell L., Carlberg M., Hansson M. Mobile phone use and the risk for malignant brain tumors: a case-control study on deceased cases and controls. // *Neuroepidemiology*, 2010, 35, (2), p.109-114.
23. Hardell L., Carlberg M., Söderqvist F. et al. Time trends in brain tumor incidence rates in Denmark, Finland, Norway, and Sweden, 1974-2003. // *Journal of the National Cancer Institute*, 2010, 102(10), p.740-743
24. Markova E, Malmgren L, Belyaev I. GSM/UMTS microwaves inhibit 53BP1 DNA repair foci in human stem cells stronger than in differentiated cells: mechanistic link to possible cancer risk. // *Envir. Health Perspect* 2010, 118(3):394-399.
25. Salford L., Nittby H., Brun A. et al. Effects of microwave radiation upon the mammalian blood-brain barrier. // In.: ICEMS Monograph "Non-thermal effects and mechanisms of interaction between electromagnetic fields and living matter. Bologna, Italy, 2010, 423 p.
26. Lukianova S.N.. Phenomenology and Genesis of Changes in the Overall Bioelectric Activity of the Brain in Response to Electromagnetic Radiation. *Radiation Biology. Radiation Ecology*. 2002, volume 42, No.3. pages 308 to 314
27. Grigoriev Yu.G., Grigoriev O.A.. Mobile Communications and Human Health: Hazard Assessment, Social and Ethical Problems. Theses of Reports of the 6th Conference on Radiation Studies (Radiation Biology, Radiation Ecology, Radiation Safety). 25-28 October 2010. Moscow, 2010. Volume 1, page 6

Russian National Committee on Non-Ionizing Radiation Protection
(RNCNIRP) was founded January 28, 1997.

Committee formed of highly qualified scientists and specialists. Now it comprises 36 persons. RNCNIRP members represent the leading research centers of the Ministry of Health of Russia, Russian Academy of Sciences and Academy of Medical Sciences, Ministry of Defence, as well as non-governmental organizations.

The RNCNIRP is a union of scientists conducting research in the biological effects of non-ionizing radiation in fields of radiobiology, health, physics and other disciplines. Each session of the Committee is meeting professionals the opportunity to comprehensively discuss almost any issue, maintain and enhance academic and personal contacts.

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