The Truth about Mobile Phone and Wireless Radiation:

What we know
What we need to know
What we can do now

Dr. Devra Davis
President, Environmental Health Trust
Visiting Professor of Medicine:
Hebrew University Hadassah Medical School
Ondokuz Mayis University Medical School

Co-sponsored by the Melbourne School of Engineering, the Melbourne Networked Society Institute, the Faculty of Medicine, Dentistry and Health Sciences, and the Faculty of Science.
Career highlights

• Danforth Foundation Fellow, University of Chicago, 1967-71, PhD in Science Studies

• National Cancer Institute Senior Post-Doctoral Fellow in Epidemiology, Johns Hopkins University, 1981-82, MPH

• Founding Director Board on Environmental Studies and Toxicology, National Research Council, National Academy of Sciences 1983-93 (group advising bans on indoor smoking)

• Clinton Presidential Appointee 1994-99 National Chemical Safety & Hazard Investigation Board, with bi-partisan Senate approval

• Visiting Professor, Hebrew University, Hadassah Medical Center and Ondokuz Mayis Medical School, Samsun, 2015-16

• More than 200 technical publications, 11 edited monographs, 3 popular books
Presentation overview

- Laws and customs
- Who is at risk?
  - Brains child/adult
  - Pregnancy
- What’s the problem?
  - Sperm
  - Breasts
  - Honey bees
- Business opportunities/Responsibilities
- Global policy responses

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Show and tell—hidden safety advice

• For iPhone go to
  • Settings
  • About
  • Legal
  • RF exposure

For all other smartphones go to
www.showthefineprint.org
Telstra safety message being texted regularly to mobile customers in Australia


The WHO provides the following information on how to reduce mobile phone exposure
1. Use hands free device to keep mobile phone away from the head & body
2. Limit the number and length of calls
3. Use the phone in areas of good reception
Standards for cell phones based on outdated assumptions

- 1997 typical user was military, medical, or business
- Employs the head of a 220 lb male at the top 98% of military recruits in 1989
- Designed to avoid heating after 6 minute call
- Does not consider growing evidence of non-thermal impacts from chronic exposures
Since 1997 secondary insurers do not cover health damages from wireless

- **Lloyds of London** denies coverage for health damages from wireless devices.

- **Swiss Re 2014** rates electromagnetic fields as one of the 6 top risks businesses face today, above things like Mad Cow Disease.

- “Risk from dangers linked to EMF can be classified as an emergent risk”-- the same category once occupied by asbestos.

- General Insurance Exclusions: Electromagnetic fields directly or indirectly arising out of, resulting from or contributed to by electromagnetic fields, electromagnetic radiation, electromagnetism, radio waves or noise.
Cellphones Emit Pulsed Microwave radiation

Electromagnetic Spectrum

Image credit: ARPANSA
Microwaves:
- Ovens
- Cellphones (GSM-3G UMTS)
- Cordless phones
- Wi-Fi (WLAN)
The impact of any form of radiation depends on the nature of the waves:

- Frequency
- Amplitude
- Pulse
- Wavelength/Form
- Information
INTENSITY
V/m

STAND-BY
RINGING
SPEAKING
LISTENING

END OF CALL

Time 4 sec/division
Sunlight exposure is distinct from absorbed dose

Identical sunlight exposure results in different UV dose to my red-haired blue-eyed granddaughter and my darker daughter
2-D modeling showed that children & smaller adults absorb more radiation than larger adults (1996, 2002)

Gandhi 1996 scaled relative absorption in child/adult, questioning whether the adult model adequately predicted child exposure

Gandhi and Kang 2002 confirmed proportionally greater absorption in smaller head
3-D anatomically based modeling reveal proportional differences in radiation dose in 8 & 34 year old heads

Fernandez et al, 2013
3-D modeling of dose at target tissue infant exposure
Modeled microwave radiation dose of six-year old showing greater levels to frontal and temporal lobes, eyes and cheek, extending into brainstem
Mobile Phone in Pocket Exposes Reproductive Organs and Bone Marrow
Greatest exposure occurs to fetal head/spinal cord
Normalized SAR when 9 mos fetus exposed to a dipole antenna in front of abdomen

(courtesy Andreas Christ, IT’IS, 2013)
Cell phone radiation absorption in adult brain
Relatively greater absorption into fast growing tissue
Repeated calls for ‘research’ on infants, toddlers, young children, pregnancy

Best Baby Apps
parents.com calls iPad ‘best babysitter’

https://www.youtube.com/watch?v=U2Rrb9-9NiQ
Experimental Studies of Wireless
Radiation Exposure
Pregnancy in Rats & Rabbits

Prof. Nesrin Seyhan
Chairman, Gazi University
Faculty of Medicine
Biophysics Department
Ankara, Turkey

EHT Conference
Convened in collaboration with Turkish Ministry of Health, Istanbul
May, 2011
Biomarker of cellular damage increased in prenatally exposed compared to control groups
1800 MHz GSM-like RF radiation for 15min/day, 7 days.

Control Groups 1, III, and V show significantly less DNA damage than exposed to wireless transmitting devices.

• Changes in the liver Malondialdehyde (MDA, nmol/g tissue) level.
• All values are expressed as median (IQR) values.
Prenatal exposure to microwave transmitting devices reduces brain & testes growth

Prof. Süleyman KAPLAN
Department of Histology-Embryology
Dean Medical School
Ondokuz Mayıs University
skaplan@omu.edu.tr
www.stereoloji.org/skaplan
Prenatal 900 MHz EMF exposure decreased hippocampal granular cell number in the dentate gyrus of newborn rats.
Prenatal exposure of 900 MHz EMF induces pyramidal cell loss in the hippocampus of newborn rats

RESULTS:
Prenatal exposure to wireless radiation damages cells of rat hippocampus – the thinking and memory Section of the brain (Odaci et al., 2008)
Prenatally exposed newborns have impaired memory and learning.

Figure 2. Radial arm maze test results from the newborn control and newborn electromagnetic field (EMF) groups.

Exposed newborns took three times as long to find their way out of an experimental maze and made twice as many errors (p=0.007).
Experimental studies find mobile-phone exposed human sperm more damaged than controls.

De Iuliis et al, 2009 with Laureate Professor John Aitken, Newcastle
### Heavier cell phone users have reduced sperm count

<table>
<thead>
<tr>
<th>Sperm count</th>
<th>No Use</th>
<th>2 h/day</th>
<th>2h/day</th>
<th>4 h/day</th>
</tr>
</thead>
</table>

- Ashok Agarwal MD PhD, Cleveland Clinic, 2008; and seven other studies
Evidence for mobile phone radiation exposure effects on reproductive pattern of male rats: role of Reactive Oxygen Species

• 70 day old male rats exposed to cellphone radiation (middle-aged) 2 hours a day for 45 days
• Lower testosterone
• Increased enzyme tied with DNA damage (caspase-3)
• Overall lower fertility with offspring showing diminished male reproductive capacity

Kesari KK¹, Behari J. 2012
Normal testes
Damaged testes after cell phone exposure

Lumen
Wide Lumen

Aged Spermatocytes
Fat and fluid cook in microwave oven
Breast = chiefly adipose and fluid
Invasive multiple primary tumors in 34 year old, avid runner Chinese-American woman who used cell phone 4 hours a day in her bra for 10 years

—reported by Robert Nagourney, MD, PhD
Case Reports - 21 yr old multi-focal tumors tied with cellphones kept in bra

John West et al
Summary of 38+ Cases

- Negative for BRCA1/2—NO known genetic risks
- No family history or other risk factors
- Multi-focal tumors occur directly under phone antennas with mix of tubular/solid patterns of identical nuclear morphology & grade
- No significant histology in ductal and lobular units away from the areas of cellular phone use
- Two with metastases at young ages
Yale University studies report prenatally exposed mice do not develop normal brains or behavior.

_Fetal Radiofrequency Radiation Exposure From 800-1900 Mhz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice_ Scientific Reports, March 2012
Tamir S. Aldad, Geliang Gan, Xiao-Bing Gao and Hugh S. Taylor
(slides courtesy of Prof. Taylor)
Prenatal RF-Exposure causes significant behavioral impacts in adults

- Memory
- Hyperactivity
- Anxiety
- Fear
Committee Chair Jonathan Samet: "the evidence, while still accumulating, is strong enough to support a conclusion and the 2B classification. The conclusion means that there could be some risk, and therefore we need to keep a close watch for a link between cell phones and cancer risk."

IARC Director Christopher Wild: "it is important that additional research be conducted into the long-term, heavy use of mobile phones. Pending the availability of such information, it is important to take pragmatic measures to reduce exposure such as hands-free devices or texting."
Cell phone radiation a “Human Carcinogen”

International Agency for Research on Cancer of the World Health Organization, 2011: declared cell phone and other wireless radiation:

“Possible Human Carcinogen”

EHT Experts, 2013

“Probable Human Carcinogen”

International Journal of Oncology
Increased Glioma risk found in all case-control studies published since IARC 2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1640+ hours</td>
<td>1.40*</td>
<td>1.82*</td>
<td>1.75*</td>
<td>2.89* (896+ hrs)</td>
</tr>
<tr>
<td>10+ yrs</td>
<td>0.98</td>
<td>2.18*</td>
<td>1.79*</td>
<td>1.61</td>
</tr>
<tr>
<td>20+</td>
<td></td>
<td>4-8*</td>
<td>3+</td>
<td></td>
</tr>
</tbody>
</table>

*those beginning to use phones as teens have greatest risks
Atomic Bombs Japan, 1945

No increase in brain tumors was found in survivors until 40 years later.
In most epidemiological studies, cell phones do not increase brain cancer until after at least ten years of heavy use.
Radio Frequency Radiation and Human Health:
Technical Studies from India

Dr. R. S. Sharma
Sr. Deputy Director General & Scientist-G
Division of RCH
Indian Council of Medical Research
New Delhi – 110 029
Decoding the language of the Honey Bees

Nobel Lecture, December 12, 1973
Karl Von Frisch
University of Munich, Federal Republic of Germany

Waggle Dance
Shacking Dance
Tremble Dance
Electromagnetic radiation (EMR) damages Honey Bees (Sainudeen, 2011)

Control hives, n=3

10 day

All workers return to hives

Test hives, n=3

10 day

After few days the workers never return to hives

Colony Collapse/Disrupting Syndrome

Only queen, eggs & hive bounds immature worker bees

Thriving hives deserted
Wireless Repels Honey Bees

After 10 minutes of cell phone radiation daily for 10 days, worker bees did not return to test colonies.

3 Hives Exposed

3 Hives Controls

Sainudeen Sahib S. Electromagnetic Radiation (EMR) Clashes with Honey Bees.
INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCES Volume 1, No 5, 2011
Why so many inconsistent results?

- It is truly complicated

- Different cells studied, i.e., adult lymphocytes compared to neuronal stem cells

- Different exposures used (CW/Digital)

- Sponsored research can induce publication bias, i.e., most industry sponsored research finds no effect and while independent research finds an effect (Lai et al, 2008)

- Secret Industry memo in 1994 to conduct “war-games” to discredit the scientists and the science
Policy Responses

- Right to Know Laws & Policies
  - Labeling
  - Headsets Provided with all phones
- Changes in Hardware/Antennae
- Changes in Software/OS
- Challenges to Evidentiary Burden of Proof
  - Daubert
  - Frye
What is to be done?

• Standardized metrics for evaluating personal exposures (OGC)
• Opportunistic cross-sectional surveys
  • Memory
  • Reaction time/accuracy
  • Reproductive health
• Promoting wired school programs with mobile tablet banks
• Public educational programs sharing ‘fine print’ advisories
  • Parents
  • Teachers
  • Health professionals
May 2010 French House of Deputies and Senate Chamber passed law

- Bans on advertising to young children
- All cell phones sold with ear pieces
- Labeling of SAR on phone
- Restrictions for childrens’ use
- Warnings for all users overall to reduce direct radiofrequency
- Radiation to the brain

FRANCE, DECEMBER 2008
India

2012 Exposure Limits lowered to 1/10 of ICNIRP SAR labeling mandated on phones.
- Official Guidelines For Cell Phone Use
- Use Headsets or Speakerphones
- Limit cell use and choose landlines
- Increase distance from devices

EMF Webpage of Ministry of Communications and Information Technology educates the public to reduce cell phone radiation exposure in detail.

2013: Indian Supreme Court upheld Rajasthan State Court decision to remove all cell towers from the vicinity of schools, hospitals and playgrounds because of radiation “hazardous to life.”
Israel has national institute on non-ionizing radiation

- No Wi-Fi in kindergarten
- Prefer wired over wireless in schools
- All phones come with headsets and information about safety
- No advertising with children
Belgium Law Implemented 2014

- No phones designed or sold for children under age 7
- All handsets sold with headsets
- Safety Information Readily available
- SAR publicly accessible wherever mobile phones are sold as well as on the Internet

- Children’s mobile phones may no longer be sold. Besides this, the specific absorption rate (SAR) has to be listed for every mobile phone at the point of sale.
- As of 1 March 2014, the sale of mobile phones that have been specially manufactured for young children (under 7s) will be prohibited.
Health Canada’s Official “Practical Advice” on reducing exposure to wireless radiation.

1. Limit the length of cell phone calls,
2. Replace cell phone calls with text, use "hands-free" devices and
3. Encourage children under the age of 18 to limit their cell phone usage


- Awareness campaign on cell phones and Wi-Fi
- Policy measures on the marketing to children
- Funding for research.
Canadian Parliamentary Health Committee urges that test system be updated & public educated about risks

• Based on flawed modeling of total head absorption and inaccurate analyses using homogenous liquid (Morris et al, 2015, IEEE/Access in press)

• Does not take into account
  • Dose at the target tissue of brain
  • Developmental immaturity of young brain
  • Non-thermal biological impacts
  • Impacts on pregnancy, sperm and nervous system
  • Proliferation of apps for infants and toddlers
  • microwave radiation is now a "serious public health issue" June 18, 2015
“If there is even a reasonable possibility that cell phone radiation is carcinogenic, the time for action in the public health and regulatory sectors is upon us. Even though the financial and social cost of restricting such devices would be significant, those costs pale in comparison to the cost in human lives from doing nothing, only to discover thirty or forty years from now that the early signs were pointing in the right direction. If the probability of carcinogenicity is low, but the magnitude of the potential harm is high, good public policy dictates that the risk should not be ignored.”
Cell Phone Right To Know Ordinance
Unanimously passed by City of Berkeley California defended by Harvard Law Professor Lawrence Lessig and Yale Law Dean Robert Post

May 2015: requires cell phone retailers provide a fact sheet

"The City of Berkeley requires that you be provided the following notice: To assure safety, the Federal Government requires that cell phones meet radio frequency (RF) exposure guidelines. If you carry or use your phone in a pants or shirt pocket or tucked into a bra when the phone is ON and connected to a wireless network, you may exceed the federal guidelines for exposure to RF radiation. Refer to the instructions in your phone or user manual for information about how to use your phone safely."
Body-worn SAR testing has been carried out at a separation distance of 1.0 cm. To meet RF exposure guidelines during body-worn operation, the device should be positioned at least this distance away from the body.

Yes, it actually says this in the Galaxy S5 user manual under SAR Value.

FIND YOUR PHONE

SHOW US THE FINE PRINT.
Baby Safe Project Underway Globally to Promote Precautions During Pregnancy

“As a research scientist and physician...I am deeply concerned about the growing exposure to cell phone and other wireless radiation”

Hugh Taylor, MD PhD
Chief Yale- New Haven Hospital

www.BabySafeProject.org
#KnowYourExposure
“Principal Risks Factors and Uncertainties # 7: Our business may be impacted by actual or perceived health risks associated with the transmission of radio waves from mobile telephones, transmitters and associated equipment.

Risk: Concerns have been expressed that electromagnetic signals emitted by mobile telephone handsets and base stations may pose health risks. Authorities including the World Health Organization (‘WHO’) agree there is no evidence that convinces experts that exposure to radio frequency fields from mobile devices and base stations operated within guideline limits has any adverse health effects.

A change to this view could result in a range of impacts from a change to national legislation, to a major reduction in mobile phone usage or to major litigation.”
“Actual or perceived health risks associated with the use of mobile devices could materially impair our ability to retain and attract customers, reduce wireless telecommunications usage or result in litigation.”

“...we cannot be certain that future studies, irrespective of their relative reliability or trustworthiness, will not impute a link between electromagnetic fields and adverse health effects.”

“Research into these issues is ongoing by government agencies, international health organizations and other scientific bodies in order to develop a better scientific understanding and public awareness of these issues...”

“Unfavorable litigation or governmental investigation results could require us to pay significant amounts...”

As we deploy newer technologies, especially in the wireless area, we also face current and potential litigation relating to alleged adverse health effects on customers or employees who use such technologies including, for example, wireless handsets.

We may incur significant expenses defending such suits or government charges and may be required to pay amounts or otherwise change our operations in ways that could materially adversely affect our operations or financial results.”

Would you give two cents?*

*Monthly fee on all devices, users, IP providers to support:

- Cross-disciplinary training programs in bioelectromagnetics for engineers, docs & computer scientists
- Identify data gaps and R & D needs re hardware/software reconfig & research priorities
- Monitoring of special populations similar to drug surveillance for biological impacts of mobile phones and wireless,
  - hearing, memory, reaction time, insomnia, & other behavioral endpoints
  - Sperm count & other measures of reproductive health
So how can you minimise exposure?

• Avoid carrying your mobile phone on your body (e.g. in a pocket or bra)

• Avoid holding any mobile phone against your body when in use (i.e against your head)

• Use your mobile phone on loud speaker or with an “air tube” headset

• Put your mobile phone on ‘airplane mode’ when not in use

• Avoid using your mobile phone in cars, trains or elevators

• Keep mobile phones away from you when you are asleep (out of the bedroom)
Materials used with permission - thank you!

- Ashok Agarwal MD PhD, Cleveland Clinic
- John Aitken, MD, Laureate Prof. and Pro Vice-Chancellor, Newcastle
- Frank Clegg, former President Microsoft Canada
- Alvaro De Salles, Claudio Fernandez, Brazilian Federal Universities, Rio Grande de Sul
- Joel Moskowitz, PhD, University of California Berkeley
- Nesrin Seyhan, Suleyman Kaplan, Gazi and Ondokuz Mayis Universities
- Robert Nagourney MD PhD, Rational Therapeutics, John West MD, Orange County Breast Center
- Lisa Bailey MD, former President American Cancer Society/California, breast surgeon
- Lloyd Morgan, BSEE, Robert Morris, MD, PhD, Environmental Health Trust
- R.S. Sharma, MD, PhD India Council of Medical Research
- Hugh Taylor MD PhD, Yale University
- Lukas Margaritis, MD University of Athens
The world is not dangerous because of those who do harm, but because of those who look at it without doing anything

-Albert Einstein
Slides for discussion
Scientific Collaborators

Prof. Claudio Enrique Fernandez-Rodriguez, Federal Institute for Education, Science and Technology of Rio Grande do Sul – IFRS, Canoas, RS, Brazil

Prof. Alvaro Augusto A. de Salles, Electrical Engineering Department, Federal University of Rio Grande do Sul – UFRGS Porto Alegre, RS, Brazil,

Prof. Emeritus, Anthony B. Miller MD, FRCP, FRCP (C), FFPH, FACE, Univ of Toronto

Annie Sasco, MD DrPH, former Unit Chief of Epidemiology for Cancer Prevention at the International Agency for Research on Cancer (IARC) in Lyon, France, Prof. INSERM

Robert D. Morris, MD, PhD, and Lloyd Morgan B.S. Electrical Engineer, EHT Sr Scientists

Siegal Sadetzki MD MPH, Prof. Gertner Institute of Epidemiology, Tel Aviv
Digital Dementia Diagnosed in South Korean Children

Dr. Byun Gi-Won, a cognitive expert from the Balance Brain Center in Seoul, South Korea, states, “Young people who are heavy technology users are likely to have a properly developed left hemisphere of the brain while the right hemisphere will be unused and underdeveloped.”
Korean government studies on digital addiction and dementia

![Graph showing 2012 Smartphone Addiction Rate and Change in # of Dementia Patients]

Source: Ministry of Science, ICT and Future Planning

Source: National Health Insurance Services
Interoperability now!

Time to agree on a commonly used and widely *blessed* vocabulary and grammar for EMF!
1. Radio frequency spectrum is a limited (though instantly renewable) natural resource essential to modern civilization, yet there is no common language to describe it!

2. Many domains need to record and process data about real world EMF emissions and measurements.

3. Data communication requires standards.
   - Open standards maximize opportunities for communication between systems. A standard data model provides a basis for standard interfaces and/or Semantic Web best practices.
   - A standard data model supports efficient publishing, discovery, assessment, access, aggregation and use of data.

4. A standard data model provides a template for rigorous and useful data collection and aggregation. In research, this enables comparison, verification, averaging of results, longitudinal studies, cross-disciplinary studies etc.

5. Open standards create opportunities for innovation and new markets. Convergence of digital and wireless is still new, still ripe for innovation.
An open standard would open up opportunities for cloud analytics and apps.
Open Geospatial Consortium

OGC®
Making location count.

• Not-for-profit, international consortium of 500+ industry, government, and university members, including Google
• Founded in 1994
• Work based on collaboration and consensus
• Members set policies and procedures.
• Many alliance partners: W3C, OASIS, ITU, ISO, Smart Grid Interoperability Panel, buildingSMART International, etc.

OGC Mission
Deliver geospatial data encodings, interface standards and best practices that are openly and freely available for global use.
Abstract models and implementation models

Abstract and/or conceptual model models what needs to be described modeled in software (location, orientation, time, signal type, frequency, pulsing characteristics, energy intensity max/min, etc.). Includes relationships and units of measurement.

Implementation models model how features, phenomena and relationships are to be encoded for a particular software implementation platform.
Example OGC standard: OGC WaterML 2.0

**SITUATION:** Nations seek to provide integrated national and cross-border views of fresh water resources. Also, there is increased need for the exchange of hydrologic data to improve our understanding of complex environmental processes, such as climate change.

**PROBLEM:** 2005 Global Climate Observing System (GCOS) report: “There are no established international standards on the acquisition of river data, the set of required metadata, data formats, and transmission modes.”

**APPROACH:** WMO (World Meterological Organization) and an international team of hydrologic organizations came together to form the OGC WaterML 2.0 Standards Working Group. They used OGC’s rapid prototyping process to develop the WaterML 2.0 standard.

**SOLUTION:** WaterML 2.0 is a standard information model for the representation of water observations data, with the intent of allowing the exchange of such data sets across information systems. Based on existing OGC standards, it is used to address a range of exchange requirements.

**CSIRO (Australia)**
San Diego Supercomputer Center (US)
Australian Bureau of Meteorology
Geological Survey of Canada, Nat. Resources Canada
USGS (US)
KISTERS AG (Private sector – Germany)
Collaboration is needed to address complexity.

Complexity makes data integration and communication difficult. Collaboration make integration and communication possible.

EMF are complex:

- Frequency or frequencies
- Modulation type & other pulse details (waveform parameters)
- Polarization
- Energy intensity max/min.
- Energy intensity ave.
- Location & orientation
- Time
- Unique source ID?
- Sensor or emitter specs
- Etc.

Spatial data are complex:

- Vector, raster, point clouds and other types data
- Diverse Earth coordinate reference systems & Earth shape models (geodesy)
- 2D, 3D, 4D and nD
- Conflating semantically different data
- Conflating precise and imprecise data
- Harmonizing with other standards for spatial features and phenomena
- Navigating IT trends, e.g. database > services > linked data etc.

OGC members who are EMF domain experts will bring this expertise to working group meetings.

OGC staff and OGC members who are spatial technology experts will bring this expertise.
Why the Open Geospatial Consortium (OGC)?

1. EMF instances are inherently spatial. All
   - have a point or region of origin. All EMF instances that we observe have one or more points at which observations are collected.
   - are affected by the media they travel through.
   - are absorbed, reflected, and refracted by the objects and phenomena they impinge upon.
   - have effects on the objects and phenomena they impinge on.

2. The OGC focuses on spatial and temporal encoding and interface standards.
   - Historically, OGC’s focus was solely geo-spatial.
   - Recently, OGC members are working with other standards organizations on convergence of geospatial data & technology with data & technologies used to model the built environment.
   - Basic principles of modeling macrospatial and mesospatial features and phenomena can be extended to microspatial and nanospatial (and nanotemporal) features and phenomena.

3. The OGC’s standards portfolio includes a comprehensive portfolio of standards for description and management of sensors and sensor data.

4. The OGC’s membership includes a broad range of companies and organizations that might participate in developing an EMF standard.
“With dramatic increases reported in autistic spectrum disorders coincident in time with the deployment of wireless technologies, we need aggressive investigation of potential …EMF/RFR links. The evidence is sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure levels now known to be biologically disruptive, and strong, interim precautionary practices are advocated.”

Martha Herbert MD, PhD, Harvard Medical School
Concerned About RF Increasing Autism Risk, 2013
Worldwide Cell Phone Advisories

Belgium 2013:
The Public Health Minister bans cell phone sales both in shops and online to children under 7 years old. Cell phone advertisements are also banned during children’s TV programs.

Australia 2013:
The federal government’s Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has created a fact sheet providing citizens ways to reduce exposure from wireless devices. The agency advises that parents limit children’s exposure to cell phones.
Worldwide Cell Phone Advisories

Italy 2012:
On October 12th, 2012 the Italian Supreme Court ruled in favor of an Italian business man who claimed that his brain tumor developed from using cell phone 5-6 hours a day

France 2013:
The French National Assembly bans Wi-Fi in schools until it is proven to be safe for human consumption and in nurseries.
Worldwide Cell Phone Advisories

Turkey 2013:
Governor Aksoy Huseyin, of the Samsun province is launching a cell phone campaign using EHT’s pamphlets and health/science materials.
Save the girls

Doctors warn that unusual breast cancers are occurring in women who stored cell phones in their bras.

#SaveTheGirls

www.ehtrust.org
Your future is in your hands

Medical experts are warning men not to keep their mobile phones in their pockets as this can have a direct effect on their fertility.
Melatonin Protects Against 1800 MHz RF Radiation Damage

- Xu et al
- Brain Research, 2010
Precautions Noted by the FCC, FDA, and ACS as of September, 2010

• Use an earpiece or headset.
• Avoid continually wearing a wireless earpiece
• Keep wireless devices away from your body when they are on
• Use speakerphone
• or purchase a low SAR phone to reduce exposure to the head.
• Consider texting rather than talking, but don’t text while you are driving.
• Can limit talk time
We protect children in car seats

• Different car seats and distances at different ages

• Am Acad. Pediatrics recommends
## Radiation Risks of CT Scans

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Machine Setting</th>
<th>Relevant Organ</th>
<th>Approximate Equivalent Dose to Relevant Organ (mSv)</th>
<th>Equivalency in chest x-rays*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Head CT Scan</td>
<td>Unadjusted¹</td>
<td>Brain</td>
<td>60</td>
<td>400-6000</td>
</tr>
<tr>
<td>Pediatric Head CT Scan</td>
<td>Adjusted²</td>
<td>Brain</td>
<td>30</td>
<td>200-3000</td>
</tr>
<tr>
<td>Pediatric Abdominal CT</td>
<td>Unadjusted</td>
<td>Stomach</td>
<td>25</td>
<td>166-2500</td>
</tr>
<tr>
<td>Pediatric Abdominal CT</td>
<td>Adjusted</td>
<td>Stomach</td>
<td>6</td>
<td>40-600</td>
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<tr>
<td>Chest X-ray (PA/lateral)</td>
<td>n/a</td>
<td>Lung</td>
<td>0.01/0.15</td>
<td>1</td>
</tr>
</tbody>
</table>

¹ National Cancer Institute 11/29/15

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Equivalency in chest x-rays:

- Pediatric Head CT Scan (Unadjusted): 400-6000
- Pediatric Head CT Scan (Adjusted): 200-3000
- Pediatric Abdominal CT Scan (Unadjusted): 166-2500
- Pediatric Abdominal CT Scan (Adjusted): 40-600
- Chest X-ray (PA/lateral): 1
As Low as Reasonably Achievable in Pediatric CT Scans

- Children ten times more vulnerable than adults to radiation (Int’l Com Radiol Prot, 1991)
- Quality of CT image better with higher radiation
- Many unnecessary tests ordered in children and adults

Slovis, Pediatric Radiology, April 2002
Recommendations

1. Avoid carrying your cell phone on your body (e.g. in a pocket or bra).
2. Avoid holding any wireless device against your body when in use.
3. Use your cell phone on speaker setting or with an “air tube” headset.
4. Avoid using your wireless device in cars, trains or elevators.
5. Avoid cordless phones, especially where you sleep.

Save the girls

Doctors warn that unusual breast cancers are occurring in women who stored cell phones in their bras.
6. Whenever possible, connect to the internet with wired cables.
7. When using Wi-Fi, connect only to download, then disconnect and disable Wi-Fi.
8. Avoid prolonged or direct exposure to nearby Wi-Fi routers.
9. Unplug your home Wi-Fi router when not in use (e.g. at bedtime).
10. Sleep as far away from wireless utility meters (i.e. “smart” meters) as possible.