

Twist Custom Panels

Your Targets, Your Design, On Your Schedule

KEY BENEFITS

Exceptional, Consistent Performance

- Effective design, accurate synthesis, and detailed quality control maximize both uniformity of capture and reproducibility
- High-fidelity double-stranded DNA probes offer high-quality, consistent performance
- NGS-based quality control of all probes ensures balanced probe representation and minimizes dropout

Rapid Customization and Optimization

- Fast turnaround time to final panel
- Simple addition or enhancement of content without sacrificing performance
- Ensures adjustment of workflow biases for optimum performance

Intuitive, Proprietary Panel Design

- Scalable design from 100 to >1M probes per pool
- Reduces the iterations to final design
- Enables balanced capture, even for challenging regions

At Twist Bioscience, we combine precise oligonucleotide synthesis with a scalable silicon-based manufacturing platform to generate high-performing probe panels for NGS target enrichment. We also complement this powerful technology with proprietary design algorithms and a rapid iteration pipeline to enable the quick design, synthesis, and optimization of custom panels. Twist Custom Panels can be designed and built to cover a wide range of panel sizes, target regions, and multiplexing requirements — all with exceptional and consistent performance.

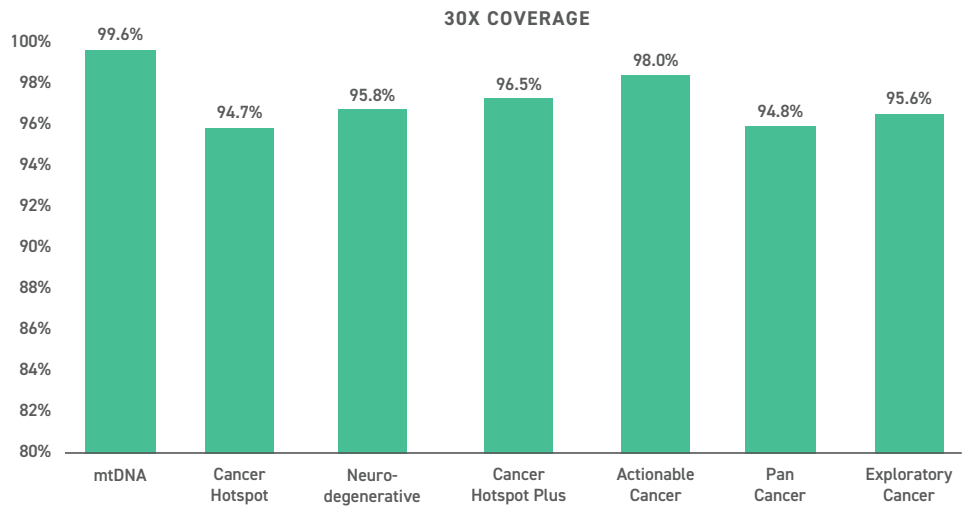
Whether you design your own panel from scratch or add targets to enhance the content of existing panels, you can use your Twist Custom Panel with Twist's modular library preparation kits or seamlessly integrate them into an existing workflow.

Consistent Performance Across a Range of Panel Sizes and Target Regions

Design a Twist Custom Panel in minutes using a list of gene names or a target bed file. Regardless of panel size or target region, Twist Custom Panels consistently deliver excellent performance.

PANEL DESCRIPTION				PERFORMANCE (PICARD METRICS)	
NAME	TARGET SIZE (MB)	PROBES	GENES	UNIFORMITY (FOLD-80)	DUPLICATION RATE
mtDNA	0.017	139	37	1.22	0.8%
Cancer Hotspot	0.037	384	50	1.36	1.9%
Neurodegenerative	0.6	6,024	118	1.23	1.0%
Cancer Hotspot Plus	0.81	7,446	127	1.25	2.2%
Actionable Cancer	1.69	19,661	522	1.27	1.4%
Pan-Cancer	3.4	31,002	578	1.27	1.9%
Exploratory Cancer	13.2	135,937	5,442	1.30	3.0%

Summary of Twist Custom Panel designs. Twist has generated probe panels of varying size and complexity, and all have delivered exceptional performance.



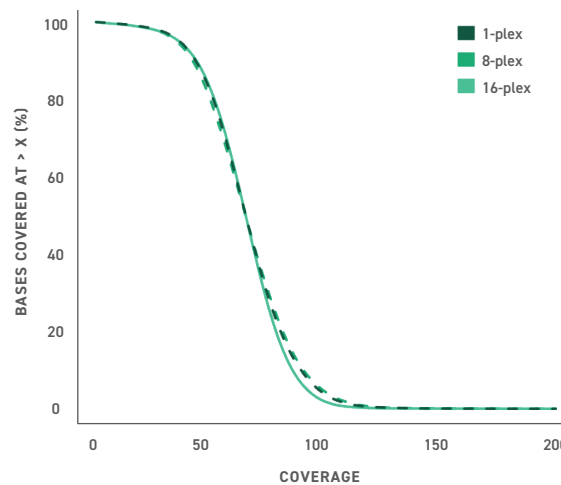
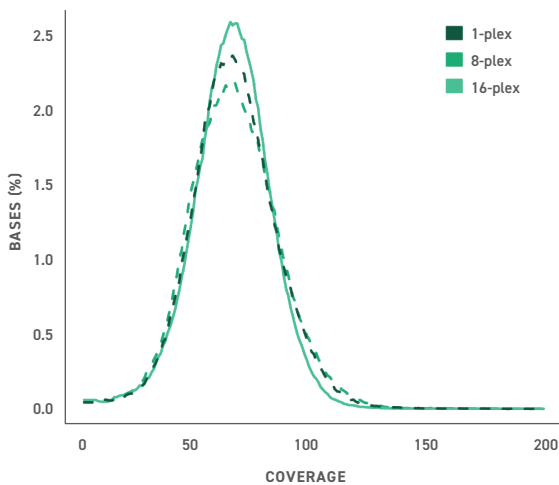
Percentage of reads in each custom panel achieving 30x coverage. All data were generated in singleplex enrichment reactions and subsampled to 150x coverage. MapQuality filter = 20. Sequencing was performed on an Illumina NextSeq instrument using 2 x 76 reads.

Robust Performance During Multiplex Target Enrichment

Twist Custom Panels deliver high-quality performance across 1-, 8-, and even 16-plex enrichment reactions:

- High uniformity for all levels of multiplexing
- High on-target rates do not vary with higher levels of multiplexing
- Low duplication rates across all levels of multiplexing

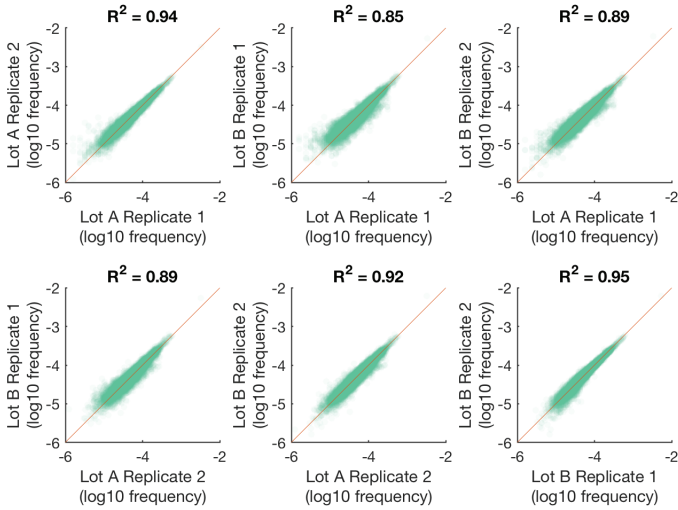
MULTIPLEXING	PERFORMANCE (PICARD METRICS)		
	Uniformity (Fold-80)	On-Target Rate	Duplication Rate
SINGLEPLEX	1.25	70%	1.8%
8-PLEX	1.27	69%	2.2%
16-PLEX	1.30	69%	2.7%



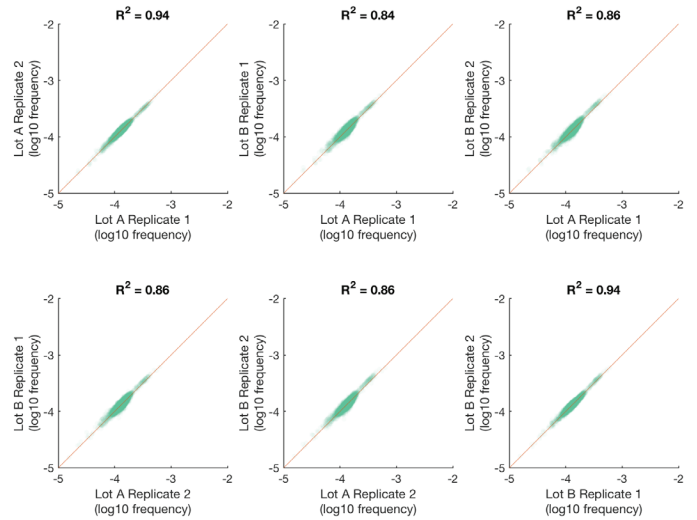
Performance data using 810 kb panel. All data were subsampled to 150x coverage. MapQuality filter = 20. Sequencing was performed on an Illumina NextSeq instrument using 2 x 76 reads. Note the coverage distribution plots show minimal differences with increasing multiplexing across all levels of coverage.

Verified by NGS to Ensure Reproducibility from Lot to Lot

As demonstrated by NGS-based quality analysis, Twist Custom Panels demonstrate a low lot-to-lot variation. Every Twist Custom Panel is sequenced to ensure consistent quality and performance across all probes within a panel.



Consistent quality of 800 kb panels, as assessed by NGS. Lots A and B are independent lots produced using two synthesis runs. Each dot represents probe abundance. Note the excellent agreement between replicate synthesis runs.



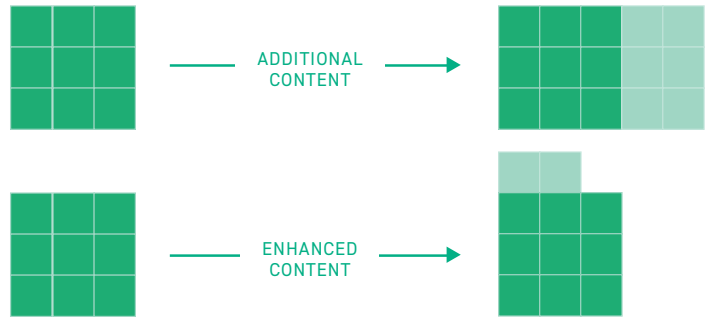
Consistent enrichment performance of 800 kb panels. Lots A and B are independent lots produced using two synthesis runs. Each dot represents probe coverage following NGS target enrichment at 1500x coverage. Note the excellent agreement between replicate synthesis runs.

Easy, Flexible Customization

Gene definitions are being updated constantly, making panels based on older definitions outdated or incomplete. The flexibility and modularity of Twist Custom Panels can be used to add or enhance content, all while maintaining highly uniform enrichment.

As an example, we added 3 Mb of target regions derived from the RefSeq database to the Twist Human Core Exome. When compared to the original panel, the customized version displayed:

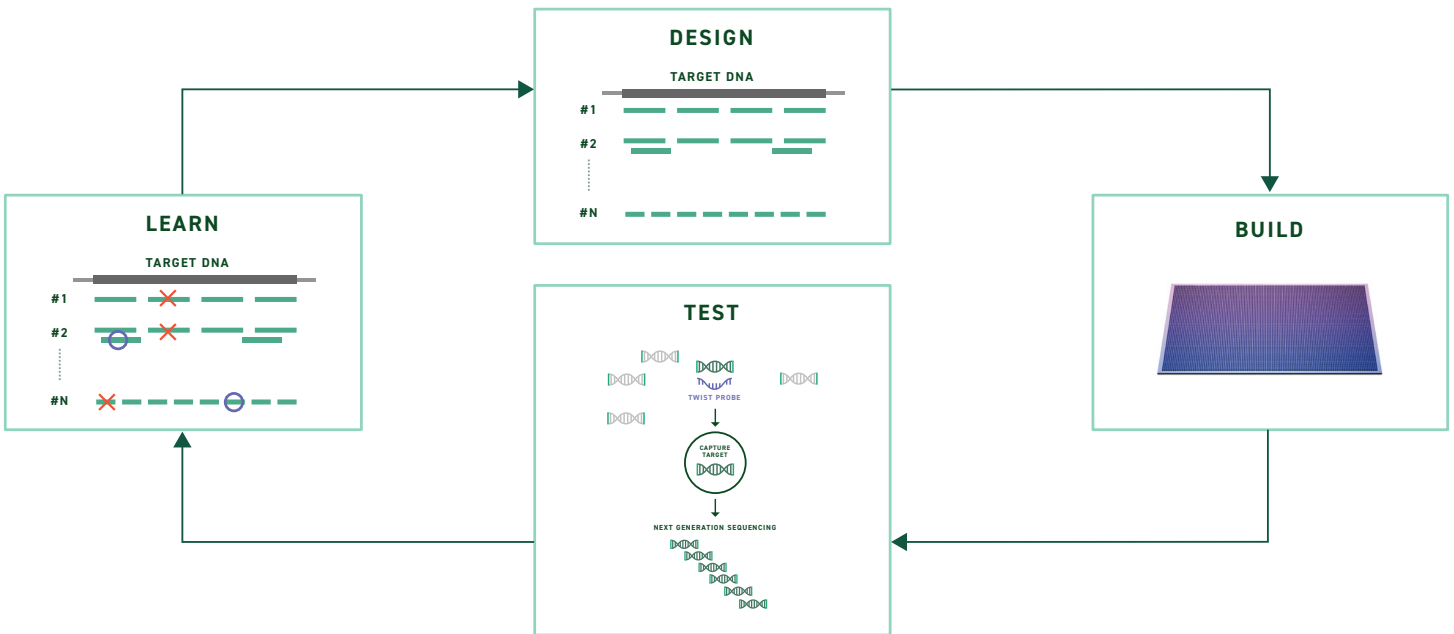
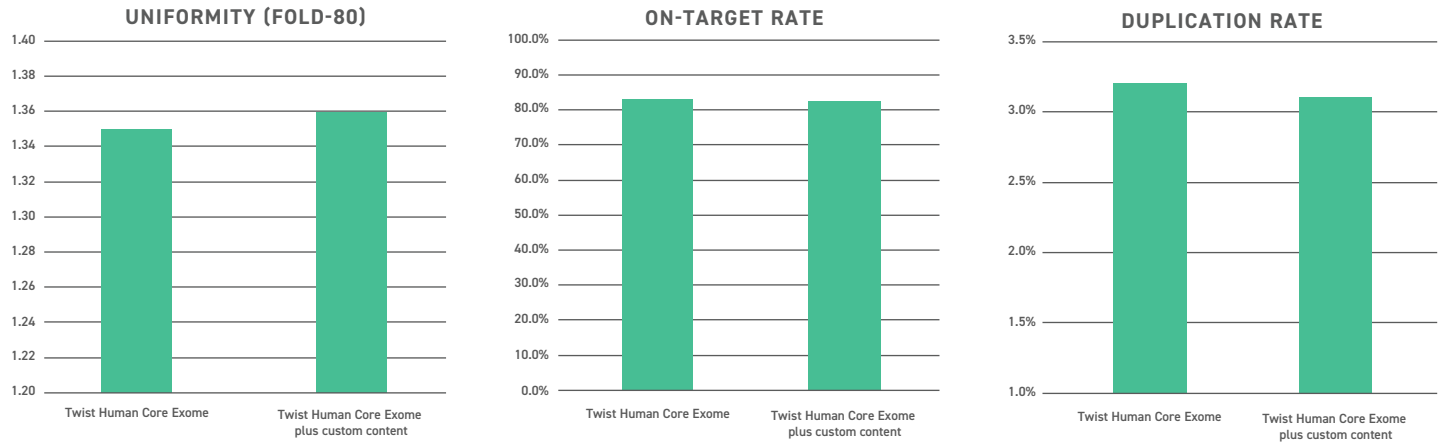
- Increased coverage: Coverage improved to >99% of the RefSeq, CCDS, and GENCODE databases for best-in-class coverage and content
- Did not sacrifice performance: Both the Human Core Exome and Human Core Exome plus custom content displayed exceptional performance, as demonstrated by high uniformity and on-target rate, as well as a low duplicate rate (all results based on 150x sequencing)



Add to or enhance Twist Custom Panel content. Adding content to the Twist Human Core Exome or Custom Panels increases the number of targets covered. Enhancing content augments the coverage of specific regions within your core panel.

VENDOR	DATABASE COVERAGE		
	RefSeq (35.9 Mb)	CCDS20 (33.2 Mb)	GENCODE v28 (34.8 Mb)
Twist Human Core Exome (hg38)	92.3%	99.5%	95.1%
Twist Human Core Exome plus custom content (hg38)	99.2%	99.5%	99.1%

Increasing database coverage with Twist Custom Panels. The data compare the overlap between panel content to the protein-coding regions in the databases annotated on the primary human genome assembly (alternative chromosomes were excluded) as of May 2018 (UCSC genome browser). Comparisons were performed using the BEDtools suite and genome version indicated in parentheses. Note the addition of 3 Mb of custom content improved the coverage of RefSeq and GENCODE databases to >99%.



Rapid Customization, Easy Ordering

Twist Bioscience is the leader in cost-effective, scalable oligonucleotide synthesis. We help you design your custom panel and then quickly build it for you at the scale you choose. Once you test the panel in your own lab using the workflow of your choice, we work with you to quickly revise the panel design or simply scale up its production to meet your needs.

Whether you need to cover 100 or one million targets, we're ready for your order.

Twist Custom Panels are a component of the Twist portfolio of products for NGS Target Enrichment. Learn more at [twistbioscience.com/products/ngs](https://www.twistbioscience.com/products/ngs).

ORDERING INFORMATION

Simply contact Twist Bioscience at sales@twistbioscience.com for more information.

Twist products are subject to certain use restrictions as set forth in Twist's Supply Terms and Conditions (www.twistbioscience.com/supply-terms-and-conditions). Twist Bioscience's quality management system governing the design and manufacture of NGS Target Enrichment Panels is ISO 13485:2016 certified (San Francisco, CA). NextSeq and Illumina are registered trademarks of Illumina, Inc.