

Summary of Advice from Public Health England on Exposure to Radiofrequency Electromagnetic Fields

Role of Public Health England

Public Health England (PHE) came into being in April 2013, and advises the Government on all aspects of public health, including exposure to radio waves, the appropriate standards of protection for the general population and any measures necessary to protect sensitive groups. PHE inherited this responsibility from the former Health Protection Agency (HPA) and it continues to develop and provide a range of published information about radiofrequency topics. The material includes comprehensive scientific review reports and position statements, which can be found at:

<https://www.gov.uk/government/collections/electromagnetic-fields>

Within this suite of information are statements on the following frequently mentioned topics. The statements highlight assessments that have been done and which support the PHE view that exposures are small in relation to guidelines and not expected to pose a hazard to the public,

- Wireless networks (Wi-Fi), as used in schools and elsewhere
- Mobile phone base stations
- Smart meters for monitoring of domestic energy usage

The situation with mobile phones, including their use by children, is somewhat different, as explained below, but also covered by published information.

Public exposure guidelines for radiofrequency fields: scientific evidence and consistency of PHE guidance with the international consensus

Central to PHE advice is that exposures to radio waves should comply with the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). ICNIRP is formally recognised by the World Health Organization (WHO). PHE has also issued precautionary advice to discourage the non-essential use of mobile phones by children. This precautionary advice recognises that exposures are much higher than occur in other situations, though still within the guidelines, when mobile phones are held to the head to make voice calls. Similar advice is not considered necessary with the lower exposures that occur from Wi-Fi equipment, smart meters and mobile phone base stations.

While exposure to radio waves is not new and health-related research has been conducted on this topic for many years, a large amount of new scientific evidence has emerged over the past few years. This knowledge has arisen through dedicated national and international research programmes that have addressed concerns about rapidly proliferating wireless technologies. The UK has contributed to the international research effort through various projects that have been commissioned, including through the Mobile Telecommunications and Health Research Programme (MTHR). As the research programmes have been coming to fruition, scientific expert committees have been reviewing the resulting evidence and coming to considered judgments at international, European and national levels, as explained below.

Alongside other European Union (EU) member states, the United Kingdom supports European Council Recommendation 1999/519/EC on limiting exposure to electromagnetic fields (EMFs), which include radio waves. This recommendation incorporates the 1998 guidelines from ICNIRP, as advised by Public Health England. ICNIRP restated the radiofrequency (RF) parts of these guidelines in 2009 on the basis of its own comprehensive review of the scientific evidence published at that time. ICNIRP concluded that *the scientific literature published since the 1998 guidelines had provided no evidence of any adverse health effects below the basic restrictions and did not necessitate an immediate revision of its guidance on limiting exposure to RF fields*. The 2009 ICNIRP review and statement on exposure guidelines can be found at:

<http://www.icnirp.org/en/publications/article/hf-review-2009.html>

The World Health Organization states that the main conclusion from its own reviews is that *EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health*. WHO is presently preparing an Environmental Health Criteria (EHC) monograph covering the evidence in relation to radiofrequency exposures and health. This follows earlier EHCs published in 2006 on static fields and in 2007 on low frequency fields. Information from WHO about EMF exposure guidelines can be found at:

<http://www.who.int/peh-emf/standards/en/>

The European Commission is advised on the health aspects of EMF exposures by the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). SCENIHR takes account of worldwide studies on EMFs and has produced several reports, known as Opinions, in which it expresses views broadly in line with those of PHE, ICNIRP and WHO. The most recent SCENIHR Opinion was published in March 2015 and contains detailed conclusions on different aspects of the scientific evidence. A plain language summary based

on the Opinion explains that *the results of current scientific research show that there are no evident adverse health effects if exposure remains below the levels set by current standards.* SCENIHR publications can be found through the following webpage and EMF Opinions are under the "Physical Risks" category:

http://ec.europa.eu/health/scientific_committees/emerging/index_en.htm

PHE publishes comprehensive reviews of the scientific evidence relevant to radio wave exposures and health from time to time. The most recent PHE-backed review was undertaken by its own independent expert Advisory Group on Non-ionising Radiation (AGNIR) and published at the end of April 2012. AGNIR undertakes comprehensive scientific evidence reviews of the biological effects of non-ionising radiation and suggests research priorities to improve public protection. The AGNIR report considered whether there was evidence for health effects occurring in relation to exposures below the ICNIRP levels. The overall conclusion was that, *although a substantial amount of research has been conducted in this area, there is no convincing evidence that radio wave exposures below guideline levels cause health effects in either adults or children.* The AGNIR report can be found at:

<https://www.gov.uk/government/publications/radiofrequency-electromagnetic-fields-health-effects>

Exposure to radiofrequency fields and cancer

A Working Group of the International Agency for Research on Cancer (IARC) reviewed the health effects of exposure to RF fields in May 2011 and concluded that such exposures are "possibly carcinogenic" to humans (Group 2B), based on IARC's classification scheme. As explained in the monograph itself (published in 2013) there was a minority opinion in the Working Group that that current evidence in humans was inadequate, therefore permitting no conclusion about a causal association. The monograph on RF fields can be found at:

<http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>

In putting the IARC "possibly carcinogenic" classification into context, it is worthy of note that, as of March 2017, 292 substances/situations are graded 2B by IARC, 81 as the higher "probably carcinogenic to humans" classification (Group 2A) and 119 as the highest "carcinogenic to humans" classification (Group 1). Among all of these classifications are many widespread and familiar substances/situations, including those listed below:

Group 2B: Pickled vegetables (traditional Asian), talc-based body powder (perineal use), ginkgo biloba extract, petrol engine exhaust, whole leaf extract of aloe vera, and bracken fern

Group 2A: Consumption of red meat, shift working that involves circadian disruption, and drinking very hot beverages (>65°C)

Group 1: Alcoholic beverages, consumption of processed meat, diesel engine exhaust, and outdoor air pollution.

The full lists can be found at:

<http://monographs.iarc.fr/ENG/Classification/index.php>

The IARC classification for radio waves was largely based on personal exposures associated with mobile phone use and the evidence was evaluated as being *limited* among users of wireless telephones for glioma and acoustic neuroma (cancers of brain/nerve tissues in the head), and *inadequate* to draw conclusions for other types of cancers. The evidence from environmental radiofrequency exposures, which include wireless telecommunications, was considered *inadequate* to draw conclusions.

Each carcinogenicity classification has to be looked at on its own merits, along with evidence relating to other health effects, in deciding on what is a proportionate public health response. IARC explains in the preamble to its monographs that their purpose is that of carcinogenic hazard identification, which is (only) the first step in performing a health risk assessment. For some exposures, it may be appropriate to do nothing, while for others it may be appropriate to seek to eliminate the exposure entirely. For radio wave exposures, the UK/PHE approach is between these two extremes and features the targeting of precautionary advice on the situation giving the highest exposure to the largest number of people, i.e. use of mobile phones held to the head in order to make voice calls. There is also a particular emphasis in that advice on those considered potentially most vulnerable, i.e. children, whose use of mobile phones should be discouraged.

HPA (now PHE) issued a response to the IARC classification when it was published and the classification has been taken into account in PHE advice. The response can be found at:

<http://webarchive.nationalarchives.gov.uk/20140714084352/http://www.hpa.org.uk/NewsCentre/NationalPressReleases/2011PressReleases/110531electromagneticfields/>

The topic of cancer effects also occupies a substantial part of the 2012 AGNIR report. The Group reviewed essentially the same evidence as the IARC working group and concluded that, although some positive findings have been reported in a few studies, overall the evidence does not suggest that using mobile phones causes brain tumours or any other type of cancer. The data, however, are essentially restricted to periods of less than 15 years from first exposure because mobile phones have only been in widespread use for that long.

AGNIR considered it will be important to continue monitoring the evidence over the coming years, including that from national brain tumour trends, which have so far given no indication of any risk.

Continuing PHE precautionary advice about exposure to radiofrequency technologies

PHE (as the former HPA) responded to the 2012 AGNIR report maintaining its advice to follow the ICNIRP guidelines and also maintaining the long-standing precautionary advice in respect of exposures from mobile phones, which can give rise to exposures that approach the international guidelines when they are held to the head to make voice calls. The decision to maintain the precautionary approach reflected the continuing possibility of: (a) biological effects, although not apparently harmful, occurring at exposure levels within the ICNIRP guidelines, and (b) the limited information regarding cancer effects in the long term. Measures that mobile phone users may take to reduce their exposures were described in the HPA response to the AGNIR report

In responding to the AGNIR report for situations giving rise to exposures that are already low in relation to guidelines (for example, those from Wi-Fi, smart meters or mobile phone base stations), PHE advised that community and individual measures to reduce exposures are not necessary. PHE is also committed to carefully continue monitoring the emerging scientific evidence, providing any necessary advice and undertaking another comprehensive review of the science once sufficient evidence has accumulated. The PHE response to the AGNIR report can be found at:

<https://www.gov.uk/government/publications/radiofrequency-electromagnetic-fields-health-effects>

Electrical sensitivity/hypersensitivity

The AGNIR report has carefully assessed whether certain people are especially sensitive to exposures to RF fields, leading to unpleasant symptoms which affect their health. Many studies have now been carried out, reflecting the importance ascribed to understanding the condition and making appropriate help available to sufferers. AGNIR concludes *there is increasing evidence that RF fields below guideline levels do not cause symptoms and cannot be detected by people, even those who consider themselves sensitive to RF fields*. PHE agrees with AGNIR that this does not undermine the importance of the symptoms that are experienced, but it does suggest causes other than those directly related to RF fields should be considered.

Unfortunately, the symptoms many people complain of are all too common in society, not just in those who consider themselves to be ill. Such findings are not new, for example in

1990, before the advent of modern communications technology, 27% of people complained of having had a headache in the last month (Blaxter). HPA published a review of the public health aspects of electrical sensitivity (EHS) in 2005 and this included comments on the management of affected individuals and evaluation of treatment options. The report is available at:

<http://webarchive.nationalarchives.gov.uk/20140722091854/http://www.hpa.org.uk/Publications/Radiation/HPARPDSeriesReports/HpaRpd010/>

In terms of a practical way forward, WHO advises in its “backgrounder” document on EHS that *treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem.* For more information on WHO’s advice please follow the link below:

<http://www.who.int/peh-emf/publications/facts/fs296/en/index.html>

Acknowledging the range of opinion about the health effects of exposure to radiofrequency fields

Public Health England keeps emerging scientific studies worldwide under review and supports the scientific processes and officially mandated organisations described above. It is also aware of other reports and groups that have made pronouncements on this topic but gives greater weight to documents that use rigorous review processes and base their advice on the entire range of scientific information available.

Among the alternative sources of information on this topic are the 2007 and 2012 Bioinitiative Reports. PHE is aware of the contents of these reports, and of many other reports, and has considered their contents, but it has not responded to them. In part this is because other organisations have already reviewed these reports and drawn attention to problems that have affected their conclusions.

The Council of Europe Resolution 1815 (2011) also makes various recommendations and comes from the Council of Europe’s Committee on the Environment, Agriculture and Local and Regional Affairs. It is not clear exactly what evidence was considered or which experts were approached to submit evidence to their review. The Council of Europe is separate from the European Parliament and the European Commission,

Government and Public Health England are aware that there are people and organisations who believe more precaution is warranted for public exposure to radio waves in light of their view of the scientific evidence. However, the published reviews by AGNIR and internationally recognised bodies do not, in the opinion of PHE, warrant more precaution than is already advised with respect to public exposure to radiofrequency fields.

PHE priorities for health improvement

In 2014, PHE published its report “From evidence into action: opportunities to protect and improve the nation’s health”. The document can be found at:

<https://www.gov.uk/government/publications/from-evidence-into-action-opportunities-to-protect-and-improve-the-nations-health>

PHE sets out in the report its seven priorities for the next 5 years, tackling obesity, reducing smoking, reducing harmful drinking, ensuring every child has the best start in life, reducing dementia risk, tackling antimicrobial resistance and reducing tuberculosis. Protection from environmental hazards, including uncertain ones like exposure to radio waves, is an important consideration for PHE, but it is also important to take a broad view across the whole range of health topics in deciding what actions are appropriate and proportionate. Unlike the hazards more specifically mentioned in the “From evidence into action...” document, and despite much research, there remains no clear evidence of harm to health from exposure to radio waves below the internationally agreed (ICNIRP) guideline levels that are already adopted in the UK.

Promotion of UK precautionary advice about exposure to radiofrequency fields

Precautionary advice for the public on radio wave exposures has been published in a leaflet from the Department of Health on the NHS choices website, and in more technical sources such as the previously mentioned PHE response to the AGNIR report. PHE’s view is that provision of this material on the internet reflects the appropriate priority of this particular topic within the broader context of all messages directed to the public about their health. Links to this material are below:

<https://www.gov.uk/government/publications/mobile-phone-base-stations-and-health>

<http://www.nhs.uk/Conditions/Mobile-phone-safety/Pages/Introduction.aspx>

Summary of PHE advice about the health effects of exposure to radiofrequency fields

April 2015 1b

Role of Public Health England

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Within this suite of information are statements on the following frequently mentioned topics. The statements highlight assessments that have been done and which support the PHE view that exposures are small in relation to guidelines and not expected to pose a hazard to the public,

- Wireless networks (Wi-Fi), as used in schools and elsewhere
- Mobile phone base stations, including the latest 4G systems
- Smart meters for monitoring of domestic energy usage.

The situation with mobile phones, including their use by children, is somewhat different, as explained below, but also covered by published information.

Public exposure guidelines for radiofrequency fields: scientific evidence and consistency of PHE guidance with the international consensus

Central to PHE advice is that exposures to radio waves should comply with the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). ICNIRP is formally recognised by the World Health Organization (WHO). PHE has also issued precautionary advice to discourage the non-essential use of mobile phones by children. This precautionary advice recognises that exposures are much higher than occur in other situations, though still within the guidelines, when mobile phones are held to the head to make voice calls. Similar advice is not considered necessary with the lower exposures that occur from Wi-Fi equipment, smart meters and mobile phone base stations, including the latest 4G systems.

While exposure to radio waves is not new and health-related research has been conducted on this topic for many years, a large amount of new scientific evidence has emerged over the past few years. This knowledge has arisen through dedicated national and international research programmes that have addressed concerns about rapidly proliferating wireless technologies. The UK has contributed to the international research effort through various projects that have been commissioned, including through the Mobile Telecommunications and Health Research Programme (MTHR). As the research programmes have been coming to fruition, scientific expert committees have been reviewing the

resulting evidence and coming to considered judgments at international, European and national levels, as explained below.

Alongside other European Union (EU) member states, the United Kingdom supports European Council Recommendation 1999/519/EC on limiting exposure to electromagnetic fields (EMFs), which include radio waves. This recommendation incorporates the 1998 guidelines from ICNIRP, as advised by Public Health England. ICNIRP restated the radiofrequency (RF) parts of these guidelines in 2009 on the basis of its own comprehensive review of the scientific evidence published at that time. ICNIRP concluded that *the scientific literature published since the 1998 guidelines had provided no evidence of any adverse health effects below the basic restrictions and did not necessitate an immediate revision of its guidance on limiting exposure to RF fields*. The 2009 ICNIRP review and statement on exposure guidelines can be found at:

<http://www.icnirp.org/PubEMF.htm>

The World Health Organization states that the main conclusion from its own reviews is that *EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health*. WHO is presently preparing an Environmental Health Criteria (EHC) monograph covering the evidence in relation to radiofrequency exposures and health. This follows earlier EHCs published in 2006 on static fields and in 2007 on low frequency fields. Information from WHO about EMF exposure guidelines can be found at:

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The European Commission is advised on the health aspects of EMF exposures by the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). SCENIHR takes account of worldwide studies on EMFs and has produced several reports, known as Opinions, in which it expresses views broadly in line with those of PHE, ICNIRP and WHO. The most recent SCENIHR Opinion was published in March 2015 and contains detailed conclusions on different aspects of the scientific evidence. A plain language summary based on the Opinion explains that *the results of current scientific research show that there are no evident adverse health effects if exposure remains below the levels set by current standards*. SCENIHR publications can be found through the following webpage and EMF Opinions are under the "Physical Risks" category:

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Exposure to radiofrequency fields and cancer

A Working Group of the International Agency for Research on Cancer (IARC) reviewed the health effects of exposure to RF fields in May 2011 and concluded that such exposures are "possibly carcinogenic" to humans (Group 2B), based on IARC's classification scheme. As explained in the monograph itself (published in 2013), there was a minority opinion in the Working Group that that

current evidence in humans was inadequate, therefore permitting no conclusion about a causal association. The monograph on RF fields can be found at:

<http://monographs.iarc.fr/ENG/Monographs/Vol102/index.php>

In putting the IARC "possibly carcinogenic" classification into context, it is worthy of note that, as of February 2015, 285 substances/situations are graded 2B by IARC, 70 as the higher "probably carcinogenic to humans" classification (group 2A) and 116 as the highest "carcinogenic to humans" classification (group 1). Among all of these classifications are many widespread and familiar substances/situations, including coffee and pickled vegetables (2B), shift working that involves circadian disruption (2A) and alcohol (1). The full lists can be found at:

<http://monographs.iarc.fr/ENG/Classification/index.php>

The IARC classification for radio waves was largely based on personal exposures associated with mobile phone use and the evidence was evaluated as being *limited* among users of wireless telephones for glioma and acoustic neuroma (cancers of brain/nerve tissues in the head), and *inadequate* to draw conclusions for other types of cancers. The evidence from environmental radiofrequency exposures, which include wireless telecommunications, was considered *inadequate* to draw conclusions.

Each carcinogenicity classification has to be looked at on its own merits, along with evidence relating to other health effects, in deciding on what is a proportionate public health response. IARC explains in the preamble to its monographs that their purpose is that of carcinogenic hazard identification, which is (only) the first step in performing a health risk assessment. For some exposures, it may be appropriate to do nothing, while for others it may be appropriate to seek to eliminate the exposure entirely. For radio wave exposures, the UK/PHE approach is between these two extremes and features the targeting of precautionary advice on the situation giving the highest exposure to the largest number of people, i.e. use of mobile phones held to the head in order to make voice calls. There is also a particular emphasis in that advice on those considered potentially most vulnerable, i.e. children, whose use of mobile phones should be discouraged.

HPA (now PHE) issued a response to the IARC classification when it was published and the classification has been taken into account in PHE advice. The response can be found at:

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The topic of cancer effects also occupies a substantial part of the 2012 AGNIR report. The Group reviewed essentially the same evidence as the IARC working group and concluded that, although some positive findings have been reported in a few studies, overall the evidence does not suggest that using mobile phones causes brain tumours or any other type of cancer. The data, however, are essentially restricted to periods of less than 15 years from first exposure because mobile phones have only been in widespread use for that long. AGNIR considered it will be important to continue monitoring the evidence over the coming years, including that from national brain tumour trends, which have so far given no indication of any risk.

Continuing PHE precautionary advice about exposure to radiofrequency technologies

PHE (as the former HPA) responded to the 2012 AGNIR report maintaining its advice to follow the ICNIRP guidelines and also maintaining its long-standing precautionary advice in respect of exposures from mobile phones, which can give rise to exposures that approach the international guidelines when they are held to the head to make voice calls. The decision to maintain the precautionary approach reflected the continuing possibility of: (a) biological effects, although not apparently harmful, occurring at exposure levels within the ICNIRP guidelines, and (b) the limited

information regarding cancer effects in the long term. Measures that mobile phone users may take to reduce their exposures were described in the HPA response to the AGNIR report

In responding to the AGNIR report for situations giving rise to exposures that are already low in relation to guidelines (for example, those from Wi-Fi, smart meters or mobile phone base stations), PHE advised that community and individual measures to reduce exposures are not necessary. PHE is also committed to carefully continue monitoring the emerging scientific evidence, providing any necessary advice and undertaking another comprehensive review of the science once sufficient evidence has accumulated. The PHE response to the AGNIR report can be found at:

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Electrical sensitivity/hypersensitivity

The AGNIR report has carefully assessed whether certain people are especially sensitive to exposures to RF fields, leading to unpleasant symptoms which affect their health. Many studies have now been carried out, reflecting the importance ascribed to understanding the condition and making appropriate help available to sufferers. AGNIR concludes *there is increasing evidence that RF fields below guideline levels do not cause symptoms and cannot be detected by people, even those who consider themselves sensitive to RF fields*. PHE agrees with AGNIR that this does not undermine the importance of the symptoms that are experienced, but it does suggest causes other than those directly related to RF fields should be considered.

Unfortunately, the symptoms many people complain of are all too common in society, not just in those who consider themselves to be ill. Such findings are not new, for example in 1990, before the advent of modern communications technology, 27% of people complained of having had a headache in the last month (Blaxter). HPA published a review of the public health aspects of electrical sensitivity (EHS) in 2005 and this included comments on the management of affected individuals and evaluation of treatment options. The report is available at:

<http://webarchive.nationalarchives.gov.uk/20140722091854/http://www.hpa.org.uk/Publications/Radiation/HPARPDSeriesReports/HpaRpd010/>

In terms of a practical way forward, WHO advises in its "background" document on EHS that *treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem*. For more information on WHO's advice please follow the link below:

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organisations have already reviewed these reports and drawn attention to problems that have affected their conclusions.

The Council of Europe Resolution 1815 (2011) also makes various recommendations and comes from the Council of Europe's Committee on the Environment, Agriculture and Local and Regional Affairs. It is not clear exactly what evidence was considered or which experts were approached to submit evidence to their review. The Council of Europe is separate from the European Parliament and the European Commission,

Government and Public Health England are aware that there are people and organisations who believe more precaution is warranted for public exposure to radio waves in light of their view of the scientific evidence. However, the published reviews by AGNIR and internationally recognised bodies do not, in the opinion of PHE, warrant more precaution than is already advised with respect to public exposure to radiofrequency fields.

PHE priorities for health improvement

In 2014, PHE published its report "From evidence into action: opportunities to protect and improve the nation's health". The document can be found at:

<https://www.gov.uk/government/publications/from-evidence-into-action-opportunities-to-protect-and-improve-the-nations-health>

PHE sets out in the report its seven priorities for the next 5 years, tackling obesity, reducing smoking, reducing harmful drinking, ensuring every child has the best start in life, reducing dementia risk, tackling antimicrobial resistance and reducing tuberculosis. Protection from environmental hazards, including uncertain ones like exposure to radio waves, is an important consideration for PHE, but it is also important to take a broad view across the whole range of health topics in deciding what actions are appropriate and proportionate. Unlike the hazards more specifically mentioned in the "From evidence into action..." document, and despite much research, there remains no clear evidence of harm to health from exposure to radio waves below the internationally agreed (ICNIRP) guideline levels that are already adopted in the UK.

Promotion of UK precautionary advice about exposure to radiofrequency fields

Precautionary advice for the public on radio wave exposures has been published in a leaflet from the Department of Health, on the NHS choices website, and in more technical sources such as the previously mentioned PHE response to the AGNIR report. Leaflets have also been prepared in Wales with the involvement of school children. PHE's view is that provision of this material on the internet reflects the appropriate priority of this particular topic within the broader context of all messages directed to the public about their health.

PHE 5G lines

Mobile telecommunications technology has developed through several generations and there are now many 2G, 3G and 4G base stations installed throughout the environment providing services to users of mobile phones and other devices. Over the decades since the networks were first introduced there has been a general trend towards increasing numbers of smaller transmitters that individually provide services to smaller geographical areas and which have reducing radiated powers. Against this background, many measurements have been made and these continue to show that exposures of the general public to radio waves are well within the international health-related guideline levels that are used in the UK. These guidelines are from the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and underpin health protection policies at UK and European levels.

In relation to the implementation of 5G user devices and networks, this technology is at an early stage and reflects the latest evolution in mobile communications technology. Current technical standards that draw on the ICNIRP guidelines will apply to the products that are developed and the UK network operators are already committed to complying with the ICNIRP guidelines.

With the increase in the volume of information being transferred, more spectrum is being made available and the highest frequencies being discussed for future use by 5G are around ten times higher than those used by current network technologies, up to a few tens of GHz. Their use is not new, and they have been used for point-to-point microwave links and some other types of transmitters that have been present in the environment for many years. ICNIRP guidelines apply up to 300 GHz, well beyond the maximum (few tens of GHz) frequencies under discussion for 5G.

Exposure to radio waves is not new and health-related research has been conducted on this topic over several decades. In particular, a large amount of new scientific evidence has emerged over the past few years through dedicated national and international research programmes that have addressed concerns about rapidly proliferating wireless technologies.

The main focus of recent research studies has been on exposure to the types of radio signals used by current communications technologies and at the frequencies they use, up to a few GHz. Fewer studies have been carried out at higher frequencies but the biophysical mechanisms that govern the interaction between radio waves and body tissues are well understood at higher frequencies and are the basis of the present ICNIRP restrictions. The main change in using higher frequencies is that there is less penetration of radio waves into body tissues and absorption of the radio energy, and any consequent heating, becomes more confined to the body surface.

It is possible that there may be a small increase in overall exposure to radio waves when 5G is added to an existing network or in a new area; however, the overall exposure is expected to remain low relative to guidelines and as such there should be no consequences for public health.

Further information

Public Health England's (PHE's) Centre for Radiation, Chemical and Environmental Hazards (CRCE) takes the lead on public health matters associated with radiofrequency electromagnetic fields, or radio waves, used in telecommunications.

A summary of PHE advice on radio waves can be accessed in the following link:
<https://www.gov.uk/government/collections/electromagnetic-fields#radio-waves>

PHE is committed to monitoring the evidence applicable to this and other radio technologies, and to revising its advice, should that be necessary.