

# RT<sup>2</sup> Profiler™ PCR Array

## Mouse Hedgehog Signaling Pathway

### Catalog Number:

PAMM-078A  
PAMM-078C  
PAMM-078D  
PAMM-078E  
PAMM-078F  
PAMM-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 Mouse 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 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, Siah1a.

Hedgehog Receptors: Disp1, Npc1, Npc111, Ptch1, Ptch2, Ptchd1, Ptchd2, Ptchd3.

Sonic Hedgehog (Shh) Pathway: Gli1, Gli2, Gli3, Gsk3b, Ptch1, Shh, Smo, Sufu.

Smoothened Signaling Pathway: Boc, Cdon, Cep76, Ctnna1, Disp1, Fgf9, Fkbp8, Gli1, Gli2, Gli3, Hhip, Ift52, Otx2, Ptch1, Runx2, Shh, Shox2, Smo.

Wnt Receptor Signaling Pathway: Btrc, Csnk1a1, Csnk1d, Csnk1e, Csnk1g1, Csnk1g2, Ctnnb1, Fbxw11, Gsk3b, Prkaca, Prkacb, Prkx, Sfrp1, Siah1a, 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, Boc, Ctnnb1, Fgf9, Gli1, Gli3, Ihh, Mapk1, Runx2, Sfrp1, Shh, Siah1a, Smo, Wnt1, Wnt3a, Wnt7a, Zic1, Zic2.

#### **Regulators of Development:**

Nervous system development: Bmp4, Crim1, Ctnnb1, Gli2, Gli3, Grem1, Lrp2, Mtss1, Otx2, Rab23, Shh, Siah1a, 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, Boc, Dhh, Disp1, Erbb4, Fgf9, Foxe1, Hhat, Kctd11, Numb, Runx2, Sfrp1, Shox2, 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: Mouse 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	Boc	Btrc	Cdon	Cep76	Crim1
B	Csnk1a1	Csnk1d	Csnk1e	Csnk1g1	Csnk1g2	Ctnna1	Ctnnb1	Dhh	Disp1	ErbB4	Fbxw11	Fgf9
C	Fgfr3	Fkbp8	Foxe1	Gas1	Gli1	Gli2	Gli3	Grem1	Gsk3b	Hhat	Hhip	Ift52
D	Ihh	Kctd11	Lrp2	Mapk1	Mtss1	Npc1	Npc111	Numb	Otx2	Prkaca	Prkacb	Prkx
E	Ptch1	Ptch2	Ptchd1	Ptchd2	Ptchd3	Rab23	Runx2	Sfrp1	Shh	Shox2	Siah1a	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	Gusb	Hprt1	Hspcb	Gapdh	Actb	MGDC	RTC	RTC	RTC	PPC	PPC	PPC

### Gene Table

Position	UniGene	GenBank	Symbol	Description
A01	Mm.103205	NM_007553	Bmp2	Bone morphogenetic protein 2
A02	Mm.6813	NM_007554	Bmp4	Bone morphogenetic protein 4
A03	Mm.428950	NM_007555	Bmp5	Bone morphogenetic protein 5
A04	Mm.374781	NM_007556	Bmp6	Bone morphogenetic protein 6
A05	Mm.595	NM_007557	Bmp7	Bone morphogenetic protein 7
A06	Mm.439749	NM_007558	Bmp8a	Bone morphogenetic protein 8a
A07	Mm.439764	NM_007559	Bmp8b	Bone morphogenetic protein 8b
A08	Mm.41561	NM_172506	Boc	Biregional cell adhesion molecule-related/down-regulated by oncogenes (Cdon) binding protein
A09	Mm.119717	NM_009771	Btrc	Beta-transducin repeat containing protein
A10	Mm.80509	NM_021339	Cdon	Cell adhesion molecule-related/down-regulated by oncogenes
A11	Mm.111928	NM_001081073	Cep76	Centrosomal protein 76
A12	Mm.311912	NM_015800	Crim1	Cysteine rich transmembrane BMP regulator 1 (chordin like)
B01	Mm.26908	NM_146087	Csnk1a1	Casein kinase 1, alpha 1
B02	Mm.216227	NM_139059	Csnk1d	Casein kinase 1, delta
B03	Mm.30199	NM_013767	Csnk1e	Casein kinase 1, epsilon
B04	Mm.325816	NM_173185	Csnk1g1	Casein kinase 1, gamma 1
B05	Mm.29873	NM_134002	Csnk1g2	Casein kinase 1, gamma 2
B06	Mm.18962	NM_009818	Ctnna1	Catenin (cadherin associated protein), alpha 1
B07	Mm.291928	NM_007614	Ctnnb1	Catenin (cadherin associated protein), beta 1
B08	Mm.324688	NM_007857	Dhh	Desert hedgehog
B09	Mm.358721	NM_026866	Disp1	Dispatched homolog 1 (Drosophila)
B10	Mm.442420	XM_136682	ErbB4	V-erb-a erythroblastic leukemia viral oncogene homolog 4 (avian)
B11	Mm.28017	NM_134015	Fbxw11	F-box and WD-40 domain protein 11
B12	Mm.8846	NM_013518	Fgf9	Fibroblast growth factor 9
C01	Mm.6904	NM_008010	Fgfr3	Fibroblast growth factor receptor 3
C02	Mm.141864	NM_010223	Fkbp8	FK506 binding protein 8
C03	Mm.354634	NM_183298	Foxe1	Forkhead box E1 (thyroid transcription factor 2)
C04	Mm.22701	NM_008086	Gas1	Growth arrest specific 1
C05	Mm.391450	NM_010296	Gli1	GLI-Kruppel family member GLI1
C06	Mm.273292	NM_001081125	Gli2	GLI-Kruppel family member GLI2
C07	Mm.5098	NM_008130	Gli3	GLI-Kruppel family member GLI3
C08	Mm.166318	NM_011824	Grem1	Gremlin 1
C09	Mm.394930	NM_019827	Gsk3b	Glycogen synthase kinase 3 beta
C10	Mm.145857	NM_144881	Hhat	Hedgehog acyltransferase
C11	Mm.254493	NM_020259	Hhip	Hedgehog-interacting protein
C12	Mm.34034	NM_172150	Ift52	Intraflagellar transport 52 homolog (Chlamydomonas)
D01	Mm.439736	NM_010544	Ihh	Indian hedgehog
D02	Mm.239498	NM_153143	Kctd11	Potassium channel tetramerisation domain containing 11
D03	Mm.23847	NM_001081088	Lrp2	Low density lipoprotein receptor-related protein 2
D04	Mm.196581	NM_011949	Mapk1	Mitogen-activated protein kinase 1
D05	Mm.215481	NM_144800	Mtss1	Metastasis suppressor 1
D06	Mm.3484	NM_008720	Npc1	Niemann Pick type C1
D07	Mm.212492	NM_207242	Npc111	NPC1-like 1
D08	Mm.4390	NM_010949	Numb	Numb gene homolog (Drosophila)
D09	Mm.134516	NM_144841	Otx2	Orthodenticle homolog 2 (Drosophila)
D10	Mm.19111	NM_008854	Prkaca	Protein kinase, cAMP dependent, catalytic, alpha
D11	Mm.16766	NM_011100	Prkacb	Protein kinase, cAMP dependent, catalytic, beta
D12	Mm.290338	NM_016979	Prkx	Protein kinase, X-linked
E01	Mm.228798	NM_008957	Ptch1	Patched homolog 1
E02	Mm.287037	NM_008958	Ptch2	Patched homolog 2
E03	Mm.218811	XM_142262	Ptchd1	Patched domain containing 1
E04	Mm.33873	NM_001083342	Ptchd2	Patched domain containing 2
E05	Mm.61213	XM_109751	Ptchd3	Patched domain containing 3

## Product Specification Sheet

Position	UniGene	GenBank	Symbol	Description
E06	Mm.86744	NM_008999	Rab23	RAB23, member RAS oncogene family
E07	Mm.391013	NM_009820	Runx2	Runt related transcription factor 2
E08	Mm.281691	NM_013834	Sfrp1	Secreted frizzled-related protein 1
E09	Mm.57202	NM_009170	Shh	Sonic hedgehog
E10	Mm.39093	NM_013665	Shox2	Short stature homeobox 2
E11	Mm.324553	NM_009172	Siah1a	Seven in absentia 1A
E12	Mm.29279	NM_176996	Smo	Smoothened homolog (Drosophila)
F01	Mm.310974	NM_175031	Stk36	Serine/threonine kinase 36 (fused homolog, Drosophila)
F02	Mm.41210	NM_015752	Sufu	Suppressor of fused homolog (Drosophila)
F03	Mm.32831	NM_011915	Wif1	Wnt inhibitory factor 1
F04	Mm.1123	NM_021279	Wnt1	Wingless-related MMTV integration site 1
F05	Mm.5130	NM_009518	Wnt10a	Wingless related MMTV integration site 10a
F06	Mm.4709	NM_011718	Wnt10b	Wingless related MMTV integration site 10b
F07	Mm.22182	NM_009519	Wnt11	Wingless-related MMTV integration site 11
F08	Mm.137403	NM_053116	Wnt16	Wingless-related MMTV integration site 16
F09	Mm.33653	NM_023653	Wnt2	Wingless-related MMTV integration site 2
F10	Mm.10740	NM_009520	Wnt2b	Wingless related MMTV integration site 2b
F11	Mm.159091	NM_009521	Wnt3	Wingless-related MMTV integration site 3
F12	Mm.1367	NM_009522	Wnt3a	Wingless-related MMTV integration site 3A
G01	Mm.20355	NM_009523	Wnt4	Wingless-related MMTV integration site 4
G02	Mm.287544	NM_009524	Wnt5a	Wingless-related MMTV integration site 5A
G03	Mm.321818	NM_009525	Wnt5b	Wingless-related MMTV integration site 5B
G04	Mm.268282	NM_009526	Wnt6	Wingless-related MMTV integration site 6
G05	Mm.56964	NM_009527	Wnt7a	Wingless-related MMTV integration site 7A
G06	Mm.306946	NM_009528	Wnt7b	Wingless-related MMTV integration site 7B
G07	Mm.558	NM_009290	Wnt8a	Wingless-related MMTV integration site 8A
G08	Mm.88365	NM_011720	Wnt8b	Wingless related MMTV integration site 8b
G09	Mm.218794	NM_139298	Wnt9a	Wingless-type MMTV integration site 9A
G10	Mm.215161	NM_011719	Wnt9b	Wingless-type MMTV integration site 9B
G11	Mm.335350	NM_009573	Zic1	Zinc finger protein of the cerebellum 1
G12	Mm.308936	NM_009574	Zic2	Zinc finger protein of the cerebellum 2
H01	Mm.371672	NM_010368	Gusb	Glucuronidase, beta
H02	Mm.299381	NM_013556	Hprt1	Hypoxanthine guanine phosphoribosyl transferase 1
H03	Mm.2180	NM_008302	Hspcb	Heat shock protein 1, beta
H04	Mm.333399	NM_008084	Gapdh	Glyceraldehyde-3-phosphate dehydrogenase
H05	Mm.297	NM_007393	Actb	Actin, beta, cytoplasmic
H06	N/A	SA_00106	MGDC	Mouse 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