

Teaching in small groups to learn complex imaging techniques and supporting professional practice in neuroscience

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MSc Module CLNE0043: Applied experimental approaches to studying neuronal circuits in health and disease



Structure:

1. The context: teaching practicals to learn complex subjects.
2. Lessons from previous experience: challenges.
3. Necessity to update design and learning approaches.
4. New format:
 - Introductory session,
 - teaching in small groups,
 - paired teaching,
 - SoRAs, others.
5. Feedback from our students.
6. What will we do differently next time?

1. Teaching tutorials to learn advanced fluorescent imaging techniques in neuroscience

Diverse Educational Background Cohort enrolled in the Module

Taught Programmes:

MSc Psychologist

MSc Brain and Mind Sciences

MSc Clinical Neuroscience

MSc Clinical Neuroscience: Neuromuscular Diseases

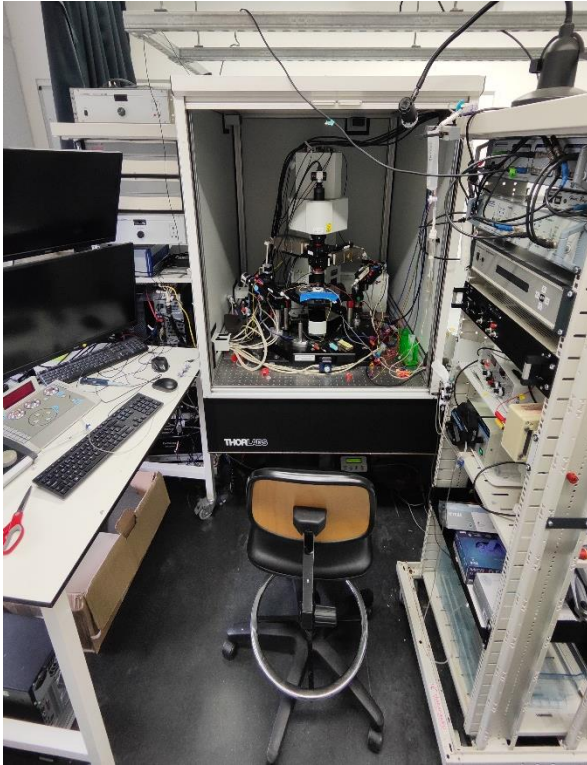
MSc Clinical Neuroscience: Stroke Medicine

International and home students

Return to on-site practical sessions post covid pandemic

2. Challenges

Limited space in laboratories, tightly-packed with equipment and imaging systems

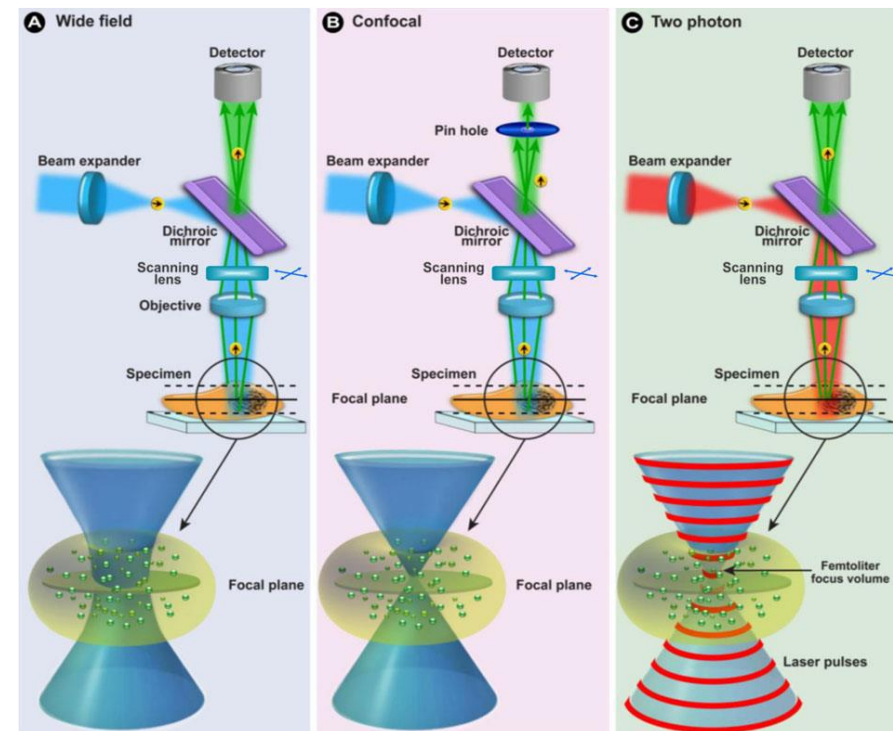


2. Challenges

- Balancing the complexity of imaging methods taught with simple explanations.
- Designing understandable experiments.
- Experimental outcomes (i.e., successful recordings from biological samples).
- Object management – biological samples of alive brain tissue.
- Time management (a session of around 45 minutes).

3. Necessity to review and update

- Return to on-site practical sessions post covid pandemic.
- Learning complex subjects, such as advanced methodologies in neuroscience, requires a variety of teaching approaches that are versatile and effective.
- Tutorials taught by postdoctoral fellows with different teaching experience.



A Cartoon of Imaging Techniques Taught

4. Our solutions:

A team-based teaching!

Introductory session incorporated to sum up the lecture materials and the demo schedule.


Teaching in small groups for interactive discussions (3 – 4 students per group).

Teaching in pairs to advance teaching experience.

Preparation of biological samples in advance, sharing between different demonstrations.

Conclusion session added to discuss experimental flows and sum up learning, Q&A.

QUEEN SQUARE INSTITUTE OF NEUROLOGY
Dept. Clinical and Experimental Epilepsy



CLNE0043: Applied experimental approaches to studying neuronal circuits in health and disease

Introduction to Imaging Tutorials

Demonstration 1: Live-imaging quantal glutamate release at single synapses (Dr Kotzadimitriou, Ms McGowan).

Demonstration 2: Supralinear dendritic integration elicited by 2-photon glutamate uncaging (Dr Griesius).

Demonstration 3: Fluorescent lifetime imaging technique for quantitative measurements of intracellular calcium dynamics in living cells (Dr Tiurikova).

Demonstration 4: (Dr Langley).

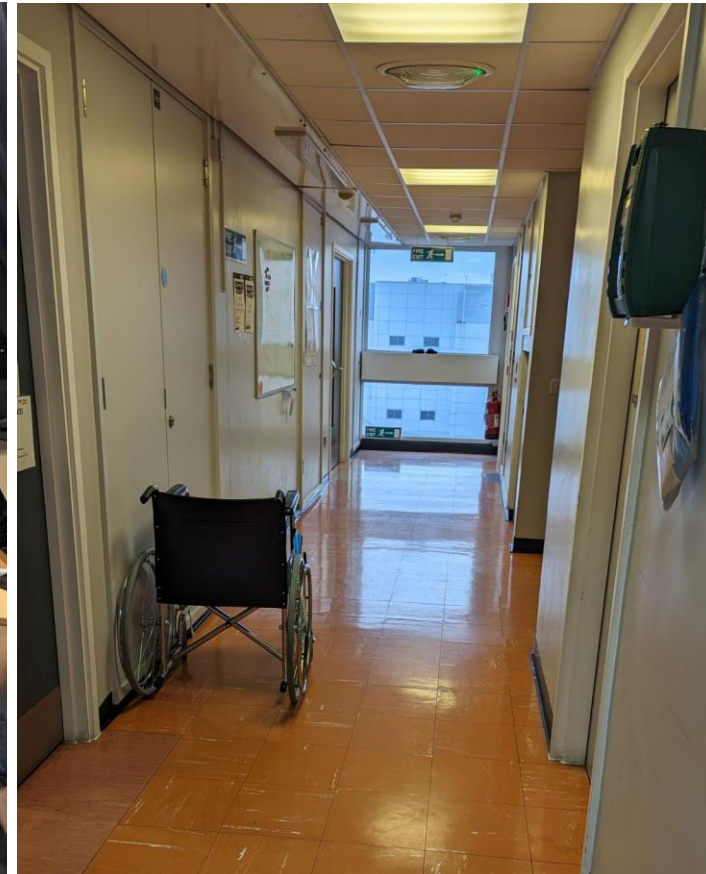


4. Our solutions:

Inclusiveness, supporting SoRAs

- trained personnel at place
- completing safety in advance
- managing access to laboratories
- extra time one-to-one.

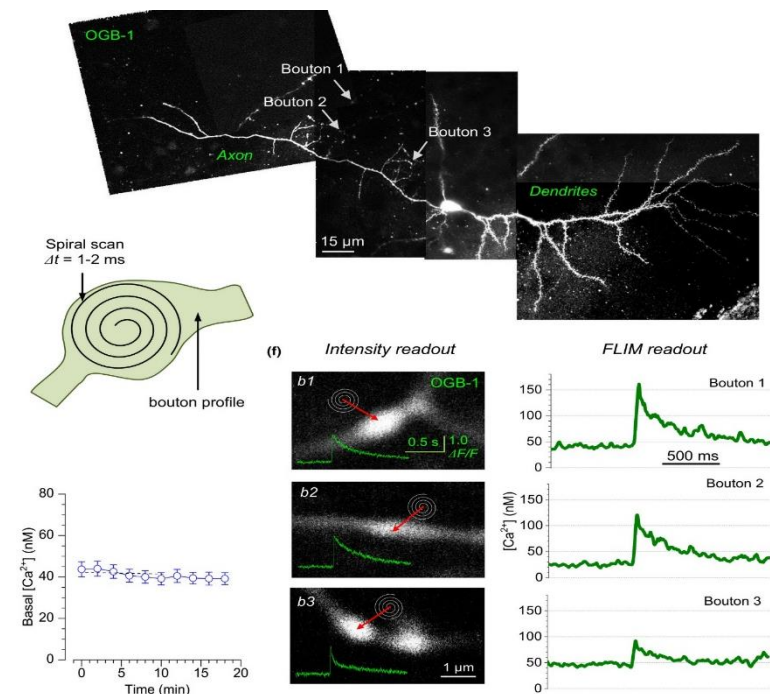
Students' questionnaire
for our reflection on teaching approaches.



New format: Example from Dr Tiurikova (experienced in teaching postdoc)

Re-Designing Tutorial Flow:

- Introduction to the demonstration – ppt slides from previous research to facilitate understanding the basis of imaging method.
- Define the experimental question(s) of the tutorial.
- Starting interactive discussions for inclusiveness within the small group and student engagement in learning process.
- Experimental part – recordings from biological samples for planned research outcomes.
- Critical analysis of experimental data, with **overview** to the quality of sample size and statistical analysis.
- Follow-up Q&A.
- Relate skills to real world applications.



5. Feedback from our students:

“The overall sessions were all well, clear linkage between the lectures given and the demonstrations that we had received afterwards”;

“The demonstrations were clear but probably need more time”, “...sometimes difficult to understand demonstrations”, “...mostly because I am personally lacking background knowledge”;

“I liked that they asked us questions”;

“The demonstrators clearly answered our questions”;

“I really liked seeing all the final product with the fluorescent images”.

6. Our team-based teaching – what will we do differently next time?

- Develop and incorporate more digital visualisations to enhance understanding complex imaging systems and relative equipment.
- Engage more demonstrators to work in pairs, split tasks and improve time management.
- Encourage discussions to develop problem-solving skills.
- Connecting professional techniques taught with real world.

THANK YOU



[Rainbow Brain Images](#)