
Aegle Omics
Sequencing & Application
From Diagnosis to Therapy,
we Prioritize Accuracy.

Dear Colleagues,

As you know, most non-communicable diseases stem from a combination of genetic factors, lifestyle choices, and environmental influences. Testing for gene mutations associated with cancer can help assess the risk of developing or passing on the disease. We're seeing a shift from cancer susceptibility gene panels to gene panels used in cancer treatment. As cancer physicians, we're pushed to go beyond conventional treatments, focusing on genomic-based approaches. This allows for personalized treatment plans, omitting ineffective or harmful therapies.

Through 'AEGLE OMICS,' we're committed to offering continuous support to oncologists in Sri Lanka, providing high-quality, precise testing. We've partnered with top-tier testing labs worldwide, ensuring access to comprehensive repositories. Our goal is to deliver valued services to leading health and research institutions globally. Our gene panels cover various cancers, facilitating quicker, easier clinical decisions without compromising professional integrity. Thank you for your interest in Precision Oncology.

Dr. Mahendra Perera,
MBBS, MD, Dip.RT, FSLCO

Chairman - AEGLE OMICS PVT LTD.
Consultant - Clinical Oncology & Radiotherapy.
Principal Investigator - Clinical Trials, Past President - Sri Lanka College of Oncologists.
Ex Chairman - Board of Oncolog, Sri Lanka

New Test Code	Unique Test Name	Genes/Biomarkers	Test Categoery	Sample Type	Method	TAT
SLS161000	Germline BRCA1 & BRCA2 test	BRCA 1, BRCA 2	Germline	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	NGS	21 Days
SLS161001	Germline 3 Gene panel	BRCA1, BRCA2, TP53	Germline	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	NGS	21 Days
SLS161003	HBOC Comprehensiv Panel (19 Gene)	ATM, BRCA1, BRCA2, BRIP1, CDH1, CHEK2, EPCAM, MLH1, MSH2, MSH6, NBN, NF1, PALB2, PMS2, PTEN, RAD51C, RAD51D, STK11, TP53	Germline	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	NGS	21 Days
SLS161004	Lynch Syndrome panel	EPCAM, MLH1, MSH2, MSH6, PMS2	Germline	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	NGS	21 Days
SLS161013	Hereditary Cancer Test	APC, ATM, BMPR1A, BRCA1, BRCA2, BRIP1, CDH1, CHEK2, EPCAM, MAX, MEN1, MLH1, MSH2, MSH6, MUTYH, NF1, NF2, PALB2, PMS2, PTEN, RAD51C, RAD51D, RB1, RET, SDHAF2, SDHB, SDHC, SDHD, SMAD4, STK11, TP53, TSC1, TSC2, VHL, WT1	Germline	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	NGS	21 Days
SLS162800	Germline Homologous Recombination Repair Test (gHRR)	ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, RAD51B, RAD51C, RAD51D, RAD54L	Germline	Blood/ DBS	NGS	21 Days
SLS810011	Final Diagnosis Panel	Sequential	Somatic Speciality	FFPE Plastic container	IHC	5 Days
SLS810001	PDL-1 22C3 (Dako)	PDL-1 22C3	Somatic Speciality	FFPE Plastic container	IHC	5 Days
SLS810004	PDL-1 SP142 (Ventana)	PDL-1 SP142	Somatic Speciality	FFPE Plastic container	IHC	5 Days

New Test Code	Unique Test Name	Genes/Biomarkers	Test Categoery	Sample Type	Method	TAT
SLS810006	PDL-1 SP263 (Ventana)	PDL-1 SP263	Somatic Speciality	FFPE Plastic container	IHC	5 Days
SLS140010	EGFR Tissue	Mutation detection EGFR (exon 18,19,20,21) including T790M	Somatic Speciality	FFPE Plastic container	RT PCR	10 Days
SLS150001	MST (Sanger Sequencing)		Somatic Speciality	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	Sanger	9 Days
SLS140014	MLPA BRCA1	BRCA1	Somatic Speciality	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	Sanger	14 Days
SLS140015	MLPA BRCA2	BRCA2	Somatic Speciality	Blood/ DBS EDTA Vacutainer (Purple Top)/ DBS Kit	Sanger	14 Days
SLS162200	Somatic BRCA Test	BRCA1, BRCA2	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS162800	Somatic Homologous Recombination Repair Test (sHRR)	ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, RAD51B, RAD51C, RAD51D, RAD54L	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS162201	Homologous Recombination Deficiency Test (HRD)	BRCA1, BRCA2 and Genomic Scar Score (GSS)	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS162400	Lung Cancer Essential Panel	DNA genes (SNV, indels, CNV) - ALK, BRAF, EGFR, ERBB2, KRAS, MET, ROS1 RNA genes (fusions) - ALK, MET (exon 14 skipping), RET, ROS1	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS160001	Lung Cancer Actionable Panel	DNA genes (SNV, indels, CNV) - ALK, BRAF, EGFR, ERBB2, KRAS, MET, ROS1 RNA genes (fusions) - ALK, MET (exon 14 skipping), RET, ROS1 PDL-1 22C3 (Dako)	Somatic Small Panels	FFPE Plastic container	NGS, IHC	21 Days

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New Test Code	Unique Test Name	Genes/Biomarkers	Test Categoery	Sample Type	Method	TAT
SLS160002	Lung Cancer Comprehensive Panel	DNA genes (SNV, indel, CNV) - ALK, BRAF, EGFR, ERBB2, KEAP1, KRAS, MET, MAP2K1, NRAS, PIK3CA, PTEN, ROS1, STK11, TP53 RNA genes (fusions) - ALK, MET (exon 14 skipping), NTRK1, NTRK2, NTRK3, RET, ROS1 PDL-1 22C3 (Dako)	Somatic Small Panels	FFPE Plastic container	NGS, IHC	21 Days
SLS140006	EGFR liquid biopsy	EGFR,T790M (EGFR L858R and Del 19)	Somatic Marker	Whole Blood in Streck Tubes Streck tube	PCR	21 Days
SLS162600	Colorectal Cancer Essential Panel	BRAF, ERBB2, KRAS, MET,NRAS, PIK3CA, PTEN	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS160003	Colorectal Cancer Actionable Panel	BRAF, ERBB2, KRAS, MET,NRAS, PIK3CA, PTEN MSI by PCR	Somatic Small Panels	FFPE & Blood Plastic container & EDTA Vacutainer (Purple Top)	NGS, PCR	21 Days
SLS160004	Colorectal Cancer Comprehensive Panel	AKT1, APC, BRAF, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, FBXW7, KRAS, MAP2K1, MET, MLH1, MSH2, MSH6, NOTCH1, NRAS, PIK3CA, PMS2, PTEN, SMAD4, TP53 MSI by PCR	Somatic Small Panels	FFPE & Blood Plastic container & EDTA Vacutainer (Purple Top)	NGS, PCR	21 Days
SLS162900	Endometrial Cancer Test	MMRD mutations, POLE mutations, TP53	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS163000	Thyroid cancer basic panel	ALK, BRAFV600E, NTRK, PIK3CA, RAS, RET	Somatic Small Panels	FFPE Plastic container	NGS	21 Days
SLS163001	Thyroid cancer advance panel	DNA Genes (SNV, Indels, CNV) ALK, BRAFV600E, NTRK ,PIK3CA, RAS, RET, RNA genes (fusions) - ALK, RET, NTRK	Somatic Small Panels	FFPE Plastic container	NGS	21 Days

New Test Code	Unique Test Name	Genes/Biomarkers	Test Categoery	Sample Type	Method	TAT
SLS162000	Somatic Advantage 74 Gene Test	DNA genes: AKT1, ALK, APC, AR, ARID1A, ATM, ATR, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, CDK12, CDKN2A, CHEK1, CHEK2, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ESR1, EZH2, FANCA, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, HRAS, IDH1, IDH2, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MET, MLH1, MRE11, MSH2, MSH6, NBN, NF1, NOTCH1, NRAS, NTRK1, NTRK2, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLE, PTCH1, PTEN, RAD51B, RAD51C, RAD51D, RAD54L, RET, ROS1, SMAD4, SMO, STK11, TERT, TP53 RNA genes: ALK, BRAF, ERG, EWSR1, FGFR2, FGFR3, FUS, NRG1, NTRK1, NTRK2, NTRK3, PPARG, RET, ROS1 MSI by NGS	Comprehensive. Genomic Profiling. (CGP)	FFPE Plastic container	NGS	18 Days
SLS162001	Liquid Biopsy 56 Gene Panel (Ct DNA)	ABL1, AKT1, ALK, APC, ATM, BRAF, CDH1, CDKN2A, CSF1R, CTNNB1, DDR2, DNMT3A, EGFR, ERBB2, ERBB4, EZH2, FBXW7, FGFR1, FGFR2, FGFR3, FLT3, FOXL2, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, JAK2, JAK3, KDR, KIT, KRAS, MAP2k1, MET, MLH1, MPL, MSH6, NOTCH1, NPM1, NRAS, PDGFRA, PIK3CA, PTEN, PTPN11, RB1, RET, SMAD4, SMARCB1, SMO, SRC, STK11, TP53, TSC1, VHL	Comprehensive. Genomic Profiling. (CGP)	Blood Streck tube	NGS	21 Days
SLS162002	Comprehensive Genomic Profiling - Strand Advantage 500 Basic (DNA)	523 Genes, Tumour Mutation Burden (TMB), Microsatellite Instability (MSI)	Comprehensive. Genomic Profiling. (CGP)	FFPE Plastic container	NGS	21 Days
SLS162003	Comprehensive Genomic Profiling - Strand Advantage 500 Advanced (DNA+RNA)	523 Genes, 55 Fusion, Tumour Mutation Burden (TMB), Microsatellite Instability (MSI)	Comprehensive. Genomic Profiling (CGP)	FFPE Plastic container	NGS	21 Days

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BREAST CANCER

BREAST – RISK SCREENING & PREDICTIVE VALUES

Test Code	Test Name	Sample Requirment	TAT	Special Instruction
NA1030	BRCA1 and BRCA2 Gene Sequencing Panel	3-4 mL Peripheral Blood in 1 Lavender Top (EDTA) tube	15 Days	History Biopsy & ER/PR Her2neu report mandatory

Identifies Mutations in 1/2 genes leading to hereditary breast cancer. Detects point mutations in the sequence and small indel mutations

Test Code	Test Name	Sample Requirment	TAT	Special Instruction
NA2452	BRCA1 and BRCA2 Somatic Gene Sequencing Panel	FFP embeded tissue block or at least 10 section of Formalin fixed paraffin embedded tissue block of thickness 5-10Âµm with marked area of enriched tumor and accompanying pathology report	15 Days	Clinical history, Biopsy & ER/PR Her2neu report mandatory

For Somatic Breast Cancer Cases

Test Code	Test Name	Sample Requirment	TAT	Special Instruction	Clinical Utility
IA1892	GCDFP-15	Formalin fixed paraffin embedded tissue block	4 Days	Clinical History, Histopathology Report, Any Radiological Findings required	Diagnosis of breast cancer metastasis
IA1868	Mammaglobin	FFP embedded tissue block		Clinical History, Histopathology Report, Any Radiological Findings required	Diagnosis of PRIMARY AND breast cancer metastasis

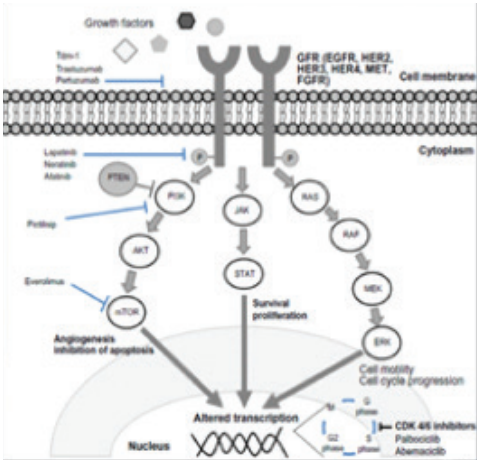
Test Code	Test Name	Sample Requirment	TAT	Special Instruction
AO2904	CA 27.29	2 mL (1 mL min.) Serum from 1 SST	Sample by 6th of the month, report after 3 weeks	3 Weeks
AO1175	CA 15.3	2 mL (1 mL min.) Serum from 1 SST	SERUM	

Monitor the response to therapy and if elevated suggests recurrence in women with Stage II or III breast Cancer.

The analysis of actionable targets in breast cancer involves several approaches, including:

1. **Tumor biopsy or surgical specimen:** A tissue sample is collected from the breast tumor through a biopsy or during surgery. This sample is then analyzed to determine the molecular characteristics of the tumor, including hormone receptor status (ER, PR), HER2 expression, and genetic mutations.
2. **Immunohistochemistry (IHC):** IHC is a technique that uses antibodies to detect specific proteins in the tumor tissue. It can be used to determine the expression levels of hormone receptors (ER, PR) and HER2 protein.
3. **Fluorescence in situ hybridization (FISH):** FISH is a molecular technique that can determine the amplification of the HER2 gene. It involves using fluorescently labeled DNA probes that bind to specific regions of the HER2 gene. This technique helps identify HER2-positive breast cancer cases.
4. **Next-generation sequencing (NGS):** NGS is a high-throughput sequencing technology that can analyze multiple genes simultaneously. It can identify genetic mutations and alterations in breast cancer-related genes, such as BRCA1, BRCA2, PIK3CA, and others. NGS can also be used to identify potential therapeutic targets and predict response to targeted therapies.

5. **Gene expression profiling:** (GEP) Techniques like microarray analysis or RNA sequencing can measure the expression levels of thousands of genes in the tumor tissue. This can provide insights into the molecular subtype of breast cancer (e.g., luminal A, luminal B, HER2-enriched, basal-like), which can guide treatment decisions.



The analysis of actionable targets in breast cancer is typically performed by a multidisciplinary team of pathologists, oncologists, and molecular biologists, who interpret the results and guide treatment decisions based on the specific characteristics of the tumor. There are several genomic targetable anti-cancer drugs used in the treatment of breast cancer. These drugs target specific genetic mutations or alterations in cancer cells. Some of the commonly used genomic targetable drugs for breast cancer include:

1. **HER2-Targeted Therapy:** Drugs like trastuzumab, pertuzumab, ado-trastuzumab emtansine (T-DM1), and neratinib specifically target the HER2 protein, which is overexpressed in HER2-positive breast cancers.
2. **CDK4/6 Inhibitors:** Cyclin-dependent kinase 4/6 inhibitors, such as palbociclib, ribociclib, and abemaciclib, target the CDK4/6 pathway, which is frequently dysregulated in breast cancer.
3. **PARP Inhibitors:** Poly (ADP-ribose) polymerase (PARP) inhibitors, such as olaparib and talazoparib, target cancers with BRCA1 or BRCA2 mutations, which are involved in DNA repair.
4. **PI3K Inhibitors:** Phosphatidylinositol 3-kinase (PI3K) inhibitors, like alpelisib, target the PI3K pathway, which is commonly altered in breast cancer.
5. **AKT Inhibitors:** AKT inhibitors, such as capivasertib, target the AKT pathway, which is involved in cell growth and survival.
6. **FGFR Inhibitors:** Fibroblast growth factor receptor (FGFR) inhibitors, like erdafitinib, target cancers with FGFR alterations, which are involved in cell signaling and growth.

Role of ctDNA in Breast Cancer

Marta Sant, Adrià Bernat-Peguera, [...], and Mireia Margelí

TP53, PIK3CA, ESR1, GATA3, ARID1A and PTEN are the most frequently altered. These mutations can be truncal, when they are found in all the patient's cancer cells, or subclonal, when they are randomly dispersed throughout the genome. The ctDNA dynamics of subclonal mutations have a limited potential to predict clinical outcome.

PIK3CA encodes for the p110a subunit of PI3K. PIK3CA mutations are associated with worse prognosis, although they confer sensitivity to PI3K inhibitors (PI3Ki) such as **taselisib, alpelisib, buparlisib** and **copanlisib.**

Although there are no validated predictive biomarkers of response to CDK 4/6 inhibitors, **early ctDNA dynamics of PIK3CA truncal mutations predicted sensitivity to Palbociclib, a CDK 4/6 inhibitor.** Palbociclib is a cytostatic drug, and its effects decrease **PIK3CA-mutant ctDNA, indicating that ctDNA PIK3CA mutations may be useful as an early predictor of response,** as was observed in the PALOMA-3 trial of ER-positive/HER2-negative advanced breast cancer patients who had previously progressed to endocrine therapy.

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ESR1 encodes for an ER, and its mutations are found in 30% of patients receiving endocrine therapy. However, if a CDK 4/6 inhibitor is used together with Aromatase inhibitors, the ESR1 mutation rate decreases. ESRI mutations are located in the ligand-binding domain and are hormone-independent activating mutations. In some cases, methylation of the ESRI promoter causes gene silencing, leading to a lack of ER expression and resistance to endocrine therapy. Activating ESR1 mutations are acquired mutations and not a clonal selection, as they are not detected in primary breast cancer and they are found in the subclonal population.

Druggable target gene alterations detected in ciDNA in metastatic breast cancer. * (asterisk) means translation termination (stop) codon.

Gene (Hot spot mutation	Effect on Treatment Response
PTEN (R130Q. R130G, R130*, R130P, R130Qfs*4)	Sensitivity to capivasertib / ipatasertib (AKT inhibitors) + paclitaxel Resistance to PI3Ki (loss of PTEN)
PIK3CA (H1047R, H1047L, N345K, E545K, ES42K,)	Resistance to endocrine therapy (truncal mutations) Sensitivity to PI3Ki (tasclisib, alpelisib, buparlisib, copanlsib.
ESRI (Y537C, Y537N, Y537S, S463P, D538G)	Resistance to endocrine therapy (subclonal mutation)
AKT (E 17K)	Sensitivity to capivasertib (AKT kinase inhibitor)
HER2 (L755S, V777L)	HER2 inhibitor (bind to kinase domain) (lapatinib, neratinib)

https://blog.lgcclinicaldiagnostics.com/brca12?utm_campaign=CG_2023-10_Breast%20Cancer%20Awareness&utm_medium=email&_hsmi=279085006&_hsenc=p2ANqtz-_exT6gJSbNsVsEcg2sPZsKXcjNK5IOvBena0FaJ5Ml1s9-9LQqPqwhK1gDtMlwIaFQrG43HmIGJ2ItribpX0OMqPFLPQ&utm_content=279085006&utm_source=hs_email

Test Code	Test Name	Sample Requirment	TAT	Method
MC1276	mammaCORE BRCA 1&2 Deletion/Duplication Panel	3-4mL Peripheral Blood in 1 Lavender Top (EDTA) tube	15 Days	Multiplex Ligation Dependent Probe Amplification (MLPA)

Identifies mutations in1/2 gene leading to hereditary breast cancer. Detects larger deletions or duplications of the entire regions of the gene.

Test Code	Test Name	Components	Sample Requirement	TAT	Method
P00353	mammaCORE BRCA Advanced Panel	BRCA 1 & 2 Germline+ Somatic Mutation Analysis	3-4 mL EDTA Whole Blood and FFP embedded tissue block	15 Days	Next Generation Sequencing
P00354	mammaCORE BRCA Advanced Plus Panel	BRCA 1 & 2 Germline+ Somatic Mutation Analysis + Del/Dup Analysis	EDTA Whole Blood and FFP embedded tissue block	15 Days	Multiplex Ligation Dependent Probe Amplification, Next generation Sequencing
NA1031	mammaCORE BRCA Comprehensive Panel	BRCA 1 & 2 Germline+Del/Dup Analysis	3-4 mL Peripheral Blood in 1 Lavender Top (EDTA) tube.	30 Days	Next Generation Sequencing
P00008	mammaCORE PANEL 1	ER, PR, HER2/neu	FFP embedded tissue block	4 Days	IHC
P00009	mammaCORE PANEL 2	ER, PR, HER2/neu, Ki67	FFP embedded tissue block	4 Days	IHC

Test Code	Test Name	Components	Sample Requirement	TAT	Method
P00062	mammaCORE Panel 3	Ki-67, p53,ER/PR, Her2/ neu	FFP embedded tissue block	4 Days	IHC
IA1868	Mammaglobin		FFP embedded tissue block	4 Days	IHC

Diagnosis, Prognosis and therapy indication for Breast cancer patients

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
P01065	HRR Gene Panel (Somatic + Germline) Extended	Formalin fixed paraffin embedded tissue block + Peripheral Blood	2 Weeks	Next Generation Sequencing	Tissue-Ambient (18-25°C) temperature. Do not Freeze. +Blood-Transport in 2 to 8°C (with cold pack)
P00397	FUS-DDIT3	FFPE+ Peripheral Blood	2 Weeks	Next Generation Sequencing	Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53 FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA2579	HRR Gene Panel (Germline)	2ml Peripheral Blood (EDTA Vacutainer)	2 Weeks	Next Generation Sequencing	Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53 FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA3166	HRR Gene Panel (Germline) Extended	2ml Peripheral Blood (EDTA Vacutainer)	2 Weeks	Next Generation Sequencing	Transport in 2 to 8°C (with cold pack)

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA2577	HRR Gene Panel (Somatic)	Formalin fixed paraffin embedded tissue block	2 Weeks	Next Generation Sequencing	Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53, FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA3167	HRR Gene Panel (Somatic) Extended	Formalin fixed paraffin embedded tissue block	2 Weeks	Next Generation Sequencing	Ambient (18-25°C) temperature. Do not Freeze.

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

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Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA3163	HRR Somatic reflex to HRR Germline	Formalin fixed paraffin embedded tissue block + Peripheral Blood	16 Days	Next Generation Sequencing	Tissue-Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53 FANCD2, RAD51C, RAD51D

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Blockade of EGFR Over Expression with the monoclonal antibodies (mAbs) cetuximab or Panitumumab is effective in RAS wild-type CRC.

At relapse, the majority of patients develop RAS mutations, while a subset of patients acquires EGFR extracellular domain mutations. Overcoming RAS Mutations in mCRC (40%) Predicts a Negative response to EGFR inhibitors.

KRAS G12C mutation (found in 3% of mCRC) Sotorasib (AMG 510)

(HER2) amplifications is a negative predictive biomarker for anti-EGFR therapies. Found in ~3%-4% of patients with mCRC and in 6%-8% of patients with KRAS-wild-type mCRC.

BRAF V600E mutations occur in up to 12% of mCRCs and are nearly always mutually exclusive with KRAS mutations. This mutation is associated with worse prognosis and predicts a poorer response to anti-EGFR treatment.

Based on the similar OS rates for doublet and triplet combinations, Encorafenib/ Cetuximab is currently recommended in the chemotherapy- refractory setting of BRAF V600E-mutated mCRC.

HER2-positive mCRC; Number of Trastuzmab based treatments have been tried.
(ie: T-DM1, Trastuzumab/Pertuzumab, Trastuzumab/ Lapatinib etc)

Trastuzumab Deruxtecan in HER2-positive mCRC, showed a meaningful improvement in terms of ORR, PFS and OS; 30% of these patients had previously received anti-HER2 treatment.

MSI and NTRK Fusions in mCRC.
MSI is found in 5% of mCRC and is a biomarker of response to immunotherapy in the metastatic setting. The anti-programmed cell death protein 1 (PD-1) agent Pembrolizumab has been tested in mCRC in several clinical trials. Across studies, the ORR was 40%.

NTRK fusions have been reported in 1.5% of mCRC patients. In mCRC, rearrangements in NTRK genes are more commonly detected in MSI-H tumours and wild-type BRAF/ KRAS/NRAS.

Larotrectinib and Entrectinib have produced dramatic and prolonged responses in gastrointestinal malignancies with NTRK fusions.

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00005	KRAS and NRAS Mutation Analysis	Formalin fixed paraffin embedded tissue block	5 Days	Real Time Polymerase Chain Reaction	Transport at ambient (18-25°C) temperature	This assay is useful for the detection of KRAS and NRAS mutations which are associated with shorter progression-free survival in Colorectal cancer.
ME1068	KRAS Somatic Mutation (Exon 2-4) Analysis	Formalin fixed paraffin embedded tissue block	5 Days	Real Time Polymerase Chain Reaction	Transport at ambient (18-25°C) temperature	This assay is useful for the detection of KRAS mutations which are associated with shorter progression-free survival in Colorectal cancer. Codon 12 and codon 13 are more prevalent while codon 61,117,146 forms less than 1% of KRAS mutations.
	DPD/ DPYD mutation analysis	3-4 mL Bone marrow/ Peripheral Blood in Lavender Top (EDTA) vacutainers.	5 Days	PCR, Sequencing	Transport in 2 to 8°C (with cold pack). Stable at 4°C for 72 hours	To confirm the clinical diagnosis of dihydropyrimidine dehydrogenase (DPD) deficiency in affected patients and for detection of IVS14+1G>A mutation in asymptomatic carriers

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Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
P00006	coloCORE Panel 1	Formalin fixed paraffin embedded tissue block	7 Days		Samples should reach the lab ASAP(2-4°C). If more than 72 hours then specimens should be frozen, preferably at -80°C, and ship in dry ice.	Transport at ambient (18-25°C) temperature	This assay is useful for the detection of KRAS, NRAS and BRAF mutations which are associated with shorter progression-free survival in Colorectal cancer.
P00023	coloCORE Panel 2	Formalin fixed paraffin embedded tissue block	7 Days	IHC / PCR	Clinical history is mandatory.	Transport at ambient (18-25°C) temperature.	
P00616	coloCORE Targeted Panel-1	Formalin-fixed paraffin-embedded tissue block, 3 mL Peripheral Blood in EDTA (Lavender Top) Tube	15 Days	NGS / PCR			
P00617	coloCORE Targeted Panel-2	Formalin fixed paraffin embedded tissue block	15 Days	NGS / IHC			
ME1070	BRAF		5 Days	RT / PCR	Clinical history	Transport at ambient (18-25°C) temperature	Predict response to EGFR-targeted immunotherapy in patients with metastatic colorectal cancer
IA1070	BRAF V600E (VE1)		4 Days	IHC	Clinical history	Transport at ambient (18-25°C) temperature	
IA1432	CK19	FFP	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Pancreatic Cancer
IA1435	CK20	FFP	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings.	Transport at ambient (18-25°C) temperature	Diagnosis of Large Intestinal CA.

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
YB1060	EGFR (FISH)	Formalin fixed paraffin embedded tissue block	6 Days	IHC	Clinical history mandatory.	Transport at ambient (18-25°C) temperature	EGFR-targeted therapy in metastatic colorectal cancer cases.
IA1060	EGFR (IHC)	FFPE block or submit tissue in 10% formal saline	5 Days	IHC	Clinical history mandatory. Slides to be transported in proper slide mailers (plastic) with proper labelling.	Ambient	
MG1619	EGFR T790M	1 Streck BCT/ Paxgene Tube with 9-9.5 mL blood. Do not fill till the end so as to avoid hemolysis	5 Days	Droplet Digital Polymerase Chain Reaction	Previous EGFR report	Stable at 4°C for 7 days	To Determine presence of Primary and Secondary EGFR Mutations
P00015	EGFR (PCR), ALK (IHC)	Formalin fixed paraffin embedded tissue block	5 Days	Real Time Polymerase Chain Reaction & Immunohisto-chemistry	Clinical history mandatory.	Transport at ambient (18-25°C) temperature	Diagnosis and therapeutic indication in cases of NSCLC

GASTROINTESTINAL STROMAL TUMORS

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions	
MM1336	PDGFRA Mutation Analysis (Solid Tumors)	FFP	8 Days	PCR	Transport at ambient (18-25°C)	PDGFRA confirm the diagnosis of GIST.
IA1006	CD117/c-Kit (KIT Mutation in Exon 11, 9,13,17)	FFP	5 Days	IHC	Transport at ambient (18-25°C)	GIST stomach, small intestine,
MM1006	c-KIT Mutation analysis which looks at Exon 9,11,13,17	FFP	10 Days	PCR	Transport at ambient (18-25°C)	GIST
IA1794	DOG 1	FFP	5 Days	IHC	Transport at ambient (18-25°C)	GIST diagnosis

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LUNG CANCER

Key molecular targets include Epidermal Growth Factor Receptor (EGFR) mutation, Anaplastic Lymphoma Kinase (ALK) translocation and several relatively uncommon oncogenic drivers, while for patients without an oncogene driver, the key biomarker

is PD-L1 expression.

Targeting the Uncommon Mutations:

The ambit of potentially targetable oncogenic drivers in NSCLC expanded in the 2010s, and, in addition to EGFR and ALK, there are seven others (listed alphabetically below). However, in contrast with EGFR/ALK, targeted drugs for these molecular subgroups have largely been evaluated/approved after phase I/II trials and in the relapse setting.

1. **BRAF** mutations: Dabrafenib+trametinib is approved for BRAF V600E mutation-positive NSCLC with similar ORRs (63%) in pretreated (mPFS, 9.7 months) and treatment-naïve (mPFS, 10.9 months) patients (NCT01336634). Vemurafenib (NCT01524978; NCT02304809) showed inferior efficacy.

2. **HER2 (ErbB2)** mutations: Trastuzumab deruxtecan (n=91, ORR 55%, mPFS 8.2 months; NCT02675829; under priority review by the FDA at the time of publication) and Pyrotinib (n=60, ORR 30%, mPFS 6.9 months; NCT03505710; available only in China) have shown 'promising' activity.

3. **KRAS G12C** mutations: Sotorasib (CodeBreaK100[NCT03600883]), approved by the FDA and the EMA as a second-line therapy, is associated with an ORR of 32%, a mPFS of 6.3 months and OS of 12.4 months. Adagrasib (KRYSTAL-1 [NCT03785249]) has also received FDA 'breakthrough therapy designation'.

4. **MET** exon 14 skipping: Capmatinib (GEOMETRY Mono-1 [NCT02414139]) showed a higher ORR for treatment-naïve patients (68% versus 41% pretreated), while Tepotinib responses (VISION [NCT02864992]) were similar (44% treatment-naïve, 48% pre- treated) for MET exon 14 'skipping' mutations.

5. **NTRK** (Neurotrophic tyrosine receptor kinase) fusions/rearrangements;
Given its rarity, efficacy was demonstrated by pooled analysis of three phase I/II trials involving pretreated and treatment-naïve patients with NTRK fusion-positive solid tumours for both Entrectinib (ORR 70%) (STARTRK-1 [NCT02097810], STARTRK-2 [NCT02568267] and ALKA-372-001 [EudraCT:2012-000148-88]) and Larotrectinib (ORR 75%) (NCT02122913, NCT02637687, NCT02576431).

6. **RET** fusions/rearrangements:Selpercatinib(RR64%;LIBRETTO-001 [NCT03157128]) and pralsetinib (ORR 61%; ARROW [NCT03037385]) are effective for RET-rearranged lung and thyroid cancers.

7. **ROS1** fusions/rearrangements: Similar to the ALK timeline, Crizotinib was the first ROS1 inhibitor to be approved (phase I trial: PROFILE 1001 [NCT00585195]; ORR 72%, mPFS 19 months), with identical outcomes in another, phase II trial (NCT01945021). Unlike ALK, ceritinib effectiveness was primarily for Crizotinib-naïve patients (NCT01964157). Lorlatinib efficacy was also more pronounced for Crizotinib-naïve than Crizotinib-pretreated patients (ORR 62% ver- sus 35%; mPFS 21 versus 8.5 months; NCT01970865). Entrectinib approval was based on pooled analysis of STARTRK-1, STARTRK-2 and ALKA-372-001 trials (ORR 67%, mPFS 16 months).

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
IA1337	TTF-1	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Transport at ambient (18-25°C)	Diagnosis of Thyroid/ Lung Cancer
YB1290	MET	Formalin fixed paraffin embedded tissue block	6 Days	FISH	Transport at ambient (18-25°C)	For NSCLC patients developed resistance against TKI and crizotinib therapy.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
P00099	CŌREprime Lung Panel 1	ALK (IHC) ,EGFR (PCR)	FFPE Block	Cut-off 1 PM, report next day 8 PM	Multiple Technologies	Transport at ambient (18-25°C) temperature
P00100	CŌREprime Lung Panel 2	EGFR (PCR), ALK (IHC), ROS1 (IHC)	FFPE Block	Cut-off 1 PM, report next day 8 PM	Multiple Technologies	Transport at ambient (18-25°C) temperature

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
P00013	EGFR + ALK Fusion	EGFR (PCR), ALK (FISH)	Formalin fixed paraffin embedded tissue block	6 Days	Real Time Polymerase Chain Reaction & Fluorescence In Situ Hybridization	Clinical history mandatory.	Transport at ambient (18-25°C) tempera-ture	Diagnosis and therapeutic indcation in cases of NSCLC
ME1060	EGFR Somatic Mutation (Exon 18-21) Analysis		Formalin fixed paraffin embedded tissue block	5 Days	Real-Time Polymerase Chain Reaction(PNA RT-PCR)	Clinical history mandatory.	Transport at ambient (18-25°C) tempera-ture	For identifying non small cell lung cancer patients who could be benefited from TKI therapy.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00098	Pulmo DDx Comprehen-sive Panel	Pulmo DDX (IHC), EGFR Mutation Analysis (PCR), ALK (FISH)	FFPE Block	6 Days	IHC, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C)	For diagnosis prognosis And treatment with TKI inhibitors
P00117	pulmoCORE 5 Gene Pan-el with MET (FISH)	EGFR, BRAF, c-MET, ALK & ROS1, MET(FISH)	FFPE tissue block		Fluorescence In Situ Hybridization, Next Generation Sequencing	Transport at ambient (18-25°C) temperature	
NA2470	pulmoCORE any 4 Mark-ers (High Reso-lution)	Choose any 4 from the following genes (EGFR, BRAF, c-MET, ALK & ROS1)	FFPE Block	12 Days	Next Generation Sequencing	Transport at ambient (18-25°C) temperature	
NA2469	pulmoCORE Basic Panel	EGFR, BRAF, c-MET, ALK & ROS1	FFPE Block	12 Days	Next Generation Sequencing	Transport at ambient (18-25°C) temperature	

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Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00141	pulmoCORE Extended Panel	EGFR, ALK, ROS1, BRAF & MET (Next Generation Sequencing), MET (FISH), PD-L1(SP263 Ventana) IHC	FFPE Block	12 Days	Immunohistochemistry, Next Generation Sequencing, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	EGFR, ALK, ROS1, BRAF & MET (Next Generation Sequencing) + MET (FISH) + PDL1 IHC
P00020	pulmoCORE Panel 1	EGFR (Mutation Analysis), ALK (IHC), ROS1 (FISH)	FFPE Block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC
P00027	pulmoCORE Panel 10	EGFR, ALK (FISH), ROS-1 (FISH), MET , HER2(FISH), PDL-1 (SP263)	FFPE Block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosis and therapy indication for lung carcinoma
P00061	pulmoCORE Panel 11	EGFR (Mutation analysis), ALK (IHC), ROS1 (FISH), MET (FISH)	FFPE Block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	
P00187	pulmoCORE Panel 12	EGFR Mutation Analysis, ALK (IHC), ROS1 (FISH), PDL1 SP263 (IHC), BRAF Mutation Analysis	FFPE Block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosis and therapeutic indication in cases of NSCLC
P00019	pulmoCORE Panel 2	EGFR (mutation analysis), ALK (FISH), ROS-1 (FISH)	FFPE Block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC
P00079	pulmoCORE Panel 4	EGFR, ALK (FISH), ROS1 (FISH), PDL1 SP263 (IHC), BRAF	FFPE tissue block	6 Days	Immunohistochemistry, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00105	pulmoCORE Panel 5	EGFR (Mutation Analysis), ALK (FISH), ROS1 (FISH), PDL1 SP263 (IHC)	Formalin fixed paraffin embedded tissue block	6 Days	IHC, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC
P00116	pulmoCORE Panel 6	EGFR (Mutation Analysis) , ALK (IHC) , ROS1 (FISH), PDL1 SP263 (IHC)	Formalin fixed paraffin embedded tissue block	6 Days	IHC, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC
P00026	pulmoCORE Panel 6	EGFR (mutation analysis), ALK (FISH), ROS1 (FISH), MET (FISH)	Formalin fixed paraffin embedded tissue block	6 Days	Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	Diagnosisand therapeutic indcation in cases of NSCLC
P00241	pulmoCORE Panel 8	EGFR (Mutation Analysis) , ALK (IHC) , ROS1 (IHC) , PDL-1 22C3 (IHC)	Formalin fixed paraffin embedded tissue block	5 Days	IHC, Polymerase Chain Reaction	Transport at ambient (18-25°C) temperature	

Components covered- EGFR | Mutation Analysis /ALK/ROS1 (D4D6 R) Rabbit Mab CST/PDL-1
For identifying non small cell lung cancer patients who could be benefited from TKI therapy.
Aid in identifying patients eligible for treatment with ALK Kinase Inhibitor
To identify NSCLC patients benefit from crizotinib therapy.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00242	pulmoCORE Panel 9	EGFR (Mutation Analysis), ALK (IHC), ROS-1 (FISH), PDL-1 22C3 (IHC)	Formalin fixed paraffin embedded tissue block	6 Days	IHC, Polymerase Chain Reaction, Fluorescence In Situ Hybridization	Transport at ambient (18-25°C) temperature	

Components covered - EGFR | Mutation Analysis /ALK/ROS1/PDL-1
For identifying non small cell lung cancer patients who benefited from TKI therapy.
Aid in identifying patients eligible for treatment with ALK Kinase Inhibitor
To identify NSCLC patients benefit from crizotinib therapy.

Test Code	Test Name	Sample Requirement	TAT	Method
NA2726	pulmoCORE 12 gene	Formalin fixed paraffin embedded tissue block	10 Days	Next Generation Sequencing

Hotspot genes: (SNVs and short indels): ALK, BRAF, EGFR, ERBB2, KRAS, MAP2K1, MET, NRAS, PIK3CA, RET, ROS1 and TP53.
Gene Fusions: ALK, METex14 skipping mutation, NTRK (1,2,3), RET and ROS1
CNV: MET Amplification.

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Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
P00884	pulmoCORE 12 gene + liquiCORE lung Panel	pulmoCORE 12 gene , liquiCORE lung Panel	FFPE block+ 2 Streck BCT/ Paxgene Tube with 9-9.5 mL Blood each. Do not fill till the end	15 Days	Next Generation Sequencing	Clinical history is mandatory	Transport at ambient (18-25°C) temperature. For Blood: Transport at 2 to 8°C temperature.
P00613	pulmoCORE 12 gene panel - 2	pulmoCORE 12 gene panel, PDL-1 SP263 (Ventana)	Formalin fixed paraffin embedded tissue block	10 Days	Next Generation Sequencing, Immunohisto-chemistry		
P00612	pulmoCORE 12 gene panel panel-1	pulmoCORE 12 gene panel, PDL-1 SP142 (Ventana)	Formalin fixed paraffin embedded tissue block	10 Days	Next Generation Sequencing, Immunohisto-chemistry		
P00882	pulmoCORE 12 gene reflex liquiCORE lung Panel			18 Days	Next Generation Sequencing	Clinical history is mandatory	For Blood: Transport at 2 to 8°C temperature.

Formalin fixed paraffin embedded tissue block+ 2 Streck BCT/Paxgene Tube with 9-9.5 mL Blood each. Do not fill till the end so as to avoid hemolysis.

Test Code	Test Name	Sample Requirement	TAT	Method
NA2707	pulmoCORE 20 gene Panel	Formalin fixed paraffin embedded tissue block	15 Days	Next Generation Sequencing

Hotspot genes : (SNVs and short indels): ALK, BRAF, EGFR, ERBB2, FGFR2, FGFR3, HRAS, KIT, KRAS, MAP2K1, MAP2K2, MET, MTOR, NRAS, PDGFRA, PIK3CA, RET and ROS1.

Gene Fusions: ALK, BRAF, EGFR, ERBB2, FGFR2, FGFR3, MET, NTRK (1,2,3), PDGFRA, RET and ROS1

(CNV) genes: ALK, BRAF, EGFR, ERBB2, FGFR2, FGFR3, KIT, KRAS, MET, PDGFRA, PIK3CA and MYC

PROSTATE CARCINOMA

In metastatic prostate cancer, several mutations and therapeutic targets have been identified. Some of these include:

1. **Androgen receptor (AR) mutations:** Mutations in the AR gene can lead to resistance to hormonal therapies, such as androgen deprivation therapy (ADT). These mutations can cause the AR to be constitutively active, allowing the cancer cells to continue growing even in the absence of androgens. Therapeutic strategies targeting AR mutations include next-generation anti-androgens, such as enzalutamide and abiraterone, which can inhibit AR signaling. Fusion genes (TMPRSS2–ERG) and transcription factors (FOXP1, NKX3.1) that promote tumour-cell pro- liferation and survival, and prostate-specific antigen (PSA) expression.

   Novel hormonal agents targeting the AR pathway, either by inhibiting steroid synthesis (abiraterone) or by AR antagonists (enzalutamide, darolutamide, apalu- tamide), has extended the treatment options and significantly prolonged OS in metastatic hormone-sensitive PC, and non-metastatic and metastatic castration-resistant prostate cancer (CRPC).

2. **DNA repair gene mutations:** Mutations in DNA repair genes, such as BRCA1, BRCA2, and ATM, have been found in a subset of metastatic prostate cancers. These mutations impair the ability of cells to repair DNA damage, making them more susceptible to certain targeted therapies. Poly ADP-ribose polymerase (PARP) inhibitors, such as olaparib and rucaparib, have shown efficacy in treating prostate cancers with DNA repair gene mutations.

3. **PTEN loss:** PTEN is a tumor suppressor gene that is frequently lost or mutated in prostate cancer. Loss of PTEN function can activate signaling pathways that promote cancer cell survival and growth. Therapies targeting the PI3K/AKT/mTOR pathway, such as mTOR inhibitors (e.g., everolimus) and PI3K inhibitors like buparlisib, are being investigated as potential treatments for prostate cancers with PTEN loss.

   Loss of PTEN is seen in 15%-40% of PCs (depending on the detec- tion method) and can occur as a homozygous deletion in early disease. PTEN loss is associated with aggressive metastatic disease and other adverse outcomes. A phase III trial (NCT03072238) in mCRPC patients compared ipatasertib (AKT inhibitor) plus the novel AR-targeted agent abiraterone and prednisone, versus placebo plus abiraterone and pred- nisone. Results reported a significantly prolonged rPFS by immunohis- tochemistry in the population with tumour PTEN loss.

4. **Neuroendocrine differentiation:** In some cases of metastatic prostate cancer, the cancer cells may undergo neuroendocrine differentiation, leading to a more aggressive and treatment-resistant phenotype. Therapeutic options for neuroendocrine prostate cancer include agents that target neuroendocrine markers, such as enzalutamide and platinum-based chemotherapy.

5. **Immunotherapies:** Immune checkpoint inhibitors, such as pembrolizumab and nivolumab, have shown activity in a subset of CRPC patients with mismatch repair (MMR) deficiency or high tumor mutational burden (TMB). These drugs help unleash the body's immune system to attack cancer cells.

6. **Radiopharmaceuticals:** Targeted radiopharmaceuticals, like radium-223 (Xofigo), can deliver radiation directly to bone metastases in CRPC, providing palliative benefit and potentially extending survival.

HRR (Homologous Recombination Repair) mutated cancers and BRCA (Breast Cancer) mutated cancers are related but distinct concepts. HRR mutated cancers refer to cancers that have mutations in genes involved in the homologous recombination repair pathway, which is responsible for repairing DNA double-strand breaks. These mutations can occur in various genes, such as BRCA1, BRCA2, RAD51, PALB2, and others. When these genes are mutated, the ability of cells to repair DNA damage is impaired, leading to an increased risk of developing cancer. HRR mutated cancers can occur in various types of tissues and are not limited to breast or ovarian cancers.

On the other hand, BRCA mutated cancers specifically refer to cancers that have mutations in the BRCA1 or BRCA2 genes. These genes are a subset of the HRR genes and are well-known for their association with an increased risk of breast and ovarian cancers. Mutations in BRCA1 or BRCA2 genes can significantly elevate the lifetime risk of developing these specific cancers. However, it's important to note that not all breast or ovarian cancers are caused by BRCA mutations, as other genetic and environmental factors can also contribute to the development of these cancers.

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PROSTATE

(NEURO ENDOCRINE CARCINOMA)

Neuroendocrine carcinoma of the prostate is a rare and aggressive form of prostate cancer that is typically resistant to standard prostate cancer treatments. Due to its aggressive nature, treatment options for neuroendocrine carcinoma of the prostate may differ from those used for typical prostate adenocarcinoma.

1. **Chemotherapy:** Chemotherapy drugs such as cisplatin and etoposide are commonly used to treat neuroendocrine carcinoma. These drugs can help shrink tumors and slow down the progression of the disease.
2. **Hormone therapy:** Although neuroendocrine carcinoma is typically less responsive to hormone therapy compared to typical prostate adenocarcinoma, some patients may still benefit from hormone therapy drugs such as androgen receptor antagonists or LHRH agonists.
3. **Targeted therapy:** Targeted therapies that specifically target certain genetic mutations or proteins may be considered. For example, PARP inhibitors or immunotherapy drugs may be used in some cases.
4. **Radiation therapy:** Radiation therapy may be used to help relieve symptoms or target specific areas where the cancer has spread, such as bone metastases.

Table 3: Comparison of gene testing strategies [9, 43]

Method of Testing	Sample Required	Advantage	Limitations
Germline Testing	Blood or Saliva	• Germline mutations detected reliably • Large panels of tests available which can detect germline mutations in mCRPC	Unable to detect somatic mutations relevant to treatment selection
Somatic Testing	Tumor Tissue/ metastatic tissue	• Can detect germline and somatic mutations, • Tumor heterogeneity might result which might be relevant for initiating targeted therapies • Provides information about translocations and amplifications • A multigene panel of tests available with testing for >300 genes possible	Tumor heterogeneity might result in missing late somatic mutations especially if testing is conducted on archival sample• Somatic testing is less sensitive, and thus robustly validated somatic testing is require
Ct DNA Testing	Plasma	• Can identify germline and somatic mutations relevant for targeted therapies. • Minimally invasive process for sample in collection as the biomaterial required is blood • Provides insight into the subclonal population • Gene that may be more relevant to current disease	• Not enough evidence about shedding in mCRPC pattern of cDNA in blood circulion • Availability of robustly validated HRR gene panetest • Panels may not have nonactionable genes still relevantor PCa • Chance of missing a germline variant if not sequencing the whole gene due to small size of ctDNA

Test Code	Test Name	TAT	Method	Special Instructions	Shipping & Stability Conditions
IA1193	Androgen Receptor (AR)	4 Days	IHC	Clinical history, Histopathology report, Any radiological findings	Transport at ambient (18-25°C) temperature

Test Code	Test Name	Sample Requirement	TAT	Shipping & Stability Conditions	Clinical Utility
IA1860	ERG	Formalin fixed paraffin embedded tissue block	4 Days	Transport at ambient (18-25°C) temperature	Diagnosis of Prostatic Adeno Carcinoma

Test Code	Test Name	Sample Requirement	TAT	Special Instructions
YB2535	NTRK 1/2/3 Fusions Gene Panel	Submit formalin fixed paraffin embedded tissue block or three 4 micron sections on Poly-L-Lysine coated slides.	5 Days	Transport at ambient (18-25°C) temperature

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions
IA1425	AMACR	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Transport at ambient (18-25°C) temperature

Test Code	Test Name		Sample Requirement	TAT	Method	Shipping & Stability Conditions
OA2670	Homologous Recombination Deficiency	HOXb	FFPE+ 4ml Peripheral Blood (EDTA vacutainer)	3-4 Weeks	MLPA, Next Generation Sequencing	Ambient (18-25°C) temperature. Do not Freeze.

Test Code	Test Name	Sample Requirement	TAT	Special Instructions	Shipping & Stability Conditions
NA2452	BRCA1 and BRCA2 Somatic Gene Sequencing Panel	Formalin fixed paraffin embedded tissue block or at least 10 section of accompanying pathology report	15 Days	NGS	Transport at ambient (18-25°C) temperature

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
NA3166	HRR Gene Panel (Germline) Extended	2ml Peripheral Blood (EDTA Vacutainer)	2 Weeks	Next Generation Sequencing	Clinical history is mandatory	Transport in 2 to 8°C (with cold pack)

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
NA3163	HRR Somatic reflex to HRR Germline	FFPE block + Peripheral Blood	16 Days	NGS	Clinical history is mandatory.	Tissue-Ambient (18-25°C) temperature. Do not Freeze

ATM, MRE11, BARD1, NBN, BRCA1, PALB2 , BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53, FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
NA3167	HRR Gene Panel (Somatic) Extended	FFP	2 Weeks	NGS	Clinical history is mandatory.	Ambient (18-25°C) temperature. Do not Freeze

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

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Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions
NA2577	HRR Gene Panel (Somatic)	FFPE	2 weeks	NGS	Ambient (18-25°C) temperature. Do not Freeze

ATM, MRE11, BARD1, NBN, BRCA1, PALB2 , BRCA2, PPP2R2A, BRIP1, RAD51B , CDK12 , RAD54L, CHEK2, TP53, FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
NA3166	HRR Gene Panel (Germline) Extended	2ml Peripheral Blood (EDTA Vacutainer)	2 Weeks	NGS	Clinical history is mandatory.	Transport in 2 to 8°C (with cold pack)

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
NA2579	HRR Gene Panel (Germline)	2ml Peripheral Blood (EDTA Vacutainer)	2 Weeks	NGS	Clinical history is mandatory.	Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53, FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
P00397	FUS-DDIT3	FFPE+ Peripheral Blood	2 Weeks	NGS	Clinical history is mandatory.	Ambient (18-25°C) temperature. Do not Freeze.

ATM, MRE11, BARD1, NBN, BRCA1, PALB2, BRCA2, PPP2R2A, BRIP1, RAD51B, CDK12, RAD54L, CHEK2, TP53, FANCD2, RAD51C, RAD51D

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
P01065	HRR Gene Panel (Somatic + Germline) Extended	FFPE block + Peripheral Blood	2 Weeks	NGS	Clinical history is mandatory.	Tissue-Ambient (18-25°C) temperature. Do not Freeze. +Blood-Transport in 2 to 8°C (with cold pack)

ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK2, FANCD2, MRE11, NBN, PALB2, PPP2R2A, RAD51B, RAD54L, TP53, CHEK1, FANCL, RAD50, RAD51, RAD51C, RAD51D, RAD52, XRCC2, KRAS, PIK3CA, POLD1, POLE, PTEN

RENAL CELL CA

Clear Cell RCC – Multiples Kinases Involved in the Angiogenesis Pathway.

VEGF: VEGF-C and its receptor, VEGFR-3, are involved in lymph- angiogenesis. Expression of these receptors is seen in endothelial and tumour cells. VEGF-C can induce lymphangiogenesis, lymphovascular invasion and metastasis.

PDGF (Platelet-derived growth factor): promotes tumour neoangiogenesis, which plays a role in tumour progression. PDGF is induced by inactivation of the VHL pathway. High expression of PDGF-β in tumour tissue is associated with poor prognosis for patients with clear cell RCC (ccRCC).

FGFs (Fibroblast growth factor): FGFs and FGFR2 regulate cel- lular proliferation, survival, migration and differentiation, but also promote the formation of blood vessels and are upregulated upon resistance to VEGF-targeted treatment. Endothelial cells respond to FGFs via integrins (cell adhesion) and promote cell adhesion and pro- liferation. FGF/FGFR signalling plays a role in angiogenesis, mitosis and proliferation in the RCC pathway.

mTOR (Mammalian target of Rapamycin): PI3K/AKT/mTOR pathway activation is a result of signal transduction by growth factors. Genitourinary Malignancies 159

It is one of the signalling pathways characteristic of most cells. Phosphatase and tensin homologue (PTEN) is a key suppressor of the PI3K/AKT/mTOR signalling cascade. Its mutations and deletion in primary RCC have been associated with an increased risk of metastasis.

HIF 2 alpha (HIF-2α): The VHL protein (pVHL) is closely related to ccRCC carcinogenesis, as is its function as a subunit of the E3 ubiqui- tin ligase complex, which mediates the degradation of HIF-2α. Under hypoxic conditions, HIF-2α forms an active transcription factor (by binding to HIF-1β) that upregulates expression of hypoxia-inducible genes, such as VEGF.

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
IA1787	PAX2	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Renal Cell Carcinoma
MM1788	Wilms tumor (WT1) gene	EDTA Whole Blood / EDTA Bone Marrow 3ml	10 Days	IHC	Clinical history is mandatory	Transport in 2 to 8°C (with cold pack)	
IA1788	WT1 (Wilms Tumor)	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Kidney Tumors
Wilm's tumour suppressor gene1 (WT1) causes an embryonic malignancy of the kidney. It occur in both sporadic and hereditary forms. Inactivation of WT1 causes Wilm's tumour, and Denys-Drash syndrome (DDS), leading to nephropathy and genital abnormalities							

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PAILLARY UROTHELIAL CARCINOMA
(PRCC Type 1 and Type 2)

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
IA1437	CK7	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Transport at ambient (18-25°C) temperature	Diagnosis of Lung, Salivary gland, Uterus, Thyroid, Breast, Ovary Type 1 Papillary Renal Cell CA (pRCC)

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
IA1435	CK20	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Large Intestinal Cancers.,
IA1440	E-Cadherin	FFPE block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Breast cancer, Type 2 Papillary Renal Cell CA (pRCC)
IA1425	AMACR	FFPE block	4 Days	IHC	Transport at ambient (18-25°C) temperature	AMACR (P504S) is a positive marker for Prostatic adenocarcinomas which along with basal cell markers like 34 Beta E12 and p63 helps to confirm the diagnosis of a small focus of prostate carcinoma in needle biopsies. Expressed in Papillary Renal Cell Carcinoma.	

https://www.sciencedirect.com/topics/medicine-and-dentistry/papillary-renal-cell-carcinomas

EPITHELIAL UROTHELIAL CARCINOMA

CDKN2A is a tumor suppressor gene. It is a Variants of Uncertain Significance (VUS) here. CTNNB1 explains the possibility of this cancer being hereditary. It's a rare mutation, but if found they are extremely sensitive to Cisplatin, Cyclophosphamide, Vincristine, Gemcitabine, and Radiation Therapy. (Here it is detected and pathogenic) Since PIK3CA [NM_006218.4] is detected and pathogenic, it would respond to ALPELISIB in advanced or metastatic stage.

Gene (Exon) [Transcript]	Variant (Amino acid Alteration)	Variant (Coding)	Variant Allele Frequency (VAF)	Variant Effect*	Variant Classification (AMP)	Variant Classification (ACMG)#	Associated FDA Approved Therapies
PIK3CA (10) [NM_006218.4]	p.Glu545Lys (p.E545K)	c.1633G>A	10.9%	GOF	Tier2	Pathogenic	Available (Please refer to page no. 2 for more details)
CTNNB1 (3) [NM_001904.4]	p.Ser45Phe [p.S45F]	c.134C>T	8.2%	GOF	Tier2	Pathogenic	NA
TP53 (5) [NM_000546.6]	p.Cys135Tyr (p.C135Y)	c.404G>A	8.9%	LOF	Tier1	Likely pathogenic	NA
CDKN2A (2) [NM_001195132.2]	p.His83Tyr (p.H83Y)	c.247C>T	12.1%	–	Tier3	VUS	NA

Trial	Experimental Therapy	Control Arm	Primary End Point	Pfs	Os
Sunitinib vs IFN-α n=750 NCT00083889	Sunitinib	Everolimus	PFS	11 vs 5 mo CHR 0.42, 95% CI 0.32-0.54, p < 0.001)	26.4 vs 21.8 mo CHR 0.821, 95% CI 0.673-1.001, p = 0.05)
Sunitinib vs pazopanib n=1110 NCT00720941	Pazopanib	Sunitinib	PFS (non-inferiority)	8.4 vs 9.5 mo CHR 1.05, 95%6 CI 0.90-1.22)	28.4 vs 29.3 mo CHR 0.91, 95% CI 0.76 1.08, p = 0.28)
Tivozanib vs sorafenib n=517 NCT01030783	Tivozanib	Sorafenib	PFS	11.9 vs 9.1 mo (HR 0.797, 95% CI 0.639-0.993, p = 0.042)	28.8 vs 29.3 mo (HR 1.245, 95% CI 0.954-1.624, p = 0.105)
CheckMate 214 n=1096 NCT02231749	Ipilimumab + nivolumab	Sunitinib	PFS, OS IMDC risk score: intermediate/ poor RISK	11.6 vs 8.3 mo (HR 0.75, 95% CI 0.62-0.90, p = 0.0015)	55.7 vs 38.4 mo (HR 0.72, 95% CI 0.62-0.85, p < 0.0001)
KEYNOTE-426 n=961 NCT02853331	Pembrolizumab + axitinib	Sunitinib	PFS /OS	15.7 vs 11.1 mo (HR 0-68, 959 CI 0.58-0.8, p < 0-0001)	45.7 vs 40.1 mo (HR 0.73, 95% CI 0.60-0.88), p < 0.001)
CheckMate 9ER n=651 NCT03141177	Nivolumab + cabozantinib	Sunitinib	PFS	16.6 vs 8.3 mo (HR 0.51, 959 CI 0.41-0.64, p < 0.001)	37.7 vs 34.3 mo CHR 0.7, 95% CI 0.55-0.9, p = 0.001)
CLEAR n=1069 NCT04704219	Pembrolizumab + lenvatinib vs Lenvatinib + Everolimus	Sunitinib	PFS	23.9 vs 9.2 mo (HR 0.39, 95% CI 0.32-0.49, p < 0.001)	24 mo: 79.2% vs 70.496 (HR 0.66, 95% CI 0.49-0.88, p = 0.005)

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THYROID CA

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
IA1337	TTF-1	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Diagnosis of Thyroid/Lung Cancer

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
YB2534	NTRK 1 Gene Rearrangement	Formalin fixed paraffin embedded tissue block	5 Days	Fluorescence In Situ Hybridization	Clinical history is mandatory	Transport at ambient (18-25°C) temperature

NTRK1 rearrangements have been shown to be involved in thyroid carcinogenesis. Several studies show that NTRK1 rearrangements may be associated with a worse clinical course when compared with NTRK1 rearrangement-negative Papillary Thyroid Carcinomas. The treatment of patients with NTRK fusion-positive cancers with a NTRK inhibitor, such as the FDA approved drugs Larotrectinib or Entrectinib, is associated with high response rates regardless of NTRK gene, fusion partner, and tumor type. Hence, detection of NTRK1 rearrange-ments by in situ Hybridization may be of prognostic and therapeutic significance.

PANCREAS CA

Several genes are targeted in pancreatic cancer treatment, including:

1. **KRAS:** Mutations in the KRAS gene are found in the majority of pancreatic cancers, making it a prime target for therapeutic interventions aimed at inhibiting the aberrant signaling pathways associated with KRAS mutations.
2. **EGFR (Epidermal Growth Factor Receptor):** Drugs like erlotinib target EGFR, which is overexpressed in some pancreatic cancers. These drugs work by blocking the signaling pathways that promote cancer cell growth and proliferation.
3. **BRCA1/BRCA2:** PARP inhibitors, such as olaparib, are used in patients with pancreatic cancer who have mutations in the BRCA1 or BRCA2 genes. These drugs exploit deficiencies in DNA repair mechanisms to selectively kill cancer cells.
4. **mTOR (Mammalian Target of Rapamycin):** Everolimus is an mTOR inhibitor that can be used in pancreatic cancer treatment to block the mTOR signaling pathway, which is involved in cell growth and survival.
5. **HER2 (Human Epidermal Growth Factor Receptor 2):** Some pancreatic cancers overexpress HER2, making them potential targets for HER2-targeted therapies such as trastuzumab.

These are just a few examples, and ongoing research continues to identify new targets for pancreatic cancer treatment.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
YB2535	NTRK 1/2/3 Fusions Gene Panel	NTRK1 (1q21.3), NTRK2 (9q21.3), NTRK3 (15q25.3)	Submit formalin fixed paraffin embedded tissue block or three 4 micron sections on Poly-L-Lysine coated slides.	5 Days	FISH	Transport at ambient (18-25°C) temperature

Test Code	Components	Sample Requirement	TAT	Method
P00616	TP53, KRAS, NRAS, BRAF, ERBB2, NTRK(1,2,3), PIK3CA, MSI-PCR	Formalin-fixed paraffin-embedded tissue block, 3 mL Peripheral Blood in EDTA (Lavender Top) Tube	15 Days	Next Generation Sequencing, PCR

Gene rearrangements that involve NTRK1/2/3 can generate fusion oncoproteins that contain the kinase domains of TRKA/B/C, respectively. In NSCLC, NTRK fusions are estimated to occur at a frequency of approximately 0.1% to 1%. The TRK inhibitors namely, Larotrectinib (LOXO-101) and Entrectinib (RXDX-101) are oral tyrosine kinase inhibitor that have high selectivity and potency for TRKA, TRKB, and TRKC. The detection of NTRK1/2/3 translocations by Fluorescence in situ Hybridization (FISH) may be of diagnostic and therapeutic relevance.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions
P00078	ALK IHC + ROS1 IHC	ALK IHC + ROS1 IHC	FFPE	4 Days	IHC	Clinical history, Histopathology report, any radiological findings	Transport at ambient (18-25°C) temperature

Test Code	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA2452	BRCA1 and BRCA2 Somatic Gene Sequencing Panel	Formalin fixed paraffin embedded tissue block or at least 10 section of Formalin fixed paraffin embedded tissue block of thickness 5-10Âµm with marked area of enriched tumor and accompanying pathology report	15 Days	Next Generation Sequencing	Transport at ambient (18-25°C) temperature

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Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
MM1119	MSI	Formalin fixed paraffin embedded tissue block, 3 mL Peripheral Blood in EDTA (Lavender Top) Tube.	6 Days	PCR	Clinical history, Medical prescription	Blood : Stable at - 4°C for 72 hrs, FFPE Block : Ambient temperature. Transport in 2 to 8°C (with cold pack). Stable at 4°C for 1 week	Microsatellite instability (MSI) is a hypermutable 15% of all colorectal cancers; 3% are of these are associated with Lynch syndrome and the other 12% are caused by sporadic, acquired hypermethylation of the promoter of the MLH1 gene, which occurs in tumors with the CpG island methylator phenotype

Some current drugs used in the treatment of pancreatic cancer include:

1. **Gemcitabine:** A chemotherapy drug often used as a first-line treatment for pancreatic cancer.
2. **Abraxane (nab-paclitaxel):** Another chemotherapy drug commonly used in combination with gemcitabine for the treatment of pancreatic cancer.
3. **FOLFIRINOX:** A chemotherapy regimen consisting of a combination of drugs including folinic acid, fluorouracil, irinotecan, and oxaliplatin. It is used for advanced pancreatic cancer.
4. **Erlotinib:** A targeted therapy drug that inhibits the epidermal growth factor receptor (EGFR), used in combination with gemcitabine for advanced pancreatic cancer.
5. **Everolimus:** An mTOR inhibitor used in cases where standard chemotherapy has failed.
6. **Olaparib:** A PARP inhibitor used in pancreatic cancer patients with BRCA mutations.
7. **Trastuzumab:** A targeted therapy drug used in pancreatic cancer patients whose tumors overexpress the HER2/neu protein.

These drugs are often used in combination with each other or with other treatment modalities such as surgery and radiation therapy, depending on the stage and characteristics of the cancer. Treatment decisions are made on a case-by-case basis by healthcare providers. Some current drugs used in the treatment of pancreatic cancer include:

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CNS /GLIOMAS

Some targeted therapy options are available for patients with selected CNS tumours. Oncogenic NTRK fusions are primarily described in paediatric gliomas ofall grades, ependymoma, glioneuronal tumours and adult glioblastoma.

Although only a small subpopulation of tumours harbour NTRK fusions, they represent a viable target for personalised treatment approaches. Intracranial activity of NTRK inhibitors was shown in paediatric and adult primary brain tumours with an acceptable safety profile

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
ME1102	MGMT	FFPE tissue block	10 Days	Methylation Specific PCR	Clinical History is mandatory.	Transport at ambient (18-25°C) temperature	It is a strong predictive factor of favourable survival in Glioblastoma multiforme (GBM) patients undergoing chemotherapy with alkylating agents.
YB1104	1p/19q (co-deletion)	FFPE tissue block	7 Days	Fluorescence In Situ Hybridization	Clinical history is mandatory	Transport at ambient (18-25°C) temperature	Oligodendroglioma tumors exhibit simultaneous deletions of 1p and 19q in two thirds of cases. These deletions have been associated with a favorable response to chemotherapy with long survival.
IA1395	ATRX	FFPE tissue block	4 Days	IHC	Clinical history, Histopathology report, Any radiological findings	Transport at ambient (18-25°C) temperature	Astrocytomas - diagnostic, predictive, and prognostic marker applications
MM1101	IDH 1 & 2 Mutation Analysis	FFPE	8 Days	PCR Sequencing		Transport at ambient (18-25°C)	The IDH1 mutations are considered to be the earliest events in the development of oligodendrogliomas. IDH-mutated cancers are associated with younger age at diagnosis in most glioma tumor. Glioma patients with IDH mutations survive longer than patients with wild-type IDH.
IA1103	IDH 1 R132H	FFPE Block	4 Days	IHC	History, Histopathology report. Any radiological findings	Transport at ambient (18-25°C) temperature	Distinguish reactive Gliosis from Low Grade Glioma

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Table 1. Overview on NTRK Inhibitor Trials in Glioma.

Disease Entity	Drug	Response Rate	Survival/DoR	NCT Trial Number
Glioma, glioblastoma, astrocytoma, not otherwise specified	Larotrectinib	ORR: 11% DCR: 100%	DoR: 2.8-9.2 mo	NCT02637687 NCT02576431
High-grade glioma, low-grade glioma, glioneuronal tumours, neuroepithelial tumours, CNS neuroblastoma, small round blue cell tumours	Larotrectinib	ORR: 30% DCR: 73%	Median PFS: 18.3 mo DoR: not reached	NCT02637687 NCT02576431
CNS tumours (paediatric), not otherwise specified	Entrectinib	ORR: 75%	Not reported	NCT02650401

Abbreviations: CNS, central nervous system; DCR, disease control rate; DoR, duration of response; mo, months: NTRK, neurotrophic tyrosine receptor kinase; ORR, overall response rate; PFS, progression-free survival.

Table 2. Overview of Trials in BRAF-mutant Brain Tumours.

Disease Entity	Drug	Response Rate	Survival/DoR	NCT Trial Number
BRAF V600E-mutant gliomas (diffuse glioma, glioblastoma, pleomorphic xanthoastrocytoma, anaplastic ganglioglioma, pilocytic astrocytoma, not otherwise specified, high-grade glioma)	Vemurafenib	ORR: 25%	Median PFS: 5.5 mo	NCT02637687 NCT02576431
BRAF V600E-mutant paediatric low-grade glioma	Dabrafenib	ORR: 41%	Not reported	NCT02637687 NCT02576431
BRAF V600E-mutant high-grade glioma	Dabrafenib + trametinib (MEK inhibitor)	ORR: 26%	Median PFS: 1.9 mo DoR: 212 mo in 62.5% of patients	NCT02650401
Papillary craniopharyngioma (BRAF-mutant)	Vemurafenib + cobimetinib (MEK inhibitor)	ORR: 93% (central review), 93.75% (local review)	Median PFS: not reached	NCT03224767

Abbreviations: CNS, central nervous system; DCR, disease control rate; DoR, duration of response; mo, months: NTRK, neurotrophic tyrosine receptor kinase; ORR, overall response rate; PFS, progression-free survival.

Table 3. Overview of Trials in IDH-mutant Gliomas.

Disease Entity	Drug	Response Rate	Survival/DoR	NCT Trial Number
Diffuse glioma, IDH-mutant	Ivosidenib	Non-contrast enhancing glioma: ORR: 2.9% DCR: 85.7% Contrast enhancing glioma: DCR: 45.2%	Non-contrast enhancing glioma: Median PFS: 13.6 mo Contrast enhancing glioma: Median PFS: 1.4 mo	NCT02073994

Disease Entity	Drug	Response Rate	Survival/DoR	NCT Trial Number
Diffuse glioma, IDH-mutant	Vorasidenib	ORR: 13.6% SD: 77.3%	60.5% of patients were progression-free and alive at 24 months.	NCT02481154
Astrocytoma, WHO grade 3 or4, IDH-mutant	IDH1-vac	Peripheral immune response: 93.3%	63% 3-year PFS	NCT02454634

Abbreviations: DCR, disease control rate; DoR, duration of response: IDH, isocitrate dehydrogenase: IDHI-vac, IDHI (RI32H) peptide vaccine; mo, months; ORR, overall response rate; PFS, progression-free survival; SD. stable disease; WHO, World Health

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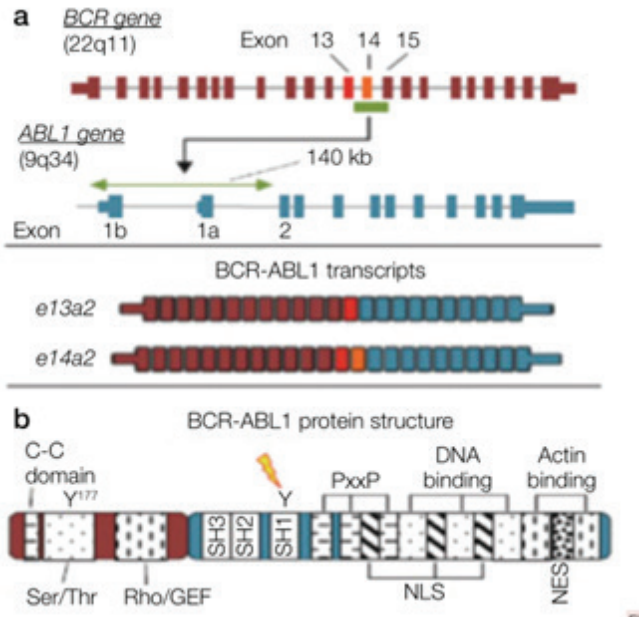
SMALL ROUND CELL TUMORS

Test Code	Test Name		Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
IA1791	Beta-catenin (EP35 Rabbit Monoclonal)	$ 32.26	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at Ambient (18-25°C) temperature	Overexpression of beta-catenin, a cytoplasmic signaling protein, is characteristic of neuroblastoma, in contrast to most other small round blue cell tumors. Desmoid tumors may show both nuclear and cytoplasmic expression for beta-catenin.

MESOTHELIOMA

Test Code	Test Name		Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
IA1796	Ber- Ep4 (EpCAM)	$ 32.26	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at Ambient (18-25°C) temperature	Differential diagnosis of mesothelioma versus adenocarcinoma

CHRONIC MYELOID LEUKAEMIA



The prevalence of CML will almost double in the next 30 years, due to survival improvement and increasing life expectancy.

Three bcr/abl1 TKIs are registered and available in most European countries as first-line therapy for CML in ie: Imatinib, Nilotinib , Dasatinib. The second-generation TKIs Nilotinib and Dasatinib reveal faster cytogenetic and molecular responses compared with imatinib; the 5-year overall survival is, however, not statistically significantly DIFFERENT.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
NA2873	Chronic Myeloproliferative Disorder Gene Panel (CMPD)	Hotspot genes: ABL1, CBL, CSF3R, JAK2, KIT, MPL Full genes: CALR Gene fusions: PDGFRA	5 mL Bone marrow/ Peripheral Blood in EDTA(Lavender Top) in two separate vials	15 Days	Next Generation Sequencing	Transport in 2 to 8Â°C (with cold pack)

We can find BCR-ABL1 for CML; JAK2V617F & JAK2 exon 12 in V617F-negative case for Polycythemia Vera; JAK2V617F, CALR, MPLW515 for Primary myelofibrosis (PMF) & Essential thrombocythemia (ET); PDGFRA Fusion for CEL/HES, CSF3R for Chronic neutrophilic leukemia.

Test Code	Test Name	Sample Requirement	TAT	Special Instructions	Shipping & Stability Conditions	Clinical Utility
YB1122	PDGFRA, (4q12) Gene Rearrangement	3-4 ml Bone Marrow/ Peripheral Blood in EDTA(Lavender Top), Sodium heparin (Green Top) Tube.	7 Days	Clinical history is mandatory.	Transport in 2 to 8°C (with cold pack) within 72 hrs.	For diagnosis of myeloproliferative/ myelodysplastic syndrome with eosinophilia.
YB1121	PDGFRB, (5q32-5q33) Gene Rearrangement	3-4 ml Bone Marrow/ Peripheral Blood in EDTA(Lavender Top), Sodium heparin (Green Top) Tube.	7 Days	Clinical history is mandatory.	Transport in 2 to 8°C (with cold pack) within 72 hrs.	For diagnosis of myeloproliferative/ myelodysplastic syndrome with eosinophilia.

Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
MM1003	BCR-ABL Kinase Domain Mutations	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top) Tube	7 Days	Polymerase Chain Reaction, Sequencing	Clinical history is mandatory, Old report number (if done from same lab)	Stable at 4°C for 72 hours. Transport in 2 to 8°C (with cold pack).	Detection of mutationin the Kinase domain of BCR-ABL and can have therapeutic indication. Also called as IRMA
NA1003	BCR-ABL Kinase Domain Mutations	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top) Tube	15 Days	Next Generation Sequencing	Clinical history is mandatory, Old report number (if done from same lab)	Stable at 4°C for 72 hours. Transport in 2 to 8°C (with cold pack).	
ME1000	BCR-ABL Qualitative	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top) Tube	3 Days	Real Time Polymerase Chain Reaction	Clinical history is mandatory, Old report number (if done from same lab)	Stable at 4°C for 72 hours. Transport in 2 to 8°C (with cold pack).	As a prognostic marker in ALL patients. Presence of BCR-ABL gene rearrangement is associated with poor prognosis.

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Test Code	Test Name	Sample Requirement	TAT	Method	Special Instructions	Shipping & Stability Conditions	Clinical Utility
ME1005	BCR-ABL Quantitative with p210 breakpoint	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top) Tube	3 Days	Real Time Polymerase Chain Reaction	Clinical history is mandatory	Stable at 4°C for 72 hours. Transport in 2 to 8°C (with cold pack).	confirms clinical diagnosis of Chronic Myeloid Leukemia (CML) patients to stratify patients for Imatinib therapy
ME1002	BCR-ABL Quantitative, International Scale [IS]	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top) Tube	3 Days	Real Time Polymerase Chain Reaction	Clinical history is mandatory, Old report number (if done from same lab)	Stable at 4°C for 72 hours. Transport in 2 to 8°C (with cold pack).	To confirm the diagnosis of CML & monitor the progress CML treatment
YB1004	BCR-ABL translocation [t(9:22)]	Detection of mutation in the Kinase domain of BCR-ABL and can have therapeutic indication. Also called as IRMA	5 days	Fluorescence In Situ Hybridization	Brief Clinical history is mandatory	Transport in 2 to 8°C (with cold pack) within 72 hrs.	Help diagnose chronic myelogenous leukemia (CML) or a type of acute lymphoblastic leukemia (ALL) Monitor treatment Detect resistance to therapy

MYELOMA

PLASMA CELL LYMPHOMA PANELS

Several mAbs such as daratumumab (anti-CD38), isatuximab (anti- CD38) and elotuzumab (anti-SLAMF7) and small molecules inhibitors such as first-in-class oral SINE selinexor, the oral proteasome inhibitor ixazomib and the BCL2 inhibitor venetoclax have shown activity in MM.

Daratumumab, initially approved as a single agent in 2015 for patients with R/R MM previously treated with a proteasome inhibitor and an immunomodulatory agent, was subsequently evaluated in different com- binations including first-line regimens.

Although MM is still an incurable disease, there is no doubt that it is also a disease with a high number of active new treatments.

B-cell maturation antigen (BCMA) is a specific biomarker of normal and malignant plasma cells and has been regarded as a target for the development of new therapies in MM, including ADCs, CAR-T cells and bispecific T-cell engagers (BiTEs). Among them, belantamab mafo- dotin-blmf, a BCMA-targeted ADC, and idecabtagene vicleucel, a first- in-class BCMA CAR-T cell therapy, have been approved by the FDA for patients with MM after at least four prior lines of treatment. Although MM is still an incurable disease, there is no doubt that it is also a disease with a high number of active new treatments.

B-cell maturation antigen (BCMA) is a specific biomarker of normal and malignant plasma cells and has been regarded as a target for the development of new therapies in MM, including ADCs, CAR-T cells and bispecific T-cell engagers (BiTEs). Among them, belantamab mafo- dotin-blmf, a BCMA-targeted ADC, and idecabtagene vicleucel, a first- in-class BCMA CAR-T cell therapy, have been approved by the FDA for patients with MM after at least four prior lines of treatment.

Test Code	Test Name	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
YB1122	CŌREprime Multiple Myeloma Diagnostic Panel	3mL Serum from 1 SST, 3 mL EDTA (Lavender Top)	Cut-off 11 AM, report same day 8 PM	Multiple Technologies	Ship refrigerated	Kappa/lambda light chains, free ,Immunofixation , Protien electrophoresis, Beta 2 microglobulin, CBC, BUN, Creatinine, Calcium, Albumin, LDH, Immunoglobulin profile

Creatinine, CBC, BUN, Calcium, Albumin, LDH, Beta-2-Microglobulin, Protein Electrophoresis, Immunofixation Electrophoresis, Immunoglobulin IgG, Immunoglobulin IgA, Immunoglobulin IgM, Kappa Free Light Chain, Lambda Free Light Chain.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
P00285	Multiple Myeloma Comprehensive Panel Quantitative, Serum	Beta 2 Microglobulin, Protein Electrophoresis, Immunofixation Electrophoresis, Immunoglobulin Profile, Kappa/Lambda- Free light chain	3mL Serum from 1 SST (Gel barrier tube). Separate Serum within 1 hour of collection	Sample by 1 pm report next day	Multiple Technologies	Room Temperature: 1 day, Refrigerated (2-8˚C): 7 days, Frozen (-20°C): 30 days

Immunofixation Electrophoresis can be used to identify abnormal bands in order to determine which type of antibody (immunoglobulin) is present. Immunnofixation Quantitative Includes: Immunofixation Quantitative-Protein electrophoresis, Immunofixation, IgG, IgM, , freelite and Beta 2 microglobulin

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Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions
BV1059	Multiple Myeloma Comprehensive Panel Quantitative, Urine	Protein Electrophoresis, Immunofixation, Immunoglobulin Profile, Kappa/Lambda- Free light chain	10 mL 24 Hrs Urine (Preferred) in Sterile Container without Preservatives, Spot Urine is also acceptable	Sample by Saturday, Report in 4 days	Multiple Technologies	Ship refrigerated or frozen

This assay is useful for diagnosing & monitoring patients with Monoclonal gammopathies. Protein electrophoresis alone is not considered an adequate screening test for Monoclonal gammopathies.
immunnofixation Quantitative.

Test Code	Test Name	Components	Sample Requirement	TAT	Method	Shipping & Stability Conditions	Clinical Utility
YB1072	Multiple Myeloma 7 Markers Panel	del17p, t(14;20), Monosomy 1/ Chromosome 1 aberration, t(14;16), t(11;14), del13q and t(4;14)	3-4 mL Bone marrow/Peripheral Blood in EDTA (Lavender Top), Sodium heparin (Green Top) Tube.	5 Days	Fluorescence In Situ Hybridization	Transport in 2 to 8°C (with cold pack) within 72 hrs.	Prognostic marker in patients with Multiple myeloma.
WB1196	Multiple Myeloma Flow Panel		3-4 mL Bone marrow/Peripheral Blood in EDTA (Lavender Top), Sodium Heparin (Green Top) Tube.	2 Days	Flow Cytometry	Transport in 2 to 8°C (with cold pack). EDTA sample in 48 hrs and Heparin in 72 hrs	Prognostic Marker in Patients with Multiple Myeloma.
WB1144	Multiple Myeloma MRD		3-4 mL Bone marrow/Peripheral Blood in EDTA (Lavender Top), Sodium Heparin (Green Top) Tube.	3 Days	Flow cytometry	Transport in 2 to 8°C (with cold pack).	Estimation of Minimal Residual Disease in Diagnosed cases of Multiple Myeloma
P00687	Multiple Myeloma, Diagnostic Panel-1	Protein Electrophoresis, Immunofixation Electrophoresis, Kappa/Lambda-Free light chain, Beta-2-microglobulin	3 mL (2 mL min.) serum from 1 SST.	Sample by 1 pm report next day	Multiple Technologies		
P00688	Multiple Myeloma, Diagnostic Panel-2	Protein Electrophoresis, Immunofixation Electrophoresis, Kappa/Lambda-Free light chain, Beta-2-microglobulin	3 mL (2 mL min.) serum from 1 SST.	Sample by 1 pm report next day	Multiple Technologies		

Test Code	Test Name	Components	TAT	TAT	Method	Shipping & Stability Conditions
IA1187	Kappa (Diagnosis of B-cell Lymphomas)	Formalin fixed paraffin embedded tissue block	4 Days	IHC	Transport at ambient (18-25°C)	Diagnosis of B-cell lymphoma & Plasma cell Dyscrasicm
AL1209	Kappa and Lambda- Free Light Chain, Urine	10 ml of Spot Urine (acceptable) or 10 ml of aliqout of 24 hour Urine sample (Preferred)	4 Days	IHC	Transport at 2 to 8°C (with cold pack).	
WB1187	Kappa Light Chain	3-4 mL Bone marrow/ Peripheral Blood in EDTA (Lavender Top)/ Heparin (Green Top) Tubes	2 Days	Flow Cytometry	Transport at 2 to 8°C (with cold pack). EDTA sample in 48 hrs and Heparin sample in 72 hrs	Clonal Restriction/B-Cell Maturity Marker
AL2478	Kappa- Free Light Chain, Serum	3 mL (2 mL min.) Serum from 1 SST.	2 Days	Turbidimetry	Ship refrigerated or frozen. Room Temperature: 1 day, Refrigerated (2-8˚C): 7 days, Frozen (-20°C): 30 days	
P00292	Kappa/Lambda-Free Light Chain, Serum	3 mL (2 mL min.) Serum from 1 SST.	2 Days	Turbidimetry	Ship refrigerated or frozen. Room Temperature: 1 day, Refrigerated (2-8˚C): 7 days, Frozen (-20°C): 30 days	

There are several targeted therapies for myeloma, including:

1. **Proteasome inhibitors:** Drugs such as bortezomib, carfilzomib, and ixazomib target and inhibit the proteasome, a cellular complex responsible for breaking down proteins. By blocking the proteasome, these drugs can help kill myeloma cells and slow down the progression of the disease.
2. **Immunomodulatory drugs (IMiDs):** Drugs like lenalidomide and pomalidomide enhance the immune system's ability to fight myeloma cells. They can also inhibit the growth of blood vessels that support the tumor.
3. **Monoclonal antibodies:** Antibodies like daratumumab and elotuzumab specifically target proteins on the surface of myeloma cells, marking them for destruction by the immune system or directly killing the cells.
4. **Histone deacetylase inhibitors:** Drugs such as panobinostat and vorinostat can modify the way genes are expressed in myeloma cells, leading to their death.
5. **Targeted kinase inhibitors:** Certain drugs like ibrutinib and dasatinib venetoclax can block specific signaling pathways that are important for the survival and growth of myeloma cells.
6. **CAR T-cell therapy:** Chimeric Antigen Receptor (CAR) T-cell therapy involves modifying a patient's own immune cells to express a receptor that recognizes a specific protein on myeloma cells. These modified T-cells are then infused back into the patient, where they can recognize and eliminate myeloma cells.

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Table 4. New Combinations in MM.

Drug	Indication	Approval	Trial	Primary Endpoint
Elotuzumab (Elo) + pomalidomide + dexamethasone (EloPd)	R/R >2 prior therapies (including lenalidomide and PI)	FDA 2019 EMA 2019	ELOQUENT-3 Phase II EloPd vs Pd (NCT02654132)	PFS: 10.3 mo (EloPd) vs 4.7 mo (Pd) ORR: 53% vs 26%
Elotuzumab (Elo) + lenalidomide + dexamethasone (EloRd)	R/R >1 prior therapy	FDA 2015 EMA 2016	ELOQUENT-2 Phase III! EloRd vs Rd (NCT01239797)	Median PFS: 19.4 (EloRd) vs 14.9 (Rd) ORR: 78.5% vs 65.5%
Isatuximab + carfilzomib + dexamethasone (IsaKd)	R/R >I prior therapy	FDA 2021 EMA 2021	IKEMA Phase III IsaKd vs Kd (NCT03275285)	Median PFS: NR (IsaKd) vs 19.15 mo (Kd)
Isatuximab + pomalidomide + dexamethasone (IsaPd)	R/R >2 prior therapies (including lenalidomide and PI)	FDA 2020 EMA 2020	ICARIA-MM Phase IIII IsaPd vs Pd (NCT02990338)	PFS at median FU (11.6 mo): 11.53 mo (IsaPd) vs 6.47 mo (Pd) ORR: 60.49 vs 35.3%
Ixazomib + lenalidomide + dexamethasone (IxaRd)	R/R >1 prior therapy	FDA 2015 EMA 2015	TOURMALINE-MM1 Phase IIII IxaRd vs Rd (NCT01564537)	PFS: 20.6 mo (IxaRd) vs 14.7 mo (Rd)
Carfizomib + lenalidomide + dexamethasone (KRd)	R/R >1 prior therapy	FDA 2015 EMA 2015	ASPIRE Phase III KRd vs Rd (NCT01080391)	Median PFS: 26.3 mo (KRd) vs 17.6 mo (Rd)
Selinexor + bortezomib + dexamethasone (SVS)	R/R >1 prior therapy	FDA 2020	BOSTON Phase III SVS vs Vd (NCT03110562)	PFS: 13.9 mo (SVS) vs 9.5 mo (Vd)
Idecabtagene vicleucel	R/R >4 prior therapies	FDA 2021	KarMMa Phase II (NCT03361748)	Median PFS: 8.8 mo ORR: 73% with 33% CR
Belantamab	R/R >4 prior therapies	FDA 2020	DREAMM-2 Phase II (NCT03525678)	ORR: 31% DoR:

Abbreviations: CR, complete response; DoR, duration of response; EMA, European Medicines Agency: FDA, Food and Drug Administration; FU, follow-up: Kd, carfitzomib, dexamethasone; MM, multiple myeloma; mo, months; NR, not reached;

ORR, overall response rate: Pd, pomalidomide and dexamethasone; PFS, progression-free survival; PI: proteasome inhibitor:

R/R: relapsed/refractory: Rd, lenalidomide and dexamethasone: Vd, bortezomib and dexamethasone.

SALIVARY GLANDS / MUCO EPIDERMOID CA

Test Code	Test Name	Components	TAT	TAT	Method	Shipping & Stability Conditions	Clinical Utility
IA1870	MUC 1	FFPE block	3 Days	IHC	Date and time of sample withdrawn, Detailed clinical history required	Transport at Ambient (18-25°C) t	Overexpression of MUC1 is often associated with colon, breast, ovarian, lung and pancreatic cancers.
IA1871	MUC 2	FFPE block	4 Days	IHC	Clinical History, Histopathology Report,	Transport at Ambient (18-25°C)	Differential Diagnosis of Intestinal cancer.
IA2189	MUC 4	FFPE block	4 Days	IHC	Clinical history is mandatory.	Transport at Ambient (18-25°C)	
IA1872	MUC5AC	FFPE block	4 Days	IHC	Clinical History, Histopathology Report,	Transport at Ambient (18-25°C)	Differential Diagnosis of Gastric Cancer.
IA1223	p53	FFPE block	4 Days	IHC	Clinical History, Histopathology Report, Any Radiological Findings required	Transport at ambient (18-25°C) temperature	Prognostic Marker

MUC5A MUCB in Low Grade
CRTC1/MAML2 fusion in a low-grade
HER2, EGFR or MUC1 MUC1, MUC2, MUC 4 are expressed more in high-grade tumors,
NOTCH1, PIK3CA, CDKN21, ERBB2, HER2,
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8913015/

Oncogenes and Its Potential Therapeutic Targets in Treating Mucoepidermoid Carcinoma

Targeted agent	Oncogenes involved in MEC
Sorafenib	VEGF and ANG2
Nintedanib	VEGFR, FGFR, and PDGFR
Trastuzumab	HER2/neu
Lapatinib	EGFR and erbB2
ANA-12	TrkB and BDNF

MEC: mucoepidermoid carcinoma; VEGF: vascular endothelial growth factor; VEGFR: VEGF receptor; FGFR: fibroblast growth factor receptor; PDGFR: platelet-derived growth factor receptor; HER2/neu: human epidermal growth factor receptor 2; EGFR: epidermal growth factor receptor; erbB-2: receptor tyrosine-protein kinase; TrkB: tropomyosin receptor kinase B; BDNF: brain-derived neurotrophic factor.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9818327/

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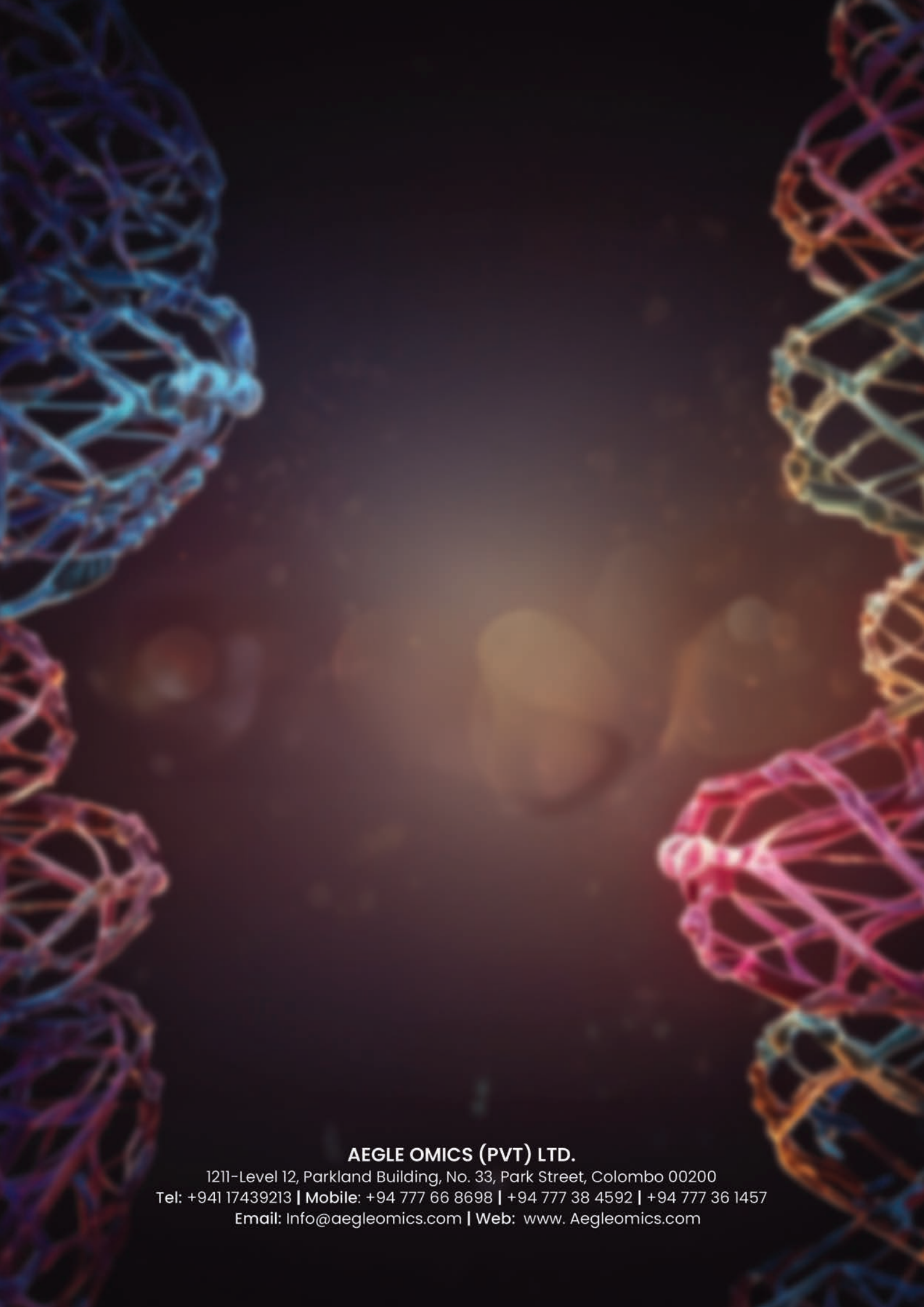

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