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*A Powerful Approach to Systems Cell Biology
and Drug Discovery*

Edited by

D. Lansing Taylor

Cellumen, Inc., Pittsburgh, PA

Jeffrey R. Haskins

Cellomics, Inc., Pittsburgh, PA

Kenneth A. Giuliano


Cellumen, Inc., Pittsburgh, PA

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Preface

There has always been some tension between proponents of hypothesis-driven and discovery-driven research in the broad field of life sciences. Academic research has been primarily focused on hypothesis-driven research. However, the success of the human genome project, a discovery-driven research approach, has opened the door to adding other types of discovery-driven research to a continuum of research approaches.

In contrast, drug discovery research in the pharmaceutical industry has embraced discovery-driven research for many years. A good example has been the discovery of active compounds from large chemical libraries, through screening campaigns.

The success of the human genome project has also demonstrated the need for both academic researchers and industrial researchers to now understand the functions of genes and gene products. The cell is the basic unit of life and it has been at the cellular level where function can be demonstrated most cost-effectively and rapidly. High content screening (HCS) was developed by Cellomics Inc. in the mid-1990s to address the need for a platform that could be used in the discovery-driven research and development required to understand the functions of genes and gene products at the level of the cell.

It is important to understand that HCS evolved from light microscope imaging methods, used extensively in hypothesis-driven research for more than a decade before the introduction of HCS. The automation and informatics of HCS added the capability of discovery-driven research and development on cells to the existing strengths of the manual and semi-automated imaging light microscopy methods already applied to hypothesis-driven research. It is predicted that both hypothesis-driven research using advanced imaging microscopic methods and discovery-driven research and development (R&D) using HCS will continue to be used as a continuum of approaches. In fact, the continued evolution of HCS is expected to include the incorporation of new optical modules that come from the basic research activities of investigators from both academia and industry. However, HCS will always give up some flexibility relative to the imaging microscopy systems in favor of speed.

This volume was assembled to assist both existing users of HCS, as well as investigators considering the addition of a discovery-driven platform to their R&D activities. We assembled a team of authors that include the innovators of HCS, academic researchers that are at the forefront in applications of HCS to basic research, and experts from industry that are driving the evolution of HCS reagents, informatics and applications for drug discovery. The chapters have been organized into sections that highlight the importance of integrating instrumentation, application software, reagents and informatics. In addition, there are a combination of pure review chapters on key topics and specific methods chapters.

The editors would like to thank the authors for taking part in this project and hope that this volume will serve as a valuable resource as the use of HCS continues to grow and evolve.

D. Lansing Taylor, PhD
Jeffrey R. Haskins, PhD
Kenneth A. Giuliano, PhD

Contents

Preface v

Contributors xi

Guide to the Companion CD xiii

Part I. Introduction to High Content Screening

1 Past, Present, and Future of High Content Screening
and the Field of Cellomics
D. Lansing Taylor 3

2 A Pharmaceutical Company User’s Perspective
on the Potential of High Content Screening in Drug Discovery
Ann F. Hoffman and Ralph J. Garippa 19

3 Linking Microscopy and High Content Screening
in Large-Scale Biomedical Research
James G. Evans and Paul Matsudaira 33

Part II. Instrumentation, Biological Application Software, and Sample Preparation

4 Requirements, Features, and Performance
of High Content Screening Platforms
Albert H. Gough and Paul A. Johnston 41

5 Characteristics and Value of Directed Algorithms
in High Content Screening
Richik N. Ghosh, Oleg Lapets, and Jeffrey R. Haskins 63

6 Characteristics and Value of Machine Learning for Imaging
in High Content Screening
Juergen A. Klenk 83

7 Tools for Quantitative and Validated Measurements of Cells
**Anne L. Plant, John T. Elliott, Alessandro Tona,
Dennis McDaniel, and Kurt J. Langenbach** 95

8 Automated Cell Plating and Sample Treatments for Fixed
Cells in High Content Assays
**Gillian R. Richards, Julie E. Kerby, Grace K. Y. Chan,
and Peter B. Simpson** 109

9 Differentiating Primary Human Cells in Rapid-Throughput
Discovery Applications
Daniel R. Marshak and Dale E. Greenwalt 121

10 Use of the CellCard™ System for Analyzing Multiple
Cell Types in Parallel
Oren Beske, Daniel Bassoni, and Simon Goldbard 129

Part III. Reagents

- 11 Reagents to Measure and Manipulate Cell Functions
**Kenneth A. Giuliano, D. Lansing Taylor,
and Alan S. Waggoner 141**
- 12 Fluorescent Proteins and Engineered Cell Lines
Nick Thomas 165
- 13 Optimizing the Integration of Immunoreagents
and Fluorescent Probes for Multiplexed
High Content Screening Assays
Kenneth A. Giuliano 189
- 14 The HaloTag™: A Novel Technology for Cell Imaging
and Protein Analysis
Georgyi V. Los and Keith Wood 195
- 15 Protein Labeling With FLAsH and ReAsH
**Thomas Machleidt, Matt Robers,
and George T. Hanson 209**
- 16 Exploiting Network Biology to Improve Drug Discovery
Marnie L. MacDonald and John K. Westwick 221
- 17 Physiological Indicators of Cell Function
Michael J. Ignatius and Jeffrey T. Hung 233
- 18 The Use of siRNA to Validate Immunofluorescence Studies
**K. Gregory Moore, Wayne Speckmann,
and Ronald P. Herzig 245**
- 19 Caged Substrates Applied to High Content Screening:
An Introduction With an Eye to the Future
**Peter G. Conrad, II, Rajesh V. Chavli,
and Richard S. Givens 253**

Part IV. Informatics and Bioinformatics

- 20 Overview of Informatics for High Content Screening
**R. Terry Dunlay, Wallace J. Czekalski,
and Mark A. Collins 269**
- 21 Large-Scale Data Management for High Content Screening
Leon S. Garfinkel 281
- 22 An Integrated Biomedical Knowledge Extraction
and Analysis Platform: *Using Federated Search
and Document Clustering Technology*
Donald P. Taylor 293
- 23 Visualization of High Content Screening Data
Matthew J. Anstett 301
- 24 Pathway Mapping Tools for Analysis of High Content Data
**Sean Ekins, Yuri Nikolsky, Andrej Bugrim,
Eugene Kirillov, and Tatiana Nikolskaya 319**

Part V. Assays and Applications of High Content Screening

25	Systems Biology in Cancer Research: <i>Genomics to Cellomics</i> Jackie L. Stilwell, Yinghui Guan, Richard M. Neve, and Joe W. Gray	353
26	Target Validation in Drug Discovery Robert A. Blake	367
27	High Content Screening as a Screening Tool in Drug Discovery Anthony Nichols	379
28	Discovery of Protein Kinase Phosphatase Inhibitors Andreas Vogt and John S. Lazo	389
29	High Content Translocation Assays for Pathway Profiling Frosty Loechel, Sara Bjørn, Viggo Linde, Morten Præstegaard, and Len Pagliaro	401
30	In Vitro Cytotoxicity Assessment Peter O'Brien and Jeffrey Haskins	415
31	Neurite Outgrowth in Retinal Ganglion Cell Culture John B. Kerrison and Donald J. Zack	427
	Index	435

Contributors

MATTHEW J. ANSTETT • *Spotfire, Inc., Somerville, MA*
DANIEL BASSONI • *Vitro Bioscience, Inc., Mountain View, CA*
OREN BESKE • *Vitro Bioscience, Inc., Mountain View, CA*
SARA BJØRN • *BioImage A/S, Copenhagen, Denmark*
ROBERT A. BLAKE • *Exelixis, Inc., South San Francisco, CA*
ANDREJ BUGRIM • *GeneGo, St. Joseph, MI*
GRACE K. Y. CHAN • *The Neuroscience Research Centre, Merck Sharp and Dohme Research Laboratories, Essex, UK*
RAJESH V. CHAVLI • *Panomix, Inc., Fremont, CA*
MARK A. COLLINS • *Panomix, Inc., Pittsburgh, PA*
PETER G. CONRAD, II • *Genospectra, Inc., Fremont, CA*
WALLACE J. CZEKALSKI • *Cellomics, Inc., Pittsburgh, PA*
R. TERRY DUNLAY • *Sage Sciences, Inc., Albuquerque, NM*
SEAN EKINS • *GeneGo, Jerkintown, PA, and School of Pharmacy Department of Pharmaceutical Sciences, College Park, MD*
JOHN T. ELLIOTT • *National Institute of Standards and Technology, Gaithersburg, MD*
JAMES G. EVANS • *Whitehead-MIT BioImaging Center, Computational and Systems Biology Initiative, Massachusetts Institute of Technology, Cambridge, MA*
LEON S. GARFINKEL • *Hoffman-La Roche Inc., Global Research Infrastructure, Nutley, NJ*
RALPH J. GARIPPA • *Hoffmann-La Roche, Inc., Nutley, NJ*
RICHIK N. GHOSH • *Cellomics, Inc., Pittsburgh, PA*
KENNETH A. GIULIANO • *Cellumen, Inc., Pittsburgh, PA*
RICHARD S. GIVENS • *Department of Chemistry, University of Kansas, Lawrence, KS*
SIMON GOLDBARD • *Vitro Bioscience, Inc., Mountain View, CA*
ALBERT H. GOUGH • *Cellumen, Inc., Pittsburgh, PA*
JOE W. GRAY • *Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, and the Comprehensive Cancer Center, University of California, San Francisco, CA*
DALE E. GREENWALT • *Cambrex Bio Science Walkersville, Inc., Walkersville, MD*
YINGHUI GUAN • *Lawrence Berkeley National Laboratory, Berkeley, CA*
GEORGE T. HANSON • *Invitrogen Corporation, Madison, WI*
JEFFREY R. HASKINS • *Cellomics, Inc., Pittsburgh, PA*
RONALD P. HERZIG • *Upstate USA/Chemicon International, Charlottesville, VA*
ANN F. HOFFMAN • *Hoffmann-La Roche, Inc., Nutley, NJ*
JEFFREY T. HUNG • *Molecular Probes/Invitrogen, Eugene, OR*
MICHAEL J. IGNATIUS • *Molecular Probes/Invitrogen, Eugene, OR*
PAUL A. JOHNSTON • *University of Pittsburgh School of Medicine, Department of Pharmacology, Pittsburgh, PA*

- JULIE E. KERBY • *The Neuroscience Research Centre, Merck Sharp and Dohme Research Laboratories, Essex, UK*
- JOHN B. KERRISON • *Wilmer Eye Institute, Johns Hopkins Hospital, Baltimore, MD*
- EUGENE KIRILLOV • *GeneGo, St. Joseph, MI*
- JUERGEN A. KLENK • *Booz Allen Hamilton, Inc., McLean, VA*
- KURT J. LANGENBACH • *National Institute of Standards and Technology, Gaithersburg, MD*
- OLEG LAPETS • *Cellomics, Inc., Pittsburgh, PA*
- JOHN S. LAZO • *Department of Pharmacology, University of Pittsburgh Drug Discovery Institute, University of Pittsburgh, Pittsburgh, PA*
- VIGGO LINDE • *BioImage A/S, Copenhagen, Denmark*
- FROSTY LOEHEL • *NeuroSearch A/S, Ballerup, Denmark*
- GEORGYI V. LOS • *Promega Corporation, Madison, WI*
- MARNIE L. MACDONALD • *Odyssey Thera, Inc., San Ramon, CA*
- THOMAS MACHLEIDT • *Invitrogen Corporation, Madison, WI*
- DANIEL R. MARSHAK • *Cambrex Corporation, Baltimore, MD*
- PAUL MATSUDAIRA • *Whitehead-MIT BioImaging Center, Computational and Systems Biology Initiative, Massachusetts Institute of Technology, Cambridge, MA*
- DENNIS MCDANIEL • *National Institute of Standards and Technology, Gaithersburg, MD*
- K. GREGORY MOORE • *Serologicals Corporation, Charlottesville, VA*
- RICHARD M. NEVE • *Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, and the Comprehensive Cancer Center, University of California, San Francisco, CA*
- ANTHONY NICHOLS • *Molecular Screening and Cell Pharmacology Department, Serono Pharmaceutical Research Institute, Geneva, Switzerland*
- TATIANA NIKOLSKAYA • *GeneGo, St. Joseph, MI*
- YURI NIKOLSKY • *GeneGo, St. Joseph, MI*
- PETER O'BRIEN • *Safety Sciences Europe, Pfizer Global Research and Development, Sandwich, UK*
- LEN PAGLIARO • *BioImage A/S, Copenhagen, Denmark*
- ANNE L. PLANT • *National Institute of Standards and Technology, Gaithersburg, MD*
- MORTEN PRÆSTEGAARD • *BioImage A/S, Copenhagen, Denmark*
- GILLIAN R. RICHARDS • *The Neuroscience Research Centre, Merck Sharp and Dohme Research Laboratories, Essex, UK*
- MATT ROBERS • *Invitrogen Corporation, Madison, WI*
- PETER B. SIMPSON • *The Neuroscience Research Centre, Merck Sharp and Dohme Research Laboratories, Essex, UK*
- WAYNE SPECKMANN, *Upstate USA, Charlottesville, VA*
- JACKIE L. STILWELL • *Lawrence Berkeley National Laboratory, Berkeley, CA*
- D. LANSING TAYLOR • *Cellumen, Inc., Pittsburgh, PA*
- DONALD P. TAYLOR • *VIVISIMO, Inc., Pittsburgh, PA*
- NICK THOMAS • *GE Healthcare, The Maynard Centre, Cardiff, UK*
- ALESSANDRO TONA • *National Institute of Standards and Technology, Gaithersburg, MD, and Geo-centers, Inc. Newton, MA*

ANDREAS VOGT • *Department of Pharmacology, University of Pittsburgh Drug
Discovery Institute, University of Pittsburgh, Pittsburgh, PA*

ALAN S. WAGGONER • *Carnegie Mellon University, Pittsburgh, PA*

JOHN K. WESTWICK • *Odyssey Thera, Inc., San Ramon, CA*

KEITH WOOD • *Promega Corporation, Madison, WI*

DONALD J. ZACK • *Wilmer Eye Institute, Johns Hopkins Hospital, Baltimore, MD*



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CHAPTER 1 FIGS. 2, 3, 7

CHAPTER 2 FIG. 2

CHAPTER 5 FIGS. 1, 6

CHAPTER 7 FIGS. 1, 3

CHAPTER 10 FIG. 1

CHAPTER 14 FIGS. 5–7

CHAPTER 16 FIGS. 1–4

CHAPTER 18 FIG. 2

CHAPTER 20 FIG. 2

CHAPTER 21 FIGS. 1–5

CHAPTER 23 FIGS. 1, 2, 7, 10, 13–16

CHAPTER 24 FIGS. 1–10

CHAPTER 25 FIGS. 2, 4

CHAPTER 28 FIGS. 1, 2

CHAPTER 29 FIG. 1

CHAPTER 30 FIG. 2