

# RT<sup>2</sup> Profiler™ PCR Array

## Human Hedgehog Signaling Pathway

**Catalog Number:**

PAHS-078A  
PAHS-078C  
PAHS-078D  
PAHS-078E  
PAHS-078F  
PAHS-078G

**For Real-Time Instruments:**

ABI Standard Blocks; Bio-Rad iCycler, MyiQ, and (MJ Research) Chromo 4 and Stratagene Mx3005p, Mx3000p  
ABI 7500 and 7900HT FAST 96-Well Blocks, ABI StepOnePlus  
Bio-Rad (MJ Research) Opticon and Opticon 2, Stratagene Mx4000  
ABI 7900HT 384-Well Block  
Roche LightCycler 480 96-well Blocks  
Roche LightCycler 480 384-well Blocks

### Description

The Human Hedgehog Signaling RT<sup>2</sup> Profiler™ PCR Array profiles the expression of 84 key genes involved in the hedgehog signaling pathway. The hedgehog family members, including Sonic hedgehog (Shh), are the most well-known morphogens involved in the developmental pattern formation of various organs, such as the nervous system, muscle, the heart and the lungs. Hedgehog signaling has also been implicated in the development of several human cancers. The array includes hedgehog family members, hedgehog receptors, and other associated proteins. The array also includes key genes involved in cell differentiation and multi-cellular organism development. Using real-time PCR, you can easily and reliably analyze expression of a focused panel of genes related to hedgehog signaling with this array.

### Functional Gene Groupings

**Genes Involved in Hedgehog Signaling Pathway:**

Hedgehog Family Members and Associated Proteins: DHH, HHAT, HHIP, IHH, SHH, SIAH1.

Hedgehog Receptors: C18orf8, C6orf138, NPC1, NPC1L1, PTCH1, PTCH2, PTCHD1, PTCHD2, PTCHD3.

Sonic Hedgehog (Shh) Pathway: GLI1, GLI2, GLI3, GSK3B, PTCH1, SHH, SMO, SUFU.

Smoothed Signaling Pathway: CDON, CEP76 (C18orf9), FGF9, FKBP8, GLI1, GLI2, GLI3, HHIP, IFT52, OTX2, PTCH1, SHH, SMO.

WNT Receptor Signaling Pathway: BTRC, CSNK1A1, CSNK1A1L, CSNK1D, CSNK1E, CSNK1G1, CSNK1G2, CTNNB1, FBXW11, GSK3B, PRKACA, PRKACB, PRKACG, PRKX, PRKY, SFRP1, SIAH1, WIF1, WNT1, WNT10A, WNT10B, WNT11, WNT16, WNT2, WNT2B, WNT3, WNT3A, WNT4, WNT5A, WNT5B, WNT6, WNT7A, WNT7B, WNT8A, WNT8B, WNT9A, WNT9B.

Other Genes Involved in Hedgehog Signaling Pathway: BMP2, BMP4, BMP5, BMP6, BMP7, BMP8A, BMP8B, DHH, GAS1, IHH, LRP2, RAB23, SMO, STK36, ZIC2.

**Regulators of Cell Differentiation:** BMP2, BMP4, BMP6, BMP7, BMP8A, BMP8B, CTNNB1, FGF9, GLI1, GLI3, IHH, MAPK1, SFRP1, SHH, SIAH1, SMO, WNT1, WNT3A, WNT7A, ZIC1, ZIC2.

**Regulators of Development:**

Nervous System Development: BMP4, CRIM1, CTNNB1, GLI2, GLI3, GREM1, LRP2, MTSS1, OTX2, RAB23, SHH, SIAH1, WNT8B, ZIC1, ZIC2.

Camera-Type Eye Development: BMP4, FKBP8, SHH.

Skeletal Development: CTNNB1, FGFR3, GLI2, IHH, SUFU.

Heart Development: BMP4, CTNNB1, GLI2, GLI3, SHH.

Lung Development: BMP4, CTNNB1, GLI1, GLI2, GLI3, HHIP, SHH, WNT5A.

Cartilage Development: BMP2, BMP4, BMP5, BMP6, BMP7.

Other Regulators for Multi-Cellular Organism Development: BMP8A, BMP8B, DHH, ERBB4, FGF9, FOXE1, HHAT, KCTD11, NUMB, PRKACG, SFRP1, SMO, STK36, WIF1, WNT1, WNT10A, WNT10B, WNT11, WNT16, WNT2, WNT2B, WNT3, WNT3A, WNT4, WNT5B, WNT6, WNT7A, WNT7B, WNT8A, WNT9A, WNT9B.

## Product Specification Sheet

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### **Storage Conditions**

Please check the kit components immediately after you receive this package. We are only responsible for missing items reported within two (2) business days of receipt.

**Storage Conditions:** PCR Arrays are shipped at ambient temperature. Keep plates at -20 °C for long-term storage.

**NOTE:** Be sure that you have the correct PCR Array format for your instrument before starting the experiment.

### **References**

1. Wang, Y., A.P. McMahon, and B.L. Allen, *Shifting paradigms in Hedgehog signaling*. Current Opinion in Cell Biology, 2007. **19**(2): p. 159-165.
2. Varjosalo, M. and J. Taipale, *Hedgehog signaling*. J Cell Sci, 2007. **120**(Pt 1): p. 3-6.
3. Lou, H. and M. Dean, *Targeted therapy for cancer stem cells: the patched pathway and ABC transporters*. Oncogene, 2007. **26**(9): p. 1357-60.
4. Morton, J.P. and B.C. Lewis, *Shh signaling and pancreatic cancer: implications for therapy?* Cell Cycle, 2007. **6**(13): p. 1553-7.
5. Nagase, T., et al., *Hedgehog signaling: a biophysical or biomechanical modulator in embryonic development?* Ann N Y Acad Sci, 2007. **1101**: p. 412-38.

## Product Specification Sheet

### Array Layout: Human Hedgehog Signaling Pathway RT<sup>2</sup> Profiler™ PCR Array

	1	2	3	4	5	6	7	8	9	10	11	12
A	BMP2	BMP4	BMP5	BMP6	BMP7	BMP8A	BMP8B	BTRC	C18orf8	CEP76	C6orf138	CDON
B	CRIM1	CSNK1A1	CSNK1A1L	CSNK1D	CSNK1E	CSNK1G1	CSNK1G2	CTNNB1	DHH	ERBB4	FBXW11	FGF9
C	FGFR3	FKBP8	FOXE1	GAS1	GLI1	GLI2	GLI3	GREM1	GSK3B	HHAT	HHIP	IFT52
D	IHH	KCTD11	LRP2	MAPK1	MTSS1	NPC1	NPC1L1	NUMB	OTX2	PRKACA	PRKACB	PRKACG
E	PRKX	PRKY	PTCH1	PTCH2	PTCHD1	PTCHD2	PTCHD3	RAB23	SFRP1	SHH	SIAH1	SMO
F	STK36	SUFU	WIF1	WNT1	WNT10A	WNT10B	WNT11	WNT16	WNT2	WNT2B	WNT3	WNT3A
G	WNT4	WNT5A	WNT5B	WNT6	WNT7A	WNT7B	WNT8A	WNT8B	WNT9A	WNT9B	ZIC1	ZIC2
H	B2M	HPRT1	RPL13A	GAPDH	ACTB	HGDC	RTC	RTC	RTC	PPC	PPC	PPC

### Gene Table

Position	UniGene	GenBank	Symbol	Description
A01	Hs.73853	NM_001200	BMP2	Bone morphogenetic protein 2
A02	Hs.68879	NM_001202	BMP4	Bone morphogenetic protein 4
A03	Hs.296648	NM_021073	BMP5	Bone morphogenetic protein 5
A04	Hs.285671	NM_001718	BMP6	Bone morphogenetic protein 6
A05	Hs.473163	NM_001719	BMP7	Bone morphogenetic protein 7 (osteogenic protein 1)
A06	Hs.567883	NM_181809	BMP8A	Bone morphogenetic protein 8a
A07	Hs.664022	NM_001720	BMP8B	Bone morphogenetic protein 8b (osteogenic protein 2)
A08	Hs.696242	NM_033637	BTRC	Beta-transducin repeat containing
A09	Hs.529006	NM_013326	C18orf8	Chromosome 18 open reading frame 8
A10	Hs.236940	NM_024899	CEP76	Centrosomal protein 76kDa
A11	Hs.659409	NM_001013732	C6orf138	Chromosome 6 open reading frame 138
A12	Hs.38034	NM_016952	CDON	Cdon homolog (mouse)
B01	Hs.699247	NM_016441	CRIM1	Cysteine rich transmembrane BMP regulator 1 (chordin-like)
B02	Hs.529862	NM_001892	CSNK1A1	Casein kinase 1, alpha 1
B03	Hs.512897	NM_145203	CSNK1A1L	Casein kinase 1, alpha 1-like
B04	Hs.631725	NM_001893	CSNK1D	Casein kinase 1, delta
B05	Hs.474833	NM_001894	CSNK1E	Casein kinase 1, epsilon
B06	Hs.646508	NM_022048	CSNK1G1	Casein kinase 1, gamma 1
B07	Hs.651905	NM_001319	CSNK1G2	Casein kinase 1, gamma 2
B08	Hs.476018	NM_001904	CTNNB1	Catenin (cadherin-associated protein), beta 1, 88kDa
B09	Hs.524382	NM_021044	DHH	Desert hedgehog homolog (Drosophila)
B10	Hs.390729	NM_005235	ERBB4	V-erb-a erythroblastic leukemia viral oncogene homolog 4 (avian)
B11	Hs.484138	NM_012300	FBXW11	F-box and WD repeat domain containing 11
B12	Hs.111	NM_002010	FGF9	Fibroblast growth factor 9 (glia-activating factor)
C01	Hs.1420	NM_000142	FGFR3	Fibroblast growth factor receptor 3 (achondroplasia, thanatophoric dwarfism)
C02	Hs.173464	NM_012181	FKBP8	FK506 binding protein 8, 38kDa
C03	Hs.159234	NM_004473	FOXE1	Forkhead box E1 (thyroid transcription factor 2)
C04	Hs.65029	NM_002048	GAS1	Growth arrest-specific 1
C05	Hs.632702	NM_005269	GLI1	Glioma-associated oncogene homolog 1 (zinc finger protein)
C06	Hs.111867	NM_005270	GLI2	GLI-Kruppel family member GLI2
C07	Hs.199338	NM_000168	GLI3	GLI-Kruppel family member GLI3 (Greig cephalopolysyndactyly syndrome)
C08	Hs.40098	NM_013372	GREM1	Gremlin 1, cysteine knot superfamily, homolog (Xenopus laevis)
C09	Hs.445733	NM_002093	GSK3B	Glycogen synthase kinase 3 beta
C10	Hs.58650	NM_018194	HHAT	Hedgehog acyltransferase
C11	Hs.507991	NM_022475	HHIP	Hedgehog interacting protein
C12	Hs.444332	NM_016004	IFT52	Intraflagellar transport 52 homolog (Chlamydomonas)
D01	Hs.654504	NM_002181	IHH	Indian hedgehog homolog (Drosophila)
D02	Hs.592112	NM_001002914	KCTD11	Potassium channel tetramerisation domain containing 11
D03	Hs.657729	NM_004525	LRP2	Low density lipoprotein-related protein 2
D04	Hs.431850	NM_002745	MAPK1	Mitogen-activated protein kinase 1
D05	Hs.336994	NM_014751	MTSS1	Metastasis suppressor 1
D06	Hs.464779	NM_000271	NPC1	Niemann-Pick disease, type C1
D07	Hs.567486	NM_013389	NPC1L1	NPC1 (Niemann-Pick disease, type C1, gene)-like 1
D08	Hs.654609	NM_003744	NUMB	Numb homolog (Drosophila)
D09	Hs.288655	NM_021728	OTX2	Orthodenticle homeobox 2
D10	Hs.707989	NM_002730	PRKACA	Protein kinase, cAMP-dependent, catalytic, alpha
D11	Hs.487325	NM_182948	PRKACB	Protein kinase, cAMP-dependent, catalytic, beta
D12	Hs.158029	NM_002732	PRKACG	Protein kinase, cAMP-dependent, catalytic, gamma
E01	Hs.390788	NM_005044	PRKX	Protein kinase, X-linked
E02	Hs.632287	NM_002760	PRKY	Protein kinase, Y-linked
E03	Hs.494538	NM_000264	PTCH1	Patched homolog 1 (Drosophila)
E04	Hs.591497	NM_003738	PTCH2	Patched homolog 2 (Drosophila)

## Product Specification Sheet

Position	UniGene	GenBank	Symbol	Description
E05	Hs.319503	NM_173495	PTCHD1	Patched domain containing 1
E06	Hs.202355	NM_020780	PTCHD2	Patched domain containing 2
E07	Hs.631832	NM_001034842	PTCHD3	Patched domain containing 3
E08	Hs.555016	NM_183227	RAB23	RAB23, member RAS oncogene family
E09	Hs.708003	NM_003012	SFRP1	Secreted frizzled-related protein 1
E10	Hs.164537	NM_000193	SHH	Sonic hedgehog homolog (Drosophila)
E11	Hs.295923	NM_003031	SIAH1	Seven in absentia homolog 1 (Drosophila)
E12	Hs.437846	NM_005631	SMO	Smoothened homolog (Drosophila)
F01	Hs.706917	NM_015690	STK36	Serine/threonine kinase 36, fused homolog (Drosophila)
F02	Hs.404089	NM_016169	SUFU	Suppressor of fused homolog (Drosophila)
F03	Hs.284122	NM_007191	WIF1	WNT inhibitory factor 1
F04	Hs.248164	NM_005430	WNT1	Wingless-type MMTV integration site family, member 1
F05	Hs.121540	NM_025216	WNT10A	Wingless-type MMTV integration site family, member 10A
F06	Hs.91985	NM_003394	WNT10B	Wingless-type MMTV integration site family, member 10B
F07	Hs.108219	NM_004626	WNT11	Wingless-type MMTV integration site family, member 11
F08	Hs.272375	NM_057168	WNT16	Wingless-type MMTV integration site family, member 16
F09	Hs.567356	NM_003391	WNT2	Wingless-type MMTV integration site family member 2
F10	Hs.258575	NM_004185	WNT2B	Wingless-type MMTV integration site family, member 2B
F11	Hs.445884	NM_030753	WNT3	Wingless-type MMTV integration site family, member 3
F12	Hs.336930	NM_033131	WNT3A	Wingless-type MMTV integration site family, member 3A
G01	Hs.25766	NM_030761	WNT4	Wingless-type MMTV integration site family, member 4
G02	Hs.696364	NM_003392	WNT5A	Wingless-type MMTV integration site family, member 5A
G03	Hs.306051	NM_032642	WNT5B	Wingless-type MMTV integration site family, member 5B
G04	Hs.29764	NM_006522	WNT6	Wingless-type MMTV integration site family, member 6
G05	Hs.72290	NM_004625	WNT7A	Wingless-type MMTV integration site family, member 7A
G06	Hs.512714	NM_058238	WNT7B	Wingless-type MMTV integration site family, member 7B
G07	Hs.591274	NM_058244	WNT8A	Wingless-type MMTV integration site family, member 8A
G08	Hs.421281	NM_003393	WNT8B	Wingless-type MMTV integration site family, member 8B
G09	Hs.149504	NM_003395	WNT9A	Wingless-type MMTV integration site family, member 9A
G10	Hs.326420	NM_003396	WNT9B	Wingless-type MMTV integration site family, member 9B
G11	Hs.598590	NM_003412	ZIC1	Zic family member 1 (odd-paired homolog, Drosophila)
G12	Hs.653700	NM_007129	ZIC2	Zic family member 2 (odd-paired homolog, Drosophila)
H01	Hs.534255	NM_004048	B2M	Beta-2-microglobulin
H02	Hs.412707	NM_000194	HPRT1	Hypoxanthine phosphoribosyltransferase 1 (Lesch-Nyhan syndrome)
H03	Hs.546356	NM_012423	RPL13A	Ribosomal protein L13a
H04	Hs.544577	NM_002046	GAPDH	Glyceraldehyde-3-phosphate dehydrogenase
H05	Hs.520640	NM_001101	ACTB	Actin, beta
H06	N/A	SA_00105	HGDC	Human Genomic DNA Contamination
H07	N/A	SA_00104	RTC	Reverse Transcription Control
H08	N/A	SA_00104	RTC	Reverse Transcription Control
H09	N/A	SA_00104	RTC	Reverse Transcription Control
H10	N/A	SA_00103	PPC	Positive PCR Control
H11	N/A	SA_00103	PPC	Positive PCR Control
H12	N/A	SA_00103	PPC	Positive PCR Control