



# Data Sheet

## GeneChip® *Pseudomonas aeruginosa* Genome Array

*Pseudomonas aeruginosa* is an opportunistic pathogen associated with a wide variety of human infections. The GeneChip® *Pseudomonas aeruginosa* Genome Array serves as an important tool in studying gene functions of this clinically relevant bacterium.

*Pseudomonas aeruginosa* (*P. aeruginosa*) is responsible for many nosocomial (hospital-acquired) infections and can cause persistent infections in patients with cancer, severe burns, or other immune-compromising conditions. *P. aeruginosa* can cause particularly virulent and chronic lung infections in individuals afflicted with cystic fibrosis (CF), a common genetic disorder that currently affects over 30,000 people in the United States. *P. aeruginosa* is the most common bacterial infection found in the lungs of CF patients and leads to progressive lung disease, which is also the leading cause of death among these individuals.

Because *P. aeruginosa* forms biofilms under laboratory conditions, it has been used as a model to study quorum sensing and cell signaling in gram-negative bacteria. These properties and its pathogenicity have made *P. aeruginosa* a key target in the development of new anti-bacterial drugs. Its disease-causing properties are not restricted to mammalian organisms. *P. aeruginosa* has been shown to be pathogenic in the worm *Caenorhabditis elegans* and plant *Arabidopsis thaliana*. *P. aeruginosa* utilizes common pathogenicity pathways between animals and plants<sup>1</sup>. Its ability to survive in a wide variety of environments also makes the *P. aeruginosa* genome a source for identifying novel transport and utilization pathways for metabolites.

The *P. aeruginosa* genome, which is relatively large for a prokaryote, contains over 6.3 million base pairs and 5,570 predicted open reading frames (ORFs). This genome is comprehensively represented on the GeneChip® *P. aeruginosa* Genome Array, which contains probes to over 5,500 ORFs. The sequence information on this array was developed, in collaboration with the Cystic Fibrosis Foundation, from the initial publication of the *P. aeruginosa* sequence<sup>2</sup>.

### Applications

With the *P. aeruginosa* Genome Array, specific genes can be studied to understand the role of individual genes in processes such as antibiotic resistance, biofilm formation<sup>3</sup>, and host-pathogen interaction.

The *P. aeruginosa* Genome Array includes probe sets to intergenic sequences which may lead to the identification of new genes.

In addition to sequences from the *P. aeruginosa* strain PAO1, the array also includes unique sequences from other strains to broaden the research possibilities with the array. Genes encoding serological determinants and pathogenicity islands<sup>4</sup> are included on the array and have proven useful in genotyping *P. aeruginosa* strains isolated from human infections originating from different tissues.

### Assay

The sample preparation for this array utilizes reverse transcriptase and random hexamers for cDNA synthesis. A unique hybridization protocol has been developed to accommodate the relatively high GC content of the *P. aeruginosa* genome.

### Array Content

The GeneChip *P. aeruginosa* Genome Array contains probe sets for over 5,500 ORFs from the PAO1 strain of *P. aeruginosa*, 199 probe sets corresponding to 100 intergenic sequences, and 117 additional genes from *P. aeruginosa* strains other than PAO1.

During the design process, the *P. aeruginosa* sequences were pruned against the GeneChip Human Genome U95 Genome Array, facilitating experiments on the *P. aeruginosa* samples isolated from human tissues.

## Critical Specifications

Number of arrays in set	One
Array format	Midi
Feature size	20 µm
Oligonucleotide probe length	25-mer
Probe pairs/sequence	~13
Control sequences included	Poly-A controls: <i>dap</i> , <i>lys</i> , <i>phe</i> , and <i>trp</i> from <i>B. subtilis</i>
Detection sensitivity	~1 copy/cell*

\*Expected performance based on the detection of unlabeled controls spiked into total RNA and carried through the cDNA labeling protocol. This sensitivity is based on the assumption that *P. aeruginosa* content is similar to *E. coli* cells which contain approximately 100 fg total RNA per cell, and mRNA accounts for approximately 2% of total RNA.

## Ordering Information

### GeneChip® *P. aeruginosa* Genome Array

<b>900339</b>	Contains 5 GeneChip <i>P. aeruginosa</i> Genome Arrays
<b>900340</b>	Contains 30 GeneChip <i>P. aeruginosa</i> Genome Arrays

## Supporting Products

Part #	Product Name	Description
900542	GeneChip® DNA Labeling Reagent	Sufficient for 30 reactions
900301	Control Oligo B2, 3nM	Sufficient for 30 reactions
900433	GeneChip® Eukaryotic Poly-A RNA Control Kit	Approximately 100 reactions

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## REFERENCES:

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2. C. Stover, *et al. Nature* **406**: 959-964 (August 21, 2000).
3. M. Whiteley, *et al. Nature* **413**: 860-864 (October 25, 2001).
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