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PATIENT: **DOE, JAMES**

ACCESSION NO:

CLINICIAN/  
REQUESTING  
DOCTOR:

PATIENT ID:  
DATE OF BIRTH: 1/5/1986  
GENDER: MALE  
DATE COLLECTED: 5/26/2015  
DATE OF REPORT: 6/15/2015

## RESULTS

## PRIMARY TUMOR TYPE

## RIGHT TESTICLE

### BIOLOGICALLY IMPORTANT ONCOGENES DETECTED

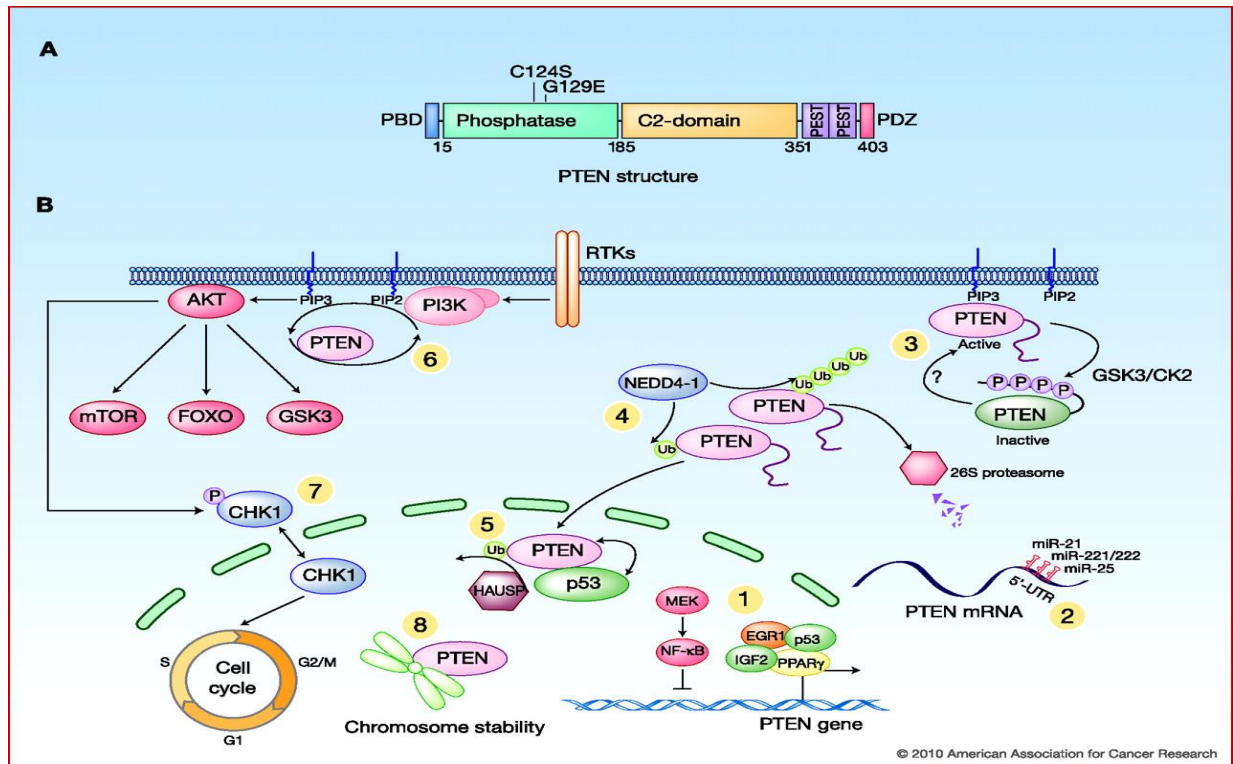
GENE	IMPLICATION
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TP53	TP53 mutations may be an important driver of tumorigenesis and / or a reason for treatment resistance in a some patients.
PTEN	Responsible for uncontrolled growth.
MDM2	Causes p53 inactivation. Associated with cancer growth and progression.
TGFB1	TGFB appears to promote tumor progression by stimulating invasion and metastasis.
TUBB2A	Microtubules are the key components of the cytoskeleton of eukaryotic cells and have an important role in various cellular functions such as intracellular migration and transport, cell shape maintenance, polarity, cell signaling and mitosis.
c-JUN	Proto-oncogene
PHB2	Prohibitins play a crucial role in adhesion processes in the cell and thereby sustaining cancer cell propagation and survival.

**Clinical Impression:** Low Aggressive Potential

**Additional Genes Detected:** ABCG2, ARHGAP5, ATF4, BIRC5, BNIP3, CAPNS1, CARD17, CCNB1, CD24, CDC20, CDK18, CKS2, DCN, DEPDC1, FTL, FZD5, FZD9, GAPDH, GNB2, GPR126, H2AFZ, HDAC1, HMGN2, ID1, IFITM1, JUNB, KPNA2, KRT18, LDHA, LTF, MAD2L1, MAP2K1, MAP2K2, MAP2K4, MAPRE1, MAS1, NME1, NME3, NPM1, PA2G4, PABPC1, PFDN4, PGAM1, PGK1, PHB, PIK3CB, PKM, PPIA, PPIH, PRKX, PRNP, PTMA, RAC1, RAC2, RALBP1, RAP1A, RBBP4, RHOB, RHOC, RRM2, SFN, SNAI2, SOCS1, SOCS3, SPRY2, SYNCRIP, TOB1, TPBG, TPT1, TYRO3, XRCC6, YWHAZ, ZMYND8

**Clinical correlation is suggested.**



## BIOLOGICAL PATHWAYS INVOLVED

**GENES INVOLVED IN CLASS I PI3K SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN SIGNALING EVENTS MEDIATED BY FOCAL ADHESION KINASE:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN ARF6 SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN CLASS I PI3K SIGNALING:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN EGF RECEPTOR ERBB1 SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN MTOR SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN PDGFR-BETA SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN ERBB1 DOWNSTREAM SIGNALING:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN EGFR-DEPENDENT ENDOTHELIN SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, FZD5, GAPDH, HDAC1, JUN, JUNB, KPNA2, LDHA, MAP2K1, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, TP53, XRCC6, YWHAZ

#### GENES INVOLVED IN DRUG INTERACTIONS

<u>DRUG</u>	<u>GENE INVOLVED</u>
<b>PACLITAXIL</b>	YBX1, ID1, TUBB2A, BIRC5, MADL1, ABCG2, TP53
<b>CISPLATIN</b>	RRM2, YBX1, MDM2, BIRC5, MAD2L1, ABCG2, TP53
<b>DOXORUBICIN</b>	YBX1, MDM2, BIRC5, PTEN, RALBP1, SFN, ABCG2, TP53
<b>DAUNORUBICIN</b>	YBX1, MDM2, BIRC5, PTEN, RALBP1, SFN, ABCG2, TP53
<b>EPIRUBICIN</b>	NME1, BIRC5, SFN, CKS2, ABCG2, TP53
<b>DOCETAXEL</b>	RRM2, ID1, BIRC5, MAD2L, ABCG2
<b>NETILMICIN</b>	GAPDH, TUBB2A, GNB2, PGK1, PPIA, PHB
<b>CEFOTAXIME</b>	GAPDY, TUBB2A, PGK1, GNB2, PPIA, PHB
<b>CEFACETRILE</b>	GAPDH, TUBB2A, PGK1, GNB2, PPIA, PHB
<b>GLUTATHIONE</b>	JUN, GAPDH, RALBP1, XRCC6, RAC1, TP53, HDAC1, YWHAZ, KPNA2

**GENES TESTED** AARS, ABCB1, ABCC4, ABCG2, ABI2, ABL1, ABL2, ACADS, ACY1, ADM, AGFG1, AK1, AKAP1, AKT1, AKT2, ALB, ALDH4A1, ALDH6A1, ANPEP, ANXA5, ANXA7, AP2B1, AP2M1, APC, APPL1, AR, ARHGAP5, ARHGEF5, ARID4A, ARMC1, ASNS, ASPM, ATAD2, ATF4, ATM, ATP5O, AURKA, AXIN2, AXL, B2M, BAG1, BAG3, BARD1, BAX, BBC3, BCAR1, BCL2, BCL2L1, BCL2L11, BHLHE40, BID, BIRC5, BLMH, BMP6, BNIP3, BRAF, BRCA1, BRCA2, BTG2, BTK, BUB1, CA9, CAMK2A, CAMK2B, CANX, CAPN1, CAPNS1, CARD17, CASP8, CASP9, CBF3, CBLB, CCL2, CCNA2, CCNB1, CCNB2, CCND1, CCND2, CCND3, CCNE1, CCT5, CD24;CD24L4, CD34, CD44, CD59, CD70, CDC20, CDC25A, CDC25B, CDC25C, CDC42, CDC42BPA, CDH1, CDK1, CDK13, CDK16, CDK17, CDK18, CDK2, CDK4, CDK5, CDK9, CDKL1, CDKN1A, CDKN1B, CDKN1C, CDKN2A, CDKN2B, CDKN2D, CEACAM5, CEBPG, CENPA, CGRRF1, CHAF1A, CHPT1, CIB1, CIRBP, CKS2, CLTC, CNBP, COL1A1, COL4A2, COL6A3, COX6C, COX7A2, CP, CRAT, CRHR1, CRK, CSF1, CSF1R, CSF3, CSNK1G2, CTNNA1, CTNNA1, CTPS, CTSB, CTSC, CTSE, CTSL2, CXCL12, CYC1, CYCS, CYP19A1, CYR61, DCC, DCK, DCN, DDX10, DEGS1, DEK, DEPDC1, DHCR7, DHRS2, DHX8, DLG3, DTL, DVL1, DVL3, E2F1, E2F3, E2F5, ECT2, EGF, EGFR, EGLN1, EGR1, EGR3, EIF2C2, EIF5, ELK1, EPHA2, ERBB2, ERBB3, ERBB4, ERCC3, ESM1, ESR1, ETV1, ETV3, ETV6, EVL, EXT1, EZH2, EZR, F2R, FADD, FAS, FASLG, FASTK, FBN1, FBN2, FBP1, FBXO5, FES, FGD6, FGF2, FGF3, FGF8, FGFR1, FGR, FKBP8, FLT1, FN1, FOS, FOSL2, FOXO1, FRZB, FTL, FUT8, FYN, FZD1, FZD2, FZD5, FZD9, GAPDH, GBE1, GCN1L1, GDF15, GGH, GMPS, GNA13, GNAS, GNAZ, GNB2, GNB2L1, GPR126, GPR180, GPR39, GRB2, GRB7, GSK3A, GSK3B, GSPT1, GSTM3, GTF2I, GUSB, H2AFZ, HADHA, HDAC1, HDGF, HGF, HLA-C, HLA-G, HMBS, HMG2, HMMR, HPRT1, HRAS, HSPA4, HSPA5, HSPA8, HSPB1, HSPH1, HYAL1, HYOU1, ICAM1, ID1, ID2, IDUA, IER3, IFITM1, IFNGR1, IGF1, IGF1R, IGF2, IGF2R, IGFBP3, IGFBP4, IGFBP5, IL1B, INS, INSR, IP6K2, IRF3, ITGA2B, ITGA3, ITGAV, ITGB1, ITGB3, ITGB4, ITPR1, JAK1, JUN, JUNB, JUND, KAT2A, KDM5A, KDR, KIF14, KIF21A, KIF3B, KIT, KITLG, KLK10, KLK13, KPNA2, KRAS, KRT18, KRT19, KRT2, KRT9, LAMB1, LAMP2, LCK, LCN2, LDHA, LEF1, LEP, LIMK1, LITAF, LONP1, LRPAP1, LTF, LYN, LZTR1, M6PR, MAD2L1, MAP2K1, MAP2K2, MAP2K2;LOC407835, MAP2K4, MAP3K5, MAP3K8, MAPK1, MAPK12, MAPK13, MAPK14, MAPK3, MAPK8, MAPKAPK3, MAPRE1, MARS, MAS1, MATN3, MAX, MCC, MCCC1, MCM2, MCM4, MCM6, MDM2, MDM4, MELK, MET, MGST1, MIB1, MKI67, MLF1IP, MLLT10, MLLT3, MME, MMP1, MMP11, MMP14, MMP17, MMP2, MMP28, MMP3, MMP9, MNDA, MRPL13, MS4A7, MSH2, MSH6, MT3, MTDH, MTOR, MX1, MYB, MYBL2, MYC, MYCN, MYD88, MYRIP, NDC80, NDRG1, NF1, NF2, NFKB1, NFKB2, NFKBIA, NID1, NINJ1, NMBR, NME1, NME3, NMU, NOTCH1, NOTCH2, NOTCH4, NPM1, NQO1, NR1D1, NR2F6, NR4A1, NRAS, NRG1, ODZ1, ORC6L, OSM, OXCT1, PA2G4, PABPC1, PAK1, PCNA, PDGFA, PDGFB, PDGFRA, PDPK1, PEA15, PECAM1, Peci, PFDN4, PFDN5, PFKP, PGAM1, PGK1, PGR, PHB, PHB2, PIK3CA, PIK3CB, PIK3CD, PIK3CG, PIK3R1, PIR, PKM2, PKMYT1, PLCB1, PLCG1, PLCG2, PLG, PLK2, PPARG, PPIA, PPIH, PPP1R1B, PPP2R5A, PRAME, PRC1, PRDX2, PRDX4, PRKACA, PRKAR1A, PRKAR2B, PRKCA, PRKCB, PRKCD, PRKCE, PRKCG, PRKCQ, PRK CZ, PRKD1, PRKD2, PRKX, PRNP, PSMA1, PTEN, PTGS1, PTK2, PTK2B, PTMA, PTN, PTPRN, RAB27B, RAB5A, RAB6B, RAC1, RAC2, RAD21, RAD50, RAD51, RAF1, RALBP1, RAPIA, RARB, RASGRF1, RASL11B, RB1, RBBP4, RBL2, REL, RELA, RELB, RET, RFC2, RFC4, RGS19, RHOA, RHOB, RHOC, RHOD, RIPK1, ROCK1, ROCK2, RPN2, RPS6KB1, RRM2, SARS, SCUBE2, SEC14L2, SELENBP1, SEMA4D, SEPP1, SEPT6, SERPINH1, SFN, SFPQ, SFRS7, SHB, SHC1, SHH, SIAH2, SIVA1, SKI, SKIL, SLC16A1, SLC1A4, SLC20A1, SLC2A3, SLC7A1, SMAD1, SMAD4, SMO, SNAI2, SND1, SOCS1, SOCS3, SOD1, SORT1, SOS1, SP1, SPINT2, SPP1, SPRY2, SRC, STAT1, STAT2, STAT3, STAT5B, STC1, STK3, STK32B, STMN1, STX1A, SYNCRIP, TBL3, TBP, TBX3, TCF3, TCF4, TCF7L2, TFAP2C, TFDP1, TFDP2, TFRC, TGFA, TGFB1, TGFB2, TGFB3, TGFB1, TGFB2, TGFB3, TGFB1, TMEM45A, TNF, TNFRSF10A, TNFRSF10B, TNFRSF1A, TNFRSF1B, TNK1, TNK2, TOB1, TP53, TP53BP2, TP53I3, TPBG, TPT1, TRADD, TRAM1, TRIP13, TRRAP, TSG101, TUBA4A, TUBB3, TXNRD1, TYK2, TYRO3, UBE2L6, UCHL1, UCHL5, UHMK1, USP7, VDAC1, VEGFA, VIM, WISP1, WNT1, WNT2, WNT3, WNT5A, WT1, XRCC1, XRCC3, XRCC4, XRCC5, XRCC6, YBX1, YES1, YWHAB, YWHAZ, ZMYND8

#### **METHODOLOGY:**

Testing is performed on DNA extracted from a formalin fixed tissue specimen by spectrophotometry and genotyping using Taqman® allele discrimination PCR analysis.

#### **LIMITATIONS:**

Interpretation and commentary are provided to the practitioner for educational purposes only and should not be taken as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the sole responsibility of the practitioner. While polymorphisms are important, other variants and mutations in these genes will not be detected. Mutations in other genes that could affect tumor progression will not be detected.



Felipe Dominguez, MD  
Pathologist

#### CLIA FDA STATEMENT:

The PCR assays were validated pursuant to the 1988 CLIA standards by SunCoast Pathology Associates. The FDA has neither cleared nor approved these assays, nor is FDA pre-market review required. SunCoast Pathology Associates is certified under the Federal 1988 CLIA legislation to perform high complexity clinical laboratory testing and is inspected and accredited by the College of American Pathologists.

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PATIENT: **DOE, DICK**

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CLINICIAN/  
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DOCTOR:

PATIENT ID:  
DATE OF BIRTH: 3/24/1960  
GENDER: MALE  
DATE COLLECTED: 5/21/2015  
DATE OF REPORT: 6/11/2015

**RESULTS**

**PRIMARY TUMOR TYPE**

**PROSTATE**

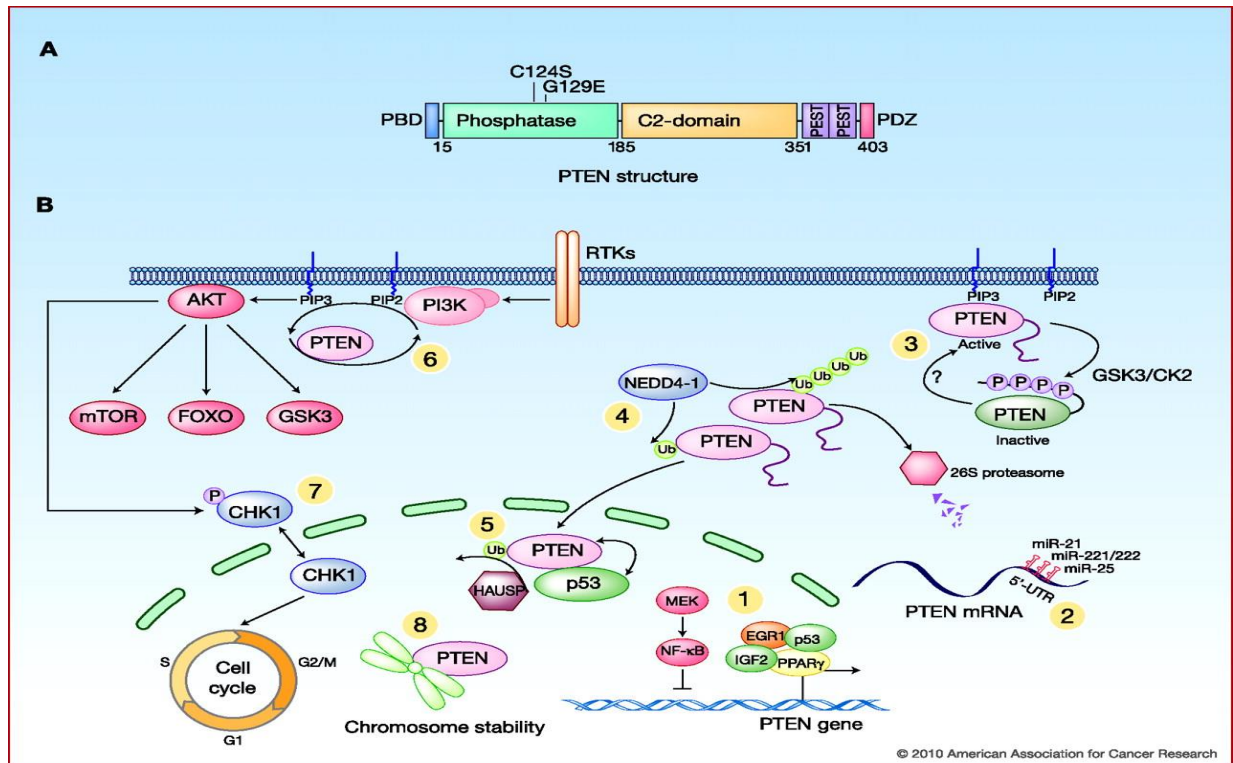
## **BIOLOGICALLY IMPORTANT ONCOGENES DETECTED**

<b>GENE</b>	<b>IMPLICATION</b>
BIRC5	This gene is a member of the inhibitor of apoptosis (IAP) gene family, which encode negative regulatory proteins that prevent apoptotic cell death.
PTEN	Responsible for uncontrolled growth.
MDM2	Causes p53 inactivation. Associated with prostate cancer growth and progression.
MMP11	Overexpression of MMP-11 gene is related with increased aggressiveness of cancers and a poor clinical outcome.
K18 & K19	K18 and K19 promoters lack classical androgen response elements, making the mechanism of regulation unclear.
RHOC	RhoC promotes tumor metastases in prostate cancer by augmenting cell invasiveness through a modulation of the Akt pathway.
HSPB1	HspB1 is involved in oncogenesis and resistance to various anti-cancer therapies due to its cytoprotective activities. It is suggested that HspB1 plays a crucial function during metastasis formation.
BNIP3	BNIP3 associates with PTB-associating splicing factor and histone deacetylase 1, and binds to the promoter of the AIF gene, hence repressing its expression and resulting in increased resistance to apoptosis.
TP53	Decreased Cell cycle arrest and Apoptosis.

**Clinical Impression:** Very Aggressive Potential

**Additional Genes Detected:** ARHGAP5, ATF4, AXL, CARD17, CCNB1, CKS2, DCN, DEPDC1, FTL, FZD2, FZD6, GAPDH, GPR126, H2AFZ, HDAC1, HMGN2, ID1, IFITM1, IGF2, JUN, JUNB, LDHA, MAD2L1, MAP2K2, MAPRE1, MAS1, NME1, NME3, NPM1, PA2G4, PABPC1, PFDN4, PGAM1, PGK1, PHB, PHB2, PIK3CB, PKM, PPIA, PPIH, PRDX2, PRKX, PRNP, PSMA1, PTMA, RAC1, RAC2, RALBP1, RAP1A, RBBP4, RHOB, RRM2, SFN, SOCS1, SOCS3, SPRY2, SYNCRIP, TFDP1, TOB1, TPBG, TPT1, TUBB2A, TYRO3, XRCC6, YBX1, YWHAZ, ZMYND8

Clinical correlation is suggested.



## BIOLOGICAL PATHWAYS INVOLVED

**GENES INVOLVED IN CLASS I PI3K SIGNALING EVENTS:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDP1, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN SIGNALING EVENTS MEDIATED BY FOCAL ADHESION KINASE:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDP1, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN ARF6 SIGNALING EVENTS:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDP1, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN CLASS I PI3K SIGNALING:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDP1, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN EGF RECEPTOR ERBB1 SIGNALING PATHWAY:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2,



NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDPI, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN MTOR SIGNALING PATHWAY:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDPI, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN PDGFR-BETA SIGNALING PATHWAY:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDPI, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN ERBB1 DOWNSTREAM SIGNALING:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDPI, TP53, XRCC6, YWHAZ

**GENES INVOLVED IN EGFR-DEPENDENT ENDOTHELIN SIGNALING EVENTS:** ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, IGF2, JUN, JUNB, KRT19, LDHA, MAP2K2, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SOCS1, SOCS3, SPRY2, TFDPI, TP53, XRCC6, YWHAZ

#### GENES INVOLVED IN DRUG INTERACTIONS

<u>DRUG</u>	<u>GENE INVOLVED</u>
<b>DOXORUBICIN</b>	YBX1, MDM2, BIRC5, PTEN, RALBP1, SFNTP53
<b>PODOFILOX</b>	BNIP3, MDM2, HSPB1, BIRC5, TPT1, TP53, PRDX2
<b>GLUTATHIONE</b>	JUN, GAPDH, RALBP1, XRCC6, RAC1, TP53, HDAC1, YWHAZ, PRDX2
<b>PACILTAXEL</b>	YBX1, ID1, TUBB2A, BIRC5, MAD2L1, TP53
<b>EPIRUBICIN</b>	NME1, BIRC5, SFN, CKS2, TP53
<b>DAUNORUBICIN</b>	YBX1, MDM2, BIRC5, PTEN, RALBP1, SFN, TP53
<b>CEFOTAXIME</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>NETILMICIN</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>CEFACETRILE</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>CIPROFLOXACIN</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB

**GENES TESTED** AARS, ABCB1, ABCC4, ABCG2, ABI2, ABL1, ABL2, ACADS, ACY1, ADM, AGFG1, AK1, AKAP1, AKT1, AKT2, ALB, ALDH4A1, ALDH6A1, ANPEP, ANXA5, ANXA7, AP2B1, AP2M1, APC, APPL1, AR, ARHGAP5, ARHGEF5, ARID4A, ARMC1, ASNS, ASPM, ATAD2, ATF4, ATM, ATP5O, AURKA, AXIN2, AXL, B2M, BAG1, BAG3, BARD1, BAX, BBC3, BCAR1, BCL2, BCL2L1, BCL2L11, BHLHE40, BID, BIRC5, BLMH, BMP6, BNIP3, BRAF, BRCA1, BRCA2, BTG2, BTK, BUB1, CA9, CAMK2A, CAMK2B, CANX, CAPN1, CAPNS1, CARD17, CASP8, CASP9, CBF3, CBLB, CCL2, CCNA2, CCNB1, CCNB2, CCND1, CCND2, CCND3, CCNE1, CCT5, CD24;CD24L4, CD34, CD44, CD59, CD70, CDC20, CDC25A, CDC25B, CDC25C, CDC42, CDC42BPA, CDH1, CDK1, CDK13, CDK16, CDK17, CDK18, CDK2, CDK4, CDK5, CDK9, CDKL1, CDKN1A, CDKN1B, CDKN1C, CDKN2A, CDKN2B, CDKN2D, CEACAM5, CEBPG, CENPA, CGRRF1, CHAF1A, CHPT1, CIB1, CIRBP, CKS2, CLTC, CNBP, COL1A1, COL4A2, COL6A3, COX6C, COX7A2, CP, CRAT, CRHR1, CRK, CSF1, CSF1R, CSF3, CSNK1G2, CTNNA1, CTNNA1, CTNNA1, CTPS, CTSB, CTSC, CTSE, CTSB, CTSL2, CXCL12, CYC1, CYCS, CYP19A1, CYR61, DCC, DCK, DCN, DDX10, DEGS1, DEK, DEPDC1, DHCR7, DHRS2, DHX8, DLG3, DTL, DVL1, DVL3, E2F1, E2F3, E2F5, ECT2, EGF, EGFR, EGLN1, EGR1, EGR3, EIF2C2, EIF5, ELK1, EPHA2, ERBB2, ERBB3, ERBB4, ERCC3, ESM1, ESR1, ETV1, ETV3, ETV6, EVL, EXT1, EZH2, EZR, F2R, FADD, FAS, FASLG, FASTK, FBN1, FBN2, FBP1, FBXO5, FES, FGD6, FGF2, FGF3, FGF8, FGFR1, FGR, FKBP8, FLT1, FN1, FOS, FOSL2, FOXO1, FRZB, FTL, FUT8, FYN, FZD1, FZD2, FZD5, FZD9, GAPDH, GBE1, GCN1L1, GDF15, GGH, GMPS, GNA13, GNAS, GNAZ, GNB2, GNB2L1, GPR126, GPR180, GPR39, GRB2, GRB7, GSK3A, GSK3B, GSPT1, GSTM3, GTF2I, GUSB, H2AFZ, HADHA, HDAC1, HDGF, HGF, HLA-C, HLA-G, HMBS, HMG2, HMMR, HPRT1, HRAS, HSPA4, HSPA5, HSPA8, HSPB1, HSPH1, HYAL1, HYOU1, ICAM1, ID1, ID2, IDUA, IER3, IFITM1, IFNGR1, IGF1, IGF1R, IGF2, IGF2R, IGFBP3, IGFBP4, IGFBP5, IL1B, INS, INSR, IP6K2, IRF3, ITGA2B, ITGA3, ITGAV, ITGB1, ITGB3, ITGB4, ITPR1, JAK1, JUN, JUNB, JUND, KAT2A, KDM5A, KDR, KIF14, KIF21A, KIF3B, KIT, KITLG, KLK10, KLK13, KPNA2, KRAS, KRT18, KRT19, KRT2, KRT9, LAMB1, LAMP2, LCK, LCN2, LDHA, LEP, LIMK1, LITAF, LONP1, LRPAP1, LTF, LYN, LZTR1, M6PR, MAD2L1, MAP2K1, MAP2K2, MAP2K2;LOC407835, MAP2K4, MAP3K5, MAP3K8, MAPK1, MAPK12, MAPK13, MAPK14, MAPK3, MAPK8, MAPKAPK3, MAPRE1, MARS, MAS1, MATN3, MAX, MCC, MCCC1, MCM2, MCM4, MCM6, MDM2, MDM4, MELK, MET, MGST1, MIB1, MKI67, MLF1IP, MLLT10, MLLT3, MME, MMP1, MMP11, MMP14, MMP17, MMP2, MMP28, MMP3, MMP9, MNDA, MRPL13, MS4A7, MSH2, MSH6, MT3, MTDH, MTOR, MX1, MYB, MYBL2, MYC, MYCN, MYD88, MYRIP, NDC80, NDRG1, NF1, NF2, NFKB1, NFKB2, NFKBIA, NID1, NINJ1, NMBR, NME1, NME3, NMU, NOTCH1, NOTCH2, NOTCH4, NPM1, NQO1, NR1D1, NR2F6, NR4A1, NRAS, NRG1, ODZ1, ORC6L, OSM, OXCT1, PA2G4, PABPC1, PAK1, PCNA, PDGFA, PDGFB, PDGFRA, PDPK1, PEA15, PECAM1, Peci, PFDN4, PFDN5, PFKP, PGAM1, PGK1, PGR, PHB, PHB2, PIK3CA, PIK3CB, PIK3CD, PIK3CG, PIK3R1, PIR, PKM2, PKMYT1, PLCB1, PLCG1, PLCG2, PLG, PLK2, PPARG, PPIA, PPIH, PPP1R1B, PPP2R5A, PRAME, PRC1, PRDX2, PRDX4, PRKACA, PRKAR1A, PRKAR2B, PRKCA, PRKCB, PRKCD, PRKCE, PRKCG, PRKCQ, PRK CZ, PRKD1, PRKD2, PRKX, PRNP, PSMA1, PTEN, PTGS1, PTK2, PTK2B, PTMA, PTN, PTPRN, RAB27B, RAB5A, RAB6B, RAC1, RAC2, RAD21, RAD50, RAD51, RAF1, RALBP1, RAPIA, RARB, RASGRF1, RASL11B, RB1, RBBP4, RBL2, REL, RELA, RELB, RET, RFC2, RFC4, RGS19, RHOA, RHOB, RHOC, RHOD, RIPK1, ROCK1, ROCK2, RPN2, RPS6KB1, RRM2, SARS, SCUBE2, SEC14L2, SELENBP1, SEMA4D, SEPP1, SEPT6, SERPINH1, SFN, SFPQ, SFRS7, SHB, SHC1, SHH, SIAH2, SIVA1, SKI, SKIL, SLC16A1, SLC1A4, SLC20A1, SLC2A3, SLC7A1, SMAD1, SMAD4, SMO, SNAI2, SND1, SOCS1, SOCS3, SOD1, SORT1, SOS1, SP1, SPINT2, SPP1, SPRY2, SRC, STAT1, STAT2, STAT3, STAT5B, STC1, STK3, STK32B, STMN1, STX1A, SYNCRIP, TBL3, TBP, TBX3, TCF3, TCF4, TCF7L2, TFAP2C, TFD1, TFD2, TFR3, TGFA, TGFB1, TGFB2, TGFB3, TGFB4, TGFB5, TGFB6, TMEM45A, TNF, TNFRSF10A, TNFRSF10B, TNFRSF1A, TNFRSF1B, TNK1, TNK2, TOB1, TP53, TP53BP2, TP53I3, TPBG, TPT1, TRADD, TRAM1, TRIP13, TRRAP, TSG101, TUBA4A, TUBB3, TXNRD1, TYK2, TYRO3, UBE2L6, UCHL1, UCHL5, UHMK1, USP7, VDAC1, VEGFA, VIM, WISP1, WNT1, WNT2, WNT3, WNT5A, WT1, XRCC1, XRCC3, XRCC4, XRCC5, XRCC6, YBX1, YES1, YWHAB, YWHAZ, ZMYND8

**METHODOLOGY:**

Testing is performed on DNA extracted from a formalin fixed tissue specimen by spectrophotometry and genotyping using Taqman® allele discrimination PCR analysis.

**LIMITATIONS:**

Interpretation and commentary are provided to the practitioner for educational purposes only and should not be taken as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the sole responsibility of the practitioner. While polymorphisms are important, other variants and mutations in these genes will not be detected. Mutations in other genes that could affect tumor progression will not be detected.



Felipe Dominguez, MD  
Pathologist

#### CLIA FDA STATEMENT:

The PCR assays were validated pursuant to the 1988 CLIA standards by SunCoast Pathology Associates. The FDA has neither cleared nor approved these assays, nor is FDA pre-market review required. SunCoast Pathology Associates is certified under the Federal 1988 CLIA legislation to perform high complexity clinical laboratory testing and is inspected and accredited by the College of American Pathologists.

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PATIENT: **SMITH, JOHN**

ACCESSION NO:

CLINICIAN/  
REQUESTING  
DOCTOR:

PATIENT ID:  
DATE OF BIRTH: 4/21/1941  
GENDER: MALE  
DATE COLLECTED: 6/1/2015  
DATE OF REPORT: 6/11/2015

**RESULTS**

**PRIMARY TUMOR TYPE**

**PROSTATE**

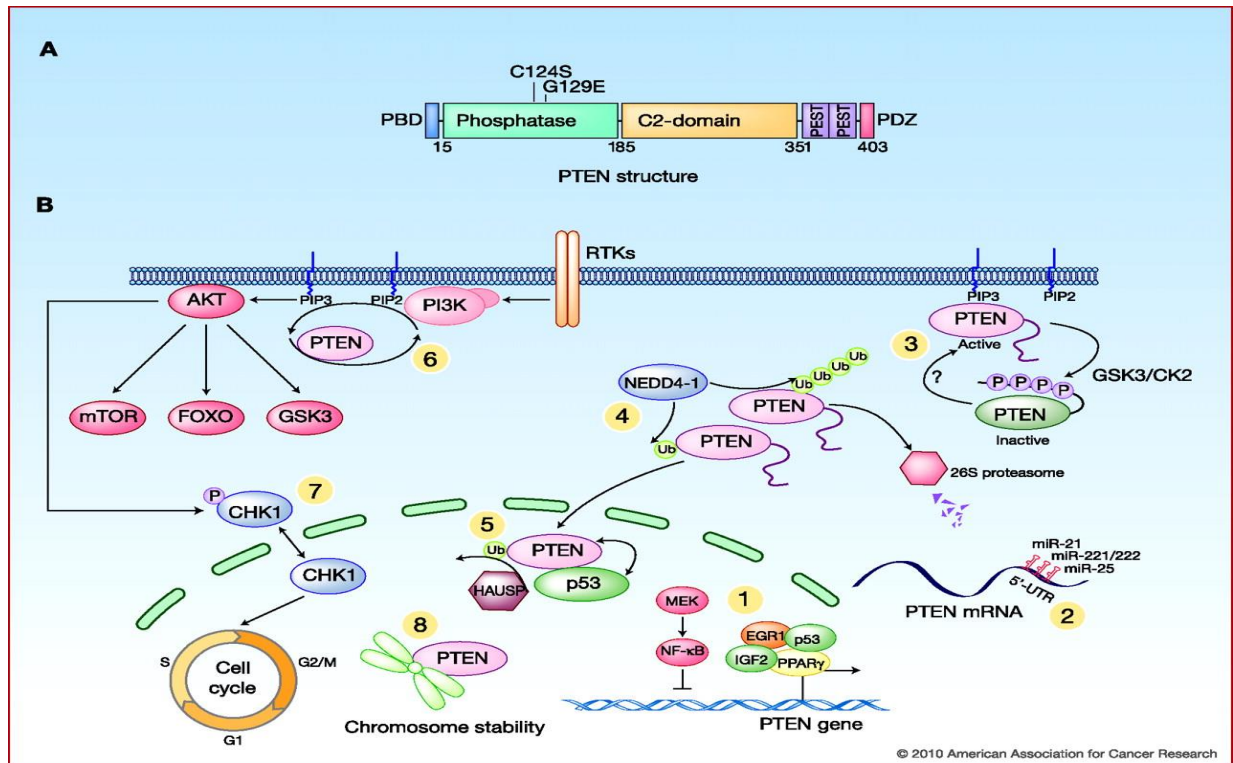
## **BIOLOGICALLY IMPORTANT ONCOGENES DETECTED**

<b>GENE</b>	<b>IMPLICATION</b>
BIRC5	This gene is a member of the inhibitor of apoptosis (IAP) gene family, which encode negative regulatory proteins that prevent apoptotic cell death.
PTEN	Responsible for uncontrolled growth.
MDM2	Causes p53 inactivation. Associated with prostate cancer growth and progression.
CD24	CD24 is among the most overexpressed protein in cancer cells and is a valuable marker indicative of poor prognosis for cancer patients. Intracellular CD24 promotes tumour cell growth by causing ARF degradation.
K18 & K19	K18 and K19 promoters lack classical androgen response elements, making the mechanism of regulation unclear.
SNAI2	SNAI2 is a major player in cancer metastasis
HSPB1	HspB1 is involved in oncogenesis and resistance to various anti-cancer therapies due to its cytoprotective activities. It is suggested that HspB1 plays a crucial function during metastasis formation.
BNIP3	BNIP3 associates with PTB-associating splicing factor and histone deacetylase 1, and binds to the promoter of the AIF gene, hence repressing its expression and resulting in increased resistance to apoptosis.
RRM2	RRM2 plays a critical role in proliferation and invasion of Pca.

**Clinical Impression:** Very Aggressive Potential

**Additional Genes Detected:** ABCG2, ARHGAP5, ATF4, CARD17, CCNB1, CDC20, CDK18, CKS2, DCK, DCN, FTL, FZD2, FZD9, GAPDH, GPR126, H2AFZ, HDAC1, HMGN2, ID1, IFITM1, JUN, JUNB, KPNA2, MAP2K2, MAP2K4, MAPRE1, MAS1, NME1, NME3, NPM1, PA2G4, PFDN4, PGAM1, PGK1, PHB, PIK3CB, PKM, PPIA, PPIH, PRDX2, PRKX, PRNP, PSMA1, PTMA, RAC1, RALBP1, RAP1A, RBBP4, RHOB, SFN, SOCS1, SOCS3, SPRY2, TGFB1, TOB1, TPBG, TPT1, TUBB2A, XRCC6, YBX1, YWHAZ, ZMYND8

Clinical correlation is suggested.



## BIOLOGICAL PATHWAYS INVOLVED

**GENES INVOLVED IN CLASS I PI3K SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN SIGNALING EVENTS MEDIATED BY FOCAL ADHESION KINASE:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN ARF6 SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN CLASS I PI3K SIGNALING:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN EGF RECEPTOR ERBB1 SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2,

MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN MTOR SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN PDGFR-BETA SIGNALING PATHWAY:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN ERBB1 DOWNSTREAM SIGNALING:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

**GENES INVOLVED IN EGFR-DEPENDENT ENDOTHELIN SIGNALING EVENTS:** ABCG2, ATF4, BIRC5, BNIP3, CCNB1, DCN, GAPDH, HDAC1, HSPB1, JUN, JUNB, KPNA2, KRT19, MAP2K2, MAP2K4, MDM2, NME1, NPM1, PA2G4, PGK1, PKM, PTEN, PTMA, RAC1, RAP1A, RBBP4, SFN, SNAI2, SOCS1, SOCS3, SPRY2, XRCC6, YWHAZ

#### GENES INVOLVED IN DRUG INTERACTIONS

<u>DRUG</u>	<u>GENE INVOLVED</u>
<b>DOXORUBICIN</b>	YBX1, MDM2, BIRC5, PTNE, RALBP1, SFN ABCG2
<b>PODOFILOX</b>	BNIP3, MDM2, HSPB1, BIRC5, PRDX2, TPT1
<b>GLUTATHIONE</b>	JUN, GAPDH, RALBP1, XRCC6, RAC1, HDAC1, YWHAZ, PRDX2, KPNA2
<b>ETOPOSIDE</b>	BNIP3, MDM2, HSPB1, BIRC5, PRDX2, ABCG2
<b>EPIRUBICIN</b>	NME1, BIRC5, SFN, CKS2, ABCG2
<b>DAUNORUBICIN</b>	YBX1, MDM2, BIRC5, PTEN, RALBP1, SFN, ABCG2
<b>CEFOTAXIME</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>NETILMICIN</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>CEFACETRILE</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB
<b>CIPROFLOXACIN</b>	GAPDH, TUBB2A, HSPB1, PGK1, PPIA, PHB

**GENES TESTED** AARS, ABCB1, ABCC4, ABCG2, ABI2, ABL1, ABL2, ACADS, ACY1, ADM, AGFG1, AK1, AKAP1, AKT1, AKT2, ALB, ALDH4A1, ALDH6A1, ANPEP, ANXA5, ANXA7, AP2B1, AP2M1, APC, APPL1, AR, ARHGAP5, ARHGEF5, ARID4A, ARMC1, ASNS, ASPM, ATAD2, ATF4, ATM, ATP5O, AURKA, AXIN2, AXL, B2M, BAG1, BAG3, BARD1, BAX, BBC3, BCAR1, BCL2, BCL2L1, BCL2L11, BHLHE40, BID, BIRC5, BLMH, BMP6, BNIP3, BRAF, BRCA1, BRCA2, BTG2, BTK, BUB1, CA9, CAMK2A, CAMK2B, CANX, CAPN1, CAPNS1, CARD17, CASP8, CASP9, CBF3, CBLB, CCL2, CCNA2, CCNB1, CCNB2, CCND1, CCND2, CCND3, CCNE1, CCT5, CD24;CD24L4, CD34, CD44, CD59, CD70, CDC20, CDC25A, CDC25B, CDC25C, CDC42, CDC42BPA, CDH1, CDK1, CDK13, CDK16, CDK17, CDK18, CDK2, CDK4, CDK5, CDK9, CDKL1, CDKN1A, CDKN1B, CDKN1C, CDKN2A, CDKN2B, CDKN2D, CEACAM5, CEBPG, CENPA, CGRRF1, CHAF1A, CHPT1, CIB1, CIRBP, CKS2, CLTC, CNBP, COL1A1, COL4A2, COL6A3, COX6C, COX7A2, CP, CRAT, CRHR1, CRK, CSF1, CSF1R, CSF3, CSNK1G2, CTNNA1, CTNNA1, CTNNA1, CTPS, CTSB, CTSC, CTSE, CTSL2, CXCL12, CYC1, CYCS, CYP19A1, CYR61, DCC, DCK, DCN, DDX10, DEGS1, DEK, DEPDC1, DHCR7, DHRS2, DHX8, DLG3, DTL, DVL1, DVL3, E2F1, E2F3, E2F5, ECT2, EGF, EGFR, EGLN1, EGR1, EGR3, EIF2C2, EIF5, ELK1, EPHA2, ERBB2, ERBB3, ERBB4, ERCC3, ESM1, ESR1, ETV1, ETV3, ETV6, EVL, EXT1, EZH2, EZR, F2R, FADD, FAS, FASLG, FASTK, FBN1, FBN2, FBP1, FBXO5, FES, FGD6, FGF2, FGF3, FGF8, FGFR1, FGR, FKBP8, FLT1, FN1, FOS, FOSL2, FOXO1, FRZB, FTL, FUT8, FYN, FZD1, FZD2, FZD5, FZD9, GAPDH, GBE1, GCN1L1, GDF15, GGH, GMPS, GNA13, GNAS, GNAZ, GNB2, GNB2L1, GPR126, GPR180, GPR39, GRB2, GRB7, GSK3A, GSK3B, GSPT1, GSTM3, GTF2I, GUSB, H2AFZ, HADHA, HDAC1, HDGF, HGF, HLA-C, HLA-G, HMBS, HMG2, HMMR, HPRT1, HRAS, HSPA4, HSPA5, HSPA8, HSPB1, HSPH1, HYAL1, HYOU1, ICAM1, ID1, ID2, IDUA, IER3, IFITM1, IFNGR1, IGF1, IGF1R, IGF2, IGF2R, IGFBP3, IGFBP4, IGFBP5, IL1B, INS, INSR, IP6K2, IRF3, ITGA2B, ITGA3, ITGAV, ITGB1, ITGB3, ITGB4, ITPR1, JAK1, JUN, JUNB, JUND, KAT2A, KDM5A, KDR, KIF14, KIF21A, KIF3B, KIT, KITLG, KLK10, KLK13, KPNA2, KRAS, KRT18, KRT19, KRT2, KRT9, LAMB1, LAMP2, LCK, LCN2, LDHA, LEF1, LEP, LIMK1, LITAF, LONP1, LRPAP1, LTF, LYN, LZTR1, M6PR, MAD2L1, MAP2K1, MAP2K2, MAP2K2;LOC407835, MAP2K4, MAP3K5, MAP3K8, MAPK1, MAPK12, MAPK13, MAPK14, MAPK3, MAPK8, MAPKAPK3, MAPRE1, MARS, MAS1, MATN3, MAX, MCC, MCCC1, MCM2, MCM4, MCM6, MDM2, MDM4, MELK, MET, MGST1, MIB1, MKI67, MLF1IP, MLLT10, MLLT3, MME, MMP1, MMP11, MMP14, MMP17, MMP2, MMP28, MMP3, MMP9, MNDA, MRPL13, MS4A7, MSH2, MSH6, MT3, MTDH, MTOR, MX1, MYB, MYBL2, MYC, MYCN, MYD88, MYRIP, NDC80, NDRG1, NF1, NF2, NFKB1, NFKB2, NFKBIA, NID1, NINJ1, NMBR, NME1, NME3, NMU, NOTCH1, NOTCH2, NOTCH4, NPM1, NQO1, NR1D1, NR2F6, NR4A1, NRAS, NRG1, ODZ1, ORC6L, OSM, OXCT1, PA2G4, PABPC1, PAK1, PCNA, PDGFA, PDGFB, PDGFRA, PDPK1, PEA15, PECAM1, Peci, PFDN4, PFDN5, PFKP, PGAM1, PGK1, PGR, PHB, PHB2, PIK3CA, PIK3CB, PIK3CD, PIK3CG, PIK3R1, PIR, PKM2, PKMYT1, PLCB1, PLCG1, PLCG2, PLG, PLK2, PPARG, PPIA, PPIH, PPP1R1B, PPP2R5A, PRAME, PRC1, PRDX2, PRDX4, PRKACA, PRKAR1A, PRKAR2B, PRKCA, PRKCB, PRKCD, PRKCE, PRKCG, PRKCQ, PRK CZ, PRKD1, PRKD2, PRKX, PRNP, PSMA1, PTEN, PTGS1, PTK2, PTK2B, PTMA, PTN, PTPRN, RAB27B, RAB5A, RAB6B, RAC1, RAC2, RAD21, RAD50, RAD51, RAF1, RALBP1, RAPIA, RARB, RASGRF1, RASL11B, RB1, RBBP4, RBL2, REL, RELA, RELB, RET, RFC2, RFC4, RGS19, RHOA, RHOB, RHOC, RHOD, RIPK1, ROCK1, ROCK2, RPN2, RPS6KB1, RRM2, SARS, SCUBE2, SEC14L2, SELENBP1, SEMA4D, SEPP1, SEPT6, SERPINH1, SFN, SFPQ, SFRS7, SHB, SHC1, SHH, SIAH2, SIVA1, SKI, SKIL, SLC16A1, SLC1A4, SLC20A1, SLC2A3, SLC7A1, SMAD1, SMAD4, SMO, SNAI2, SND1, SOCS1, SOCS3, SOD1, SORT1, SOS1, SP1, SPINT2, SPP1, SPRY2, SRC, STAT1, STAT2, STAT3, STAT5B, STC1, STK3, STK32B, STMN1, STX1A, SYNCRIP, TBL3, TBP, TBX3, TCF3, TCF4, TCF7L2, TFAP2C, TFDP1, TFDP2, TFRC, TGFA, TGFB1, TGFB2, TGFB3, TGFB1, TGFB2, TGFB3, THBS1, TIE1, TIMP1, TIMP3, TJP1, TK1, TLE1, TLR2, TLR3, TLR4, TLR7, TLR9, TMEFF1, TMEM45A, TNF, TNFRSF10A, TNFRSF10B, TNFRSF1A, TNFRSF1B, TNK1, TNK2, TOB1, TP53, TP53BP2, TP53I3, TPBG, TPT1, TRADD, TRAM1, TRIP13, TRRAP, TSG101, TUBA4A, TUBB3, TXNRD1, TYK2, TYRO3, UBE2L6, UCHL1, UCHL5, UHMK1, USP7, VDAC1, VEGFA, VIM, WISP1, WNT1, WNT2, WNT3, WNT5A, WT1, XRCC1, XRCC3, XRCC4, XRCC5, XRCC6, YBX1, YES1, YWHAB, YWHAZ, ZMYND8

#### **METHODOLOGY:**

Testing is performed on DNA extracted from a formalin fixed tissue specimen by spectrophotometry and genotyping using Taqman® allele discrimination PCR analysis.

#### **LIMITATIONS:**

Interpretation and commentary are provided to the practitioner for educational purposes only and should not be taken as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the sole responsibility of the practitioner. While polymorphisms are important, other variants and mutations in these genes will not be detected. Mutations in other genes that could affect tumor progression will not be detected.





Felipe Dominguez, MD  
Pathologist

#### CLIA FDA STATEMENT:

The PCR assays were validated pursuant to the 1988 CLIA standards by SunCoast Pathology Associates. The FDA has neither cleared nor approved these assays, nor is FDA pre-market review required. SunCoast Pathology Associates is certified under the Federal 1988 CLIA legislation to perform high complexity clinical laboratory testing and is inspected and accredited by the College of American Pathologists.

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