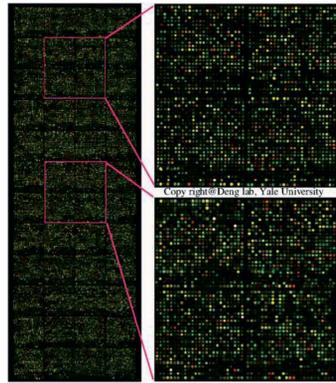


# New platforms and systems for DNA microarrays

70mer oligonucleotide probes offer excellent sensitivity and specificity

## Introduction

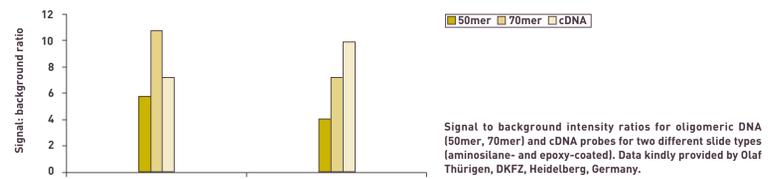
DNA microarrays are commonly used in expression profiling and genetic analysis experiments. Today still many DNA arrays are based on short oligonucleotides or cDNAs. These can provide either high specificity or high sensitivity respectively, but cannot combine these qualities. Operon has designed probes of different lengths to various positions in the Open Reading Frames (ORFs) and the results clearly show that 70mers offer the optimal combination of specificity and sensitivity. Using the ENSEMBL database <http://www.ensembl.org> or other databases that display genome and transcript information allows the design of common, partial common and individual transcript 70mers. This design strategy is suitable for differentiating alternative splice variants and is maximizing the number of represented transcripts. Whenever possible, oligos were designed to be fully contained in one exon (exon oligos) avoiding the location of oligos across exon borders. In collaboration with leading researchers, Operon has designed Array-Ready Oligo Sets™ consisting of optimized 70mers for expression analysis on genome and transcriptome level for a number of genomes, including Human, Mouse, Rat, Drosophila, C. elegans and Zebrafish.



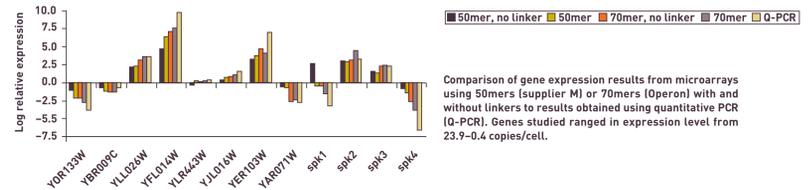
A sample rice oligo-array hybridization image. This image is from slide A of the two-slide set of the whole genome oligo (70mer) array, hybridized with probes derived from total RNA samples from rice panicles (red) and cultured rice cells (green). (Released July 7, 2003). Data kindly provided by the Deng laboratory, Yale University.

## 70mer oligonucleotides are optimal microarray probes

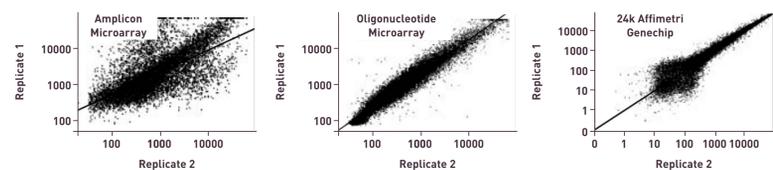
### Improved Signal: Background Ratios Using 70mers



### True Relative Expression Values



## Superior reproducibility performance of Array Ready Oligo Sets

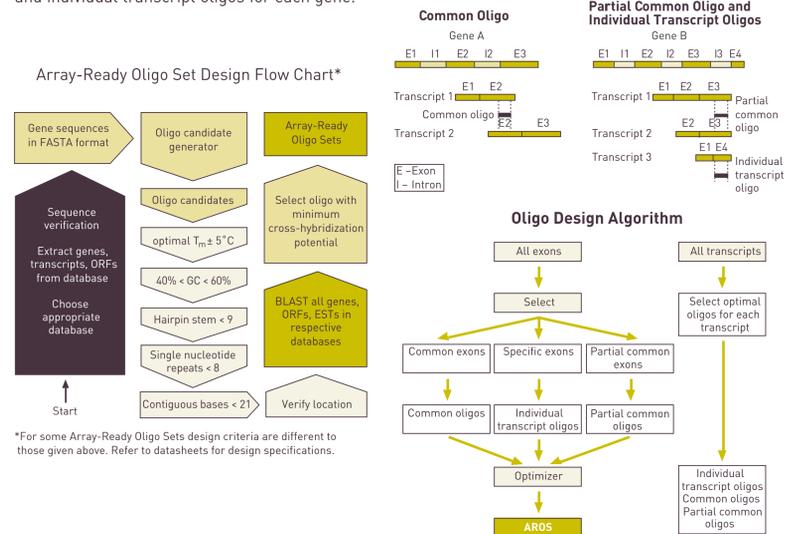


Reproducibility measurements comparing three expression platforms. In all cases, replicate RNA samples from Arabidopsis plants grown under similar conditions to similar growth stages were converted into targets, and were hybridized to two separate microarrays or GeneChips. Cy3 and Cy5 dye reversals were done for the microarrays. The intensity values for the corresponding array elements were then compared over the two replicates. In all cases, a line of correlation can be seen. Left panel: amplicon microarrays characteristically display a proportion of elements whose reproducibility is poor. Typically, these elements would be flagged and their contributions to technical replications ignored. Centre panel: 70-mer oligonucleotide-based microarrays display remarkable reproducibility over the entire dynamic range. Right panel: for the GeneChips, good reproducibility is observed only for the upper 50% of the elements. Most of the genes in the lower half are called as 'Absent', and their reproducibilities are very low.

From: David W. Galbraith, Comparative and Functional Genomics, 2003; 4: 208-215.

## Array-Ready Oligo Set design

Array-Ready Oligo Sets are created using an algorithm that generates common, partial common, and individual transcript oligos for each gene.



## Comprehensive online information and documentation

The Operon OMAD (Oligo MicroArray Database) at <http://www.operon.com/arrays/omad.php> provides customers with information on every single oligo in Array-Ready Oligo Sets.

Oligo_ID	UniGene ID	Locus	GenBank accession	Gene Symbol	Plate Number	Plate Position
A000005_01	21097	Atlg13270	AF250961		1	A11
Oligo Length	TM	Representative gene sequence	UniGene	TAIR	TIGR	MIPS
70	78.30	Sequence	UniGene	TAIR	TIGR	MIPS
Description	Arabidopsis thaliana methionine aminopeptidase - like protein mRNA, complete cds					

### The Download Center provides customers with:

- Up-to-date overviews of all available Array-Ready Oligo Sets
- Lists of genes and transcripts
- Data sheets with comprehensive bioinformatics information and specifications

## Summary

Using synthetic DNA to produce probes for microarray experiments avoids the drawbacks associated with generating probes by PCR amplification. Extensive analyses have shown that 70mers have a number of advantages, offering highly specific, sensitive, and reliable microarray analysis. Array-Ready Oligo Sets consist of optimized 70mers, and are available for a wide

range of organisms (see OMAD Downloadcenter). They are cost-effective and efficient tools for generation of reproducible microarray data. Using the open-access Ensembl database for design of e.g. Human and Mouse Array-Ready Oligo Sets enables the investigation of alternatively spliced transcripts and provides much additional information on an organism's transcriptome.

Array-Ready Oligo Sets	Number of Oligos	Sequence source
Arabidopsis Version V3.0 <b>NEW</b>	29,110	TIGR Arabidopsis genome annotation database ATH1 Release 5.0
Human Version 4.0 <b>NEW</b>	35,035	ENSEMBL Human 28.35a, Human Ref Seq, H-Inv DB
Mouse Version 4.0 <b>NEW</b>	35,852	ENSEMBL Mouse 26.33b.1, RIKEN, NCBI RefSeq, UniGene
Rat Version 3.0	26,962	ENSEMBL Rat v19.3b.2
Zebrafish Version 3.0 <b>NEW</b>	~30,000	ENSEMBL Zebrafish > v32.5 and VEGA
E. coli Version 2.0 <b>NEW</b>	9,308	GenBank
Drosophila Version 1.1	14,593	Gadfly release 3.1, BDGP
Tomato Version 1.0 <b>NEW</b>	12,160	Lycopersicon combined (Build #3), SGN, Cornell University
Maize Version 1.0	57,452	TIGR
Sinorhizobium Version 1.0	6,205	NCBI RefSeq

B. Henze, B. Saal, D. Drutschmann, K. Wellesen, P. Schübler  
Operon Biotechnologies GmbH, Cologne, Germany

[www.operon.com](http://www.operon.com)

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