

The Unique Vulnerability of Children,
& Ever Increasing Combined Exposures to the Public
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Comments on the National Toxicology Program Study of Radiofrequency
Radiation Exposures
March 26, 2018

Widespread Use of Cell Phones and Wireless Devices Near Body Now & In The Future



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Children's Exposure

“Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children.”

-American Academy of Pediatrics

Thinner skulls, Smaller heads,
Different dielectric properties

*Brains less myelinated and still developing.

“The average RF radiation energy deposition for children exposed to mobile phone RF is two times higher in the brain and 10 times higher in the bone marrow of the skull compared with mobile phone use by adults.”

- International Agency for the Research on Cancer
- Monograph on RFR, IT'IS modeling, also Gandhi et al, 2012

Peak Exposure to Cell Phone Radiation Occurs in Youngest Children SAR at Eyes Plane



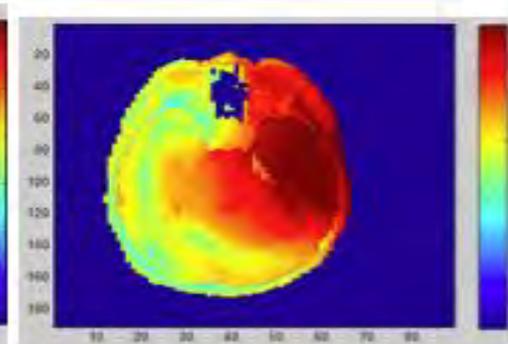
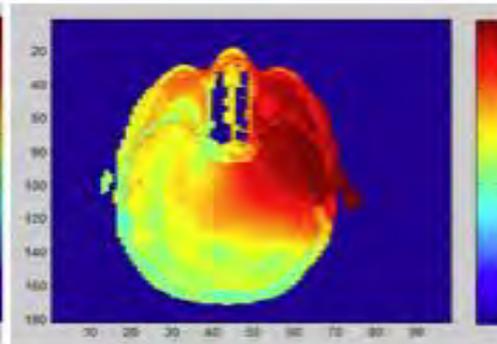
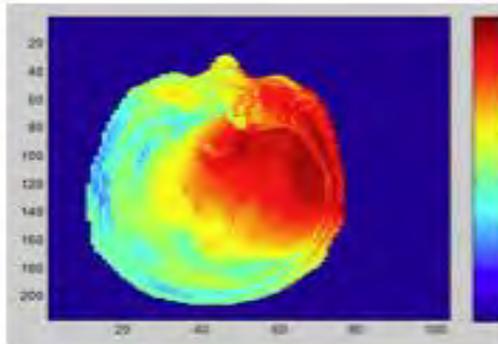
34 year old



6 year old



3 year old



[Derived from scans from Dosimetric Simulations of Brain Absorption of Mobile Phone Radiation—The Relationship Between psSAR and Age](#)
Fernandez et al. 2015 EHT/Port Alegro Not to be used without permission.



Woman was walking and talking on cell phone with her baby in this position.

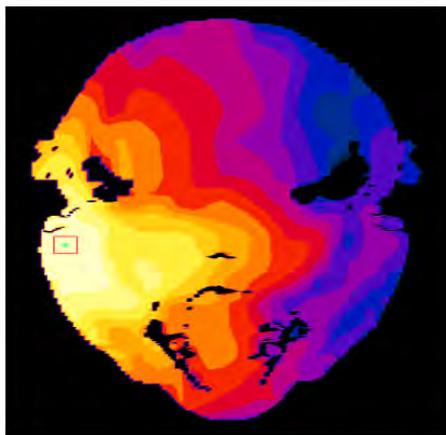
The bottom 1/3 of the phone was touching the baby's head.



Multiple Devices Increase Exposure

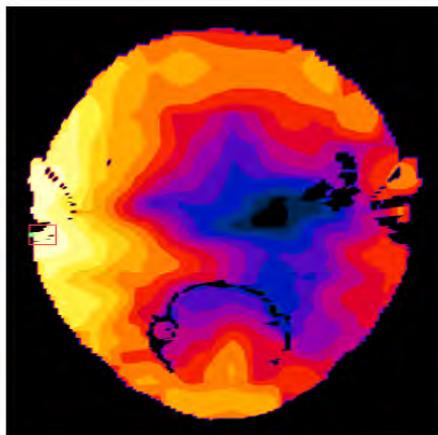
“Results show SAR can increase- up to 20% while making a call with Laptop on right side, activated vertical antenna, compared to no laptop”

Cell Phone To Head + Wi-Fi Laptop = SAR Increased 20%



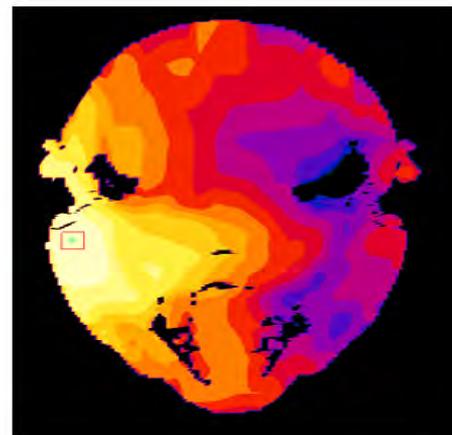
900 MHz SAR = .421 W/kg

+



2400 MHz +.128 W/kg

=



Combination SAR = .502 W/kg



Salah I. Yahya, Yazen A. Khalil “Numerical Computation of the Combined Specific Absorption Rates Induced in Human Head due to Multiple Independent Sources” International Journal of Electromagnetics and Applications (2015)

Metal Inside/Outside The Body Increases Exposure

“Electrically conductive objects in or on the body may interact with sources of RF energy in ways that are not easily predicted. Examples of conductive objects in the body include implanted metallic objects. Examples of conductive objects on the body include eyeglasses, jewelry, or metallic accessories.” –US FCC



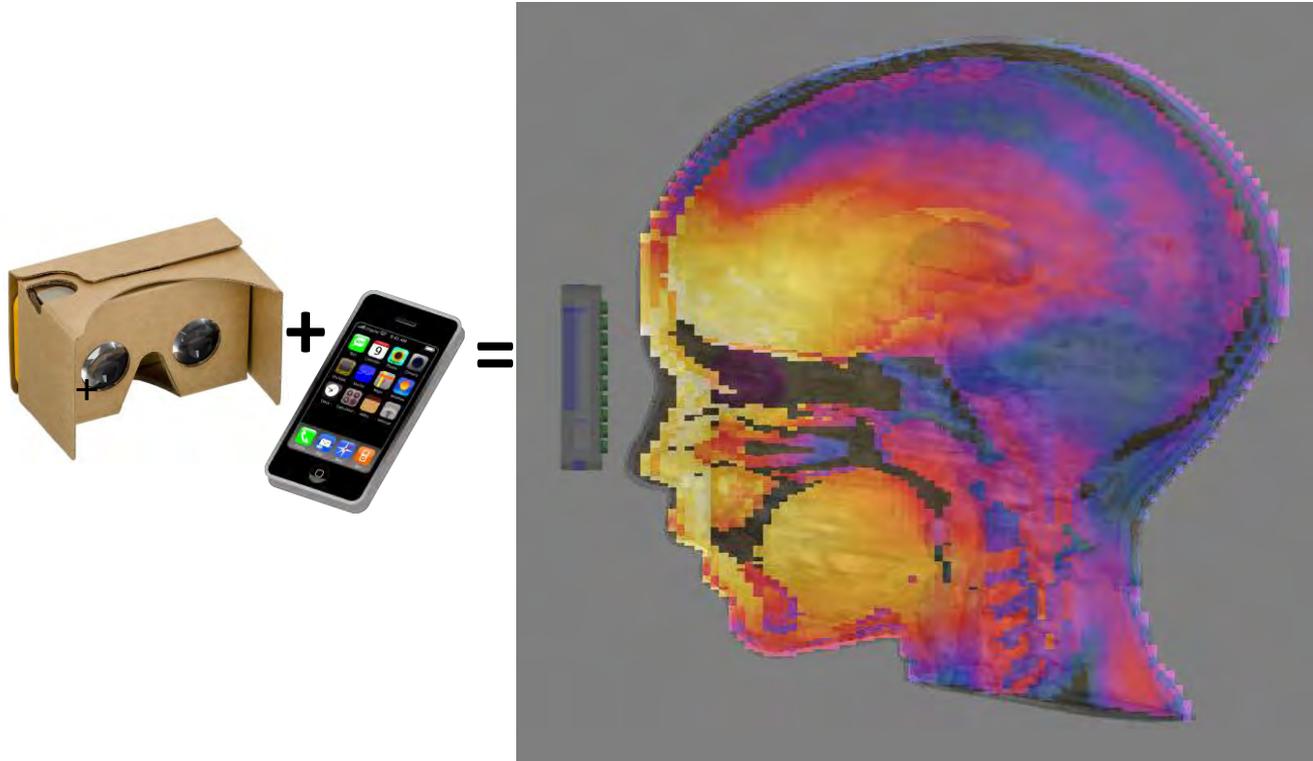
Credit: NIADDK, 9A04 NIH

Published research has found local SAR enhancement:

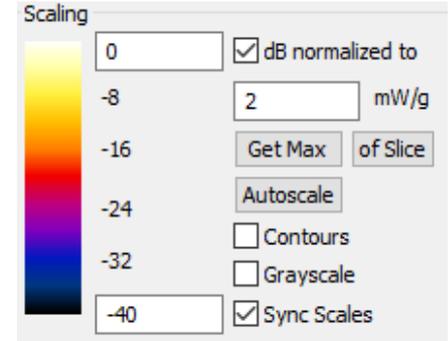
- Eyeglasses with metal frames, metal jewelry, piercings, storing phones next to metal objects like keychains.
- Metal Implants : skull plates, dental, hip replacements etc.
- Cell phone use inside a vehicle (leads to reflections and wave propagation.) Even passengers without phones have increased SAR from passengers with phones.

Microwave RFR Radiation SAR in 6 Year Old Child

From Virtual Reality Simulations



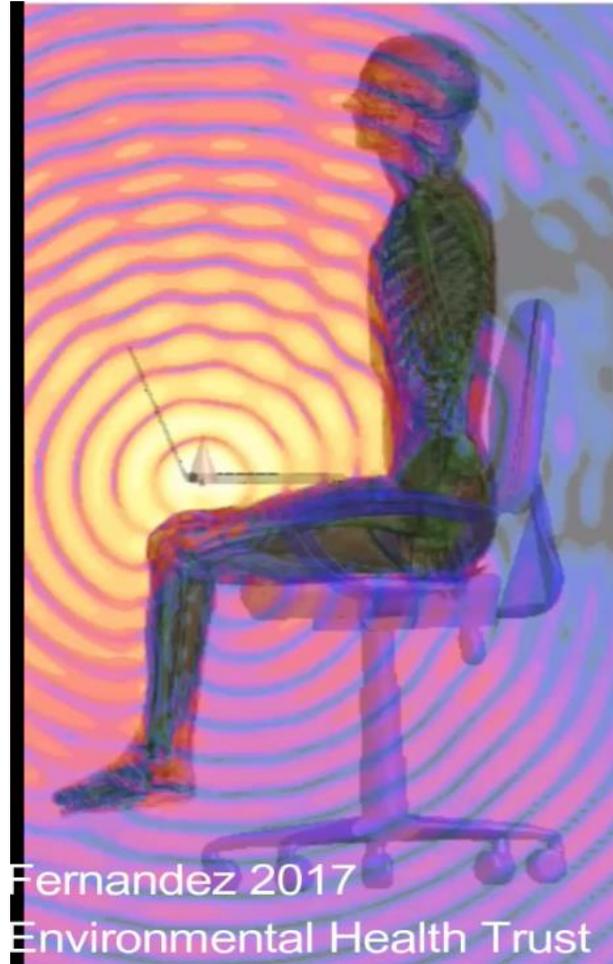
40dB color Scale.
Smartphone placed in
a position to the eyes
as it would be placed
using the cardboard
virtual reality holder.
(Fernandez 2015)



“Small Cell” in Front of Balcony, CA

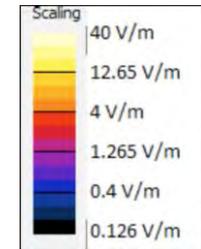


Wi-Fi Laptop on Lap Peak SAR



Simulation of Peak Exposures from 2.45 GHz Wi-Fi Laptop

Focus on field from laptop



Focus on field on body

