ADHD symptoms associated with voice calls, only among children with higher blood lead values. (Byun 2013 PLOS)

“Our results suggest that exposure to RF associates with increased ADHD symptom risk with simultaneous exposure to lead, and that RF exposure alone may have a weak or no effect on ADHD symptoms, i.e., a combined or cooperative toxic action of RF and lead on the developing brain.”

2,422 children - 27 schools - 10 Korean cities - 2 y follow up

Increased risk of having poor/delayed neurodevelopment up to 36 months of age in association with mobile phone use during pregnancy. (Choi 2017)

- 1198 mother-child pairs, personal exposure measurements with meters and blood lead level during pregnancy.

Co-exposures represent a critical research area, significant data gaps.
Changes in the Permeability of the Blood Brain Barrier

Additional Research to be added to NTP

“This study demonstrated, for the first time, the blood-brain barrier and cognitive changes in rats exposed to 900 MHz electromagnetic field (EMF) and aims to elucidate the potential molecular pathway underlying these changes. Researchers found that EMF exposure for 28 days induced the expression of mkp-1, resulting in ERK dephosphorylation. Taken together, these results demonstrated that exposure to 900 MHz EMF radiation for 28 days can significantly impair spatial memory and damage BBB permeability in rat by activating the mkp-1/ERK pathway.” Tang, J., et al. “Exposure to 900 MHz electromagnetic fields activates the mkp-1/ERK pathway and causes blood-brain barrier damage and cognitive impairment in rats.” Brain Research, vol. 1601, 2015, pp. 92-101.


“A significant increase in albumin was found in the brains of the RF-exposed male rats when compared to sham-exposed male brains.”

Prenatal Exposure Decreases Brain Cells

Prenatal 900 MHz EMF exposure decreased hippocampal granular cells in dentate gyrus of newborn rats.

Control Group

EMF Exposed

Several studies finding decreased brain cells; Sonmez 2010, Bas 2009, Odaci 2008, Kaplan 2016
Prenatal Cell Phone Exposure Linked to Behavioral Problems Speech Issues

Mice exposed prenatally: hyperactivity and poor memory, altered brain development (Aldad 2012)

Maternal EMF exposure to speech issues in children (Zarei et al, 2015)

Prenatal/Postnatal cell phone use associated w/ behavioral problems (Divan et al., 2012 & 2009)
World Wide Government Action to Reduce RF Exposure
Over 20 countries recommend reducing exposure to cell phones

France: Cell Phone radiation labeling, no advertising cell phones to children, Wi-Fi Banned in Kindergarten. Elementary Schools Wi-Fi off when not in use.

Belgium: Ban on sale of cell phones for children. Wi-Fi banned in Ghent nursery schools.

Israel: Official recommendations to reduce exposures from phone. Wi-Fi banned in nurseries. Wi-Fi removed/ minimized in schools.

India: Phone Radiation labeling, Recommendations to reduce cell phone exposure, Exposure limits lowered to 1/10 of the ICNIRP level, some municipalities ban towers near schools.

Cyprus: Wi-Fi removed from elementary classrooms in 2017. PSAs by Cyprus Children’s Environmental Health Committee

French Polynesia: Banned advertising cell phones to children under 14. Children should not use phones under 14. Major awareness campaign on how to reduce ELF/RF EMF
“The Council recommends limiting radiofrequency exposures as much as feasibly practical.”

Recommendations

The Maryland State Department of Education

“Should consider using wired devices in classrooms”
“If a new classroom is to be built... network cables can be added at the same time, providing wired network access.”

“The Maryland Department of Health and Mental Hygiene should provide suggestions to the public on ways to reduce exposure.

San Francisco & Burlingame, California
Connecticut Department of Health,
RECOMMENDS
SPEAKERPHONE OR HEADPHONES
SLEEP WITH PHONE AT ARM'S LENGTH
AVOID KEEPING IN POCKET

WARNING SIGNALS
CALIFORNIA HEALTH OFFICIALS WARN ABOUT CELL PHONE SAFETY
CDPH Deleted Several Recommendations
144 pages of redrafts since 2009

Cordless phones: “both base stations and the handsets emit EMFs”
- “reducing time” spent on cordless phones
- “do not sleep with the base station near your head,”
- “replace old analog cordless phones with corded phones”

“What State Governments and It’s Employees Can Do To Lower Potential Risks From Cordless Phones and Cell Phones”
- “use a beeper so that cell phones can be turned off”
- “state employees could avoid purchasing cordless phones for office use.”

Ways the California State Department of General Services can take to reduce employee exposure. When purchasing phones for employees “create contract language to require manufacturers to provide SAR ratings for phones and to offer low-emission accessories.”

“Do not allow children to use a cell phone except for emergencies.”

https://www.cdph.ca.gov/Programs/OPA/Pages/NR17-086.aspx
DNA Damage Analysis is Missing

“DNA damage was significantly increased in the frontal cortex of male mice (both modulations), peripheral leukocytes of female mice (CDMA only), and hippocampus of male rats (CDMA only)...”

“These results suggest that exposure to RFR has the potential to induce measurable DNA damage under certain exposure conditions.”

Input the table and conclusions into the final technical report.
These findings appear to support the International Agency for Research on Cancer (IARC) conclusions regarding the possible carcinogenic potential of RFR.

Reference to WHO/IARC is missing in 2018 Report
Schwannoma in the Rats and Lymphoma in the Mice: By Chance?

Schwannoma in NTP-rats
Schwannoma in Ramazzini (Falconi 2018) -rats
Vestibular schwannoma (acoustic neuroma) in human case control studies (Hardell 2013)-people
Schwannoma (and mammary adenocarcinomas) in Ramazzini Study  Elf+ Gamma (Sofritti 2015)-rats
Lymphoma = ENU in utero (Lerchl 2015, a replication Tillman 2010) – mice
Lymphoma, NTP - mice

Lerchl, Tillman and a summary of ELF need to be added to the NTP technical report.