

Figure S1. Overview of pathways upregulated in pancreatic ductal adenocarcinomas. Upregulated pathways are presented in yellow.

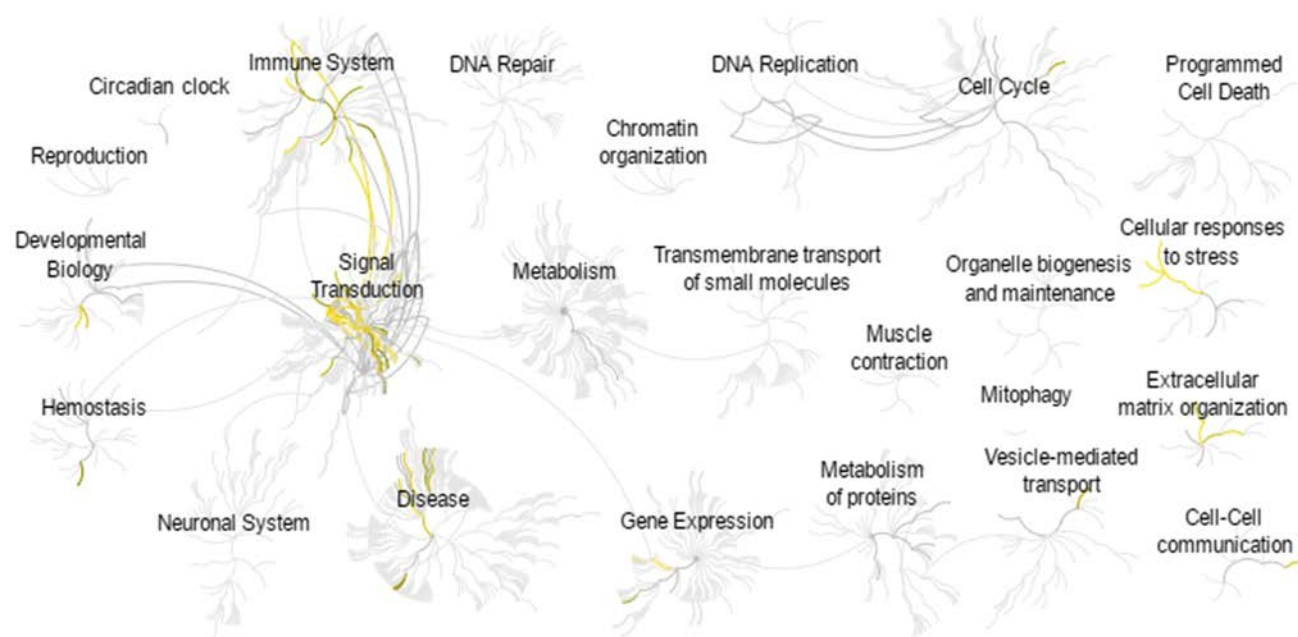


Table SI. IGF/MAPK signalling pathway and associated upregulated genes.

Gene name	Function
RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	Non-receptor serine/threonine protein kinase (PC00167)
INSULIN RECEPTOR SUBSTRATE 2 (PTHR10614:SF7)	
DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	
MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Non-receptor serine/threonine protein kinase (PC00167)
GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	
INSULIN (PTHR11454:SF9)	
PROTO-ONCOGENE C-FOS (PTHR23351:SF4)	Basic leucine zipper transcription factor (PC00056)
RIBOSOMAL PROTEIN S6 KINASE ALPHA-2 (PTHR24351:SF48)	
ETS DOMAIN-CONTAINING PROTEIN ELK-1 (PTHR11849:SF178)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
RAS GTPASE-ACTIVATING PROTEIN 1 (PTHR10194:SF19)	G-protein modulator (PC00022)
CATION-INDEPENDENT MANNOSE-6-PHOSPHATE RECEPTOR (PTHR15071:SF17)	Receptor (PC00197)
INSULIN RECEPTOR SUBSTRATE 1 (PTHR10614:SF11)	
SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC00113)
INSULIN-LIKE GROWTH FACTOR II (PTHR46886:SF1)	
INSULIN RECEPTOR (PTHR24416:SF535)	
RIBOSOMAL PROTEIN S6 KINASE ALPHA-1 (PTHR24351:SF43)	

Table SII. Integrin signalling pathway and associated upregulated genes.

Gene name	Function
FILAMIN-B (PTHR38537:SF7)	
INTEGRIN ALPHA-5 (PTHR23220:SF3)	
INTEGRIN ALPHA-6 (PTHR23220:SF9)	
TYROSINE-PROTEIN KINASE ABL1 (PTHR24418:SF88)	
INTEGRIN ALPHA-7 (PTHR23220:SF90)	
ACTIN, AORTIC SMOOTH MUSCLE (PTHR11937:SF201)	Actin and actin related protein (PC00039)
PHOSPHATIDYLINOSITOL 3-KINASE REGULATORY SUBUNIT ALPHA (PTHR10155:SF3)	Kinase modulator (PC00140)
INTEGRIN BETA-2 (PTHR10082:SF15)	Cell adhesion molecule (PC00069); receptor (PC00197)
VASODILATOR-STIMULATED PHOSPHOPROTEIN (PTHR11202:SF12)	
RHO GTPASE-ACTIVATING PROTEIN 26 (PTHR12552:SF4)	G-protein modulator (PC00022)
LAMININ SUBUNIT ALPHA-2 (PTHR10574:SF291)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
RAP GUANINE NUCLEOTIDE EXCHANGE FACTOR 1 (PTHR23113:SF224)	Guanyl-nucleotide exchange factor (PC00113)
TYROSINE-PROTEIN KINASE CSK (PTHR24418:SF407)	
COLLAGEN ALPHA-1(XVII) CHAIN (PTHR24023:SF891)	
COLLAGEN ALPHA-1(VIII) CHAIN (PTHR24023:SF903)	Extracellular matrix structural protein (PC00103)
MITOGEN-ACTIVATED PROTEIN KINASE KINASE KINASE 2 (PTHR24361:SF342)	
FOCAL ADHESION KINASE 1 (PTHR24418:SF78)	
INTEGRIN ALPHA-3 (PTHR23220:SF89)	
COLLAGEN ALPHA-5(IV) CHAIN (PTHR24023:SF877)	
BREAST CANCER ANTI-ESTROGEN RESISTANCE PROTEIN 1 (PTHR10654:SF15)	
ADP-RIBOSYLATION FACTOR 1 (PTHR11711:SF357)	
RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
NETRIN-4 (PTHR10574:SF282)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	Non-receptor serine/threonine protein kinase (PC00167)
INTEGRIN BETA-8 (PTHR10082:SF9)	Cell adhesion molecule (PC00069); receptor (PC00197)
DEDICATOR OF CYTOKINESIS PROTEIN 1 (PTHR45653:SF1)	
COLLAGEN ALPHA-2(VI) CHAIN (PTHR24020:SF29)	Receptor (PC00197)
DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	
MITOGEN-ACTIVATED PROTEIN KINASE KINASE KINASE 3 (PTHR24361:SF656)	
COLLAGEN ALPHA-1(V) CHAIN (PTHR24023:SF387)	
ACTIN, CYTOPLASMIC 1 (PTHR11937:SF192)	Actin and actin related protein (PC00039)
COLLAGEN ALPHA-1(XIV) CHAIN (PTHR24020:SF15)	Receptor (PC00197)
MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Non-receptor serine/threonine protein kinase (PC00167)
CRK-LIKE PROTEIN (PTHR19969:SF20)	
INTEGRIN ALPHA-2 (PTHR23220:SF23)	
RAS-RELATED PROTEIN RAP-2B (PTHR24070:SF194)	Small GTPase (PC00208)
PROTO-ONCOGENE TYROSINE-PROTEIN KINASE SRC (PTHR24418:SF53)	
LAMININ SUBUNIT ALPHA-5 (PTHR10574:SF261)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	
VINCULIN (PTHR46180:SF1)	
INTEGRIN ALPHA-L (PTHR23220:SF84)	

Table SII. Continued.

Gene name	Function
FIBRONECTIN (PTHR19143:SF267)	Signaling molecule (PC00207)
ALPHA-ACTININ-1 (PTHR11915:SF434)	
COLLAGEN ALPHA-3(V) CHAIN (PTHR24023:SF907)	
PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2	Kinase (PC00137)
DOMAIN-CONTAINING SUBUNIT BETA (PTHR10048:SF30)	
LAMININ SUBUNIT ALPHA-3 (PTHR10574:SF285)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 2 (PTHR12058:SF0)	
COLLAGEN ALPHA-1(X) CHAIN (PTHR24023:SF880)	Extracellular matrix structural protein (PC00103)
TRANSFORMING PROTEIN RHOA (PTHR24072:SF153)	Small GTPase (PC00208)
COLLAGEN ALPHA-1(III) CHAIN (PTHR24023:SF604)	
INTEGRIN BETA-4 (PTHR10082:SF42)	Cell adhesion molecule (PC00069); receptor (PC00197)
SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2)	Signaling molecule (PC00207)
COLLAGEN ALPHA-1(XVI) CHAIN (PTHR24023:SF372)	
COLLAGEN ALPHA-2(IV) CHAIN (PTHR24023:SF588)	
LAMININ SUBUNIT BETA-2 (PTHR10574:SF36)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
INTEGRIN BETA-5 (PTHR10082:SF26)	Cell adhesion molecule (PC00069); receptor (PC00197)
MITOGEN-ACTIVATED PROTEIN KINASE 13 (PTHR24055:SF107)	Non-receptor serine/threonine protein kinase (PC00167)
LAMININ SUBUNIT BETA-1 (PTHR10574:SF233)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
INTEGRIN ALPHA-1 (PTHR23220:SF22)	
ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 1B (PTHR10709:SF10)	Actin family cytoskeletal protein (PC00041)
INTEGRIN ALPHA-E (PTHR23220:SF79)	
COLLAGEN ALPHA-1(XII) CHAIN (PTHR24020:SF17)	Receptor (PC00197)
LAMININ SUBUNIT GAMMA-2 (PTHR10574:SF313)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
COLLAGEN ALPHA-2(V) CHAIN (PTHR24023:SF539)	
GTPASE NRAS (PTHR24070:SF189)	Small GTPase (PC00208)
COLLAGEN ALPHA-1(XIII) CHAIN (PTHR24023:SF871)	
PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2	Kinase (PC00137)
DOMAIN-CONTAINING SUBUNIT ALPHA (PTHR10048:SF28)	
TYROSINE-PROTEIN KINASE FYN (PTHR24418:SF44)	
MITOGEN-ACTIVATED PROTEIN KINASE KINASE KINASE 1 (PTHR24361:SF414)	
LAMININ SUBUNIT ALPHA-4 (PTHR15036:SF47)	
ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 5 (PTHR12644:SF1)	Actin family cytoskeletal protein (PC00041)
INTEGRIN ALPHA-X (PTHR23220:SF124)	
ADP-RIBOSYLATION FACTOR 6 (PTHR11711:SF322)	
LAMININ SUBUNIT BETA-3 (PTHR10574:SF268)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
RHO-RELATED GTP-BINDING PROTEIN RHOD (PTHR24072:SF175)	Small GTPase (PC00208)
INTEGRIN BETA-1 (PTHR10082:SF28)	Cell adhesion molecule (PC00069); receptor (PC00197)
RAS-RELATED PROTEIN R-RAS (PTHR24070:SF245)	Small GTPase (PC00208)
RAS-RELATED C3 BOTULINUM TOXIN SUBSTRATE 2 (PTHR24072:SF169)	Small GTPase (PC00208)
ACTIN, CYTOPLASMIC 2 (PTHR11937:SF414)	Actin and actin related protein (PC00039)
LAMININ SUBUNIT GAMMA-3 (PTHR10574:SF240)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	Kinase (PC00137)
SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC00113)
COLLAGEN ALPHA-1(VI) CHAIN (PTHR24020:SF18)	Receptor (PC00197)
ALPHA-ACTININ-4 (PTHR11915:SF425)	

Table SII. Continued.

Gene name	Function
COLLAGEN ALPHA-1(XV) CHAIN (PTHR24023:SF912)	
TALIN-1 (PTHR19981:SF7)	
MITOGEN-ACTIVATED PROTEIN KINASE KINASE KINASE 5 (PTHR11584:SF332)	
ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 3 (PTHR12391:SF1)	Actin family cytoskeletal protein (PC00041)
ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 1A (PTHR10709:SF11)	Actin family cytoskeletal protein (PC00041)
COLLAGEN ALPHA-1(XVIII) CHAIN (PTHR24023:SF959)	
PAXILLIN (PTHR24216:SF11)	Actin family cytoskeletal protein (PC00041)
COLLAGEN ALPHA-1(IV) CHAIN (PTHR24023:SF854)	
COLLAGEN ALPHA-1(I) CHAIN (PTHR24023:SF569)	
CELL DIVISION CONTROL PROTEIN 42 HOMOLOG (PTHR24072:SF136)	Small GTPase (PC00208)
MULTIPLE EPIDERMAL GROWTH FACTOR-LIKE DOMAINS PROTEIN 9 (PTHR10574:SF298)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
RHO-RELATED GTP-BINDING PROTEIN RHOC (PTHR24072:SF100)	Small GTPase (PC00208)
COLLAGEN ALPHA-3(VI) CHAIN (PTHR24020:SF13)	Receptor (PC00197)
COLLAGEN ALPHA-1(XXVII) CHAIN (PTHR24023:SF844)	
LAMININ SUBUNIT GAMMA-1 (PTHR10574:SF270)	Extracellular matrix linker protein (PC00101); protease inhibitor (PC00191); receptor (PC00197)
ADP-RIBOSYLATION FACTOR GTPASE-ACTIVATING PROTEIN 1 (PTHR46395:SF1)	
COLLAGEN ALPHA-2(I) CHAIN (PTHR24023:SF568)	
RHO-RELATED GTP-BINDING PROTEIN RHOB (PTHR24072:SF0)	Small GTPase (PC00208)
INTEGRIN BETA-LIKE PROTEIN 1 (PTHR10082:SF3)	Cell adhesion molecule (PC00069); receptor (PC00197)
PROTEIN-TYROSINE KINASE 2-BETA (PTHR24418:SF94)	
FILAMIN-A (PTHR38537:SF5)	
INTEGRIN BETA-6 (PTHR10082:SF11)	Cell adhesion molecule (PC00069); receptor (PC00197)
INTEGRIN ALPHA-V (PTHR23220:SF4)	
ARF-GAP WITH SH3 DOMAIN, ANK REPEAT AND PH DOMAIN-CONTAINING PROTEIN 1 (PTHR45854:SF2)	
CAVEOLIN-1 (PTHR10844:SF18)	G-protein modulator (PC00022); membrane traffic protein (PC00150); structural protein (PC00211); transmembrane receptor regulatory/adaptor protein (PC00226)
INTEGRIN ALPHA-11 (PTHR23220:SF21)	

Table SIII. Ras signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
GSK3B	GLYCOGEN SYNTHASE KINASE-3 BETA (PTHR24057:SF8)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK3	MAP KINASE-ACTIVATED PROTEIN KINASE 3 (PTHR24349:SF64)	Non-motor microtubule binding protein (PC00166); Non-receptor serine/threonine protein kinase (PC00167) Non-receptor serine/threonine protein kinase (PC00167)
GSK3A	GLYCOGEN SYNTHASE KINASE-3 ALPHA (PTHR24057:SF14)	Non-receptor serine/threonine protein kinase (PC00167)
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24361:SF370)	Nucleic acid binding (PC00171); transcription factor (PC00218)
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	
ETS1	PROTEIN C-ETS-1 (PTHR11849:SF209)	
STAT1	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 1-ALPHA/BETA (PTHR11801:SF18)	
MAPKAPK2	MAP KINASE-ACTIVATED PROTEIN KINASE 2 (PTHR24349:SF63)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 2 (PTHR24361:SF314)	Guanyl-nucleotide exchange factor (PC00113)
RALGDS	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR (PTHR23113:SF35)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
AKT1	RAC-ALPHA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF171)	
GRB2	GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	Basic leucine zipper transcription factor (PC00056)
ATF2	CYCLIC AMP-DEPENDENT TRANSCRIPTION FACTOR ATF-2 (PTHR19304:SF9)	Small GTPase (PC00208)
RHOA	TRANSFORMING PROTEIN RHOA (PTHR24072:SF153)	Signaling molecule (PC00207)
SHC1	SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2)	
RPS6KA2	RIBOSOMAL PROTEIN S6 KINASE ALPHA-2 (PTHR24351:SF48)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ELK1	ETS DOMAIN-CONTAINING PROTEIN ELK-1 (PTHR11849:SF178)	Guanyl-nucleotide exchange factor (PC00113)
RGL1	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR-LIKE 1 (PTHR23113:SF199)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK13	MITOGEN-ACTIVATED PROTEIN KINASE 13 (PTHR24055:SF107)	Small GTPase (PC00208)
NRAS	GTPASE NRAS (PTHR24070:SF189)	
MAP2K7	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 7 (PTHR24361:SF387)	Guanyl-nucleotide exchange factor (PC00113)
RGL2	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR-LIKE 2 (PTHR23113:SF213)	
MAP3K1	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF414)	
PAK2	SERINE/THREONINE-PROTEIN KINASE PAK 2 (PTHR24361:SF281)	
RHOD	RHO-RELATED GTP-BINDING PROTEIN RHOD (PTHR24072:SF175)	Small GTPase (PC00208)
RAC2	RAS-RELATED C3 BOTULINUM TOXIN SUBSTRATE 2 (PTHR24072:SF169)	Small GTPase (PC00208)
RALB	RAS-RELATED PROTEIN RAL-B (PTHR24070:SF199)	Small GTPase (PC00208)
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	kinase (PC00137)

Table SIII. Continued.

Gene symbol	Gene name	Function
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC00113)
STAT3	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 3 (PTHR11801:SF2) (STAT-3)	Nucleic acid binding (PC00171); transcription factor (PC00218)
JUN	TRANSCRIPTION FACTOR AP-1 (PTHR11462:SF8)	Basic leucine zipper transcription factor (PC00056); nucleic acid binding (PC00171)
CDC42	CELL DIVISION CONTROL PROTEIN 42 HOMOLOG (PTHR24072:SF136)	Small GTPase (PC00208)
RHOC	RHO-RELATED GTP-BINDING PROTEIN RHOC (PTHR24072:SF100)	Small GTPase (PC00208)
RPS6KA1	RIBOSOMAL PROTEIN S6 KINASE ALPHA-1 (PTHR24351:SF43)	
RHOB	RHO-RELATED GTP-BINDING PROTEIN RHOB (PTHR24072:SF0)	Small GTPase (PC00208)
TIAM1	T-LYMPHOMA INVASION AND METASTASIS-INDUCING PROTEIN 1 (PTHR46001:SF1)	
MAPK14	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110)	Non-receptor serine/threonine protein kinase (PC00167)

Table SIV. PDGF signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
FLI1	FRIEND LEUKEMIA INTEGRATION 1 TRANSCRIPTION FACTOR (PTHR11849:SF161)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
VAV2	GUANINE NUCLEOTIDE EXCHANGE FACTOR VAV2 (PTHR45818:SF4)	G-protein modulator (PC00022)
ARHGAP4	RHO GTPASE-ACTIVATING PROTEIN 4 (PTHR14166:SF16)	Non-receptor serine/threonine protein kinase (PC00167)
GSK3B	GLYCOGEN SYNTHASE KINASE-3 BETA (PTHR24057:SF8)	Kinase modulator (PC00140)
PIK3R1	PHOSPHATIDYLINOSITOL 3-KINASE REGULATORY SUBUNIT ALPHA (PTHR10155:SF3)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ELF4	ETS-RELATED TRANSCRIPTION FACTOR ELF-4 (PTHR11849:SF170)	G-protein modulator (PC00022)
ARHGAP26	RHO GTPASE-ACTIVATING PROTEIN 26 (PTHR12552:SF4)	Signaling molecule (PC00207)
SHC2	SHC-TRANSFORMING PROTEIN 2 (PTHR10337:SF5)	Non-receptor serine/threonine protein kinase (PC00167)
MAP3K2	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF342)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
MAPK7	MITOGEN-ACTIVATED PROTEIN KINASE 7 (PTHR24055:SF356)	G-protein modulator (PC00022)
ELF1	ETS-RELATED TRANSCRIPTION FACTOR ELF-1 (PTHR11849:SF156)	Non-receptor serine/threonine protein kinase (PC00167)
SRGAP2B	SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 2-RELATED (PTHR14166:SF6)	G-protein modulator (PC00022)
GSK3A	GLYCOGEN SYNTHASE KINASE-3 ALPHA (PTHR24057:SF14)	Non-receptor serine/threonine protein kinase (PC00167)
SRGAP1	SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 1 (PTHR14166:SF15)	G-protein modulator (PC00022)
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	
VAV1	PROTO-ONCOGENE VAV (PTHR45818:SF2)	
ETS1	PROTEIN C-ETS-1 (PTHR11849:SF209)	Non-receptor serine/threonine protein kinase (PC00167)
STAT1	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 1-ALPHA/BETA (PTHR11801:SF18)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
PDGFA	PLATELET-DERIVED GROWTH FACTOR SUBUNIT A (PTHR11633:SF3)	Nucleic acid binding (PC001171); transcription factor (PC00218)
MAPKAPK2	MAP KINASE-ACTIVATED PROTEIN KINASE 2 (PTHR24349:SF63)	Growth factor (PC00112)
SRGAP2C	SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 2-RELATED (PTHR14166:SF6)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	G-protein modulator (PC00022)
AKT2	RAC-BETA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF176)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
ELF3	ETS-RELATED TRANSCRIPTION FACTOR ELF-3 (PTHR11849:SF13)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ETV3	ETS TRANSLOCATION VARIANT 3 (PTHR11849:SF261)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)

Table SIV. Continued.

Gene symbol	Gene name	Function
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Non-receptor serine/threonine protein kinase (PC00167)
ITPR3	INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR TYPE 3 (PTHR13715:SF51)	Ligand-gated ion channel (PC00141)
PRR5- ARHGAP8	PRR5-ARHGAP8 READTHROUGH-RELATED (PTHR45808:SF4)	
ARHGAP5	RHO GTPASE-ACTIVATING PROTEIN 5 (PTHR46005:SF2)	
GRB2	GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	
RASA4B	RAS GTPASE-ACTIVATING PROTEIN 4-RELATED (PTHR10194:SF4)	G-protein modulator (PC00022)
ARHGAP27	RHO GTPASE-ACTIVATING PROTEIN 27 (PTHR23176:SF104)	G-protein modulator (PC00022)
EPHB2	EPHRIN TYPE-B RECEPTOR 2 (PTHR24416:SF123)	
STK36	SERINE/THREONINE-PROTEIN KINASE 36 (PTHR22983:SF6)	
SRGAP2	SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 2-RELATED (PTHR14166:SF6)	
FOS	PROTO-ONCOGENE C-FOS (PTHR23351:SF4)	G-protein modulator (PC00022)
RAB11B	RAS-RELATED PROTEIN RAB-11B (PTHR24073:SF87)	Basic leucine zipper transcription factor (PC00056)
GAB2	GRB2-ASSOCIATED-BINDING PROTEIN 2 (PTHR45960:SF1)	Transmembrane receptor regulatory/adaptor protein (PC00226)
SHC1	SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2)	Signaling molecule (PC00207)
RPS6KA2	RIBOSOMAL PROTEIN S6 KINASE ALPHA-2 (PTHR24351:SF48)	
STAT2	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 2 (PTHR11801:SF41)	Nucleic acid binding (PC00171); transcription factor (PC00218)
ELK1	ETS DOMAIN-CONTAINING PROTEIN ELK-1 (PTHR11849:SF178)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ELK4	ETS DOMAIN-CONTAINING PROTEIN ELK-4 (PTHR11849:SF21)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
PDGFRB	PLATELET-DERIVED GROWTH FACTOR RECEPTOR BETA (PTHR24416:SF53)	
ARHGAP1	RHO GTPASE-ACTIVATING PROTEIN 1 (PTHR45808:SF6)	Small GTPase (PC00208)
NRAS	GTPASE NRAS (PTHR24070:SF189)	
JAK2	TYROSINE-PROTEIN KINASE JAK2 (PTHR45807:SF1)	
STAT5B	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 5B (PTHR11801:SF39)	Nucleic acid binding (PC00171); transcription factor (PC00218)
STARD13	STAR-RELATED LIPID TRANSFER PROTEIN 13 (PTHR12659:SF6)	
PKN2	SERINE/THREONINE-PROTEIN KINASE N2 (PTHR24356:SF334)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
USF2	UPSTREAM STIMULATORY FACTOR 2 (PTHR46117:SF2)	
MKNK2	MAP KINASE-INTERACTING SERINE/THREONINE-PROTEIN KINASE 2 (PTHR24349:SF254)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
PRKCA,	PROTEIN KINASE C ALPHA TYPE (PTHR24356:SF193)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKACA		G-protein modulator (PC00022)
RASA1	RAS GTPASE-ACTIVATING PROTEIN 1 (PTHR10194:SF19)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ERG	TRANSCRIPTIONAL REGULATOR ERG (PTHR11849:SF216)	

Table SIV. Continued.

Gene symbol	Gene name	Function
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	Kinase (PC00137)
ITPR2	INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR TYPE 2 (PTHR13715:SF53)	Ligand-gated ion channel (PC00141)
MYC	MYC PROTO-ONCOGENE PROTEIN (PTHR45851:SF1)	Basic helix-loop-helix transcription factor (PC00055); nucleic acid binding (PC00171)
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC00113)
SRGAP2	SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 3 (PTHR14166:SF8)	G-protein modulator (PC00022)
STAT3	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 3 (PTHR11801:SF2)	Nucleic acid binding (PC00171); transcription factor (PC00218)
PDGFRA	PLATELET-DERIVED GROWTH FACTOR RECEPTOR ALPHA (PTHR24416:SF52)	G-protein modulator (PC00022)
ARHGAP12	RHO GTPASE-ACTIVATING PROTEIN 12 (PTHR23176:SF107)	
JAK1	TYROSINE-PROTEIN KINASE JAK1 (PTHR45807:SF5)	Basic leucine zipper transcription factor (PC00056); nucleic acid binding (PC00171)
JUN	TRANSCRIPTION FACTOR AP-1 (PTHR11462:SF8)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
EHF	ETS HOMOLOGOUS FACTOR (PTHR11849:SF171)	Nucleic acid binding (PC00171); transcription factor (PC00218)
STAT6	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 6 (PTHR11801:SF48)	
RPS6KA1	RIBOSOMAL PROTEIN S6 KINASE ALPHA-1 (PTHR24351:SF43)	Small GTPase (PC00208)
RHOB	RHO-RELATED GTP-BINDING PROTEIN RHOB (PTHR24072:SF0)	Calcium-binding protein (PC00060); guanyl-nucleotide exchange factor (PC00113); phospholipase (PC00186); signaling molecule (PC00207)
PLCG1	1-PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA-1 (PTHR10336:SF173)	
NCK2	CYTOPLASMIC PROTEIN NCK2 (PTHR19969:SF12)	Non-receptor serine/threonine protein kinase (PC00167)
IKKB	INHIBITOR OF NUCLEAR FACTOR KAPPA-B KINASE SUBUNIT BETA (PTHR22969:SF7)	

Table SV. EGF signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
CBLB	E3 UBIQUITIN-PROTEIN LIGASE CBL-B (PTHR23007:SF3)	Ligase (PC00142)
CBL	E3 UBIQUITIN-PROTEIN LIGASE CBL (PTHR23007:SF5)	Lgase (PC00142)
PPP2R5A	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT ALPHA ISOFORM (PTHR10257:SF6)	Protein phosphatase (PC00195)
SHC2	SHC-TRANSFORMING PROTEIN 2 (PTHR10337:SF5)	Signaling molecule (PC00207)
PKD1	SERINE/THREONINE-PROTEIN KINASE D1 (PTHR22968:SF9)	Small GTPase (PC00208)
RHOJ	RHO-RELATED GTP-BINDING PROTEIN RHOJ (PTHR24072:SF17)	
PPP2CB	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A CATALYTIC SUBUNIT BETA ISOFORM (PTHR45619:SF11)	
MAP3K2	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF342)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK7	MITOGEN-ACTIVATED PROTEIN KINASE 7 (PTHR24055:SF356)	Chaperone (PC00072)
YWHAQ	14-3-3 PROTEIN THETA (PTHR18860:SF3)	Chaperone (PC00072)
YWHAH	14-3-3 PROTEIN ETA (PTHR18860:SF16)	
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	Non-receptor serine/threonine protein kinase (PC00167)
STAT1	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 1-ALPHA/BETA (PTHR11801:SF18)	Nucleic acid binding (PC00171); transcription factor (PC00218)
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	
AKT2	RAC-BETA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF176)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
MAP3K3	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 3 (PTHR24361:SF656)	Chaperone (PC00072)
YWHAE	14-3-3 PROTEIN EPSILON (PTHR18860:SF67)	Signaling molecule (PC00207); transcription factor (PC00218)
SPRY1	PROTEIN SPROUTY HOMOLOG 1 (PTHR12365:SF10)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Small GTPase (PC00208)
RHOQ	RHO-RELATED GTP-BINDING PROTEIN RHOQ (PTHR24072:SF13)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
AKT1	RAC-ALPHA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF171)	
GRB2	GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	Protein phosphatase (PC00195)
PPP2R5C	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT GAMMA ISOFORM (PTHR10257:SF19)	Kinase (PC00137)
PIK3C2B	PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT BETA (PTHR10048:SF30)	
RASA4B	RAS GTPASE-ACTIVATING PROTEIN 4-RELATED (PTHR10194:SF4)	G-protein modulator (PC00022)
STK36	SERINE/THREONINE-PROTEIN KINASE 36 (PTHR22983:SF6)	
GAB2	GRB2-ASSOCIATED-BINDING PROTEIN 2 (PTHR45960:SF1)	Transmembrane receptor regulatory/adaptor protein (PC00226)

Table SV. Continued.

Gene symbol	Gene name	Function
SHC1	SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2)	Signaling molecule (PC000207)
ERBB2	RECEPTOR TYROSINE-PROTEIN KINASE ERBB-2 (PTHR24416:SF137)	Nucleic acid binding (PC001171); transcription factor (PC000218)
STAT2	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 2 (PTHR11801:SF41)	G-protein modulator (PC000022)
NF1	NEUROFIBROMIN (PTHR10194:SF60)	Chaperone (PC000072)
YWHAQ	14-3-3 PROTEIN GAMMA (PTHR18860:SF22)	Non-receptor serine/threonine protein kinase (PC000167)
MAPK13	MITOGEN-ACTIVATED PROTEIN KINASE 13 (PTHR24055:SF107)	Chaperone (PC000072)
YWHAQ	14-3-3 PROTEIN BETA/ALPHA (PTHR18860:SF28)	Protein phosphatase (PC00195)
PPP2R5E	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT EPSILON ISOFORM (PTHR10257:SF80)	
ERBB3	RECEPTOR TYROSINE-PROTEIN KINASE ERBB-3 (PTHR24416:SF88)	Small GTPase (PC000208)
NRAS	GTPASE NRAS (PTHR24070:SF189)	Kinase (PC00137)
PIK3C2A	PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT ALPHA (PTHR10048:SF28)	
MAP2K7	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 7 (PTHR24361:SF387)	Nucleic acid binding (PC000171); transcription factor (PC000218)
STAT5B	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 5B (PTHR11801:SF39)	Annexin (PC000050); calmodulin (PC000061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC000219)
MAP3K1	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF414)	Small GTPase (PC000208)
PRKCA,	PROTEIN KINASE C ALPHA TYPE (PTHR24356:SF193)	Small GTPase (PC000208)
PRKACA		Small GTPase (PC000208)
RHOD	RHO-RELATED GTP-BINDING PROTEIN RHOD (PTHR24072:SF175)	G-protein modulator (PC000022)
RRAS	RAS-RELATED PROTEIN R-RAS (PTHR24070:SF245)	Growth factor (PC00112)
RAC2	RAS-RELATED C3 BOTULINUM TOXIN SUBSTRATE 2 (PTHR24072:SF169)	Kinase (PC00137)
PHLDB2	PLECKSTRIN HOMOLOG-Y-LIKE DOMAIN FAMILY B MEMBER 2 (PTHR12156:SF21)	
RASA1	RAS GTPASE-ACTIVATING PROTEIN 1 (PTHR10194:SF19)	
AREG	AMPHIREGULIN (PTHR10740:SF12)	
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	
HBEGF	PROHEPARIN-BINDING EGF-LIKE GROWTH FACTOR (PTHR10740:SF4)	Growth factor (PC00112)
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC001113)
YWHAZ	14-3-3 PROTEIN ZETA/DELTA (PTHR18860:SF7)	Chaperone (PC000072)
MAP3K5	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 5 (PTHR11584:SF332)	Signaling molecule (PC000207); transcription factor (PC000218)
SPRY4	PROTEIN SPROUTY HOMOLOG 4 (PTHR12365:SF6)	Nucleic acid binding (PC001171); transcription factor (PC000218)
STAT3	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 3 (PTHR11801:SF2)	Annexin (PC000050); calmodulin (PC000061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC000219)
PRKCI	PROTEIN KINASE C IOTA TYPE (PTHR24356:SF214)	Non-receptor serine/threonine protein kinase (PC00167); nucleic acid binding (PC001171); nucleotide kinase (PC00172)
SMG1	SERINE/THREONINE-PROTEIN KINASE SMG1 (PTHR11139:SF71)	Protease inhibitor (PC00191)
PEBP1	PHOSPHATIDYLETHANOLAMINE-BINDING PROTEIN 1 (PTHR11362:SF109)	

Table SV. Continued.

Gene symbol	Gene name	Function
STAT6 PRKD2, PKD2	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 6 (PTHR11801:SF48) SERINE/THREONINE-PROTEIN KINASE D2 (PTHR22968:SF12)	Nucleic acid binding (PC00171); transcription factor (PC00218)
PPP2R5B	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT BETA ISOFORM (PTHR10257:SF4)	Protein phosphatase (PC00195)
PPP2R5D	SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT DELTA ISOFORM (PTHR10257:SF3)	Protein phosphatase (PC00195)
RASAL2 PLCG1	RAS GTPASE-ACTIVATING PROTEIN NGAP (PTHR10194:SF52) 1-PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA-1 (PTHR10336:SF173)	G-protein modulator (PC00022) Calcium-binding protein (PC00060); guanyl-nucleotide exchange factor (PC00113); phospholipase (PC00186); signaling molecule (PC00207) Non-receptor serine/threonine protein kinase (PC00167)
MAPK14 EGFR	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110) EPIDERMAL GROWTH FACTOR RECEPTOR (PTHR24416:SF91)	

Table SVI. Angiogenesis signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
GSK3B	GLYCOGEN SYNTHASE KINASE-3 BETA (PTHR24057:SF8)	Non-receptor serine/threonine protein kinase (PC00167) Kinase modulator (PC00140)
PIK3R1	PHOSPHATIDYLINOSITOL 3-KINASE REGULATORY SUBUNIT ALPHA (PTHR10155:SF3)	
SHC2	SHC-TRANSFORMING PROTEIN 2 (PTHR10337:SF5)	Signaling molecule (PC00207)
PKD1	SERINE/THREONINE-PROTEIN KINASE D1 (PTHR22968:SF9)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
HSPB1	HEAT SHOCK PROTEIN BETA-1 (PTHR45640:SF7)	
MAPK3	MAP KINASE-ACTIVATED PROTEIN KINASE 3 (PTHR24349:SF64)	Membrane-bound signaling molecule (PC00152) Nucleic acid binding (PC00171); transcription factor (PC00218) Enzyme modulator (PC00095); signaling molecule (PC00207)
PTK2	FOCAL ADHESION KINASE 1 (PTHR24418:SF78)	
EFNB2	EPHRIN-B2 (PTHR11304:SF18)	Non-receptor serine/threonine protein kinase (PC00167) Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246) Nucleic acid binding (PC00171); transcription factor (PC00218)
RBPJ	RECOMBINING BINDING PROTEIN SUPPRESSOR OF HAIRLESS (PTHR10665:SF3)	
DVL1	SEGMENT POLARITY PROTEIN DISHEVELLED HOMOLOG DVL-1-RELATED (PTHR10878:SF5)	Growth factor (PC00112) Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24361:SF370)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	
ETS1	PROTEIN C-ETS-1 (PTHR11849:SF209)	Membrane-bound signaling molecule (PC00152) Non-receptor serine/threonine protein kinase (PC00167)
STAT1	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 1-ALPHA/BETA (PTHR11801:SF18)	
PDGFA	PLATELET-DERIVED GROWTH FACTOR SUBUNIT A (PTHR11633:SF3)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
MAPKAPK2	MAP KINASE-ACTIVATED PROTEIN KINASE 2 (PTHR24349:SF63)	
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 2 (PTHR24361:SF314)	Membrane-bound signaling molecule (PC00152); receptor (PC00197) Non-receptor serine/threonine protein kinase (PC00167)
AKT2	RAC-BETA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF176)	
FGFR1	FIBROBLAST GROWTH FACTOR RECEPTOR 1 (PTHR24416:SF131)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
DLK1	PROTEIN DELTA HOMOLOG 1 (PTHR24052:SF11)	
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Membrane-bound signaling molecule (PC00152) Non-receptor serine/threonine protein kinase (PC00167)
CRKL	CRK-LIKE PROTEIN (PTHR19969:SF20)	
AKT1	RAC-ALPHA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF171)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
SPHK1	SPHINGOSINE KINASE 1 (PTHR12358:SF47)	
EFNB1	EPHRIN-B1 (PTHR11304:SF17)	Membrane-bound signaling molecule (PC00152) Enzyme modulator (PC00095); signaling molecule (PC00207)
DVL3	SEGMENT POLARITY PROTEIN DISHEVELLED HOMOLOG DVL-3 (PTHR10878:SF6)	
NOTCH1, HN1	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 1 (PTHR45836:SF12)	

Table SVI. Continued.

Gene symbol	Gene name	Function
PRR5- ARHGAP8 TGFB1I1	PRR5-ARHGAP8 READTHROUGH-RELATED (PTHR45808:SF4) TRANSFORMING GROWTH FACTOR BETA-1-INDUCED TRANSCRIPT 1 PROTEIN (PTHR24216:SF27)	Actin family cytoskeletal protein (PC000041)
SRC CTNNB1 GRB2 HIF1A	PROTO-ONCOGENE TYROSINE-PROTEIN KINASE SRC (PTHR24418:SF53) CATENIN BETA-1 (PTHR45976:SF4) GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4) HYPOXIA-INDUCIBLE FACTOR 1-ALPHA (PTHR23043:SF7)	Basic helix-loop-helix transcription factor (PC000055); nucleic acid binding (PC00171)
F2R PLA2G4C FZD2	PROTEINASE-ACTIVATED RECEPTOR 1 (PTHR24232:SF20) CYTOSOLIC PHOSPHOLIPASE A2 GAMMA (PTHR10728:SF39) FRIZZLED-2 (PTHR11309:SF34)	Phospholipase (PC00186) G-protein coupled receptor (PC000021); protease inhibitor (PC00191); signaling molecule (PC00207) Kinase (PC00137)
PIK3C2B FZD1	PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT BETA (PTHR10048:SF30) FRIZZLED-1 (PTHR11309:SF81)	G-protein coupled receptor (PC000021); protease inhibitor (PC00191); signaling molecule (PC00207)
EPHB2 FZD5	EPHRIN TYPE-B RECEPTOR 2 (PTHR24416:SF123) FRIZZLED-5 (PTHR11309:SF136)	G-protein coupled receptor (PC000021); protease inhibitor (PC00191); signaling molecule (PC00207)
RHOA FOS PDGFC KDR SHC1 SCAP WNT5A EPHA3 DVL1	TRANSFORMING PROTEIN RHOA (PTHR24072:SF153) PROTO-ONCOGENE C-FOS (PTHR23351:SF4) PLATELET-DERIVED GROWTH FACTOR C (PTHR11633:SF5) VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR 2 (PTHR24416:SF45) SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2) SH2 DOMAIN-CONTAINING PROTEIN 2A (PTHR14388:SF9) PROTEIN WNT-5A (PTHR12027:SF33) EPHRIN TYPE-A RECEPTOR 3 (PTHR24416:SF18) SEGMENT POLARITY PROTEIN DISHEVELLED HOMOLOG DVL-1-RELATED (PTHR10878:SF5)	Small GTPase (PC00208) Basic leucine zipper transcription factor (PC000056) Growth factor (PC00112) Signaling molecule (PC00207) Signaling molecule (PC00207) Enzyme modulator (PC000095); signaling molecule (PC00207)
PDGFRB ARHGAP1 NRAS PIK3C2A NOTCH4 MAP3K1 PAK2	PLATELET-DERIVED GROWTH FACTOR RECEPTOR BETA (PTHR24416:SF53) RHO GTPASE-ACTIVATING PROTEIN 1 (PTHR45808:SF6) GTPASE NRAS (PTHR24070:SF189) PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT ALPHA (PTHR10048:SF28) NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 4 (PTHR24044:SF450) MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF414) SERINE/THREONINE-PROTEIN KINASE PAK 2 (PTHR24361:SF281)	Small GTPase (PC00208) Kinase (PC00137)

Table SVI. Continued.

Gene symbol	Gene name	Function
AXIN2	AXIN-2 (PTHR46102:SF1)	Enzyme modulator (PC00095); signaling molecule (PC00207)
DVL2	SEGMENT POLARITY PROTEIN DISHEVELLED HOMOLOG DVL-2 (PTHR10878:SF8)	
TCF7L2	TRANSCRIPTION FACTOR 7-LIKE 2 (PTHR10373:SF32)	
DLL4	DELTA-LIKE PROTEIN 4 (PTHR24044:SF320)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKCA,	PROTEIN KINASE C ALPHA TYPE (PTHR24356:SF193)	
PRKACA		
RASA1	RAS GTPASE-ACTIVATING PROTEIN 1 (PTHR10194:SF19)	G-protein modulator (PC00022)
F3	TISSUE FACTOR (PTHR20859:SF22)	
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC00113)
WNT10A	PROTEIN WNT-10A (PTHR12027:SF89)	
STAT3	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 3 (PTHR11801:SF2)	
PXN	PAXILLIN (PTHR24216:SF11)	Nucleic acid binding (PC00171); transcription factor (PC00218)
PRKCI	PROTEIN KINASE C IOTA TYPE (PTHR24356:SF214)	
PDGFRA	PLATELET-DERIVED GROWTH FACTOR RECEPTOR ALPHA (PTHR24416:SF52)	
SFRP1	SECRETED FRIZZLED-RELATED PROTEIN 1 (PTHR11309:SF87)	Actin family cytoskeletal protein (PC00041)
JAK1	TYROSINE-PROTEIN KINASE JAK1 (PTHR45807:SF5)	
JUN	TRANSCRIPTION FACTOR AP-1 (PTHR11462:SF8)	
RHOC	RHO-RELATED GTP-BINDING PROTEIN RHOC (PTHR24072:SF100)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKD2,PKD2	SERINE/THREONINE-PROTEIN KINASE D2 (PTHR22968:SF12)	
VEGFA	VASCULAR ENDOTHELIAL GROWTH FACTOR A (PTHR12025:SF5)	
NOTCH2	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 2 (PTHR45836:SF15)	G-protein coupled receptor (PC00021); protease inhibitor (PC00191); signaling molecule (PC00207)
RHOB	RHO-RELATED GTP-BINDING PROTEIN RHOB (PTHR24072:SF0)	
PLCG1	1-PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA-1 (PTHR10336:SF173)	
NCK2	CYTOPLASMIC PROTEIN NCK2 (PTHR19969:SF12)	Basic leucine zipper transcription factor (PC00056); nucleic acid binding (PC00171)
MAPK14	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110)	
WNT2B	PROTEIN WNT-2B (PTHR12027:SF93)	
		Small GTPase (PC00208)
		Growth factor (PC00112)
		Small GTPase (PC00208)
		Calcium-binding protein (PC00060); guanyl-nucleotide exchange factor (PC00113); phospholipase (PC00186); signaling molecule (PC00207)
		Non-receptor serine/threonine protein kinase (PC00167)
		Signaling molecule (PC00207)

Table SVII. CCKR signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
ARHGAP4	RHO GTPASE-ACTIVATING PROTEIN 4 (PTHR14166:SF16)	G-protein modulator (PC00022)
PDE1A	CALCIUM/CALMODULIN-DEPENDENT 3',5'-CYCLIC NUCLEOTIDE PHOSPHODIESTERASE 1A (PTHR11347:SF34)	
GSK3B	GLYCOGEN SYNTHASE KINASE-3 BETA (PTHR24057:SF8)	
PIK3R1	PHOSPHATIDYLINOSITOL 3-KINASE REGULATORY SUBUNIT ALPHA (PTHR10155:SF3)	Non-receptor serine/threonine protein kinase (PC00167) Kinase modulator (PC00140)
CHGA	CHROMOGRANIN-A (PTHR10583:SF1)	MADS box transcription factor (PC00250)
PKD1	SERINE/THREONINE-PROTEIN KINASE D1 (PTHR22968:SF9)	
CSK	TYROSINE-PROTEIN KINASE CSK (PTHR24418:SF407)	
MEF2D	MYOCYTE-SPECIFIC ENHANCER FACTOR 2D (PTHR11945:SF23)	Non-receptor serine/threonine protein kinase (PC00167)
HSPB1	HEAT SHOCK PROTEIN BETA-1 (PTHR45640:SF7)	
MAPK7	MITOGEN-ACTIVATED PROTEIN KINASE 7 (PTHR24055:SF356)	
PTK2	FOCAL ADHESION KINASE 1 (PTHR24418:SF78)	Calmodulin (PC00061)
CALM1	CALMODULIN-1 (PTHR23050:SF380)	
BCAR1	BREAST CANCER ANTI-ESTROGEN RESISTANCE PROTEIN 1 (PTHR10654:SF15)	
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	Non-receptor serine/threonine protein kinase (PC00167) Non-receptor serine/threonine protein kinase (PC00167)
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	
CSNK1D	CASEIN KINASE I ISOFORM DELTA (PTHR11909:SF301)	Enzyme modulator (PC00095) Non-receptor serine/threonine protein kinase (PC00167)
NFKBIA	NF-KAPPA-B INHIBITOR ALPHA (PTHR46680:SF1)	
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	
ARRB2	BETA-ARRESTIN-2 (PTHR11792:SF20)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	
CNKSRI	CONNECTOR ENHANCER OF KINASE SUPPRESSOR OF RAS 1 (PTHR12844:SF10)	
AKT1	RAC-ALPHA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF171)	Non-receptor serine/threonine protein kinase (PC00167)
CPE	CARBOXYPEPTIDASE E (PTHR11532:SF62)	
SRC	PROTO-ONCOGENE TYROSINE-PROTEIN KINASE SRC (PTHR24418:SF53)	
CTNNB1	CATENIN BETA-1 (PTHR45976:SF4)	Metalloprotease (PC00153) Protein phosphatase (PC00195)
CSNK1A1	CASEIN KINASE I ISOFORM ALPHA (PTHR11909:SF84)	
GRB2	GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	
GCG	GLUCAGON (PTHR11418:SF0)	Basic leucine zipper transcription factor (PC00056)
MMP7	MATRILYSIN (PTHR10201:SF143)	
TEP1, PTEN	PHOSPHATIDYLINOSITOL 3,4,5-TRISPHOSPHATE 3-PHOSPHATASE AND DUAL-SPECIFICITY PROTEIN PHOSPHATASE PTEN (PTHR12305:SF81)	
ATF2	CYCLIC AMP-DEPENDENT TRANSCRIPTION FACTOR ATF-2 (PTHR19304:SF9)	

Table SVII. Continued.

Gene symbol	Gene name	Function
RHOA	TRANSFORMING PROTEIN RHOA (PTHR24072:SF153)	Small GTPase (PC00208)
FOS	PROTO-ONCOGENE C-FOS (PTHR23351:SF4)	Basic leucine zipper transcription factor (PC00056)
SP1	TRANSCRIPTION FACTOR SP1 (PTHR23235:SF16)	DNA binding protein (PC00009); transcription cofactor (PC00217); zinc finger transcription factor (PC00244)
FOXO1	FORKHEAD BOX PROTEIN O1 (PTHR45767:SF1)	Signaling molecule (PC00207)
SHC1	SHC-TRANSFORMING PROTEIN 1 (PTHR10337:SF2)	
FOXO3	FORKHEAD BOX PROTEIN O3 (PTHR45767:SF4)	
PRKACA	CAMP-DEPENDENT PROTEIN KINASE CATALYTIC SUBUNIT ALPHA (PTHR24353:SF82)	
ELK1	ETS DOMAIN-CONTAINING PROTEIN ELK-1 (PTHR11849:SF178)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
MOB1A	MOB KINASE ACTIVATOR 1A (PTHR22599:SF30)	Kinase activator (PC00138)
ELK4	ETS DOMAIN-CONTAINING PROTEIN ELK-4 (PTHR11849:SF21)	Nucleic acid binding (PC001171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
YWHAB	14-3-3 PROTEIN BETA/ALPHA (PTHR18860:SF28)	Chaperone (PC00072)
RHEB	GTP-BINDING PROTEIN RHEB (PTHR24070:SF264)	Small GTPase (PC00208)
MCL1	INDUCED MYELOID LEUKEMIA CELL DIFFERENTIATION PROTEIN MCL-1 (PTHR11256:SF46)	Signaling molecule (PC00207)
SERPINE1	PLASMINOGEN ACTIVATOR INHIBITOR 1 (PTHR11461:SF49)	Serine protease inhibitor (PC00204)
JAK2	TYROSINE-PROTEIN KINASE JAK2 (PTHR45807:SF1)	Ribosomal protein (PC00202)
RPS6	40S RIBOSOMAL PROTEIN S6 (PTHR11502:SF16)	
HDAC7	HISTONE DEACETYLASE 7 (PTHR45634:SF9)	
MAP3K11	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 11 (PTHR44329:SF46)	
BCL2L1	BCL-2-LIKE PROTEIN 1 (PTHR11256:SF12)	Signaling molecule (PC00207)
MEN1	MENIN (PTHR12693:SF3)	
PRKCA,	PROTEIN KINASE C ALPHA TYPE (PTHR24356:SF193)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKACA		Cell adhesion molecule (PC00069); receptor (PC00197)
ITGB1	INTEGRIN BETA-1 (PTHR10082:SF28)	
PPP3CA	SERINE/THREONINE-PROTEIN PHOSPHATASE 2B CATALYTIC SUBUNIT ALPHA ISOFORM (PTHR45673:SF5)	Nuclease (PC00170); signaling molecule (PC00207)
AKAP1	A-KINASE ANCHOR PROTEIN 1, MITOCHONDRIAL (PTHR22948:SF48)	Kinase (PC00137)
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	Growth factor (PC00112)
HBEGF	PROHEPARIN-BINDING EGF-LIKE GROWTH FACTOR (PTHR10740:SF4)	
IRS1	INSULIN RECEPTOR SUBSTRATE 1 (PTHR10614:SF11)	Basic helix-loop-helix transcription factor (PC00055); nucleic acid binding (PC00171)
MYC	MYC PROTO-ONCOGENE PROTEIN (PTHR45851:SF1)	
CDH1	CADHERIN-1 (PTHR24027:SF319)	

Table SVII. Continued.

Gene symbol	Gene name	Function
RHOA	TRANSFORMING PROTEIN RHOA (PTHR24072:SF153)	Small GTPase (PC00208)
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Guanyl-nucleotide exchange factor (PC001113)
RG2	REGULATOR OF G-PROTEIN SIGNALING 2 (PTHR10845:SF43)	G-protein modulator (PC00022)
TCF4	TRANSCRIPTION FACTOR 4 (PTHR11793:SF10)	Basic helix-loop-helix transcription factor (PC00055); nucleic acid binding (PC00171)
CLU	CLUSTERIN (PTHR10970:SF1)	
EIF4EBP1	EUKARYOTIC TRANSLATION INITIATION FACTOR 4E-BINDING PROTEIN 1 (PTHR12669:SF14)	Translation factor (PC00223)
STAT3	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION 3 (PTHR11801:SF2)	Nucleic acid binding (PC00171); transcription factor (PC00218)
PXN	PAXILLIN (PTHR24216:SF11)	Actin family cytoskeletal protein (PC00041)
JUN	TRANSCRIPTION FACTOR AP-1 (PTHR11462:SF8)	Basic leucine zipper transcription factor (PC00056); nucleic acid binding (PC00171)
CDC42	CELL DIVISION CONTROL PROTEIN 42 HOMOLOG (PTHR24072:SF136)	Small GTPase (PC00208)
GNB1	GUANINE NUCLEOTIDE-BINDING PROTEIN G(I)/G(S)/G(T) SUBUNIT BETA-1 (PTHR19850:SF29)	Heterotrimeric G-protein (PC00117); hydrolase (PC00121)
PRKD2, PKD2	SERINE/THREONINE-PROTEIN KINASE D2 (PTHR22968:SF12)	
CSNK1E	CASEIN KINASE I ISOFORM EPSILON (PTHR11909:SF18)	Non-receptor serine/threonine protein kinase (PC00167)
CCND1	G1/S-SPECIFIC CYCLIN-D1 (PTHR10177:SF67)	Kinase activator (PC00138)
RPS6KA1	RIBOSOMAL PROTEIN S6 KINASE ALPHA-1 (PTHR24351:SF43)	
PLCG1	1-PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA-1 (PTHR10336:SF173)	Calcium-binding protein (PC00060); guanyl-nucleotide exchange factor (PC00113); phospholipase (PC00186); signaling molecule (PC00207)
AP2M1	AP-2 COMPLEX SUBUNIT MU (PTHR10529:SF236)	Extracellular matrix glycoprotein (PC00100); receptor (PC00197)
MAPK14	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110)	Non-receptor serine/threonine protein kinase (PC00167)
PTK2B	PROTEIN-TYROSINE KINASE 2-BETA (PTHR24418:SF94)	
ITGAV	INTEGRIN ALPHA-V (PTHR23220:SF4)	
PRKACB	CAMP-DEPENDENT PROTEIN KINASE CATALYTIC SUBUNIT BETA (PTHR24353:SF123)	

Table SVIII. VEGF signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
PIK3R1	PHOSPHATIDYLINOSITOL 3-KINASE REGULATORY SUBUNIT ALPHA (PTHR10155:SF3)	Kinase modulator (PC00140)
SHC2	SHC-TRANSFORMING PROTEIN 2 (PTHR10337:SF5)	Signaling molecule (PC00207)
PKD1	SERINE/THREONINE-PROTEIN KINASE D1 (PTHR22968:SF9)	
HSPB1	HEAT SHOCK PROTEIN BETA-1 (PTHR45640:SF7)	
MAPK3	MAP KINASE-ACTIVATED PROTEIN KINASE 3 (PTHR24349:SF64)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
PTK2	FOCAL ADHESION KINASE 1 (PTHR24418:SF78)	
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24361:SF370)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	Nucleic acid binding (PC00171); signaling molecule (PC00207); winged helix/forkhead transcription factor (PC00246)
ETS1	PROTEIN C-ETS-1 (PTHR11849:SF209)	Non-motor microtubule binding protein (PC00166); non-receptor serine/threonine protein kinase (PC00167)
MAPKAPK2	MAP KINASE-ACTIVATED PROTEIN KINASE 2 (PTHR24349:SF63)	
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE 2 (PTHR24361:SF314)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
AKT1	RAC-ALPHA SERINE/THREONINE-PROTEIN KINASE (PTHR24356:SF171)	
SPHK1	SPHINGOSINE KINASE 1 (PTHR12358:SF47)	
PRR5-	PRR5-ARHGAP8 READTHROUGH-RELATED (PTHR45808:SF4)	Actin family cytoskeletal protein (PC00041)
ARHGAP8		
TGFB1I1	TRANSFORMING GROWTH FACTOR BETA-1-INDUCED TRANSCRIPT 1 PROTEIN (PTHR24216:SF27)	Basic helix-loop-helix transcription factor (PC00055); nucleic acid binding (PC00171)
HIF1A	HYPOXIA-INDUCIBLE FACTOR 1-ALPHA (PTHR23043:SF7)	Kinase (PC00137)
PIK3C2B	PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT BETA (PTHR10048:SF30)	Small GTPase (PC00208)
KDR	VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR 2 (PTHR24416:SF45)	Kinase (PC00137)
SCAP	SH2 DOMAIN-CONTAINING PROTEIN 2A (PTHR14388:SF9)	
ARHGAP1	RHO GTPASE-ACTIVATING PROTEIN 1 (PTHR45808:SF6)	
NRAS	GTPASE NRAS (PTHR24070:SF189)	
PIK3C2A	PHOSPHATIDYLINOSITOL 4-PHOSPHATE 3-KINASE C2 DOMAIN-CONTAINING SUBUNIT ALPHA (PTHR10048:SF28)	
PRKCA,	PROTEIN KINASE C ALPHA TYPE (PTHR24356:SF193)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKACA		

Table SVIII. Continued.

Gene symbol	Gene name	Function
RAC2	RAS-RELATED C3 BOTULINUM TOXIN SUBSTRATE 2 (PTHR24072:SF169)	Small GTPase (PC00208)
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	Kinase (PC00137)
PXN	PAXILLIN (PTHR24216:SF11)	Actin family cytoskeletal protein (PC00041)
PRKCI	PROTEIN KINASE C IOTA TYPE (PTHR24356:SF214)	Annexin (PC00050); calmodulin (PC00061); non-receptor serine/threonine protein kinase (PC00167); transfer/carrier protein (PC00219)
PRKD2,	SERINE/THREONINE-PROTEIN KINASE D2 (PTHR22968:SF12)	Growth factor (PC00112)
PKD2	VASCULAR ENDOTHELIAL GROWTH FACTOR A (PTHR12025:SF5)	Calcium-binding protein (PC00060); guanyl-nucleotide exchange factor
VEGFA	1-PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE PHOSPHODIESTERASE	(PC00113); phospholipase (PC00186); signaling molecule (PC00207)
PLCG1	GAMMA-1 (PTHR10336:SF173)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK14	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110)	

Table SIX. B cell activation pathway and associated upregulated genes.

Gene symbol	Gene name	Function
VAV2	GUANINE NUCLEOTIDE EXCHANGE FACTOR VAV2 (PTHR45818:SF4)	
PPP3CB	SERINE/THREONINE-PROTEIN PHOSPHATASE 2B CATALYTIC SUBUNIT BETA ISOFORM (PTHR45673:SF7)	
MAP3K2	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF342)	Calmodulin (PC00061)
CALM1	CALMODULIN-1 (PTHR23050:SF380)	
RAF1	RAF PROTO-ONCOGENE SERINE/THREONINE-PROTEIN KINASE (PTHR44329:SF22)	
MAP2K1	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 1 (PTHR24361:SF370)	
MAPK1	MITOGEN-ACTIVATED PROTEIN KINASE 1 (PTHR24055:SF203)	Non-receptor serine/threonine protein kinase (PC00167)
VAV1	PROTO-ONCOGENE VAV (PTHR45818:SF2)	
IGHM	IMMUNOGLOBULIN HEAVY CONSTANT MU (PTHR23266:SF120)	
NFKB1A	NF-KAPPA-B INHIBITOR ALPHA (PTHR46680:SF1)	
MAP2K2	DUAL SPECIFICITY MITOGEN-ACTIVATED PROTEIN KINASE KINASE 2 (PTHR24361:SF314)	
MAP3K3	MITOGEN-ACTIVATED PROTEIN KINASE KINASE 3 (PTHR24361:SF656)	
MAPK3	MITOGEN-ACTIVATED PROTEIN KINASE 3 (PTHR24055:SF393)	Non-receptor serine/threonine protein kinase (PC00167)
NFKB1	NUCLEAR FACTOR NF-KAPPA-B P105 SUBUNIT (PTHR24169:SF9)	P53-like transcription factor (PC00253); Rel homology transcription factor (PC00252); nucleic acid binding (PC00171)
NFATC1	NUCLEAR FACTOR OF ACTIVATED T-CELLS, CYTOPLASMIC 1 (PTHR12533:SF5)	Rel homology transcription factor (PC00252)
ITPR3	INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR TYPE 3 (PTHR13715:SF51)	Ligand-gated ion channel (PC00141)
GRB2	GROWTH FACTOR RECEPTOR-BOUND PROTEIN 2 (PTHR46037:SF4)	
PPP3CC	SERINE/THREONINE-PROTEIN PHOSPHATASE 2B CATALYTIC SUBUNIT GAMMA ISOFORM (PTHR45673:SF2)	
FOS	PROTO-ONCOGENE C-FOS (PTHR23351:SF4)	Basic leucine zipper transcription factor (PC00056)
MAPK13	MITOGEN-ACTIVATED PROTEIN KINASE 13 (PTHR24055:SF107)	Non-receptor serine/threonine protein kinase (PC00167)
NFATC4	NUCLEAR FACTOR OF ACTIVATED T-CELLS, CYTOPLASMIC 4 (PTHR12533:SF11)	Rel homology transcription factor (PC00252)
NRAS	GTPASE NRAS (PTHR24070:SF189)	Small GTPase (PC00208)
SYK	TYROSINE-PROTEIN KINASE SYK (PTHR24418:SF231)	
RHOD	RHO-RELATED GTP-BINDING PROTEIN RHOD (PTHR24072:SF175)	Small GTPase (PC00208)
PPP3CA	SERINE/THREONINE-PROTEIN PHOSPHATASE 2B CATALYTIC SUBUNIT ALPHA ISOFORM (PTHR45673:SF5)	
RAC2	RAS-RELATED C3 BOTULINUM TOXIN SUBSTRATE 2 (PTHR24072:SF169)	
CALM3	CALMODULIN-3 (PTHR23050:SF381)	Small GTPase (PC00208)
PIK3CB	PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT BETA ISOFORM (PTHR10048:SF33)	Calmodulin (PC00061)
ITPR2	INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR TYPE 2 (PTHR13715:SF53)	Kinase (PC00137)
SOS1	SON OF SEVENLESS HOMOLOG 1 (PTHR23113:SF168)	Ligand-gated ion channel (PC00141)
		Guanyl-nucleotide exchange factor (PC00113)

Table SIX. Continued.

Gene symbol	Gene name	Function
JUN	TRANSCRIPTION FACTOR AP-1 (PTHR11462:SF8)	Basic leucine zipper transcription factor (PC00056); nucleic acid binding (PC00171)
IKKB	INHIBITOR OF NUCLEAR FACTOR KAPPA-B KINASE SUBUNIT BETA (PTHR22969:SF7)	Non-receptor serine/threonine protein kinase (PC00167)
MAPK14	MITOGEN-ACTIVATED PROTEIN KINASE 14 (PTHR24055:SF110)	Non-receptor serine/threonine protein kinase (PC00167)

Table SX. Notch signalling pathway and associated upregulated genes.

Gene symbol	Gene name	Function
HEYL	HAIRY/ENHANCER-OF-SPLIT RELATED WITH YRPW MOTIF-LIKE PROTEIN (PTHR10985:SF79)	Basic helix-loop-helix transcription factor (PC000055)
PSEN1	PRESENILIN-1 (PTHR10202:SF18)	Aspartic protease (PC000053); calcium-binding protein (PC000060); Membrane-bound signaling molecule (PC00152) Signaling molecule (PC00207)
NUMB	PROTEIN NUMB HOMOLOG (PTHR11232:SF33)	Glycosyltransferase (PC00111); signaling molecule (PC00207)
NOTCH3	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 3 (PTHR45836:SF17)	
LFNG	BETA-1,3-N-ACETYLGALUCOSAMINYLTRANSFERASE LUNATIC FRINGE (PTHR10811:SF7)	
POFUT1	GDP-FUCOSE PROTEIN O-FUCOSYLTRANSFERASE 1 (PTHR21420:SF3)	
RBPJ	RECOMBINING BINDING PROTEIN SUPPRESSOR OF HAIRLESS (PTHR10665:SF3)	Nucleic acid binding (PC00171); transcription factor (PC00218)
NEURL4	NEURALIZED-LIKE PROTEIN 4 (PTHR12429:SF14)	Ubiquitin-protein ligase (PC00234)
DLK1	PROTEIN DELTA HOMOLOG 1 (PTHR24052:SF11)	Membrane-bound signaling molecule (PC00152); receptor (PC00197)
NCSTN	NICASTRIN (PTHR21092:SF0)	
NOTCH1, HNI	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 1 (PTHR45836:SF12)	
ADAM17	DISINTEGRIN AND METALLOPROTEINASE DOMAIN-CONTAINING PROTEIN 17 (PTHR45702:SF6)	
LNX2	LIGAND OF NUMB PROTEIN X 2 (PTHR19964:SF33)	
ADAM10	DISINTEGRIN AND METALLOPROTEINASE DOMAIN-CONTAINING PROTEIN 10 (PTHR45702:SF4)	
NCOR2	NUCLEAR RECEPTOR COREPRESSOR 2 (PTHR13992:SF21)	Nucleic acid binding (PC00171); transcription cofactor (PC00217)
NOTCH4	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 4 (PTHR24044:SF450)	
RFNG	BETA-1,3-N-ACETYLGALUCOSAMINYLTRANSFERASE RADICAL FRINGE (PTHR10811:SF1)	Glycosyltransferase (PC00111); signaling molecule (PC00207)
DLL4	DELTA-LIKE PROTEIN 4 (PTHR24044:SF320)	
APH1A	GAMMA-SECRETASE SUBUNIT APH-1A (PTHR12889:SF3)	Enzyme modulator (PC000095)
MAML1	MASTERMIND-LIKE PROTEIN 1 (PTHR15692:SF19)	Transcription factor (PC00218)
HES1	TRANSCRIPTION FACTOR HES-1 (PTHR10985:SF19)	Basic helix-loop-helix transcription factor (PC000055)
NOTCH2	NEUROGENIC LOCUS NOTCH HOMOLOG PROTEIN 2 (PTHR45836:SF15)	
TRAF7	E3 UBIQUITIN-PROTEIN LIGASE TRAF7 (PTHR19848:SF4)	

Table SXI. Significantly upregulated proteins observed with Proteome profiler arrays.

Protein	P-value
Nectin-4	4.85×10^{-3}
P27/Kip 1 (CDKN1B)	5.97×10^{-3}
MUC-1	8.42×10^{-3}
CapG	1.02×10^{-2}
Cathepsin D	1.23×10^{-2}
ERalpha/NR3A1	1.58×10^{-2}
Cathepsin S	1.70×10^{-2}
ErbB3/Her3	1.74×10^{-2}
Hif-1 alpha	1.82×10^{-2}
Endoglin/NR3A1	1.86×10^{-2}
EGFR/ErbB1	2.10×10^{-2}
Galectin-3	2.38×10^{-2}
Cathepsin B	2.71×10^{-2}
ENPP-2/Autotaxin	2.83×10^{-2}
SPARC	3.13×10^{-2}
Angiopoietin-like 4	3.96×10^{-2}
CEACAM-5	4.11×10^{-2}
Osteopontin (OPN)	4.30×10^{-2}
DLL1	4.87×10^{-2}