LUXEMBOURG INSTITUTE OF HEALTH
RESEARCH DEDICATED TO LIFE

TRAINING & WORKSHOPS 2017 - Course outlines

Methodology

The Lancet Series: How to increase value and reduce waste in research?

Why do subjects participate in randomised controlled trials even if the effect of the tested product is already obvious? Why do many research projects not reflect real life?
This interactive training course is related to the Lancet Series 2014 on research waste and the recommendations given. It is intended for PhD candidates and other early-stage researchers who wish to extend their understanding of the most pressing issues in biomedical research. The input will be followed by an open discussion on how to handle those challenges. Finally, the recommendations will be transferred to the Luxembourgish research context.

The following topics will be addressed:
- Consequences of bad science
- How research waste can be avoided when research priorities are set
- Increasing value in research design, conduct and analysis
- The importance of unbiased and usable research reports
- The role of fully accessible research information.

Basic statistics for life scientists

This two-day course will be suitable for life scientists, in particular PhD candidates, who wish to extend their understanding of statistics. Some basic concepts such as tests of significance and confidence intervals will be revisited but the emphasis will be on using good graphical displays and intelligent models to gain insight into data. Time will be devoted to planning studies also. The examples are all genuine and mainly based on *in vivo* animal and *in vitro* experiments. A few examples will be included from clinical trials. The emphasis will be on using statistics to help understand data rather than as a black box. Mathematical development will be kept to a strict minimum.

Intermediate statistics for life scientists

This two-day course will cover basic descriptive statistics including ways of summarising and presenting data and some key topics in statistical inference including elementary probability, significance tests and P-values and confidence intervals. Amongst techniques that will be covered are t-tests, rank tests analysis of variance and regression. Simple considerations in design of experiments and sampling designs will be touched on. Potential pitfalls will be highlighted.
The course will be illustrated using genuine examples, mainly based on *in vivo* and *in vitro* animal experiments analysed with GenStat®, since this is powerful software that is relatively easy to use (available to all LIH employees). However, the emphasis will be on statistical understanding and interpretation and not algorithms. Knowledge of GenStat® is not required.

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Introduction to Genstat® – INTERNAL ONLY

GenStat® is a flexible, powerful and attractively priced statistics package with extremely strong data-manipulation capabilities and excellent integration between menu and command modes of operation. LIH's Competence Centre for Methodology and Statistics (CCMS) has identified this as a suitable package to permit researchers to do their own standard analyses whilst also making it possible to exchange code with the CCMS so that help can be given for more advanced needs. The purpose of the course is to give a brief overview of GenStat® and give interested researchers sufficient understanding so that they start using it for themselves in their own time.

Introduction to R

This course provides the kick-start for those, who are interested in using R-language for the analysis and manipulation of their experimental data. We shall start with basic R programing, see how to load and transform biological data in R. Some basic statistical methods will be considered.

Clinical research: Efficient start-up and planning to ensure a successful project

In this training the experts from the Clinical and Epidemiological Investigation Centre (CIEC) will share their best practices gained over the last years. The course will cover each step of the starting phase of clinical research projects: from the initial feasibility study to site activation. Attendance is highly recommended for principal investigators, researchers, study nurses and project managers who are involved in the development of research projects with human participants.

Scientific skills

Confocal microscopy: Basics and applications – INTERNAL ONLY

The first part of the training will be focused on basics in microscopy (light, optics, fluorescence, ...) and will cover applications of confocal microscopy such as imaging, super-resolution, time-lapse, FRAP or FRET for example. The second part will be dedicated to the practical operation of the new confocal microscope LSM880 Airy installed in the BAM building of LIH.

Natural killer cells and other innate lymphoid cells

Natural Killer (NK) cells have been discovered in 1975 and have since then been continuously in the focus of interest in immunology. Initially considered as simple killers, they are now known to be highly sophisticated cells implicated in many levels of the immune response in health and disease. They are also increasingly used in cancer immunotherapy. In the past few years, new family members, namely innate lymphoid cells (ILC) of types 1, 2 and 3 have joined them. This course will summarise our current knowledge on NK cells and ILC with a focus on the most recent discoveries.

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Introduction to mass spectrometry-based proteomics – INTERNAL ONLY

This introductory proteome analysis workshop is designed to introduce participants to the fundamentals of mass spectrometry based proteomics and the attached data handling. The course will cover quantitative and non- quantitative liquid chromatography (LC) tandem mass spectrometry based proteomics (LC-MS/MS).
Lectures will cover:

- Fundamentals of protein chemistry and mass spectrometry (MS)
- MS based protein identification
- Post-translational modification of proteins
- Peptide spectrum matching using MS/MS data, relative and absolute protein quantitation using full scan
- Introduction to the output data of the MaxQuant software package.

You are what you eat: true or not? – Diet and its relation to health and well-being

Dieting, superfoods and magic supplements are much appraised by the media. This course will provide an overview on the relation of diet and health, with a focus on bioactive dietary ingredients (vitamins, secondary plant compounds etc.) and their relation to health and well-being, especially regarding chronic disease prevention. Mechanisms of action including bioavailability, influences on gene expression of nutrients/non-nutrients will be highlighted. Pros and cons of various diets will be discussed, and case studies including diets and functional foods will be distributed to participants for controversial discussion." At the end of the course, participants should have a more critical view on what diet can and what it cannot do for a healthy living.

Epigenetics and DNA methylation

Epigenetic modifications are the principal link between the external environment and our genome. The recent increase in epigenetic research has highlighted the role of epigenetic modifications in all the major public health diseases including cardiovascular disease, chronic inflammatory diseases, mental health and obesity. In this course we will go through the basic epigenetic principals, laboratory techniques available, the initial evidence available on epigenetic study design, statistical power, and the preliminary guidelines for epigenome-wide association studies (EWAS).

Introduction to preclinical *in vivo* imaging with MRI and Optical Imaging

This course provides an introduction to preclinical *in vivo* imaging of rodents. It is organised in two half-days and is intended for life-scientists involved in preclinical studies. During the first half-day, a theoretical session will discuss the principles of image formation and describe the equipment involved in magnetic resonance imaging (MRI) and optical imaging (OI) studies. The different steps of a typical *in vivo* imaging experiment will be described, from study planning to animal handling, images acquisition and analysis. In a second half-day session, participants will have the opportunity to attend a live demo given at the *in vivo* Imaging platform, located in the specific pathogen-free animal facility in the BAM building of LIH.

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Transferable skills

How to write a PhD thesis
What is a PhD thesis and how should it be structured? This course will give you useful hints on what a PhD thesis should contain and on how to write the various sections.

Boosting your peer review skills to improve your chances to get published
This training will offer you the opportunity to enhance your writing skills in the context of the peer review model of scientific publishing. You will conduct collaborative exercises of peer reviewing and will practice skills for formulating and communicating responses to critical feedback.

Writing a scientific publication
This is an interactive course about how to write a good scientific publication. What do you have to keep in mind when writing a paper? What are frequent mistakes and how can you avoid them? Where to begin and which part should be written last? How can you make a text more concise? All these topics will be discussed during the course and illustrated with real life examples.

Getting ready for your PhD oral examination
This course will improve your understanding of the process of successfully defending your PhD thesis. You will learn lessons, tips and techniques that are useful prior to and during the PhD oral examination. The training includes collaborative exercises and advice from the perspective of PhD examiners and candidates. The course is especially dedicated to PhD candidates being in their final year.

Boosting your conference presentations
Part 1 - Creating slides with impact - tips, tricks and pitfalls (2 h)
Part 2 - From laser pointers to body language (2 h)
To make a good scientific presentation, it is not enough to show good data. Poor slides can blur the message and reduce the impact that excellent scientific results deserve. The first part of this workshop discusses common pitfalls to avoid when preparing slides for an oral presentation and to provide some basic tips to make sure that the message gets the attention it really deserves. The best slides will however be of little use if the presenter is a poor performer. Verbal and behavioural ticks are only some of the aspects that can spoil the 'show'. The second part of this workshop will address issues from laser pointers to body language and provide some guidelines to be optimally tuned for a perfect oral presentation.

Effective time management: Strategies for PhD candidates
This course will provide practical advice on effective time planning and uses during your PhD. It will cover well-established and "emerging" strategies, including those relevant for stress control. The course involves different interactive activities and exercises.

Social media: personal, professional or both? – INTERNAL ONLY
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Technology transfer

Introduction to Intellectual Property management tools and rights – INTERNAL ONLY

The course will address the following topics:
- IP management tools for better public or private collaborations: CDAs, MTAs, MoUs…
- Benefits of agreements and demystification of their content
- IP rights: patents, trademarks and copyright
- Life of a patent application, notions on how to evaluate the patentability of an invention
- Practical exercises and interactive case studies

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