How to make a research on NEUROSCIENCE
Research Strategies of Molecular Neuroscience

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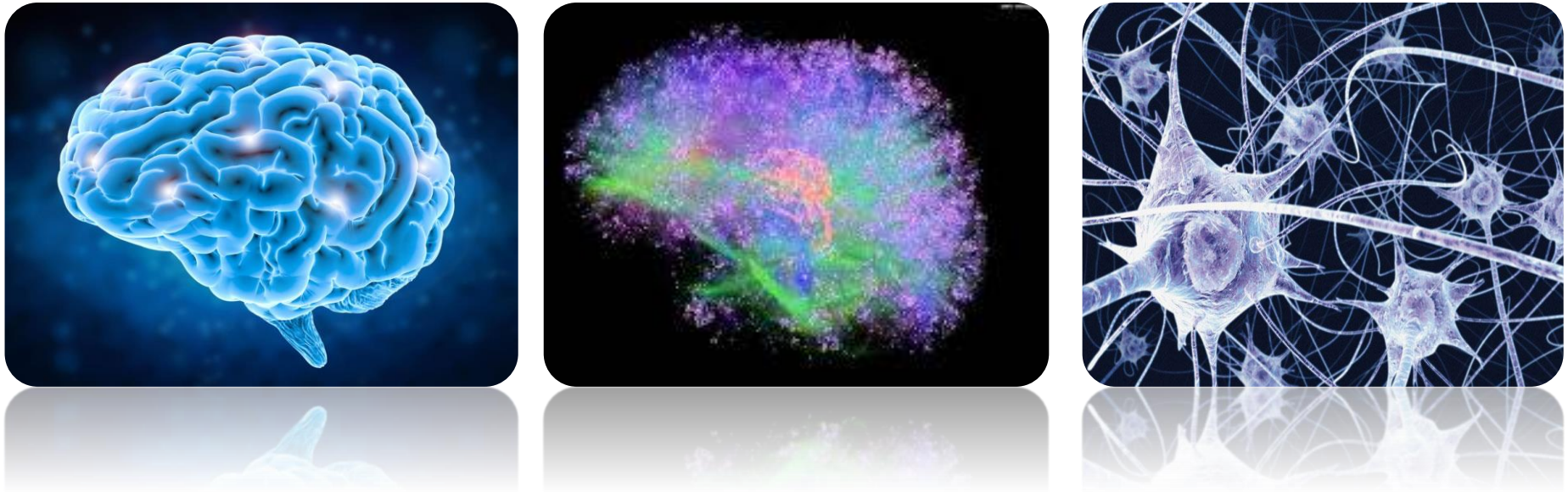
SCIENCE AND RESEARCH METHOD (MED118-A)– 21.05.2021

The most mysterious organ: **BRAIN**



Hundreds of billions of **neurons**

Hundreds of trillions of connections: **synapses**

Understanding the human brain is one of the great challanges facing 21st century science

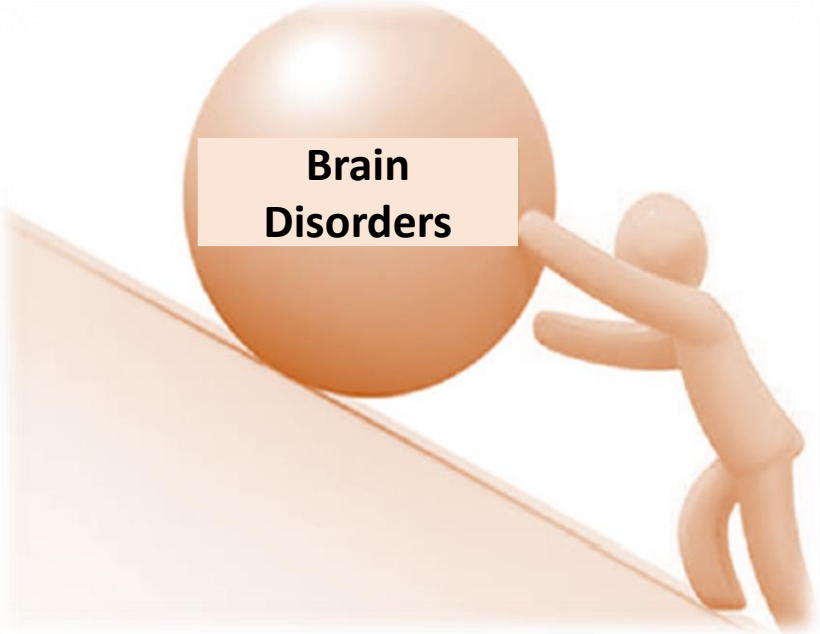
Why do we want to understand **how human brain works?**

We can…

- rise to profound insights into what makes us human
- build revolutionary new computing technologies
- develop new treatments for brain diseases

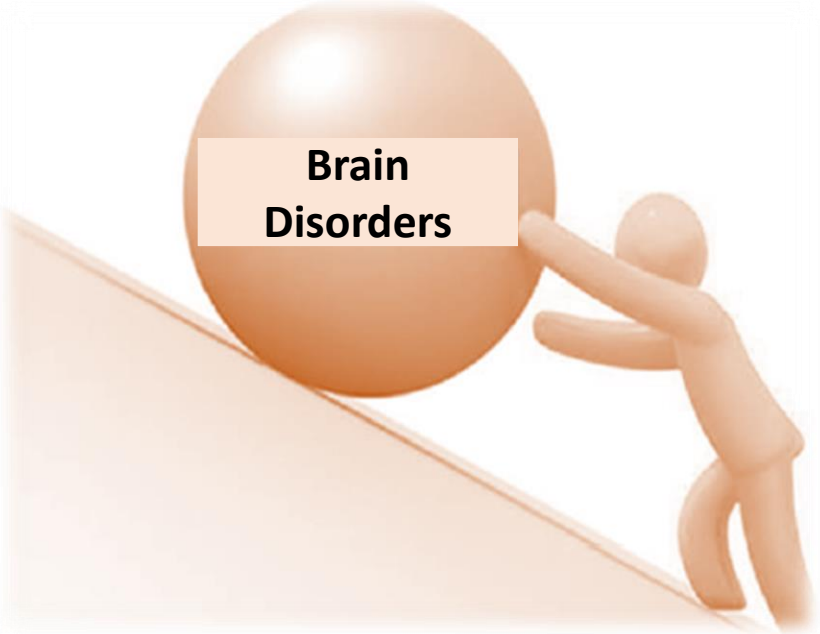
Challanges of Brain Disorders

- ✓Lack of objective blood testing
- ✓Lack of effective treatment
- ✓Drug developmet: Slow and expensive



Challanges of Brain Disorders

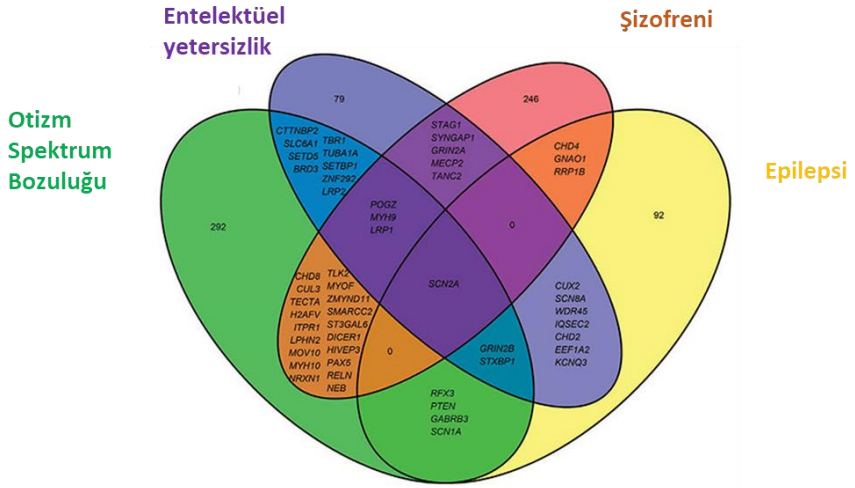
- ✓Lack of objective blood testing
- ✓Lack of effective treatment
- ✓Drug developmet: Slow and expensive
- ✓**Disease mechanisms**?



Understanding the Molecular Mechanisms of Neurodevelopmental Disorders: From Gene(s) to Cognition

Neurodevelopmental Disorders

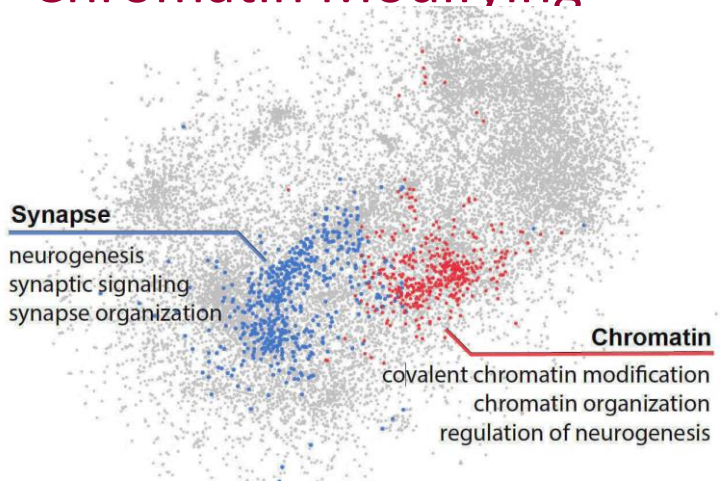
- Gene x Environment
- Genetic and Clinic heterogeneity
- Pathophysiology?
- Synaptic dysfunction and **Chromatin Regulators**



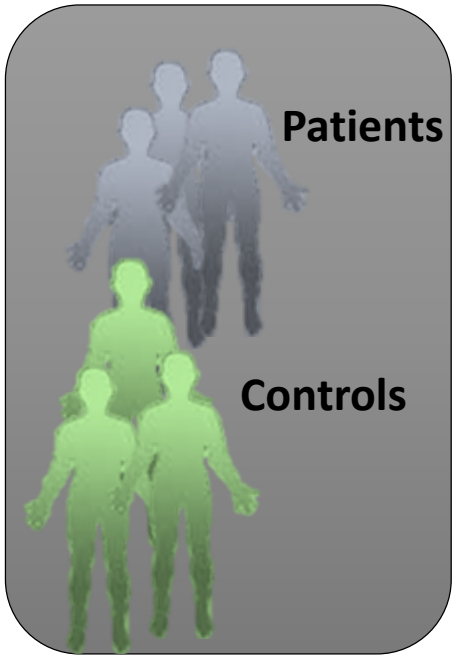
Molecular Psychiatry (2016) 21, 290–297

- Genome architecture and accessibility
- ~ %3 of human genes (>500)

✓Chromatin binding
✓Chromatin Remodelling
✓Chromatin Modifying



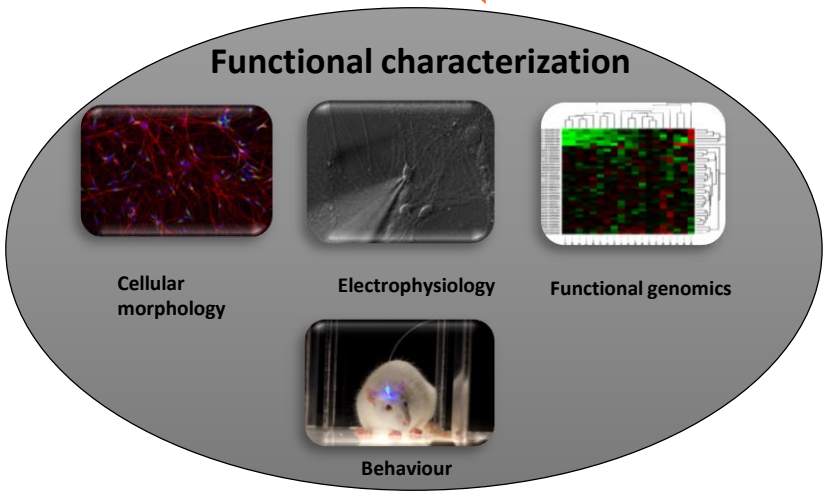
Nat Genet 2019; 51, 973–980



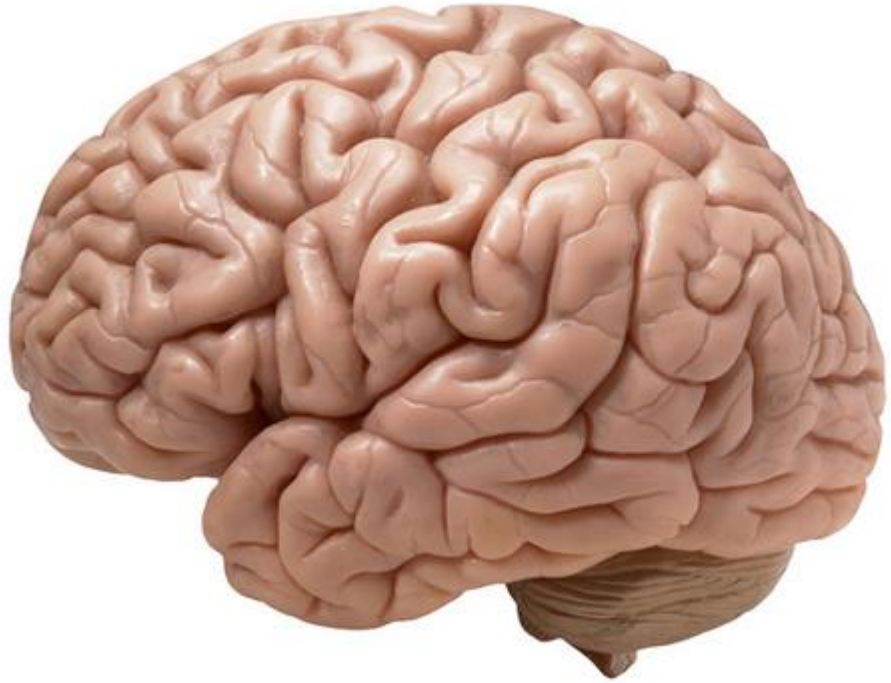
Disease gene(s)

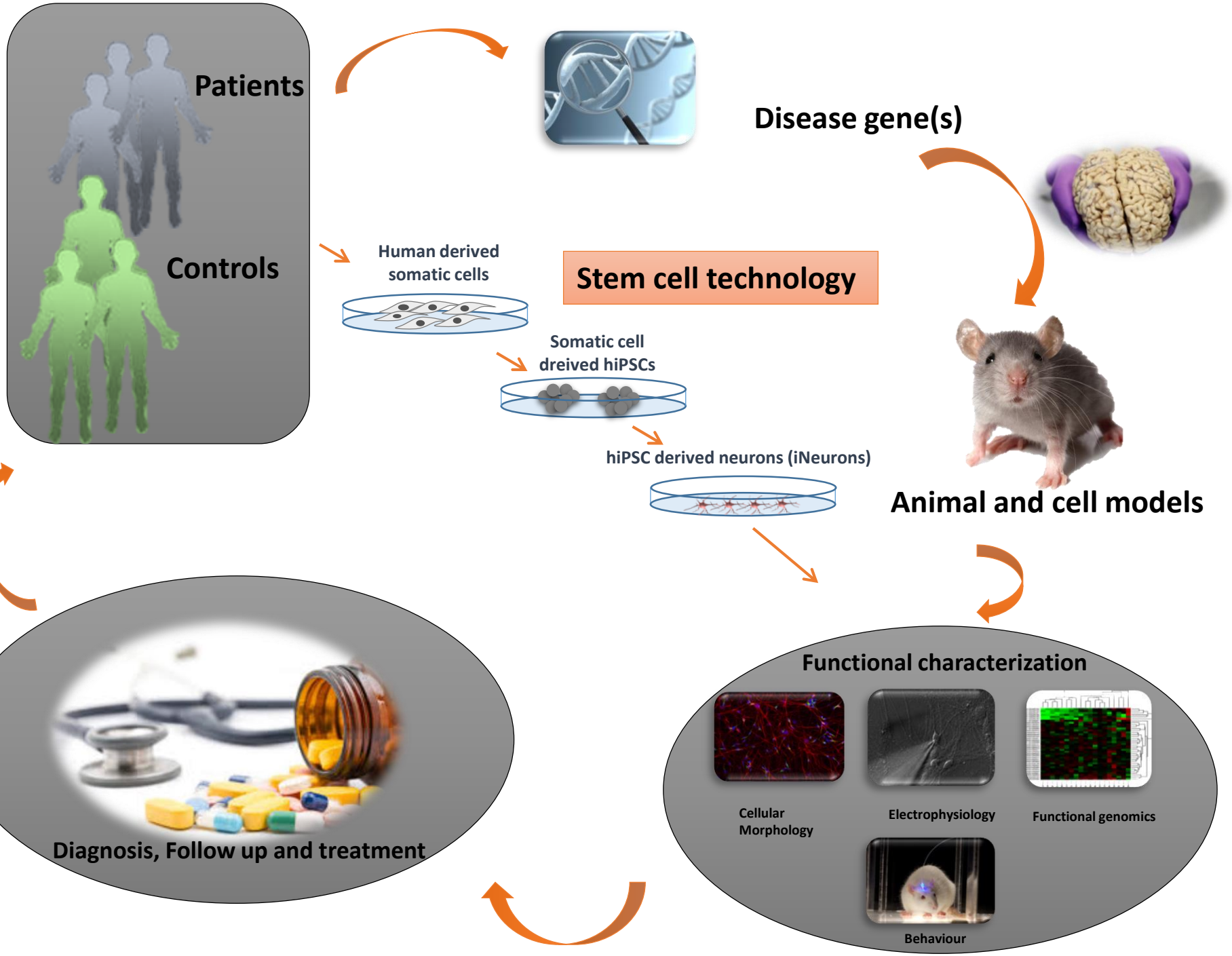
Gene discovery for complex disorders requires large number of samples

Animal and cell models



Functional importance of GOIs in human brain




Patients
Controls
Disease gene(s)
Human derived somatic cells
Stem cell technology
Somatic cell dreived hiPSCs
hiPSC derived neurons (iNeurons)
Animal and cell models
Functional characterization
Cellular Morphology
Electrophysiology
Functional genomics
Behaviour
Diagnosis, Follow up and treatment