Proposed Bioelectric Dissonance Pathway

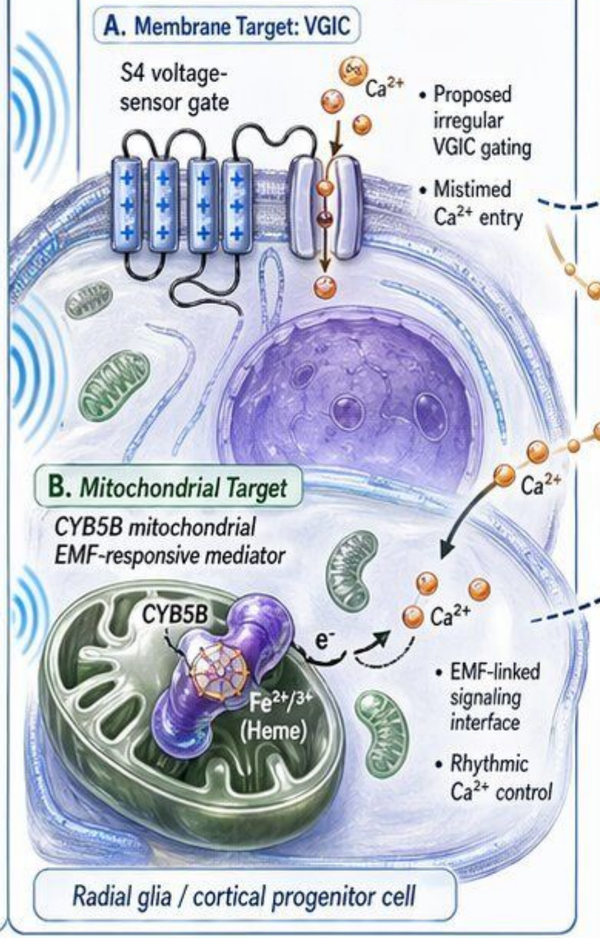
Proposed mechanistic integration

RF/ELF pulse structure → S4 voltage-sensor stress + CYB5B mitochondrial sensing → calcium timing disruption → BET/NDEL1 pathway effects → altered neurodevelopment

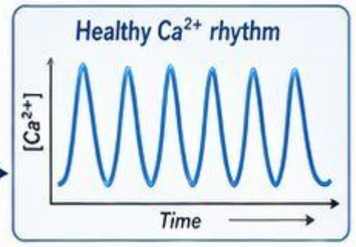
1 Modulated RF / ELF Exposure

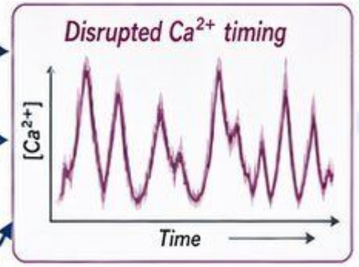
RF carriers (e.g., 700 MHz–6 GHz) modulated by ELF frequencies (e.g., 0.1–300 Hz)

2 Dual Cellular Targets (Cortical Progenitor / Radial Glia)



3 Calcium waveform fidelity collapses



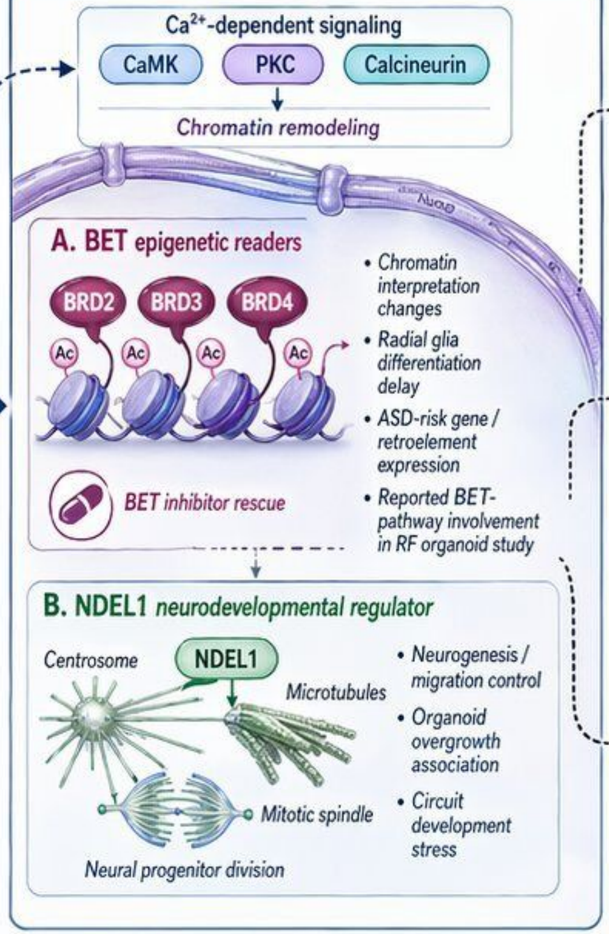


Frequency, phase, and amplitude carry biological information

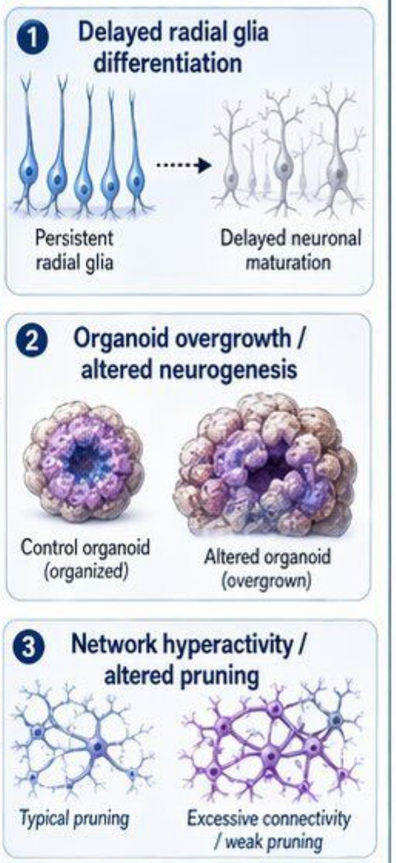
Timing noise may distort developmental signaling

Bioelectric dissonance

4 Nuclear translation / regulatory branches



5 Developmental Outcomes (Possible contribution)



Possible contribution to neurodevelopmental vulnerability

LEGEND *(Line meanings)*

- *Solid arrow = direct experimental finding*
- *Dashed arrow = proposed mechanistic bridge*
- *Dotted arrow = downstream interpretation*

EVIDENCE NOTES *(Selected)*

- *RF/ELF–BET pathway effects reported in human cortical organoids (Eubanks et al., 2021; Toxicological Sciences).*
- *CYB5B as an EMF-responsive mitochondrial mediator (Levy, 2012; Front. Public Health).*
- *Roles for S4/VGIC timing, Ca^{2+} oscillations, and NDEL1 in neurodevelopment well established in the literature.*

PATHWAY SUMMARY *(Not proven; proposed integration)*

RF/ELF pulse structure → *S4 + CYB5B targets* → *Ca^{2+} timing noise* → *BET/NDEL1 dysregulation* → *Altered radial glia, neurogenesis, and circuit maturation*