Product Profile

GeneRead® QIAact Actionable Insights Tumor Panel

For actionable insights through robust design, unique variant selection, and proven performance

Robust design process

The GeneRead QIAact Actionable Insights Tumor Panel was specifically designed to enrich for the most relevant genes and variants, aimed at delivering actionable insights for cancer research. The panel is focused on common cancer types that can benefit the most from genetic testing: breast, ovarian, colorectal, lung and melanoma.

The QIAGEN® Knowledge Base is an industry-leading and comprehensive database of public and proprietary information. The panel was built using an unprecedented process leveraging the Knowledge Base to include information from many sources (Figure 1):

- Approved therapeutics labels
- Professional association practice guidelines
- Active late-stage clinical trials

The goal of this design is to provide a set of "necessary and sufficient" targets to maximize the efficiency of the sequencing process as well as impact of the results. The same knowledge base is used in both panel design and result interpretation, thus bioinformatically linking panel content to insight generation. A cancer research lab can now enrich for, sequence, analyze and interpret actionable targets with confidence and ease.

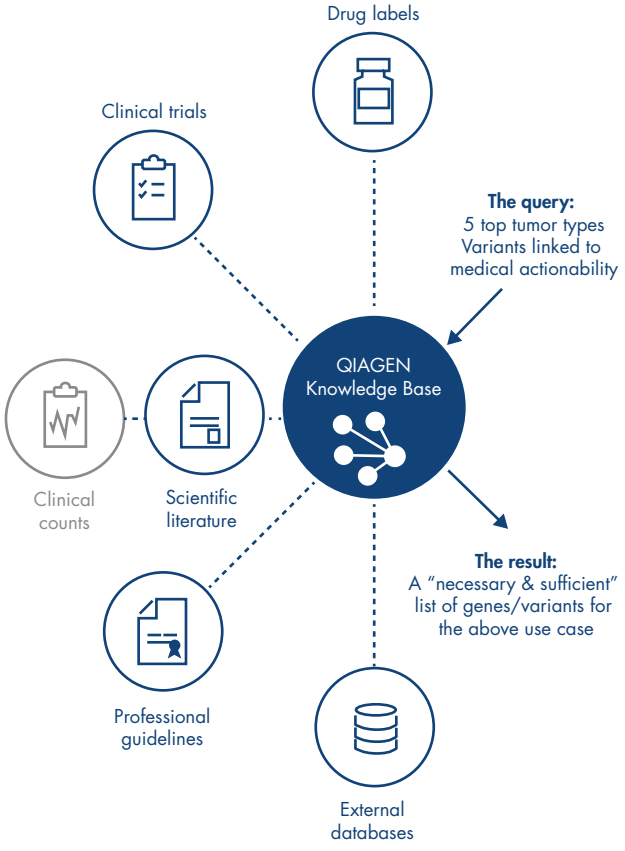

Figure 1. The QIAGEN Knowledge Base.

Unique content selection

This rigorous design process yields a unique set of genes and variants with an unparalleled level of relevance for clinical research, giving you the confidence in obtaining critical insights from your results.

The GeneRead QIAact Actionable Insights Tumor Panel contains 773 variant positions in 12 genes (Table 1):

KRAS, NRAS, KIT, BRAF, PDGFRA, ALK, EGFR, ERBB2, PIK3CA, ERBB3, ESR1, RAF1.

Eight of these genes are in common with both Illumina® Tumor 26 panel and Thermo Fisher® Cancer HotSpot Panel V2. However, as shown in Table 1, there are 81 variants from these 8 genes that are unique to the QIAGEN panel design.

One example of these unique variants is ERBB2 S310F, found in 1–2% of lung and breast cancers, and linked to prolonged response to Trastuzumab (2). Furthermore, action on lung cancer harboring this mutation is consistent with NCCN guidelines (4).

Proven performance with a seamless workflow

The GeneRead QIAact Actionable Insights Tumor Panel is designed specifically for the QIAGEN GeneReader™ NGS System, the world's first truly complete NGS workflow, validated to work upstream with the GeneRead DNA FFPE Kit, as well as downstream with QCI™ Analyze and QCI Interpret, in one seamless workflow (Figure 2).

Number of variants unique to GeneRead QIAact Actionable Insights Tumor Panel

	Genes	Not covered by Thermo AmpliSeq HotSpot Panel V2	Not covered by Illumina TruSight Tumor 26 Panel	Not covered by either
8 overlapping genes	**EGFR**	58	28	21
	PI3KCA	46	24	11
	KIT	26	28	22
	ALK	13	17	13
	KRAS	12	–	–
	BRAF	9	2	2
	ERBB2	9	13	8
	PDGFRA	8	3	4
	Total	**181**	**117**	**81**

Table 1. List of genes in the GeneRead QIAact Actionable Insights Tumor Panel

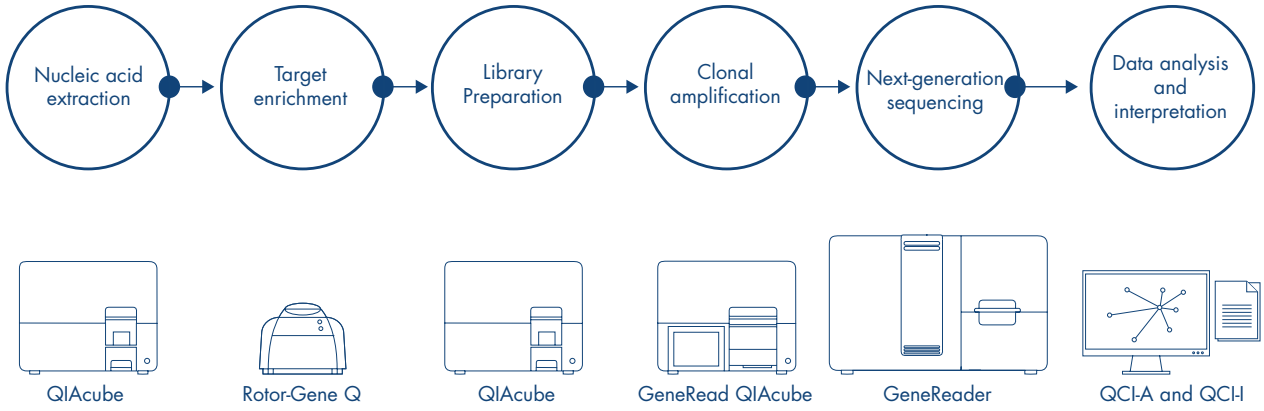

Figure 2. GeneRead QIAact Actionable Insights Tumor Panel workflow.

When tested for performance on the GeneReader 1.0 with new proprietary sequencing chemistry, the panel shows superior coverage even with FFPE samples up to 20 years old (Table 2). As shown in Table 3, data from the GeneReader™ NGS System are 100% concordant with the results of other assays for RAS variants. Additionally, these data are also entirely consistent with those obtained with another NGS sequencing technology (Table 4).

Sample to Insight® NGS solution designed for any lab to deliver actionable results

- **The world's first truly complete NGS workflow:** Rely on one partner to provide a seamlessly integrated workflow, offering ease of use and efficiency from sample to insight.
- **Actionable insights:** Create relevant reports using QIAGEN's proven gene panels and bioinformatics.
- **Flexibility to fit your needs:** Scalable batch sizes and continuous loading of multiple flow cells enable you to adapt and scale the GeneReader NGS System to match your needs and grow.
- **Guaranteed results with predictable costs:** Innovative commercial models such as Price-Per-Insight (PPI) options offer better cost management and low initial investment hurdles.
- **Proven expertise and service for our customers:** Our teams at QIAGEN are ready to support you in efficiently implementing, validating and operating the GeneReader NGS System in your lab.

		RAS Variant Allele Frequency (%)		
Sample no.	KRAS AA change	*therascreen* PCR/ Pyro	GeneReader NGS System* †	Alternative NGS technology
1	G12D	+	20	7
2	G12D	+	37	12
3	A59T	19	16	14
4	G12D	+	44	11
5	Q61H	14	10	13
6	A146P	41	42	32
7	Q61H	36	41	26
8	Q61H	32	25	35
9	K117N	24	36	39
10	G13D	+	44	15
11	G12C	+	32	10
12	G13D	+	27	10
13	Q61H	26	26	23

100% Positive Agreement between GeneReader NGS System and an alternative NGS technology

+: Mutant identified by *therascreen* RGQ; allele frequency not available.

* GeneReader data generated using new proprietary sequencing chemistry

† Sample processed from different FFPE sections with potentially different tumor content and variant allele frequency.

Table 4. The GeneReader NGS System – Shows concordance with an alternative NGS platform.

Parameter	Details
Panel size	12 Genes / 16.7 kb
Insight size	773 unique variant positions
Amplicons	330
Average amplicon size	134 bp
DNA input	10 ng x 4
Throughput	10-40 samples per run
Variant	5%
Amplicon Coverage	>500x: 96.73% >200x: 99.03%
Variant Insight coverage	>500x: 99.50% >200x: 99.96%

Outstanding coverage at both amplicon and variant insight levels

Note: Positive samples included in the study have all been confirmed with Sanger sequencing and passed Quantimize <0.04.

Average of 42 colorectal cancer FFPE samples (ades 3-20 years)

Table 2. GeneRead QIAact Actionable Insights Tumor Panel – RAS sample study

***RAS* agreement study**		***therascreen* PCR and Pyro Assays***		
>5% Ras variant allele frequency cut-off		+ (MT)	– (WT)	**Total**
GeneReader NGS System† ‡	+ (MT)	13	0	13
	– (WT)	0	29	29
	Total	**13**	**29**	**42**

100% agreement between GeneReader NGS System and QIAGEN *therascreen* PCR & Pyro Assays

* If KRAS status regarded as mutant (MT) as identified by either therascreen KRAS PCR Assay or by therascreen RAS Extension Pyro Assay.

† Variants from codons 12, 13, 59, 61, 117, 146 contained in established QIAGEN *therascreen* assays are called

‡ GeneReader NGS System data generated using new proprietary sequencing chemistry.

Table 3. GeneReader NGS System: Concordant with PCR and Pyro Assays

References

1. Cancer Genome Atlas Research Network (2014) Comprehensive molecular profiling of lung adenocarcinoma. Nature **511**, 543-550.
2. Chumsri, S. et al. (2015) Prolonged response to Trastuzumab in a patient with HER2-nonamplified breast cancer with elevated HER2 dimerization harboring an ERBB2 S310F mutation. J. Natl. Compr. Canc. Netw. **13**, 1066–1070.
3. Herter-Sprie, G.S., Greulich, H., and Wong, K. K. (2013) Activating mutations in ERBB2 and their impact on diagnostics and treatment. Front. Oncol. **3**, 86.
4. NCCN Guideline: **www.nccn.org**, assessed October 2015.

Ordering Information

Product	Contents	Cat. no.
GeneRead QIAact Actionable Insights Tumor Panel (GeneRead Targeted Gene Panels, Powered by QCI)	Sets of 4 pools containing wet-bench verified primer sets for targeted enrichment of a focused panel of 12 genes	GRTP-101X-12 (181910)
GeneRead DNAseq Panel PCR Kit V2	PCR chemistry for use with the GeneRead DNAseq Panel V2 System (12 reactions) (96 reactions)	181940 (12) 181942 (96)
Related Product		
GeneRead DNA FFPE Kit (50)	QIAamp® MinElute® columns, Proteinase K, UNG, Collection Tubes (2 ml), Buffers, Deparaffinization Solution, RNase A	180134

These products are for research use only. Not for use in diagnostic procedures.

Please note, data reported in this Product Profile was generated with new proprietary sequencing chemistry, which is currently only available in the US. Legacy chemistry is only available ex-US.

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at www.qiagen.com or can be requested from QIAGEN Technical Services or your local distributor.