

The Microrevolution: Applications and impacts of microarray technology on molecular biology and medicine (Review)

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Abstract. Microarray is a technique that provides a global analysis of gene expression at the level of transcription. Genetic and epigenetic changes underlie neoplastic transformation, cardiovascular disease, some psychiatric illnesses, and a growing list of disease pathogeneses and therapeutic responses. The profile of genes expressed by different cells (gene up- and downregulation under different conditions) determines their phenotype, and thus provides insights into the molecular basis for health and disease. Microarray technology combines standard molecular techniques with high-throughput screening to monitor the expression of up to 38,500 genes. A single experiment can assay gene expression across the entire genome under experimental or clinical conditions. Microarray therefore extends wide bridges between basic science and clinical medicine. This review describes the principles behind transcriptional profiling, experimental designs, and data analyses in the context of basic and clinical sciences. In addition, we survey the Microrevolutionized field of clinical cancer research by reviewing the most recent and innovative microarray studies of breast carcinoma.