Cell Phones and Health: An Update on Science
Devra Davis, PhD, MPH, President
Environmental Health Trust

www.ehtrust.org

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The impact of any form of radiation depends on the nature of the waves

- Frequency
- Amplitude
- Pulse
- Wave length

Courtesy of Margaritis et al
Microwave Radiation

Positive Impacts
- Treats liver cancer
- Stops bleeding
- Enhances uptake of drugs to brain
- Detects cancer

Negative Impacts
- Damages DNA
- Disrupts blood brain barrier
- Weakens & damages sperm
- Changes brain metabolism
Controlled Experiments with Human Sperm

Cell Phone Exposed

Not Exposed
Laureate Professor John Aitken

Exposed Sperm were Significantly Reduced & damaged
Controlled Experiments Find Sperm Count and Vitality Significantly Worsened by RF

Aitken group, 2009, PLOS
Heavier Cell Phone Users Have Reduced Sperm Count

Agarwal, Cleveland Clinic, 2008; and seven other studies

www.environmentalhealthtrust.org
Middle School Children Use Cell phones in Risky Manner—Mary Redmayne et al., 2011

Most New Zealand adolescents carry a cellphone switched-on in a pocket > 6 hrs/day

More than 2 in 5 regularly send texts without looking during class from within a side pocket

1 in 5 keep a phone on and in their pocket >10 hrs/day

This may impair future fertility and/or reproductive integrity
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.
Parotid or Salivary Gland Tumors
Tripled in Israel
1 in 5 under age 20
Increase in Parotid Gland Tumors in Israel Over the Last 30 Years

**Source:** Epidemiology, 22, p.130, January 2011

![Graph showing trends in parotid, submandibular, and sublingual gland tumors over 30 years.](image)

**Figure:** For trend analyses, we added regression lines and calculated $R^2$ values. Parotid gland cancer: $R^2 = 0.83$; Submandibular gland cancer: $R^2 = 0.36$; Sublingual gland cancer: $R^2 = 0.02$. 
Israeli Dental Association Warning

- One in every five rare malignant tumors of the cheek occurs in someone under age 20
- Young people should limit direct exposure of the head to microwave radiation from cell phones
Spending 50 minutes with your phone pressed against the ear increases activity in the brain

Cell Phones Standards were set in 1993 to avoid heating

Based on temperature measured through rectal probes in starved rats so warm that they stopped trying to get food

1993 Standards were set with assumed length of call—6 minutes

Technologies are radically different but standards have not changed

Fifty-fold safety factor applies to base stations but NOT to cellphones
Cell phone standards are based on a heavy-set 6 foot tall man NOT a young child

900 MHz the SAR maximum occurs in the center of the case

(w 15 mm spacer for 10 gm)

1800 MHz SAR max occurs at edge of case, Christ et al, 2010

Images courtesy of IT’IS, 2010
Who's Most At Risk?

These computer models from the University of Utah show how radio-frequency radiation from cell phones passes further into the brain of a child than that of an adult. Research that Dr. Om P. Gandhi and Dr. Devra Davis are currently working on indicates that children may be exposed to twice as much radio-frequency radiation from a cell phone as an adult.

Source: Brain graphics courtesy of Professor Om P. Gandhi, Univ. of Utah; photos from iStockPhoto.com
Mobile phone use: the city of Lyon teaches a lesson

"For the first time in France, a major city is launching a campaign to discourage the use of mobile phones among children."

"The really new, in fact unusual, factor is that this action is not being promoted by the city itself but by a political group, the Green Party, of which Mireille Roy, the council officer in charge, is a member. It's taking place in an interesting context. If the question focuses on a matter of public health, the real issue is a political one."

"Neither the body of law authorised by the Council of State nor any other legal or regulatory directives allow local authorities any real freedom of action in this domain. But in the face of mounting pressure, something had to be done. Thus the moment was ripe for this campaign, even though it would be possible for those who are concerned to bring a group action in court."
French Government Restrictions on Cell Phones, January, 2009

• Ban advertising to children under 12
• Ban design of phones to be used by those under six.
• Handsets all sold with phones w SAR posted
• City of Lyon official advertising campaign to discourage the use of the phones by children.
How to Protect Your Family

- France, Finland, Israel, and the European Environment Agency advise reducing direct radiofrequency radiation to the brain
  - Use speakerphone
  - Use earpieces
  - Do not keep phone on the body
  - Avoid use in areas of weak signals
  - Limit children’s use of phones next to brain
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.
Fine Print Warnings
Fine Print Warnings (iPhone 4)

For optimal mobile device performance and to be sure that human exposure to RF energy does not exceed the FCC, IC, and European Union guidelines, always follow these instructions and precautions: When on a call using the built-in audio receiver in iPhone, hold iPhone with the dock connector pointed down toward your shoulder to increase separation from the antenna. When using iPhone near your body for voice calls or for wireless data transmission over a cellular network, keep iPhone at least 15 mm (5/8 inch) away from the body, and only use carrying cases, belt clips, or holders that do not have metal parts and that maintain at least 15 mm (5/8 inch) separation between iPhone and the body.

iPhone’s SAR measurement may exceed the FCC exposure guidelines for body-worn operation if positioned less than 15 mm (5/8 inch) from the body (e.g., when carrying iPhone in your pocket).
Blackberry and Pacemakers

• Always keep the BlackBerry device more than 7.88 inches (20 cm) from the pacemaker when the BlackBerry device is turned on.
Do not carry the BlackBerry device in your breast pocket.
Little Known Facts

Mandated testing is done only with phone held next to the head or in a holster.

Gandhi and Kang, 2002, showed that Specific Absorption Rates (SARs) for phones used in shirt or pants pocket are 4-8 times higher than when held at head.
The world is not dangerous because of those who do harm but because of those who look at it without doing anything.

- Albert Einstein

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Thank You

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Secondary Slides for Q & A
• As typically used each one of the world’s five billion + cell phones exceeds recommended standards
• 8.1.1. take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and particularly the exposure to children and young people who seem to be most at risk from head tumours;

• 6 May 2011
8.1.2. reconsider the scientific basis for the present electromagnetic fields exposure standards set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations

6 May 2011
• apply —as low as reasonably achievable” (ALARA) principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation;

• 6 May 2011

• Warning labels for cell phones
• Use an earpiece or speakerphone
• Don’t keep phone on and on the body
• Text message rather than talk
• Ban apps to be played next to babies’ heads
• Promote and generate funding for major independent research programs
Sticker Campaign

1. MICROWAVES FROM THIS CELL PHONE CAN DAMAGE YOUR CHILD’S BRAIN
2. KEEP AWAY FROM YOUR BRAIN
3. CELL PHONE FREE ZONE
4. CAN’T CALL IT A SMART PHONE IF IT KILLS BRAIN CELLS
5. NEVER KEEP YOUR CELL PHONE IN YOUR POCKET. MICROWAVE ENERGY REDUCES SPERM COUNT.
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.
Handheld Hazards

Why cell phone users should limit their exposure

BY JULIE KLING, PAGE 8
What’s Next for Environmental Health Trust?

• YouTube Public Service Announcement Contests with Local Teens winning features to be shown at Public Library and in Theatres
• Expanding Business Campaign for Safer Cell Phones nation-wide
• Scientific Research Program on brain modelling and epidemiology of rare events
• Evolving public policy outreach
  – Congressional and Regulatory Developments
  – Turkey proposed Right to Know?
Environmental Health Trust*

non-profit research and policy organization promoting environmental wellness

• Educating communities & health professionals
• Conducting basic and applied research
• Developing local & national policies to reduce avoidable environmental health risks.

current priority: cell phones

*Devra Lee Davis Charitable Foundation DBA Environmental Health Trust
IRS EIN 501c3 207498107
IARC cancer classifications

IARC uses 5 different strengths of evidence in classifying potential carcinogens:

• Group 1: human carcinogens ()
• Group 2A: probable carcinogens ()
• Group 2B: possible carcinogens ()
• Group 3: inconclusive carcinogens ()
• Group 4: Not a carcinogen ()
IARC classifications & supporting evidence

The strengths of evidence groups used by IARC are: “sufficient”, “limited”, and “inadequate”. For example, while Group 1 consists of those agents where there is “sufficient evidence of carcinogenicity” in humans; Groups 2 A is those agents where there is “limited evidence of cancer in humans” but “sufficient evidence of cancer in animals” and Group 2B, which is the mobile phone category, is those agents where there is “limited evidence of cancer in humans and less than sufficient evidence in animals” and where “chance, bias or confounding cannot be ruled out with reasonable confidence”.

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DNA is first unwound under alkaline conditions and then subjected to electrophoresis.
DNA fragments migrate towards the anode, thereby forming a comet–like appearance.
Amount of DNA damage is quantified by the length and density of the comet tail.
control
30 minutes
Figure 4. Age-adjusted incidence rates for primary brain and central nervous system tumors in the CBTRUS and SEER 9 Registry, 1995-2006
Figure 3. SEER 9 Registry age-specific incidence rates for gliomas, 0-39 years of age, 1975-2006.

EAPC values that differ significantly from zero are indicated by an asterisk.