

High Content Screening Technologies Course

(TCD Molecular Medicine MSc Module)

9 - 15 February 2008

TCD Institute of Molecular Medicine, St James's Hospital

General course description

This course comprises of an extensive series of lectures series to be delivered by world leaders in the fields of High Content Screening (HCS) platform technologies, experimental design and implementation, assay development, planning and deployment of automated analysis and robotized workflow systems, image analysis, data interpretation and information storage.

As part of the course we will be offering a comprehensive range of practical demonstrations and hands on tryout sessions. The course content will also include a comprehensive series of case studies chosen to highlight both the advantages and challenges of employing HCA technologies in biomedical research.

Day 1 (9 Feb) Introduction to HCS and Associated Platform Technologies

John Durkan Lecture Theatre

- 09:15-09:30 **Welcome to students and speakers** Prof Dermot Kelleher (TCD)
- 09:35-10:05 **Introduction to High Content Screening** D Lansing Taylor (Cellumen)
- 10:10-10:40 **Utilization of HCS and facility setups in academia**
Eberhard Krausz (Max Plank Institute)
- 10:40-11:10 **Break**
- 11:10-11:40 **Microscope based imaging technologies** (Molecular Devices)
- 11:40-12:30 **Description of HCS platform technologies**
Scot Keefer (Thermo Fisher Scientific)
- 12:30-13:15 **Practical advantages of using HCS in biomedical research**
Scot Keefer (Thermo Fisher Scientific)
- 13:15-13:45 **The DRAQ5 story** Roy Edward (Biostatus)
- 13:45-14:45 **Lunch**
- 14:45-18:45 **Technology demonstration and hands on training sessions (Rotating Groups)** in the Montgomery Lecture Theatre
- 18:45 **Close**

Day 2 (10 Feb) Experimental Design and Development of Cell Based Assays

John Durkan Lecture Theatre

- 09:15-09:30 **Course overview**
- 09:30-11:35 **Principles of experimental design**
Debby Nickischer (Thermo Fisher Scientific)
- 11:35-12:05 **Break**
- 12:05-13:15 **Development of cell based assays for High Content Screening**
Eberhard Krausz (Max Plank Institute)
- 14:00-15:30 **The Concept of cellular systems biology and HCS**
D Lansing Taylor (Cellumen)
- 15:30-14:30 **Lunch**
- 14:30- 18:30 **Technology demonstration and hands on training sessions (Rotating Groups)** in the Montgomery Lecture Theatre

Day 3 (11 Feb) Development and Use of Reporters and Bio-Stains in High Content Screening John Durkan Lecture Theatre

- 09:15-09:30 **Course overview**
- 09:30-10:10 **The use of fluorescent proteins & engineered cell lines in HCS**
Nick Thomas (GE Healthcare)
- 10:15-10:45 **Multi-parameter cell cycle siRNA screening with dynamic GFP sensors** Nick Thomas (GE Healthcare)
- 10:45-11:15 **Fixed endpoint cell based assays, development and utilization strategies** (Thermo Fisher Scientific)
- 11:45-12:15 **Break**
- 12:15-12:45 **Live cell assays, development and utilization strategies**
(Thermo Fisher Scientific)
- 12:45-13:15 **Live cell and fixed endpoint screening strategies (BD)**
- 13:15-13:45 **Live cell and fixed endpoint screening strategies (BD)**
- 14:45-15:00 **Data Storage in HCS workflows Molecular Devices**
- 15:00-15:40 **Title to be confirmed** Dr Sarah Payne (TTP Labtec)
- 15:40-16:00 **Break**

HCS Research Facility Official Opening Ceremony

- 16:00-17:00 **Opening Speeches (TBA)**
- 17:00-17:30 **Ribbon Cutting and Official tour of IMM Research Centre**
- 17:30-21:30 **Wine Reception and Technology Showcase**

Day 4 (12 Feb) Automation Strategies for High Content Screening

John Durkan Lecture Theatre

- 09:15-09:30 **Course overview**
- 09:30-10:10 **Lab automation and HCS** (ThermoFisher scientific)
- 10:20-11:00 **Lab automation, experimental set ups**
(Malcolm Crook, Process Analysis & Automation - PAA, UK)
- 11:00-11:40 **Liquid Handling** (Aoife Gallagher, Deerac Fluidics)
- 11:40-12:10 **Break**
- 12:10-12:50 **Lab automation setups for siRNA screens** (David Egan)
- 12:50-13:30 **Automated cell plating and sample treatments for fixed cells in HCS assays** (Peter Simpson, Astra Zeneca)
- 13:30-14:30 **Lunch**
- 14:30-15:10 **Deployment of HCS technologies in large-scale industrial environment** (Peter Simpson, Astra Zeneca)
- 15:40-16:20 **Considerations for Setting up an HCS Workcell**
(ThermoFisher Scientific)
- 16:20-17:00 **HCS automation set-ups** Panel discussion
- 17:15 **Close**

Day 5 (13 Feb) Analysis, processing and archiving of image based and numerical HCS data sets John Durkan Lecture Theatre

- 09:15-09:30 **Course overview**
- 09:30-10:00 **Description of image analysis algorithms for HCS, how they work**
Gert Van de Wouwer (DCi Labs)
- 10:00-10:45 **Video image analysis demonstration** Gert Van de Wouwer (DCi Labs)
- 10:45-11:15 **Break**
- 12:30-13:30 **Novel approaches to solving complex imaging problems** (Definians)
- 13:30-14:00 **Complex image analysis demonstration** (Definians)
- 14:00-15:00 **Lunch**
- 15:00-15:40 **HCS data analysis strategies** Gerard Conway (Spotfire)
- 14:10-14:50 **HCS data analysis a worked example** Gerard Conway (Spotfire)
- 14:50-16:30 **HCS Data Management and workflows** (Accelerays)
- 16:40-17:20 **Data retrieval, image processing and neural networks**
Khurshid Ahmad (TCD)
- 17:30 **Close**

Day 6 (14 Feb) Description of fully integrated HCS work flow in academic and industrial settings John Durkan Lecture Theatre

- 09:00-09:15 **Opening remarks**
- 09:15-10:00 **Introduction to an imaging platform for fully automated high speed and high resolution HCA and HCS**
Kurt Herrenknecht (Evotec Technologies)
- 10:00-10:45 **Introduction to a highly flexible image analysis, data processing software for HCA and HCS** Kurt Herrenknecht (Evotec Technologies)
- 10:45-11:00 **Break**
- 11:00- 12:30 **Design and preparation for HCS campaigns**
Stefan Jager (Evotec Technologies)
- 12:30-13:15 **Automated HCS-description of a fully industrialized process**
Stefan Jager (Evotec Technologies)
- 13:15-14:15 **Lunch**
- 14:15-15:15 **Case study Drug Toxicity assessment using HCS**
Dr Peter O'Brien (UCD)
- 15:20-16:00 **Dealing with large HCS data sets** (Molecular Devices).
- 16:00-16:20 **Micro plate designs** (Genetix)
- 16:20-17:00 **Micro plate storage systems** (Matrical)
- 17:00-17:40 **Development of Cell Based Assays for Drug Discovery**
Dr Anthony Davies (TCD)
- 17:40 **Close**

Day 7 (15 Feb) HCS Case Studies John Durkan Lecture Theatre

09:00-09:15 **Opening Remarks.**

09:15-10:00 **Thoracic Oncology Studies Using HCS.**

10:00-10:45 **Golgi fragmentation analysis.**

10:45-11:00 **Break**

11:00-12:30 **Study of Interactions between cells and nano-crystals using HCS bio applications.**

12:30-13:15 **Cytotoxicity interactions between cells and nano-materials**

13:15-14:15 **Lunch**

14:15-15:15 **Study of gut tissue biopsies using HCS imaging technologies**

15:20-16:00 **Using HCS platforms for identification of novel bio-reactive, small molecules**

16:00-16:20 **The use of HCS platform technologies for the study of microbial interactions with human cell lines.**

16:20-17:00 **TBA**

17:00-17:40 **TBA**

Close