

# Superior Software for Designing Oligonucleotide Probe Pool: PP-Designer v2.0

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## BACKGROUND

Next generation sequencing technologies continue to provide scientists and clinicians with enhanced accuracy and increased sequence readout within a single reaction. However, further advancement has been limited by the ability to minimize the cross-reactivity among combined primer pairs. The linear padlock probe approach, physically linking two primers together, provides improved target specificity. The reduction in probe cross reactivity allows larger combinations of probes for multiplex genotyping reactions. Software capable of streamlining the design of probe pool with desirable characteristics is in much need to further progress the sequencing quest.

## TECHNOLOGY DESCRIPTION

UC San Diego researchers have developed a software system, Padlock Probe-Designer (PP-Designer) that automatically constructs customizable primers of padlock and non-padlock DNA or RNA probes to any sequenced, annotated genome. These primers are designed to have higher specificities and affinities to their target sequences. Using PP-Designer v1.0, 90-99 percent target specificity from a pool of ~10,000 padlock probes has been demonstrated; it achieves a level of multiplexing far exceeding any comparable assays with traditional primer pairs. PP-Designer v2.0 further expands the application to include non-padlock probes with balanced probe/target affinity yielding representative data readout. This balanced output of oligonucleotide affinities results in robust sequencing coverage, especially in multiplexed reactions. Combined with increased numbers of probes pairs per genotyping assay, the PP-Designer v2.0 delivers enhanced accuracy and increased sequence readout within a single reaction with substantial time and money savings.

## ADVANTAGES

A sophisticated and robust algorithm, with intuitive web and user-friendly interface, designs primers that work “out of the box” amid genomic complexity.

- Designs padlock and non-padlock DNA or RNA primers.
- Primer pools with balanced target affinities.
- Two to three folds of improvement in primer performance compared to PP-Designer v1.0.

## APPLICATIONS

Applications include, but are not limited to designing probes for:

- Epigenetic analysis, such as methylation pattern identification
- Transcriptional profiling
- Bisulphate and conventional PCR sequencing
- DNA fingerprinting.
- Clinical genotyping, such as SNP detection, tumor profiling, etc.
- Patient cohort genotyping
- Pharmacogenetics
- Agri-biogenetics

## STATE OF DEVELOPMENT

PP-Designer v2.0 is in beta testing for the primer design algorithm and in alpha testing for Web interface within UC San Diego and selected non-UC collaborators.

## RELATED MATERIALS

## CONTACT

University of California, San Diego  
Office of Innovation and Commercialization  
[innovation@ucsd.edu](mailto:innovation@ucsd.edu)  
tel: 858.534.5815.



## OTHER INFORMATION

### KEYWORDS

PP-Designer, DNA or RNA  
probe/primer, padlock, targeted  
sequencing, epigenetic analysis,  
methylation pattern, transcriptional  
profiling, bisulphate, PCR sequencing,  
DNA fingerprinting, genotyping, SNP  
detection, tumor profiling

### CATEGORIZED AS

- **Biotechnology**
  - Bioinformatics
- **Computer**
  - Software
- **Medical**
  - Disease: Cancer

### RELATED CASES

2009-831-0

► [PP-Designer v. 1.0.:](#) Deng J, Shoemaker R, Xie B, Gore A, LeProust EM, Antosiewicz-Bourget J, Egli D, Maherali N, Park IH, Yu J, Daley GQ, Eggan K, Hochedlinger K, Thomson J, Wang W, Gao Y, Zhang K. Targeted Bisulfite Sequencing Reveals Changes in DNA Methylation Associated with Nuclear Reprogramming. Nat Biotechnol. 2009 Apr;27(4):353-60.

**University of California, San Diego**  
**Office of Innovation and Commercialization**  
9500 Gilman Drive, MC 0910, ,  
La Jolla,CA 92093-0910

Tel: 858.534.5815  
innovation@ucsd.edu  
<https://innovation.ucsd.edu>  
Fax: 858.534.7345

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