1. Record Nr. UNINA9910139958503321

Titolo	Batch effects and noise in microarray experiments, sources, and solutions [[electronic resource] /] / edited by Andreas Scherer
Pubbl/distr/stampa	Chichester, West Sussex ; ; Hoboken, : J. Wiley, 2009
ISBN	1-282-37950-X 9786612379505 0-470-68598-0 0-470-68599-9
Descrizione fisica	1 online resource (282 p.)
Collana	Wiley Series in Probability and Statistics ; ; v.868
Altri autori (Persone)	SchererAndreas <1966->
Disciplina	572.8 572.8636 611.01816
Soggetti	DNA microarrays DNA microarrays - Experiments Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Batch Effects and Noise in Microarray Experiments; Contents; List of Contributors; Foreword; Preface; 1 Variation, Variability, Batches and Bias in Microarray Experiments: An Introduction; 2 Microarray Platforms and Aspects of Experimental Variation; 2.1 Introduction; 2.2 Microarray Platforms; 2.2.1 Affymetrix; 2.2.2 Agilent; 2.2.3 Illumina; 2.2.4 Nimblegen; 2.2.5 Spotted Microarrays; 2.3 Experimental Considerations; 2.3.1 Experimental Design; 2.3.2 Sample and RNA Extraction; 2.3.3 Amplification; 2.3.4 Labeling; 2.3.5 Hybridization; 2.3.6 Washing; 2.3.7 Scanning 2.3.8 Image Analysis and Data Extraction2.3.9 Clinical Diagnosis; 2.3.10 Interpretation of the Data; 2.4 Conclusions; 3 Experimental Design; 3.1 Introduction; 3.2 Principles of Experimental Design; 3.2.1 Definitions; 3.2.2 Technical Variation; 3.2.3 Biological Variation; 3.2.4 Systematic Variation; 3.2.5 Population, Random Sample, Experimental and Observational Units; 3.2.6 Experimental Factors; 3.2.7 Statistical Errors; 3.3 Measures to Increase Precision and Accuracy; 3.3.1

Randomization; 3.3.2 Blocking; 3.3.3 Replication; 3.3.4 Further Measures to Optimize Study Design
3.4 Systematic Errors in Microarray Studies3.4.1 Selection Bias; 3.4.2 Observational Bias; 3.4.3 Bias at Specimen/Tissue Collection; 3.4.4 Bias at mRNA Extraction and Hybridization; 3.5 Conclusion; 4 Batches and Blocks, Sample Pools and Subsamples in the Design and Analysis of Gene Expression Studies; 4.1 Introduction; 4.1.1 Batch Effects; 4.2 A Statistical Linear Mixed Effects Model for Microarray Experiments; 4.2.1 Using the Linear Model for Design; 4.2.2 Examples of Design Guided by the Linear Model; 4.3 Blocks and Batches; 4.3.1 Complete Block Designs; 4.3.2 Incomplete Block Designs
4.3.3 Multiple Batch Effects4.4 Reducing Batch Effects by Normalization and Statistical Adjustment; 4.4.1 Between and Within Batch Normalization with Multi-array Methods; 4.4.2 Statistical Adjustment; 4.5 Sample Pooling and Sample Splitting; 4.5.1 Sample Pooling; 4.5.2 Sample Splitting: Technical Replicates; 4.6 Pilot Experiments; 4.7 Conclusions; Acknowledgements; 5 Aspects of Technical Bias; 5.1 Introduction; 5.2 Observational Studies; 5.2.1 Same Protocol, Different Times of Processing; 5.2.2 Same Protocol, Different Sites (Study 1); 5.2.3 Same Protocol, Different Sites (Study 2)
5.2.4 Batch Effect Characteristics at the Probe Level5.3 Conclusion; 6 Bioinformatic Strategies for cDNA-Microarray Data Processing; 6.1 Introduction; 6.1.1 Spike-in Experiments; 6.1.2 Key Measures - Sensitivity and Bias; 6.1.3 The IC Curve and MA Plot; 6.2 Pre-processing; 6.2.1 Scanning Procedures; 6.2.2 Background Correction; 6.2.3 Saturation; 6.2.4 Normalization; 6.2.5 Filtering; 6.3 Downstream Analysis; 6.3.1 Gene Selection; 6.3.2 Cluster Analysis; 6.4 Conclusion; 7 Batch Effect Estimation of Microarray Platforms with Analysis of Variance; 7.1 Introduction
7.1.1 Microarray Gene Expression Data

Sommario/riassunto

Batch Effects and Noise in Microarray Experiments: Sources and Solutions looks at the issue of technical noise and batch effects in microarray studies and illustrates how to alleviate such factors whilst interpreting the relevant biological information. Each chapter focuses on sources of noise and batch effects before starting an experiment, with examples of statistical methods for detecting, measuring, and managing batch effects within and across datasets provided online. Throughout the book the importance of standardization and the value of standard operating procedures in the devel