The Adverse Health effects of Non-Ionizing Radiation on Foetus and Child: is it a mythos or a scientifically evident Global Public Health Challenge

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1. Introduction


2. Children and Fetuses Exposure and Vulnerability

Mobile phones, baby monitors,wireless tablets and toys, and Wi-Fi, are major sources of children’s passive and active exposure at home and schools. Of great concern is the wide spread of Wi-Fi at schools (Reykjavik Appeal 2017). A review on Wi-Fi multiple effects is done by Wilke I. (2018). Pall, M. (2018b) concludes that Wi-Fi causes oxidative stress, sperm/testicular damage, neuropsychiatric effects including EEG changes, apoptosis, cellular DNA damage, endocrine changes, and calcium overload, and that these effects are established. Absorption from child’s brain is greater and in deeper tissues compared to adults. Child’s brain has different dielectric constants, greater conductivity, smaller size, thinner cranial bones and smaller distance from radiation source (Keshvair, J et al 2006, Christ, A. 2010, Morgan L, 2014, ). Apart from higher exposure, children’s vulnerability to toxic factors is disproportionately higher than adults, because of developmental windows of vulnerability. Children sensitivity to EMF/RF caused epigenetic changes in DNA is higher(Kheifets, L 2005). Embryonic stem cells are more sensitive to multiple radiation frequencies and cannot adapt to chronic EMF/RF exposures, Lee(2014; Belyaev (2009). Because such stem cells occur at much higher cell densities in fetus and children impact on children are likely to be much higher than in adults Belyaev (2009) . The decreased DNA repair and increased DNA damage combined with faster cell division and more years of exposure to EMF/RF, strongly suggest that young children may be increasingly susceptible to cancer, Pall M.L(2018b). EMF/RF action on stem cells may also cause young children to be particularly susceptible to disruption of brain development, Xu (2016); Bhargav (2015). Epigenetic mechanisms can change fetal development especially the neurological one, Sage, C. (2018). Damages can be irreversible, leading to neurological/neuropsychiatric effects, Divan A.(2010),Schaefers (2016), Pall M.. (2016).

3. Risk Evaluation- Precautionary Measures

Risk Assessment/management in the EMF/RF domain, remains quite complex and challenging, with gaps and uncertainties. Effects are multi factorial, depending e.g on vulnerability of the subject, frequency, modulation, strenght and exposure duration (all being highly variable(ANSES 2016)). Dose-response curves are often non-linear/ non-monotonic,Belyaev, 2005, 2005;Pall, 2015b). Some long term effects have not yet been investigated or are beyond the timeframe of most of the studies. Disperse passive exposure, limits availability of unexposed /blank population. These could explain part of conflicting studies, and limit biological consistency, full establishment of certain effects and causality. Child oriented studies are still very limited (ANSES 2016) and extrapolation from adults studies is not scientifically adequate. Despite these constrains, the existing scientific evidence is strong enough, indicating damages that could be serious and in some cases irreversible. Application of the Precautionary Principle (Com 2000) is fully justified. Scientific groups, medical and other organizations and researchers, recommend actions to reduce EMF/RF

**Keywords:** EMF/RF children exposure, vulnerability, effects, risk, precautionary approach.*

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