

PUBLIC NOTICE

Task Group on Radiofrequency Fields and Health Risks, 2023

WHO Headquarters, Geneva, Switzerland

Disclaimer

In order to enhance its management of conflicts of interest as well as strengthen public trust and transparency in connection with WHO meetings and activities involving the provision of technical/normative advice, the names and brief biographies of individuals (“Published Information”) being considered for participation in a WHO-convened Guideline Development Group are disclosed for public notice and comment.

The Published Information is provided by the experts themselves and is the sole responsibility of the individuals concerned. WHO is not responsible for the accuracy, veracity and completeness of the Published Information provided. Furthermore, in no event will WHO be responsible or liable for damages in relation to the use of, and reliance upon, the Published Information.

The comments received by WHO through the public notice and comment process are treated confidentially. Any comments should be sent to this e-mail address: emfproject@who.int. Comments brought to the attention of WHO through this process are an integral component of WHO’s conflict of interest assessment process and are carefully reviewed. WHO reserves the right to discuss information received through this process with the relevant expert and disclose to this expert the name and affiliation of the provider of such information. Upon review and assessment of the information received through this process, WHO, in its sole discretion, may take appropriate management action in accordance with its policies.

Guideline Development Groups provide technical and/or normative advice and recommendations to WHO. Participation in a Guideline Development Group convened by WHO does not necessarily mean that the views expressed by the expert concerned are shared by WHO and/or represent the decisions or stated policy of WHO.

The list of participating experts, a summary of relevant interests disclosed by such experts, and any appropriate mitigation measures taken by WHO relating to the management of conflicts of interests, will be reported publicly in accordance with WHO policies.

WHO Review on Radiofrequency Fields and Health Risks

Background

Exposure to radiofrequency (RF) electromagnetic fields (EMF) (frequencies of 100 kHz to 300 GHz) has been steadily increasing since the 1950s, with primarily radio and television signals and more recently including wireless telecommunications. The characteristics of RF exposure have been changing over time and are expected to change further with the deployment of new technologies around the world. Wireless technologies are found in all countries of the world, and many developing countries are using wireless networks as the main communications means over landline networks. Due to the ubiquitous and increasing exposure to RF fields, it is important to establish whether the fields have adverse health effects on humans, and to perform a health risk assessment, as far as possible.

Objectives and desired impact of the WHO review

In order to respond to this need, WHO has an ongoing project to assess potential health effects of exposure to radiofrequency (RF) electromagnetic fields in the general and working population. The analysis and synthesis of available evidence will be published as a monograph in the WHO Environmental Health Criteria (EHC) series. It will be informed by a scoping report and a set of commissioned systematic reviews related to several health outcomes (cancer, adverse reproductive outcomes, cognitive impairment and symptoms) and biological outcomes (heating and oxidative stress).

Role of the Task Group

In line with WHO processes for scientific evaluation, the Task Group will support WHO in:

- reviewing the draft of the scoping report and drawing conclusions on the effects of RF exposure on health;
- formulating an overall health risk assessment for each outcome in the EHC monograph based on the conclusions of the scoping report and the systematic reviews;
- compiling national good practice interventions; and,
- identifying research gaps.

The Task Group will assist the Secretariat through online and/or physical meetings and provide written input on scientific texts and conclusions. The Task Group will be expected to meet at least twice in plenary, virtually or in person, usually for 2-3 days each time. Interim teleconferences may be required of the members. The project is estimated to end by December 2023. The working language of the group will be English.

Brief biographies of the Task Group members

ZEEB Hajo (Chair)

Expertise: Epidemiologist
Qualifications: MSc, MD, PhD
Current position: Professor of Epidemiology
Institutional affiliation: Leibniz-Institute for Prevention Research and Epidemiology-BIPS (Bremen, Germany) and University of Bremen (Germany)

Dr. Hajo Zeeb leads the Department of Prevention and Evaluation at the Leibniz-Institute for Prevention Research and Epidemiology - BIPS in Bremen, Germany. He holds a professorship for epidemiology at the University of Bremen. His earlier posts include scientist positions at the German Cancer Research Center (DKFZ, Heidelberg) (1996-1999), the School of Public Health of Bielefeld University (1999-2005), the WHO in Geneva, Switzerland (2005-2006), and a professorship at the University Medical Center of Mainz University (2006-2009).

Hajo Zeeb obtained his medical doctorate from RWTH Aachen (1990) and an MSc in Community Health from Heidelberg University (1996).

Dr. Zeeb has been involved in numerous large scale national and international radiation epidemiology research projects, focusing on cosmic and on medical radiation and their health consequences. For the WHO, he coordinated the International Radon Project and the publication of the WHO Radon handbook, and he worked on the INTERSUN programme.

Dr Zeeb is active in several professional associations, such as the German Society for Epidemiology (DGEpi – past president, board member), the German Public Health Association (DGPH – vice-president), and the International Epidemiological Association (IEA). He has been serving for the German Radiation Protection Commission (SSK) in various committees and working groups since 2000. Since 2016, he chairs the Steering Committee of the German Uranium Mining studies. He serves as deputy chair of the SSK from 2023 onwards. In addition, he has been a member of the German UNSCEAR delegation since 2014, including as deputy head of the German delegation. He was a consultant for the UNSCEAR 2017 report.

VERBEEK Jos (Methodologist)

Expertise: Occupational Physician by training, specialized in systematic reviews and guidelines of environmental and occupational health issues
Qualifications: MD, PhD
Current position: Senior Researcher
Institutional affiliation: University Medical Centers Amsterdam, Public and Occupational Health Department, Cochrane Work

Jos Verbeek trained and worked as an occupational physician, and he is also a registered epidemiologist in the Netherlands. He conducted research at the University of Amsterdam at the Coronel Institute for Occupational Health specializing in evidence-based medicine and practice guideline development and evaluation. He was involved in the development of four Occupational Health clinical practice guidelines as a methodologist for the Dutch Society of Occupational Medicine.

He worked at the Finnish Institute of Occupational Health as a researcher in systematic review methodology and as Coordinating Editor of the Cochrane Work Group. He authored and co-authored several dozen systematic reviews both inside and outside the Cochrane Library.

For WHO, he was involved as a methodologist with the environmental noise, working safely with nanomaterials, and air pollution guidelines, and currently with the radiofrequency electromagnetic fields systematic reviews.

He co-authored several guideline articles of the GRADE Working Group on environmental health issues.

He holds an associate professorship at the University of Kuopio, Finland and he is an honorary member of the Dutch Society of Occupational Medicine.

AHN Young Hwan

Expertise: Clinician - Neurosurgeon

Qualifications: MD, PhD

Current position: Professor of Neurosurgery

Institutional affiliation: Ajou University School of Medicine, Ajou University Hospital,

He is a neurosurgeon and is currently the director of the Parkinson's Center at Ajou University Hospital in Suwon Korea. As an active clinician, he served as President of the Korean Gamma Knife Radiosurgery Society (2014-2015), President of the Korean Society of Stereotactic Functional Neurosurgery (2016-2017), and Continental Vice President of the World Society of Stereotactic Functional Neurosurgery (2017). He is also the President-elect of the Korean Society for Cranial Nerve Rhizopathic Disorder (2023-2024).

He was the 5th leader of the Korea Bio-EMF Research Group (2019-2022), one of the 17 study groups under the Korean Institute of Electromagnetic Engineering and Science (KIEES). He has been working as a researcher in Bio-EMF research field for about 15 years and have some related publications. His research interest in bio-EMF field is mostly focused on the nervous system including the brain.

He is a principal investigator of the Korea side of the international joint project between Korea and Japan, called 'International Validation Project of the NTP Study on Carcinogenesis of Mobile-Phone Radio-Frequency Radiation' This is a 5-year ongoing project scheduled from 2019 until 2023. He is also a committee member of the Korea Electromagnetic Field Health Criteria (KEHC, chaired by Park Jeong-gi), to evaluate the health effects of EMF in daily life in Korea.

AUVINEN Anssi

Qualifications: MD, PhD (epidemiology)

Current position: Professor of epidemiology

Institutional affiliation: Tampere University, Tampere, Finland

Dr Auvinen received his MD degree from Tampere university in 1989 and PhD in epidemiology in 1997. His research career started worked as researcher, senior scientist and finally research professor at STUK – Radiation and Nuclear Safety Authority in Helsinki, Finland in 1990-1999. He was a visiting postdoctoral scientist at Radiation Epidemiology Branch, U.S. National Cancer Institute in 1996-1998. Since 2000, he has been a professor of epidemiology at Tampere University but maintained also a part-time position as a research professor at STUK. At the university, he is also chair of the epidemiology section and director of the Prostate Cancer Research Center. Dr Auvinen has been a visiting senior scientist at IARC, Lyon, France and visiting professor at Erasmus Medical School, Rotterdam, the Netherlands. He has also served as an invited expert in radiation epidemiology at WHO, ICNIRP, IARC, UICC, SCENIHR, SSM and other organisations. He is currently also Finnish delegate and Bureau member at UNSCEAR. His main research interests include health effects of ionising and non-ionising radiation, as well as cancer screening. He has published more than 400 scientific articles, supervised more than 20 PhD dissertations and held

numerous invited lectures at international conferences.

CARDIS Elisabeth

Expertise: Epidemiologist
Qualifications: PhD
Current position: Professor of Epidemiology, Head Radiation Programme
Institutional affiliation: Barcelona Institute of Global Health (ISGlobal)

Elisabeth Cardis is Professor of Radiation Epidemiology and Head of the Radiation Program at ISGlobal (previously the Center for Research in Environmental Epidemiology) in Barcelona since 2008. Before that, she led the Radiation Group at the International Center for Cancer Research (IARC) of the WHO in Lyon, where she worked for over 20 years. She earned a PhD in Biostatistics from the University of Washington (Seattle, USA) in 1985 and was visiting scientist at the Radiation Effects research Foundation in Hiroshima Japan in 1981-82.

She is the author of about 250 peer-reviewed publications and has extensive experience in epidemiological studies on health effects of medical, accidental, environmental and occupational exposures to radiation (ionizing and non-ionizing). She was the coordinator of the INTERPHONE, INTEROCC, MOBI-Kids and GERoNiMO EC funded projects on effects of radiofrequency radiation. She was a member of numerous national and international committees on effects of radiation, including the Radiofrequency working group of the French Agency for Environmental, Occupational and Food Safety and Health. She is currently a member of the board of directors of the European platform MELODI (European Multidisciplinary Initiative on Low Dose) and of the management group of the Spanish R & D Platform in Radiological Protection (PEPRI).

She chaired the IARC Monographs working group on Ionizing Radiation and UV rays, and was a member of the IARC Monographs working group on Radio Frequency radiation, of the High Level Expert Group on European Research on Low-Dose Risks, the Steering Committee of the Swiss National Non-Ionizing Radiation Program, the Spanish Committee on Radio Frequency and Health Assessment, the BEIR Committee VII of the National Academy of Sciences of the United States, the Group of Experts in Health for the United Nations Chernobyl Forum and of the project management boards of the EC funded EMF-Net and EFHRAN projects (EMF risk assessment coordination network), the scientific advisory board of the WHO EMF International project, a corresponding member of International Commission for Non-Ionising Radiation Protection (ICNIRP), and consultant of the United Nations Scientific Committee on the Effects of Atomic Radiation.

DE SÈZE René

Expertise: researcher, background in physics and medicine; expertise in human and vivo studies, focused on the nervous and the endocrine system, and recently on thermal regulation and perception
Qualifications: MD, PhD, Docent
Current position: Senior scientist, end February 28th, 2023
Institutional affiliation: National Institute of Industrial Environment and Risks, under the umbrella of the Environment Ministry (Ecology)

René de Sèze has a background in physics and specialized in radiology (MRI). His research interests address the biological effects of electromagnetic fields. His doctoral research on the effects of

microwaves on the murine immune system was performed in the Bioelectromagnetics Laboratory of Bernard Veyret in Bordeaux. He also looked at the therapeutic effects of magnetic fields on cancer in mice and rats. He then moved to the Medical Biophysics Department at the Medical School of Montpellier-Nîmes. He conducted studies on health risks of mobile phones: in human laboratory studies, on the endocrine system, on the auditory function, on neurophysiology and cognitive performances, on heat exchanges from the phone and/or the radiofrequency (RF) exposure; on the nervous system of rats. Rene de SEZE is now researcher at the National Institute of Industrial Environment and RISks (INERIS) in Verneuil-en-Halatte close to Paris. He developed there his experience on health impact of electromagnetic fields and continues to manage studies on this topic in the department of chronic risks, toxicology unit. He is involved in studies on effects of RF on thermoregulation in rodents. He has recently been President of the Bioelectromagnetics Society (BEMS), he is member of the Société Française de Radioprotection (SFRP) and has been President of the European Bioelectromagnetics Association (EBEA).

ELTITI Stacy

Expertise: Researcher
Qualifications: Ph.D.
Current position: Associate Professor of Psychology
Institutional affiliation: Rosemead School of Psychology, Biola University

Stacy Eltiti completed her Ph.D. in Cognitive Psychology at the University of Essex in the United Kingdom. Following her doctoral studies, she worked on several research grants. The most noteworthy of these utilized double-blind provocation studies to investigate possible health effects from exposure to electromagnetic fields produced by cell phone base stations among individuals with idiopathic environmental intolerance attributed to electromagnetic fields. Currently, she teaches both undergraduate and graduate courses in the areas of statistics, experimental, and cognitive psychology and supervises both Ph.D. and Psy.D. research. She also serves as the Director of Research at Rosemead School of Psychology, overseeing and facilitating research within the department.

FIOCCHI Serena

Expertise: Bioelectromagnetics, EMF computational exposure assessment
Qualifications: PhD (Bioengineering)
Current position: Research Scientist
Institutional affiliation: CNR – National Research Council, Institute of Electronics, Information Engineering and Telecommunications (IEIIT), Italy

Serena Fiocchi holds a PhD in Bioengineering (Polytechnic of Milan, 2013) and a Master's degree in Biomedical Engineering (Polytechnic of Milan, 2009). She is a research Scientist at the Institute of Electronics, Computer and Telecommunication Engineering (IEIIT) of the National Research Council (CNR). In 2011 she has been a Visiting Student at the Department of Physics of the Aristotle University of Thessaloniki (Greece) in the framework of European Cooperation in Science and Technology COST action BM0704 "Emerging EMF Technologies and Health Risk Management". Her scientific interests include the study of the interactions between electromagnetic fields (EMF) and human health, with the goal of expanding the scientific and technological basis of safe and beneficial applications of EMF. In particular, her scientific activity is

focused on the EMF exposure assessment by both deterministic and stochastic dosimetry, the design and the optimization by computational electromagnetic techniques of biomedical technologies based on EMF for diagnostic and therapeutic applications.

She authored > 50 articles on international peer-reviewed Journals, 4 book chapters and more than 40 international peer-reviewed conference articles.

She is/has been involved in several projects related to the EMF and health and well-being, including 5 EU funded project, 2 cost actions, 5 international projects and led 2 national projects.

KAIJSER Magnus

Expertise: Clinician and Researcher

Qualifications: MD, PhD

Current positions: Senior Consultant in Neuroradiology, Professor of Epidemiology

Institutional affiliation: Department of Neuroradiology, Karolinska University Hospital, Institute of Environmental Medicine, Karolinska Institute

Magnus Kaijser is a clinician at the Karolinska University Hospital and a researcher at the Karolinska Institute, Stockholm, Sweden. Kaijser's clinical experience includes 20 years as a radiologist, 5 of which as Head of the Department of Neuroradiology at the Karolinska University Hospital. He is Expert in Neuroradiology for the Stockholm County and has a current position as Consultant in Neuroradiology at Karolinska. His research has had a focus on cancer epidemiology, including studies of antenatal exposures and risks of cancer and other adverse outcomes, and risks of cancer after exposure to ionizing radiation from diagnostic radiology. Another focus has been on diagnostics and treatment of neurological disease. From 2022, he is Professor in Epidemiology at the Institute of Environmental Medicine at the Karolinska Institute.

KROMHOUT Hans

Expertise: Epidemiologist/exposure scientist

Qualifications: PhD, MSc

Current position: Full Professor

Institutional affiliation: Utrecht University, Institute for Risk Assessment Sciences

Hans Kromhout is an international authority on occupational and environmental exposure assessment and epidemiology based at the Institute for Risk Assessment Sciences at Utrecht University in the Netherlands. He is currently the Editor-in-Chief of the BMJ Journal Occupational and Environmental Medicine. He was a member of the Committee on Electromagnetic Fields from 2004-2022 and served as its chair from 2017-2022. His work has covered the health effects of chemical and physical (electromagnetic fields) agents in the workplace and general environment. He has been involved in large international studies in amongst others asphalt paving industry, rubber manufacturing industry, industrial minerals industry, utility industry, health care and agriculture as well as in community-based studies on cancer, respiratory diseases, neurodegenerative diseases and reproductive health effects. He has published 550 peer-reviewed publications.

LAAKSO Ilkka

Expertise: Researcher

Qualifications: M.Sc.(Tech.), D.Sc.(Tech.)
Current position: Assistant Professor, Department of Electrical Engineering and Automation
Institutional affiliation: Aalto University

Ilkka Laakso is an Assistant Professor in Electromagnetics in Health Technologies at the Department of Electrical Engineering and Automation, Aalto University, Finland. He received the M.Sc.(Tech.) degree from Helsinki University of Technology, Espoo, Finland, in 2007, and the D.Sc.(Tech.) degree in electromagnetics from Aalto University, Espoo, Finland in 2011 after which he joined the Nagoya Institute of Technology as a postdoctoral researcher. Between 2013 and 2015, he has been a Research Assistant Professor and Research Associate Professor at the Department of Computer Science and Engineering, Nagoya Institute of Technology. Since 2015, he has been leading the research group of Electromagnetics in health technologies at Aalto University. He is actively involved in the research on dosimetry for the assessment of exposure to electromagnetic fields, development of computational methods for dosimetry, and biomedical applications of electromagnetic fields. The work has resulted in more than 100 peer-reviewed papers published in international journals and conference proceedings. Since 2017, he is a member of the scientific expert group of International Commission on Non-ionizing Radiation.

LEE Hae-June

Expertise: Researcher
Qualifications: DVM, PhD
Current position: Principal Researcher
Institutional affiliation: Korea Institute of Radiological & Medical Sciences

Hae-June Lee, DVM, PhD is a principal researcher and Research team leader at Korea Institute of Radiological & Medical Sciences in Seoul, Korea. She is working as a researcher in the Division of Radiation Biomedical Research, Korea Institute of Radiological and Medical Sciences since 2007. Her research work included in vitro/in vivo studies for radiation biology (ionizing radiation), in vivo studies for radiofrequency electromagnetic fields, and in vivo studies for ELF electromagnetic fields.

LOUGHRAN Sarah

Expertise: Research Scientist
Qualifications: PhD
Current position: Director, Radiation Research and Advice
Institutional affiliation: Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

Sarah Loughran is the Director of Radiation Research and Advice at the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). She is also appointed as an adjunct Associate Professor at the University of Wollongong. Sarah is an elected member of the International Commission on Non-Ionizing Radiation Protection's (ICNIRP) Scientific Expert Group, and chief investigator at and previous director of The Australian Centre for Electromagnetic Bioeffects Research. Her research focuses on a wide range of bioelectromagnetic health issues including the effects on sleep, human brain function, and the mechanisms associated with these effects. Sarah's research interests also include risk communication approaches and strategies, as well as scientific methodology more generally.

MCGARR Gregory W.

Expertise: Thermal Physiology; Integrative Human Physiology
Qualifications: PhD
Current Position: Research Scientist; Adjunct Professor
Institutional Affiliation: Non-Ionizing Radiation Health Sciences Division, Consumer and Clinical Radiation Protection Bureau, Health Canada; School of Human Kinetics, Faculty of Health Sciences, University of Ottawa.

Gregory McGarr is an expert in human thermal physiology. He has extensive research experience evaluating the local mechanisms that regulate blood flow and sweating in human skin in response to local tissue heating, whole-body heat stress, and pharmacological stimuli. He is also experienced in evaluating individual factors that influence human heat tolerance in occupational groups and vulnerable populations including children, older adults, and individuals with common chronic health conditions such as hypertension and type II diabetes. Dr. McGarr is currently a Research Scientist with the Consumer and Clinical Radiation Protection Bureau at Health Canada. He is also an Adjunct Professor in the School of Human Kinetics at the University of Ottawa. His current research program is funded by Health Canada and the Natural Sciences and Engineering Research Council of Canada. This work examines human tissue temperature responses to localized radiofrequency electromagnetic fields ≥ 6 GHz. He is also currently developing novel in vitro studies to evaluate the biological effects of separate and combined exposures to radiofrequency electromagnetic fields and heat stress in human-derived cell lines.

MODENESE Alberto

Expertise: occupational medicine, occupational epidemiology
Qualifications: PhD, MD
Current position: Occupational Physician, Post-Doc Researcher, Secretary of the ICOH Scientific Committee “Radiation and Work”
Institutional affiliation: a) Department of biomedical, metabolic and Neural Science, University of Modena & Reggio emilia; b) International Commission on Occupational Health (ICOH) – Scientific Committee “Radiation and Work”

I am an occupational physician, Post-Doc Researcher at the Chair of Occupational Medicine of the University of Modena and Reggio Emilia (UniMoRe), where Bernardino Ramazzini more than three centuries ago founded the modern Occupational Medicine. My main area of research is the studying of preventive measures, exposure evaluation methods and health effects related to Non-Ionizing Radiation (NIR) exposure in workers. Considering the prevention of electromagnetic fields (EMF) related occupational risks in workers, my main activities are related to:

- study of adverse effects related to EMF exposure, with a particular focus on workers with an increased susceptibility, as those with implanted active medical devices (DOI: 10.1016/j.shaw.2021.12.859; ISBN: 9788894982251);
- epidemiologic research on the possible relation of long-term EMF exposure with carcinogenic effects (DOI: 10.1016/j.shaw.2021.12.1521; 10.1136/oem-2021-epi.241; 10.1136/oemed-2018-icoabstracts.1230);
- methodological research for the conduction of systematic reviews to study the long-term effects of occupational exposures to work-related risk factors (DOI: 10.1016/j.envint.2019.105039; 10.1016/j.envint.2021.107005; 10.1016/j.envint.2022.107136);
- investigation of sensorial symptoms and other effects related to EMF exposure of MRI operators

(DOI: 10.1007/s11517-021-02435-6; 10.3389/fpubh.2021.699675; 10.1136/oemed-2018-icoabstracts.1207; ISSN: 2281-7956);

- production of indications and guidelines for the occupational physicians in order to develop appropriate health surveillance programs for workers exposed to EMF (ISBN: 9788890937941; ISBN:978- 963-454-816-4; doi 10.1109/EEEIC/ICPSEurope49358.2020.9160831; 10.3390/ijerph18041730; 10.25046/aj0601159; PMID: 33600659).

Since 2012 I am a member of the International Commission on Occupational Health (ICOH), recognized by the United Nations as a non-governmental organization (NGO) with close working relationships with ILO and WHO. Within ICOH, I am an active member of the Scientific Committee “Radiation and Work”, and since 2018 I was appointed as secretary of the SC. As Secretary of the ICOH SC Radiation and Work, I participate to the annual International Advisory Committee meetings of the EMF International project coordinated by the Radiation programme of the WHO, and I have organized together with the past (Prof. Fabriziomaria Gobba) and the current (Dr. Marc Wittlich) Chairs of the SC several international meetings on the prevention of occupational EMF risk, including specific sessions at the ICOH world Congress 2015 in Seoul, 2018 in Dublin and the 2022 online Congress.

OKOKON Enembe Oku

Expertise: public health physician, clinical lecturer, environmental epidemiologist
Qualifications: MD, PhD
Current position: Chief consultant; senior lecturer; Caldwell Research Fellow, NCEPH, Australian National University.
Institutional affiliation: University of Calabar, Nigeria; National Centre for Epidemiology and Population Health, Australian National University.

Enembe Okokon is from the southern part of Nigeria. He graduated from the University of Calabar, Nigeria, in 1999 with a degree in medicine and surgery. He later completed a residency in Community Medicine in 2008. He has a master's degree in General Toxicology and Environmental Health Risk Assessment from the University of Eastern Finland. He also has a Ph.D. in Environmental Physics, Health, and Biology from the same University.

Enembe lived in Kuopio, Finland, for 9 years and there he did his master's and doctoral studies. He had the opportunity to participate in several national and international research projects which were domiciled in the Environmental Health Unit of the Department of Health Protection, Finnish Institute of Health and Welfare. His previous research has focused on themes of air pollution and noise epidemiology, and exposure assessments. In this regard, together with his co-researchers, they have considered relationships between traffic-related noise and air pollution and clinical endpoints such as insomnia, anxiety, depression, respiratory disease, and cardiovascular disease. He is currently doing research on the health effects of climate change.

Enembe has interests in statistical modelling, data mining, and basic and advanced research synthesis. He is a lecturer at the University of Calabar where he provides lectures in community medicine to undergraduate medical students, and in epidemiology to master's and doctoral students. He is still a practicing clinician.

SAVITZ David A.

Expertise: Epidemiologist

Qualifications: PhD
Current position: Professor of Epidemiology
Institutional affiliation: Brown University School of Public Health, Providence, Rhode Island, USA

David Savitz is a professor of epidemiology in the Brown University School of Public Health with joint appointments as a professor of obstetrics and gynecology and pediatrics in the Alpert Medical School. From 2013-2017, Dr. Savitz served as the vice president for research at Brown University. He came to Brown in 2010 from Mount Sinai School of Medicine, where he had served as the Charles W. Bluhdorn Professor of Community and Preventive Medicine and the director of the Disease Prevention and Public Health Institute since 2006. Before that appointment, he taught and conducted research at the University of North Carolina School of Public Health and at the Department of Preventive Medicine and Biometrics at the University of Colorado School of Medicine. His epidemiologic research has addressed a wide range of public health issues including exposures to a wide range of physical and chemical hazards in the workplace and community, health impact of exposures associated with military deployment, environmental effects of energy development, risks from environmental exposures during pregnancy, and drinking water safety. He has authored more than 400 papers in professional journals and the editor or author of four books on environmental epidemiology. He has served as president of the Society for Epidemiologic Research, the Society for Pediatric and Perinatal Epidemiologic Research, and the North American Regional Councilor for the International Epidemiological Association. Dr. Savitz is a member of the National Academy of Medicine, inducted in 2007, and has previously served on 14 consensus committees, 8 of which he chaired or vice-chaired, in addition to serving on several other NASEM convening activities. Dr. Savitz received his undergraduate training in psychology at Brandeis University, holds a master's degree in preventive medicine from The Ohio State University, and received his Ph.D. in epidemiology from the University of Pittsburgh Graduate School of Public Health.

SCHMIDT Janine

Expertise: Biologist
Qualifications: Diploma, Dr. rer. nat. (PhD in Science)
Current position: Senior Scientist, Competence Center for Electromagnetic fields
Institutional affiliation: German Federal Office for Radiation Protection (BfS)

In 2011, Janine Schmidt graduated with a diploma in biology. She wrote her diploma thesis at the Institute of Pathology and Neuropathology of the University Hospital Tübingen on the topic of phenotyping of anaplastic large-cell lymphoma. In 2017, she completed her PhD at the same institute, focusing her research on follicular lymphoma. In her doctoral thesis, she investigated the evolution of the early precursor form in-situ follicular neoplasia to manifest follicular lymphoma. In 2018, she received the PhD award of the Reinhold-and-Maria-Teufel-Foundation for her doctoral thesis. During her time at the Institute of Pathology, she was part of the Molecular Tumor Diagnostics team. Her work here included performing and evaluating molecular analyses of different kinds of cancers as well as preparing the reports. In 2017, she started working at the Federal Office for Radiation Protection (BfS), where she is currently employed as a Senior Scientist at the Competence Center for Electromagnetic Fields. The Competence Center pools the expertise of the BfS in relation to static and extremely low-frequency electric and magnetic fields (ELF EMF) as well as radiofrequency electromagnetic fields (RF EMF). Janine Schmidt's scientific activities include the initiation and supervision of research projects and the assessing/evaluation of potential biological and health effects of ELF and RF EMF on the basis of the scientific literature. Current supervised research projects deal with biological effects of RF EMF exposure on human cells below and above 6 GHz. One project focuses specifically on biological effects of RF EMF

exposure in the frequency range FR2 (centi- and millimeter waves) of the 5th generation (5G) mobile communications standard. Regarding ELF magnetic fields, Janine Schmidt supervises several research projects on childhood leukemia, including two in vivo studies investigating effects of magnetic fields exposure on mice. These projects are part of the BfS research program “Radiation Protection in the Process of Power Grid Expansion”.

USHIYAMA Akira

Expertise: in vivo experiment
Qualifications: PhD, MPH
Current position: Director
Institutional affiliation: National Institute of Public Health

Dr. Akira Ushiyama is Director of Department of Environmental Health, National Institute of Public Health. He is managing all the research relating to health hazard such as non-ionizing/ionizing radiation, water quality, and indoor air quality. He is also actively involved in his own research and has published more than 30 papers so far, mainly on animal experiments in the field of bioelectromagnetics. The focus of his research is on biological and/or health effects in vivo on a wide range of frequency, from extremely low frequency (ELF) to radiofrequency (RF).

He is also a representative of Japan of the International Advisory Committee (IAC) of the WHO EMF project and a member of The Committee on the Possible Adverse Health Effects of RF Electromagnetic Fields, The Ministry of Internal affairs and Communications (MIC), Japan.

He is an associate editor of the journal “Bioelectromagnetics” published by BioEM (formerly known as Bioelectromagnetic Society) since 2019, and an associate editor of “the Journal of Radiation Research” published by The Japanese Radiation Research Society since 2018.

WATANABE Soichi

Expertise: RF EMF exposure expert
Qualifications: Doctor of Engineering
Current position: Director
Institutional affiliation: Electromagnetic Compatibility Laboratory, Electromagnetic Standards Research Center, Radio Research Institute, National Institute of Information and Communications Technology

Soichi Watanabe received the B.E., M.E., and D.E. degrees in electrical engineering from Tokyo Metropolitan University, Tokyo, Japan, in 1991, 1993, and 1996, respectively. He is currently with the National Institute of Information and Communications Technology (NICT), Tokyo.

Dr. Watanabe has been engaging on various topics related with non-ionizing radiation (NIR), especially RF fields. One of the most important his researches is to develop voxel human models which include the world’s first adult female whole-body model and pregnant woman whole-body model. Another his contribution to NIR is international standardizations, such as ITU, IEC, and IEEE. His researches have mainly been dedicated to increasing scientific reliability of compliance procedures to NIR safety guidelines, e.g., uncertainty evaluation, calibration, and validation, which are responsible functions for national standard institutes such as NICT. His contributions to NIR are comprehensive, effective and neutral for developing adequate NIR environment for general public and occupational persons.

Dr. Watanabe was a member of the Standing Committee III (Physics and Engineering) of the International

Commission on Nonionizing Radiation Protection (ICNIRP) from 2004 to 2012, and has been a member of the Main Commission of ICNIRP since 2012. He is a member of the Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields, Ministry of Internal Affairs and Communications of Japan, the Institute of Electronics, Information and Communication Engineers (IEICE), the Institute of Electrical Engineers (IEEE), Japan, the Institute of Electrical and Electronics Engineers (IEEE), and the BioEM Society. He was the recipient of the 1996 Young Scientist Award of the International Union of Radio Science (URSI), the 1997 Best Paper Award of the IEICE, the 2004 Best Paper Award (The Roberts Prize) of Physics in Medicine and Biology, the Best Paper Award (The Risaburo Sato Award) of EMC Sapporo and APEMC 2019, and the 2020 Achievement Award of the IEICE.

WU Tongning

Expertise: Exposure expert
Qualifications: PhD
Current position: Professorate senior engineer
Institutional affiliation: China Academy of Information and Communications Technology

Tongning Wu is a professorate senior engineer in China Academy of Information and Communications Technology. His research focuses on electromagnetic dosimetry and medical image analysis. He received his B.E. degree in biomedical engineering from Tianjin University, Tianjin, China in 2002, M.S. degree in communication and information system from China Academy of Telecommunication Technology, Beijing, China, in 2005, and Ph.D degree in electronics and signal processing from Université Paris-Est Marne-la-Vallée, France, in 2009. He is a Senior member of IEEE, SEG member of ICNIRP, Vice chair of ITU-D SG2 and co-rapporteur of ITU-D Q7/2 (Strategies and policies concerning human exposure to electromagnetic fields).