Cell Phones and Your Health

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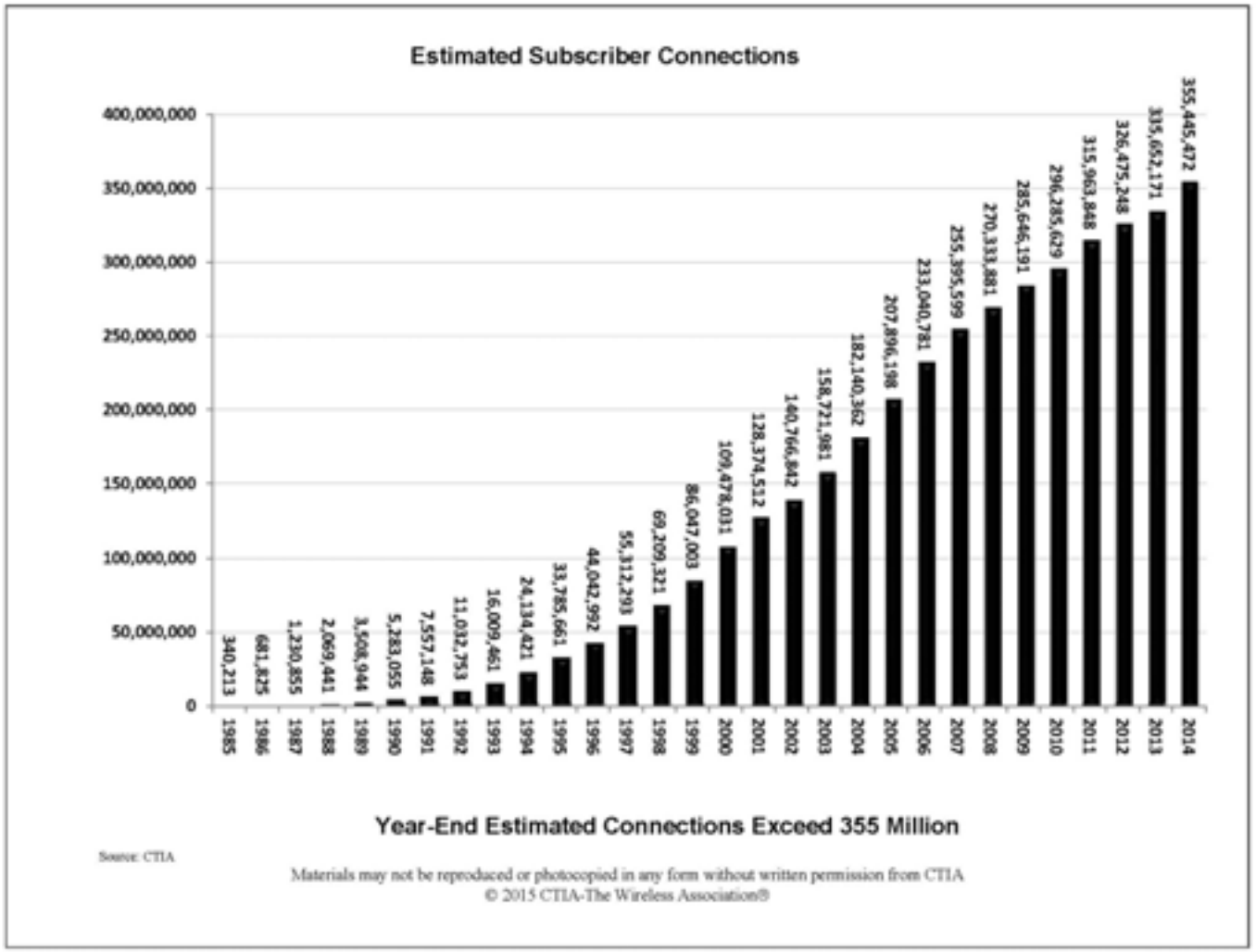
SaferEMR.com

USA: Rapid growth in cell phone use



355 mil. connections

208 mil. smartphones

298,055 cell sites

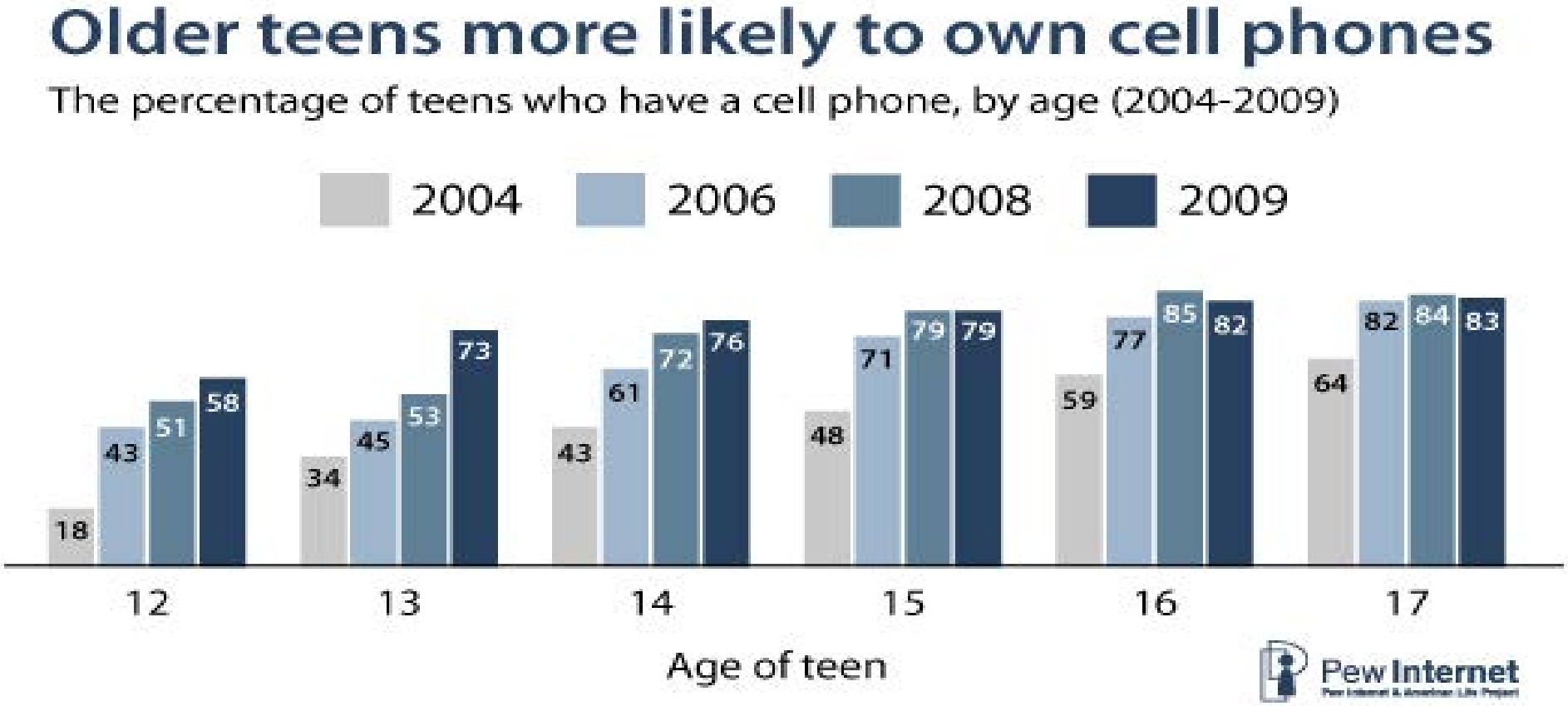
$188 bil. annual revenue

$430 bil. investment

CTIA: Dec. 2014

http://bit.ly/CTIA12-2014

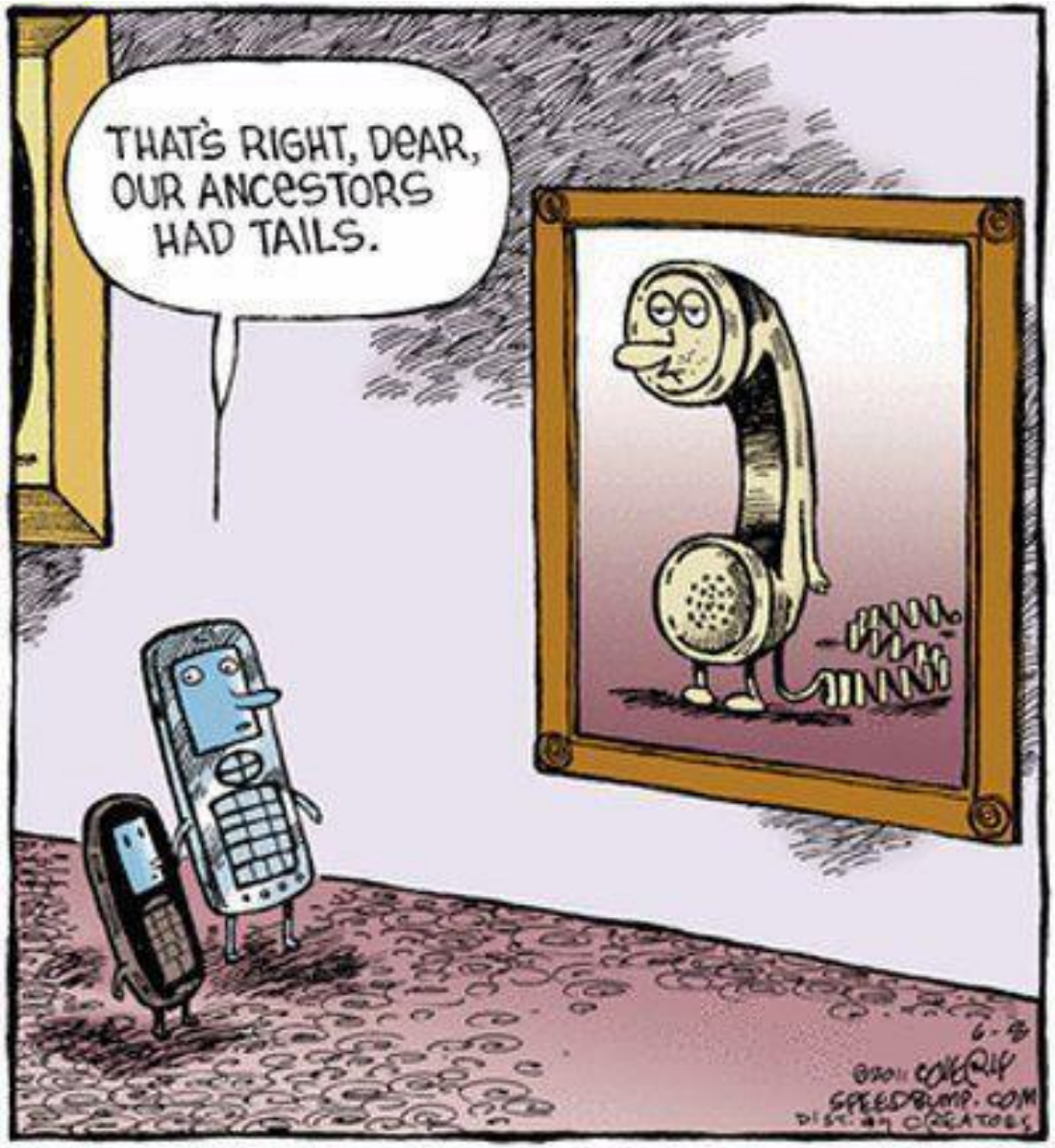
Adolescent cell phone use



88% of 13-17 year olds in US have cell phones
73% have smartphones

Pew Internet (http://pewrsr.ch/1J03zea), 4/9/2015

Demise of the landline



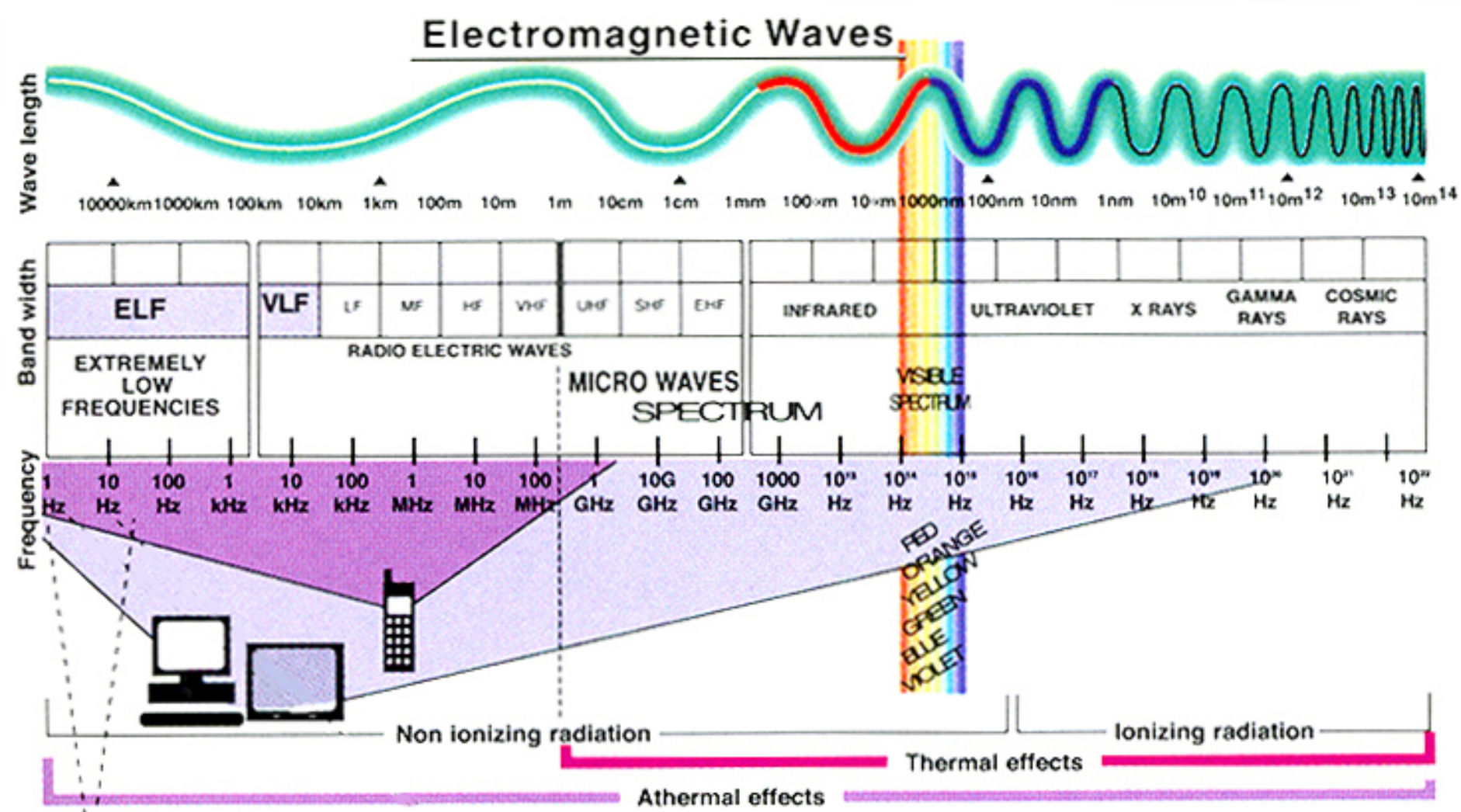
**US Households*
(Jan-Jun, 2014)**

- 44.0% wireless-only
- 33.1% wireless-mostly
- 20.3% landline-only
- 2.6% no phone

NHIS. NCHS, CDC. Dec., 2014.

http://bit.ly/wireless1214

Cell Phone Basics



Martin Blank. EMF and health risk: a scientific perspective. Commonwealth Club, San Francisco, 2010.

IARC RF working group: Overview

- IARC - WHO (2011)
  - "Gold standard" for carcinogenicity
  - 31 member expert working group
- Reviewed carcinogenic mechanisms, animal & epidemiologic studies

IARC RF working group: Official press release

International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as **possibly carcinogenic to humans (Group 2B)**, based on an increased risk for **glioma**, a malignant type of brain cancer, associated with wireless phone use.

IARC RF working group: Press conference

- **Christopher Wild, IARC Director:** "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."
- **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."

Glioma risk: 3 recent case-control studies

	Interphone (2010)	Interphone (App. 2) (2010)	Hardell (2013)	CERENAT (2014)
"Heavy" Lifetime Use	**1.40*** **1640+ hrs**	**1.82*** **1640+ hrs**	**1.75*** **1640+ hrs**	**2.89*** **896+ hrs**
10+ years	0.98	**2.18***	**1.79***	1.61

Current estimated lifetime risk of glioma in US is from 1 in 200 to 1 in 250.

Hardell Research Group: Case-control studies since IARC

- Wireless phone use ≥ 25 years
  - Glioma: OR = 3.3 (95% CI: 1.6 – 6.9)
- Wireless phone use ≥ 20 yrs
  - Acoustic neuroma: OR = 4.4 (95% CI: 2.2 – 9.0)

Hardell et al. *Int J Oncology*. 43:1833-1845. 2013.
Hardell et al. *Int J Oncology. 43:* 1036-1044. 2013.

Oxidative stress from low-intensity radiofrequency radiation

Yakymenko et al. (2015) review

- 93 studies (16 cellular, 73 animal / plant, 4 human) found significant effects
- 7 studies found no effects
- Cell signaling disrupted, stress proteins, free radical formation, DNA-damage
- Carcinogenicity, neurologic disorders including electrohypersensitivity

Child's brain absorbs 2X the radiation

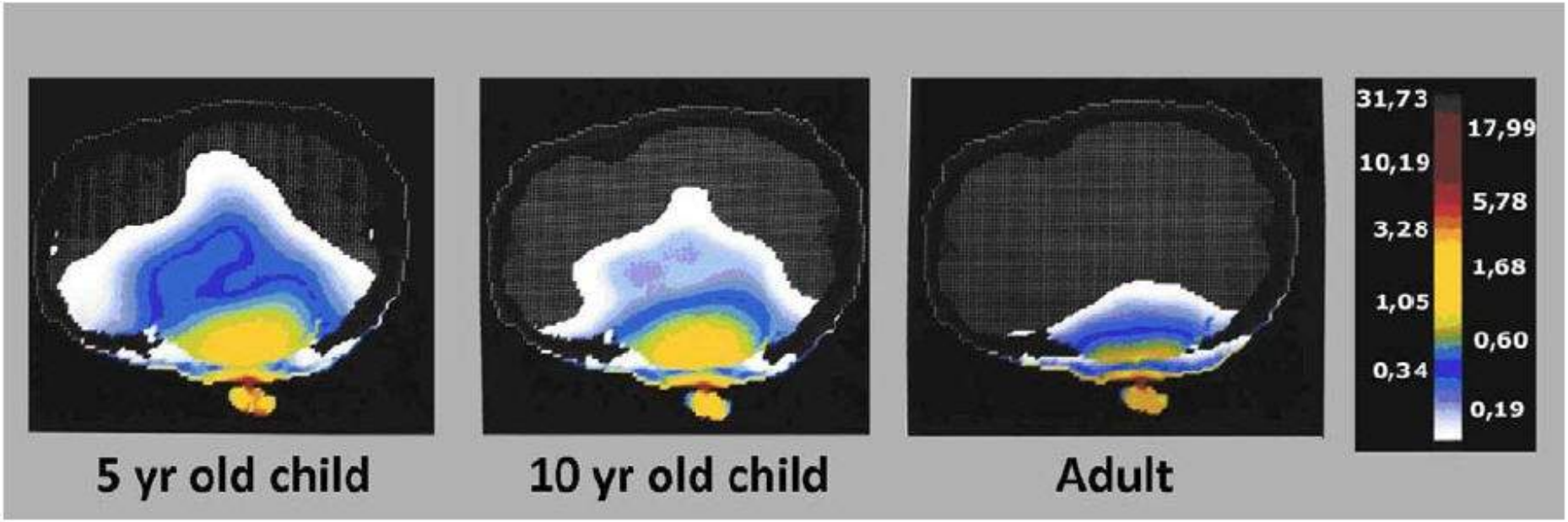


Figure 1. Estimation of the penetration of electromagnetic radiation from a cell phone based on age (Frequency GSM 900 Mhz) (On the right, a scale showing the *Specific Absorption Rate* at different depths, in W/kg) [1]*

Gandhi et al., 2012

CEFALO: Children's brain tumor risk

- Case-control study – Denmark, Sweden, Switzerland, Norway (2004-2008)
- Youth 7-19 years of age
  - 352 cases, 646 controls
- "**Regular"** cellphone use: OR = 1.36 (0.92-2.02)
  - 3 nations (OR's = 1.49 to 1.73); Norway (OR = 0.51)
- Operator records: > 2.8 yrs cellphone use
  - **OR = 2.14** (1.07-4.29)

Aydin et al. J Natl Cancer Inst. 103:1264-1276. 2011.

Brain cancer incidence: Recent increases over time

- **USA**: frontal lobe in adults 20-29 years of age; GBM in frontal & temporal lobes & cerebellum (overall population)
- **Norway & Finland**: overall population
- **Denmark**: GBM for males
- **England**: frontal & temporal lobes (overall)
- **Australia & New Zealand**: over age 70

- **Sweden**: tumor registry unreliable

Other potential health risks in humans from wireless phone use

- Tumors: acoustic neuroma, meningioma, parotid, pituitary & thyroid glands; breast
- Sperm damage & male infertility
- Reproductive effects: memory, ADHD, autism?
- Children: ADHD, headaches, hearing
- Electromagnetic hypersensitivity
  - Headaches, dizziness, fatigue, insomnia, tinnitus, skin rashes, heart palpitations

European Environment Agency: Policy recommendations

- Reduce cell phone radiation exposure, especially children & young adults
- Use phones hands-free & text
- Issue cell phone warning labels
- Adopt more stringent radiation standards
- Governments should fund research
- Manufacturers improve cell phone design

http://bit.ly/EEArecommends

Alarmism vs. denialism–what about precaution?

Industry position: CTIA—The Wireless Association

"The FCC, the FDA, the National Cancer Institute, and the World Health Organization have each evaluated the scientific research on wireless phones and each has found that the weight of the scientific research has not shown that wireless phone use causes any adverse health effects."

CTIA, May 27, 2012

U.S. government: Radio Frequency Interagency Working Group

National Institute for Occupational Safety and Health
NIOSH

FDA

OSHA
Occupational Safety and Health Administration
www.osha.gov

FEDERAL COMMUNICATIONS COMMISSION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

U.S. DEPARTMENT OF COMMERCE
NTIA
NATIONAL TELECOMMUNICATIONS & INFORMATION ADMINISTRATION

WHO & US federal agency positions

- WHO: “To date, no adverse health effects have been **established as being caused by** mobile phone use.”

- FCC: “currently no scientific evidence establishes a causal link between wireless device use and cancer or other illnesses.”
- FDA: “The scientific evidence does not show a danger to any users of cell phones from RF exposure, including children and teenagers.”
- NCI: “currently no consistent evidence that non-ionizing radiation increases cancer risk …The only known biological effect of radiofrequency energy is heating.”

Federal government position

- **Need to wait for conclusive evidence yet govt. makes minimal investment in research**
- “the overlap of federal agency responsibilities … leaves leadership unclear and encourages a **pass-the-buck attitude**.” (Cities of Boston & Philadelphia, 2013) http://bit.ly/1kAYSu7
- "the electromagnetic radiation standards used by the FCC continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today." (U.S. Dept. of Interior, 2014) http://1.usa.gov/1jn3CZg

International EMF Scientist Appeal

EMFscientist.org

- Petition calls for precautionary health warnings & stronger regulation of electromagnetic fields
- Submitted to UN & WHO (May 11, 2015)
- Signed by 200+ EMF scientists

Berkeley: Cell phone "Right to Know" ordinance

- Berkeley City Council unanimously adopted cell phone consumer disclosure ordinance (May 12, 2015)
- CTIA filed lawsuit – 1st Amendment
- Harvard Law Prof. Lawrence Lessig v. Ted Olson
- See SaferEMR.com for updates & media coverage

Contact information





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References

Tumor risk review papers

- Myung et al (2009) Mobile phone use & risk of tumors: a meta-analysis. http://1.usa.gov/12wBOmd
- Khurana et al (2009) Cell phones & brain tumors: a review including long-term epi data. http://1.usa.gov/1jeI7s0
- Levis et al (2011) Mobile phones & head tumours: the discrepancies in cause-effect relationships in the epi studies-how do they arise. http://1.usa.gov/1gzK8vl
- Levis et al. (2012) Mobile phones & head tumours: a critical analysis of case-control epi studies. http://bit.ly/1rA9aTM
- Hardell, Carlberg (2013) Using the Hill viewpoints from 1965 for evaluating strengths of evidence of the risk for brain tumors associated with use of mobile and cordless phones. Rev Environ Health. http://1.usa.gov/1jeIT8p

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Tumor risk review papers

- WHO (2013) IARC monographs on the evaluation of carcinogenic risks to humans. Volume 102: Non-ionizing radiation, Part 2: Radiofrequency electromagnetic fields. http://bit.ly/10oIE3o
- Morgan et al (2015) Mobile phone radiation causes brain tumors and should be classified as a probable human carcinogen (2A) (Review). http://1.usa.gov/1EqL1DF

Tumor risk case-control studies

- Interphone Study Group (2010) Brain tumour risk in relation to mobile phone use: results of the Interphone international case-control study. http://1.usa.gov/IBm2nJ
- Interphone Study Group (2011) Acoustic neuroma risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. http://1.usa.gov/18CRSNA

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Tumor risk case-control studies

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- Hardell et al (2013) Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones. http://1.usa.gov/1iu2ORM
- Aydin et al (2011) Mobile phone use & brain tumors in children & adolescents: a multi-center case-control study. http://1.usa.gov/1baLADg
- Coureau et al (2014) Mobile phone use and brain tumours in the CERENAT case-control study. http://bit.ly/1DWgzRi

Breast cancer case series

- West et al (2013) Multifocal breast cancer in young women with prolonged contact between their breasts and their cellular phones. http://1.usa.gov/1yFRFBH

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Brain tumor incidence trends

- Inskip et al (2010) Brain cancer incidence trends in relation to cellular telephone use in the United States. http://1.usa.gov/1DXyCGR
- Zada et al (2012) Incidence trends in the anatomic location of primary malignant brain tumors in the United States: 1992-2006. http://1.usa.gov/1tRnRPJ
- Hardell & Carlberg (2015). Increasing rates of brain tumours in the Swedish National Inpatient Register & the Causes of Death Register. http://bit.ly/1aDHJmf

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Mechanisms

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- Juutilainen et al (2011) Review of possible modulation-dependent biological effects of radiofrequency fields. http://1.usa.gov/1eQUXJ3
- Ruediger (2009) Genotoxic effects of radiofrequency electromagnetic fields. http://1.usa.gov/1gzLuX3
- Volkow et al (2011) Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. http://1.usa.gov/IHmW2W
- Yakymenko et al (2015) Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. http://bit.ly/1Hgq8fa

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Reproductive Health Effects

- Adams et al (2014). Effect of mobile telephones on sperm quality: A systematic review and meta-analysis. http://bit.ly/1pUnmDq
- LaVignera et al (2011) Effects of the exposure to mobile phones on male reproduction: a review of the literature. http://1.usa.gov/1eQXwuv
- Aldad et al (2012) Fetal radiofrequency radiation exposure from 800-1900 Mhz-rated cellular telephones affects neurodevelopment and behavior in mice. http://1.usa.gov/18cGEwK
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Exposure

- Kelsh et al (2010) Measured radiofrequency exposure during various mobile-phone use scenarios. http://1.usa.gov/1eQXinm
- Gandhi et al (2012) Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. http://1.usa.gov/1cVJBRD

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Other

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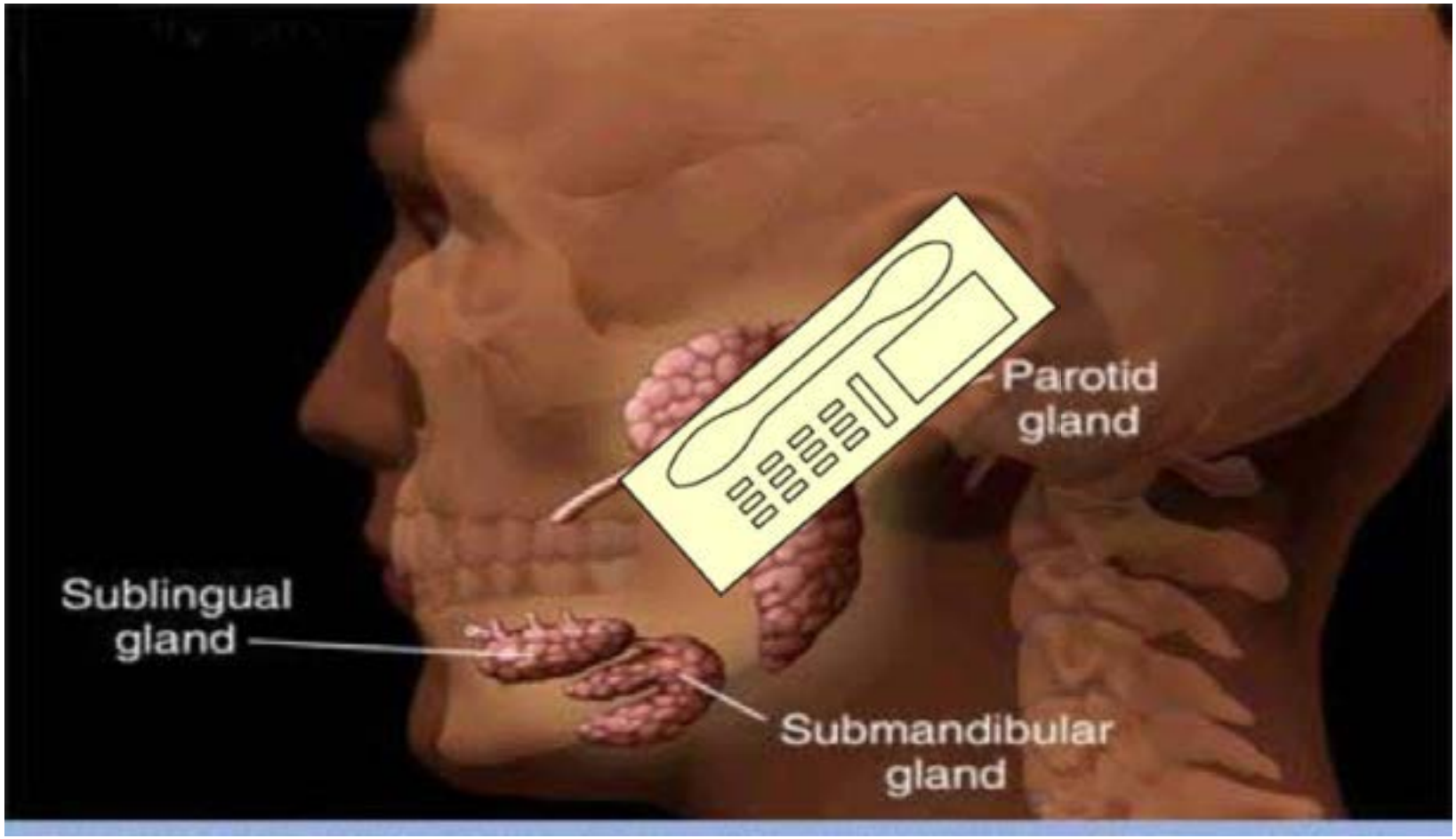
Supplemental Slides

Israel: Parotid gland tumors triple over time



Source: Environmental Health Trust

Israel: Increase in parotid gland tumors (PGT) over 30 years

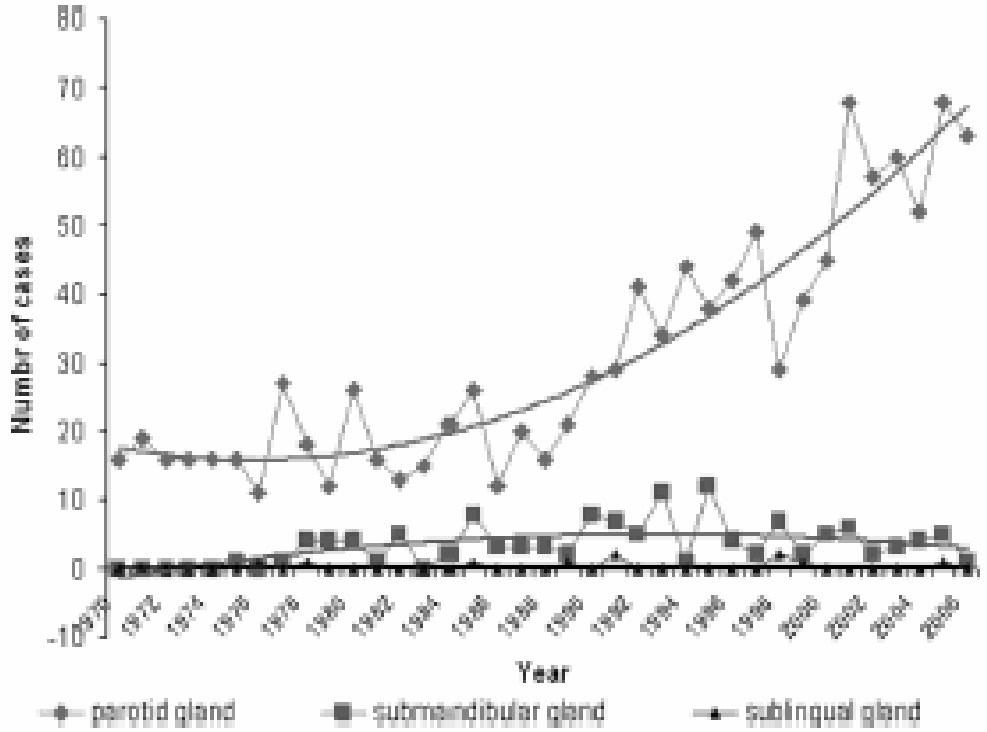


FIGURE. For trend analyses, we added regression lines and calculated R^2 values. Parotid gland cancer: $R^2 = 0.83$; Submandibular gland cancer: $R^2 = 0.36$; Sublingual gland cancer: $R^2 = 0.02$.

Source: Epidemiology *22*(130). 2011.

Israel: PGT case-control study

- Elevated risks for regular cell phone users & heavy users in rural areas.
- For ipsilateral use, 49% increased risk for highest category of call time.
- Positive dose-response trend.

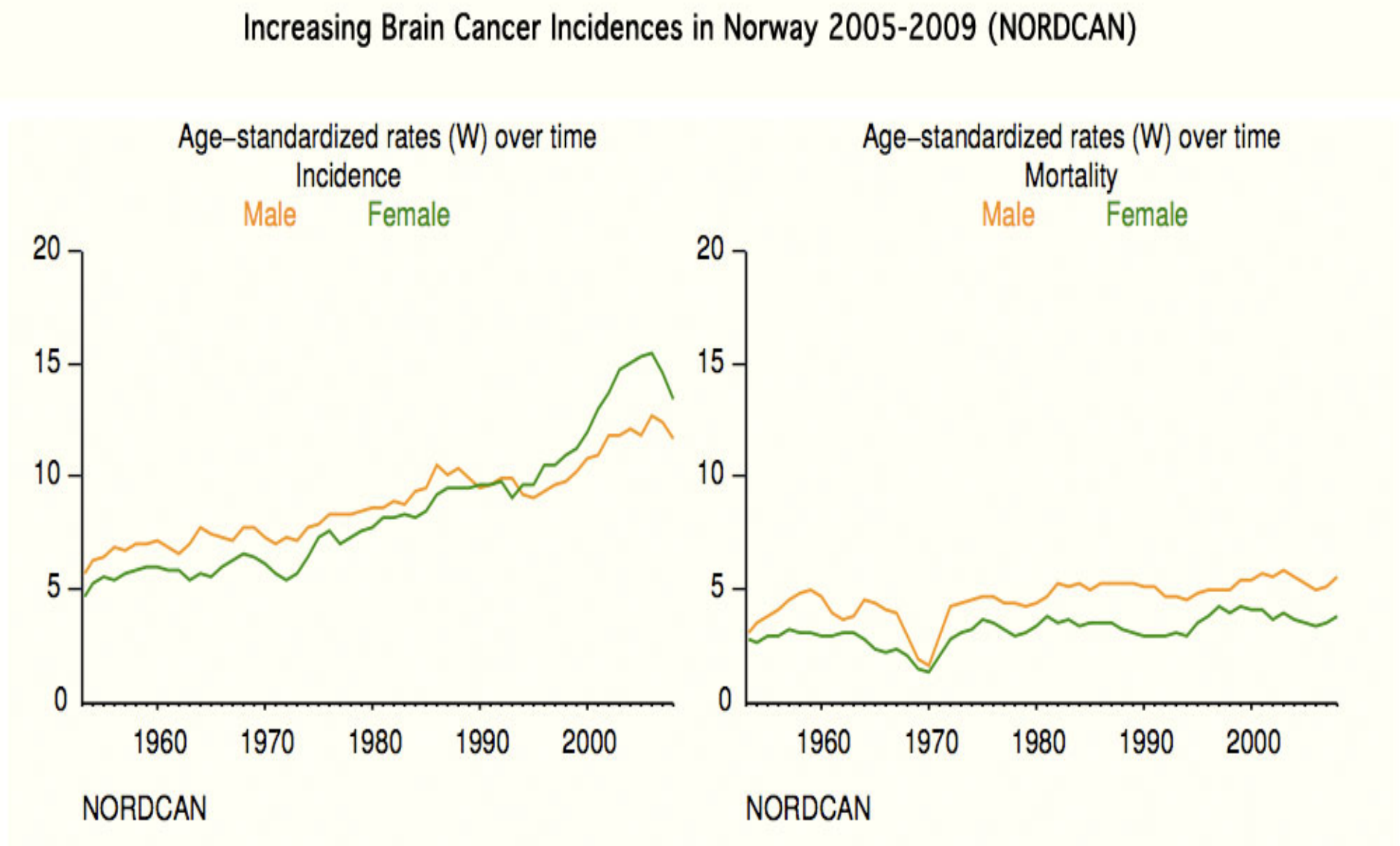
Sadetzki et al. Amer J Epidemiol. 167 (4): 457-467. 2008.

Israel: Israeli Dental Association PGT warning

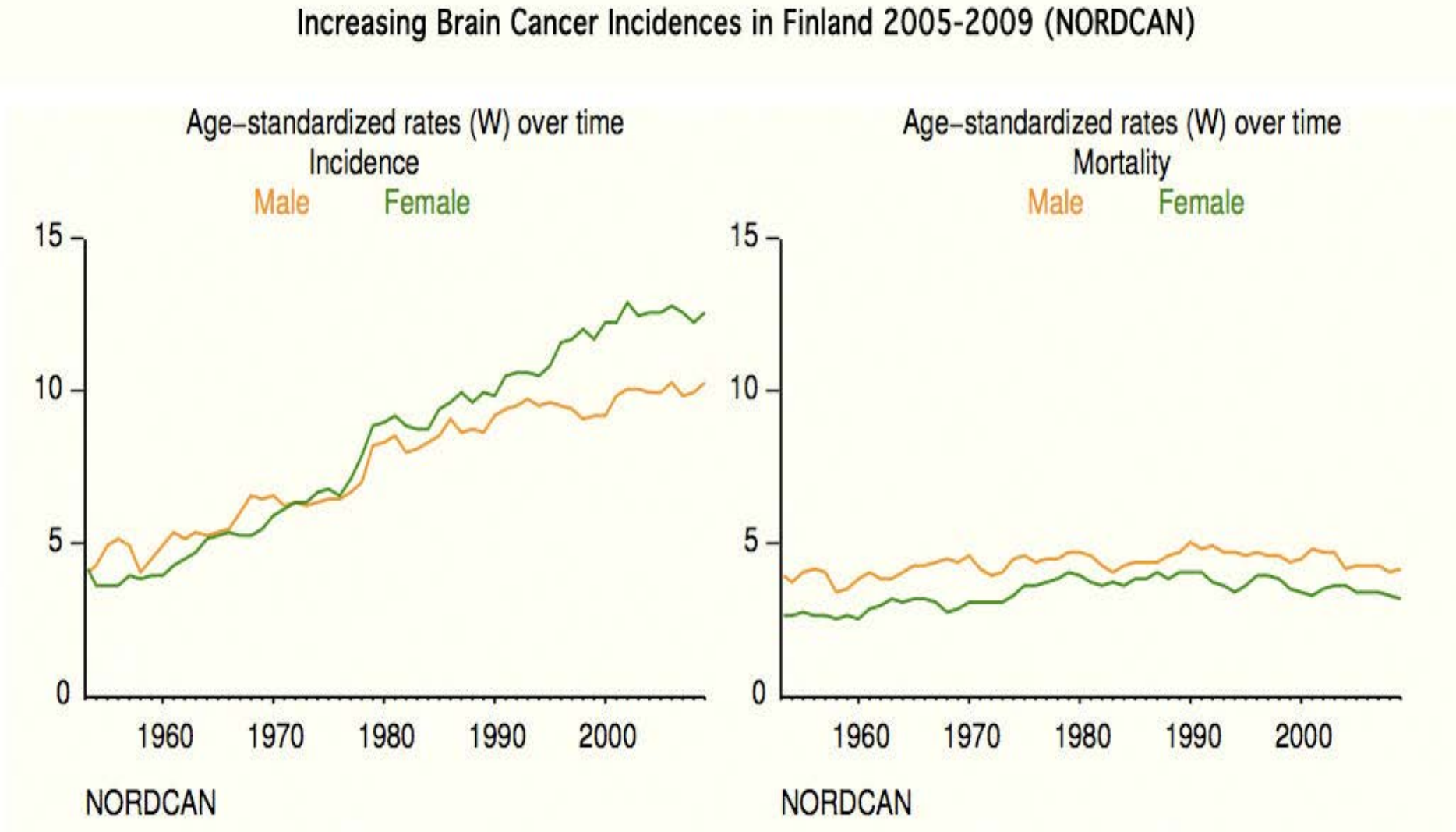
- Young people should limit direct exposure of the head to microwave radiation from cell phones.

- More than14 nations have issued precautionary health warnings to limit cell phone use.

Brain cancer incidence: Norway



Brain cancer incidence: Finland



Brain cancer incidence: England