

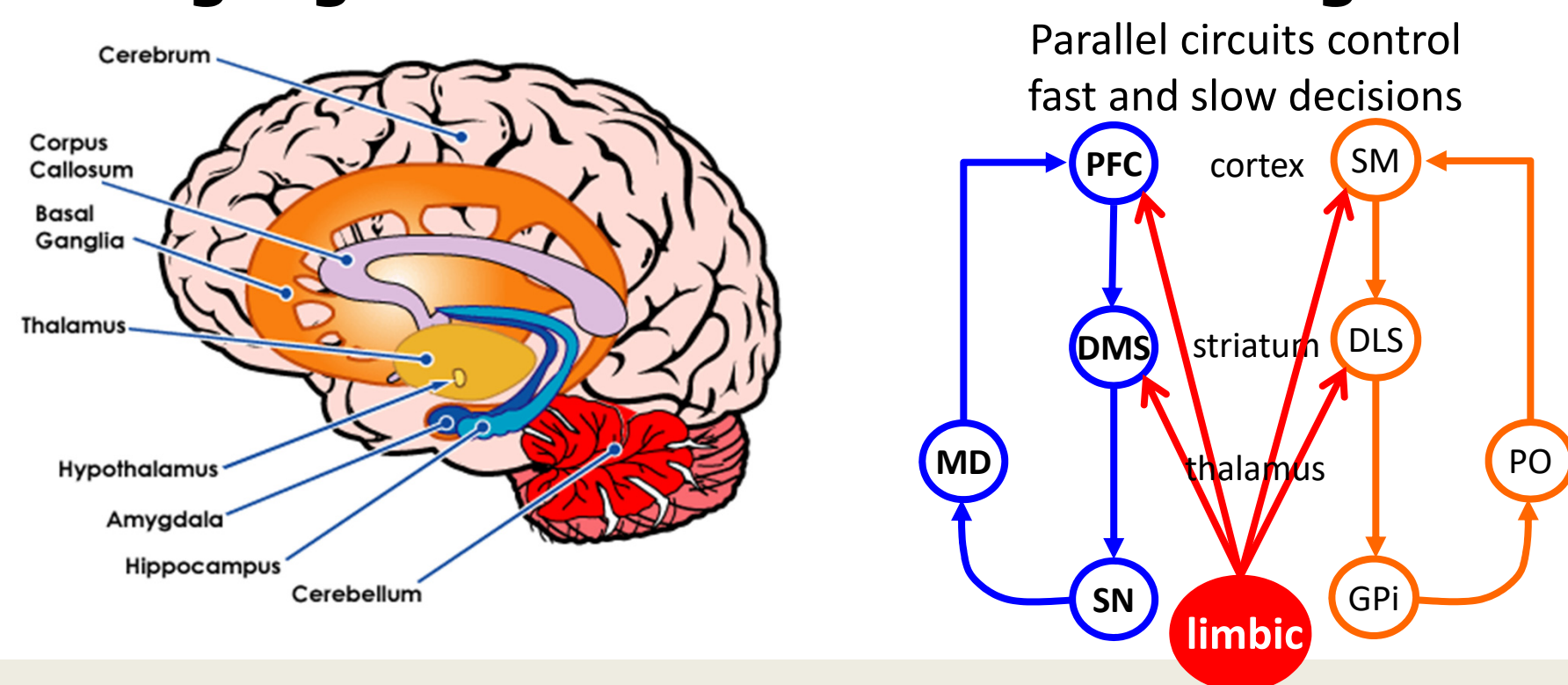
New tools for dissecting decision-making

Decision Neuroscience Lab, School of Psychology

Decision-making:

- A complex capacity that depends on the smooth, moment to moment integration of cognition – involving frontal lobes- and emotion – involving limbic structures.
- Dysfunction of this integrative capacity accompanies many major psychiatric conditions, neurodegenerative disorders and drug addiction.
- Our research seeks to establish the changes in brain circuits mediating cognitive-emotional integration using behavioural, circuit-level, cellular, genetic and imaging tools in humans and rodent models

Basal ganglia: site of cortical-limbic integration



Facilities and infrastructure:

The Decision Neuroscience Lab in the School of Psychology accommodates 30 scientists and senior investigators and has facilities for histology, microscopy, protein analysis, electrophysiology, and behaviour. It is composed of wet lab and behavioural suites with both rat and mouse vivaria and human testing facilities.

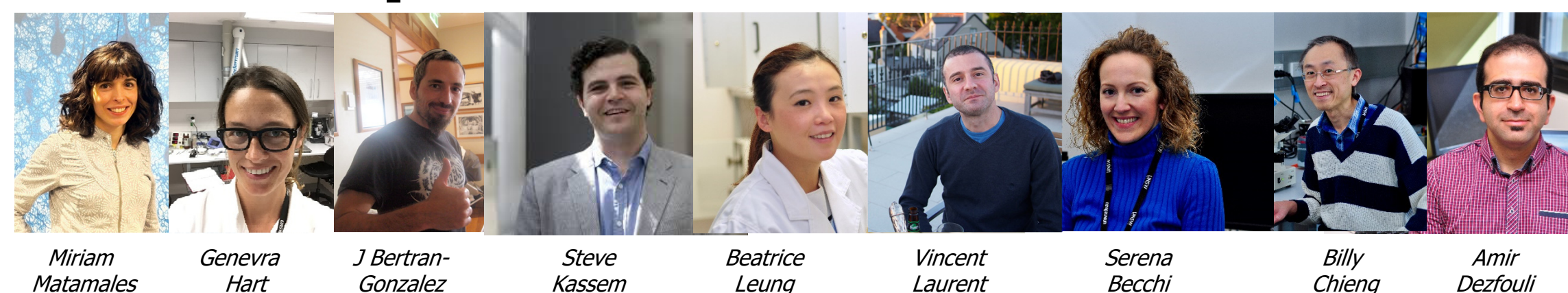
Recent industry collaboration:

Project: Testing novel anti-inflammatory compounds for use in neurodegenerative conditions.

Partner: Pharmaxis Pharmaceuticals Pty Ltd.

Interim Research Report: Becchi et al *British Journal of Pharmacology*, 2017

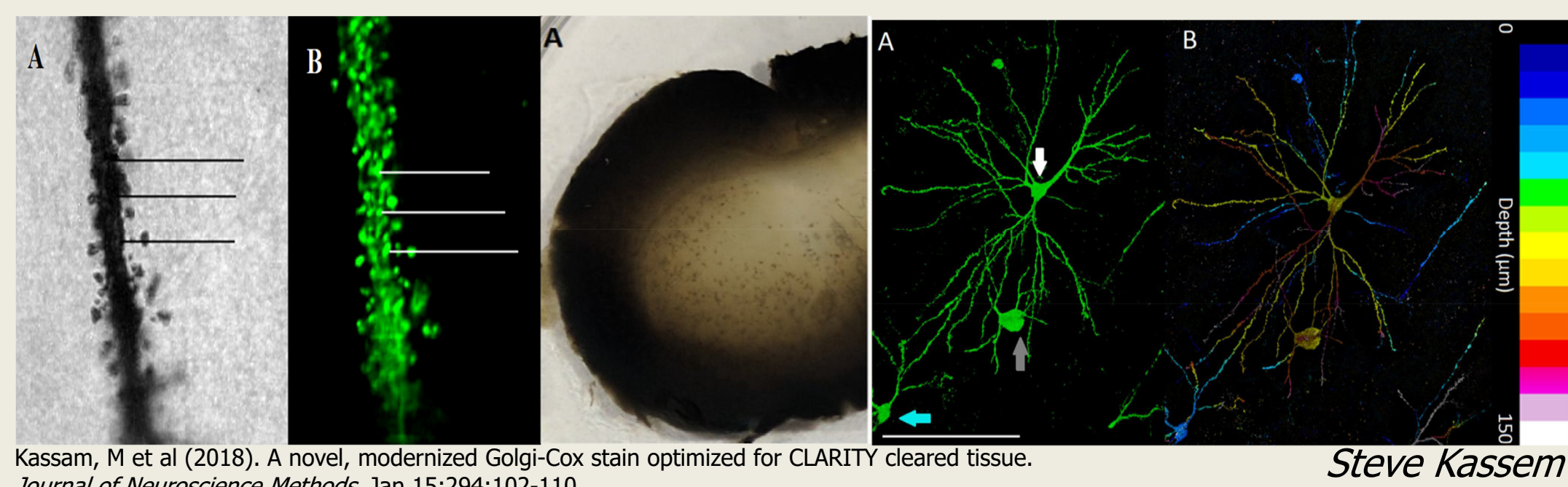
Our experts:



Imaging decision-making

We are developing 4 world's first techniques for use in imaging brain activity in real time in conjunction with specific assessments of decision-making.

1. Ultra rapid golgi: Stain that reveals changes in cellular morphology within 48 h in brains cleared using CLARITY. Neurons can be observed in 3-D in their entirety in situ.

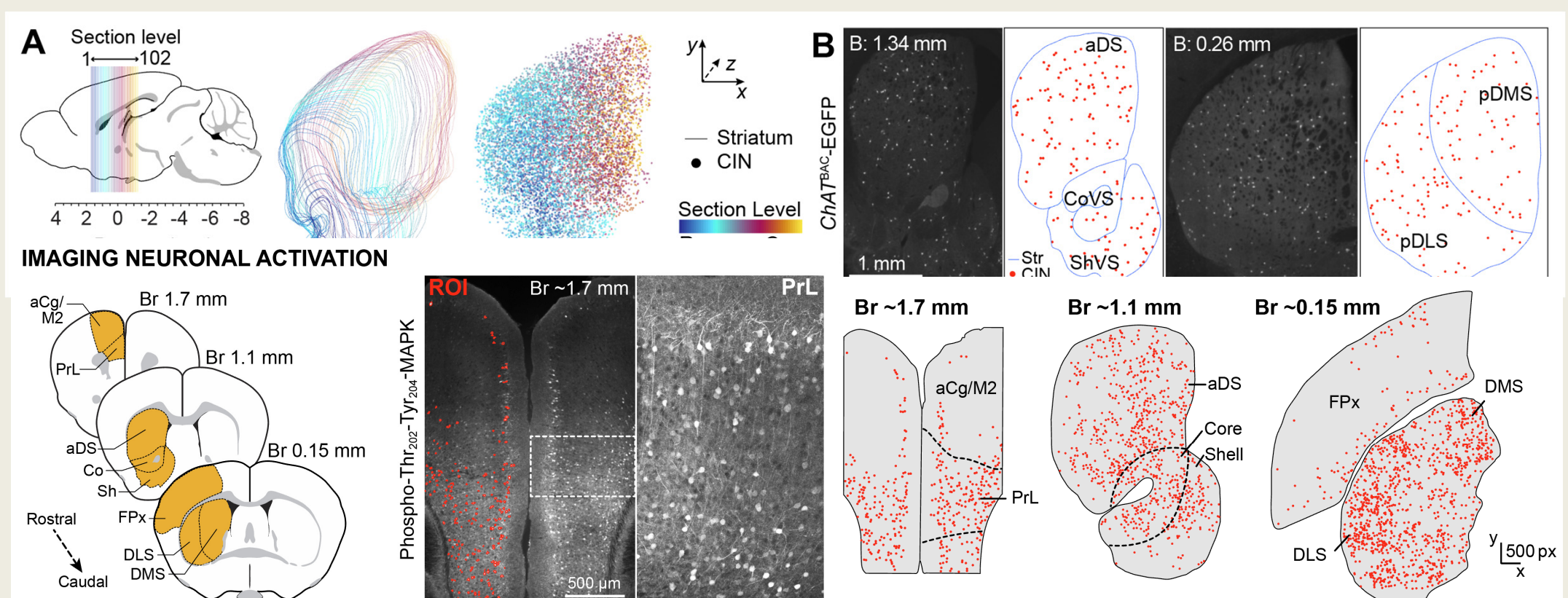
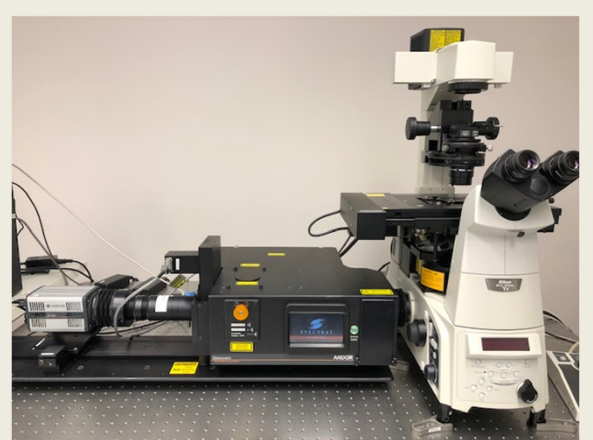


Kassem, M et al (2018). A novel, modernized Golgi-Cox stain optimized for CLARITY cleared tissue. *Journal of Neuroscience Methods*, Jan 15;294:102-110.

Steve Kassem

3. Region-wide imaging:

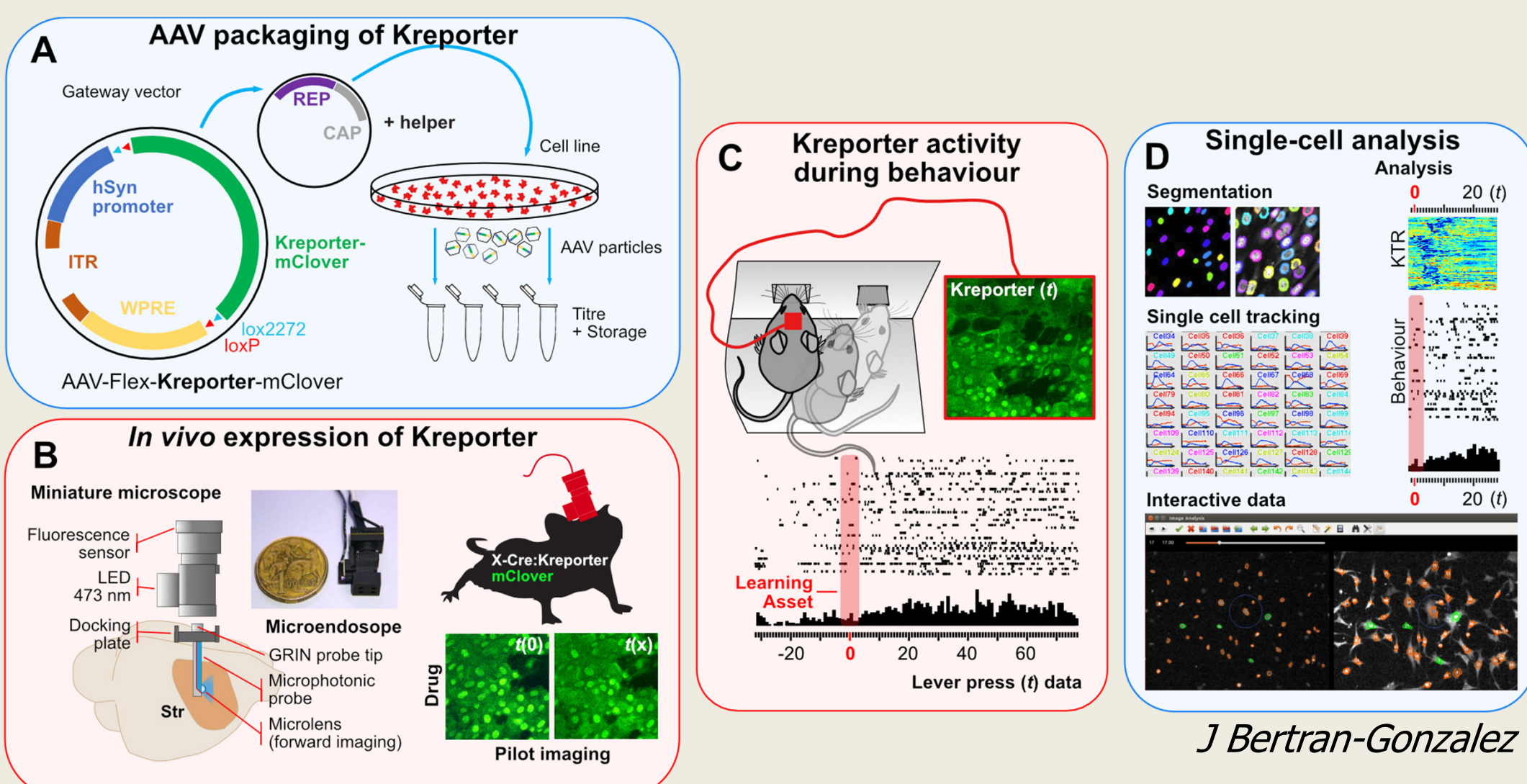
Rapid, high-throughput reconstruction of plasticity in specific cell types over entire brain regions during decision-making using spinning disk and computational methods



Miriam Matamales

2. Imaging real-time changes in intra-cellular signaling:

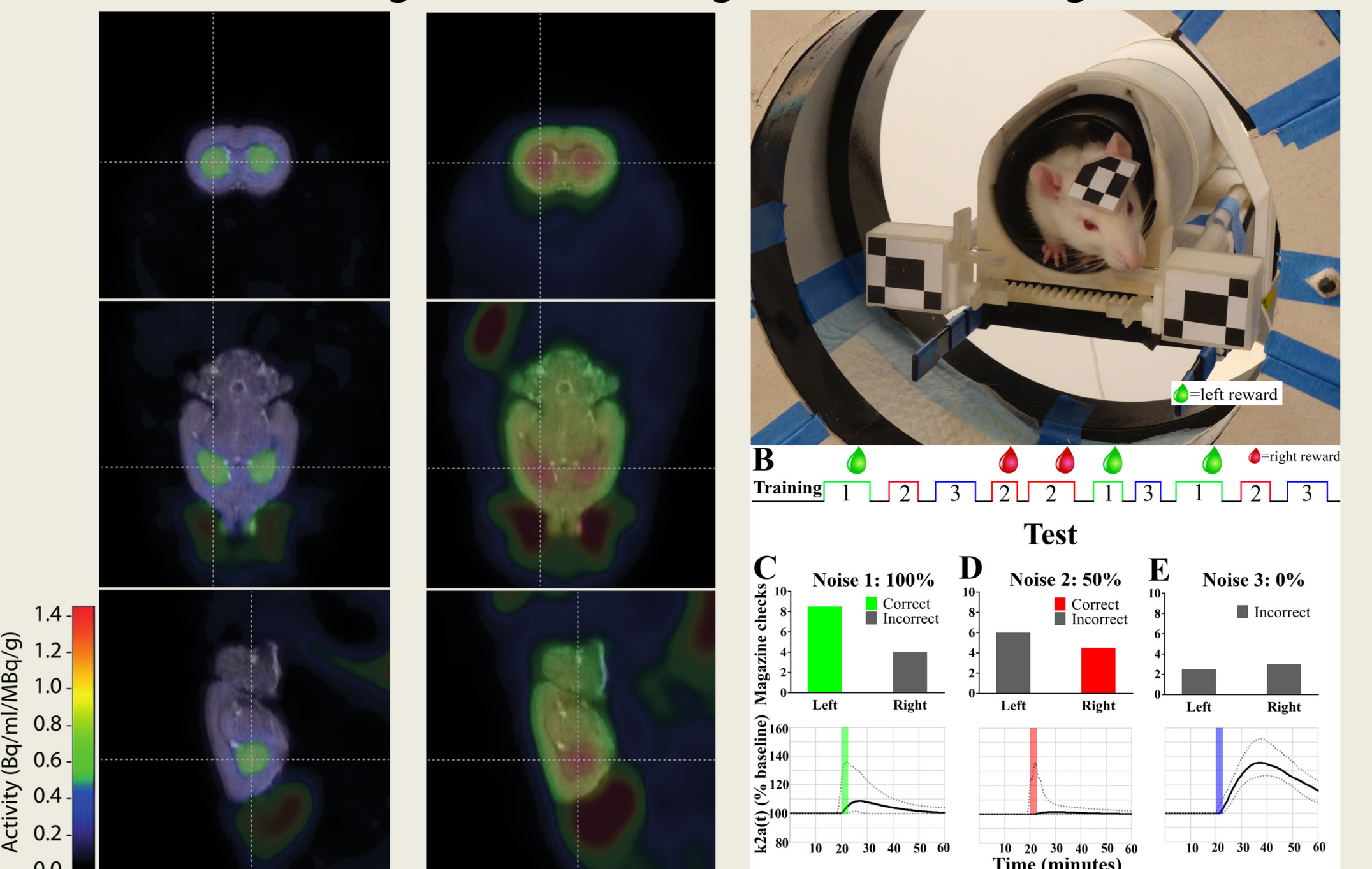
Single-cell imaging of kinase activity in specific brain circuits during learning and decision-making



J Bertran-Gonzalez

4. Functional PET-scanning:

Imaging in real time in awake behaving animals during decision-making tasks



Genevra Hart

