Mikrogen Hereditary Cancer Panels

PANEL NAME	NUMBER OF GENES	SAMPLE TYPE	PANEL GENE CONTENT
Prostate Cancer Panel	14 genes	Blood with EDTA	APC, ATM, BRCA1, BRCA2, CHEK2, EPCAM, HOXB13, MLH1, MSH2, MSH6, MUTYH, PALB2, PMS2, TP53
Fanconi Anemia Panel	18 genes	Blood with EDTA	BRCA2, BRIP1, ERCC4, FANCA, FANCB, FANCC, FANCD2, FANCE, FANCF, FANCG, FANCI, FANCL, FANCM, PALB2, RAD51C, SLX4, UBE2T, XRCC2
Comprehensive Cancer Panel	275 genes	Blood with EDTA	MAPK1, GATA1, ROS1, FGFR3, FGF4, SOX9, NOTCH3, IDH1, SMAD2, IGF1R, SMC3, CHEK1, MYCN, BRCA2, INHBA, HRAS, GREM1, GALNT12, SOCS1, HOXB13, CDKN2B, TAL1, SRSF2, PDGFRA, SMAD4, CEBPA, ID3, CD79A, NFKBIA, RAD21, TGFBR2, MYD88, MPL, PIK3CA, DICER1, CD79B, TSC2, KMT2B, NKX2-1, CDK4, BAP1, PMS1, WHSC1, ERBB3, CDK6, EPHA3, GNAS, PAX5, BIRC3, XRCC2, PIK3R1, MET, BCL2, TSHR, KMT2A, GRIN2A, NFE2L2, FAS, MYC, PMS2, KDR, RHOA, MYCL, TCF3, AURKB, FLT4, ABL1, HSP90AA1, FLT3, RUNX1, CALR, U2AF2, BLM, PRKDC, TP53, BTK, CSF1R, B2M, RAD51, CXCR4, RIT1, SOX2, PTPN11, MAP3K1, CCNE1, SRC, AXIN1, CYLD, IL7R, ESR1, TERT, ARID2, MSH6, CDKN2C, SMC1A, EPAS1, PRDM1, DNMT3A, PIK3R2, MCL1, DDR2, MEN1, XRCC3, FGFR2, MAP2K4, FGF6, MSH2, IRF4, ATM, MED12, TRAF3, NSD1, MDM4, CTNNA1, SMO, CDKN2A, PDGFRB, RAD50, ZRSR2, POLD1, MDM2, NPM1, AKT1, FANCA, ARID1A, FANCG, APC, ZNF217, PHF6, MTOR, SMARCA4, PAK3, CIC, VHL, RHEB, CDH1, DNM2, RET, DAXX, SDHB, ARAF, FANCE, NTRK3, PPP2R1A, BCL2L1, HGF, IDH2, HNF1A, MAP2K1, FGFR1, STK11, NF1, FANCC, NTRK2, TNFRSF14, EED, JAK3, BCR, STAT3, DOT1L, PLCG1, CDC73, AXIN2, MITE, CTCF, ARID1B, GNAQ, GEN1, PPM1D, CCND1, PTEN, EPHA5, EZH2, CBLB, RAF1, XPO1, KDM6A, RNF43, FANCD2, KAT6A, FLCN, H3F3A, FAM46C, EGLN1, TNFAIP3, FUBP1, PIM1, KRAS, SPOP, MRE11A, CTNNB1, ATRX, AKT2, AKT3, PRKAR1A, POLE, CBLC, PBRM1, FH, CARD11, TET2, PRSS1, SUFU, IKZF1, IKZF3, BCOR, MUTYH, FBXW7, MLH1, TSC1, KDM5C, FOXL2, AMER1, MAP3K14, FAM175A, ERG, BCORL1, KIT, ATR, BRCA1, AURKA, CCND3, KEAP1, GNA11, CD274, PTCH1, BRAF, CSF3R, NOTCH2, CBL, WT1, ETV6, EP300, PALB2, BRIP1, NOTCH1, ERBB2, NTRK1, CDK12, MAP2K2, SMARCB1, CREBBP, JAK2, JAK1, RAC1, GATA2, SUZ12, SETD2, EXO1, AURKC, CHEK2, STAG2, ACVR1B, RB1, FGFR4, LRP1B, SF3B1, ALK, NF2, ERBB4, SETBP1, KMT2D, U2AF1, KMT2C, GATA3, ASXL1, BCL6, EGFR, NRAS, AR, FANCF, HIST1H3B, CRLF2, CUX1, MEF2B
Breast Cancer Panel	93 genes	Blood with EDTA	PIK3CA, PTEN, ATR, BLM, BRCA1, BRCA2, CASP8, CDH1, CDKN2A, CSMD1, EGFR, ERBB2, ERBB3, EXOC2, FGFR1, HERC1, ITCH, KMT2C, KRAS, MED12, MSH6, MUC16, NEK2, PALLD, PIK3R1, PMS2, PTGFR, RAD51C, RB1, SMARCA4, SYNE1, TP53, XRCC2, AKT1, APC, ATM, FANCC, FGFR2, GATA3, GEN1, HOXB13, MLH1, MRE11, MSH2, NF1, PALB2, RAD51D, SMAD4, STK11, ACVR1B, CBFB, EXT2, PPM1L, SEPT9, AR, BMPR1A, CDK4,FBXO32, IRAK4, NCOR1, RAD50, TRAF5,VHL, MAP2K4, NBN, AXIN2, BARD1, BRIP1, CDK6, CHEK2, CTNNB1, DIRAS3, ERCC4, FAM175A, MEN1, MUTYH, PMS1, RAD51, TGFB1, BAP1, EP300, ESR1, MAP3K1, MDM2, MYC, PBRM1,PCGF2, WEE1, ZBED4, RET, CCND1,EPCAM, XRCC3
Colon Cancer Panel	71 genes	Blood with EDTA	BRAF, FBXW7, KRAS, CTNNB1, NRAS, PIK3CA, APC, DMD, SMAD4, STK11, TCF7L2, TP53, ACVR1B, AKT1, ATM, ATP6V0D2, AXIN2, BAX, BLM, BMPR1A, BRCA1, BRCA2, BUB1B, CASP8, CDC27, CDH1, CDK4, CDKN2A, CHEK2, CTNNA1, DCC, EGFR, ENG, EP300, EPCAM, ERBB2, FGFR3, FLCN, FZD3, GALNT12, GPC6, GREM1, KIT, MAP2K4, MAP7, MET, MIER3, MLH1, MLH3, MSH2, MSH3, MSH6, MUTYH, MYO1B, PALB2, PIK3R1, PMS1, PMS2, POLD1, POLE, PTEN, PTPN12, RET, RPS20, SLC9A9, SMAD2, SRC,TCERG1, TGFBR2, WBSCR17, SCG5
Lung Cancer Panel	72 genes	Blood with EDTA	KRAS, PIK3CA, TP53, ALK, AMER1, APC, ATM, ADGRB3, BRAF, CDKN2A, CTNNB1, EGFR, ERBB2, FGFR3, GRM8, HRAS, JAK2, MET, MUC16, NF1, NFE2L2, NRAS, NTRK2, NTRK3, PDGFRA, PIK3CG, PKHD1, PTEN, RB1, RET,SMARCA4, STK11, TNFAIP3, ARID1A, CREBBP, DDR2, EPHA5, ERBB4, FBXO7, FBXW7, FGFR1, FHIT, KDR, KIT, LRP1B, KMT2D, MYC, NOTCH1, NTRK1, PIK3R1, PTPRD, RARB, RBM10, RIT1, ROS1, RUNX1T1, SETD2, AKT1, CDKN2B, FGFR2, KEAP1, MAP2K1, MDM2, MGA, MLH1, PIK3R2, SMAD4, TSC1, U2AF1, BAP1, RASSF1, SOX2
Myeloid Neoplasia Panel	141 genes	Blood with EDTA / Bone marrow	ASXL2, ATM, BRAF, CALR, CDKN2A, CREBBP, CRLF2, CSF3R, CTCF, DNM2, EGFR, EP300,FBXW7, GATA2, HNRNPK, HRAS, IKZF3, IL7R, KDM6A, KDR, KMT2C, LRRC4, MAP2K1, MLH1, MSH2, MSH6, NOTCH1, NTRK3, PAX5, PDGFRA, PMS2, PRAMEF2, PTEN, RELN, SMARCB1, ANKRD26, ASXL1, BCOR, BCORL1, BIRC3, C17orf97, CARD11, CBLC, CEBPA, CHEK2, CSF1R, DAXX, DDX41, DNMT1, ELANE, FLRT2, FLT3, GATA1, IDH1, IDH2, IKZF1, JAK1, JAK3, KIT, KMT2A,KRAS, MPL, MYC, NBN, NPM1, NRAS, NSD1, OR13H1, OR8B12, P2RY2, PCDHB1, PHF6, PRPF8, PTPN11, RAD21, RUNX1, SF1, SF3A1, SMC1A, SMC3, SRP72, SRSF2, STAG2,STXBP2, U2AF1, U2AF2, WT1, ADA, BLM, KCNA4, KLHL6,NPAT, TAL1, TERT, TUBA3C, WAS, WRN, ABL1, RB1, TP53, LUC7L2, BCL6, BCR, GJB3, SH2D1A, ATRX, ETNK1, GNAS, SETBP1, XPO1, ZRSR2, CBL, CBLB, DNMT3A, EED, ETV6, EZH2, PRPF40B, SUZ12, TET2, JAK2, KAT6A, NF1,SF3B1, SH2B3, KLHDC8B, TPMT, BRCA1, BRCA2, BRINP3, CUX1, FAM47A, FAS, KCNK13, MYD88, PML, PRF1, SAXO2, STAT3, TERC, TNFRSF13B

Mikrogen Hereditary Cancer Panels

BRCA1/2 Panel	2 genes	Blood with EDTA	BRCA1, BRCA2
AML Hot Spot NGS Panel	12 genes	Blood with EDTA / Bone marrow	MPL, JAK2, CALR, C-KIT, PDGFRA, PDGFRB, RUNX1, ASXL1, TP53, CEBPA, FLT3, NPM1
Micro-HRR Panel	15 genes	Blood with EDTA	ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, PPP2R2A, RAD51B, RAD51C, RAD51D, RAD54L

Genetic Diagnosis of Hereditary Cancer

Testing for hereditary cancers can detect specific, heritable, disease-related gene mutations that may increase the risk of certain cancers. Patient-tailored screening programs, preventive measures and proactive treatment are possible for patients of a high-risk group. Early diagnosis can mean a better overall prognosis through a choice of surgical and non-surgical treatment options.

What is Unique Molecular Indexing (UMI) Technology:

UMI Panel integrates unique molecular index (UMI) technology into a gene-specific, primer-based target enrichment process, enabling sensitive variant detection of targeted genomic regions by NGS. UMIs allow us to distinguish between the artifacts generated by PCR from sequence variants present in original molecules.

Hereditary Cancer Variant Analysis:

Data are analyzed by using QIAGEN Clinical Insight (QCI) and Franklin by Genoox variant analysis software. The obtained data is evaluated by two different bioinformatic analysis methods in terms of base sequencing, low quality readings and artifacts filtering and anotation of variants. In addition to all the disease-causing variants reported in the HGMD®, ClinVar and CentoMD® databases, all variants with a minor allele frequency (MAF) below 1% are considered in the gnomAD database. Research for the relevant variables focuses on coding exons and enclosing +/- 20 intronic bases.

All variants detected in the analysis are classified according to the criteria set by the American College of Medical Genetics, as indicated in the table below.

*ACMG STANDARDS AND GUIDELINES, Standarts and guidelines for the interpretation of sequence variants 17(5):405-424. doi:10.1038/gim.2015.30 GENETICS in MEDICINE, 2015

Class	Type	Possibility Of Pathogenicity	Interpretation
1	Pathogenic	>%99	Changes with sufficient data on pathogenic effect (pathogenicity).
2	Likely Pathogenic	%95-99	Changes with very strong data in favor of the presence of a pathogenic effect.
3	Variant of Unknown Significance (VUS)	%5-95	Changes with limited and/or controversial data on pathogenic effect.
4	Likely Benign	%1-5	Changes with very strong data in favor of no pathogenic effect.
5	Benign	<%1	Changes shown with sufficient data that do not have a pathogenic effect.