648 gene panel focused on actionable mutations by DNA sequencing

- Specimen: tumor and matched normal (peripheral blood or saliva)
- SNVs (single nucleotide variants) and indels are detected in all 648 genes
- Copy number amplifications of 8 or more are reported in ERBB2 (HER2) when the tumor percentage is ≥30%
- Genomic rearrangements are detected on 9 genes by DNA sequencing
- Microsatellite instability status and tumor mutational burden are included in the xT report
- Average coverage ~ 500x

ABCB1
ABCC3
ABL1
ABL2
ABRAXAS1
ACTA2
ACVR1
(ALK2)
ACVR1B
AGO1
AJUBA
AKT1
AKT2
AKT3
ALK
AMER1
APC**
APLNR
APOB
AR
ARAF
ARHGAP26
ARHGAP35
ARID1A
ARID1B
ARID2
ARID5B
ASNS
ASPSCR1
ASXL1
ATIC
ATM**
ATP7B
ATR
ATRX
AURKA
AURKB
AXIN1
AXIN2**
AXL
B2M
BAP1
BARD1
BCL10
BCL11B
BCL2
BCL2L1
BCL2L11
BCL6
BCL7A
BCLAF1
BCOR
BCORL1
BCR
BIRC3

BLM
BMPR1A**
BRAF
BRCA1**
BRCA2**
BRD4
BRIP1**
BTG1
BTK
BUB1B
C11orf65
C3orf70
C8orf34
CALR
CARD11
CARM1
CASP8
CASR
CBFB
CBL
CBLB
CBLC
CBR3
CCDC6
CCND1
CCND2
CCND3
CCNE1
CD19
CD22
CD274
(PD-L1)
CD40
CD70
CD79A
CD79B
CDC73
CDH1**
CDK12
CDK4
CDK6
CDK8
CDKN1A
CDKN1B
CDKN1C
CDKN2A **
CDKN2B
CDKN2C
CEBPA**
CEP57
CFTR
CHD2
CHD4
CHD7
CHEK1

CHEK2**
CIC
CIITA
CKS1B
CREBBP
CRKL
CRLF2
CSF1R
CSF3R
CTC1
CTCF
CTLA4
CTNNA1
CTNNB1
CTRC
CUL1
CUL3
CUL4A
CUL4B
CUX1
CXCR4
CYLD
CYP1B1
CYP2D6
CYP3A5
CYSLTR2
DAXX
DDB2
DDR2
DDX3X
DICER1
DIRC2
DIS3
DIS3L2
DKC1
DNM2
DNMT3A
DOT1L
DPYD
DYNC2H1
EBF1
ECT2L
EGF
EGFR**
EGLN1
EIF1AX
ELF3
ELOC
(TCEB1)
EMSY
ENG
EP300
EPCAM**
EPHA2
EPHA7

EPHB1
EPHB2
EPOR
ERBB2
(HER2)
ERBB3
ERBB4
ERCC1
ERCC2
ERCC3
ERCC4
ERCC5
ERCC6
ERG
ERRFI1
ESR1
ETS1
ETS2
ETV1
ETV4
ETV5
ETV6**
EWSR1
EZH2
FAM46C
FANCA
FANCB
FANCC
FANCD2
FANCE
FANCF
FANCG
FANCI
FANCL
FANCM
FAS
FAT1
FBXO11
FBXW7
FCGR2A
FCGR3A
FDPS
FGF1
FGF10
FGF14
FGF2
FGF23
FGF3
FGF4
FGF5
FGF6
FGF7
FGF8
FGF9
FGFR1

FGFR2
FGFR3
FGFR4
FH**
FHIT
FLCN**
FLT1
FLT3
FLT4
FNTB
FOXA1
FOXL2
FOXO1
FOXO3
FOXP1
FOXQ1
FRS2
FUBP1
FUS
G6PD
GABRA6
GALNT12
GATA1
GATA2**
GATA3
GATA4
GATA6
GEN1
GLI1
GLI2
GNA11
GNA13
GNAQ
GNAS
GPC3
GPS2
GREM1
GRIN2A
GRM3
GSTP1
H19
H3F3A
HAS3
HAVCR2
HDAC1
HDAC2
HDAC4
HGF
HIF1A
HIST1H1E
HIST1H3B
HIST1H4E
HLA-A
HLA-B
HLA-C

HLA-DMA
HLA-DMB
HLA-DOA
HLA-DOB
HLA-DPA1
HLA-DPB1
HLA-DPB2
HLA-DQA1
HLA-DQA2
HLA-DQB1
HLA-DQB2
HLA-DRA
HLA-DRB1
HLA-DRB5
HLA-DRB6
HLA-E
HLA-F
HLA-G
HNF1A
HNF1B
HOXA11
HOXB13
HRAS
HSD11B2
HSD3B1
HSD3B2
HSP90AA1
HSPH1
IDH1
IDH2
IDO1
IFIT1
IFIT2
IFIT3
IFNAR1
IFNAR2
IFNGR1
IFNGR2
IFNL3
IKBKE
IKZF1
IL10RA
IL15
IL2RA
IL6R
IL7R
ING1
INPP4B
IRF1
IRF2
IRF4
IRS2
ITPKB
JAK1
JAK2

JAK3
JUN
KAT6A
KDM5A
KDM5C
KDM5D
KDM6A
KDR
KEAP1
KEL
KIF1B
KIT
KLF4
KLHL6
KLLN
KMT2A
KMT2B
KMT2C
KMT2D
KRAS
L2HGDH
LAG3
LATS1
LCK
LDLR
LEF1
LMNA
LMO1
LRP1B
LYN
LZTR1
MAD2L2
MAF
MAFB
MAGI2
MALT1
MAP2K1
MAP2K2
MAP2K4
MAP3K1
MAP3K7
MAPK1
MAX
MC1R
MCL1
MDM2
MDM4
MED12
MEF2B
MEN1**
MET
MGMT
MIB1
MITF
MKI67

MLH1**
MLH3
MLLT3
MN1
MPL
MRE11
MS4A1
MSH2**
MSH3**
MSH6**
MTAP
MTHFD2
MTHFR
MTOR
MTRR
MUTYH**
MYB
MYC
MYCL
MYCN
MYD88
MYH11
NBN**
NCOR1
NCOR2
NF1
NF2**
NFE2L2
NFKBIA
NHP2
NKX2-1
NOP10
NOTCH1
NOTCH2
NOTCH3
NOTCH4
NPM1
NQO1
NRAS
NRG1
NSD1
NSD2
NT5C2
NTHL1
NTRK1
NTRK2
NTRK3
NUDT15
NUP98
OLIG2
P2RY8
PAK1
PALB2**
PALLD
PAX3

PAX5
PAX7
PAX8
PBRM1
PCBP1
PDCD1
PDCD1LG2
PDGFRA
PDGFRB
PDK1
PHF6
PHGDH
PHLPP1
PHLPP2
PHOX2B
PIAS4
PIK3C2B
PIK3CA
PIK3CB
PIK3CD
PIK3CG
PIK3R1
PIK3R2
PIM1
PLCG1
PLCG2
PML
PMS1
PMS2**
POLD1**
POLE**
POLH
POLQ
POT1
POU2F2
PPARA
PPARD
PPARG
PPM1D
PPP1R15A
PPP2R1A
PPP2R2A
PPP6C
PRCC
PRDM1
PREX2
PRKAR1A
PRKDC
PRKN
PRSS1
PTCH1
PTCH2
PTEN**
PTPN11
PTPN13

PTPN22
PTPRD
PTPRT
QKI
RAC1
RAD21
RAD50
RAD51
RAD51B
RAD51C**
RAD51D**
RAD54L
RAF1
RANBP2
RARA
RASA1
RB1**
RBM10
RECQL4
RET**
RHEB
RHOA
RICTOR
RINT1
RIT1
RNF139
RNF43
ROS1
RPL5
RPS15
RPS6KB1
RPTOR
RRM1
RSF1
RUNX1 **
RUNX1T1
RXRA
SCG5
SDHA
SDHAF2**
SDHB **
SDHC**
SDHD**
SEC23B
SEMA3C
SETBP1
SETD2
SF3B1
SGK1
SH2B3
SHH
SLC26A3
SLC47A2
SLC9A3R1
SLIT2

SLX4
SMAD2
SMAD3
SMAD4**
SMARCA1
SMARCA4
SMARCB1
SMARCE1
SMC1A
SMC3
SMO
SOCS1
SOD2
SOX10
SOX2
SOX9
SPEN
SPINK1
SPOP
SPRED1
SRC
SRSF2
STAG2
STAT3
STAT4
STAT5A
STAT5B
STAT6
STK11**
SUFU
SUZ12
SYK
SYNE1
TAF1
TANC1
TAP1
TAP2
TARBP2
TBC1D12
TBL1XR1
TBX3
TCF3
TCF7L2
TCL1A
TERT*
TET2
TFE3
TFEB
TFEC
TGFBR1
TGFBR2
TIGIT
TMEM127
TMEM173
TMPRSS2

TNF
TNFAIP3
TNFRSF14
TNFRSF17
TNFRSF9
TOP1
TOP2A
TP53**
TP63
TPM1
TPMT
TRAF3
TRAF7
TSC1**
TSC2**
TSHR
TUSC3
TYMS
U2AF1
UBE2T
UGT1A1
UGT1A9
UMPS
VEGFA
VEGFB
VHL**
VSIR
WEE1
WNK1
WNK2
WRN
WT1**
XPA
XPC
XPO1
XRCC1
XRCC2
XRCC3
YEATS4
ZFHX3
ZMYM3
ZNF217
ZNF471
ZNF620
ZNF750
ZNRF3
ZRSR2

GENE REARRANGEMENTS BY DNA SEQUENCING†

ABL1
ALK
BCR
EGFR
PML
RARA
RET
ROS1
TMPRSS2

* Includes promoter region

** Genes in which incidental germline findings are reported
In addition to reporting on somatic variants, when a normal sample is provided, Tempus reports germline incidental findings on a limited set of variants associated with inherited cancer syndromes within genes selected based on recommendations from the American College of Medical Genetics (ACMG), the National Comprehensive Cancer Network (NCCN), and/or published literature.

† Exons and select intronic regions only. Detailed list provided upon request.

Germline Incidental Findings Gene List

APC	APC-Associated Conditions
ATM	Ataxia-Telangiectasia, Familial pancreatic cancer, Hereditary breast and ovarian cancer
AXIN2	Oligodontia-colorectal cancer syndrome
BMPR1A	Juvenile polyposis
BRCA1	Hereditary breast and ovarian cancer
BRCA2	Hereditary breast and ovarian cancer
BRIP1	Fanconi anemia, ovarian cancer susceptibility
CDH1	Hereditary diffuse gastric cancer, breast cancer susceptibility
CDKN2A	Hereditary melanoma
CEBPA	Acute myeloid leukemia
CHEK2	Breast cancer susceptibility, colon cancer susceptibility
EGFR*	Lung cancer, TKI resistance
EPCAM*	Lynch syndrome
ETV6	Leukemia, thrombocytopenia
FH	Hereditary leiomyomatosis and renal cell cancer
FLCN	Birt-Hogg-Dube syndrome
GATA2	Emberger syndrome, Predisposition to myeloid malignancies, Immunodeficiency
MEN1	Multiple endocrine neoplasia type 1
MLH1	Lynch syndrome
MSH2	Lynch syndrome
MSH3	Colon cancer susceptibility
MSH6	Lynch syndrome
MUTYH	MYH-associated polyposis
NBN	Nijmengen breakage syndrome, breast cancer susceptibility
NF2	Neurofibromatosis type 2
PALB2	Hereditary pancreatic cancer, Fanconi anemia, hereditary breast and ovarian cancer
PMS2	Lynch syndrome
POLD1*	Colorectal cancer susceptibility
POLE*	Colorectal cancer susceptibility
PTEN	PTEN hamartoma tumor syndrome
RAD51C	Fanconi anemia, hereditary breast and ovarian cancer
RAD51D	Hereditary breast and ovarian cancer
RB1	Retinoblastoma
RET	Familial medullary thyroid cancer
RUNX1	Acute myeloid leukemia
SDHAF2	Hereditary paraganglioma-pheochromocytoma syndrome
SDHB	Hereditary paraganglioma-pheochromocytoma syndrome
SDHC	Hereditary paraganglioma-pheochromocytoma syndrome
SDHD	Hereditary paraganglioma-pheochromocytoma syndrome
SMAD4	Juvenile polyposis
STK11	Peutz-Jeghers syndrome
TP53	Li-Fraumeni syndrome
TSC1	Tuberous sclerosis complex
TSC2	Tuberous sclerosis complex
VHL	Von Hippel-Lindau syndrome
WT1	WT1-related Wilms tumor

This list is composed of genes associated with inherited cancer syndromes included on the xT panel and selected based on recommendations from the American College of Medical Genetics (ACMG), the National Comprehensive Cancer Network (NCCN) and/or published literature.

The primary focus of the xT panel is somatic reporting. Tempus also offers a separately ordered validated germline hereditary cancer panel through GeneDx.

***Special reporting**
EGFR: p.T790M, p.L792H, p.C797G, p.C797S (resistance alterations only)
EPCAM: Large deletions only
POLD1: Exonuclease domain only
POLE: Exonuclease domain only