Pillar® oncoReveal® CDx

FDA–approved IVD test for general solid tumor profiling with CDx claims for colorectal and non-small cell lung cancers

Detect DNA variants in 22 clinically relevant genes across major solid tumor types

Identify patients who are likely to respond to targeted therapies for *KRAS* and *EGFR*

Batch up to 46 clinical samples on a single Illumina MiSeq™Dx Instrument run

Go from sample to results report in under 48 hours with just 3.5 hours hands-on time

Match patients to therapies faster

Tumor molecular profiling is an important part of precision oncology, providing powerful insights into the genetic factors driving a patient's cancer to guide therapy selection. To improve clinical outcomes, it is critical that patients are matched to the most effective therapies based on their tumor genetic makeup as soon as possible after diagnosis.[1,2] Next-generation sequencing (NGS) enables the efficient assessment of different classes of genetic variation across multiple genes in a single test. Recent innovations in NGS-based genomic tests provide rapid, accurate, and actionable results to enable precision oncology and improve clinical outcomes.

Pillar oncoReveal CDx (Table 1) is an NGS-based companion diagnostic (CDx) kit for general tumor profiling with US FDA PMA.* This *in vitro* diagnostic (IVD) test interrogates DNA isolated from formalin-fixed, paraffin-embedded (FFPE) tumor biopsy samples and detects variants in 22 genes with known clinical significance across major solid tumor types. The test includes CDx claims for colorectal cancer (CRC) and non-small cell lung cancer (NSCLC). Sequencing is performed on the Illumina MiSeqDx Instrument and data are analyzed using the PiVAT® (Pillar variant analysis toolkit) software. The fast, streamlined, single-tube workflow can be performed in house by any clinical NGS laboratory, going from sample to results report in under 48 hours (Figure 1).

* Premarket approval.

Table 1: Pillar oncoReveal CDx overview

Feature	Description
Chemistry	Multiplex PCR using tiled amplicons
Sample type	DNA from FFPE tissue
DNA input	30–80 ng
Tumor nuclei required	≥ 30% tumor nuclei
No. of pools	1 pool
No. of genes/amplicons	22 genes 103 amplicons
Variant types detected	SNVs, indels
No. of targets	> 1800 hotspots covering > 3600 DNA variants
Sequencing system	MiSeqDx Instrument
Total library preparation time[a]	6.5 hr
Library preparation hands-on time	3.5 hr
Total turnaround time	< 48 hr from sample to results report

a. Total library preparation time does not include sequencing, analysis, and reporting.
indel, insertion-deletion; SNV, single nucleotide variant.

Figure 1: Overview of the Pillar oncoReveal CDx workflow

Broad clinical utility

Pillar oncoReveal CDx detects single nucleotide variants (SNVs), insertions, and deletions across 22 genes with known clinical significance (Table 2, Table 3) and can provide clinically actionable targets. The test identifies CRC and NSCLC patients who are likely to respond to targeted treatments for *KRAS* or *EGFR* (Table 4). Pillar oncoReveal CDx has been clinically and analytically validated extensively across major solid tumor types to meet rigorous IVD requirements.

Table 2: Pillar oncoReveal CDx gene list

AKT1	*ALK*	*BRAF*	*CTNNB1*
DDR2	*EGFR*[a]	*ERBB2*	*ERBB4*
FBXW7	*FGFR1*	*FGFR2*	*FGFR3*
KRAS[a]	*MAP2K1*	*MET*	*NOTCH1*
NRAS	*PIK3CA*	*PTEN*	*SMAD4*
STK11	*TP53*		

a. Genes with CDx claims.

Table 4: Approved CDx and tumor profiling indications

Tumor type	Biomarkers	FDA-approved targeted therapy
NSCLC	*EGFR* exon 19 in frame deletions and exon 21 L858R substitution mutations	All EGFR tyrosine kinase inhibitors approved by FDA
CRC	*KRAS* wild-type (absence of mutations in codons 12 and 13)	Erbitux® (cetuximab) or Vectibix® (panitumumab)
Pan-cancer solid tumors (CRC, NSCLC, breast, melanoma, ovarian, endometrial, renal, liver, bladder, thyroid, pancreatic, brain, and other)	General tumor mutation profiling to be used by qualified health care professionals in accordance with professional guidelines in oncology for cancer patients with solid malignant neoplasms.	

CRC, colorectal cancer; NSCLC, non-small cell lung cancer.

Table 3: Commonly mutated, clinically significant variants

Gene	Variant ID
EGFR	T790M, G719A, G719C, G719D, G719S, Exon 20 in-frame insertions
KRAS	A59E, A59G, A59T, A59S, Q61E, Q61H, Q61K, Q61L, Q61R, K117N, A146T, A146P, A146V
PTEN	R130Q, R130L, R130P, R130G, R130*, T319del
AKT1	E17K
PIK3CA	N345I, N345T, N345K, E542Q, E542K, E542V, E545K, E545Q, E545A, E545G, E545D, H1047Y, H1047L, H1047R, R88Q, R88L
BRAF	V600E, V600K
FGFR3	R248C, S249C, G370C, Y373C

Sensitive variant detection

Tumor genetic testing is a key step in the diagnosis of and first-line therapy selection for advanced cancers, particularly NSCLC.[3] DNA derived from FFPE biopsy samples can vary significantly in quality and quantity, making it challenging to detect rare mutations accurately. Sensitive NGS-based genetic tests are needed to detect these variants in low-quality or degraded FFPE DNA samples. Pillar oncoReveal CDx detects CDx variants down to variable allele frequency (VAF) of 1.5%. Non-CDx tumor profiling variants are detected down to 1.4% VAF for SNVs, 1.6% VAF for deletions, and 2.2% VAF for insertions. Pillar oncoReveal CDx produces high-quality data at DNA input levels as low as 10 ng,[4] which is important when working with limited quantities of tumor biopsy samples.

Excellent analytical performance

Concordance of the Pillar oncoReveal CDx assay with validated reference methods based on PCR or NGS was established for general tumor profiling (Table 5) and all CDx biomarkers (Table 6).

For concordance studies between Pillar oncoReveal CDx and the Thermo Fisher Scientific Oncomine Focus Assay 257 valid results represented by 10 tumor types were evaluated across 15 overlapping genes between the two assays. For concordance studies between Pillar oncoReveal CDx and the New York State Department of Health–validated Columbia Solid Tumor Panel 190 valid sample results represented by 10 tumor types were evaluated across 21 overlapping genes between the two assays (Table 5).

Additionally, an external study was conducted to assess the concordance between oncoReveal CDx and an FDA-approved CDx comparator. A noninferiority study was performed against the therascreen KRAS RGQ PCR kit (QIAGEN, catalog no. 870021) for KRAS in CRC, and the cobas EGFR Mutation Test v2 (Roche, catalog no. 07248563190) for EGFR in NSCLC. The agreement between oncoReveal CDx and the comparator is non-inferior to the agreement between two replicates of comparator results by a margin of 5% in CRC *KRAS* and 4% in NSCLC *EGFR* (Table 6).

Table 5: General tumor profiling concordance studies

Thermo Fisher Scientific Oncomine Focus Assay		
Variant type	PPA[a]	NPA[b]
SNV	99.3%	100.0%
MNV	100.0%	100.0%
Insertion	100.0%	100.0%
Deletion	100.0%	100.0%
Columbia Solid Tumor Panel		
Variant type	PPA[a]	NPA[b]
SNV	98.7%	100.0%
MNV	100.0%	100.0%
Insertion	90.9%	100.0%
Deletion	100.0%	100.0%
Comparator	No. of samples	% Agreement (95% CI)
Oncomine Focus Assay	257	95.7% (92.5%, 97.6%)
Columbia Solid Tumor Panel	187	89.8% (84.7%, 93.4%)

a. PPA (positive percentage agreement) is calculated by dividing the number of samples with the mutation according to the Pillar oncoReveal CDx assay by the number of samples with the mutation according to the comparator.
b. NPA (negative percentage agreement) is calculated by dividing the number of samples identified as wild-type according to the Pillar oncoReveal CDx assay by the number of samples identified as wild-type according to the comparator.
MNV, multinucleotide variant; SNV, small nucleotide variant.

Table 6: CDx concordance studies

CDx target	Comparator	PPA[a]	NPA[b]
KRAS G12X (CRC)	QIAGEN therascreen KRAS	> 95.7%	97.7%
EGFR exon19 del EGFR L858R (NSCLC)	Roche cobas EGFR	100.0%	98.3%

a. PPA (positive percentage agreement) is calculated by dividing the number of samples with the mutation according to the Pillar oncoReveal CDx assay by the number of samples with the mutation according to the comparator.
b. NPA (negative percentage agreement) is calculated by dividing the number of samples identified as wild-type according to the Pillar oncoReveal CDx assay by the number of samples identified as wild-type according to the comparator.

Fast, scalable workflow

Accurate, timely results guide faster therapy decisions for improved patient outcomes.[1,2] Pillar oncoReveal CDx uses a rapid workflow that enables labs to go from patient sample to results report in under 48 hours. The assay leverages stem-loop inhibition–mediated amplification (SLIMamp®) enrichment chemistry, providing efficient and accurate target amplification in a single tube. The assay workflow is completed in approximately 6.5 hours with just 3.5 hours of hands-on time and optional stopping points (Figure 2). Workflows completed in a single shift reduce handoffs between technicians, minimizing the potential for user error.

Libraries prepared using Pillar oncoReveal CDx are sequenced on the MiSeqDx Instrument (Figure 3), empowering clinical labs, from regional cancer centers to large, centralized service providers, to offer IVD testing in house. The easy-to-implement workflow allows labs to process up to 46 clinical samples in a single sequencing run using the MiSeqDx Reagent Kit v3, so the test can meet the lab's sample batching strategy. The rapid workflow enables labs to go from patient sample to results report in under 48 hours.

Figure 3: Illumina MiSeqDx Instrument

The FDA–regulated and Conformité Européene (CE)–marked MiSeqDx Instrument is designed specifically for the clinical laboratory environment, offering a small footprint, easy-to-use workflows, fast turnaround time, and plug-and-play reagents for simple operation.

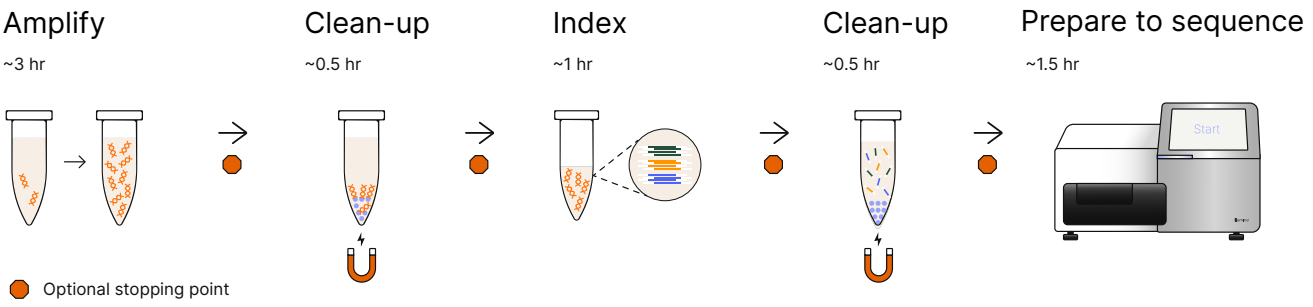

Figure 2: Single tube SLIMamp workflow

Innovative SLIMamp enrichment chemistry enables a workflow that is performed in a single tube in a single day with just 3.5 hours hands-on time. Multiple optional stopping points provide the flexibility to manage lab resources and timelines. This fast, streamlined workflow enables cancer diagnostic tests that can be conducted at any clinical lab, delivering accurate, timely results, potentially improving clinical outcomes.

Integrated analysis and reporting

Following sequencing, data are imported into the PiVAT software, a validated, easy-to-use secondary analysis pipeline that generates a compliant, easy-to-interpret results report (Figure 4) in ~2 hours. The integrated analysis software is accessible to users of all skill levels, without extensive bioinformatics expertise. Analyses are built into the software, eliminating the need for developing data analysis pipelines or creating custom reporting. The sequencing run is initiated via the Pillar Module which interfaces with the Illumina Local Run Manager software. Base calls generated during primary analysis on the MiSeqDx Instrument are demultiplexed and FASTQ files for each sample are generated. Sequence run data are manually transferred to the PiVAT software for secondary analysis. Secondary analysis includes alignment, paired-end assembly, variant calling, and report generation.

The easy-to-interpret Pillar oncoReveal CDx report, which incorporates relevant patient and sample information, is automatically generated as a PDF (Figure 4) for immediate clinical use. The diagnostic test results are presented in three levels:

- **Level 1**: CDx variants listed in the Intended Use statement (Table 7)
- **Level 2**: Cancer mutations with evidence of clinical significance
- **Level 3**: Cancer mutations with potential clinical significance

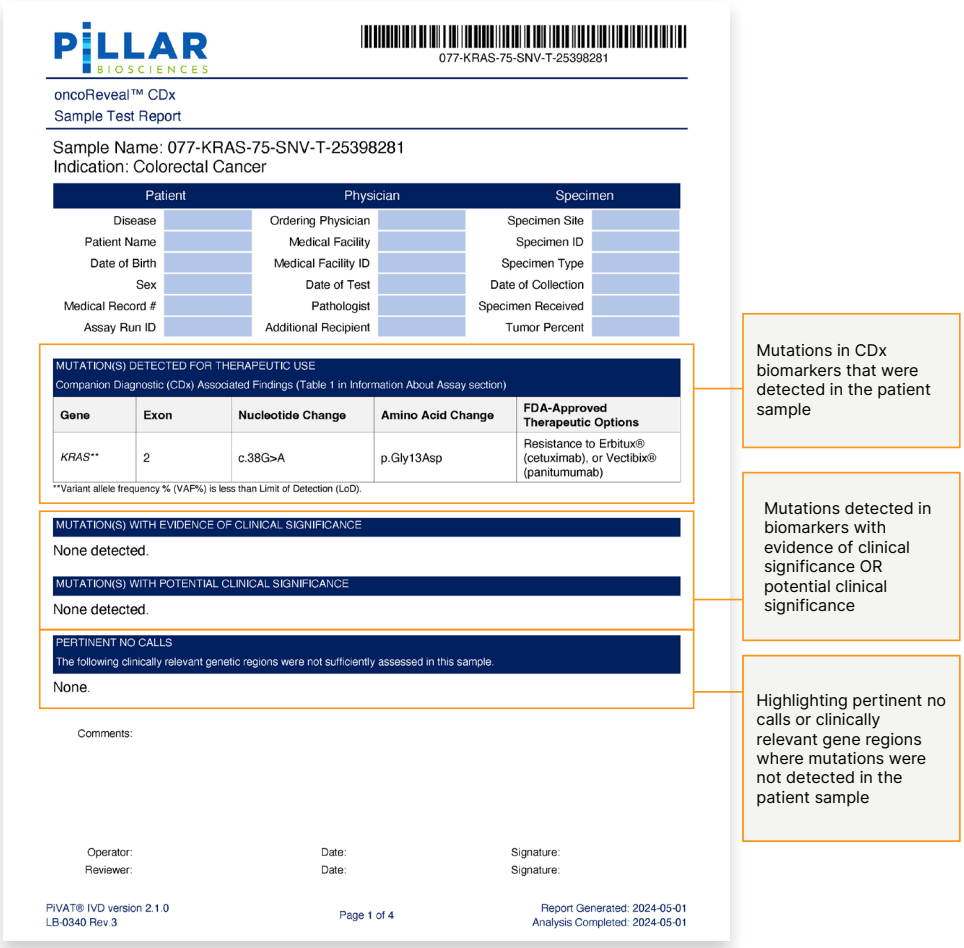

Figure 4: Pillar oncoReveal CDx results report

Summary

Tumor genetic profiling provides crucial insights into a patient's cancer and can guide therapy selection to enable precision oncology. Matching patients to targeted treatments quickly can significantly improve clinical outcomes.[1,2] Pillar oncoReveal CDx is a US FDA–approved IVD test for general tumor profiling with companion diagnostic claims for NSCLC and CRC. The assay detects genetic variants across 22 genes with known clinical significance across all major solid tumors. The fast, integrated, user-friendly workflow includes sequencing on the MiSeqDx Instrument and analysis using PiVAT software, enabling labs to go from sample to clinical report in less than 48 hours. The clear, easy-to-interpret results report provides clinicians with key information to help inform decisions regarding potential matched therapies that might improve patient outcomes.

Learn more

Pillar oncoReveal CDx

MiSeqDx Instrument

Pillar oncoReveal CDx user guide

PiVAT software for Pillar oncoReveal CDx user guide

Ordering information

Product	Catalog no.
Pillar oncoReveal CDx kit (48 reactions)	HAD-LC-2001-48
Pillar oncoReveal CDx PiVAT workstation	SFW-2012
MiSeqDx Instrument	DX-410-1001
MiSeqDx Reagent Kit v3	20037124

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2. Cone EB, Marchese M, Paciotti M, et al. Assessment of Time-to-Treatment Initiation and Survival in a Cohort of Patients With Common Cancers. *JAMA Netw Open*. 2020;3(12):e2030072. doi:10.1001/jamanetworkopen.2020.30072
3. Lindeman NI, Cagle PT, Beasley MB, et al. Molecular testing guideline for selection of lung cancer patients for EGFR and ALK tyrosine kinase inhibitors: guideline from the College of American Pathologists, International Association for the Study of Lung Cancer, and Association for Molecular Pathology. *J Thorac Oncol*. 2013;8(7):823-859. doi:10.1097/JTO.0b013e318290868f
4. Pillar Biosciences. oncoReveal CDx assay user manual. pillarbiosci.com/wp-content/uploads/2024/04/UM-0043-Rev5_for-P200011_S001_A004.pdf. Accessed July 17, 2025.

Intended use statement

Pillar oncoReveal CDx† is a qualitative next-generation sequencing–based *in vitro* diagnostic test that uses amplicon-based target enrichment technology for detection of single nucleotide variants (SNVs), insertions, and deletions in 22 genes using DNA isolated from formalin-fixed, paraffin-embedded (FFPE) tumor tissue specimens and using the Illumina MiSeqDx Instrument. The test is intended as a companion diagnostic to identify patients who may benefit from treatment with the targeted therapies listed in Table 7 in accordance with the approved therapeutic product labeling.

Additionally, Pillar oncoReveal CDx is intended to provide tumor mutation profiling to be used by qualified health care professionals in accordance with professional guidelines in oncology for previously diagnosed cancer patients with solid malignant neoplasms. Genomic findings other than those listed in Table 7 are not prescriptive or conclusive for labeled use of any specific therapeutic product.

† Pillar oncoReveal CDx is manufactured by Pillar Biosciences, Inc and distributed by Illumina, Inc.

Table 7: List of somatic variants for therapeutic use

Indication	Gene	Variant	Targeted therapy
Colorectal cancer (CRC)	*KRAS*	KRAS wild-type (absence of mutations in codons 12 and 13)	ERBITUX® (cetuximab) or VECTIBIX® (panitumumab)
Non-small cell lung cancer (NSCLC)	*EGFR*	Exon 19 in frame shift deletions and Exon 21 L858R substitution mutations	EGFR tyrosine kinase inhibitors approved by FDA[a]

a. For the most current information about the therapeutic products in this group, visit https://www.fda.gov/medical-devices/in-vitro-diagnostics/list-cleared-or-approved-companion-diagnostic-devices-in-vitro-and-imaging-tools

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