

Analyzing the Morphology of Whole Chandelier Cells in Mouse Brains

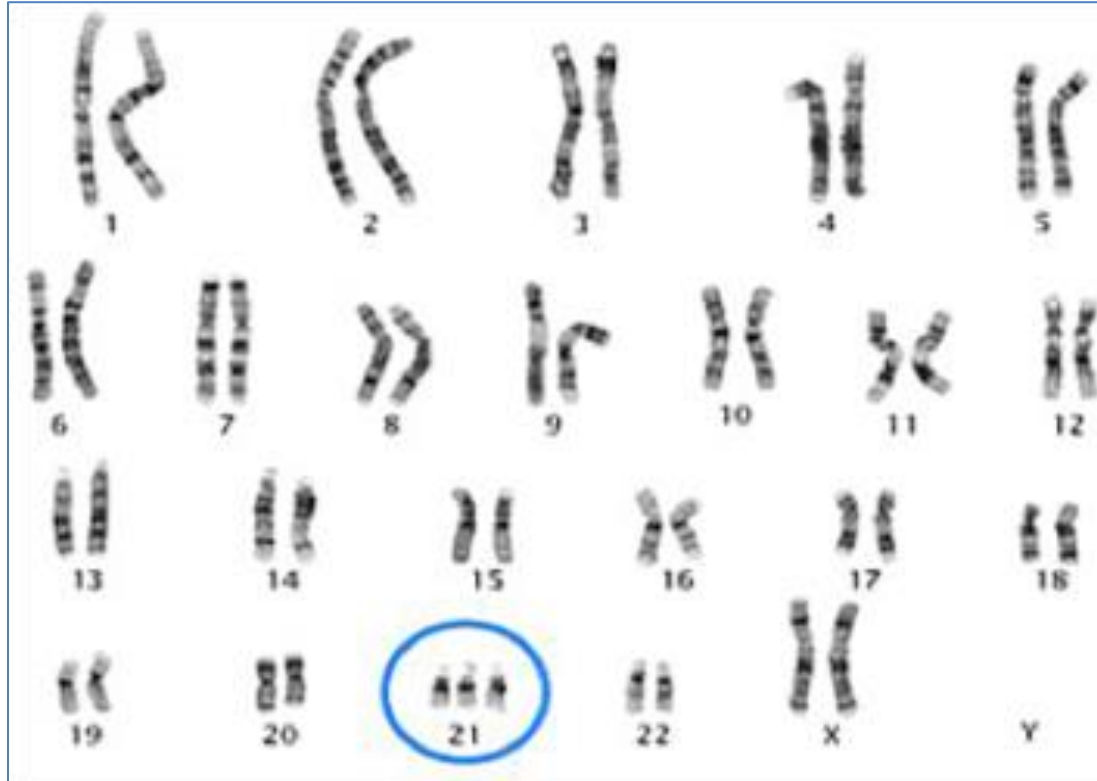
Ty Hergenreder

Bing Ye Lab

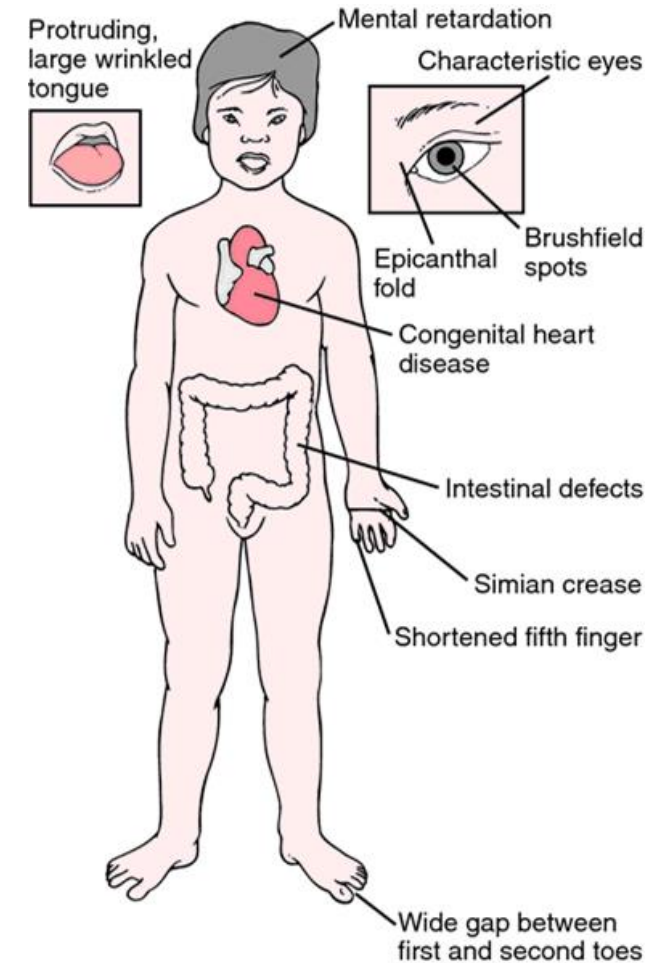
University of Michigan

Down syndrome (DS) is a chromosome disorder associated with multiple symptoms

Down syndrome is caused by trisomy 21

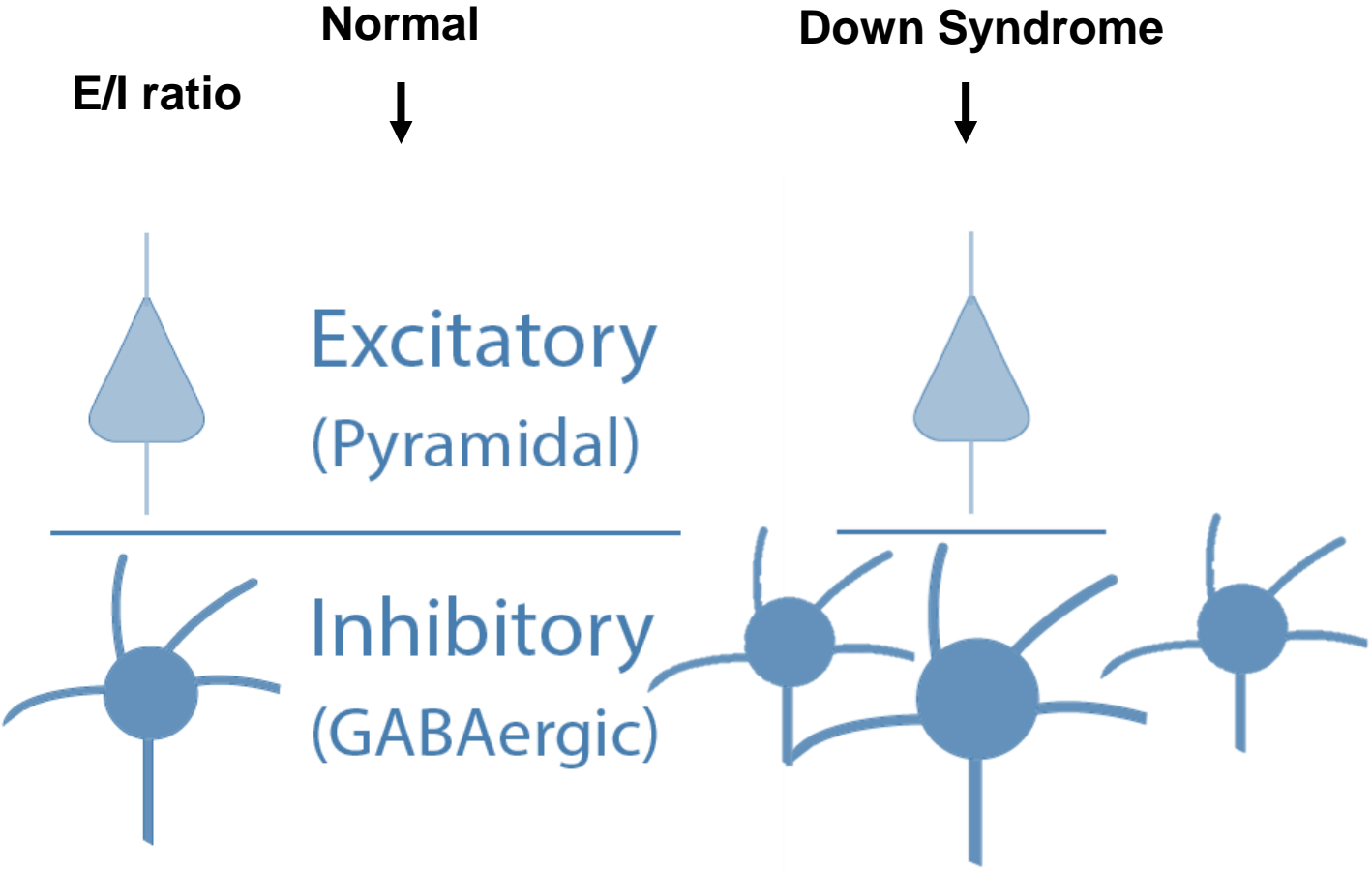


Korbel et al. (2009) *PNAS*



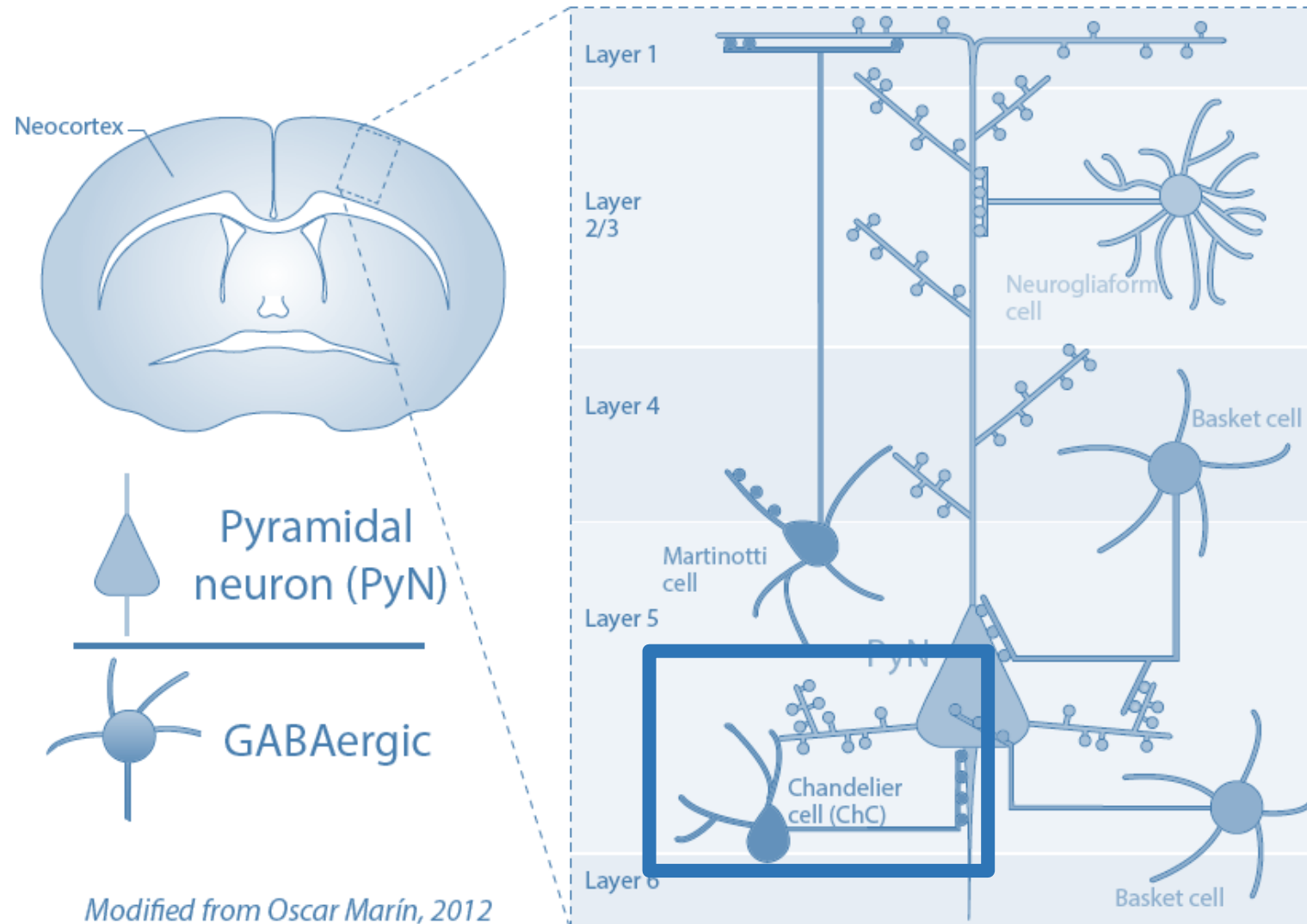
<https://geneticmutationsperiod6.wikispaces.com/Down+syndrome>

Increase in GABAergic signaling observed in Down's Syndrome



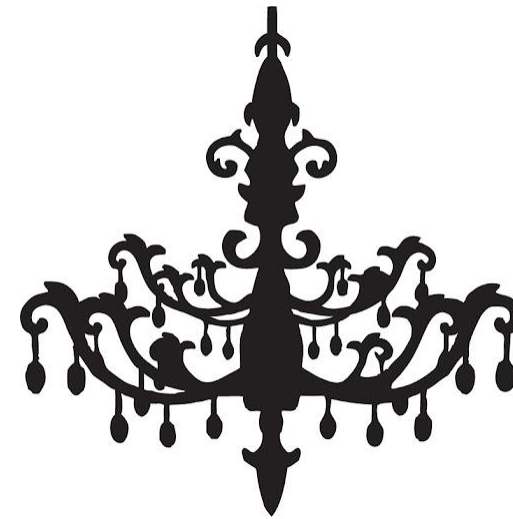
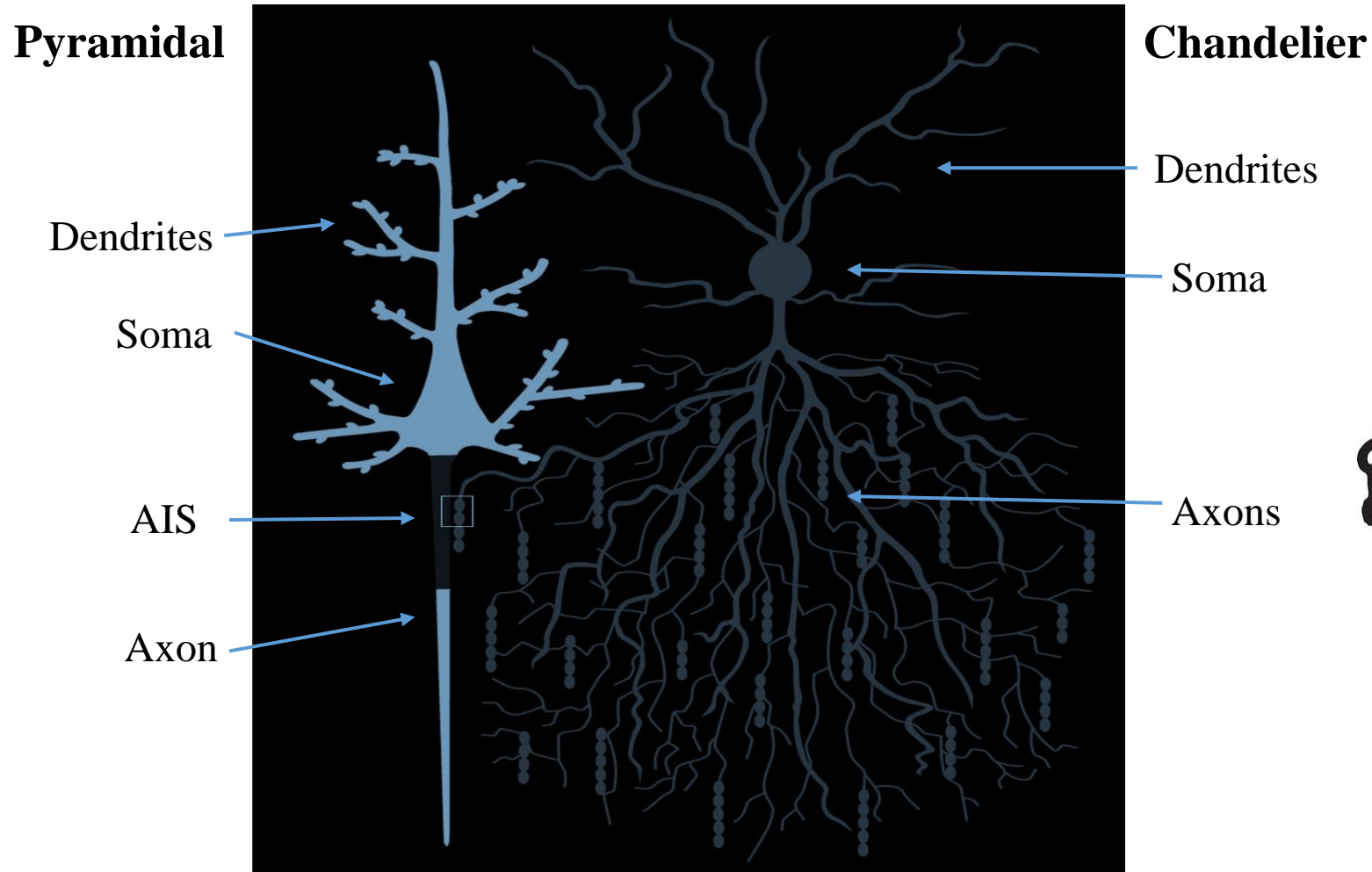
Contestabile et al., 2017

GABAergic Neurons Have High Diversity in Morphology and Physiology



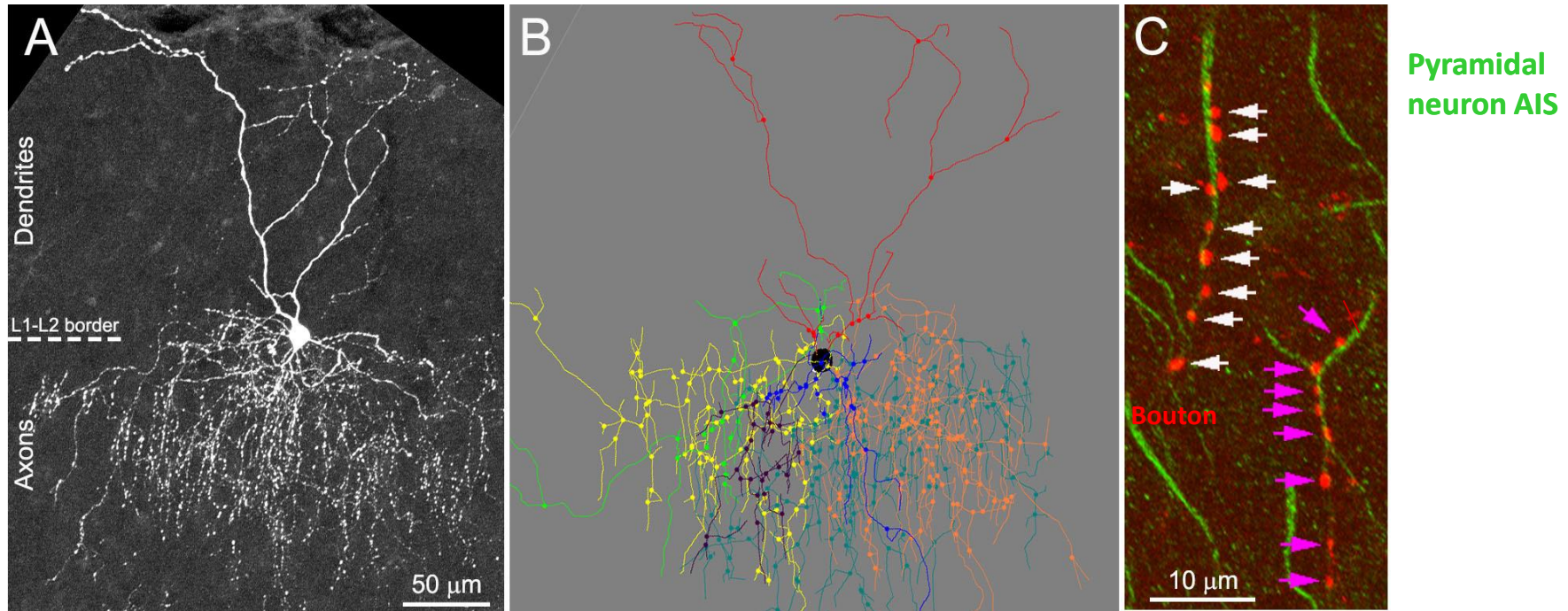
Modified from Oscar Marín, 2012

Chandelier (ChC) Neurons Innervate Multiple Axon Initial Segments (AIS) of Pyramidal Neurons



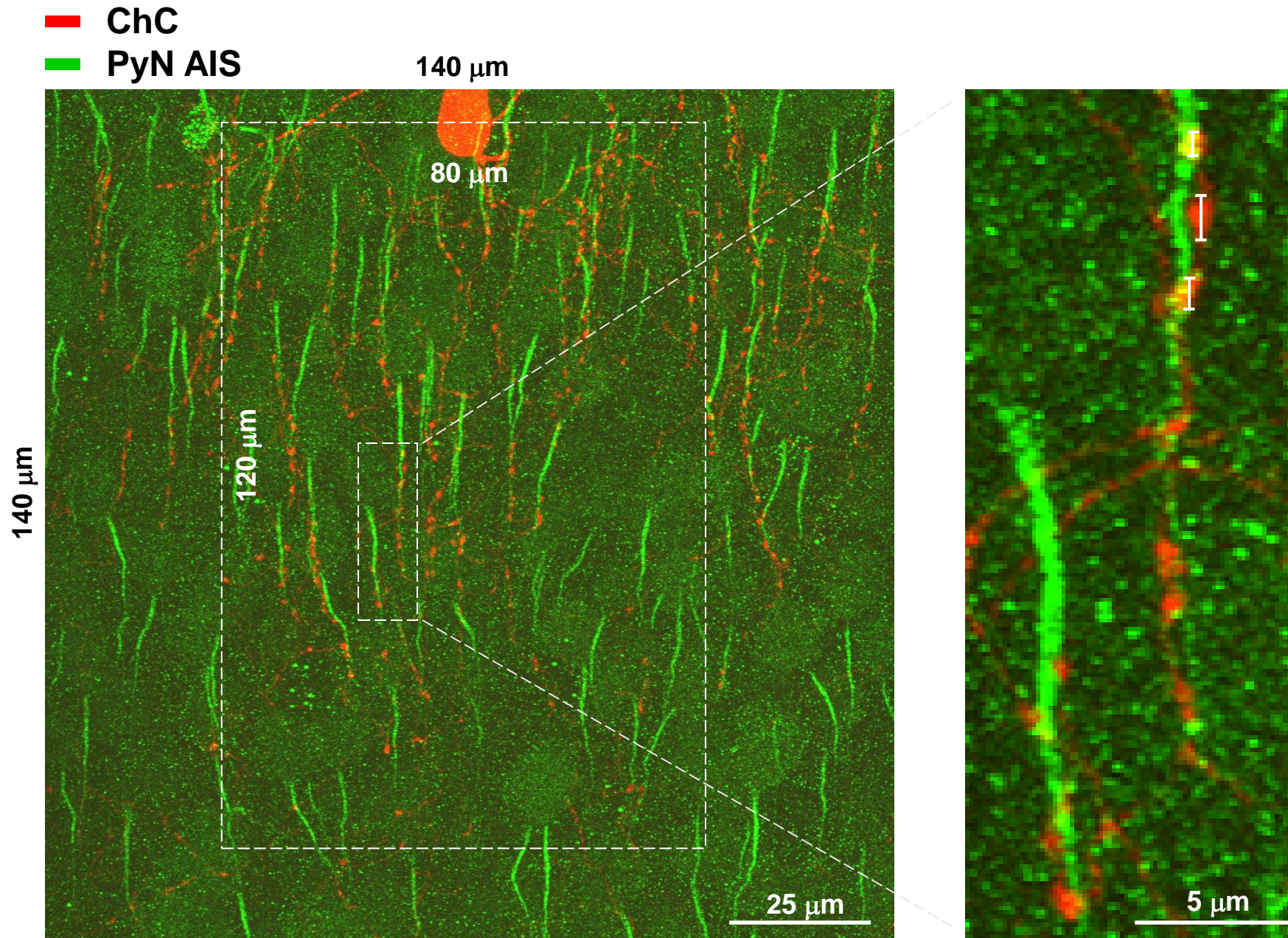
Manual ChC Tracing Inefficient

Nkx2.1-CreERT2^{+/-}
CAG-Loxp-Stop-Loxp-tdTomato^{+/-}

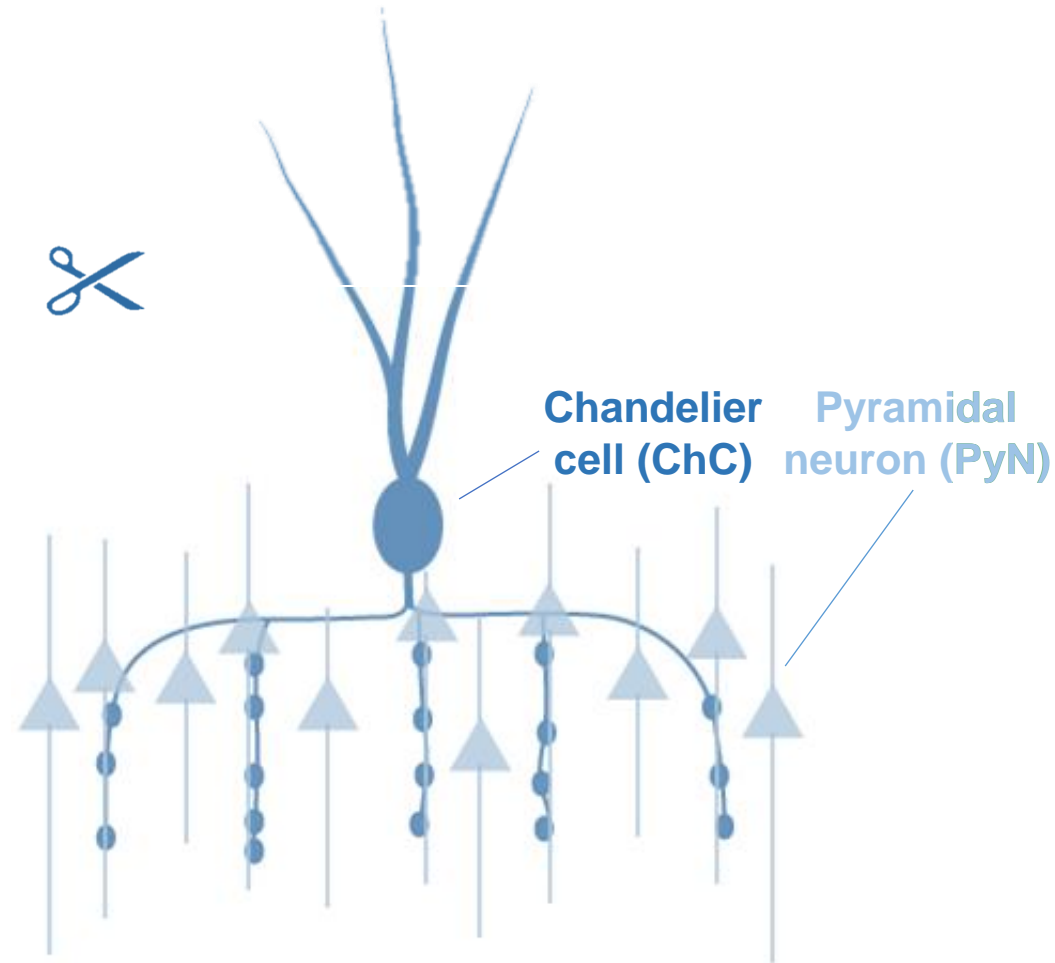


Hao Liu, unpublished data

ChC quantification method



Current Sectioning Methods Remove Parts of ChC Neurons



Are There Whole ChC
Neuron Differences Between
DS and WT Mice?

CLARITY Allows Imaging of Thick (1mm) Tissue Sections

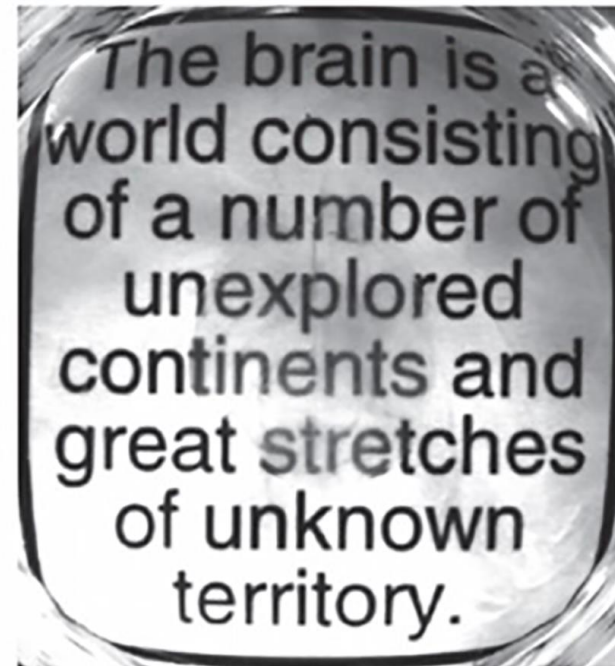
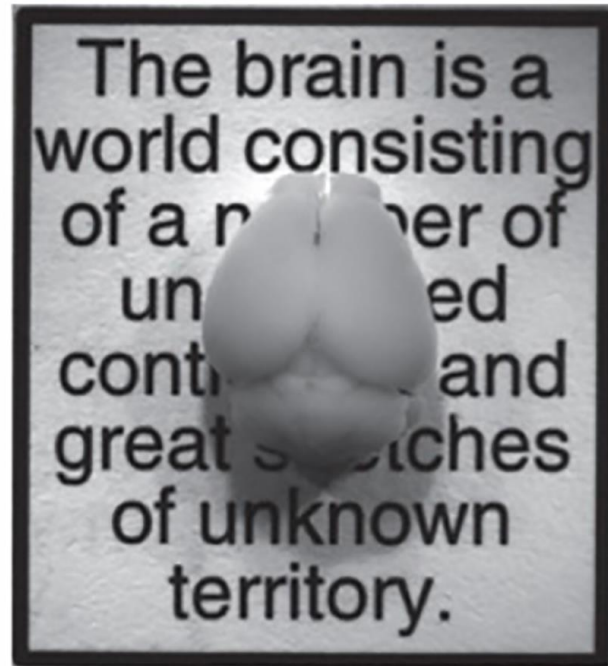
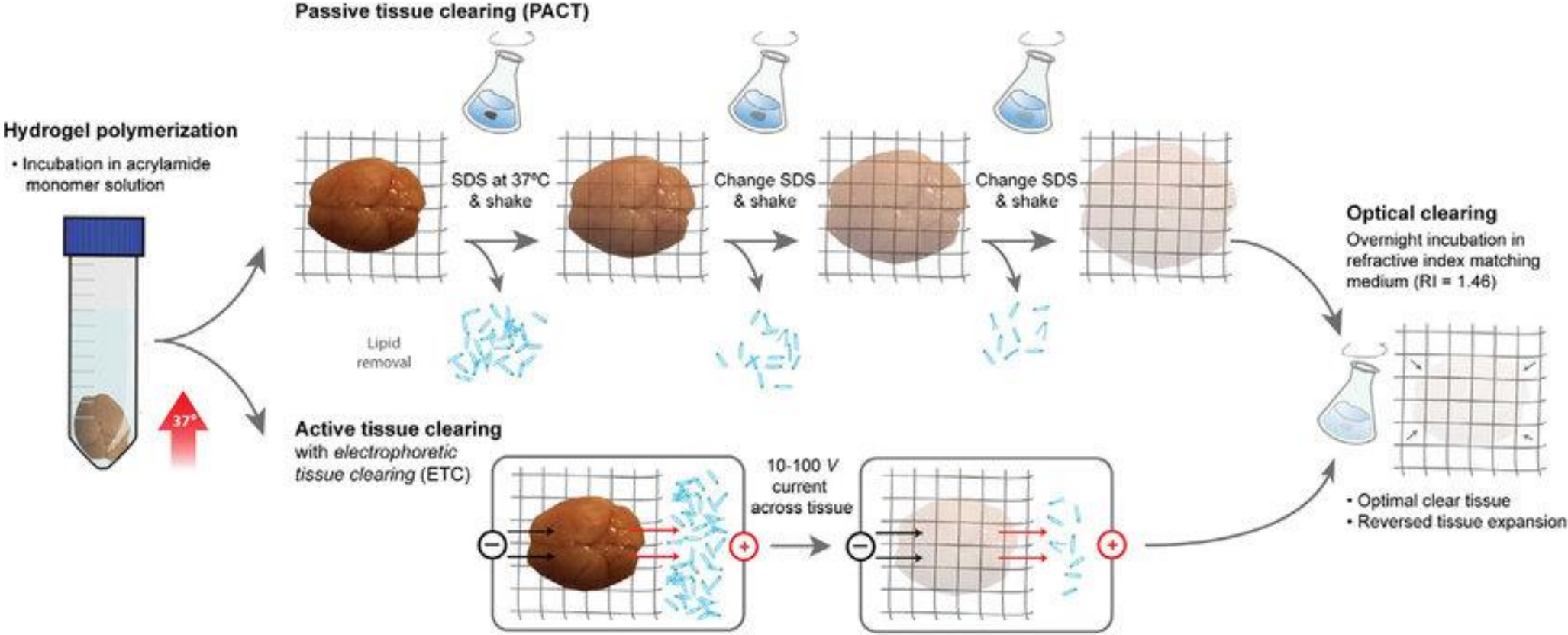


Image from Kwanghun Chung and Karl Deisseroth, Howard Hughes Medical Institute/Stanford University

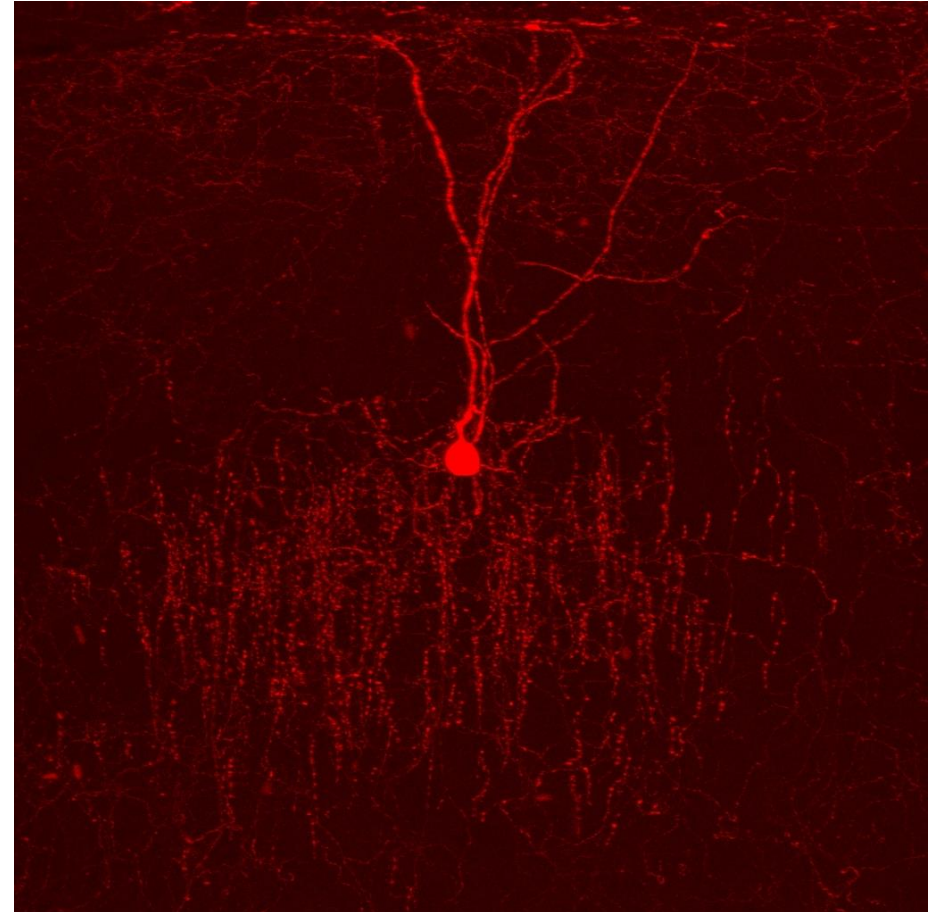
CLARITY Removes Lipids & Preserves Protein Organization



Jensen & Berg, 2017

Overall Project Goals

- Construct 3D ChC images from CLARITY dections
- Compare entire ChC Morphology in DS & WT mice
 - Determine if congruent with previous findings
 - Expand upon previous literature



Project Needs/Requirements

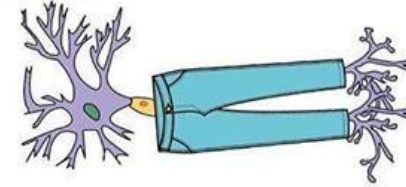
- Automatic 3D tracing
 - Dendrites and axons
- Reconstruction with z plane & x/y images (tiling)
- Possible bouton innervation

Thank you for your time!

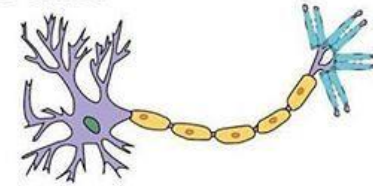


If a neuron wore pants,
would it wear them

Like this



like this?



or like this?

