# TruSight<sup>™</sup> Oncology Comprehensive (EU)

Learn more about this CEmarked *in vitro* diagnostic, next-generation sequencing solution for comprehensive genomic profiling



# General information

## What is TruSight Oncology Comprehensive (EU)?

As a global leader in next-generation sequencing (NGS) and microarray-based solutions, Illumina is dedicated to improving human health by unlocking the power of the genome. Illumina continues to innovate by offering TruSight Oncology Comprehensive (EU), a CE-marked in vitro diagnostic (IVD), pan-cancer comprehensive genomic profiling (CGP) panel. TruSight Oncology Comprehensive (EU) can generate a broad molecular profile of solid tumor patient samples, including formalin fixed, paraffin embedded (FFPE) tissue, maximizing a lab's ability to find actionable alterations that can help inform therapy decisions according to clinical guidelines.

#### Additional key points:

- TruSight Oncology Comprehensive (EU) can be implemented easily in house, features a streamlined workflow that proceeds from sample to final clinical report in 4-5 days, and requires as few as five FFPE slides
- TruSight Oncology Comprehensive (EU) reliably detects all DNA and RNA variant categories, including single nucleotide variants (SNVs), insertions/deletions (indels), amplifications, fusions, and splice variants and enables analysis of genomic signatures such as tumor mutational burden (TMB) and microsatellite instability (MSI)
- · A roadmap of Companion Diagnostic claims will add multiple indications, linked to breakthrough therapies that can improve patient outcomes



## Generate a CGP report for a patient sample

• Detect DNA plus RNA variants and biomarkers signatures for multiple solid tumor types, generate a CGP report for a patient's tumor, and increase confidence in correct treatment decisions



#### Enable targeted therapies and clinical trials

- Leverage content that includes key biomarkers associated with drug labels, ESMO guidelines, and clinical trials for multiple solid tumor types
- Deliver results that inform therapy decisions according to clinical quidelines



#### Perform IVD testing in-house

- · Implement a streamlined workflow, going from sample to report in 4-5 days
- Offer precision oncology research, keep data in your institution, and avoid losing samples to send-out services

#### Who is the target customer?

The target customers for TruSight Oncology Comprehensive (EU) are molecular pathologists and lab directors in European countries, who routinely run solid tumor tissue biomarker tests to aid oncologists with therapy selection for cancer patients. Common qualifiers and details about the locations of target customers:

Types of institutions:

- · Academic medical centers
- Large to medium hospitals
- Independent commercial labs

TruSight Oncology Comprehensive (EU) will be available in the following countries:

 Austria Finland Italy Portugal Switzerland Belgium France Liechtenstein Qatar UAE Bulgaria Luxembourg Romania UK Germany Cyprus • Greece Malta Slovenia Czech Republic Netherlands · South Africa Iceland Denmark Ireland Norway Spain Estonia Poland Sweden Israel

#### What are the IVD claims?

TruSight Oncology Comprehensive (EU) is an in vitro diagnostic test that uses targeted next-generation sequencing to detect variants in 517 genes using nucleic acids extracted from formalin-fixed, paraffinembedded (FFPE) tumor tissue samples from cancer patients with solid malignant neoplasms using the Illumina NextSeq™ 550Dx instrument. The test can be used to detect single nucleotide variants, multinucleotide variants, insertions, deletions and gene amplifications from DNA, and gene fusions and splice variants from RNA. The test also reports a Tumor Mutational Burden (TMB) score and Microsatellite Instability (MSI) status.

The test is intended as a companion diagnostic to identify cancer patients for treatment with the targeted therapy listed in Table 1, in accordance with the approved therapeutic product labeling. In addition, the test is intended to provide tumor profiling information for use by qualified healthcare professionals in accordance with professional quidelines and is not conclusive or prescriptive for labeled use of any specific therapeutic product.

Table 1: CDx indication

Tumor type	Biomarkers	Targeted therapy
Solid tumors	NTRK1, NTRK2, NTRK3 gene fusions	VITRAKVI® (larotrectinib)

Read the TruSight Oncology Comprehensive Package Insert to learn more, support.illumina.com/ sequencing/sequencing\_kits/trusight-oncology-comprehensive.html

#### What gene/biomarker content is included?

TruSight Oncology Comprehensive (EU) includes key biomarkers in clinical guidelines, drug labels, and clinical trials, across multiple solid tumor types and histologies (Figure 1). Content includes small DNA variants (Table 2) as well as fusions (RNA), splice variants (RNA), amplifications (DNA), and complex genomic signatures (Table 3). These lists are based on content that has been validated by Illumina.

		Pan-	-cance	r: BRAF,	NTRK1,	NTRK2	, NTRK	3, RET, <b>I</b>	MSI, TMI	В			
				Genes wit	h biomark	ers of clini	cal signifi	icanceª					Genes with biomarkers of potential clinical significance <sup>b</sup>
	Breast	BRCA1	BRCA2	ERBB2	ESR1	PALB2	PIK3CA						180
霥	Colorectal	ERBB2	KRAS	NRAS									166
920	Bone	EGFR	ERG	ETV1	ETV4	EWSR1	FEV	FLI1	FUS	Н3F3A	HEY1	IDH1	140
	Bolle	MDM2	NCOA2	SMARCB1									140
do	Lung	ALK	EGFR	ERBB2	KRAS	MET	NUTM1	ROS1					223
	Melanoma	KIT	NRAS	ROS1									172
લ્લિક	Ovarian	BRCA1	BRCA2	FOXL2									149
*Yk	CNS°	APC	ATRX	CDKN2A	CDKN2B	EGFR	НЗГЗА	HIST1H3B	HIST1H3C	IDH1	IDH2	MYCN	140
松		PTCH1	RELA	TERT	TP53								140
	Prostate	AR	ATM	BARD1	BRCA1	BRCA2	BRIP1	CDK12	CHEK1	CHEK2	FANCL	FGFR2	151
# T		FGFR3	PALB2	PTEN	RAD51B	RAD51C	RAD51D	RAD54L					131
	Thyroid	HRAS	KRAS	NRAS	TERT								165
)_ (	Uterine and	BRCA2	EPC1	ERBB2	ESR1	FOXO1	GREB1	JAZF1	NCOA2	NCOA3	NUTM2A	NUTM2B	138
( <del>(</del> \$\disp.)	cervical	PAX3	PAX7	PHF1	POLE	SMARCA4	SUZ12	TP53	YWHAE				130
		ALK	APC	ARID1A	ASPSCR1	ATF1	ATIC	BAP1	BCOR	BRCA1	BRCA2	CAMTA1	
		CARS	CCNB3	CDK4	CDKN2A	CIC	CITED2	CLTC	COL1A1	COL6A3	CREB1	CREB3L1	
		CREB3L2	CSF1	CTNNB1	DDIT3	DDX3X	DNAJB1	DUX4	EED	EGFR	ERBB2	ERG	
		ETV1	ETV4	ETV6	EWSR1	FEV	FGFR2	FGFR3	FLI1	FOXL2	FOXO1	FOXO4	
	Other solid	FUS	GLI1	HEY1	HGF	HMGA2	IDH1	KRAS	LEUTX	MAML3	MDM2	MYB	152
حرن	tumors	MYOD1	NAB2	NCOA2	NF1	NFATC2	NFIB	NR4A3	NRAS	NUTM1	NUTM2A	NUTM2B	
		PALB2	PATZ1	PAX3	PAX7	PDGFB	PDGFRA	PRKACA	PRKD1	RANBP2	ROS1	SDHA	
		SDHB TCF12	SDHC TERT	SDHD TFE3	SMARCB1 TFEB	SS18 TFG	SSX1 TP53	SSX2 TPM3	SSX4 TPM4	STAT6 TRAF7	SUZ12 TSPAN31	TAF15 VGLL2	
		WT1	WWTR1	YAP1	YWHAE	ZC3H7B	1733	I PIVIS	1 1º IVI4	IRAF/	ISPANSI	V GLLZ	
		VV I I	VVVVIKI	TAPI	T VV HAL								

Figure 1: Key actionable biomarkers—Genes listed represent a subset of all genes present in the panel. Content analysis provided by Velsera, based on IVD software Knowledge Base v8.5 (February 2023).

a. Genes linked to current drug labels or guidelines.

b. Based on evidence in scientific literature, presence in clinical trials, or linked to labels in other histologies..

c. CNS, central nervous system.

Table 2: TruSight Oncology Comprehensive (EU) panel content

				Small v	ariants - 517	genes (fror	m DNA)				
ABL1	BCR	CREBBP	ERBB4	FGFR4	HIST1H3G	KEAP1	MST1	PDCD1	PTPRS	SH2D1A	TFRC
ABL2	BIRC3	CRKL	ERCC1	FH	HIST1H3H	KEL	MST1R	PDCD1LG2	PTPRT	SHQ1	TGFBR1
ABRAXAS1	BLM	CRLF2	ERCC2	FLCN	HIST1H3I	KIF5B	MTOR	PDGFRA	QKI	SLIT2	TGFBR2
ACVR1	BMPR1A	CSF1R	ERCC3	FLI1	HIST1H3J	KIT	MUTYH	PDGFRB	RAB35	SLX4	TMEM127
ACVR1B	BRAF	CSF3R	ERCC4	FLT1	HIST2H3A	KLF4	MYB	PDK1	RAC1	SMAD2	TMPRSS2
ADGRA2	BRCA1	CSNK1A1	ERCC5	FLT3	HIST2H3C	KLHL6	MYC	PDPK1	RAD21	SMAD3	TNFAIP3
AKT1	BRCA2	CTCF	ERG	FLT4	HIST2H3D	KMT2A	MYCL	PGR	RAD50	SMAD4	TNFRSF14
AKT2	BRD4	CTLA4	ERRFI1	FOXA1	HIST3H3	KRAS	MYCN	PHF6	RAD51	SMARCA4	TOP1
AKT3	BRIP1	CTNNA1	ESR1	FOXL2	HNF1A	LAMP1	MYD88	PHOX2B	RAD51B	SMARCB1	TOP2A
ALK	BTG1	CTNNB1	ETS1	FOXO1	HNRNPK	LATS1	MYOD1	PIK3C2B	RAD51C	SMARCD1	TP53
ALOX12B	BTK	CUL3	ETV1	FOXP1	НОХВ13	LATS2	NAB2	PIK3C2G	RAD51D	SMC1A	TP63
AMER1	CALR	CUX1	ETV4	FRS2	HRAS	LMO1	NBN	PIK3C3	RAD52	SMC3	TRAF2
ANKRD11	CARD11	CXCR4	ETV5	FUBP1	HSD3B1	LRP1B	NCOA3	PIK3CA	RAD54L	SMO	TRAF7
ANKRD26	CASP8	CYLD	ETV6	FYN	HSP90AA1	LYN	NCOR1	PIK3CB	RAF1	SNCAIP	TSC1
APC	CBFB	DAXX	EWSR1	GABRA6	ICOSLG	LZTR1	NEGR1	PIK3CD	RANBP2	SOCS1	TSC2
AR	CBL	DCUN1D1	EZH2	GATA1	ID3	MAGI2	NF1	PIK3CG	RARA	SOX10	TSHR
ARAF	CCND1	DDR2	FAM46C	GATA2	IDH1	MALT1	NF2	PIK3R1	RASA1	SOX17	U2AF1
ARFRP1	CCND2	DDX41	FANCA	GATA3	IDH2	MAP2K1	NFE2L2	PIK3R2	RB1	SOX2	VEGFA
ARID1A	CCND3	DHX15	FANCC	GATA4	IFNGR1	MAP2K2	NFKBIA	PIK3R3	RBM10	SOX9	VHL
ARID1B	CCNE1	DICER1	FANCD2	GATA6	IGF1	MAP2K4	NKX2-1	PIM1	RECQL4	SPEN	VTCN1
ARID2	CD274	DIS3	FANCE	GEN1	IGF1R	МАРЗК1	NKX3-1	PLCG2	REL	SPOP	WISP3
ARID5B	CD276	DNAJB1	FANCF	GID4	IGF2	MAP3K13	NOTCH1	PLK2	RET	SPTA1	WT1
ASXL1	CD74	DNMT1	FANCG	GLI1	IKBKE	MAP3K14	NOTCH2	PMAIP1	RHEB	SRC	XIAP
ASXL2	CD79A	DNMT3A	FANCI	GNA11	IKZF1	MAP3K4	<b>NOTCH3</b>	PMS1	RHOA	SRSF2	XPO1
ATM	CD79B	DNMT3B	FANCL	GNA13	IL10	MAPK1	NOTCH4	PMS2	RICTOR	STAG1	XRCC2
ATR	CDC73	DOT1L	FAS	GNAQ	IL7R	МАРК3	NPM1	PNRC1	RIT1	STAG2	YAP1
ATRX	CDH1	E2F3	FAT1	GNAS	INHA	MAX	NRAS	POLD1	RNF43	STAT3	YES1
AURKA	CDK12	EED	FBXW7	GPS2	INHBA	MCL1	NRG1	POLE	ROS1	STAT4	ZBTB2
AURKB	CDK4	EGFL7	FGF1	GREM1	INPP4A	MDC1	NSD1	PPARG	RPS6KA4	STAT5A	ZBTB7A
AXIN1	CDK6	EGFR	FGF10	GRIN2A	INPP4B	MDM2	NTRK1	PPM1D	RPS6KB1	STAT5B	ZFHX3
AXIN2	CDK8	EIF1AX	FGF14	GRM3	INSR	MDM4	NTRK2	PPP2R1A	RPS6KB2	STK11	ZNF217
AXL	CDKN1A	EIF4A2	FGF19	GSK3B	IRF2	MED12	NTRK3	PPP2R2A	RPTOR	STK40	ZNF703
B2M	CDKN1B	EIF4E	FGF2	Н3F3А	IRF4	MEF2B	NUP93	PPP6C	RUNX1	SUFU	ZRSR2
BAP1	CDKN2A	ELOC	FGF23	Н3F3В	IRS1	MEN1	NUTM1	PRDM1	RUNX1T1	SUZ12	
BARD1	CDKN2B	EML4	FGF3	H3F3C	IRS2	MET	PAK1	PREX2	RYBP	SYK	
ВВС3	CDKN2C	EMSY	FGF4	HGF	JAK1	MGA	PAK3	PRKAR1A	SDHA	TAF1	
BCL10	CEBPA	EP300	FGF5	HIST1H1C	JAK2	MITF	PAK5	PRKCI	SDHAF2	ТВХ3	
BCL2	CENPA	EPCAM	FGF6	HIST1H2BD	JAK3	MLH1	PALB2	PRKDC	SDHB	TCF3	
BCL2L1	CHD2	ЕРНА3	FGF7	HIST1H3A	JUN	MLLT3	PARP1	PRKN	SDHC	TCF7L2	
BCL2L11	CHD4	EPHA5	FGF8	HIST1H3B	KAT6A	MPL	PAX3	PRSS8	SDHD	TERC	
BCL2L2	CHEK1	EPHA7	FGF9	HIST1H3C	KDM5A	MRE11	PAX5	PTCH1	SETBP1	TERT	
BCL6	CHEK2	EPHB1	FGFR1	HIST1H3D	KDM5C	MSH2	PAX7	PTEN	SETD2	TET1	
BCOR	CIC	ERBB2	FGFR2	HIST1H3E	KDM6A	MSH3	PAX8	PTPN11	SF3B1	TET2	
BCORL1	COP1	ERBB3	FGFR3	HIST1H3F	KDR	MSH6	PBRM1	PTPRD	SH2B3	TFE3	

Table 3: Additiona	I content in	TruSiaht	Oncology	Comprehensive	(EU)

	Fusions: 23 genes (from RNA)							
ALK	EGFR	ETV1	FGFR3	NTRK2	RET			
AXL	EML4	ETV4	KIF5B	NTRK3	ROS1			
BCL2	ERG	FGFR1	NRG1	PAX3	TMPRSS2			
BRAF	ESR1	FGFR2	NTRK1	RAF1				
	Splice variants: Two genes (from RNA)							
	MET			EGFR				
	Amplifications: Two genes (from DNA)							
	ERBB2			MET				
	Complex genomic signatures							
	TMB			MSI				

# What are the key attributes of the TruSight Oncology Comprehensive (EU) assay?

- Provides a kitted solution that can be implemented in house by any lab
- · Includes both DNA and RNA content and detects all classes of variants, plus genomic signatures such as TMB and MSI; of note fusions are called from RNA, to maximize sensitivity for detection
- Enables CGP test results to be generated in only 4–5 days

# How is TruSight Oncology Comprehensive (EU) different from current research use only (RUO)-labeled CGP kit offerings, eq, Oncomine Comprehensive Assay Plus (Thermo Fisher Scientific, Catalog no. A48578)?

- IVD label: As a CE-marked IVD test, TruSight Oncology Comprehensive (EU) is compliant with European IVD Directive (IVDD) requirements and is on course to comply with stricter IVD Regulation (IVDR) legislation; the IVD label provides labs with the benefits of IVDR preparedness and reduced liability risk, and enables easier implementation with significantly reduced test validation efforts, as compared to RUO tests.
- Pipeline of companion diagnostic claims: Multiple pharmaceutical partnerships have been established around TruSight Oncology Comprehensive (EU), with the goal of having many companion diagnostic claims; these are not in the roadmap for RUO-labeled products.
- Underlying technology drives a high level of reliability: TruSight Oncology Comprehensive (EU) is based on proven Illumina technology for library preparation, sequencing, and bioinformatics, maximizing data quality and accuracy; library prep uses hybrid-capture chemistry, enabling full detection and characterization of fusion events not possible with amplicon-based techniques (Figure 2).

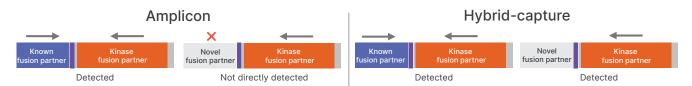


Figure 2: Hybrid-capture chemistry detects novel fusions missed by amplicon-based approaches— Amplicon-based approaches typically require confirmatory testing and do not characterize novel fusion partners. Hybrid-capture chemistry can identify both known and novel fusion partners.

# Workflow

#### What is the recommended sample input?

TruSight Oncology Comprehensive (EU) requires 40 ng RNA and/or 40 ng DNA extracted from FFPE tissue.

### What are the workflow steps from sample preparation to final report?

The TruSight Oncology Comprehensive (EU) workflow includes four steps: sample acquisition and processing, DNA and RNA extraction, library preparation, and fully automated sequencing, analysis, and report generation (Figure 3).



Figure 3: TruSight Oncology Comprehensive (EU) sample to report workflow.

#### Additional details:

- Specimen tissue should be fixed using formalin fixative suitable for molecular analyses; a minimum of 20% tumor cell content is recommended and ≥ 30% is optimal
- DNA and RNA extraction can be performed using commercially available extraction kits
- Library preparation takes approximately two days
- After loading the libraries on the NextSeq™ 550Dx instrument, the workflow is fully automated, including sequencing, base calling and QC, variant calling, interpretation, and generation of the final clinical report

#### How long is the turnaround time (TAT) from sample to report?

The TAT is 4-5 days from extracted DNA-RNA to final clinical report

#### What sequencing platform is needed?

TruSight Oncology Comprehensive (EU) is run on the NextSeg 550Dx instrument, an FDA-regulated and CE-marked, high-throughput sequencing platform

#### What is the workflow for data analysis?

TruSight Oncology Comprehensive (EU) offers a streamlined, automated workflow from sequencing to final clinical report. Simply set up the sequencing run using Local Run Manager software. After the sequencing run is complete, secondary and tertiary analysis kickoff automatically and are performed on-instrument. The output is a final clinical report.

#### What is the expected analysis time for a sample batch processed in a sequencing run?

The analysis time is 8–10 hours

## What is included in the final clinical report?

One of the key concerns when using a CGP panel is how to interpret the data and filter nonsignificant variants. TruSight Oncology Comprehensive (EU) software performs analysis and filtering as part of a fully automated workflow. The final report is easy to read and highly actionable.

# **IVD Clinical Report**

The IVD Clinical Report is organized into two main sections (Figure 4):

- · Genomic findings with evidence of clinical significance: A list of detected variants that have evidence of clinical significance (therapeutic, prognostic, or diagnostic) based on information in approved drug labels, guidelines, and clinical practice guidelines for the patient's tumor type.
- Genomic findings with evidence of potential clinical significance: A list of detected variants that:
  - 1. Have evidence of potential clinical significance (therapeutic, prognostic, or diagnostic) based on information in drug labels, guidelines, and clinical practice guidelines in another tumor type
  - 2. Match genomic and tumor type eligibility criteria for a clinical trial
  - 3. Have evidence of potential clinical significance in the primary literature for the patient's tumor type

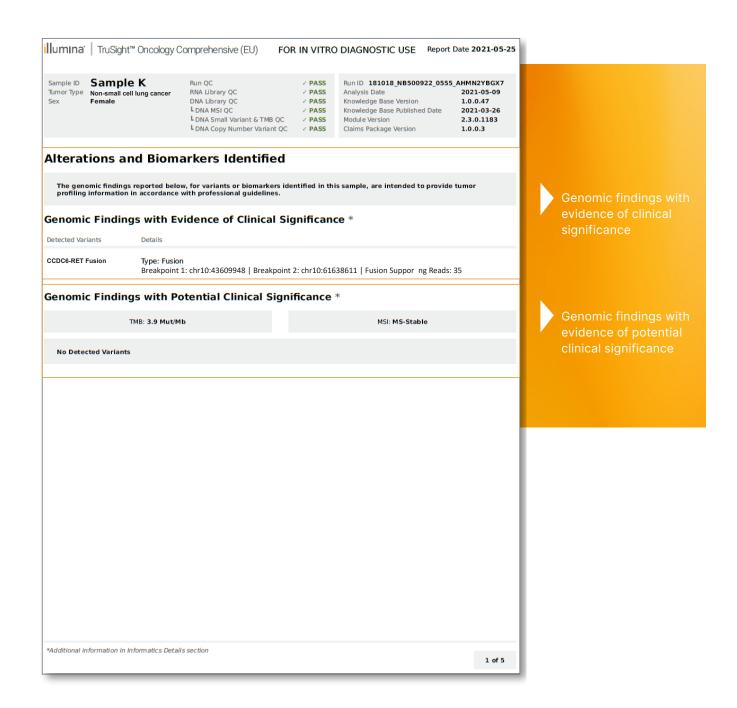


Figure 4: TruSight Oncology Comprehensive (EU) example clinical report—The clinical report includes genomic findings with evidence of clinical significance and genomic findings with evidence of potential clinical significance.

# Reimbursement

## What reimbursement is available for CGP tests in Europe? How does that vary by country?

National and/or regional funding is available in most Western European countries. Laboratory services are reimbursed in different ways depending on the country in which they are located, the clinical setting in which they work, and the services they provide (Figure 5 and Table 4). Illumina has established a dedicated Market Access team that works with Payers to further expand the reimbursement of CGP across all European countries. In addition, Illumina is working towards opening access to CGP in various major emerging markets of Europe. For further questions about the appropriate coding or reimbursement for cancer testing, we encourage customers to:

- · Speak to your respective national medical society for guidance regarding how to manage reimbursement claims for testing and refer to any national or regional budget holders (Payers) for guidance on coding and reimbursement, eg, national pathology societies.
- Contact your local Illumina representative who will connect you with the Illumina Market Access team. The Illumina Market Access team will provide you with guidance on where to find general reimbursement fee schedules, answer general reimbursement queries for diagnostics from customers or point customers to key local institutions they can contact.

Note: as a manufacturer of IVD products, Illumina will not be able to advise customers on what specific reimbursement codes customers should bill for TruSight Oncology Comprehensive (EU).

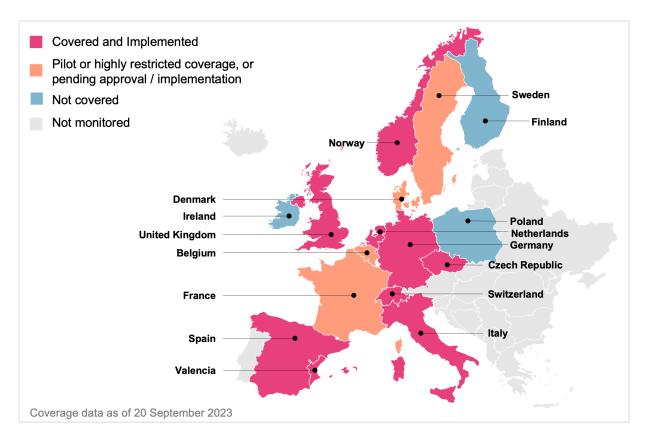


Figure 5: CGP test coverage options across Europe

Table 4: Laboratory fee schedules

Country	Relevant fee schedules
Austria	Not applicable
Belgium	NGS pilot study
Denmark	Not applicable
England	National Genomic Test Directory
Finland	Not applicable
France	National Reimbursement List for Innovative Technologies and National Fee Schedule
Germany	National Fee Schedule Germany
Israel	National Health Basket
Italy <sup>a</sup>	National Fee Schedule
Netherlands <sup>b</sup>	Not applicable
Norway	Not applicable
Scotland	Not applicable
Spain <sup>a</sup>	Not applicable
Sweden	Not applicable
Switzerland	National Fee Schedule for Medical Services

a. For Italy, the national fee schedule is informative only; for Italy and Spain, coverage is defined at the regional level

Not applicable: Not available, ie, no fee schedule for diagnostics in the country; diagnostics are funded through global budget allocation to laboratory customers



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b. For the Netherlands, coverage is negotiated at the local level between hospitals and health insurers