



**SOME Reproductive & neurological
impacts of mobile phone radiation and
toxic chemicals—a BRIEF update &
theoretical speculation**

Devra Lee Davis, PhD, MPH May 18,
2015

International EHS/MCS Symposium
Royal Medical Academy of Belgium



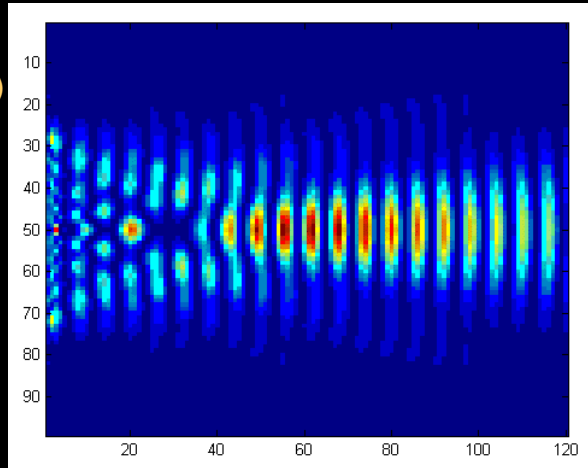
The biological impact of non-ionizing
radiation and toxic chemicals varies with

Temperature
Wave characteristics
Cell types & age
Tissue exposed
Intracellular signaling (MAPK transcription,
mRNA)
Type of exposure, continuous v. modulated
ROS & Other variables TBD

The impact of any form of radiation depends on signal properties & chemical exposures

- Frequency (pace)
- Amplitude (power)
- Pulse (beats)
- Intensity (power density)
- Polarity
- Information content

ENVIRONMENTAL
HEALTH TRUST

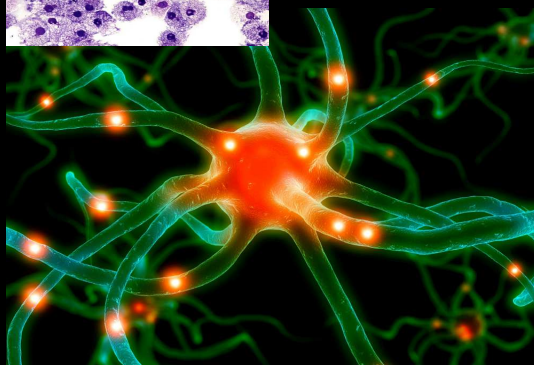
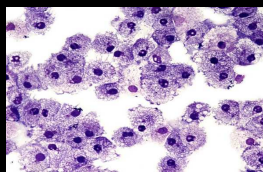


Do not take without permission

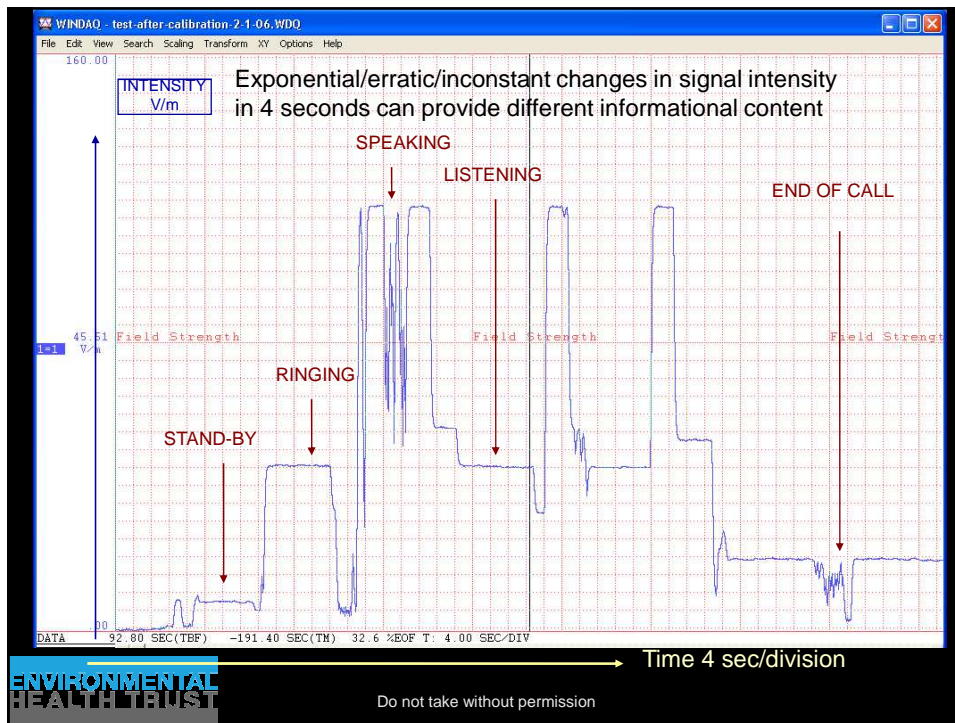
Courtesy of Margaritis et al

The impact of radiation or toxic chemicals depends on the types & parts of cells

- Cell age/function
- Tissue
- Host status
- Cell health
- Intracellular signaling (ERK)
- Membrane
- Mitochondrial activation



ENVIRONMENTAL
HEALTH TRUST

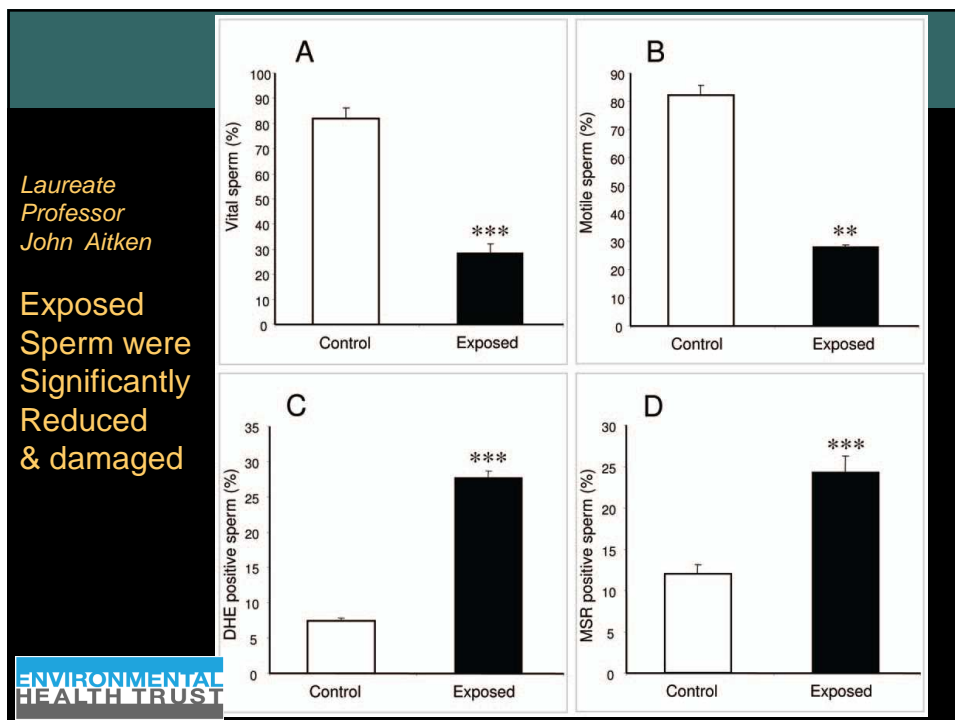
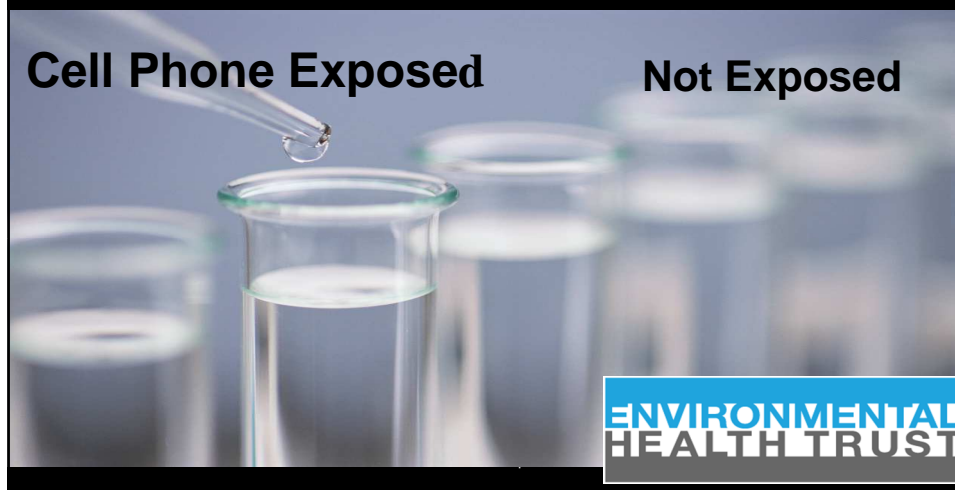


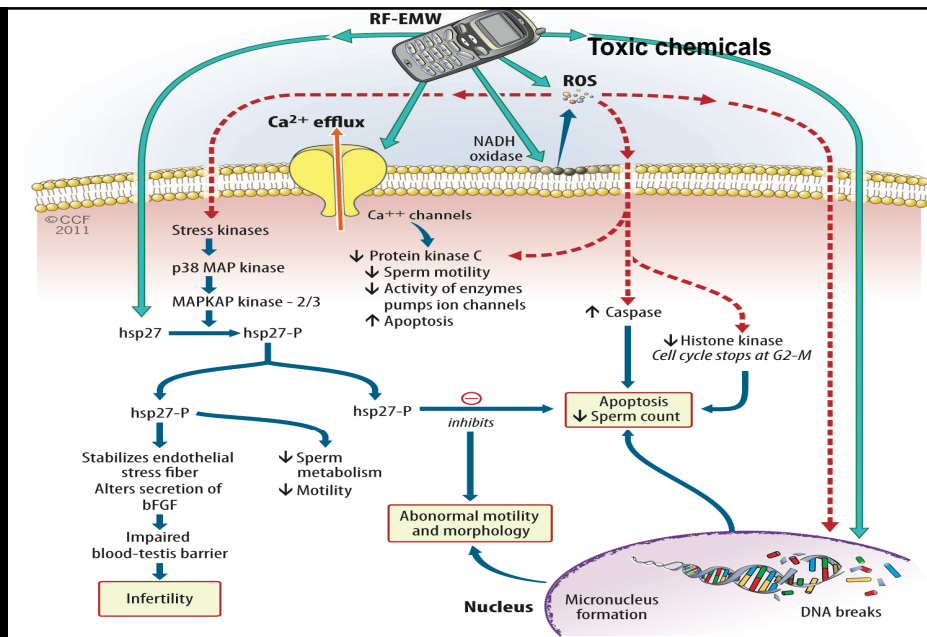
Vulnerability to Toxic Insult

- Depends on the rate of cell proliferation
- Therefore, younger faster growing cells are more vulnerable, i.e., spermatocytes, neuronal stem cells, mouse embryonic (all have thinner Membranes!?)

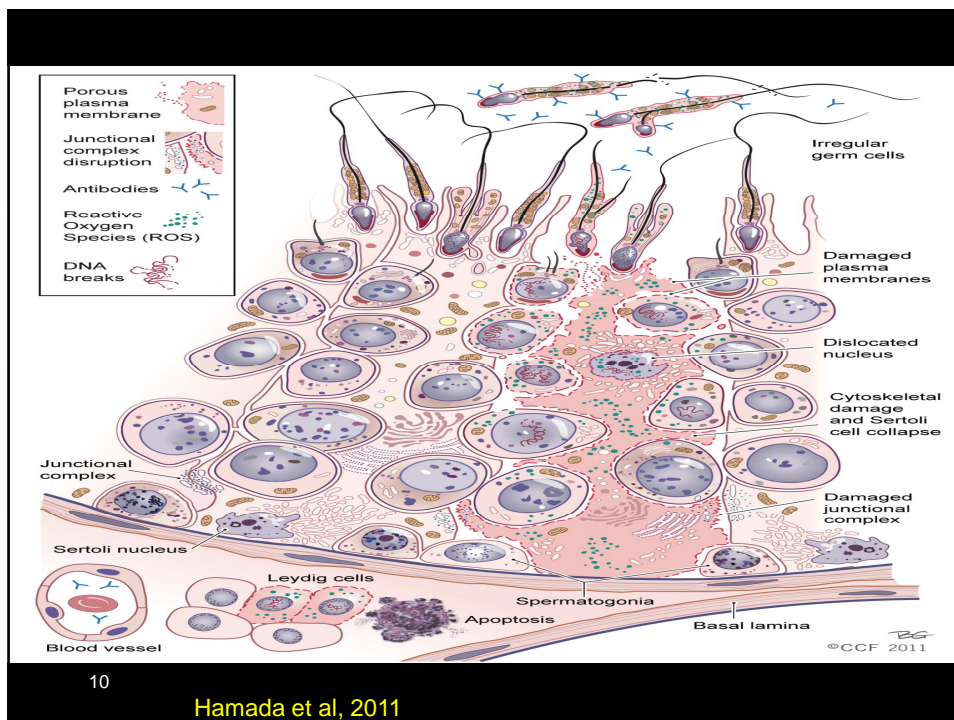


Controlled Experiments with Human Material-- sperm





9 Hamada et al., 2011

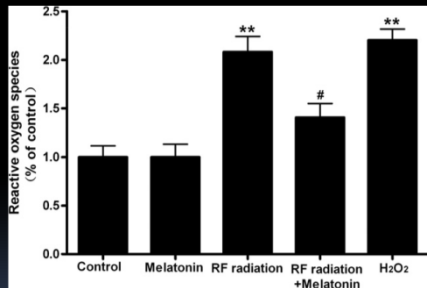


10

Hamada et al., 2011

Melatonin Protects Against RF Radiation Damage

- Xu et al
- Brain Research, 2010



Protective Effects of Anti-oxidants is Evidence for chemical synergies

- | | |
|-----------------|--------------|
| ▪ Anthocyanadin | ▪ Tocopherol |
| ▪ Cyanadin | ▪ Polyphenol |
| ▪ Ascorbate | ▪ Selenium |

Possible shared mechanisms of EMF/chemicals

- Altered calcium homeostasis due to low
- frequency EMW exposure leads to plasma membrane weakening.
Negatively charged phospholipid bilayer of the cell membranes binds to divalent cations, such as calcium,
- which fit between phospholipid molecules and prevents them
- from repelling each other.

13

Possible shared mechanisms of EMF/chemicals

Calcium helps to stabilize and strengthen cell membranes

Under induced alternating voltage across the cell membrane, submembrane calcium ions are displaced on and off the cell membrane.

14



Thank You! Collaborators

- Ashok Agarwal, Cleveland Clinic
- Igor Belyaev, National Cancer Institute of Slovakia/[Institute of General Physics, Russian Academy of Science, Moscow, Russia](#)
- Andreas Christ, formerly with IT' IS, Switzerland
- Alvaro DeSalles, University of Porto Alegre
- Suleyman Kaplan, Ondokuz Mayıs Medical Univ.
- Lukas Margaritis and Adamantia Fragopoulou, University of Athens, Greece
- Lloyd Morgan, Susan F. Dixon, Ron Herberman, EHT
- Nesrin Seyhan, Gazi University, Ankara
- Hugh Taylor, Yale University



How to Protect Your Family

- France, Finland, Israel, and the European Environment Agency advise cellphone precautions
 - Use speakerphone
 - Use earpieces
 - Do not keep phone on body/in pocket
 - Avoid use in areas of weak signals
 - Protect abdomens--pregnant, adolescent and men wishing to become fathers
 - Do not text while driving/biking/moving

Do not take without permission

ENVIRONMENTAL
HEALTH TRUST



Campaign for Safer Cell Phones—Berkely 2015 Ordinance under development

- 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

Do not take without permission

ENVIRONMENTAL
HEALTH TRUST



Campaign for Safer Cell Phones—Berkely 2015 Ordinance under development

- Where manufacturers provide advice about recommended distance for using mobile phones that information must be made visible at the point of sale

Do not take without permission

ENVIRONMENTAL
HEALTH TRUST