High-quality panel testing, simplified

INVITAE

Invitae is committed to delivering high-quality, affordable testing, with the goal of improving patients' lives while also saving the healthcare system valuable dollars.

Experience the difference by creating an account today at www.invitae.com.

Technology		Invitae Advantage
Industry leading methodology	■ Invitae's **customized** biochemical and bioinformatics methods **reduce costs and improve accuracy** over standard next-generation sequencing (NGS)	**High quality, low cost testing**
Comprehensive coverage	■ At least **50x minimum** coverage at all positions—the main determinant of accuracy[1]—and 350x average coverage ■ The use of multiple hybridization assays provides uniform coverage without gaps or bias issues ■ Specialized NGS methods tackle difficult regions and variants (e.g., PMS2 exons 12–15)	**Accurate, thorough assessment**
Advanced deletion/duplication methods	■ Invitae conducts del/dup analysis by NGS, **reducing the need for multiple assays** that increase cost and time ■ Multiple algorithms provide **equivalent sensitivity** to traditional del/dup techniques for events as small as one exon and can **detect complex events invisible to traditional techniques**[2]	**Innovative technology to improve patient care**
Confirmation	■ PacBio and Sanger technology used to confirm variants using a validated process ■ All reported CNV events confirmed by array	**Validated two-step confirmatory approach**
Testing safeguards	■ Robust safeguards to prevent sample mix-ups and clerical errors including 2 step verification, barcode scanning, and more	**In good hands**

Test Design		Invitae Advantage
Comprehensive assays	■ **Full gene sequencing and del/dup analysis** is included with every test ■ Invitae tests the **full coding sequence plus 10 bases** into each intron (more for certain genes, such as BRCA1/2, which covers 20 bases) ■ Promoters and intronic regions known to harbor pathogenic mutations are also assayed	**All-inclusive analysis in a single report**
Curated gene panels	■ Invitae's panels are **expertly curated** to produce informative results for specific indications and clinical scenarios ■ Clinicians have the ability to **customize panels** based on their needs and each patient's indication	**7 disease areas. 175+ panels. 1000+ genes. Your choice.**

[1]Not only is minimum coverage the main determinant of accuracy, but excessive coverage has no benefit on accuracy. See Ajay *et al.*, *Genome Res.* 2011. Any targets not meeting Invitae's 50x minimum, which are very rare, are reviewed by a lab director and filled in as needed with alternate methods. In addition, any assay limitations are clearly documented on reports.

[2]For example, Alu insertions and breakpoints within an exon. Invitae's algorithms are both read-depth and split-read based, following the approach taken by Nord *et al.* (*BMC Genomics* 2011) with improvements.

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Classification	Invitae Advantage
Guidelines-based variant classification	**Rigorous classification backed by experts**
■ Invitae's 5-tier variant classification begins with **the most recent (2015) ACMG guidelines**[1] and builds on them to generate rigorous variant interpretations ■ Invitae's stringent procedures provide **reproducibility** and reduce subjectivity through rigorous, critical evaluation of all applicable evidence of pathogenicity ■ Every Invitae report is reviewed by two or more PhD scientists, a medical geneticist lab director, and a genetic counselor	
Ongoing data sharing	**Improving care through open collaboration**
■ Invitae is **one of the largest contributors to ClinVar**[2], allowing peer review of all of our variant classifications ■ Invitae participates in **patient registries** to help define the medical impact of new genes and interventions	

Validation	Invitae Advantage
Demonstrated 100% analytic sensitivity and specificity	**Validated performance across variant types**
■ Invitae's **>1000 patient, peer-reviewed study** showed equivalence to traditional genetic testing technologies, even on challenging classes of variants[3] ■ Ongoing studies continue to show **100% sensitivity and 100% specificity** across the full Invitae test menu	
99.8% BRCA1/2 classification concordance	**Proven equivalence in a published head-to-head comparison**
■ **99.8% concordance** was observed between Invitae's variant classifications and those from Myriad Genetics (including Myriad's amended reports), in Invitae's published validation study of BRCA1/2[3] ■ Invitae provides **specific evidence with each classification**; because Myriad does not do so, it is not possible to determine which classification is most appropriate in the remaining 0.2% of cases ■ Ongoing studies confirm this result in an even larger population[4]	
Proven clinical utility	**Dedicated to improved patient outcomes**
■ Invitae published the **first systematic clinical utility study** of panel testing for hereditary cancer, based on recent updates to the NCCN guidelines[5]	
Fully accredited and licensed	**Results you can trust**
■ Invitae is **CLIA approved** and **CAP accredited**	

[1]Richards *et al.*, *GIM* 2015.
[2]For a list of the largest contributors to ClinVar, visit http://www.ncbi.nlm.nih.gov/clinvar/docs/submitter_list.
[3]Lincoln *et al.*, *JMD* 2015.
[4]Lincoln *et al.*, ACMG 2016 Annual Meeting, platform presentation #14, using variants from approx. 20,000 patients.
[5]Desmond *et al.*, *JAMA Oncol.* 2015.

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