A proposed metric for assessing the measurement quality of individual microarrays.

**Title**
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**Publication Type**
Journal Article

**Year of Publication**
2006

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**Journal**
BMC Bioinformatics

**Volume**
7

**Pagination**
35

**Date Published**
2006

**ISSN**
1471-2105

**Keywords**
Algorithms, Computer Simulation, Data Interpretation, Statistical, Equipment Failure Analysis, Gene Expression Profiling, Models, Genetic, Models, Statistical, Oligonucleotide Array Sequence Analysis, Quality Assurance, Health Care, Quality Control, Reference Standards

**Abstract**

**BACKGROUND:** High-density microarray technology is increasingly applied to study gene expression levels on a large scale. Microarray experiments rely on several critical steps that may introduce error and uncertainty in analyses. These steps include mRNA sample extraction, amplification and labeling, hybridization, and scanning. In some cases this may be manifested as systematic spatial variation on the surface of microarray in which expression measurements within an individual array may vary as a function of geographic position on the array surface.

**RESULTS:** We hypothesized that an index of the degree of spatiality of gene expression measurements associated with their physical geographic locations on an array could indicate the summary of the physical reliability of the microarray. We introduced a novel way to formulate this index using a statistical analysis tool. Our approach regressed gene expression intensity measurements on a polynomial response surface of the microarray's Cartesian coordinates. We demonstrated this method using a fixed model and presented results from real and simulated datasets.

**CONCLUSION:** We demonstrated the potential of such a quantitative metric for assessing the reliability of individual arrays. Moreover, we showed that this procedure can be incorporated into laboratory practice as a means to set quality control specifications and as a tool to determine whether an array has sufficient quality to be retained in terms of spatial correlation of gene
A proposed metric for assessing the measurement quality of individual microarrays.

DOI: 10.1186/1471-2105-7-35
Alternate Journal: BMC Bioinformatics
PubMed ID: 16430768
PubMed Central ID: PMC1373606
Grant List: R24 DK58776 / DK / NIDDK NIH HHS / United States
U54 CA100949 / CA / NCI NIH HHS / United States