

# Custom Assay Design

Core Competency

TARGETED RESEQUENCING, CUSTOM MICROARRAYS, MOLECULAR DIAGNOSTICS – REGARDLESS OF THE TECHNOLOGY AND APPLICATION, SUCCESSFUL ASSAYS BEGIN WITH STATE-OF-THE-ART DESIGN POWERED BY SOPHISTICATED BIOINFORMATICS. 5AM SOLUTIONS BRINGS 15 YEARS OF ASSAY DESIGN EXPERIENCE AND A SUITE OF BEST IN CLASS TOOLS TO DEVELOP CUSTOM PRIMERS, PROBES AND MICROARRAYS.

## WHAT'S YOUR APPLICATION?

With the rise of nucleic acid based diagnostic tests and genome-wide molecular assays, selecting the right s and oligonucleotide probes is a critical component in modern experimental design. Unfortunately, every experiment is different and many off the shelf tools simply aren't sufficient. Assay vendors often offer their own proprietary design programs through their web sites, but limit the user to design assays one at a time and only help with one step of the process: selecting the best oligo from the user-provided target sequence.

5AM Solutions provides end-to-end assay design support, beginning with selecting the best targets for assay design and continuing through assay ordering and quality control. Since assay design is rarely done only once, we also incorporate assay performance data into future assay design improvements. 5AM's broad design experience includes PCR design for sequencing application, RT-PCR assay designs and custom oligonucleotide array design.

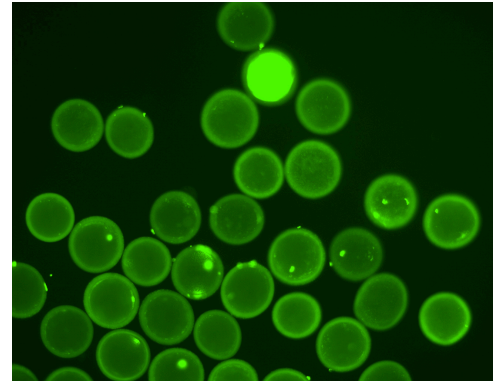
## SELECTING THE RIGHT TARGETS

Gone are the days when designing assays could be done by hand for a small number of genes or SNPs. Today's experiments often target entire chromosomes, hundreds of genes or thousands of SNPs. Today's increased knowledge of genomic features such as alternative splice forms, copy number variation and SNPs means that assay design can be more informed – if we can integrate the data in a meaningful and useful way.

5AM's assay design pipeline incorporates data from public genome resources (NCBI, UCSC and Ensembl) as well as other application specific resources such as HapMap and NCBI's Gene Expression Omnibus. We use this data to select targets of interest based on features such as gene expression, linkage disequilibrium or subspecies specificity. We also use these resources to avoid unwanted genetic variability by SNPs, CNVs or regions of low complexity. Targets can be designed to be RNA or DNA specific, or custom selected to meet your particular requirements.

## PICKING THE BEST ASSAYS

5AM starts with best in class tools such as Primer3 for assay design with wrappers and modifications to power custom design requirements. All assays we design are tested for high specificity using homology search tools like BLAST, BLAT and pgrep. When assays are to be multiplexed, 5AM tests for unwanted oligo interactions by using tools like UNAFold (mfold) and MultiPLX. Once you start working with the assays in your lab, we help you characterize performance and improve future designs using powerful statistical tools such as R and Spotfire.



## VITAL STATS

### GOT SCIENCE?

Biomedical research generates high volumes of complex and sophisticated data. Successful efforts to produce new therapeutics and diagnostics require *informed* use of this data from public and proprietary sources. To this end, our bioinformatics and science analysis team provides expertise in the tools and brings a deep knowledge of the data and data sources. We mentor, advise, and collaborate with our clients throughout the entire research and development process, from lab automation and assay design to data management, analysis and visualization.

### EXAMPLE CLIENTS

- A Top Ten Pharmaceutical Company
- An Early-Stage Diagnostic Device Company

### TOOLS

- Python
- Primer3
- Pgrep
- UCSC/NCBI databases
- UNAFold/mfold
- R, Spotfire

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## **5AM: YOUR DESIGN PARTNER**

When you engage with 5AM for your assay design project you gain a dedicated partner who will work with you to ensure the development of successful assays. Depending on your needs, 5AM will help you fulfill a onetime development need or help you set up your own automated design pipeline. Contact 5AM today to start the collaboration – [science@5amsolutions.com](mailto:science@5amsolutions.com).

## **EXAMPLE KEY BIOS**

James (“J”) Ireland has been developing assays for almost 15 years. Among his accomplishments, J has designed commercial MIP genotype panels at ParAllele, methylation and somatic mutation assays at Affymetrix, and resequencing PCR designs for SNP discovery at the Whitehead Institute, Center for Genome Research (now the Broad Institute). J is the author of the primer screening tool pgrep and is responsible for the assay design featured in more than ten journal articles and patents.

Will FitzHugh, 5AM’s Chief Science Officer, has over 17 years of experience working at biomedical research centers and biotechnology companies. He has worked on numerous genome mapping and sequencing projects, from the Human Genome Project to the first bacterial genome ever sequenced. Will worked at Celera for 7 years leveraging biological data collections to develop drug targets and diagnostic markers.