CENTER for ALTERNATIVES to ANIMAL TESTING

A 3D human iPSCs-derived model as a tool to study neurotoxicity and neurological diseases

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Environmental Neuroscience: Advancing the Understanding of How Chemical Exposures Impact Brain Health and Disease — A Virtual Workshop

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

NCATS Catalyzing Innovation

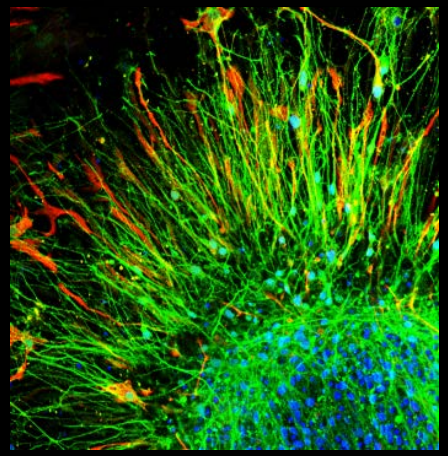
NIH National Center for Advancing Translational Sciences

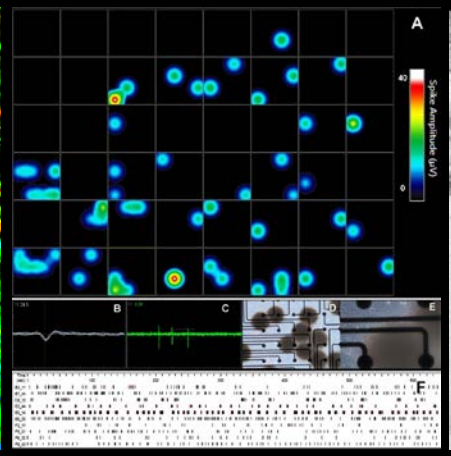
NIH National Institute of Environmental Health Sciences

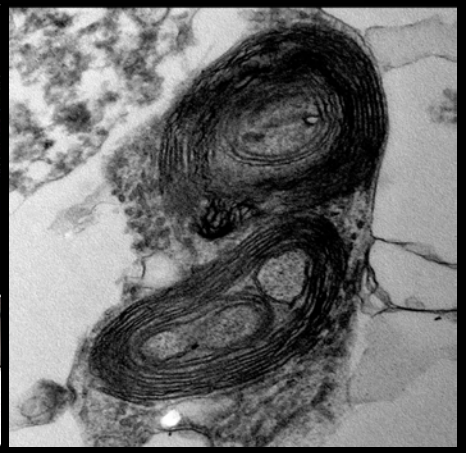
Pamies et al., 2017; 2018; Abreu et al., 2018; Plummer et al., 2019; Zhong et al., 2020

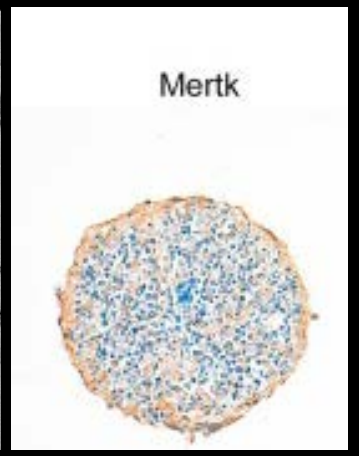
BrainSpheres/Organoids/ Microphysiological systems: Human iPSC-derived Neural Models

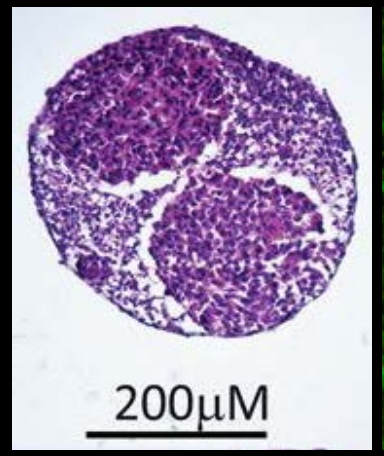
- All cell types; microglia can be added
- 350 μm diameter
- Reproducible in size and composition
- Shown critical elements of neural development
- Genetic background from patient iPSC

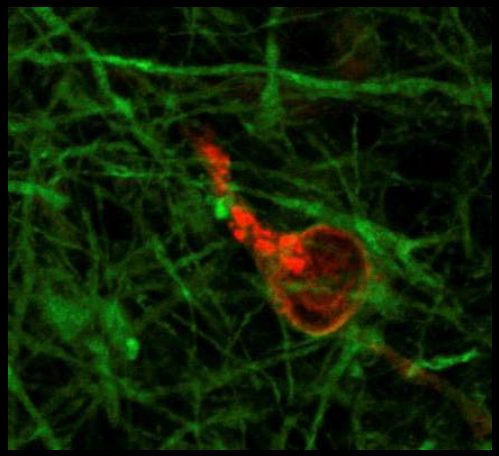












Discussion: Session 2

1. Considering emerging interest in the human exposome, what kind of basic/mechanistic studies will be needed for a broader assessment of the environmental factors that affect neurological disease and disorders?
2. What kind of models are needed to make basic mechanistic research more relevant to human disease, including how to study gene-environment interactions and synergies of multiple factors?
3. There is considerable evidence that developmental exposures to chemicals may be linked to adult neurological disease/disorders and advanced brain ageing? What is the best approach for studying this in the laboratory to uncover the mechanistic underpinnings and biological plausibility?
4. Does basic research support the notion that there are multigenerational neurological effects associated with chemical exposures?
5. What roles do inflammation and redox biology play in environmental etiologies of neurological disease and disorders? Are there other pathophysiological phenotypes common to most chemical toxicities related to brain and the environment?
6. Do we know enough about the neurobiology of disease and mechanisms of neurotoxicity to start thinking about translational research and medical interventions?
7. How can we engage more neuroscientists in the field of environmental neuroscience?