



FENS

Federation of
European
Neuroscience
Societies

Neural tracing Webinar

2022.09.17

***Viral tracing approaches
and whole brain imaging***

Anna Beyeler

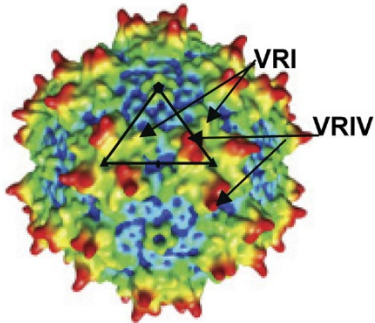
anna.beyeler@inserm.fr

French Institute of Health (INSERM)
University of Bordeaux

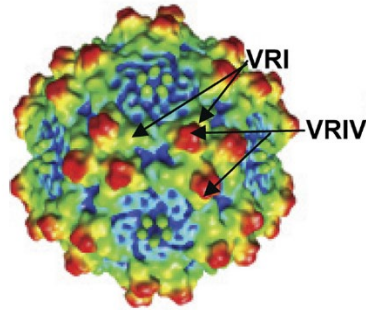
Viral vectors directionality, tropism and efficacy

Anterograde vectors

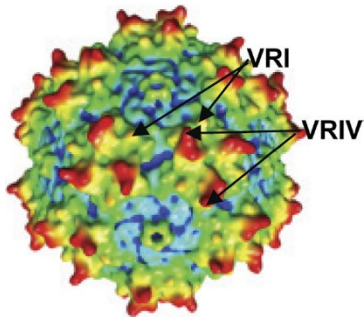
Adeno-associated virus
AAV serotypes 1-9



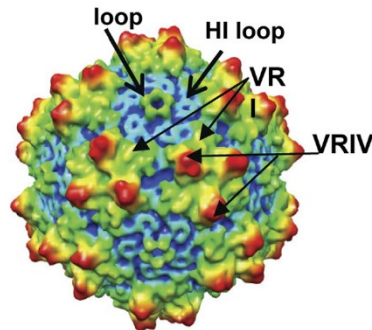
AAV2



AAV4



AAV8



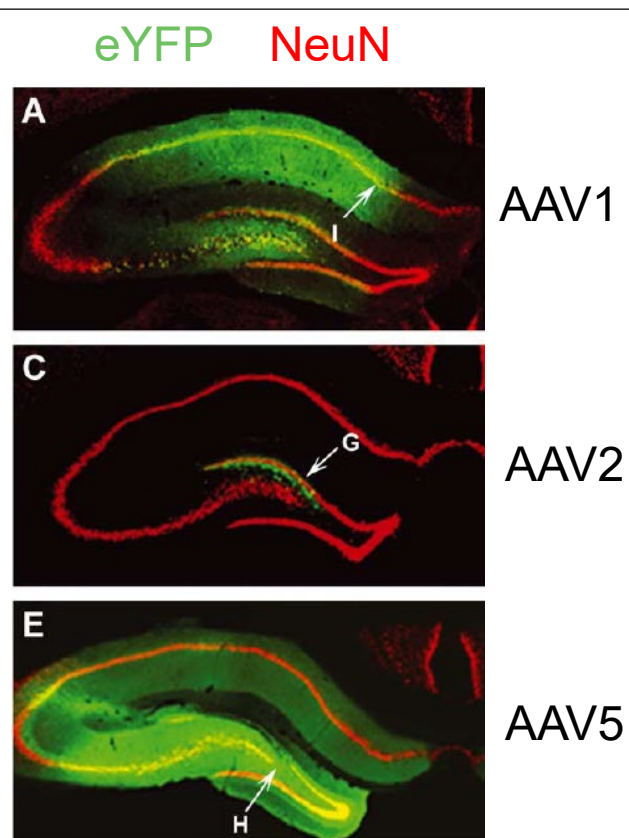
AAV9

Viral vectors directionality, tropism and efficacy

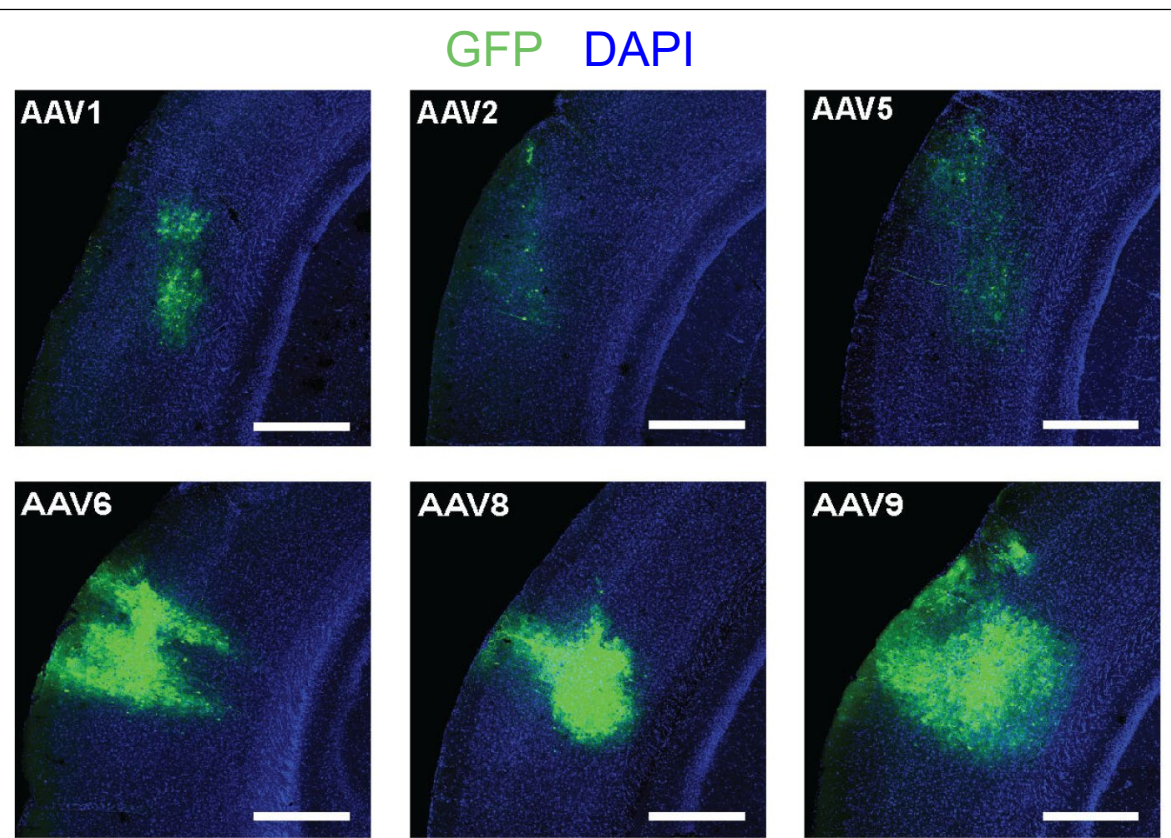
Anterograde vectors

Adeno-associated virus

AAV serotypes 1-9



Burger et al. 2013

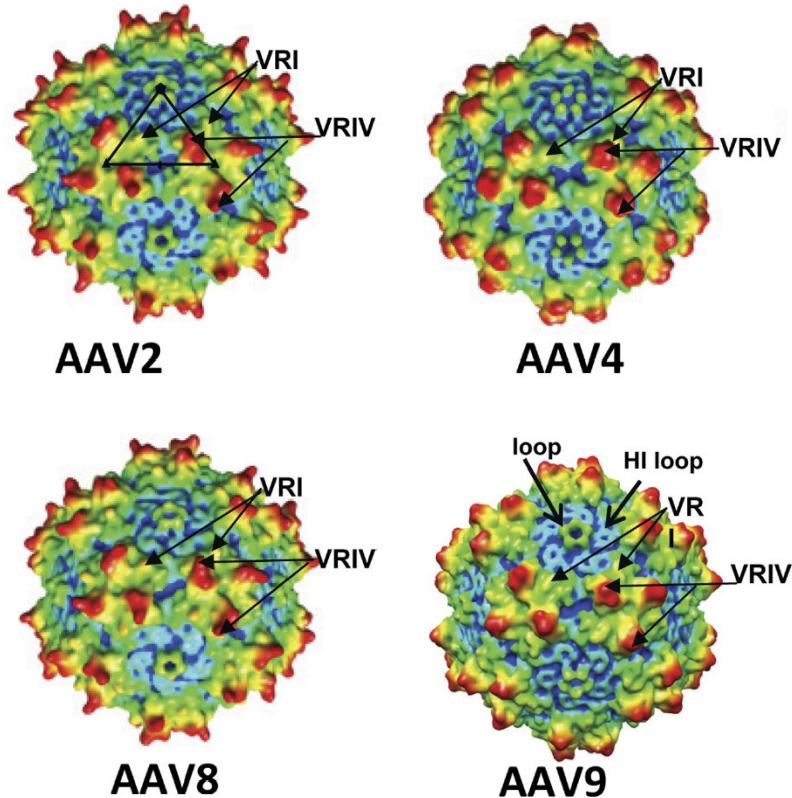


Aschauer et al. 2013

Viral vectors

Anterograde vectors

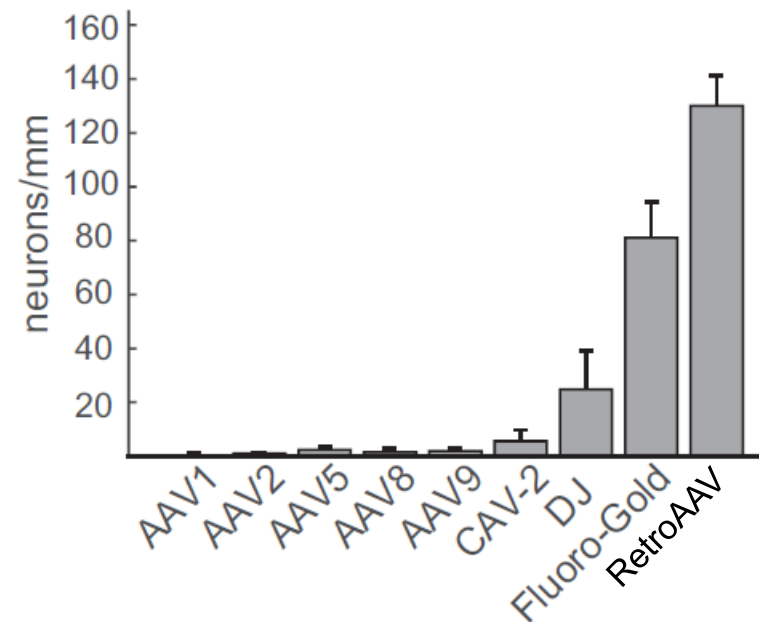
Adeno-associated virus
AAV serotypes 1-9



Di Mattia et al. 2012 J. Virology

Retrograde vectors

RetroAAV, Rabies virus,
Canine adenovirus (CAV)
Herpes simplex virus (HSV)

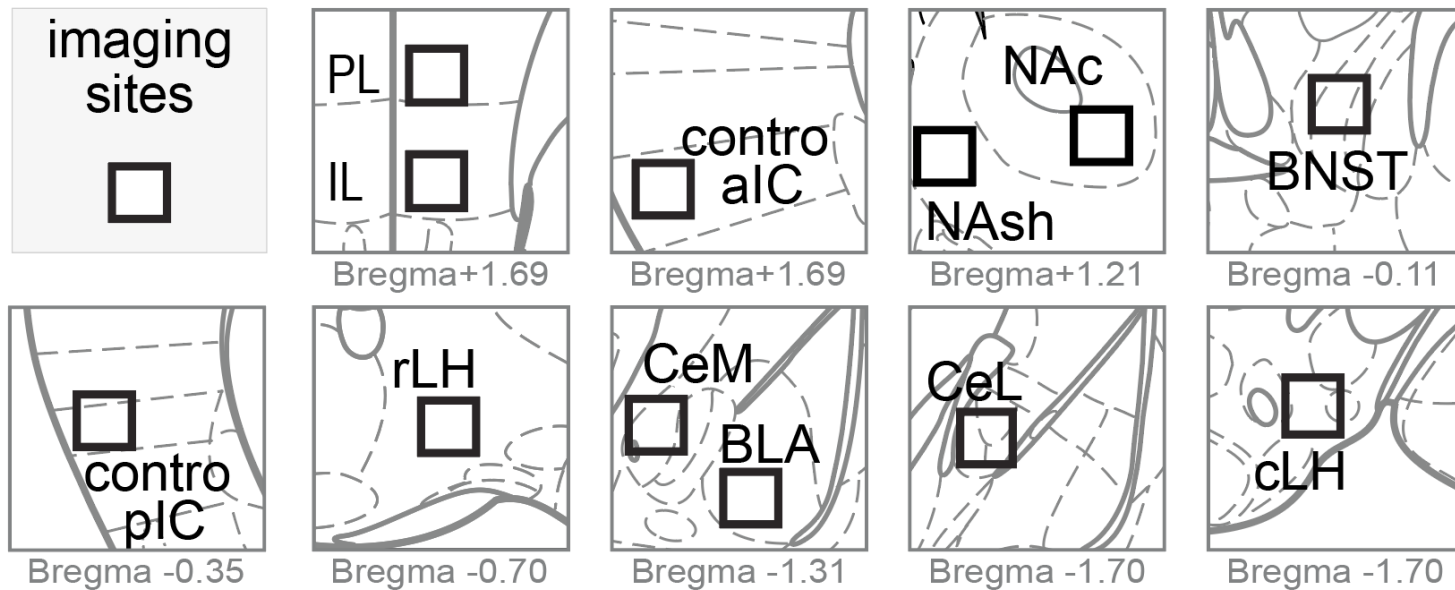
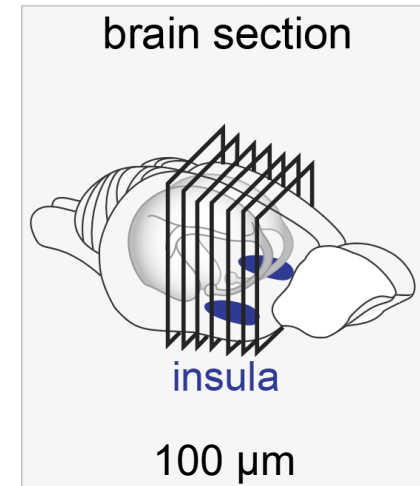
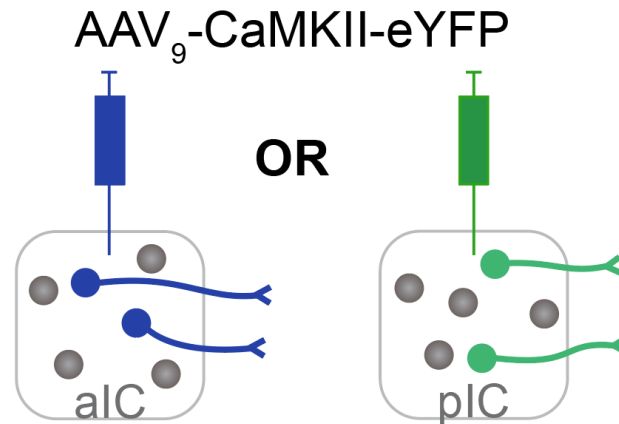


Gowanlock et al. 2016

1. Anterograde mapping of all projections
2. Mapping of selective projections and their collaterals
3. Whole brain mapping of selective projections

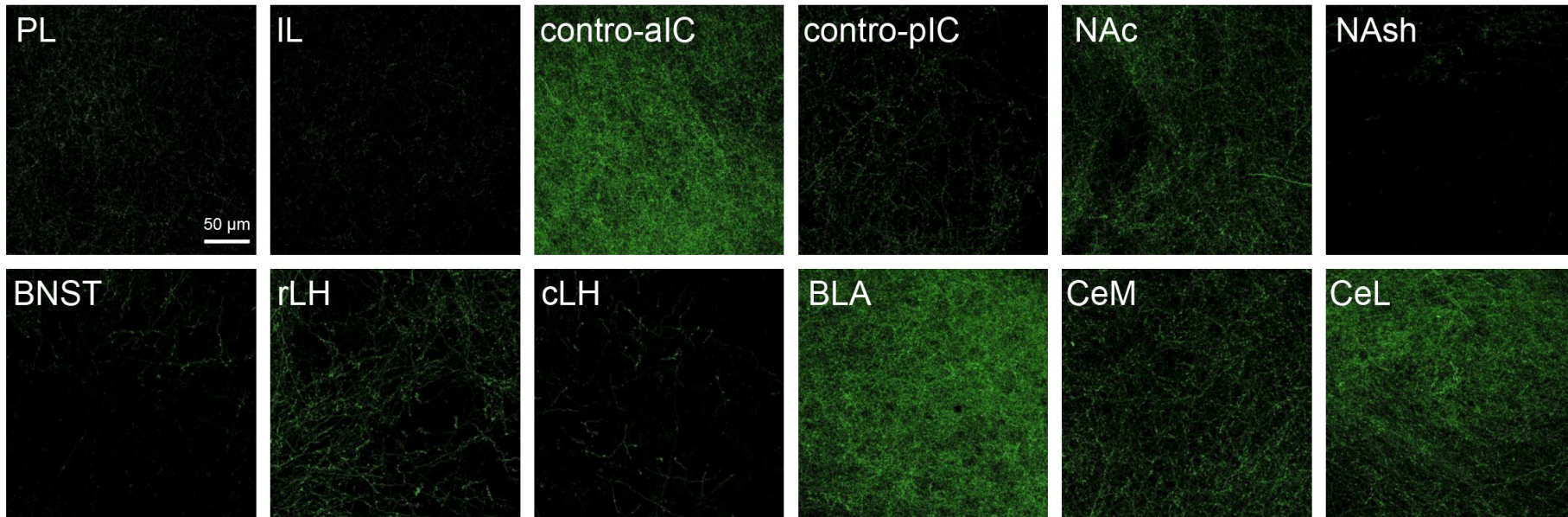
1. Anterograde mapping of all projections

Projections of anterior and posterior insular cortex (aIC and pIC)

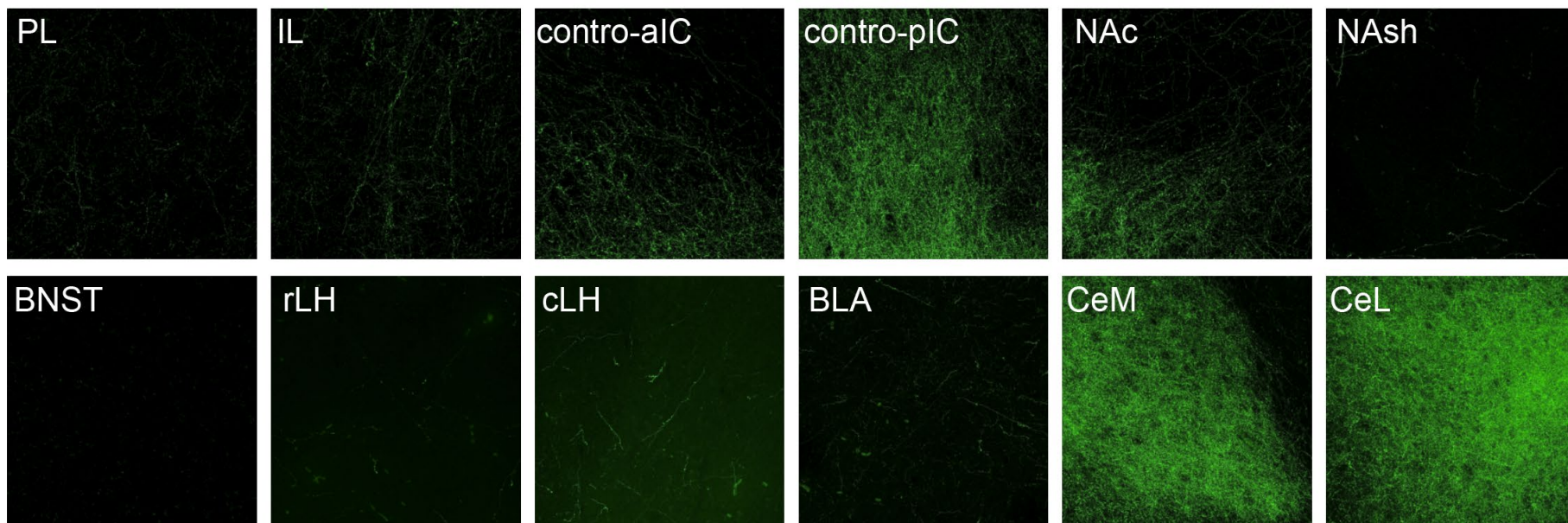


1. Anterograde mapping of all projections

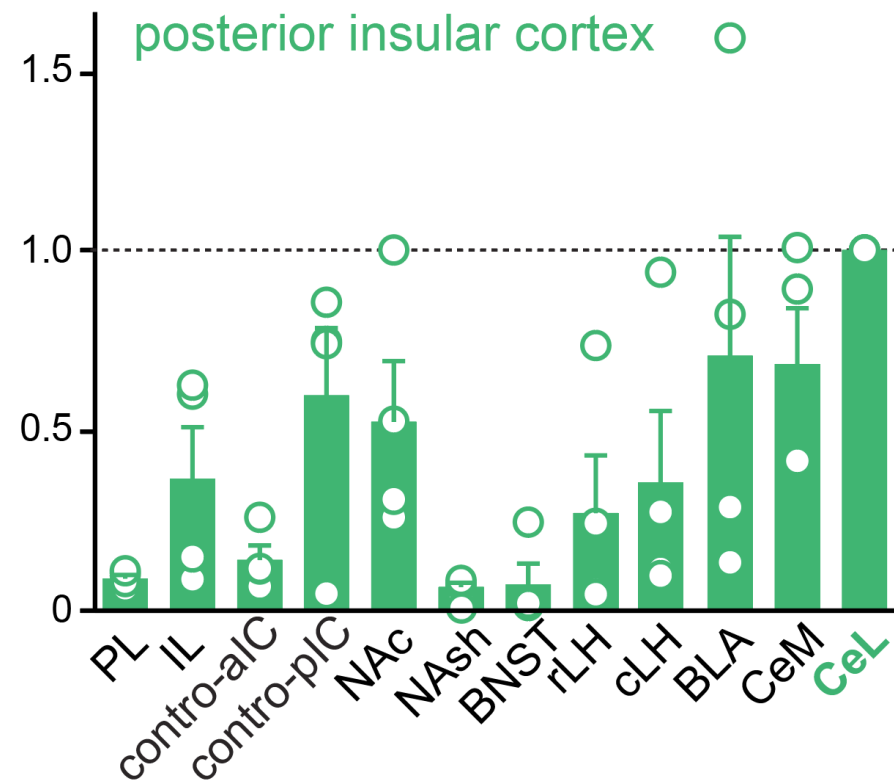
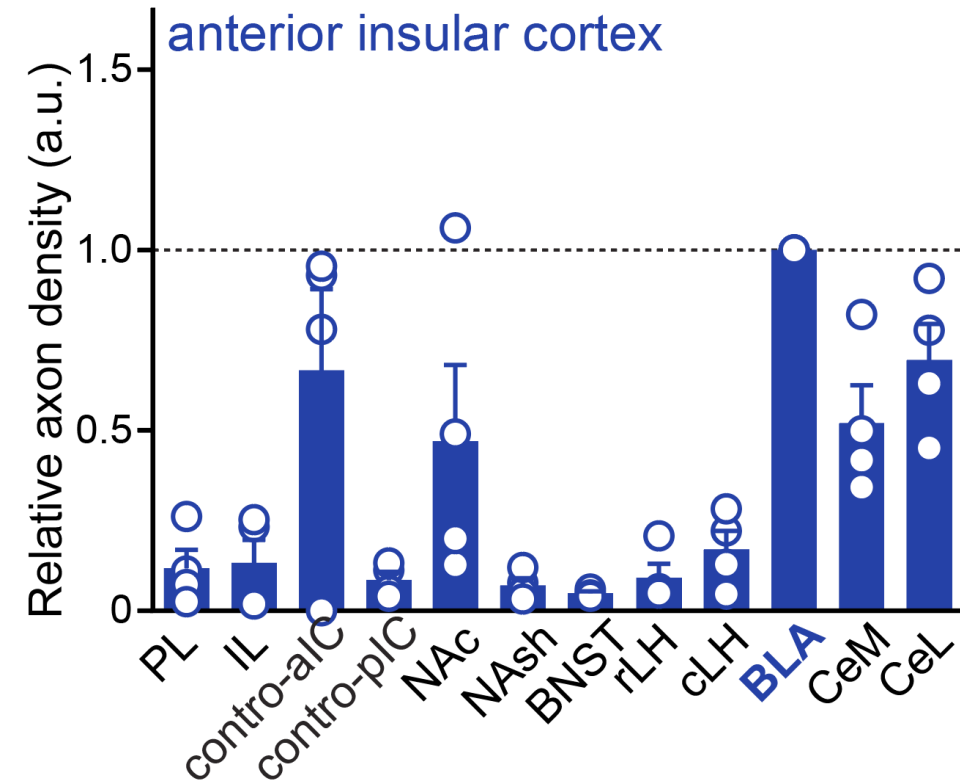
anterior insular cortex (aIC)



posterior insular cortex (pIC)



1. Anterograde mapping of all projections



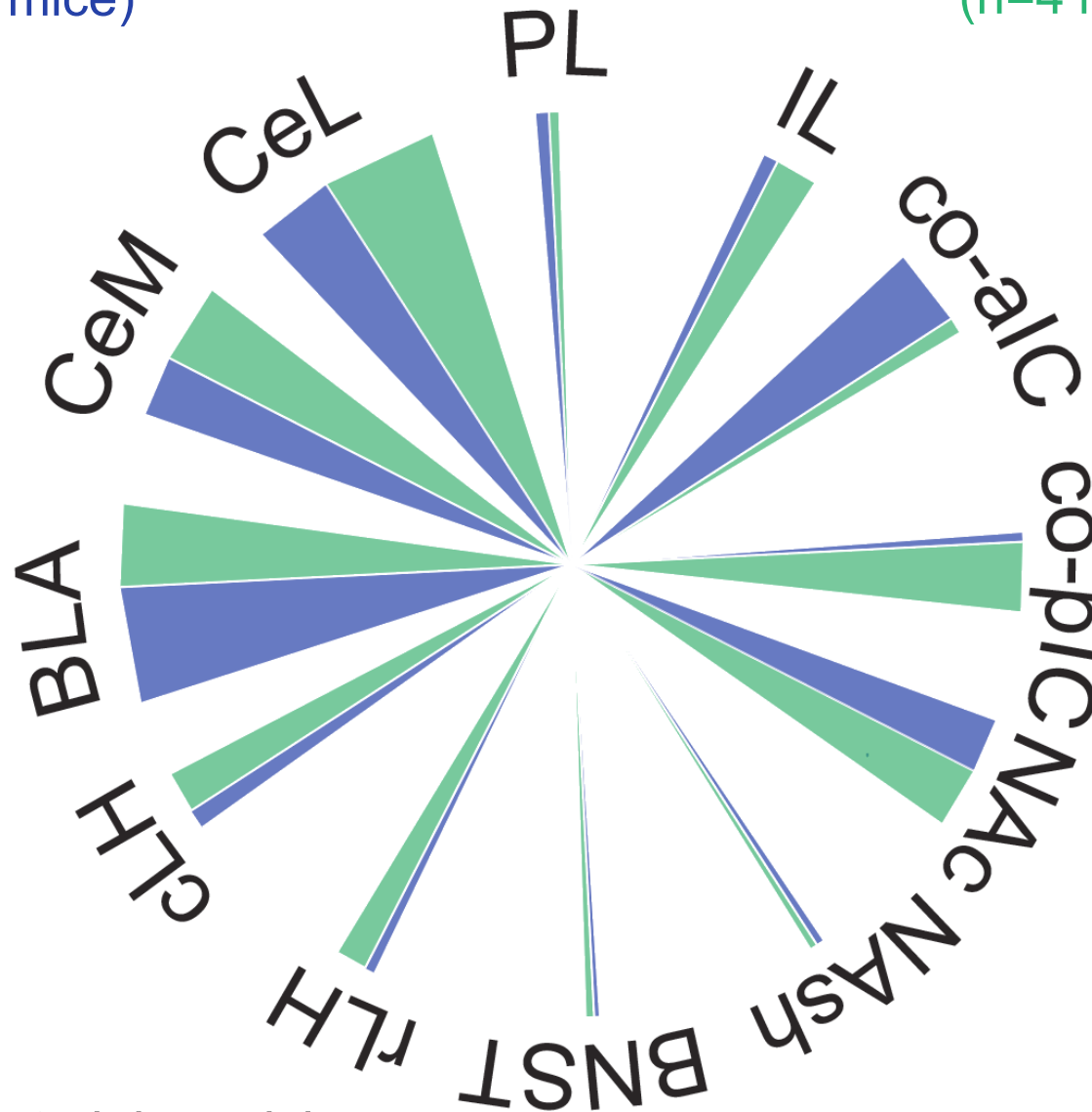
1. Anterograde mapping of all projections

anterior insula

(n=4 mice)

posterior insula

(n=4 mice)



BLA: basolateral amygdala

CeM: Centro-medial amygdala

CeL: Centro-lateral amygdala

PL: Prelimbic cortex

IL: infralimbic cortex

COaIC: contralateral anterior insula

COpIC: contralateral posterior insula

NAcc: Nucleus accumbens core

NAcsh: Nucleus accumbens shell

BNST: Bed nucleus of the tria terminalis

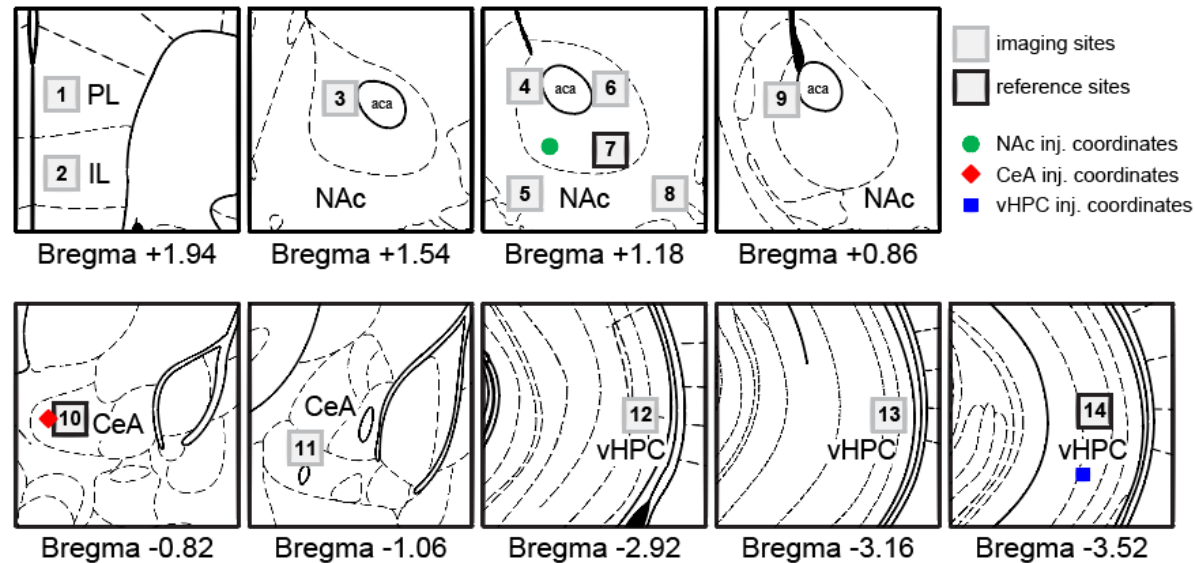
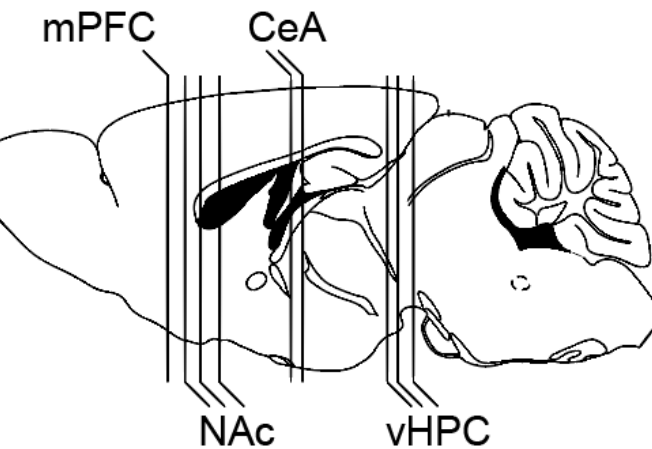
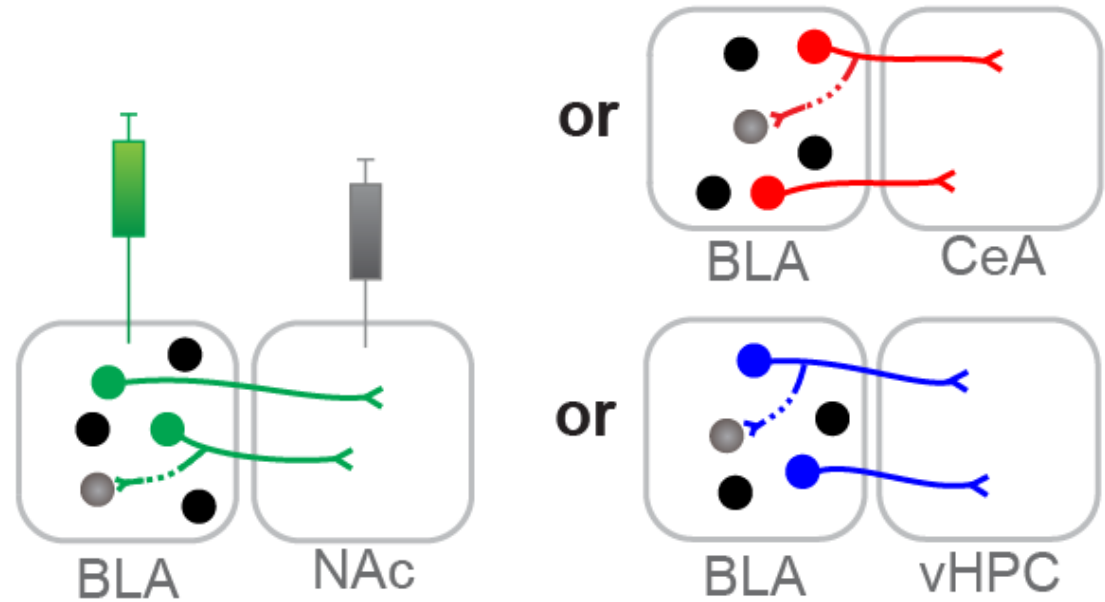
LHa: anterior Lateral Hypothalamus

LHp: posterior Lateral Hypothalamus

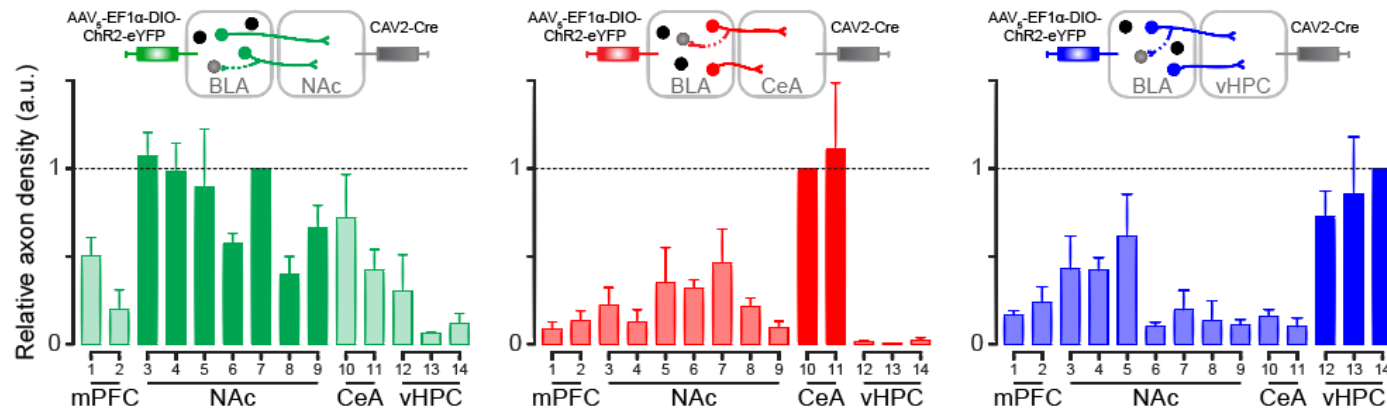
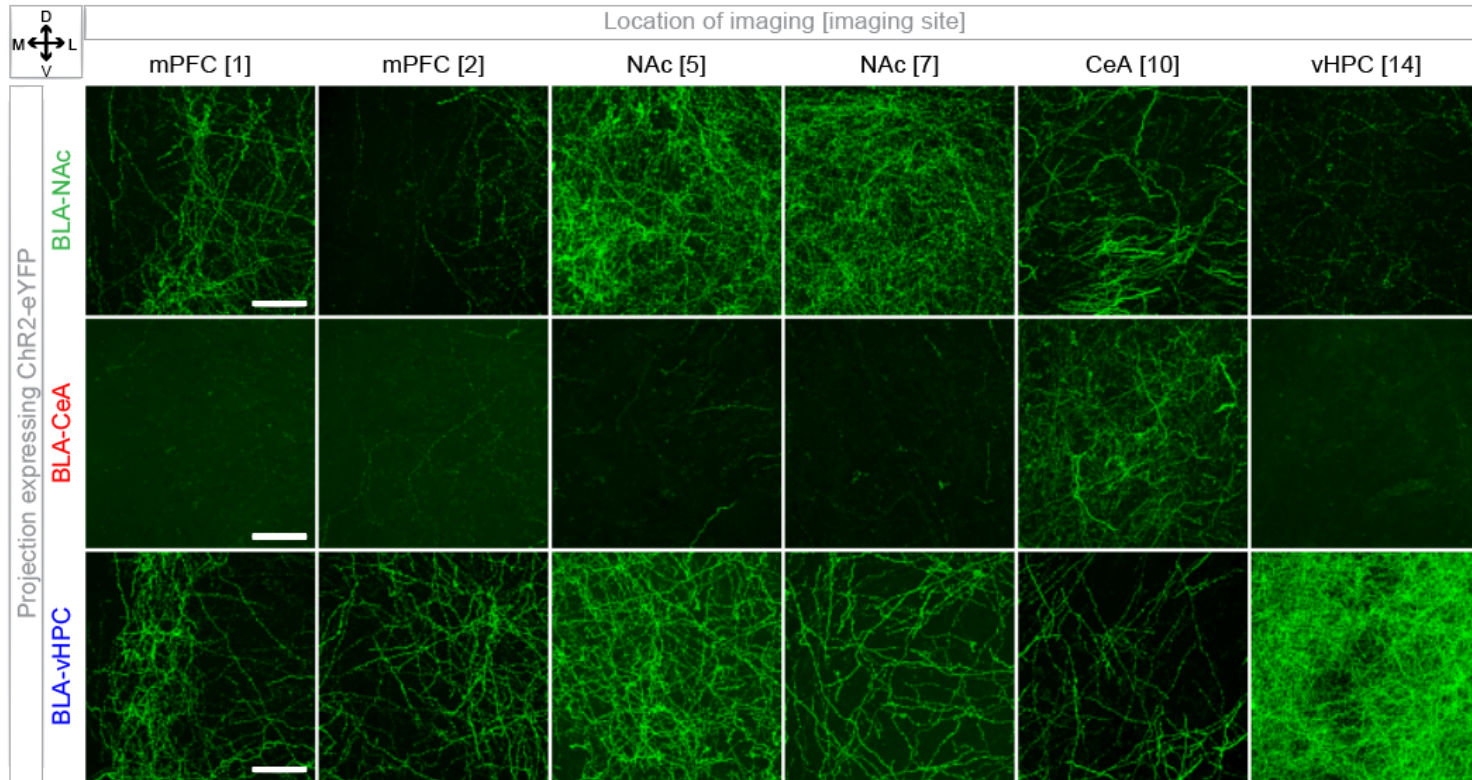
1. Anterograde mapping of all projections
2. Mapping of selective projections and their collaterals
3. Whole brain mapping of selective projections

2. Mapping of selective projections and their collaterals

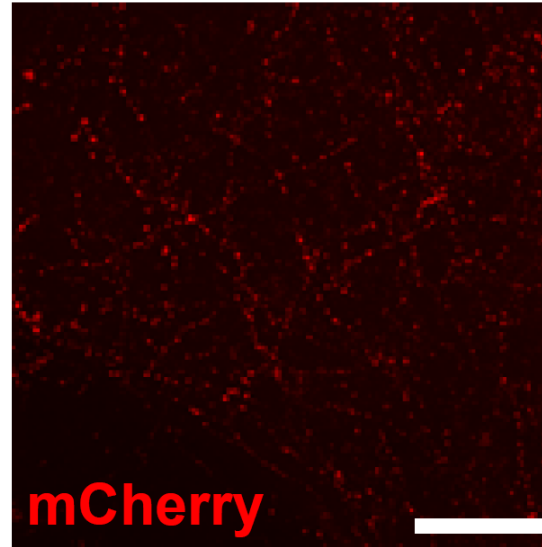
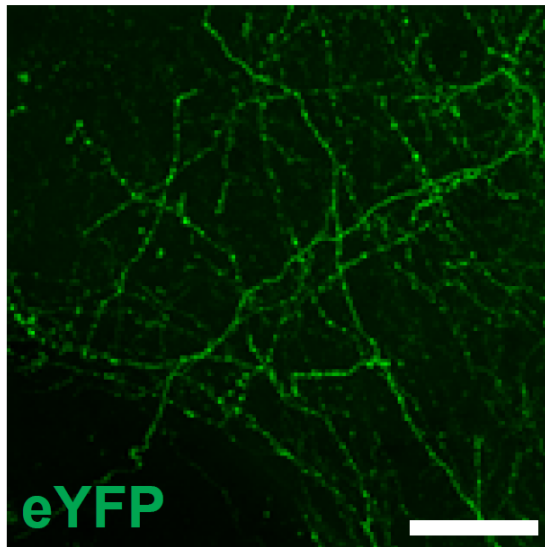
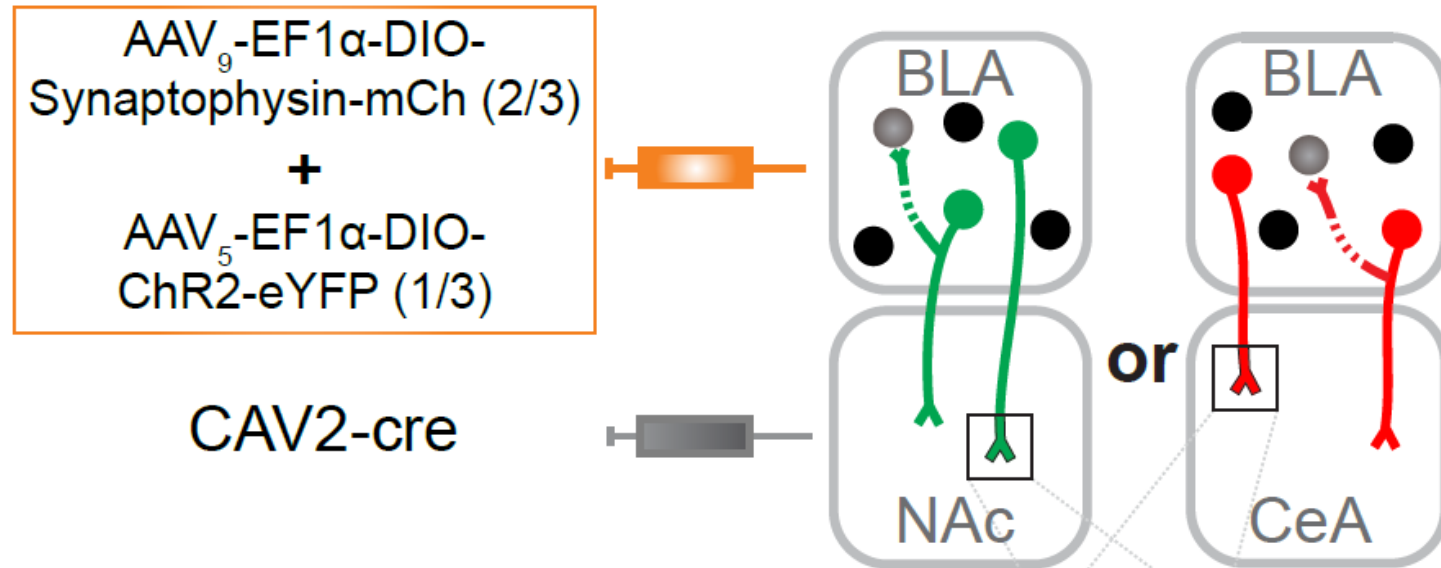
Three selective projections of the basolateral amygdala (BLA)



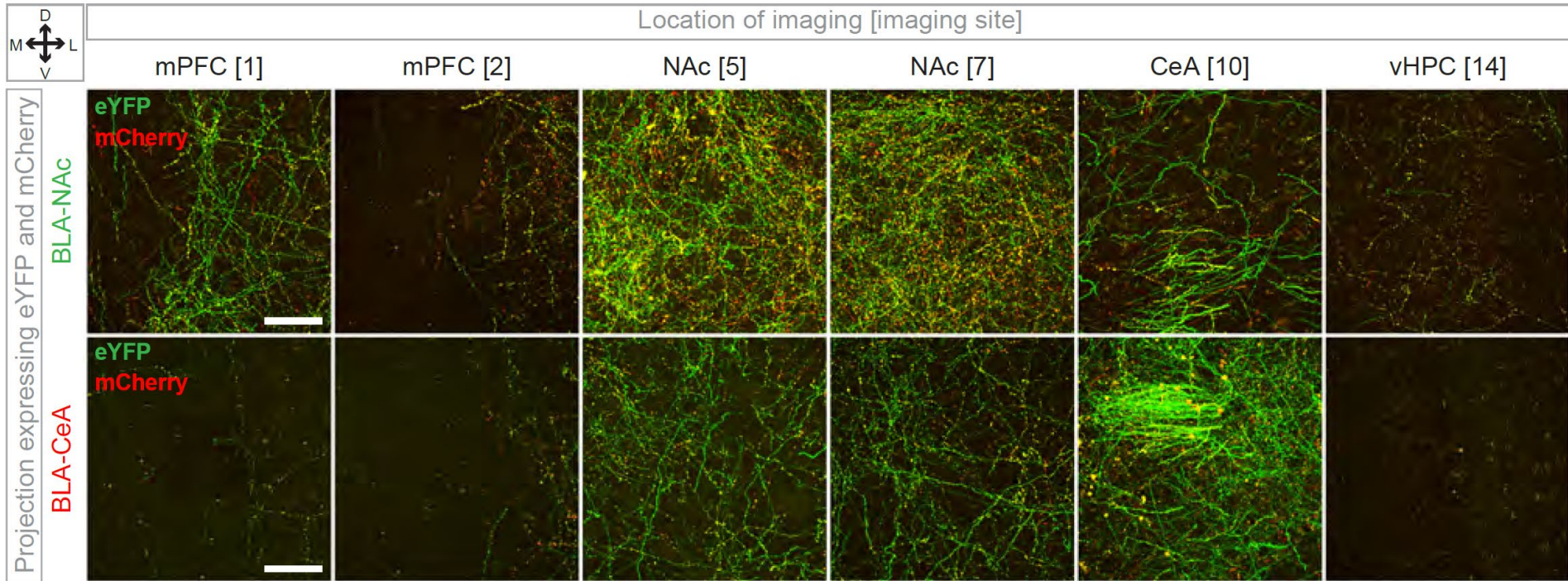
2. Mapping of selective projections and their collaterals



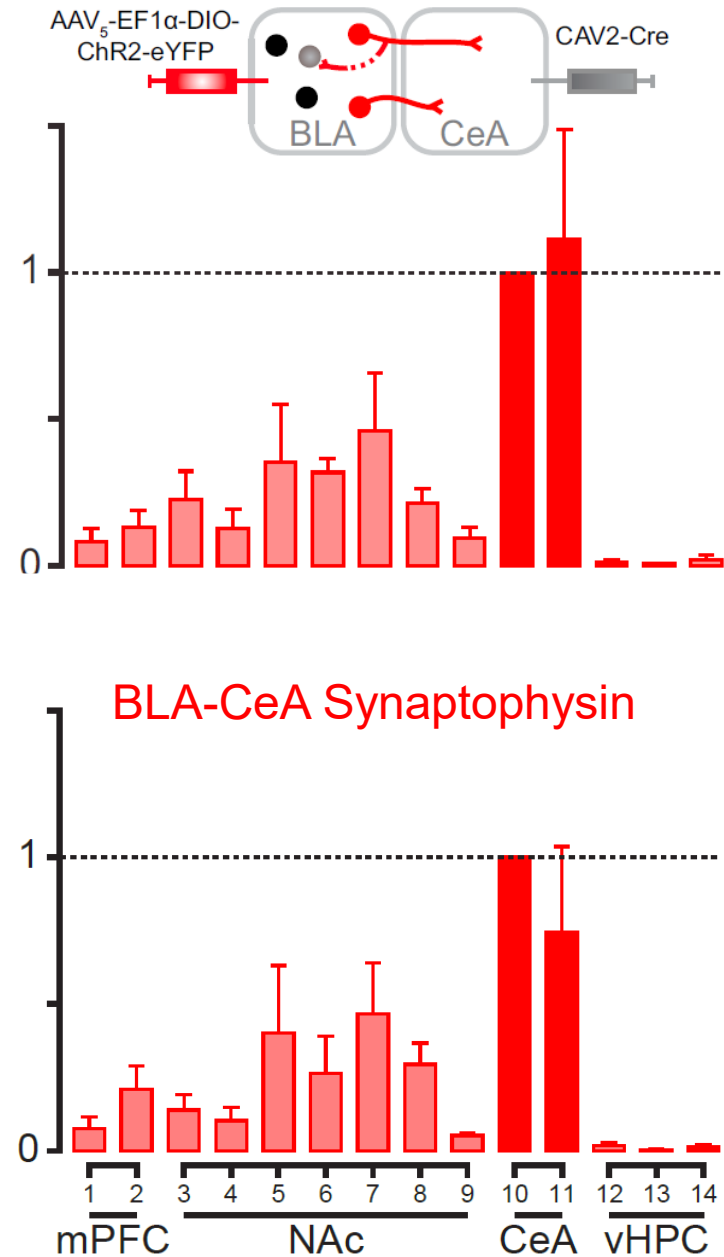
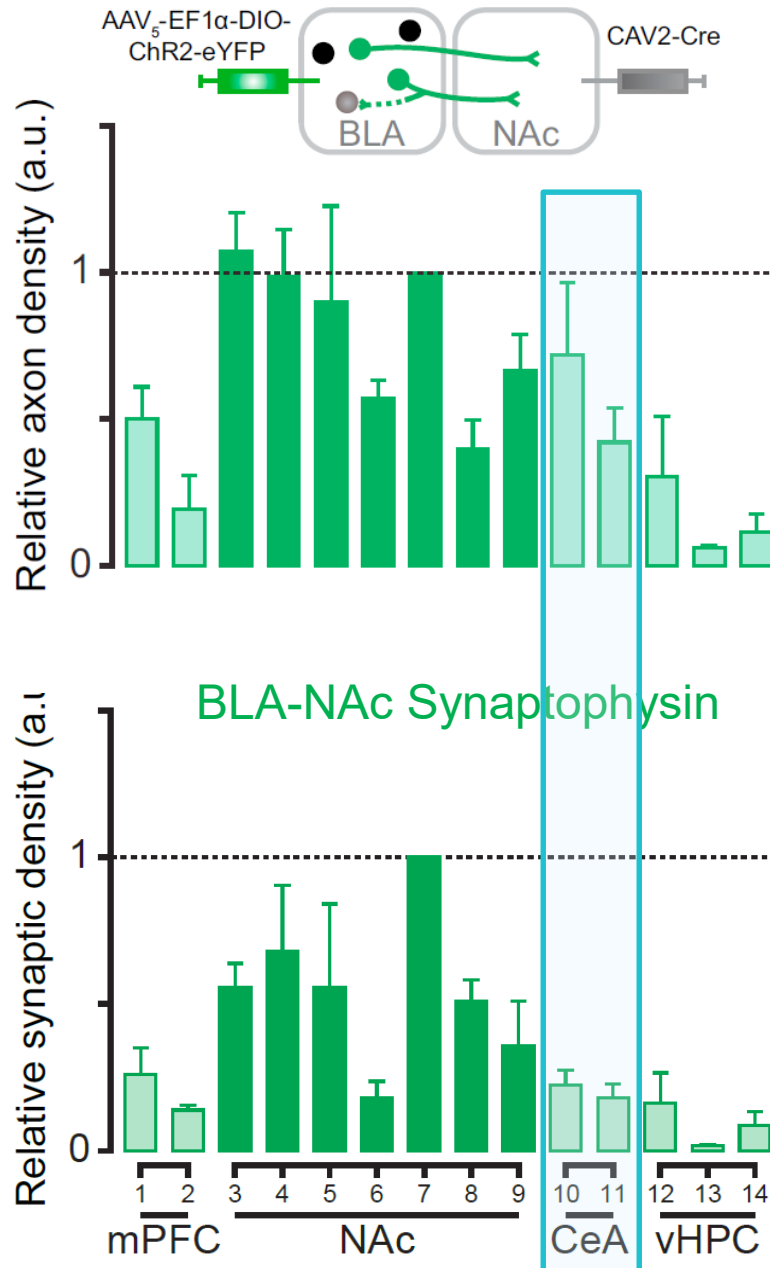
2. Mapping of selective projections and their collaterals



2. Mapping of selective projections and their collaterals



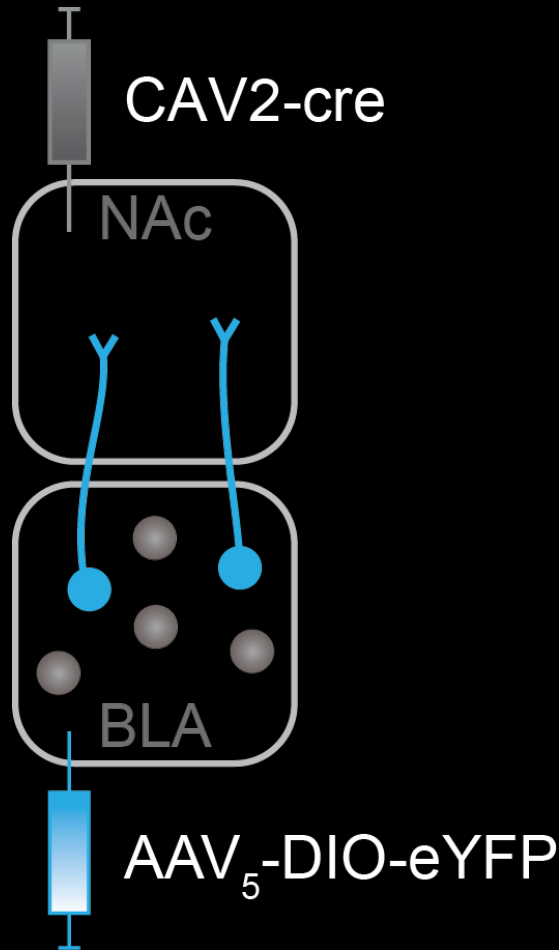
2. Mapping of selective projections and their collaterals



1. Anterograde mapping of all projections
2. Mapping of one projection and its collaterals
3. Whole brain mapping of selective projections

3. Whole brain mapping of selective projections

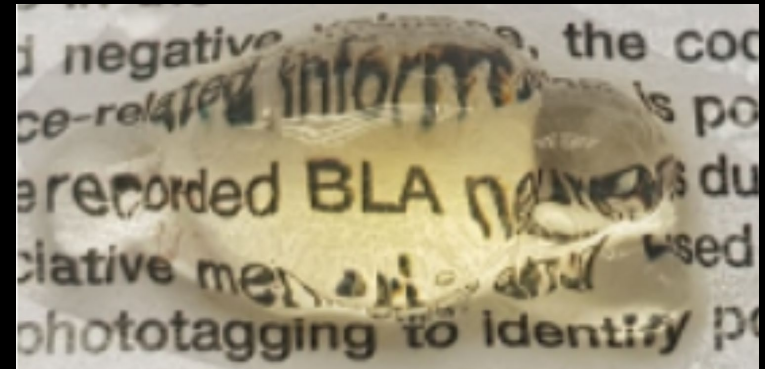
BLA-NAc projection



Lipid removal

CLARITY

Chung & Deisseroth 2013
Nature Methods

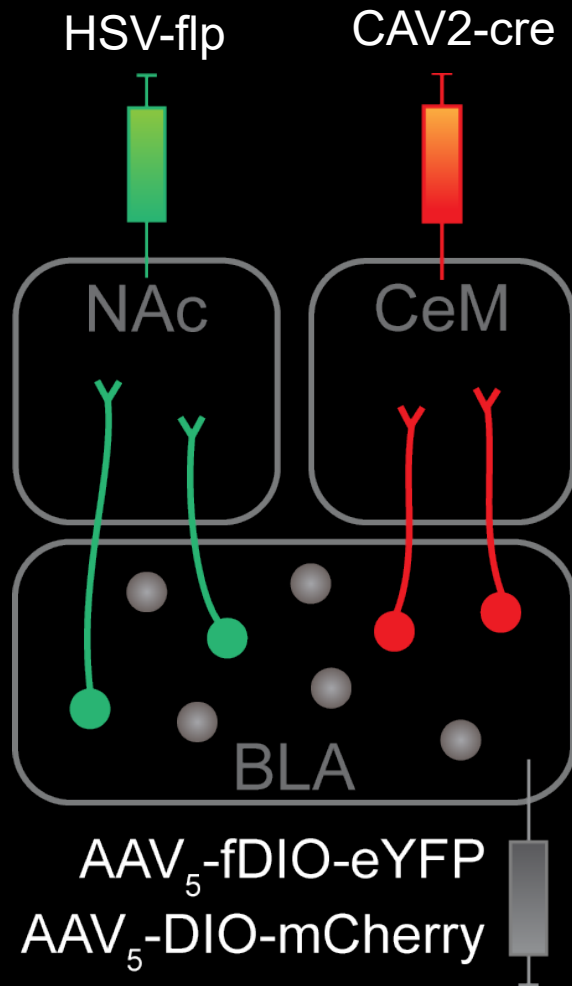


3. Whole brain mapping of selective projections

BLA-NAc



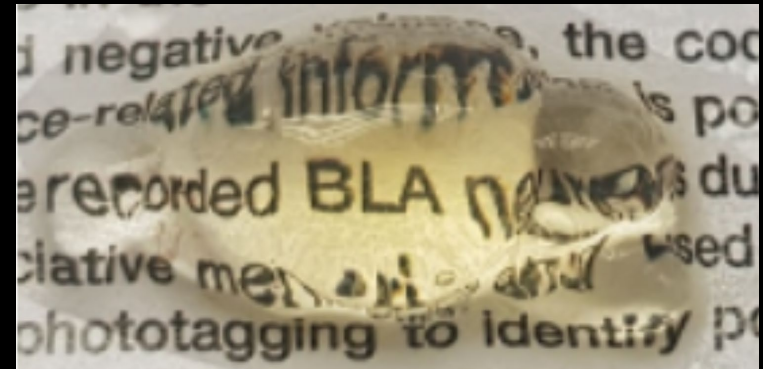
3. Whole brain mapping of selective projections



Lipid removal

CLARITY

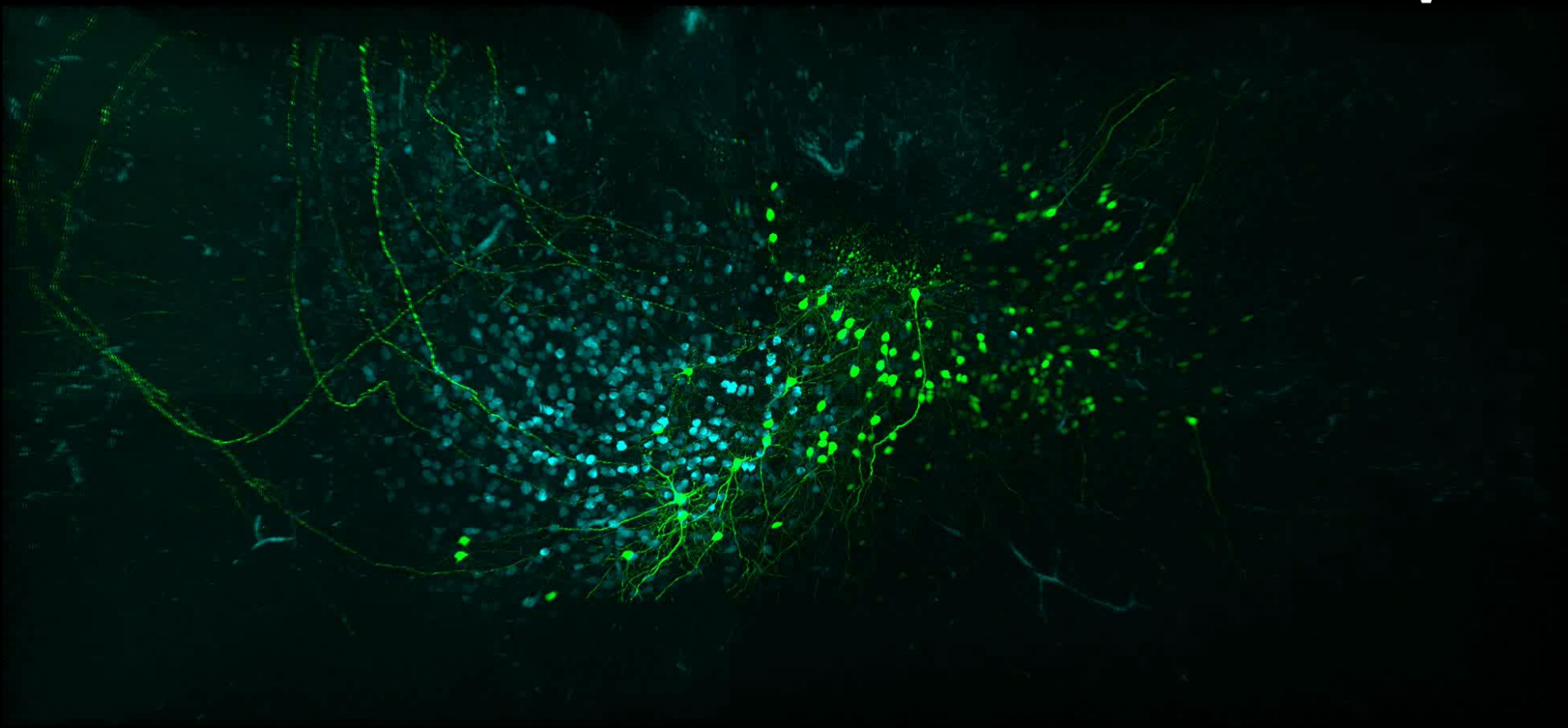
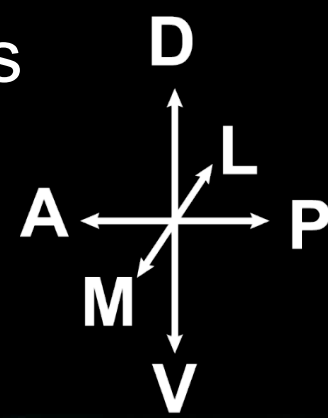
Chung & Deisseroth 2013
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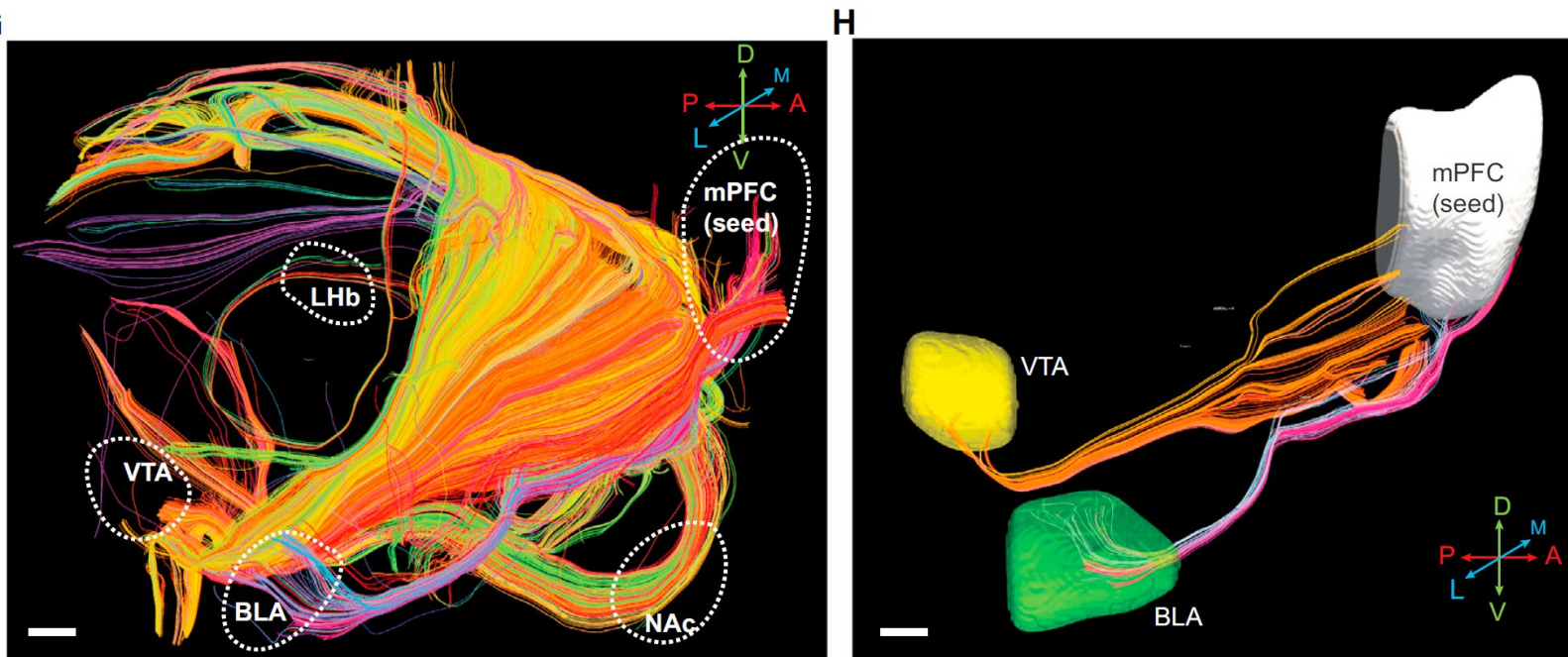
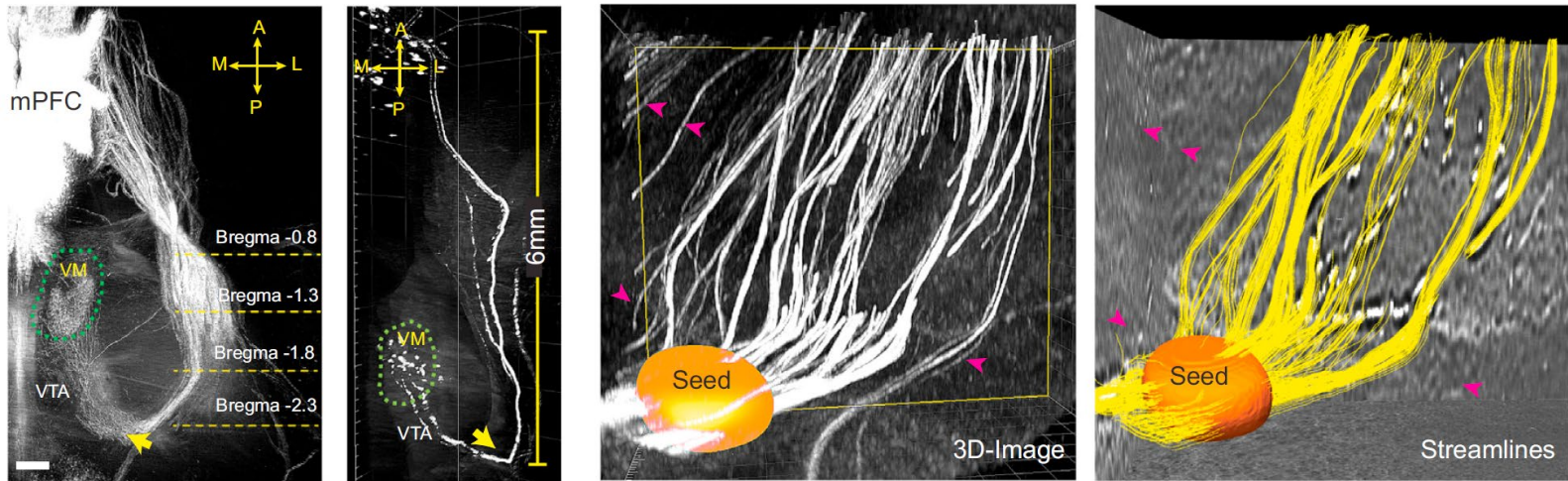
3. Whole brain mapping of selective projections

BLA-NAc

BLA-CeA

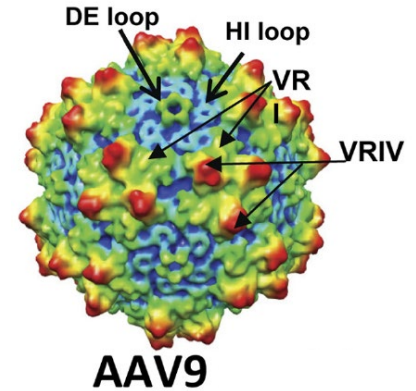


3. Whole brain mapping of selective projections

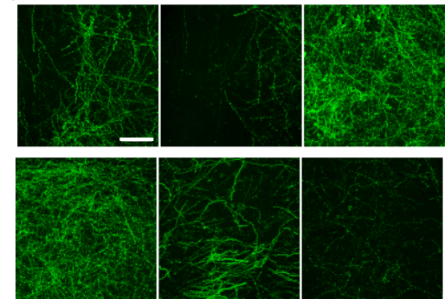


Take Home Messages

Adapt the viral strategy to your circuit



Integrate collaterals in your mapping



Use a reporter to confirm synaptic contacts

