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STATEMENT:

My name is Michelle Perro, MD, a pediatrician with more than four decades of clinical experience and co-founder and CEO of GMOScience. Thank you for allowing our input regarding radio frequency (RF) and electromagnetic field (EMF) exposures, in particular, with a recognition specifically regarding children and pregnancy.

My primary recommendation is simple: children should not be treated as small adults in RF/EMF research or risk assessment.

It must be emphasized that pregnancy, infancy, childhood, and adolescence are periods of rapid growth including and not exclusive of neurological, immune, endocrine, reproductive, and metabolic development. However, children today are growing up in an electromagnetic environment that is not only fundamentally different from that experienced by previous generations, but are receiving extensive, undocumented and unstudied cumulative exposures. Wi-Fi, cell phones, tablets, Bluetooth devices, smart meters, wireless baby monitors, smartwatches, wireless classrooms, IVs, and increasingly wireless medical devices add to a

child's overall exposure beginning very early in life (preconceptually and fetal exposures as well).

The available pediatric research remains inadequate to answer some fundamental questions. A 2022 systematic review by Bodewein and colleagues examined 42 epidemiological and 11 experimental studies involving children and adolescents. Evidence regarding cognition, behavior, and subjective symptoms was judged low to inadequate, while evidence regarding early childhood development, brain activity, cancer, and physiological outcomes was considered inadequate for drawing conclusions. I'd like to emphasize that the investigators cautioned that these findings should not be interpreted as demonstrating that RF exposure is safe for children.

I'd like to focus on this fact: An absence of demonstrated harm is not equivalent to demonstrated long-term safety.

I encourage HHS to prioritize prospective, long-term research specifically designed around pediatric exposures rather than extrapolating from adult data. Wearable technologies deserve particular attention. Children can wear wireless devices directly against their bodies for many hours per day which can add up to years of exposures. Upon review of the research, there are many factors and actual exposure patterns that should be studied, including transmitting power, frequency, duty cycle, proximity to tissues, duration of use, age at first exposure, and cumulative duration across childhood.

It is important to emphasize that those of us with concerns are neither 'anti-science' or 'anti-technology'. Wireless medical devices such as the continuous blood glucose monitor (CGM) require a more nuanced approach. I care for children with type 1 diabetes who depend upon continuous glucose monitors. The clinical benefits of these devices are not only significant, but are potentially lifesaving. A medically necessary CGM should therefore not be treated as equivalent to a smartwatch simply because both use wireless technology. Looking at comparative dosimetry across common pediatric devices would help clinicians and families make rational decisions based upon actual exposure and benefit rather than fear.

I also encourage HHS to examine exposures in electric and Ways-type vehicles. A published study measuring extremely low-frequency magnetic fields in the rear seats of ten electric vehicles specifically considered children because their smaller bodies may place them closer to electrical systems beneath the vehicle floor. The measured magnetic fields were far below current international exposure limits, which is reassuring. However, this does not answer the question of long-term developmental exposure. Research must characterize passenger-compartment exposures by seating position and age, and evaluation the following conditions: acceleration, cruising, regenerative braking, and other real-world operating conditions. Manufacturers should be held to provide consumers and researchers with standardized measurements of the electromagnetic environment inside their vehicles.

The most important research gap is cumulative exposure.

Children do not experience wireless technologies one at a time. A child awakens in a Wi-Fi-home, wears a smartwatch to soccer practice, uses Bluetooth earbuds at the gym (I see this all the time in High Schoolers), carry an iPhone in their back pocket or bra, spend six hours in a wireless school environment, travel in an EV, return to a home containing numerous wireless devices, and sleep near a phone or a phone under their pillow. A medically complex child can have additional wireless medical technology as mentioned.

Federal research and exposure assessment must therefore move beyond evaluating individual devices in isolation. Environmental health research recognizes the importance of mixtures and

the exposome. A similar framework could be developed for RF/EMF exposure so that we can begin to characterize the cumulative electromagnetic environment experienced by a developing child.

Please note my recommendations that the HHS, NIH, FDA, and CDC prioritize:

Longitudinal studies beginning during pregnancy and following children through adolescence.

Pediatric dosimetry that reflects age, body size, individualized physiology, device placement, and real-world use.

Long-term studies of physically wireless devices, including smartwatches and other wearables.

Comparative exposure studies of medically necessary versus discretionary wireless technologies.

Studies of cumulative RF/EMF exposure across the home, school, transportation, medical, and recreational environments.

Independent characterization of passenger exposures in electric and Waymo-type vehicles.

Research examining biological effects below existing federal exposure limits, including mechanistic studies addressing oxidative stress, mitochondrial function, calcium signaling, inflammation, sleep, neurodevelopment, reproductive health, metabolism, and immune function, and effects on the microbiome while clearly distinguishing reproducible findings from preliminary or conflicting evidence.

Publicly accessible exposure information that allows parents, physicians, schools, and consumers to make informed decisions without unnecessarily alarming families.

Precaution does not require panic, fear, or neuroses, nor does scientific uncertainty establish harm. But uncertainty should also not be mistaken for proof of long-term safety.

Parents deserve practical information about which exposures contribute most to their children's electromagnetic environment and which reasonable changes can meaningfully reduce unnecessary exposure. Physicians need better evidence to answer their questions. Most importantly, our federal research agenda should address the world children actually inhabit today rather than studying one device at a time.

I appreciate HHS undertaking this review and support the Department's priority to place children, pregnancy, developmental windows of vulnerability, and cumulative real-world exposure at the center of its research.

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