Tech Spotlight
Designing custom NGS Panels

Simplify your next target-enrichment panel design
with the HyperDesign Online Tool

Designing a custom target-enrichment panel can be a time-consuming and challenging task. That is why Roche has designed HyperDesign Tool to make it quick and easy for any novice or experienced user to generate new designs, or to alter existing catalog or custom panels. The pre-balancing built into the proprietary algorithms of the cloud-based software platform helps users to quickly design panels without a need for further optimization. This study highlights a solution that leverages the self-guided HyperDesign Online Tool plus the streamlined KAPA library preparation and target enrichment workflows to deliver precise and uniform sequencing results.

Highlights

- The **HyperDesign Online Tool** provided the best panel design in the first iteration, due to Roche's proprietary panel pre-optimization that minimizes the need for further optimization.
- The HyperDesign Online Tool for NGS panel design is **fully self-guided and easy to use**.
- The resulting 4.3 Mb panel yielded **better coverage uniformity** (Fold 80 penalty score of ~1.3).

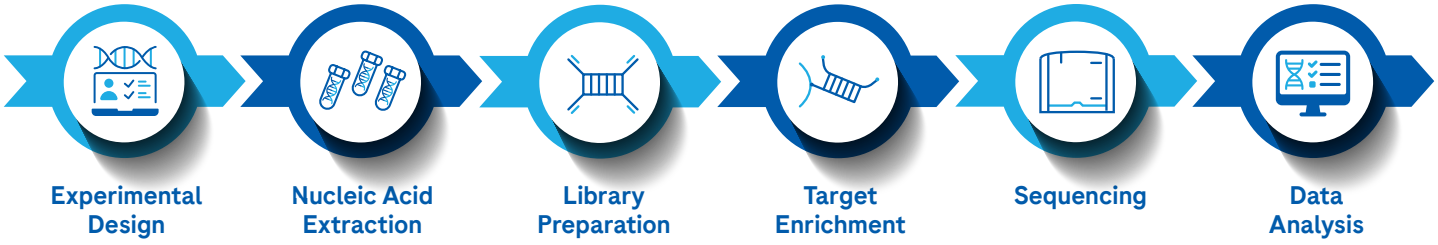

Figure 1. An overview of the NGS target enrichment workflow. Panel design steps include: **(1)** Select target genes or regions of interest; **(2)** Fine-tune the inputs; and **(3)** Submit the design request. In this study, a custom target-enrichment panel for 50 genes related to colorectal cancer (CRC) was designed using the HyperDesign Online Tool. To test the performance of this custom panel, sequencing libraries were generated using gDNA and the KAPA EvoPrep Library Prep Kit, followed by hybridization-based target enrichment using KAPA HyperCap Workflow.

Use gene names or genomic coordinates to easily submit your targets. HyperDesign Online Tool returns results in about an hour, with all the design and ordering information.

Table 1. Comparison of three design tools on the same set of 50 CRC-related genes. To test how well the design tools can access challenging regions where important variants may exist, the target regions included the entirety of all 50 genes—including introns. Therefore, an estimated coverage of <100% was expected.

	Roche HyperDesign Online Tool	Vendor I Design Tool	Vendor T Design Service
Self-guided online design tool?	Yes	Yes	No
Resulting panel size (capture target - Mb)	3.9	3.5	3.5
Estimated % coverage of region of interest	82.3	75.8	75.2

The coverage uniformity of the Roche panel, designed with HyperDesign Online Tool, was superior.

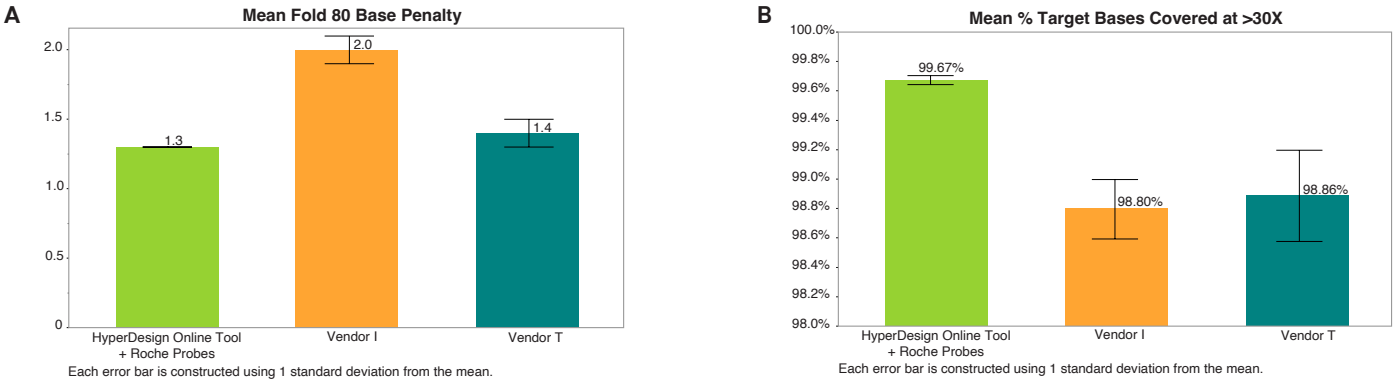

Figure 2. The *lower Fold 80 base penalty and higher % bases at or higher than 30X* coverage demonstrate that the KAPA HyperChoice Probes provide superior coverage uniformity compared to vendors I and T. DNA libraries were prepared from 100 ng of Covaris-sheared (150 bp) gDNA using KAPA EvoPrep Kits. Hybrid capture workflows were performed according to each vendor's protocol, using suggested input amounts per capture (1000 ng for KAPA HyperCap Workflow and 500 ng for vendors I and T). Final libraries were sequenced on an Illumina NextSeq 2000 (P1 300-cycle flow cell), and reads were downsampled proportional to capture target size prior to analysis (11 million reads for Roche, 10 million for vendors I and T). Three (n=3) replicates used for each condition.

Uniformly cover what matters for your research with the HyperDesign Online Tool

Minimize excessive regions coverage in favor of all your targets required coverage

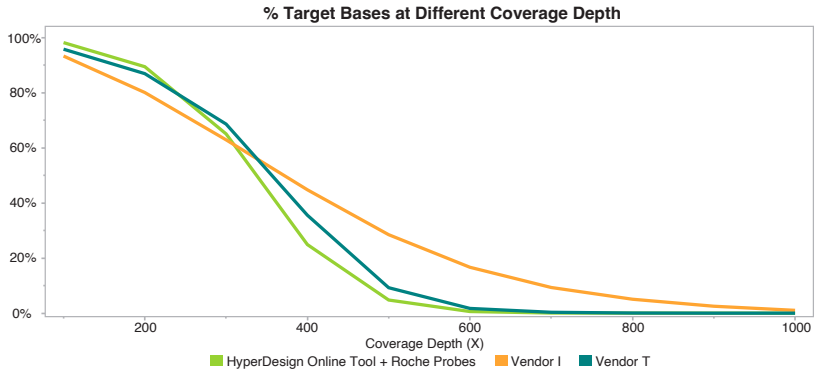

Figure 3. Sequencing reads are distributed more evenly across the entire target region with the Roche probes. Probes from other vendors result in more regions being sequenced at excessively greater depth (>300-500X) than usually required. This means that these reads are not providing meaningful data, while other regions are being covered with less depth as a result.

Add or remove regions without impacting the rest of your existing design or Roche catalog designs—as easily as creating new panels.

Roche's Expert Designers are available for complimentary consultation if additional help is needed.

Learn more

about the **HyperDesign Online Tool** at **hyperdesign.com** or by scanning the **QR code**.

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