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## TOOLS AND TECHNOLOGY

# Primer Designer

## PREMIER Biosoft International's Array Designer facilitates primer and probe design for custom arrays

By Sarah Goforth

In the rapidly widening arena of functional genomics, a few key players dominate the lab tools game. Perhaps the most prominent is the DNA microarray. This robust tool allows researchers to examine the expression of hundreds, even thousands, of genes at once. In these arrays, carefully organized patches of either complementary DNA (cDNA) clones or oligonucleotides are robotically deposited on a fixed surface. Researchers use labeled probes to locate areas of gene expression, tackling questions of gene function and interaction on a genome-wide basis. The microarray has revolutionized molecular biology by broadening the scale of expression studies and is quickly becoming an essential tool for gene discovery, disease diagnosis, and drug design.

With this expanded scale comes a new host of problems, one of which is how to efficiently design primers and probes for the creation of custom arrays. PREMIER Biosoft International of Palo Alto, Calif., solved this problem with the July 2000 release of its Array Designer software. Array Designer processes an unlimited number of sequences, using a fast and effective algorithm to examine and weigh the suitability of every possible primer pair or hybridization.

Researchers can input an unlimited number of desired sequences into Array Designer from a wide range of file formats, including GenBank, FastA, and Text. Array Designer searches all primer and probe candidates for identical reaction compatibility, allowing users to run all PCR or hybridization reactions under identical cycling conditions. Array Designer utilizes nearest neighbor thermodynamic theory with SantaLucia thermodynamics values to calculate the optimal  $T_m$  for each primer and probe. The program then rates the desirability of each primer and probe in terms of  $T_m$  and other factors such as the stability of secondary structures and the location of each oligonucleotide in comparison to the user-specified location. With this method, Array Designer ensures that the most optimal primers are found for each template.

In PCR primer design, users determine the product length and location (3' end, 5' end, or anywhere within the template). In oligonucleotide probe design, Array Designer supports many single nucleotide polymorphism (SNP) detection methods, including primer extension and tiling arrays. In both methods, a newly added BLAST feature rids the output of unwanted homologies, and each sequence is processed in a fraction of a second. **Fan Meng** of the University of Michigan, Ann Arbor, said Array Designer has been a time-saving investment. "It is a very useful tool for custom designing both cDNA and oligo arrays," he noted.

Array Designer presents output in a spreadsheet-ready format, preparing the user to place an order for oligonucleotide synthesis, import the data into central databases such as Oracle, or load the information into cDNA or oligonucleotide spotting robotics software. According to **Arun Apte**, product manager for PREMIER Biosoft International, Array Designer "reduces the entire task of designing primers from months to a day or two."

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**For More Information**

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