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**NEW ACD WORKING GROUP**

**CATALYZING THE DEVELOPMENT AND USE OF  
ALTERNATIVE METHODS TO ADVANCE  
BIOMEDICAL RESEARCH**

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Director of the Office of Science Policy  
National Institutes of Health

November Ad Hoc ACD Meeting  
November 3, 2022

# INNOVATIVE TECHNOLOGIES CREATE TREMENDOUS SCIENTIFIC OPPORTUNITY

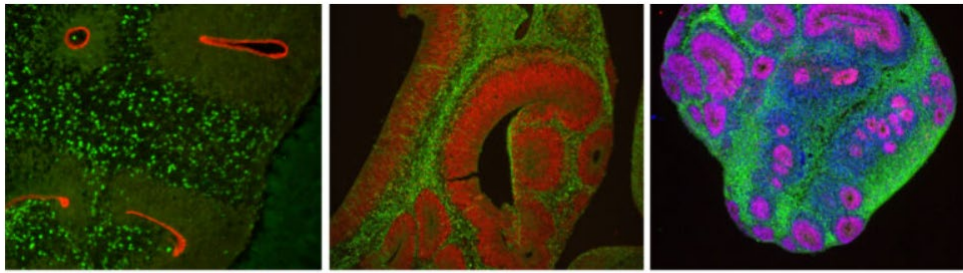
IN THE LAB

## Research using brains-in-a-dish forces a radical rethinking of Huntington's disease



By Sharon Begley · Dec. 10, 2019

Reprints



SPACE + SCIENCE

## NASA-SpaceX launches will boost science research on the space station



By Ashley Strickland, CNN

Published 3:23 AM EDT, Tue June 2, 2020

Home / News & Opinion

## SARS-CoV-2 Can Infect Human Brain Organoids

The results are a proof-of-concept that the novel coronavirus can replicate in neurons, but it's too soon to say whether this occurs in people with COVID-19.



Katarina Zima  
Jul 9, 2020 |

## NIH to Invest \$130M in Biomedical, Behavioral AI Projects

by Jamie Bennet · September 14, 2022 · 1 min read



# NIH INVESTMENTS IN ALTERNATIVES COMPLEMENTARY AND NOT REPLACEMENT APPROACHES

## *In Chemico*

- Cell-free methods
- Epigenetics
- Biochemical pathways
- Chemical genetics
- Examples:
  - Synthetic biology
  - Gene circuits

## *In Vitro*

- Cultured cell methods
- Induced Pluripotent Stem Cells (iPSC)
- Microphysiological Systems
- Examples:
  - Tissue Chips for Drug Screening
  - 3-D Tissue Bioprinting Laboratory
  - Stem Cell Translation Laboratory

## *In Silico*

- Computational methods
- Artificial Intelligence, Deep Learning, and Machine Learning
- Mathematical Modeling and Simulations
- Examples:
  - ATOM Modeling PipeLine
  - Digital Twins

EXPERIMENT DETERMINES THE APPROACH  
WHEN ARE ALTERNATIVE METHODS MOST VALUABLE?



**Toxicology**

Uses more standardized approaches

Availability of historical data

Consistency of aims



**Research dependent on animal models**

Reliance on animal models in some research areas

Studies of biological differences

Alternatives can lead to need for use of animal models



**Rigor, Transparency, and Translatability**

Development of new methods outpaces standards

Authentication of cell lines

Validation of computer simulations



**Regulatory considerations**

Animal Rule

Public trust

Scientific limitations

## WHAT IS NEEDED

### **An Honest Assessment of Scientific Opportunity**

- Enhance the rigor and translatability of animal studies (ACD rec)
- Identify where alternatives can have the biggest scientific impact

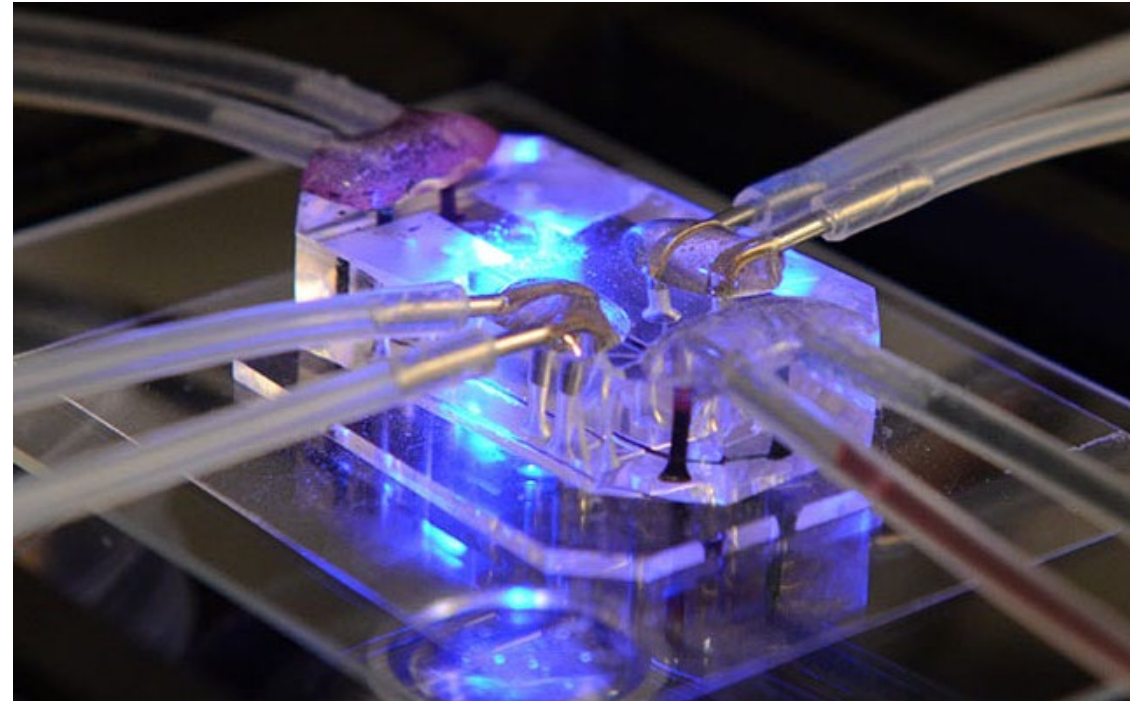
### **Proactive & Strategic Shaping of NIH Portfolio**

- Where use of alternatives can catalyze new scientific discoveries
- Areas ripe for innovation to spur new research approaches

## NOVEL ALTERNATIVE METHODS WORKING GROUP PROPOSED CHARGE

**Articulate high-priority areas for NIH investment in the use and development of novel alternative methods to:**

- Advance progress into understanding specific biological processes or states
- Augment the tools and capabilities for biomedical research to complement and/or potentially replace traditional models





# NOVEL ALTERNATIVE METHODS WORKING GROUP PROPOSED ROSTER

## Co-Chairs



Howard Chang



Lyric Jorgenson

## Executive Secretaries

- Brittany Chao
- Jessica Creery

## WG Members

- Researchers with expertise in:
  - Alternative models (e.g., *in chemico*, *in vitro*, *in silico*)
  - Creating benchmarks for alternatives
  - Developing benchmarks for community efforts
- Representation from:
  - Across sectors
  - Across disciplines
- *Ex officio* members from federal agencies

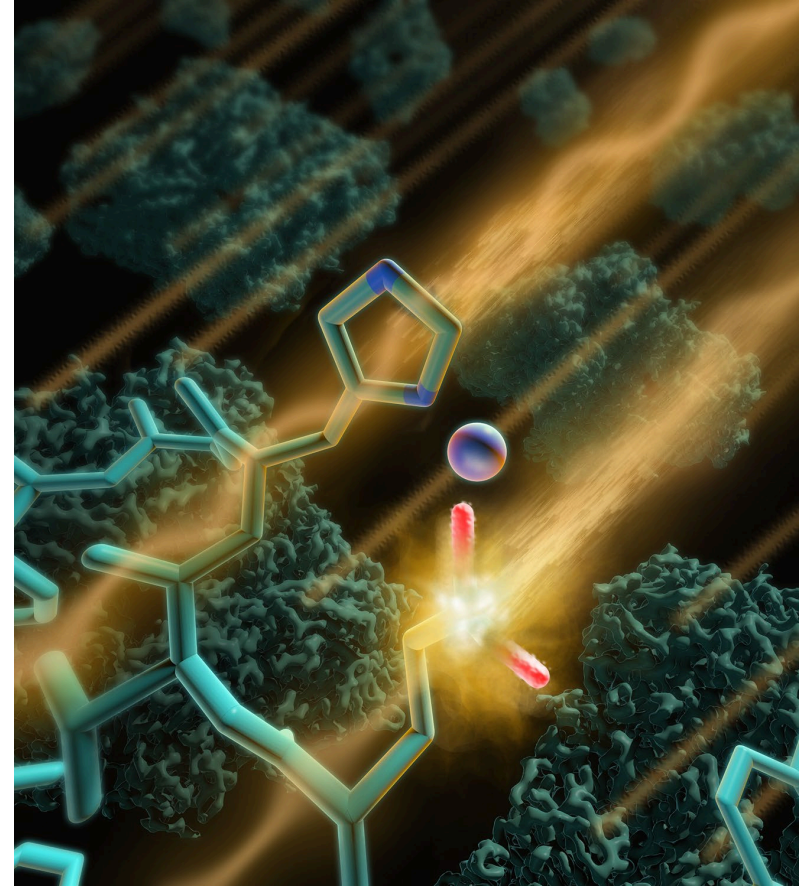
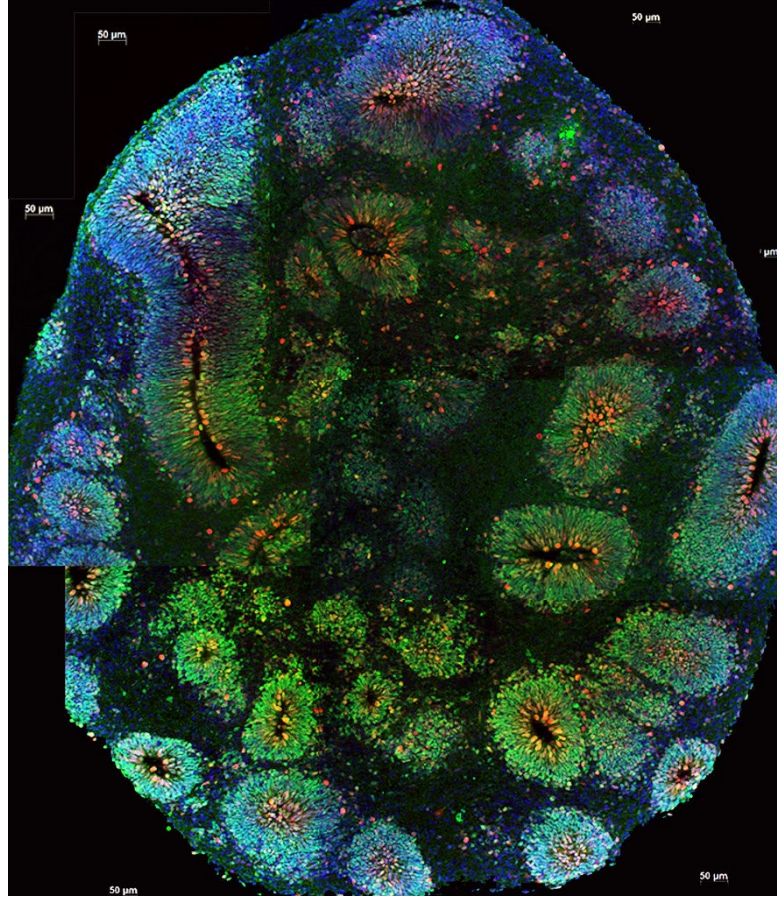
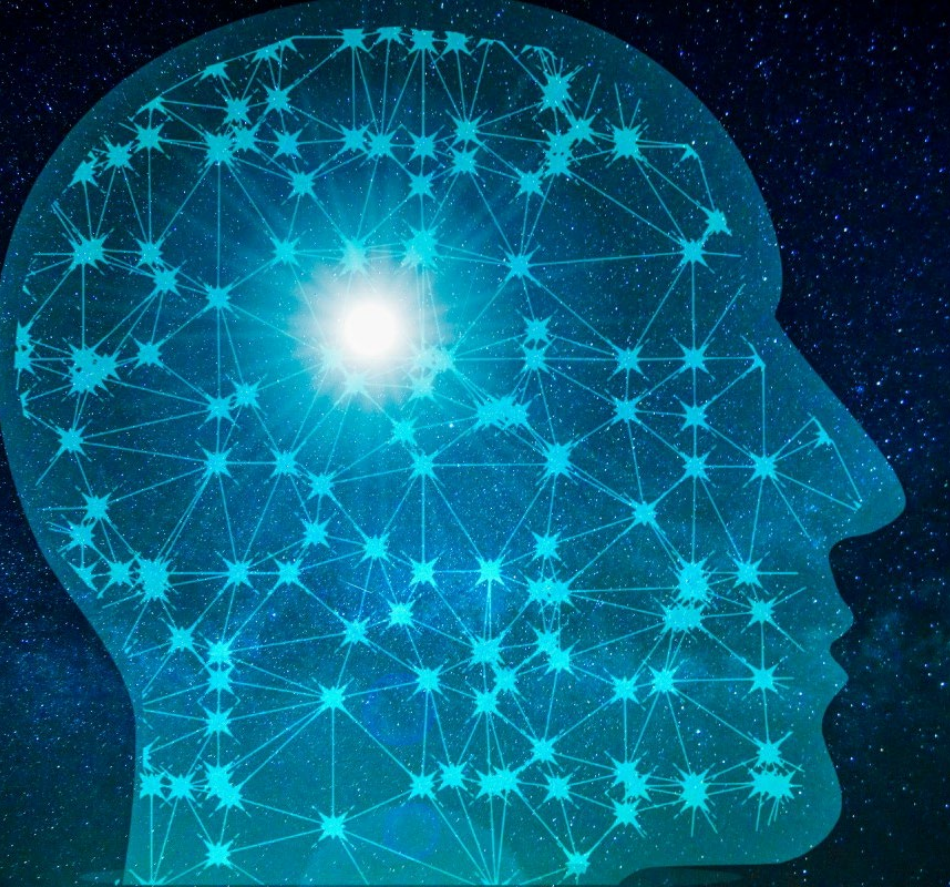
***Full roster in progress—stay tuned!***



## NOVEL ALTERNATIVE METHODS WORKING GROUP PROPOSED NEXT STEPS

- Finalize charge and roster (November 2022)
- Update ACD and discuss workplan (December 2022)
- Work! (January–May 2023)
- Present preliminary findings to ACD (June 2023)
- Stakeholder engagement (June–November 2023)
- Final report with recommendations (December 2023)





QUESTIONS AND DISCUSSION