MEDGENOME

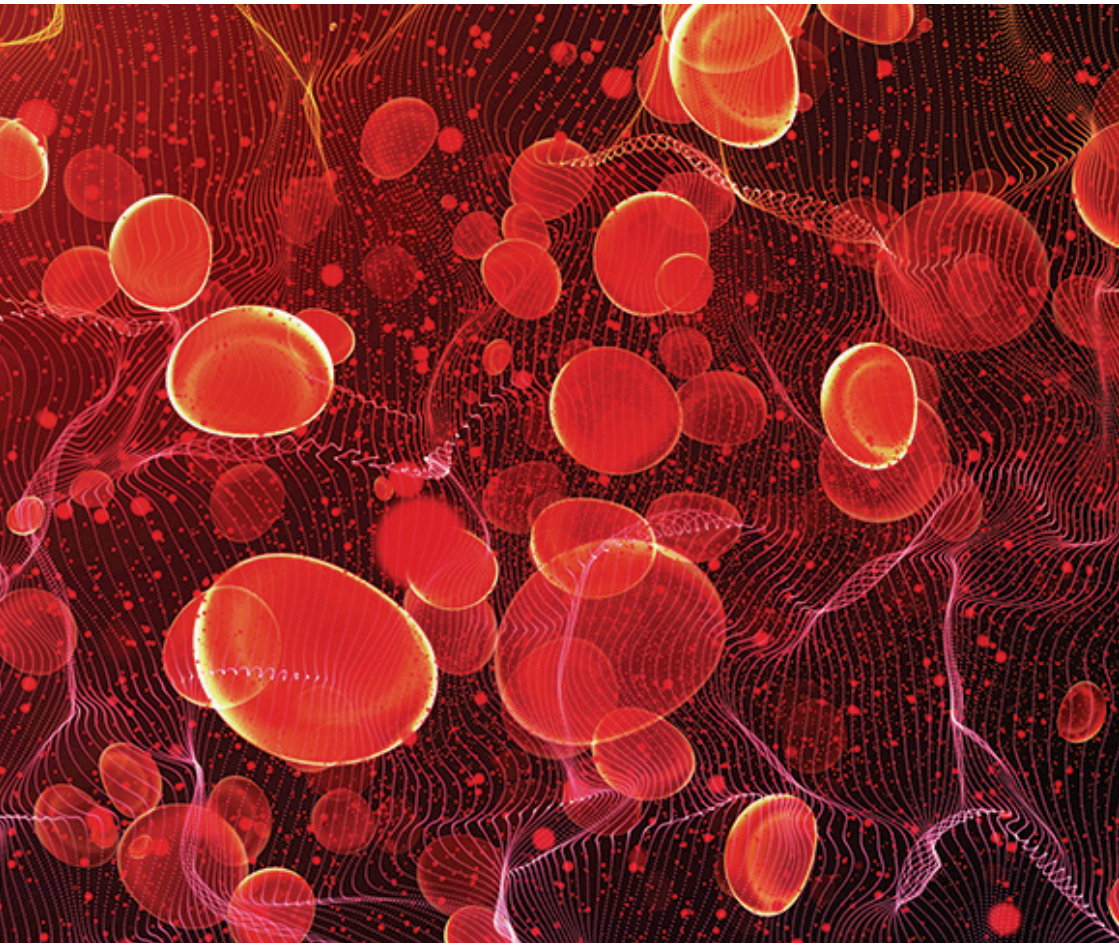
CAP ACCREDITED
COLLEGE of AMERICAN PATHOLOGISTS

OncoTrack Liquid

(NGS based Liquid Biopsy Tests)

Genomic Profiling of Solid Tumors from Blood

Minimally invasive	High precision multibiomarker	CAP accredited & extensively validated assay	≥20,000X sequencing depth (pre-UMI, LOD of 0.2% VAF)



Next Generation Sequencing (NGS) based Liquid Biopsy test

NGS based liquid biopsy is a test performed on the blood of the patient to evaluate tumor derived DNA (ctDNA) for molecular biomarker detection.

Cells in the body die continuously in a process known as “apoptosis”, releasing DNA/RNA into the bloodstream. This freely circulating DNA in the blood stream is termed as **Cell free DNA (cfDNA)**.

Tumours cells also shed their contents including DNA into the blood stream. This tumour derived DNA present in the blood stream is called as **Circulating tumour DNA or ctDNA.**

Liquid Biopsy test is advised in the following situations:

Patient discomfort, risk & morbidity

Difficulty in obtaining tumor biopsy from cancer patients for practical and clinical reasons

Fixation & Quality problems

Biopsy material is degraded or damaged or improperly/poorly fixed; Bony tissue consistent coverage & fewer assay failures in Liquid Biopsy

Low tumor cellularity in Tissue Biopsy

- **Tissue unavailability**
- **Tumor biopsy is limited to single site & time frozen whereas Liquid Biopsy represents more spatial & temporal heterogeneity**
- **More accurately represents metachronous metastatic sites**

Treatment monitoring and Relapse

in cancer patients (MRD)

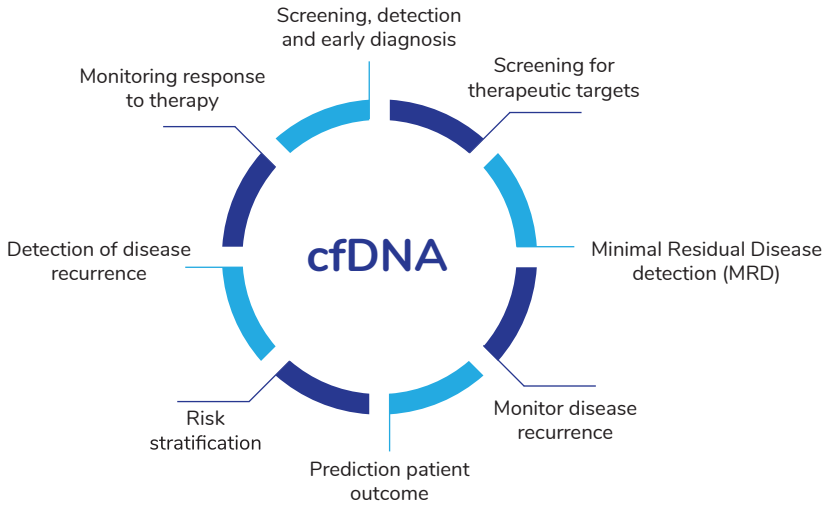
Determination of secondary acquired resistance

mutations during the course of treatment (example: *EGFR T790M* or *MET* exome skipping mutation in NSCLC)

Urgent treatment

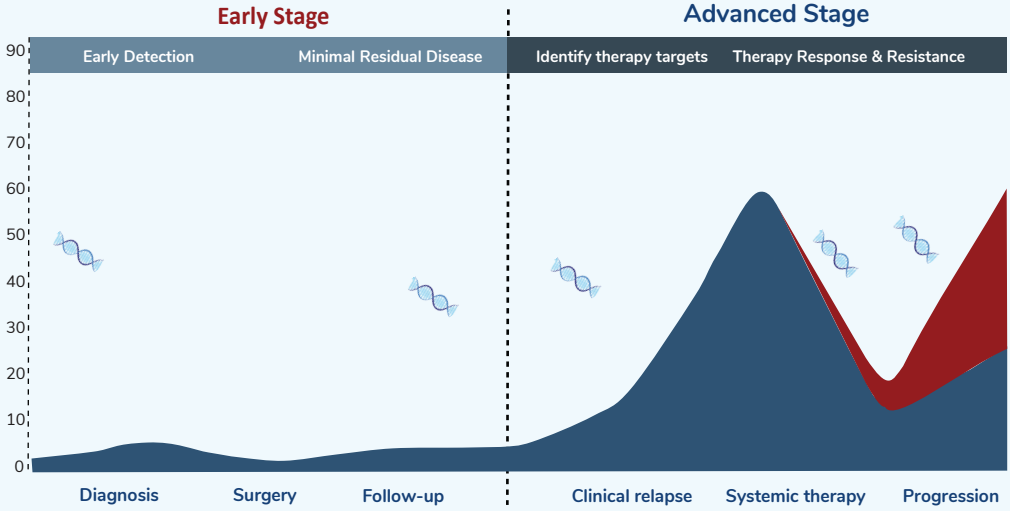
Delay in obtaining tissue Biopsy, Liquid Biopsy saves times

Clinical Applications of Liquid Biopsy



Liquid Biopsy Test can be used as a **Complementary, Alternative, Reflex** and **Serial** to Tissue Biopsy Test

Liquid Biopsy - Implications in Cancer Management



Ref: https://err.ersjournals.com/content/29/155/190052

MedGenome Liquid Biopsy NGS Assays

OncoTrack

Test code: MGM403 | TAT - 12 working days

- Screens for the presence of oncogenic mutations in four key genes: ***EGFR, KRAS, NRAS*** and ***BRAF***.
- These genes have a **potential role in clinical decision making** for different lines of approved targeted therapy and those in clinical trials.
- This assay also **screens for resistance mutations** that demonstrate the mechanism of acquired secondary/primary resistance to these drugs.

HRR Track

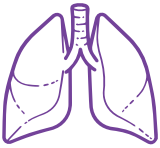
Test code: MGM2455 | TAT - 14 working days

- Indicated for Prostate, Ovarian, Breast and Pancreatic cancer
- Evaluates mutations in cfDNA (ctDNA) shed from dying cancer cells
- Screens for the mutations (SNVs and InDels) in 15 Homologous Recombination Repair(HRR) genes including ***BRCA1 and BRCA2 genes***
- Informs PARPi eligibility (approved targeted therapies and in clinical trials.)
- Complete Coding regions and splice site boundaries (+ /-10 bp) are covered
- Detects both somatic and germline* variants.

**Germline variants to be confirmed on blood DNA*

LungTrack Advance

Test code: MGM2623 | TAT - 14 working days



- NGS based CAP accredited assay to **screen all the NCCN guided actionable biomarkers** in Non-small cell Lung cancer (NSCLC)
- Detects **SNVs, Indels and Fusions**, all known / unknown fusion gene partners are detected
- **Enhanced coverage of intronic region** for key fusion genes and their reported partners
- Variants (SNVs, InDels) can be detected at **0.2% VAF** ; Fusions >3 read support
- Detects **Primary driver mutation** and **Secondary resistance** markers
- Enables **Minimal Residual Disease (MRD)** detection

Fusions will be determined in genes highlighted as bold | Novel fusion partners can also be detected

Refer to the Gene List at the end

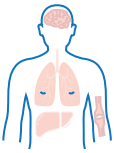
Colorectal Cancer

Test code: MGM3197| TAT - 14 working days

- NGS based CAP accredited assay to **screen all the NCCN guided actionable biomarkers** in Colorectal Cancer
- Detects **SNVs & InDels**
- Variants (SNVs, InDels) can be detected at **0.2% VAF**
- Detects **Primary driver mutation** and **Secondary resistance** markers
- Enables **Minimal Residual Disease (MRD)** detection

OncoTrack Ultima

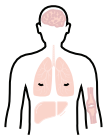
Test code: MGM455 | TAT - 14 working days



- Tumor agnostic assay covering **117 Pan cancer** genes as recommended by **guidelines (FDA, NCCN, ASCO, ESMO etc.)**
- Comprehensive coverage of **complete coding regions** of all the genes and **intron/exon boundaries** for **SNVs & InDels** detection
- Highly sensitive and can accurately detect low frequency mutations upto **0.2% Variant Allele Frequency (VAF)** at high confidence
- Analysis and reporting as per **ACMG/AMP/ASCO/CAP** guidelines
- Detects **Primary driver mutation** and **Secondary resistance** markers
- Enables **Minimal Residual Disease (MRD)** detection
- All HRR genes are covered including BRCA1 and BRCA2

OncoTrack Advance

Test code: MGM2718 | TAT - 14 working days



- Tumor agnostic assay covering **117 Pan cancer** genes as recommended by **guidelines (FDA, NCCN, ASCO, ESMO etc.)**
- Comprehensive coverage of **complete coding regions** of all the genes and **intron/exon boundaries** for **SNVs, InDels & Fusions** detection
- Highly sensitive and can accurately detect low frequency mutations upto **0.2% Variant Allele Frequency (VAF)** at high confidence
- Analysis and reporting as per **ACMG/AMP/ASCO/CAP** guidelines
- Detects **Primary driver mutation** and **Secondary resistance** markers
- Enables **Minimal Residual Disease (MRD)** detection
- All HRR genes are covered including BRCA1 and BRCA2

Refer to the Gene List at the end

OncoTrack CGP (Liquid Biopsy)

Test code: MGM3309 | TAT - 21 working days

- Provides comprehensive genomic profiling from blood sample for all solid tumors
- Achieve low limits of detection with UMI-based hybrid– capture library preparation and deep sequencing.
- Sophisticated variant calling algorithms and high depth of sequencing enable detection of key biomarkers in cfDNA with 0.5% limit of detection (LOD)
- Leverage minimally invasive blood samples as a complement to tissue biopsy or as an alternative when tissue is not readily available
- Detects low-frequency somatic variants across 523 genes with high sensitivity and specificity
- Well - validated as per CAP guidelines. High throughput Illumina's sophisticated NGS platforms

Validation of Liquid Biopsy for advanced non-small cell lung cancer

Lung Cancer: Targets and Therapy

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Validation of liquid biopsy: plasma cell-free DNA testing in clinical management of advanced non-small cell lung cancer

A total of 163 NSCLC cases were included in the validation, of which 132 patients had paired tissue biopsy and ctDNA. We chose to validate ctDNA using deep sequencing with custom designed bioinformatics methods that could detect somatic mutations at allele frequencies as low as 0.01%. Benchmarking allele specific real time PCR as one of the standard methods for tissue-based *EGFR* mutation testing, the ctDNA NGS test was validated on all the plasma derived cell-free DNA samples. We observed a high concordance (96.96%) between tissue biopsy and ctDNA for oncogenic driver mutations in Exon 19 and Exon 21 of the *EGFR* gene. The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of the assay were 91.1%, 100% 100%, 95.6%, and 97%, respectively. A false negative rate of 3% was observed. A subset of mutations was also verified on droplet digital PCR. Sixteen percent EGFR mutation positivity was observed in patients where only liquid biopsy was available, thus creating options for targeted therapy. This is the first and largest study from India, demonstrating successful validation of circulating cell-free DNA as a clinically useful material for molecular testing in NSCLC.

- Concordance- 96.96%
- Sensitivity: 91.1%
- Specificity: 100%
- PPV: 100%
- NPV: 95.6%
- Diagnostic accuracy: 97%

Limit of Detection (LOD) - Liquid Biopsy Assay

Alteration Type	Analytical Sensitivity[#]	Limit of Detection (LOD)	Analytical Specificity[##]
		30ng	
SNVs*	≥95%	>0.2 AF%	100%
INDELS*	≥95%	>0.2 AF%	100%
Fusions **	≥95%	≥3 Reads	100%

[#]Analytical Sensitivity defined as the Detection Rate for variants present at or above the limit of detection (LoD).

[##]Analytical Specificity defined as 1 minus the per-sample false positive rate

* Tested on cfDNA reference standards
** Tested on Lung track advance

All Solid Tumours

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM2718 TAT: 14 Working Days	**Oncotrack Advance -Liquid Biopsy NGS test (SNVs, InDels and Fusions)** Total Genes Covered: 133	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET(Exon 14 skipping) mutations), MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL***	**No. of Genes Covered : 15** *ALK, BRAF, EGFR, ERBB2, FGFR1, FGFR2, FGFR3, FGFR4, MET, NRG1, NTRK1, NTRK2, NTRK3, RET, ROS1*
MGM455 TAT: 14 Working Days	**Oncotrack Ultima - Liquid Biopsy test by NGS (SNVs & InDels)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET(Exon 14 skipping mutations), MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL***	NA
MGM2772 TAT: 14 Working Days	**Liquid Biopsy NGS Panel (SNVs, InDels & Fusions)** Total Genes Covered: 33	**No. of Genes Covered : 33** *AKT1, ALK, ATM, BRAF, CDKN2A, CTNNB1, DDR1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, FGFR1, FGFR2, FGFR3, FGFR4, HRAS, KIT, KRAS, MAP2K1, MET, NRAS, NRG1, NTRK1, NTRK2, NTRK3, PIK3CA, PTEN, PTPN11, RET, ROS1, SMAD4, TP53*	**No. of Genes Covered : 13** *ALK, BRAF, FGFR1, FGFR2, FGFR3, FGFR4, MET(Exon, NRG1, NTRK1, NTRK2, NTRK3, RET, ROS1*
MGM2649 TAT: 14 Working Days	**Minimal Residual Disease (MRD) by NGS in Solid Tumours (Liquid Biopsy)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET, MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL***	NA
MGM3309 TAT: 21 Working Days	OncoTrack CGP (Liquid Biopsy) Total Genes Covered: 523	*Gene list added seperately*	23 Genes for fusions - List added seperately

Lung Cancer

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM2623 TAT: 14 Working Days	**LungTrack Advance - Liquid Biopsy test by NGS (SNVs, InDels & Fusions)** Total Genes Covered: 24	**No. of Genes Covered : 24** *ALK, KRAS, BRAF, MAP2K1, CDKN2A, MET(Exon 14 skipping mutations), CTNNB1, NRAS, EGFR, NRG1, ERBB2, NTRK1, ERBB3, NTRK2, ERBB4, NTRK3, FGFR1, PIK3CA, FGFR2, RET, FGFR3, ROS1, KIT, TP53*	**No. of Genes Covered : 12** *ALK, BRAF, MET(Exon 14 skipping mutations), NRG1, NTRK1, NTRK2, NTRK3, FGFR1, FGFR2, RET, FGFR3, ROS1*
MGM3213 TAT: 14 Working Days	**Lung Cancer Panel (16 Genes) – Liquid Biopsy** Total Genes Covered: 16	**No. of Genes Covered : 16** *ALK, BRAF, EGFR, ERBB2, FGFR3, MET, KRAS, NRAS, NTRK1, NTRK2, NTRK3, MAP2K1, PIK3CA, RET, ROS1, TP53*	**No. of Genes Covered : 9** *ALK, BRAF, FGFR3, MET, NTRK1, NTRK2, NTRK3, RET, ROS1*
MGM482 TAT: 10 Working Days	**OncoFocus Express - Liquid Biopsy NGS test for EGFR gene mutations** Total Genes Covered: 1	**No. of Genes Covered : 1** *EGFR (Exon 18, 19, 20, 21)*	NA
MGM481 TAT: 12 Working Days	**OncoFocus -Liquid Biopsy NGS test for EGFR gene mutations** Total Genes Covered: 1	**No. of Genes Covered : 1** *EGFR (Exon 18, 19, 20, 21)*	
MGM420 TAT: 12 Working Days	**OncoSelect - Liquid Biopsy NGS test for EGFR TKI resistance** Total Genes Covered: 2	**No. of Genes Covered : 2** *EGFR (T790M and C797S)*	

Colorectal Cancer

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM3197 TAT: 14 Working Days	**Colorectal Cancer Panel (Liquid Biopsy)** Total Genes Covered: 9	**No. of Genes Covered : 9** *KRAS, NRAS, HRAS, BRAF, PIK3CA, AKT1, SMAD4, ERBB2, PTEN*	NA
MGM455 TAT: 14 Working Days	**Oncotrack Ultima - Liquid Biopsy test by NGS (SNVs & InDels)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET(Exon 14 skipping mutations), MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL*	
MGM2649 TAT: 14 Working Days	**Minimal Residual Disease (MRD) by NGS in Solid Tumours (Liquid Biopsy)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET, MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL*	

HRR Genes Liquid Biopsy Panel (Breast, Ovarian, Prostate and Pancreatic Cancer)

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM2455 TAT: 14 Working Days	**Liquid Biopsy NGS test (SNVs and Indels) -15 Homologous Recombination Repair (HRR) pathway genes including BRCA1/2** Total Genes Covered: 15	**No. of Genes Covered : 15** *ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, PPP2R2A, RAD51B, RAD51C, RAD51D, RAD54L*	NA

Breast Cancer

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM2732 TAT: 14 Working Days	**ESR1 gene testing by NGS -Liquid Biopsy (Hot Spot Mutations)** Total Genes Covered: 1	**No. of Genes Covered : 1** *ESR1*	NA
MGM2455 TAT: 14 Working Days	**Liquid Biopsy NGS test (SNVs and Indels) -15 Homologous Recombination Repair (HRR) pathway genes including BRCA1/2** Total Genes Covered: 15	**No. of Genes Covered : 15** *ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, PPP2R2A, RAD51B, RAD51C, RAD51D, RAD54L*	
MGM455 TAT: 14 Working Days	**Oncotrack Ultima - Liquid Biopsy test by NGS (SNVs & InDels)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET(Exon 14 skipping mutations), MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL*	
MGM2649 TAT: 14 Working Days	**Minimal Residual Disease (MRD) by NGS in Solid Tumours (Liquid Biopsy)** Total Genes Covered: 118	**No. of Genes Covered : 118** *ABL1, ABL2, AKT1, ALK, APC, AR, ARAF, ARID1A, ARID1B, ATM, ATR, ATRX, BAP1, BARD1, BRAF, BRCA1, BRCA2, BRIP1, C11orf65, CCND1, CDH1, CDK12, CDK4, CDKN2A, CDX2, CHEK1, CHEK2, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ERCC2, ESR1, EZH2, FANCL, FBXW7, FGFR1, FGFR2, FGFR3, FGFR4, FLT3, FOXA1, FOXL2, GATA3, GNA11, GNAQ, GNAS, HNF1A, HRAS, IDH1, IDH2, INPP4B, JAK1, JAK2, JAK3, KDM5C, KDM6A, KEAP1, KIT, KRAS, MAP2K1, MAP2K2, MAPK1, MET, MLH1, MPL, MSH2, MSH6, MTOR, MUTYH, MYC, MYCN, MYD88, NF1, NF2, NOTCH1, NPM1, NRAS, NTRK1, NTRK3, PALB2, PBRM1, PDGFRA, PIK3CA, PMS2, POLD1, POLE, PPP2R2A, PTCH1, PTEN, PTPN11, RAD51B, RAD51C, RAD51D, RAD54L, RAF1, RB1, RET, RHEB, RHOA, RIT1, ROS1, SETD2, SF3B1, SMAD4, SMARCB1, SMO, SPOP, SRC, STK11, TERT, TP53, TSC1, TSC2, VHL*	NA

Methodology: Next Generation Sequencing
Sample Type: Peripheral blood in Streck tube (10ml X 2)
Depth: 20000X I **Limit of Detection:** 0.2% VAF

Small NGS panels

Test Code	Test Name	Gene list (SNVs and InDels)	Gene list (Fusions)
MGM1678* TAT: 6 Working Days	**PIK3CA - therascreen® - Liquid biopsy** Total Genes Covered: 1 Limit of Detection: 1.82 - 7.07%	**No. of Genes Covered : 1** *PIK3CA (11 hotspot mutations)*	NA
MGM1677 TAT: 14 Working Days	**PIK3CA gene mutation analysis by NGS-Liquid Biopsy** Total Genes Covered: 1 Limit of Detection: 0.2% VAF	**No. of Genes Covered : 1** *PIK3CA (11 hotspot mutations)* Depth: 20000X	
MGM403 TAT: 12 Working Days	**OncoTrack - Liquid Biopsy NGS test (EGFR, KRAS, NRAS, BRAF)** Total Genes Covered: 4 Limit of Detection: 0.2% VAF	**No. of Genes Covered : 4** *EGFR, KRAS, NRAS, BRAF* Depth: 20000X	NA
MGM482 TAT: 10 Working Days	**OncoFocus Express - Liquid Biopsy NGS test for EGFR gene mutations** Total Genes Covered: 1 Limit of Detection: 0.2% VAF	**No. of Genes Covered : 1** *EGFR (Exon 18, 19, 20, 21)* Depth: 20000X	
MGM481 TAT: 12 Working Days	**OncoFocus -Liquid Biopsy NGS test for EGFR gene mutations** Total Genes Covered: 1 Limit of Detection: 0.2% VAF		
MGM420 TAT: 12 Working Days	**OncoSelect - Liquid Biopsy NGS test for EGFR TKI resistance** Total Genes Covered: 2 Limit of Detection: 0.2% VAF	**No. of Genes Covered : 2** *EGFR (T790M and C797S)* Depth: 20000X	

Methodology: Next Generation Sequencing
Sample Type: Peripheral blood in Streck tube (10ml X 2)

For more information on CAP accredited Liquid Biopsy test portfolio please write to our experts at techsupport@medgenome.com

OncoTrack CGP (Liquid Biopsy)

Gene List: 523 genes for SNVs | 59 genes for CNVs (bold) | 23 genes for fusion (underlined)

ABL1	CALR	DNAJB1	**FGF14**	HIST1H3A	KEAP1	**MYCL**	PIK3CD	RHOA	SUFU
ABL2	CARD11	DNMT1	**FGF19**	HIST1H3B	KEL	**MYCN**	PIK3CG	**RICTOR**	SUZ12
ACVR1	CASP8	DNMT3A	**FGF2**	HIST1H3C	KIF5B	MYD88	PIK3R1	RIT1	SYK
ACVR1B	CBFB	DNMT3B	**FGF23**	HIST1H3D	**KIT**	MYOD1	PIK3R2	RNF43	TAF1
AKT1	CBL	DOT1L	**FGF3**	HIST1H3E	KLF4	NAB2	PIK3R3	ROS1	TBX3
AKT2	**CCND1**	E2F3	**FGF4**	HIST1H3F	KLHL6	NBN	PIM1	RPS6KA4	TCEB1
AKT3	CCND2	EED	**FGF5**	HIST1H3G	KMT2B	NCOA3	PLCG2	**RPS6KB1**	TCF3
ALK	**CCND3**	EGFL7	**FGF6**	HIST1H3H	KMT2C	NCOR1	PLK2	RPS6KB2	TCF7L2
ALOX12B	**CCNE1**	**EGFR**	**FGF7**	HIST1H3I	KMT2D	NEGR1	PMAIP1	RPTOR	TERC
ANKRD11	CD274	EIF1AX	**FGF8**	HIST1H3J	**KRAS**	NF1	PMS1	RUNX1	TERT
ANKRD26	CD276	EIF4A2	**FGF9**	HIST2H3A	**LAMP1**	NF2	PMS2	RUNX1T1	TET1
APC	CD74	EIF4E	**FGFR1**	HIST2H3C	LATS1	NFE2L2	PNRC1	RYBP	TET2
AR	CD79A	EML4	**FGFR2**	HIST2H3D	LATS2	NFKBIA	POLD1	SDHA	TFE3
ARAF	CD79B	EP300	**FGFR3**	HIST3H3	LMO1	NKX2-1	POLE	SDHAF2	**TFRC**
ARFRP1	CDC73	EPCAM	**FGFR4**	HLA-A	LRP1B	NKX3-1	PPARG	SDHB	TGFBR1
ARID1A	CDH1	EPHA3	FH	HLA-B	LYN	NOTCH1	PPM1D	SDHC	TGFBR2
ARID1B	CDK12	EPHA5	FLCN	HLA-C	LZTR1	NOTCH2	PPP2R1A	SDHD	TMEM127
ARID2	**CDK4**	EPHA7	FLI1	HNF1A	MAGI2	NOTCH3	PPP2R2A	SETBP1	TMPRSS2
ARID5B	**CDK6**	EPHB1	FLT1	HNRNPK	MALT1	NOTCH4	PPP6C	SETD2	TNFAIP3
ASXL1	CDK8	**ERBB2**	FLT3	HOXB13	MAP2K1	NPM1	PRDM1	SF3B1	TNFRSF14
ASXL2	CDKN1A	**ERBB3**	FLT4	HRAS	MAP2K2	**NRAS**	PREX2	SH2B3	TOP1
ATM	CDKN1B	ERBB4	FOXA1	HSD3B1	MAP2K4	**NRG1**	PRKAR1A	SH2D1A	TOP2A
ATR	CDKN2A	**ERCC1**	FOXL2	HSP90AA1	MAP3K1	NSD1	PRKCI	SHQ1	TP53
ATRX	CDKN2B	**ERCC2**	FOXO1	ICOSLG	MAP3K13	NTRK1	PRKDC	SLIT2	TP63
AURKA	CDKN2C	ERCC3	FOXP1	ID3	MAP3K14	NTRK2	PRSS8	SLX4	TRAF2
AURKB	CEBPA	ERCC4	FRS2	IDH1	MAP3K4	NTRK3	PTCH1	SMAD2	TRAF7
AXIN1	CENPA	ERCC5	FUBP1	IDH2	MAPK1	NUP93	**PTEN**	SMAD3	TSC1
AXIN2	CHD2	ERG	FYN	IFNGR1	MAPK3	NUTM1	PTPN11	SMAD4	TSC2
AXL	CHD4	ERRFI1	GABRA6	IGF1	MAX	PAK1	PTPRD	SMARCA4	TSHR
B2M	**CHEK1**	**ESR1**	GATA1	IGF1R	MCL1	PAK3	PTPRS	SMARCB1	U2AF1
BAP1	**CHEK2**	ETS1	GATA2	IGF2	MDC1	PAK7	PTPRT	SMARCD1	VEGFA
BARD1	CIC	ETV1	GATA3	IKBKE	**MDM2**	PALB2	QKI	SMC1A	VHL
BBC3	CREBBP	ETV4	GATA4	IKZF1	**MDM4**	PARK2	RAB35	SMC3	VTCN1
BCL10	CRKL	ETV5	GATA6	IL10	MED12	PARP1	RAC1	SMO	WISP3
BCL2	CRLF2	ETV6	GEN1	IL7R	MEF2B	PAX3	RAD21	SNCAIP	WT1
BCL2L1	CSF1R	EWSR1	GID4	INHA	MEN1	PAX5	RAD50	SOCS1	XIAP
BCL2L11	CSF3R	EZH2	GLI1	INHBA	**MET**	PAX7	RAD51	SOX10	XPO1
BCL2L2	CSNK1A1	FAM123B	GNA11	INPP4A	MGA	PAX8	RAD51B	SOX17	XRCC2
BCL6	CTCF	FAM175A	GNA13	INPP4B	MITF	PBRM1	RAD51C	SOX2	YAP1
BCOR	CTLA4	FAM46C	GNAQ	INSR	MLH1	PDCD1	RAD51D	SOX9	YES1
BCORL1	CTNNA1	FANCA	GNAS	IRF2	MLL	PDCD1LG2	RAD52	SPEN	ZBTB2
BCR	CTNNB1	FANCC	GPR124	IRF4	MLLT3	**PDGFRA**	RAD54L	SPOP	ZBTB7A
BIRC3	CUL3	FANCD2	GPS2	IRS1	MPL	**PDGFRB**	**RAF1**	SPTA1	ZFHX3
BLM	CUX1	FANCE	GREM1	IRS2	MRE11A	PDK1	RANBP2	SRC	ZNF217
BMPR1A	CXCR4	FANCF	GRIN2A	JAK1	MSH2	PDPK1	RARA	SRSF2	ZNF703
BRAF	CYLD	FANCG	GRM3	**JAK2**	MSH3	PGR	RASA1	STAG1	ZRSR2
BRCA1	DAXX	FANCI	GSK3B	JAK3	MSH6	PHF6	RB1	STAG2	
BRCA2	DCUN1D1	FANCL	H3F3A	JUN	MST1	PHOX2B	RBM10	STAT3	
BRD4	DDR2	FAS	H3F3B	KAT6A	MST1R	PIK3C2B	RECQL4	STAT4	
BRIP1	DDX41	FAT1	H3F3C	KDM5A	MTOR	PIK3C2G	REL	STAT5A	
BTG1	DHX15	FBXW7	HGF	KDM5C	MUTYH	PIK3C3	**RET**	STAT5B	
BTK	DICER1	**FGF1**	HIST1H1C	KDM6A	MYB	**PIK3CA**	RFWD2	STK11	
C11orf30	DIS3	**FGF10**	HIST1H2BD	KDR	**MYC**	**PIK3CB**	RHEB	STK40	

Liquid Biopsy Case Studies

Biopsy material is degraded/damaged/insufficient and difficulty in obtaining biopsy material

60-year-old Female | Adenocarcinoma lung | Tissue Biopsy was not feasible

Test performed - OncoTrack Ultima

Gene	CDS variant details	Amino acid change/ Exon No.	Overall Depth/Mutan Allele Percentage	FDA Approved drugs against variant
ERBB2	c.2313_2324dup (ENST00000269571.10)	p.Tyr772_Ala775dup/Exon20	3248X/1.4%	Trasuzumab Deruxtecan

The OncoTrack Ultima test successfully identified actionable mutation for which an FDA drug is available. This helps the clinician take appropriate treatment decisions.

Tissue material insufficient

47-year-old male | case of NSCLC (ADCC); stage4

Due to limited tissue amount, only EGFR test was performed & found to be negative.

Test performed: LungTrack Advance

Treated with: First line chemotherapy (Carboplatin + Paclitaxel) and progressed after 4 cycles; now started on second line chemotherapy.

LungTrack Advance Test was performed to identify actionable driver mutations

Result - POSITIVE

CLINICALLY RELEVANT VARIANT/S DETECTED

AMP Classification	CDS variant details	Interpretation	Treatment Recommendations	Treatment Response
EZR/ROS1(FUSION) Total Read depth - 76x				
Tier I	NA	Oncogenic	Crizotinib, Entrectinib	Effective
***TP53* p.Ala84ArgfsTer40 (FRAMESHIFT-INS)** Variant Allele Frequency - 3.79%				
Tier II	c.248_249dup (ENST00000269305.9)	Oncogenic	NA	NA

01 EZR/ROS1

FDA approved Targeted therapy indicated (crizotinib, entrectinib)

02 TP53

Frame shift insertion oncogenic mutation was detected; indicative of poor prognosis.

Therapeutic response monitoring - Detection of resistance

62-year-old male

Diagnosed with Adenocarcinoma lung cancer 3 years ago.

Test performed: LungTrack Advance

Treated using EGFR TKIs & progressed. Test performed to determine resistance mechanism.

Gene	CDS variant details	Amino acid change/ Exon No.	Overall Depth/Mutan Allele Percentage	FDA Approved drugs against variant	Drug response
EGFR	c.2237_2255 delinsT(ENST00 000275493.2)	p.Glu746_Ser752 delinsVal/Exon 19	925904X/16 %	Osimertinib/Gefit inib/Erlotinib/Afat inib/Dacomitinib	Sensitive to EGFR TKIs
EGFR	c.2369C>T(ENST 00000275493.2)	p.Thr790Met /Exon 20	123188X/14 .9%	Osimertinib (Tagrisso):Third generation TKI	Resistance to first /second generation TKIs

LungTrack Advance successfully identified resistance mutation in the cfDNA of the patient

Resistance mutation acquired by patient after treatment

Liquid biopsy test for HRR gene testing

56-year-old Male

Prostatic acinar adenocarcinoma, grade 5

Test Performed: HRR Track and HRR somatic mutation panel

Genomic alteration	Nucleotide change	Depth / VAF	AMP Classification^	Interpretation	Treatment Recommendation
BRCA2 p.Gly3153Al afsTer10	c.9458del (ENST0000038 0152.8)	2720X / 46%	Tier 1	Deleterious	Confers sensitivity to PARP inhibitors

HRR track Liquid Biopsy test identified pathogenic mutation in BRCA2 gene at 46% VAF which can be useful for treatment decisions.

HRR somatic mutation panel on Tissue Biopsy also detected same mutation at 65.6t%.
Germline confirmation is under process

Talk to the Experts:

1800 296 96 96

diagnostics@medgenome.com

www.medgenome.com

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