

# BLOW UP THE OLD WAY OF TESTING gDNA

Whole-genome QC now has one workflow.

FULLY AUTOMATED **FRAGMENT ANALYZER™** DOES IT ALL.

- Assesses gDNA concentration up to 40,000 bp
- Generates a user-defined Genomic Quality Number
- Identifies RNA contamination in gDNA
- Works with samples as small as 0.1  $\mu$ L

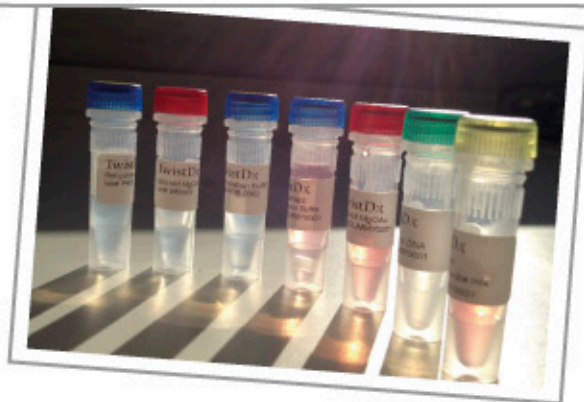
More at [AATI-US.COM](http://AATI-US.COM)





# isothermal detection of RNA

- Rapid detection in minutes
- Single molecule sensitivity
- Little or no hardware requirements
- Easy to use, stable lyophilised reagents



## ◀ TwistAmp® exo RT

Real-time fluorescent RNA detection

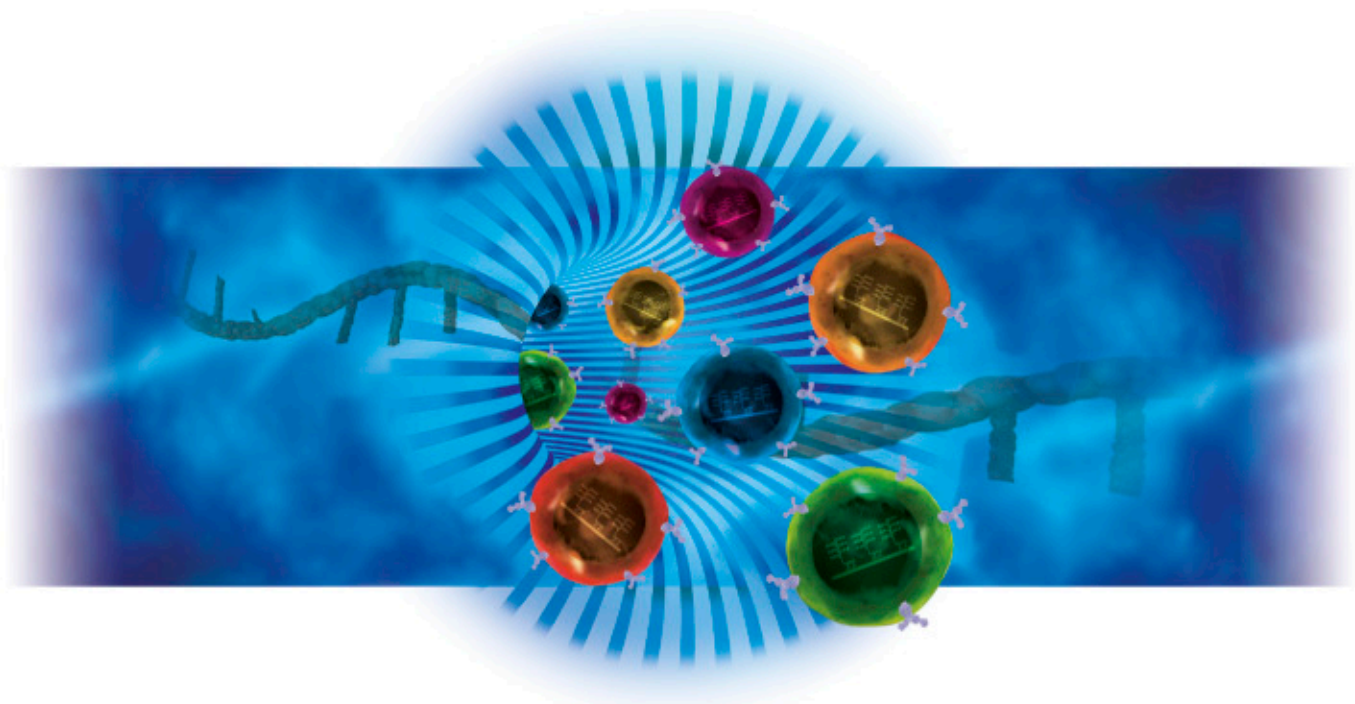
Using TwistDx's RPA technology, the exo RT kit is recommended for detecting RNA targets with a proprietary fluorescent TwistAmp® exo probe in a one-step process.

# TwistDx

[www.twistdx.co.uk](http://www.twistdx.co.uk)

## Imagine if you could detect RNA and protein in millions of single cells

Enter a new dimension of single-cell analysis



**Detect RNA and protein simultaneously by flow cytometry to:**

- See gene expression heterogeneity at the single-cell level
- Compare RNA and protein in the same cell
- Evaluate viral RNA within infected cells
- Detect non-coding RNA in cell subsets
- Analyze mRNA expression levels when antibody selection is limited

**Download  
White Paper**

Download your copy of the PrimeFlow™ RNA Assay Validation White Paper  
at [www.ebioscience.com/primeflow-white-paper-genres](http://www.ebioscience.com/primeflow-white-paper-genres)

Biology for a better world.

NORTH AMERICA: 888.999.1371 ■ EUROPE: +43 1 796 40 40-305 ■ JAPAN: +81 (0)3 6430 4020 ■ INQUIRIES: [info@ebioscience.com](mailto:info@ebioscience.com)

©Affymetrix, Inc. All rights reserved. For Research Use Only. Not for use in diagnostic or therapeutic procedures.



# Reduce your NGS Sequencing Costs with Improved Library Complexity

## Accel-NGS™ 2S DNA Library kit for Illumina® Platforms

- Broad input range: 10 pg to 1 µg. PCR-free libraries from 10 ng
- Exceptional coverage of AT-rich & GC-rich sequences
- Superior library complexity
- Tremendously efficient adapter technology



[www.swiftbiosci.com](http://www.swiftbiosci.com)



# Targeted sequencing, now for any genome

Improve your research by using Ion AmpliSeq™ DNA custom panels



**Ion Torrent™**

Harness the power of Ion Torrent™ technology for a simple, scalable, and affordable sequencing solution. Create targeted DNA panels customized for fast and efficient variant detection using one of our preloaded genomes or by uploading a private reference sequence.

Find out more at [lifetechnologies.com/ampliseqcustom](http://lifetechnologies.com/ampliseqcustom)

*life*  
technologies

For Research Use Only. Not for use in diagnostic procedures. © 2015 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. C013488 0115

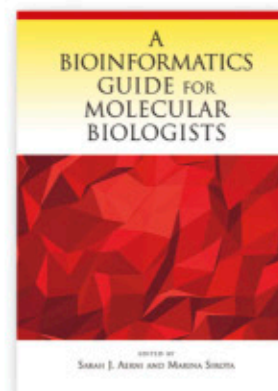
**A Thermo Fisher Scientific Brand**





# A BIOINFORMATICS GUIDE FOR MOLECULAR BIOLOGISTS

Edited by Sarah Aerni and Marina Sirota, *Biomedical Informatics Program, Stanford University School of Medicine*



Informatics can vastly assist progress in research and development in cell and molecular biology and biomedicine. However, many investigators are either unaware of the ways in which informatics can improve their research or find it inaccessible due to a feeling of "informatics anxiety." This sense of apprehension results from improper communication of the principles behind these approaches and of the value of the many tools available. In fact, many researchers are inherently distrustful of these tools. A more complete understanding of bioinformatics offered in *A Bioinformatics Guide for Molecular Biologists* will allow the reader to become comfortable with these techniques, encouraging their use—thus helping to make sense of the vast accumulation of data. To make these concepts more accessible, the editors approach the field of bioinformatics from the viewpoint of a molecular biologist, (1) arming the biologist with a basic understanding of the fundamental concepts in the field, (2) presenting approaches for using the tools from the standpoint of the data for which they are created, and (3) showing how the field of informatics is quickly adapting to the advancements in biology and biomedical technologies. All concepts are paired with recommendations for the appropriate programming environment and tools best suited to solve the particular problem at hand. It is a must-read for those interested in learning informatics techniques required for successful research and development in the laboratory.

2014, 328 pp, illustrated (64 4C, 26 B&W), index  
Hardcover \$79

ISBN 978-1-936113-22-4

## Contents

Preface

### Section 1: Introduction and Overview

- 1 Introduction to Computational Approaches for Biology and Medicine  
*Sarah J. Aerni and Marina Sirota*

### Section 2: Fundamental Concepts

- 2 Introduction to Computer Science  
*Eugene Davydov and Olga Russakovsky*
- 3 Probability and Statistics  
*Alexander A. Morgan and Linda Miller*
- 4 Machine Learning  
*Marc A. Schaub and Chuong B. Do*

### Section 3: Techniques for Analyzing Your Data

- 5 Image Analysis  
*Marina Sirota, Sarah J. Aerni, Tiffany Liu, and Guanglei Xiong*
- 6 Expression Data  
*David Ruau*
- 7 A Gentle Introduction to Genome-Wide Association Studies  
*Chuong B. Do, Marc A. Schaub, Marina Sirota, and Karen Lee*
- 8 Next-Generation Sequencing Technologies  
*Jesse Rodriguez and George Asimenos*
- 9 Proteomics  
*Amit Kaushal and Tiffany J. Chen*

### Section 4: Augmenting Your Data

- 10 Knowledge Base-Driven Pathway Analysis  
*Purvesh Khatri*
- 11 Learning Biomolecular Pathways from Data  
*Karen Sachs and Gabriela K. Fragiadakis*
- 12 Meta-Analysis and Data Integration of Gene Expression Experiments  
*Chirag J. Patel and Andrew H. Beck*
- 13 Natural Language Processing: Informatics Techniques and Resources  
*Bethany Percha and Wei-Nchi Lee*

Index

[www.cshlpress.org](http://www.cshlpress.org)





# Looking for A Genomic Research Partner?

## **Next-Generation Sequencing(NGS)**

Whole genome Sequencing (Hiseq X Ten)  
Exome Sequencing  
Trageted Sequencing  
Long Read Sequencing  
Transcriptome Analysis, small RNA  
Epigenomics

## **Bio Informatics**

Assembly / Mapping  
Variant (SNP / Indel) calling  
CNV & Breakpoints  
Expression Profiles  
DEGs / miRNA  
Enrichment Profiles  
Gene Annotation

## **Capillary Sequencing**

### **Microarray**

### **Oligonucleotide Synthesis**

### **Genetically Engineered Mouse**



# Next-Gen Sequencing

Challenged with  
low-input samples  
for ChIP-seq?

LIBRARY PREPARATION FOR NEXT-GEN SEQUENCING

## Ligation-free ChIP-seq library prep for low-input DNA samples

The New DNA SMART™ ChIP-Seq Kit



### Template switching technology, optimized for DNA

The DNA SMART ChIP-Seq Kit generates Illumina® sequencing libraries from as little as 100 pg of either single-stranded or double-stranded DNA. This kit generates sensitive sequencing libraries without using ligation, which streamlines the protocol and improves library yield and complexity. Using a novel version of Clontech's patented SMART® template switching technology compatible with low-input, fragmented DNA templates, the DNA SMART ChIP-Seq Kit generates robust, reproducible ChIP-seq libraries in around 4 hours.

View a webinar at  
[www.clontech.com/ChIP-Seq-Webinar-Signup](http://www.clontech.com/ChIP-Seq-Webinar-Signup)  
or call 1.800.662.2566



Scan to find out more



**Takara**  **Clontech**

Clontech Laboratories, Inc. • A Takara Bio Company  
United States/Canada: +1.800.662.2566 • Asia Pacific: +1.650.919.7300 • Europe: +33 (0)11.3904.6890 • Japan: +81 (0)77.543.7247  
For Research Use Only. Not for use in diagnostic or therapeutic procedures. Not for resale. Illumina is a registered trademark of Illumina, Inc. Takara and the Takara logo are trademarks of TAKARA HOLDINGS, Kyoto, Japan. Clontech, the Clontech logo, DNA SMART, SMART, and that's GOOD science! are trademarks of Clontech Laboratories, Inc. All other marks are the property of their respective owners. Certain trademarks may not be registered in all jurisdictions. © 2015 Clontech Laboratories, Inc.

[www.clontech.com](http://www.clontech.com) 03.15 US (633648)



The Most Advanced Tumor Profiling and Informatics  
**Accuracy and Content Enhanced (ACE) Cancer Services** for  
**Cancer Research and Clinical Trials**

Personalis® ACE Cancer Services

**The Most Complete and Accurate Solutions** for Tumor Profiling

Personalis' portfolio of cancer research solutions provides increased sensitivity to detect variants in cancer-associated genes, and provides improved resolution for applications such as tumor stratification, therapeutic response association studies, and identification of potential targets for companion diagnostics. Our sequencing capabilities include both high-depth augmented exome sequencing and RNA-Seq. These assays can be performed from a single sample to provide a comprehensive description of the tumor including somatic variants, low abundance SVs, fusion transcripts, and more – all from the same tumor sample.

- ✓ Enhanced coverage of 1,300+ cancer genes and 200+ miRNA genes
- ✓ Coverage of Intronic and Intergenic variants
- ✓ Analysis of DNA and RNA from a single sample
- ✓ Comprehensive coverage of key cancer pathway genes
- ✓ High accuracy somatic variant (DNA) and fusion event (RNA) calling

enhanced  
coverage of  
**1,300+**  
**cancer genes**  
and 200+  
miRNA genes

[www.personalis.com/cancer](http://www.personalis.com/cancer)



**Personalis®**  
Pioneering Genome-Guided Medicine

© 2015 Personalis, Inc. All rights reserved. Personalis® is a registered trademark of Personalis, Inc., in the United States and/or other countries.

For Research Use Only

[www.personalis.com](http://www.personalis.com) | [info@personalis.com](mailto:info@personalis.com)

+1 855-GENOME4 (436-6634)

+1 650-752-1300 (outside U.S.)

# Power your next big breakthrough.

Sequencing power for every scale.



## **NEW** HiSeq X™ Series

### **Population power**

Maximum throughput and low cost population- and production-scale human whole-genome sequencing. Series includes the HiSeq X Ten and the new HiSeq X Five Systems.



## **NEW** HiSeq® Series

### **Production power**

Maximum throughput and lowest cost for production-scale genomics. Series includes the new HiSeq 3000 and HiSeq 4000 Systems.



## **NEW** NextSeq® Series

### **Flexible power**

Desktop speed and simplicity for everyday genomics. Series includes the NextSeq 500 and the new NextSeq 550 with cytogenomic array scanning.



## **MiSeq® Series**

### **Focused power**

Speed and simplicity for targeted and small-genome sequencing. Series includes the MiSeq and MiSeqDx™ Systems.\*

Compare our new systems with our product selector at [www.illumina.com/power](http://www.illumina.com/power).

FOR RESEARCH USE ONLY

\*MiSeqDx™ is a 510(k) cleared, CE-marked instrument. See instructions for use.

©2015 Illumina, Inc. All rights reserved.

**illumina**





# 2015 SCIENTIFIC CONFERENCES

Presenting the most significant research on cancer etiology, prevention, diagnosis, and treatment

## **AACR Annual Meeting 2015**

*Program Committee Chairperson: Lewis C. Cantley*  
April 18-22, 2015 • Philadelphia, PA

## **Advances in Brain Cancer Research**

*Co-Chairpersons: Eric C. Holland, Franziska Michor, Martine F. Roussel, and Michael D. Taylor*  
May 27-30, 2015 • Washington, DC

## **Metabolism and Cancer**

*Co-Chairpersons: Ralph J. DeBerardinis, David M. Sabatini, and Almut Schulze*  
June 7-10, 2015 • Bellevue, WA

## **Methods in Cancer Biostatistics Workshop: Clinical Trial Designs for Targeted Agents**

*Chairperson: Steven Piantadosi*  
June 7-13, 2015 • Lake Tahoe, CA

## **AACR Precision Medicine Series: Integrating Clinical Genomics and Cancer Therapy**

*Co-Chairpersons: Charles L. Sawyers, Elaine R. Mardis, and Arul M. Chinnaiyan*  
June 13-16, 2015 • Salt Lake City, UT

## **EACR-AACR-SIC Special Conference on Anticancer Drug Action and Drug Resistance: From Cancer Biology to the Clinic**

*Co-Chairpersons: Richard M. Marais, Pasi Jänne, and Riccardo Dolcetti*  
June 20-23, 2015 • Florence, Italy

## **Chromatin and Epigenetics in Cancer**

*Co-Chairpersons: Peter A. Jones, Sharon Y. R. Dent, and Charles W. M. Roberts*  
September 24-27, 2015 • Atlanta, GA

## **CRI-CIMT-EATI-AACR The Inaugural International Cancer Immunotherapy Conference: Translating Science into Survival**

September 27-30, 2015 • New York, NY

## **Advances in Breast Cancer Research**

*Co-Chairpersons: Matthew J. Ellis, Charles M. Perou, and Jane E. Visvader*  
October 17-20, 2015 • Bellevue, WA

## **Advances in Ovarian Cancer**

*Co-Chairpersons: Kathleen R. Cho, Douglas A. Levine, and Benjamin G. Neel*  
October 17-20, 2015 • Orlando, FL

## **Fourth AACR International Conference on Frontiers in Basic Cancer Research**

*Chairperson: M. Celeste Simon;*  
*Co-Chairpersons: James P. Allison, John E. Dick, Nathanael S. Gray, and Victor E. Velculescu*  
October 23-26, 2015 • Philadelphia, PA

## **Basic Science of Sarcomas**

*Co-Chairpersons: Robert G. Maki, Angelo Paolo Dei Tos, Jonathan A. Fletcher, Lee J. Helman, and Brian Van Tine*  
November 3-4, 2015 • Salt Lake City, UT

## **New Horizons in Cancer Research**

*Co-Chairpersons: Lewis C. Cantley and Carlos L. Arteaga*  
November 2015 • Shanghai, China

## **AACR-NCI-EORTC International Conference on Molecular Targets and Cancer Therapeutics**

*Scientific Committee Co-Chairpersons: Levi A. Garraway, Lee J. Helman, and Jean-Charles Soria*  
November 5-9, 2015 • Boston, MA

## **Pediatric Oncology**

*Co-Chairpersons: Scott Armstrong, Charles G. Mullighan, Kevin M. Shannon, and Kimberly Stegmaier*  
November 9-12, 2015 • Fort Lauderdale, FL

## **Developmental Biology and Cancer**

*Co-Chairpersons: Hans Clevers, Stuart Orkin, and Suzanne Baker*  
November 30-December 3, 2015 • Boston, MA

## **Tumor Metastasis**

*Co-Chairpersons: Bruce R. Zetter, Melody A. Swartz, and Jeffrey W. Pollard*  
November 30-December 3, 2015 • Austin, TX

## **Noncoding RNAs and Cancer**

*Co-Chairpersons: Howard Y. Chang, Jeannie T. Lee, Joshua Mendell*  
December 4 - 7, 2015 • Boston, MA

**AACR** American Association  
for Cancer Research

**FINDING CURES TOGETHER™**

[www.AACR.org/Calendar](http://www.AACR.org/Calendar)



# CROPS 2015

improving agriculture through genomics



**May 18 – 21, 2015**

HUDSONALPHA INSTITUTE FOR BIOTECHNOLOGY  
HUNTSVILLE, AL USA

CROPS 2015 *provides a discussion forum for what is the next, most difficult challenge for plant genomics: integrating and translating genomic knowledge to improve breeding and crop production.*

**Abstract deadline**  
**April 1, 2015**

**Early Booking deadline**  
**April 17, 2015**

Register today at **CROPSconference.org**

## KEYNOTE SPEAKERS



Gerald A. Tuskan  
Joint Genome Institute



Steve Rounsley  
DOW AgroSciences

PRESENTED BY

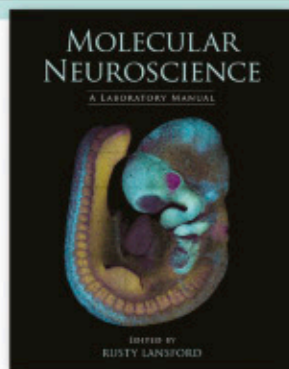






# MOLECULAR NEUROSCIENCE

## A Laboratory Manual



Edited by Rusty Lansford, *California Institute of Technology*

This laboratory manual serves as a comprehensive practical guide to molecular and cellular step-by-step methods for neuroscientists, detailing fundamental and advanced techniques for working with cells, DNA, RNA, gene transfer, and imaging. The techniques included in this manual were developed in the Advanced Techniques in Molecular Neuroscience course offered annually at Cold Spring Harbor Laboratory, as well as protocols drawn from its best-selling lab manuals. It is an essential resource for all neuroscientists, from graduate students upward, who seek to use molecular techniques to probe the complexities of the nervous system.

2014, 648 pp., illus. (64 4C, 50 B&W), index

Hardcover \$150

Paperback \$90

ISBN 978-1-621820-13-0

ISBN 978-1-621820-14-7

### CONTENTS

Foreword

Preface

### SECTION 1. WORKING WITH CELLS

Working without Contamination  
Sterile Pipetting and Pouring Techniques  
Filter Sterilization Techniques  
Aspirating Fluids with Sterile Technique  
Working Sterilely in a Biosafety Cabinet  
Mammalian Cell Culture  
Purification and Culture of Retinal Ganglion Cells  
Purification and Culture of Retinal Ganglion Cells from Rodents  
Purification and Culture of Astrocytes  
Purification of Rat and Mouse Astrocytes by Immunopanning  
Maintaining Live Cells and Tissue Slices in the Imaging Setup

### SECTION 2. WORKING WITH DNA BACTERIA BASICS

Bacteria  
Making Media for Bacterial Culture  
Obtaining Isolated Colonies of Bacteria  
Using a Petroff-Hausser Counting Chamber  
Measurement of Bacterial Growth by Spectrophotometry  
Freezing Bacteria for Long-Term Storage

### DNA BASICS

Preparation of Plasmid DNA by Alkaline Lysis with Sodium Dodecyl Sulfate: Miniprep  
Preparation and Transformation of Competent *E. coli* Using Calcium Chloride  
Quantitation of DNA and RNA  
The Basic Polymerase Chain Reaction  
Optimization and Troubleshooting in Polymerase Chain Reaction  
Working with Bacterial Artificial Chromosomes  
Isolation of Bacterial Artificial Chromosome DNA from Small-Scale Cultures  
Homologous Recombination Using Bacterial Artificial Chromosomes  
Bacterial Artificial Chromosome Transgenic Mice and the GENSAT Database of Engineered Mouse Strains  
Agarose Gel Electrophoresis  
Southern Blotting: Capillary Transfer of DNA to Membranes  
Southern Hybridization of Radiolabeled Probes to Nucleic Acids Immobilized on Membranes

### PROTEIN-DNA INTERACTIONS

Electrophoretic Mobility-Shift Assays  
Chromatin Immunoprecipitation (ChIP)  
Analysis of Protein-DNA Interactions  
Formaldehyde Cross-Linking  
Preparation of Cross-Linked Chromatin for ChIP  
ChIP  
ChIP-Quantitative Polymerase Chain Reaction (ChIP-qPCR)  
ChIP-chip  
ChIP-seq

### SECTION 3. WORKING WITH RNA RNA BASICS

The Fundamentals of RNA Purification  
General Procedures for Avoiding Contamination with RNase  
Purification of RNA from Cells and Tissues by Acid Phenol-Guanidinium Thiocyanate-Chloroform Extraction  
Isolating Total RNA from Mouse Embryos or Fetal Tissues  
Single-Neuron Isolation for RNA Analysis Using Pipette Capture and Laser Capture Microdissection  
Antisense RNA Amplification for Target Assessment of Total mRNA from a Single Cell  
Denaturation and Electrophoresis of RNA with Formaldehyde  
Northern Blots: Capillary Transfer of RNA from Agarose Gels and Filter Hybridization Using Standard Stringency Conditions  
Combinatorial Analysis of mRNA Expression Patterns in Mouse Embryos Using Hybridization Chain Reaction  
Electrophoretic Mobility Shift Assays for RNA-Protein Complexes  
RNase Footprinting to Map Sites of RNA-Protein Interactions  
Identification of RNA Cargoes by Antibody-Positioned RNA Amplification  
CLIP (Cross-Linking and Immunoprecipitation) Identification of RNAs Bound by a Specific Protein

### TRANSCRIPTOME ANALYSIS

*Transcriptome Analysis Using Microarrays*  
Preparation of Fluorescent-Dye-Labeled cDNA from RNA for Microarray Hybridization  
Microarray Slide Hybridization Using Fluorescently Labeled cDNA  
Scanning Microarray Slides

Tips on Hybridizing, Washing, and Scanning  
Affymetrix Microarrays  
Methods for Processing Microarray Data

### *Transcriptome Analysis with High-Throughput Sequencing*

Fragmentation of Whole-Transcriptome RNA Using *E. coli* RNase III  
Preparation of Small RNA Libraries for High-Throughput Sequencing  
Tips for Preparing mRNA-Seq Libraries from Poly(A)+ mRNA for Illumina Transcriptome High-Throughput Sequencing  
High-Throughput Illumina Strand-Specific RNA Sequencing Library Preparation  
Methods for Processing High-Throughput RNA Sequencing Data

### RNAi

Creating a miR30-Based shRNA Vector  
Packaging shRNA Retroviruses  
Infection of Mammalian Cells with Retroviral shRNAs  
Creating Transgenic shRNA Mice by Recombinase-Mediated Cassette Exchange

### SECTION 4. GENE TRANSFER

#### Nonviral Methods

DNA Transfection Mediated by Lipofection  
Transfection of Mammalian Cells with Fluorescent Protein Fusions  
DNA Transfection by Electroporation  
PiggyBac Transposon-Mediated Cellular Transgenesis in Mammalian Forebrain by In Utero Electroporation  
Single Cell/Cellular Subregion-Targeted Phototransfection

#### VIRAL METHODS

Generation and Analysis of Lentivirus  
Expressing a 2A Peptide-Linked Bicistronic Fluorescent Construct  
Lentiviral Vectors for Retrograde Delivery of Recombinases and Transactivators  
Rabies Viral Vectors for Monosynaptic Tracing and Targeted Transgene Expression in Neurons  
Concentration and Purification of Rabies Viral and Lentiviral Vectors  
Stable Producer Cell Lines for Adeno-Associated Virus (AAV) Assembly  
Generation of Replication-Competent and -Defective Herpes simplex Virus (HSV) Vectors  
Construction and Packaging of Herpes simplex Virus/Adeno-Associated Virus (HSV/AAV) Hybrid Amplicon Vectors

### SECTION 5. IMAGING MICROSCOPY BASICS

Microscopy  
Using the Light Microscope  
Confocal Microscopy: Principles and Practice  
Principles of Multiphoton-Excitation Fluorescence Microscopy  
Digital Scanned Laser Light Sheet Fluorescence Microscopy  
LIGHT MODULATION OF PROTEINS  
Constructing and Expressing Fluorescent Protein Fusions  
Imaging Green Fluorescent Protein-Labeled Neurons Using Light and Electron Microscopy  
Imaging Synaptic Protein Dynamics Using Photoactivatable Green Fluorescent Protein  
Imaging Neuronal Activity with Genetically Encoded Calcium Indicators  
Measuring Membrane Voltage with Fluorescent Proteins  
Optogenetics: Opsins and Optical Interfaces in Neuroscience  
Establishing a Fiber-Optic-Based Optical Neural Interface

### IN VIVO IMAGING

Single-Cell Electroporation in *Xenopus*  
Single-Cell Electroporation of *Xenopus* Tadpole Tectal Neurons  
In Vivo Time-Lapse Imaging of Neuronal Development in *Xenopus*  
Bulk Electroporation of Retinal Ganglion Cells in Live *Xenopus* Tadpoles  
4D Fluorescent Imaging of Embryonic Quail Development  
Preparation and 4D Fluorescent Imaging of Quail Embryos  
Generating and Imaging Multicolor Rainbow Mice  
Two-Photon Imaging of Microglia in the Mouse Cortex In Vivo  
Mapping Anatomy to Behavior in Thy1:ChR2-YFP Transgenic Mice Using Optogenetics

### APPENDIX

General Safety and Hazardous Material Information

### INDEX

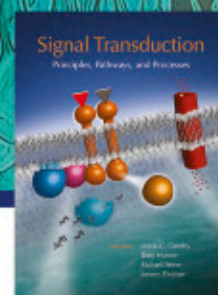


[www.cshlpress.org](http://www.cshlpress.org)





# SIGNAL TRANSDUCTION



Edited by Lewis Cantley, *Harvard Medical School*, Tony Hunter, *The Salk Institute*, Richard Sever, *Cold Spring Harbor Laboratory*, and Jeremy Thorner, *University of California, Berkeley*

Signal transduction pathways are molecular circuits that define how cells communicate with each other and respond to their environment. This new textbook for the first time provides a comprehensive view of the subject by covering both the basic mechanisms involved and the roles of signal transduction in fundamental biological processes. It starts by describing the basic players—signals, receptors, second messengers, and effectors—before comprehensively mapping the various different signaling pathways that operate in cells. It then goes on to provide detailed descriptions of how signal transduction functions in essential processes such as cell growth and division, metabolism, sensory perception, immunity, and reproduction.

2014, 464 pp., illus., index  
Hardcover \$165 £110

ISBN 978-0-879699-01-7

## Contents (preliminary)

Preface

Foreword

Edmond Fischer

## I. GENERAL PRINCIPLES AND MECHANISMS

### 1. Signals and Receptors

Carl Henrik Heldin, Benson Lu, Ron Evans, and Silvio Gutkind

### 2. General Principles and Mechanisms of Protein Regulation in Signal Transduction

Michael J. Lee and Michael B. Yaffe

### 3. Second messengers

Alexandra Newton and Susan Taylor

### 4. Signaling Networks: Computational Capabilities and Decision-making

Evren U. Azeloglu and Ravi Iyengar

## II. PATHWAYS/ROAD MAPS

### MAP Kinase Pathways

Deborah Morrison

### PI3K-PKB/Akt Pathway Signaling

Brian A. Hemmings and David F. Restuccia

### mTOR Signaling

Mathieu Laplante and David M. Sabatini

### Calcium Signaling

Martin D. Bootman

### The Cyclic AMP Pathway

Paolo Sassone-Corsi

### The Wnt Signaling

Roel Nusse

### Hedgehog Signaling

Philip W. Ingham

### Notch Pathway

Raphael Kopan

### Signaling by the TGF Superfamily

Jeffrey L. Wrana

### JAK/STAT Pathway

Douglas Harrison

### Toll-like Receptor Signaling

Kian-Huat Lim and Louis M. Staudt

### Immunoreceptor Signaling

Lawrence E. Samelson

### Signaling by Nuclear Receptors

Richard Sever and Christopher K. Glass

### The Hippo Pathway

Kieran F. Harvey and Iswar K. Hariharan

## III. SIGNALING PROCESSES

### 5. Signaling to the G1 Cell Cycle

Robert J. Duronio and Yue Xiong

### 6. Signaling Pathways that Regulate Cell Division

Nicholas Rhind and Paul Russell

### 7. Cell Growth and Metabolism

Patrick S. Ward and Craig B. Thompson

### 8. Signal Transduction and the Regulation of Cell Migration

Peter Devreotes and Rick Horwitz

### 9. Signaling Pathways in Cell Polarity

Luke M. McCaffrey and Ian G. Macara

### 10. Signaling Mechanisms Controlling Cell Fate and Embryonic Patterning

Norbert Perrimon, Chrysoula Pitsouli, and Ben-Zion Shilo

### 11. Signaling by Sensory Receptors

David Julius and Jeremy Nathans

### 12. Synaptic Signaling in Learning and Memory

Mary B. Kennedy

### 13. Signaling in Muscle Contraction

Ivana Y. Kuo and Barbara E. Ehrlich

### 14. Organismal Carbohydrate and Lipid Homeostasis

D. Graham Hardie

### 15. Signaling in Innate Immunity and Inflammation

Kim Newton and Vishva Dixit

### 16. Signaling in Lymphocyte Activation

Doreen Cantrell

### 17. Vertebrate Reproduction

Sally Kornbluth and Rafael Fissore

### 18. Stress Responses

Gökhan Hotamisligil and Roger J. Davis

### 19. Death Signaling

Douglas R. Green and Fabien Llambi

### 20. Subversion of Cell Signaling by Pathogens

Kim Orth and Neal Alto

### 21. Signaling in Cancer

Richard Sever and Joan S. Brugge

### 22. Outlook

Jeremy Thorner, Lewis Cantley,

Tony Hunter, and Richard Sever

Index



[www.cshlpress.org](http://www.cshlpress.org)