Reducing the biomedical burden of autism

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Autism is a major health problem

1 in 50 individuals now diagnosed with autism

Graph showing the increase in ASD cases per 100 over years from 1985 to 2010.
Hundreds of genes are linked to autism

- No drugs treat the core symptoms of autism.
- No way to identify chemicals that cause autism.
Imbalance of Ube3a causes two forms of autism

Angelman Syndrome

Unaffected Individual

Duplication Syndrome

Ube3A
Perform screen to find drugs that increase Ube3a

Angelman Syndrome → Drug? → Ube3A → Unaffected Individual
Robotics-assisted drug screen

Done in collaboration with Bryan Roth @ UNC
Topoisomerase inhibitors are FDA-approved to treat cancer
Ube3a
Mutated Ube3a

Mutated Ube3a
Do topoisomerase inhibitors affect additional genes?

Treat with topoisomerase inhibitor, measure levels of all genes.
Topoisomerase inhibitors reduce the levels of long genes

Gene Levels

- Increased
- No change
- Decreased

Gene length

King et al. (2013) Nature
Many autism genes are extremely long...

Average gene

Autism gene
(25x longer)
… and are found at synapses
Visualizing synaptic activity
Visualizing synaptic activity

+ Drug
Identify additional chemicals that reduce the levels of long autism genes.
Additional compounds have been found

Topo Inhib

Compound A
Towards preventing and treating autism

- Identify chemicals that cause autism so they can be avoided by mothers and babies

- Test if topoisomerase inhibitors can be therapeutic for Angelman syndrome

- UNC is ranked 2nd in WORLD for autism research

- Goal: Become the leading institution in autism research