

Wireless Communications and Health

A Motorola Report on Science, Standards and Stewardship

June 2006

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Executive Summary

The phenomenal growth of wireless communications technologies has been accompanied by occasional questions about whether these radio-based products and services might pose a risk to health. Over many years, the answer has not changed: There is no accepted scientific evidence that the radio signals from mobile phones, two-way radios or other wireless communications devices present a hazard to users or the public. That conclusion is based on a substantial body of scientific knowledge accumulated over more than 50 years. It is further supported by the existence of internationally recognized science-based safety standards and by the consistent judgments of expert panels, government agencies and health authorities around the world.

Motorola has contributed to the expansion of this knowledge base through an extensive program of in-house, direct-sponsored and supported research. Numerous studies have strengthened the basis for public health judgments on this important issue by focusing on radio signals used in mobile telephony. At Motorola, we believe that sound science, international guidelines and our commitment to product stewardship – through support for research, adherence to standards and responsiveness to the concerns of our customers and others – will continue to provide a sound basis for public confidence in the safety of our radio products.

Introduction

Around the world, advances in wireless communications technology are having profound impacts on our lifestyles. However dazzling these changes have been, we have only begun to realize their vast potential. In the years to come, even more sophisticated technologies and services will become available to more people in more places – creating untold opportunities for personal freedom, mobility and economic development.

Mobile phones and other wireless communications devices are variations of the two-way radios developed by Motorola more 60 years ago. They utilize radiofrequency (RF) energy for communication and operate in accordance with nationally and internationally recognized safety standards. Despite the consensus of standard-setting bodies and others that radio devices operating within these guidelines can be considered safe, some people have asked whether the growing presence and use of wireless communications might carry hidden risks. This has been stimulated at times by unsubstantiated research findings and by a small number of lawsuits in the United States. Over time, these legal cases have been dismissed or withdrawn. Nonetheless, they have prompted questions that deserve answers. In short, the

answer is this: The scientific consensus has been and continues to be that the radio signals from mobile phones and other wireless communications devices pose no known health risk.

As a world leader in wireless communications technologies, we have a responsibility to address questions about the safety of Motorola products. This paper will explain how these products and services work, and why you can be confident that they are safe.

The Wireless World

Wireline telephones convert sound into electrical signals that are carried by wires and cables. Wireless phones and other radio devices, on the other hand, convert sound, video or data into electromagnetic energy in the form of radio signals that are carried through the air.

Wireless phone systems are networks of fixed antennas and switching stations (commonly known as "base stations") that transmit, receive and relay radio signals to and from wireless phones within a limited range. As a user moves through service areas (known as "cells"), the network connection passes from one base station site to the next, maintaining service without interruption.

By dividing wireless phone networks into distinct geographical service areas, many individuals are able to make calls simultaneously. By keeping these "cells" relatively small, the power required for communication between the base station site and user is minimized and efficient frequency re-use is made possible. Computerized controllers at base station sites automatically reduce the output powers of wireless phones to the lowest levels needed to maintain quality service. As a result, mobile phones typically operate at power levels significantly lower than their rated maximum power outputs.

All portable radio products and base stations – regardless of features or signal type – are covered by internationally recognized standards or guidelines for safe exposure to RF energy. These guidelines also apply to next-generation radio products and networks. The trend is toward more wireless networks operating at lower power levels to enable individual base stations to serve smaller geographical areas and better accommodate growing demand for wireless communications services.

Confidence in Safety: Science, Standards and Stewardship

For decades, researchers around the world have explored the possible interactive effects of RF energy. Over the years, expert reviews of the research in this area have reached a similar conclusion: wireless communications products and services operating within recognized guidelines (described in more detail below) pose no known health risk.

Electromagnetic Energy

The electromagnetic spectrum encompasses two types of electromagnetic energy: ionizing and non-ionizing. The two are very different and should not be confused.

Ionizing energy is at the higher end of the spectrum – above the frequency of 1 billion megahertz (10^{15} hertz) and includes x-rays, gamma rays and the upper portion of the band of ultraviolet light. Electromagnetic energy in this range has a known capacity to cause serious biological harm. The energy level is sufficiently high to cause damage to genetic material and

to disrupt cell functions by stripping electrons from atoms, a process called ionization; hence the name ionizing energy.

Non-ionizing energy occupies the lower end of the electromagnetic spectrum and lacks the energy to cause the biological damage associated with ionizing energy. The only proven harm from non-ionizing energy like that used for wireless communications is from heating that can occur at power levels substantially stronger than those produced by wireless phones and other portable radio devices. Appropriate precautions are taken to assure that exposures near much higher-power transmitters, such as AM/FM radio and television antenna sites, remain within recognized limits.

As commonly defined, the radiofrequency (RF) portion of the non-ionizing spectrum extends from 3 kilohertz (kHz) to 300 Gigahertz (GHz). Most wireless communications services – including mobile phone, two-way radio, paging, commercial broadcast and mobile satellite – operate in the range of 500 kHz to 2 GHz. Future services may occupy bands up to 60 GHz.

Wireless Phones and Health

Numerous scientific expert panels have addressed the question of whether there could be adverse health effects associated with the use of wireless phones. Over time, the scientific database has grown, but the conclusions have not changed. They have been consistent in their general agreement that the use of wireless phones or other radio devices operating within accepted limits pose no known health risks.

Wireless safety became a public issue in early 1993 as the result of a lawsuit filed in the United States. The question was whether radio signals from wireless phones could cause brain cancer. The lawsuit received wide publicity at the time and far less publicity when dismissed more than two years later for lack of any credible scientific evidence.

In tracing the origins of this issue, it is useful to point out that brain cancer is rare and can occur without a clear cause. According to the U.S. National Cancer Institute (NCI), the incidence of brain cancer in the United States since 1973 has gone from about five cases per 100,000 people to somewhat more than six cases per 100,000 people per year. NCI, among other authorities, attributes some of that statistical increase to improved diagnostic techniques that today enable physicians to better identify and more accurately report cases of brain cancer. It also reflects modern medicine's improved ability to treat other historical causes of mortality. A number of expert reviews, including those conducted by the World Health Organization (WHO) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) have examined this issue and concluded that the scientific data do not support a connection between radio waves and cancer. Cancer and cancer-related effects remain the primary focus of research into wireless phones and health.

Motorola Sponsored Research

Confidence in the safety of wireless communications technologies is based on scientific research. The research database, documented by the World Health Organization (WHO) at <http://www.who.int/peh-emf/research/database/en/index.html>, continues to be strengthened by the results of studies with cells, tissues, animals and humans. This has included independent research sponsored by Motorola at numerous universities and laboratories. In recent years, much of Motorola's research support has been carried out through the Mobile Manufacturers Forum (MMF), which represents 12 of the world's leading suppliers of wireless

communications equipment, in conjunction with government programs and public health authorities.

These studies and others have covered a range of radio signals and biological endpoints. They have examined the possible effects of wireless phone signals on tumor development, DNA alterations and other biological changes with health-related implications. The Motorola research program has made significant contributions to the RF database by sponsoring studies on animals exposed for long periods of time, including lifetime exposure, to RF fields typical of those produced during mobile phone use. Researchers present their findings at open scientific meetings and are encouraged to publish their results in open, peer-reviewed scientific journals.

Laboratory studies have been only one part of this broad research agenda. In 1993, for example, Motorola commissioned an independent analysis of the health of its own employees by Dr. Robert Morgan, a respected physician and epidemiologist. Epidemiology is the study of the incidence and potential causes of disease in human populations. In view of the fact that Motorola had been developing and manufacturing radio devices for decades, we thought any hidden risk related to RF exposure might be detected in the health histories of our employees. The research team led by Dr. Morgan examined occupational RF exposure among 195,775 Motorola workers over a 20-year period, comprising a total of 2.7 million person-years of employment. This study found no evidence of an association between RF exposure and brain cancers or lymphoma/leukemia, as reported in the March 2000 issue of the scientific journal *Epidemiology*.

Dosimetry has been an equally important component of the Motorola research agenda. Dosimetry relates to the study and measurement of RF exposure. In an effort to better quantify such exposures, for purposes of compliance assessment or the design of laboratory experiments, Motorola has conducted research on its own and through other organizations. Motorola is widely recognized and respected as a leader in the development of scientific techniques for measuring exposures from mobile phones and other portable communications devices.

International Research Activities

As mentioned above, Motorola provides support in various forms for research programs and international initiatives intended to address questions about wireless communications and health. Some of these are described below.

United States

Through its membership in the Cellular Telecommunications & Internet Association (CTIA) in the United States, Motorola provided financial support for a program of independent research directed over six years by Wireless Technology Research (WTR) LLC. The WTR program comprised laboratory and epidemiological research. It also sponsored work on dosimetry in preparation for exposure studies involving animals, cells and tissue. In June 2000, CTIA signed a cooperative agreement with the U.S. Food and Drug Administration (FDA) to investigate two specific areas of follow-on scientific interest from the WTR program: possible genotoxic effects from RF exposure and the design of exposure assessment techniques to support epidemiological research related to mobile phone users and health. Research findings reported at public scientific meetings found no evidence of adverse effects from mobile phone use. For more information on recent research findings, see section below on Genotoxicity.

For more information: <http://www.fda.gov/cellphones/wireless-crada.html> or http://www.ctia.org/wireless_consumers/health_and_safety/index.cfm/AID/132

Germany

Similar to its support of independent research in the United States through CTIA, Motorola has contributed to independent research in Europe through its membership in Forschungsgemeinschaft Funk (FGF), the Research Association for Radio Applications, in Germany. FGF was founded in 1992 by electronic equipment manufacturers, service providers and the German Federal Ministry of Posts and Telecommunications to enhance understanding of the interactive effects of RF energy and to bring sound science to bear on the consideration of European safety standards. FGF has supported an extensive agenda of laboratory studies related to mobile telephony.

For more information: <http://www.fgf.de>.

European Commission

In November 1996, a scientific expert panel created by the European Commission (EC) recommended a multifaceted program of research related to the safety of wireless communications. That program of independent research has been under way for some time, funded by the EC and by industry. Motorola contributes to this research through its membership in the Mobile Manufacturers Forum (MMF), which helps fund a number of laboratory studies at universities and other research institutions in Europe.

For more information: <http://www.mmfai.org/public/research.cfm?lang=eng> or http://europa.eu.int/comm/health/ph_determinants/environment/EMF/emf_en.htm

United Kingdom

In January 2002, the U.K. government announced an initial round of research contracts under the Mobile Telecommunications and Health Research (MTHR) Programme, which was created in response to the May 2000 recommendations of the Independent Expert Group on Mobile Phones. Since then, the U.K. program has come to encompass a range of independent research jointly funded by government and industry. Motorola contributes to this program through its membership in the Mobile Manufacturers Forum (MMF).

For more information: <http://www.mthr.org.uk/>

International Agency for Research on Cancer

The International Agency for Research on Cancer (IARC) is conducting a formal scientific review to determine whether exposure to RF energy can cause cancer. As part of that undertaking, IARC is overseeing a multinational epidemiological case-control study of head and neck cancer among mobile phone users in as many as 14 countries. Motorola contributes to the IARC research effort through its membership in the Mobile Manufacturers Forum (MMF).

For more information: <http://www.iarc.fr/pageroot/UNITS/RCA4.html>

Other National/International Programs

Government-sponsored research programs also exist or are planned in Australia, Denmark, Korea, Japan, France, Germany, Italy, the United States and elsewhere. Industry- and university-sponsored research continues in a number of other countries. The WHO has attempted to provide direction and coordination of these various efforts through its sponsorship of scientific workshops and the publication of a comprehensive research agenda.

For more information: <http://www.who.int/peh-emf/research/rf03/en/>

World Health Organization

In June 1996, the World Health Organization (WHO) formally launched its International EMF (electromagnetic fields) Project to "pool together current knowledge and available resources of key international and national agencies and scientific institutions in order to arrive at scientifically sound recommendations for health risk assessments of static and time varying electric and magnetic fields in the frequency range 0-300 GHz." The WHO program does not conduct or provide direct support for laboratory research. Rather, it provides guidance to governments around the world on what is known about possible EMF health effects and offers advice on public policy strategies and research needs. WHO plans to conduct a formal assessment of possible non-cancer health risks from RF exposure following the IARC cancer assessment expected for 2007. In October 1997, WHO reported that its own review of research related to possible RF health effects "concluded that, from the current scientific literature, there is no convincing evidence that exposure to RF shortens the life span of humans, [or] induces or promotes cancer." More recent studies provide additional support for the WHO conclusion. For more information: <http://www.who.int/peh-emf/>. WHO's current conclusions read as follows:

In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research. (Electromagnetic Fields and Public Health, Fact Sheet Summary of Health Effects (2004) <http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>)

Research in progress or planned has been guided, in large measure, by the WHO Research Agenda.

Questions About Possible RF Bioeffects

Based on the weight of evidence in the substantive database on biological and health effects of RF exposure, expert panels, standard-setting bodies and health authorities around the world are in general agreement that the radio signals from wireless phones, two-way radios or other portable communications devices do not cause adverse health effects. That is not to say that researchers over the years have never reported biological interactions of any kind. Some studies had no direct relevance to health. Others produced findings or hypotheses that needed to be placed in perspective or investigated through additional, independent research to determine their possible significance. Among them:

DNA Changes

Drs. Henry Lai and N.P. Singh of the University of Washington (Seattle) reported finding elevated levels of DNA damage (single- and double-strand breaks) in the brains of rats whole-body exposed to 2450 MHz high peak power pulsed and continuous-wave RF signals. The researchers suggested that the reported RF effects could result from a "direct effect of radiofrequency electromagnetic energy on DNA molecules and/or an impairment of DNA-damage repair mechanisms." The findings generated interest, but brought admonitions from experts that the results needed to be replicated or confirmed by independent research before any conclusions could be drawn. For one thing, the results were inconsistent with those of some earlier studies. Second, experts had questions about the design of the experiment,

including the fact that the whole-body exposure conditions used in the experiment did not attempt to simulate the localized exposures most often associated with portable radio products. These questions could only be addressed through additional research. In response to these uncertainties, Motorola commissioned further independent investigation at Washington University in St. Louis, Missouri. In vitro and in vivo tests involving cells and animals exposed to continuous-wave and pulsed RF signals found no evidence of DNA damage and produced no support for the hypothesis of RF effects on DNA. In June 1999, U.S. researchers announced at a scientific conference in California that parallel efforts by two laboratories (including Drs. Lai and Singh) also failed to find DNA effects in rats exposed at the head to simulate wireless phone use. European laboratories have reported similar findings.

Genotoxicity

In 1999, U.S. researchers working under a grant from the industry-funded WTR program reported findings from a battery of tests designed to determine whether RF signals related to wireless phones could cause genetic damage. No effect was found in most of the studies. One, using a technique to detect an aberration known as micronucleus formation, reported effects under certain exposure conditions. Micronucleus formation can be an indicator of chromosomal damage and has been the subject of study by a number of researchers, some of which reported effects. As described in the U.S. research section above, the 1999 U.S. findings – reported by a team at Integrated Laboratory Systems (ILS), in Research Triangle Park, North Carolina, became the focus of scientific interest and agreement on the need for additional investigation. That work, intended as a means to determine whether the original results could be confirmed, has been carried out under the cooperative research agreement between the Cellular Telecommunications & Internet Association (CTIA) and the U.S. Food and Drug Administration (FDA). Contracts were awarded to ILS and two other laboratories – one in Italy and the other in Germany – to conduct separate follow-on studies. Representatives of all three laboratories, including the laboratory that had earlier reported the effect, announced in June 2004 at an international scientific conference that their follow-up studies failed to support the original suggestion of possible RF effects on micronucleus formation.

Blood-Brain Barrier

Scientists have known for many years that certain treatments, including heat and RF energy at levels causing significant temperature elevations in the brain, can disrupt the blood-brain barrier. The blood-brain barrier is a layer of tightly packed cells in the linings of small blood vessels of the brain. The barrier prevents certain substances in the blood – including bacteria, viruses, hormones and other large molecules – from reaching neurons in the brain, while permitting the passage of necessary molecules such as oxygen and glucose. In 1993, a Swedish study reported disruption of the blood-brain barrier in rats exposed to low levels of continuous wave and pulsed RF energy. Motorola sponsored a follow-up investigation in Germany at the Max Planck Institute for Neurological Research and the University of Heidelberg. This study found no adverse biological effects at exposure levels common to mobile phones and other portable communications devices. Effects were found at substantially higher exposure levels, but the researchers said further investigation would be needed to evaluate their possible significance and assess the possible roles of stress, heating or other factors. A more extensive follow-on to the Swedish study was conducted in Japan and found no effects. A replication of the Swedish study also has been done at Brooks Air Force Base in Texas though the results have not yet been published. The weight of evidence of about 40 publications shows that changes in the blood-brain barrier in animals exposed to RF energy are due to thermal effects.

Cancer Promotion

In mid-1997, an Australian study attracted attention for results that showed an increase in lymphatic cancer among genetically altered mice exposed to RF energy. The researchers and others within the scientific and public health communities cautioned that the results could not be extrapolated to human health and would require follow-up investigation to assess their significance. This was due, in part, to the fact that the mice used in the study were genetically predisposed to cancer and that the cancer-causing gene inserted into these animals does not exist in humans. Moreover, the results were inconsistent with those of other long-term animal studies that found no effect of RF exposure on cancer promotion. Other issues bearing on the findings of the 1997 Australian study and their significance, including the exposure conditions used in the experiment and wide deviations in exposure levels, also were identified as subjects requiring additional investigation. In September 1998, the Australian government allocated research funds for a follow-up study. The Australian researchers published results in 2002 showing that their completed study “carried out under more stringent and controlled conditions” than the original experiment, found no evidence of increased tumor incidence associated with RF exposure. A second validation/replication study continues as part of the European Commission research program. Numerous other studies carried out at various independent laboratories around the world and documented in the World Health Organization (WHO) database have failed to find evidence of a connection between RF exposure and cancer causation or promotion.

WHO research database: <http://www.who.int/peh-emf/research/database/en/>

Epidemiology

Epidemiology is a branch of science that examines whether associations exist between exposure to a particular chemical or physical agent and the incidence of specific diseases or mortality within a population. Even if strong associations are identified, epidemiological studies alone cannot conclusively determine direct causal relationships, as many additional unidentified and/or uncontrolled factors may be involved. In recent years, a number of epidemiological studies have explored whether mobile phone use might be associated with an elevated incidence of cancer. Other studies have surveyed mobile users about non-cancer health complaints such as headaches, fatigue and other subjective symptoms. However, public health authorities have been most focused on issues related to cancer.

Epidemiological studies will be accorded substantial importance as the International Agency for Research on Cancer (IARC) conducts a formal risk assessment of the carcinogenic potential of exposure to radio waves. IARC estimates that this assessment may be completed in 2007. IARC and other authoritative bodies, including the World Health Organization, have stated on numerous occasions that the scientific research to date does not support a connection between exposure to radio waves and cancer.

In some epidemiological studies, the number of subjects and limitations in exposure assessment have been cited as common deficiencies in the design and ultimate interpretive value of epidemiological studies of mobile phone users. The lack of consistent findings among studies that report positive associations makes these studies additionally difficult to interpret. The IARC project described above has been designed to provide a large base of study subjects and has elements intended to better address concerns about exposure assessment.

Safety Standards

Decades of research and practical experience provide a sound basis for confidence in the

safety of current and future wireless communications technologies. The results of recent research contribute substantially to confidence in the safety of mobile telephony devices.

The safety of wireless communications technologies is supported, in part, by the existence of rigorous, science-based standards that establish RF exposure limits well below the threshold for known adverse effects. These standards reflect international scientific consensus based on exhaustive periodic reviews of the large and ever-expanding body of knowledge about the possible biological effects of RF energy at both thermal and non-thermal exposure levels. Government agencies, scientific bodies and international health organizations support these standards as reliable guarantors of public health and safety.

The principal international standards are based on the same fundamental scientific understanding of the threshold at which exposure to RF energy may cause adverse effects. The effects possible at this threshold range are heat- and stress-related. They are behavioral and not pathological in nature, caused by the absorption of more energy than the body can naturally dissipate through blood flow and normal thermoregulation. Substantial margins of protection (10x to 50x or more) are applied by standard-setting organizations to establish exposure limits well below the point where threshold effects may occur and thus provide ample assurances of safety.

The most prevalent worldwide guidelines are those established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), an independent scientific body that advises the World Health Organization (WHO) and other agencies. ICNIRP guidelines are the basis of recommendations by the European Union and have been adopted or proposed as national standards by numerous countries.

Another commonly cited standard is the one developed by the Institute of Electrical and Electronics Engineers (IEEE) and adopted by the American National Standards Institute (ANSI). The exposure limits established by ANSI/IEEE for mobile phones, two-way radios and other wireless communications devices are similar or identical to those set by the U.S. National Council on Radiation Protection and Measurements (NCRP) in 1986. The ANSI/IEEE and NCRP standards served as the basis of exposure guidelines adopted in August 1996 by the U.S. Federal Communications Commission (FCC) with the support of all major U.S. government agencies responsible for public health including the FDA, Environmental Protection Agency, National Institute of Occupational Safety and Health, and Occupational Safety and Health Administration. All these standards are based on the same adverse effect threshold level found in the guidelines recommended by ICNIRP, WHO, the European Committee for Electrotechnical Standardization (CENELEC), and the National Radiological Protection Board (NRPB).

These standards are reliable safeguards against adverse health effects from RF exposure. The proof lies in the scientific rigor central to the standard-setting process. Standard-setting organizations, government agencies and health authorities around the world periodically review what science knows with the aim of revising the existing exposure guidelines if and when warranted by changes in the body of scientific knowledge. For years, however, the basic consensus on safe levels of RF exposure has been unchanged. This was affirmed in April 1996 by ICNIRP, which concluded after a comprehensive evaluation of the research related to possible RF bioeffects that "there is no substantive evidence that adverse health effects, including cancer, can occur in people exposed to levels at or below the limits." (ICNIRP reaffirmed the adequacy of those limits in its latest scientific review, published in April 1998.) The U.S. Federal Communications Commission (FCC) adopted new U.S. government

exposure guidelines in August 1996, saying that they "represent the best scientific thought and are sufficient to protect the public health." In the United Kingdom, the NRPB told a committee of Parliament in June 1999 that it had been advised by its own independent experts that "there are no radiological effects from mobile phones which operate within the guidelines we have established."

Motorola products are designed and built to meet nationally and internationally recognized exposure guidelines. Laboratory testing confirms that they do so in actual use. Handheld wireless phones and two-way radios meet these standards in part because they operate at such low power levels. Other radio devices may be accompanied by instructions to assure their efficient use in a manner consistent with applicable safety standards.

The expansion of wireless communications services has caused some people to wonder about the safety of RF signals from transmitting antennas mounted on buildings or towers. At these sites, workers and the public are protected by restrictions designed to keep people at a sufficient distance from energized antennas to assure that RF exposures remain within accepted limits. In this regard, it is important to note that exposure levels decrease rapidly with distance. Depending on the power output of the antenna, maintaining a distance of as little as 3 feet (1 meter) may be sufficient to assure that recommended exposure limits are met. At ground level, public exposures from mobile phone, two-way radio, paging and other antenna sites typically are hundreds or thousands of times lower than the limits established by recognized RF safety guidelines and may be so low as to be almost indistinguishable from the "background" RF that exists every day from television and AM/FM radio broadcast facilities present in most urban areas. Smaller base station sites operating at lower power levels than those associated with rooftop or tower-mounted antennas require substantially shorter separation distances to assure that exposure levels remain well within the limits recommended by relevant guidelines.

As underscored by ICNIRP and other expert scientific reviews, existing standards are reliable safeguards of public health and are based on a large and ever-expanding base of scientific evidence covering a broad range of possible biological effects. That is a sound basis for confidence in the protection afforded by these standards – and in the safety of Motorola products that comply with these standards.

Safety Information

Given the scientific evidence and standards that attest to their safety, people understandably have asked why mobile phones are accompanied by instructions about their use. The answer is that as with almost all electronic devices, users need to be advised about how to operate their phones in the most efficient manner and about their compliance with recognized safety standards.

The information in Motorola user manuals helps guard against accidental injury or reduced technical performance. It also educates users about potential situations where the phones might interfere with other sensitive electronic devices, such as medical devices, or where their use could be hazardous, such as demolition sites where explosive devices sensitive to electromagnetic energy may be in use.

Conclusions

Substantial research, including laboratory testing, has shown that the typical radio signals

from mobile phones and other wireless communications technologies are within accepted RF safety standards. These guidelines are based on international scientific consensus on the exposure threshold below which there is no evidence of health risks from human exposure to RF energy.

Our compliance with these standards provides a sound basis for confidence that Motorola products are safe.

Motorola is an industry leader in the field of RF safety. Over the years, Motorola has played a leading role in the development of sensitive electric field probes and sophisticated techniques used to measure absorption rates of energy from RF devices and to test those devices for conformance to recognized guidelines. We conduct research on our own, commission research by independent scientists and support other research efforts around the world. We are confident that as more research is undertaken and completed, it will reaffirm and strengthen the existing basis for confidence in the safety of our products.

At the same time, Motorola remains sensitive to questions or concerns about wireless safety, and we remain committed to do all we can to be responsive. After all, we do not just manufacture mobile phones, we use them extensively ourselves. So do our families and friends. As we have throughout our history, Motorola will support efforts by industry and government to add to the existing body of knowledge about the possible health effects of RF exposure. We will continue to share the results of scientific research in this area. And we will communicate – through direct contact and reports like this – with anyone who is concerned or curious about the safety of our products.

For additional information:

References to specific research programs appear above. For a more complete list of resources: <http://www.motorola.com/content.jsp?globalObjectId=2383-5018>

And: www.motorola.com/rfhealth

Motorola, Inc.
June 2006

About Motorola

Motorola is known around the world for innovation and leadership in wireless and broadband communications. Inspired by our vision of Seamless Mobility, the people of Motorola are committed to helping you get and stay connected simply and seamlessly to the people, information, and entertainment that you want and need. We do this by designing and delivering "must have" products, "must do" experiences and powerful networks -- along with a full complement of support services. A Fortune 100 company with global presence and impact, Motorola had sales of US \$36.8 billion in 2005. For more information about our company, our people and our innovations, please visit www.motorola.com.