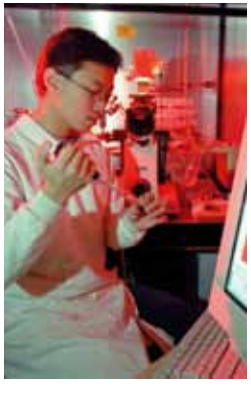
Welcome

We welcome this opportunity to invite you to be a participant at the ever popular Leeds Ion Channel Workshop, which will run for its 16th year in September 2015. It will provide you with an excellent and accessible chance to learn the basics about methods – especially electrophysiology - for the study of ion channels in the pharmaceutical industry and within an academic research environment. Our university is amongst the largest teaching and research institutions in the UK. It was placed in the top 10 in for research power in the UK's 2014 Research Assessment Exercise. The city is a vibrant and cosmopolitan place to visit – with excellent shopping, bars, clubs and restaurants, and situated on the southern edge of the beautiful Yorkshire Dales countryside. We are absolutely confident you will have a great learning experience and a very pleasant week. *Jon Lippiat, Hugh Pearson, and Chris Peers.*

The University of Leeds

About the Workshop

The Workshop began in 1999 and has run yearly with participants from a range of organisations including Aberdeen University, Actelion Pharmaceuticals, Amersham Biosciences, Astra Zeneca (UK and Sweden), Biofocus, Draper Lab MIT, Eli Lilly, GlaxoSmithKline (UK and USA), Hoffman La Roche, Huntingdon Life Sciences, Imperial College London, Merck Sharp and Dohme, Merck-Frost, Millipore, National Physics Laboratory, National University of Ireland, Nencki Institute, Novartis, Novo Nordisk, Organon, Oxford University, Peking University, Pfizer (UK and USA), Sanofi-Aventis, Scottish Biomedical, Shandong University, St Andrews University, St George's Hospital Medical School London, Takeda Cambridge, University of Auburn, University of Bucharest, University of Joensuu, University of Mysore, University of Regensburg, Vertex Pharmaceuticals, and Xention.



The Workshop provides a brief introduction to the biology of ion channels followed by coverage of the basic theory, potential artefacts and hands-on experience of whole-cell patch-clamp, bio-imaging and sharp electrode methodology. Participants also receive training in data handling and presentation. The workshop is specifically aimed at a basic level for scientists who use, plan to use or simply need to know about the methodology, but do not require a comprehensive theoretical knowledge. It will help you to avoid basic mistakes and artefacts, present your data with confidence and spot mistakes in the work of others.

No previous knowledge or experience of the techniques is required. The Workshop lasts for 5 days and occurs within the normal working environment of the University's Integrative Membrane Biology and Cardiovascular Centres, which have a long experience of electrophysiology and extensive facilities.

Feedback from previous participants

"I liked the accessibility to equipment and being able to speak to lecturers and demonstrators in between sessions" "perfect organisation" "very helpful" "clear lectures and friendly atmosphere" "tutorial sessions were a good forum for discussing data" "the aims were well defined" "lectures were excellent in conjunction with the wet work" "demonstrations were very good" "lecturers and demonstrators are knowledgeable and most helpful in explaining concepts and techniques" "the level of lectures was pitched at the right level and was of high quality" "I liked the opportunity to discuss issues in a relaxed environment" "thank you for a really pleasant week – not only for the basic theory and hands on experience, but also for your way of 'taking care of us'! Great !" "I thoroughly enjoyed the course and it has been of great benefit to me. I look forward to being able to send other members of my team next year" "it's a must". "It was the best organized workshop in which I have participated".

Eligibility

Anyone with basic science training to degree level and who is currently working in the pharmaceutical industry or in academia can be a participant. The number of places is limited to allow for close supervision of practical work by tutors and instructors.

Outline of the programme

Sunday evening

Reception dinner

Monday

Welcome, introduction, aims
Lecture: voltage-gated cationic channels
Lecture: chloride channels
Lecture: basic principles and methodology of whole-cell patch-clamp
Lecture: leakage and its subtraction, background and endogenous currents and how to block them, channel run-down, noise
Practical work: hands-on experience in research labs with direct demonstration and teaching
Small group tutorials

Tuesday

Lecture: ion gradients, equilibrium and reversal potentials, driving force, inward and outward currents, cations and anions
Lecture: liquid junction potentials, Ag/AgCl wire/pellet, agar bridges, using Cl^- substitutes
Practical work: hands-on experience in research labs with direct demonstration and teaching
Lecture: capacitative artefacts and their subtraction, series resistance, settling time of voltage-clamp, measuring fast / slow / large / small currents, space clamp
Practical work: hands-on experience in research labs with direct demonstration and teaching
Small group tutorials

Wednesday

Lecture: single channel recording
Practical work: single channel recording
Tutorial: Bad data!
Afternoon off (free time)

Thursday

Lecture: activation, deactivation and inactivation, Gmax and V0.5, voltage-dependence of drug action on channels, and use-dependence of block.
Lecture: presenting electrophysiological data
Practical work: hands-on experience in research labs with direct demonstration and teaching
Oral presentations by participants: the week's data presented by small teams.
Small group tutorials
Dinner with instructors and lecturers.

Friday (Subject to change)

Lecture: calcium imaging and multi-well real-time fluorescence
Lecture: sharp micro-electrode recording
Lecture: two-electrode voltage-clamp
Lecture: multi-well robotic planar patch-clamp
Practical work: hands-on experience in research labs with direct demonstration and teaching
Option 1: FlexStation (96-well calcium measurement)
Option 2: sharp electrode recording
Option 3: two-electrode voltage-clamp recording
Option 4: robotic multi-well planar patch-clamp recording
(Rotation around the options is available)
Feedback and farewell – participants, staff and demonstrators

Leeds city centre

Outline of wet practical experience

- Learn the basics of your patch-clamp set-up
- Learn to form, recognize and measure a “giga-seal”
- Learn to break-through to the whole-cell mode by suction and/or zap
- Construct an I/V curve and print it out
- Recognise and take account of “run-down”
- Learn methods to apply drugs and spotting potential perfusion artefacts
- Measure a reversal potential
- Observe, analyse and cancel “capacity current” - off- and on-line
- Learn about leak-subtraction methods
- Observe voltage- and use-dependent drug action on ionic currents
- In a group, prepare a presentation of electrophysiological data
- Learn to load cells with fura dye
- Learn to use a 96-well format real-time automated $[Ca^{2+}]_i$ measurement system
- Capture a fluorescent image and learn about the problems of bleaching
- Observe depolarisation-induced and agonist-induced calcium responses
- Learn to pull sharp electrodes
- Make a recording of action potentials with a sharp electrode
- Learn about injecting current with a sharp electrode
- Learn to inject oocytes with cRNA
- Make two-electrode voltage-clamp recordings from oocytes expressing channels
- Making single channel recordings, reducing noise, and sampling data.
- Introduction to a planar patch clamp device.

Cost

£2500 (Great British Pounds) per participant, which includes accommodation and meals.

Accommodation and meals

Within the price we provide en-suite accommodation for 5 nights at the University, with an optional 6th night if required, all meals, refreshments, and dinners within the city.

Refreshment is available throughout each day.

Timing

The Workshop begins with a welcome dinner on the evening of Sunday 6th September and ends with a farewell glass of wineat about 3:30 pm on Friday 11th September 2015.

To apply for a place, please contact us directly or print and complete this form, and send to:

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Leeds Ion Channel Workshop Administrator
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University of Leeds
Leeds LS2 9JT
United Kingdom

Name

Title

Position

Qualifications

Laboratory experience

Institution/organisation

Postal address

Postcode

Country

Telephone

Fax
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e-mail

Signature Date

If you would like further information please contact
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UNIVERSITY OF LEEDS

Leeds Ion Channel Workshop 2015

6-11 September

ionchannel@leeds.ac.uk