Micro-Onco Hereditary Cancer Panels

mikrogen
REPRODUCTIVE GENETICS COMPANY

	NUMBER OF GENES	STUDY MATERIAL	LIST OF TARGET GENES
Prostate Cancer Panel	14 genes	EDTA Blood	APC, ATM, BRCA1, BRCA2, CHEK2, EPCAM, HOXB13, MLH1, MSH2, MSH6, MUTYH, PALB2, PMS2, TP53
Fanconi Anemia Panel	18 genes	EDTA Blood	BRCA2, BRIP1, ERCC4, FANCA, FANCB, FANCC, FANCD2, FANCE, FANCF, FANCG, FANCI, FANCL, FANCM, PALB2, RAD51C, SLX4, UBE2T, XRCC2
Micro-Screen Cancer Panel	275 genes	EDTA Blood	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	EDTA Blood, FFPE	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	EDTA Blood, FFPE	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
Myeloid Neoplasia Panel	141 genes	EDTA Blood, 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

Micro-Onco Hereditary Cancer Panels

Lung Cancer Panel	72 genes	EDTA Blood, FFPE	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
Micro-HRR Panel	15 genes	FFPE, EDTA Blood	ATM, BARD1, BRCA1, BRCA2, BRIP1, CDK12, CHEK1, CHEK2, FANCL, PALB2, PPP2R2A, RAD51B, RAD51C, RAD51D, RAD54L.

With hereditary cancer panels both point mutations and small deletions/insertions, as well as copy number changes (CNV) in target genes are detected. Due to UMI technology used in these tests, variants can be detected effectively.

What is UMI Technology?

They are barcodes used to identify unique DNA-RNA molecules. These barcodes are linked before performing any amplification process (PCR) for rich amplification and unique analysis of target regions. Owing to UMI technology, PCR-derived false positives can be distinguished from true variants.

Hereditary Cancer Variant Analysis:

Hereditary cancer panels are analyzed by QIAGEN Clinical Insight (QCI), QIAGEN Ingenuity Variant Analysis (IVA) and Geneticist Assistant analysis programs, and pathogenic and possible pathogenic variants are reported according to international criteria. The data obtained are evaluated by two different bioinformatics analysis methods in terms of base sequencing, filtering of low quality reading areas and artefacts, and annotation of variants. Besides, all disease-causing variants reported in the HGMD®, ClinVar, and CentoMD® databases, all variants with a minor allele frequency (MAF) lower than 1% in the gnomAD database are also considered. Research for the variables of interest has focused on coding exons and surrounding +/- 20 intronic bases. All variants detected in the analysis are classified according to the criteria determined by the American College of Medical Genetics as specified in the table below.

Variant Classification (according to the criteria determined by the American College of Medical Genetics)
*ACMG STANDARDS AND GUIDELINES, Standards and guidelines for the interpretation of sequence variants 17(5):405-424. doi:10.1038/gim.2015.30 GENETICS in MEDICINE, 2015

Class	Classification	Probability of Pathogenicity	Definition
1	Pathogenic	>%99	Changes whose Disease-causing effect (pathogenicity) has been demonstrated with sufficient data
2	Likely Pathogenic	%95-99	Changes with very strong data in favor of the presence of Disease-causing effect (pathogenicity)
3	Uncertain	%5-95	Changes with limited and/or controversial data on the Disease-causing effect (pathogenicity)
4	Likely Benign	%1-5	Changes with very strong data in favor of no Disease-causing effect (pathogenicity)
5	Benign	<%1	Changes that have been demonstrated with sufficient data to have no Disease-causing effect (pathogenicity)

Hum Mutat. 2008 November;29(11): 1282-1291. doi:10.1002/humu.20880*