

Molecular Medicine Ireland Clinician Scientist Fellowship Programme

Learning objectives for Structured Training Period 3

BioStatistics

- Demonstrate awareness of statistical concepts and thinking
- Be equipped to apply simple statistical techniques to design, analyse and interpret biomedical studies
- Have obtained a practical and technical introduction to data analysis, using peer-reviewed examples
- Demonstrate appreciation for the power of statistical techniques, aided with statistical packages
- Demonstrate awareness of the limitations of simple techniques and understand they should seek expert advice when more complex procedures are required
- Demonstrate ability to communicate the results of their analyses in clear non-technical language in writing up laboratory reports, projects and publications

BioMaterials; Functional Biomaterials based approaches for Tissue Engineering and Regenerative Medicine

- Discuss the significance of biomaterials and their use in tissue engineering using appropriate examples

BioEngineering

- Understand the basics of biomechanics and biomechanical engineering within biomedical engineering, using both experimental and modelling methods, in the context of biological cells, tissues, systems and medical implants and devices.

Bibliometrics; Finding the needle in the Information-stack

- Following this three hours hands-on workshop on 'Finding the needle in the Information-stack', students will be able to define their search strategy in various e-resources available on the Net, using basic and advanced searches.
- Students will be able to critically appraise publications retrieved and store these in EndNote (local reference manager).

Paper Reviewing; How to review a scientific manuscript

- Key features of manuscripts that indicate quality
- How to provide constructive feedback to authors
- How to communicate your views to editors
- Do's and don'ts of reviewing

Grant Writing

- Be familiar with how grant systems work and how grants are assessed.
- Be able to identify appropriate support for their research and to initiate a grant submission.

Technology Transfer; Intellectual Property and Patents in Ireland's Smart Economy

The presentation will give an overview of patenting and the link with research. The concept of patenting leading to commercialization is important not only in generating financial reward to inventors but in insuring that the benefits of technology are made available to society.



Careers in Medical Education; *The Road Less Travelled*; A Career in Medical Education

- Understand the evolution of current approaches to medical education.
- Gain an understanding of the roles and responsibilities of a medical educator.
- Develop an insight into possible pathways to a part-time or full-time career in medical education.

Techniques

FACs

Flow cytometry is a technique used extensively in both routine clinical diagnostic services as well as the research environment. Having a basic knowledge of the principles and practice of flow cytometry is considered an essential component of a clinicians' armamentarium. This short presentation will outline some of the utility of flow cytometry in particular in a research environment.

Microarray

Microarrays enable researchers to measure the expression of all of the genes in an organism's genome between various conditions, such as treated vs. untreated cells or diseased vs. normal tissue. Topics covered in this presentation will include experimental design, microarray techniques, quality control and data analysis.

Real Time PCR

Quantitative Real Time PCR is an extremely sensitive and rapid method used to measure differential gene expression between various conditions. Topics covered in this presentation will include RNA isolation, reverse transcription, reproducibility, Real Time chemistries and analysis.

Immunohistochemistry/immunocytochemistry

Understand the basic principles behind immunochemistry for cells and tissues: applications, the types of visualisation systems in use, choice of antibodies, the influence of cell/tissue preservation protocols on staining efficiency, antigen retrieval.

Basic Molecular Biology Techniques

Understand the basic principles and applications of a variety of techniques used to analyse DNA, RNA and protein e.g. cloning, hybridisation, PCR, gel electrophoresis, immunoblotting, immunoprecipitation, ELISA & other colorimetric assays.

DNA / RNA / Protein Isolation

Explain the basic principles behind the isolation of DNA, RNA and protein from cells and tissues. Understand how the purity and stability of these isolated macromolecules can be optimised. Also understand some of the modern molecular biology techniques used to analyse isolated DNA, RNA and proteins.

Advanced Imaging

- Improvement in participants' skill in (a) experimental design and (b) critical analysis of quantitative morphometry.
- A basic understanding of Sampling theory
- Awareness of the application of modern design-based (unbiased) stereological techniques to biological tissues focusing on the quantification of morphological parameters such as object number, feature length, surface area, volume and spatial distribution of features of biological interest on tissue.