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## Preface

DNA microarray technology has revolutionized research in the past decade. In the beginning microarray technology was mostly used for mRNA expression studies, but soon spread to other applications such as comparative genomic hybridization, SNP and mutation analysis. These applications are now in everyday use in many laboratories and therefore the focus of this volume. It is clear from the protocols in this volume that DNA microarray assays are very complicated to perform even if fabrication of microarray is not considered. It is also clear that there are many different ways to perform microarray assays even if the basic concept is the same, i.e. hybridization of sample DNA (or RNA) to immobilized single stranded capture DNA. Minute changes to a protocol can be pivotal between success and failure in a microarray assays.

DNA microarrays fabrication can be divided into two broad categories: on chip synthesis and spotting off chip synthesized DNA. The latter is by far the most common method in house for fabrication of DNA arrays in house. In house fabrication of microarray is necessary when microarrays are not commercially available or is not an economical possibility. The largest providers of microarray are Affymetrix, Illumina and Agilent and all are exemplified in this volume on different kinds of applications. Commercial arrays are typically targeted towards popular organisms and application such as SNP, gene expression analysis, and microarray user that have other requirements are left to fabricate arrays themselves. This volume therefore addresses fabrication issues theoretically as well as giving examples of practical detailed methods.

The main advantage of DNA microarray is that many reactions are taking place in parallel on the surface of microarrays. This advantage is also microarray technology's greatest weakness because all these hybridization reactions need to operate at one single condition applied to the array which put large demands on probe's choice. Furthermore, we have little knowledge about what is taking place on the surface of microarrays that complicates array development. This volume provides robust protocols for performing microarray assays reproducibly. However, reproducible does not necessarily mean that data obtained correctly reflects what is going on in a cell or an organism.

DNA microarray technology is slowly filtering into diagnostic applications that presumably will benefit from miniaturization and highly multiplex assays just like the research community has been doing and will be doing for a considerable time yet. Before microarray comes into clinical use though, we need to find new short and efficient protocols based on the current state-of-the-art protocols provided here.

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