

TaqMan® Human Stem Cell Pluripotency Array

TaqMan® Mouse Stem Cell Pluripotency Array

These arrays are part of a collection of TaqMan® Gene Signature Arrays that enable analysis of hundreds of TaqMan® Gene Expression Assays on a micro fluidic card with minimal effort.

TaqMan® Human and Mouse Stem Cell Pluripotency Arrays use Applied Biosystems' proprietary micro fluidics technology to simultaneously analyze gene expression levels by quantitative PCR for 90 test genes and six endogenous controls.

The Human Stem Cell Pluripotency Array contains characterization markers of undifferentiated human stem cells or their differentiated derivatives. This Gene Signature Array contains a well-defined set of validated gene expression markers to characterize human embryonic stem (ES) cell identity as well as assessment of phenotypic variations between embryonic stem cell isolates¹.

Genes were selected for inclusion based on the following criteria: 1) expression in human embryonal carcinoma cells (hEC), primordial germ cells or human ES (hES) cells; 2) known role in maintenance of pluripotency in hES cells; 3) identification in microarray-based experiments as being correlated with the stem cell state; 4) expression known to be characteristic of specific differentiation lineages in the post implantation embryo and mature tissues. The format of the TaqMan® Array allows scientists to run 1–4 replicates in parallel.

NANOG, POU5F1 (OCT4) and SOX2 represent gene products that are functionally associated with maintenance of the undifferentiated embryonic stem cell state as studied in mouse ES (mES) cells²⁻⁷. The human array also includes developmentally regulated transcripts used to identify hES such as TDGF1, DNMT3B, GABRB3 and GDF3. The latter markers are useful in identification of pluripotent stem cells, although their role in maintaining the undifferentiated state is less clear. Together with NANOG and POU5F1: TDGF1, DNMT3B, GABRB3 and GDF3 constitute a set of six markers to define undifferentiated hES cells.

Pluripotent stem cells can give rise to differentiated cells and tissues for all three embryonic germ layers, and 50 genes are included in these arrays to mark differentiation. For example, AFP and NEUROD1 have been observed to be upregulated

upon differentiation into extraembryonic endoderm and neuroectoderm; CDX2, GCM1, KRT1 and EOMES are markers for trophoblast; MYF5, ACTC, HBB, COL1A1, COL2A1 and DDX4 are examples of mesodermal markers for muscle, cardiac muscle, blood, bone, cartilage and germ cells, respectively¹.

The Mouse Stem Cell Pluripotency Array contains assays for mouse genes that are orthologous to the genes selected for the human panel. It should be noted there are fundamental differences between human and mouse, which may be reflected in their stem cell properties.

Group	Genes	Human Gene Symbols
Expression in undifferentiated cells	6	NANOG, POU5F1, TDGF1, DNMT3B, GABRB3 and GDF3
Maintenance of pluripotency	3	NANOG, POU5F1 and SOX2
Correlation to stemness	33	BRIX, CD9, COMMD3, CRABP2, EBAF, FGF4, FGF5, FOXD3, GAL, GBX2, GRB7, IFITM1, IFITM2, IL6ST, IMP2, KIT, LEFTB, LIFR, LIN28, NODAL, NOG, NR5A2, NR6A1, PODXL, PTEN, REST, SEMA3A, SFRP2, TERT, TFCP2L1, UTF1, Xist and ZFP42
Differentiation markers	50	ACTC, AFP, CD34, CDH5, CDX2, CGB, COL1A1, COL2A1, DDX4, DES, EOMES, FLT1, FN1, FOXA2, GATA4, GATA6, GCG, GCM1, GFAP, HBB, HBZ, HLXB9, IAPP, INS, IPF1, ISL1, KRT1, LAMA1, LAMB1, LAMC1, MYF5, MYOD1, NES, NEUROD1, NPPA, OLIG-2, PAX4, PAX6, PECAM1, PTF1A, RUNX2, SERPINA1, SOX17, SST, SYCP3, SYP, T, TAT, TH and WT1
Controls	6	ACTB, RAF1, CTNNB1, GAPD, EEF1A1,18S

References:

1. ISCI et al. *Nature Biotechnology*, online publication 17Jun2007
2. Nichols, J. et al. *Cell* (1998) 95, 379–391
3. Matin, M.M. et al. *Stem Cells* (2004) 22, 659–668
4. Scholer, H.R. et al. *EMBO J* (1989) 8, 2551–2557
5. Mitsui, K. et al. *Cell* (2003) 113, 631–642
6. Chambers, I. et al. *Cell* (2003) 113, 643–655
7. Avilion, A.A. et al. *Genes Dev* (2003) 17, 126–140

Gene Signature Array Name	# of Targets/Controls	Format	Pack Size	Part Number
Human Stem Cell Pluripotency Array	90/6	Format 96a	4 arrays/pack*	4385344
Mouse Stem Cell Pluripotency Array	90/6	Format 96a	4 arrays/pack*	4385363

*Each TaqMan Array is suitable to run 1–4 replicates in parallel.

Human Stem Cell Pluripotency Array

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Port
A	ACTB	ACTC1	AFP	BXDC2	CD34	CD9	CDH5	CDX2	CGB	COL1A1	18S	COL2A1	COMMD3	CRABP2	CTNNB1	DDX4	DES	DNMT3B	LEFTY2	EEF1A1	EOMES	FGF4	FGF5	FLT1	1
B	FN1	FOXA2	FOXD3	GABRB3	GAL	GAPDH	GATA4	GATA6	GBX2	GCG	GCM1	GDF3	GFAP	GRB7	HBB	HBZ	HLXB9	IAPP	IFITM1	IFITM2	IL6ST	IGF2BP2	INS	IPF1	
C	ISL1	KIT	KRT1	LAMA1	LAMB1	LAMC1	LEFTY1	LIFR	LIN28	MYF5	MYOD1	NANOG	NES	NEUROD1	NODAL	NOG	NPPA	NR5A2	NR6A1	OLIG2	PAX4	PAX6	PECAM1	PODXL	2
D	POU5F1	PTEN	PTF1A	RAF1	REST	RUNX2	SEMA3A	SERPINA1	SFRP2	SOX17	SOX2	SST	SYCP3	SYP	T	TAT	TGDF1	TERT	TFCP2L1	TH	UTF1	WT1	XIST	ZFP42	
E	ACTB	ACTC1	AFP	BXDC2	CD34	CD9	CDH5	CDX2	CGB	COL1A1	18S	COL2A1	COMMD3	CRABP2	CTNNB1	DDX4	DES	DNMT3B	LEFTY2	EEF1A1	EOMES	FGF4	FGF5	FLT1	3
F	FN1	FOXA2	FOXD3	GABRB3	GAL	GAPDH	GATA4	GATA6	GBX2	GCG	GCM1	GDF3	GFAP	GRB7	HBB	HBZ	HLXB9	IAPP	IFITM1	IFITM2	IL6ST	IGF2BP2	INS	IPF1	
G	ISL1	KIT	KRT1	LAMA1	LAMB1	LAMC1	LEFTY1	LIFR	LIN28	MYF5	MYOD1	NANOG	NES	NEUROD1	NODAL	NOG	NPPA	NR5A2	NR6A1	OLIG2	PAX4	PAX6	PECAM1	PODXL	4
H	POU5F1	PTEN	PTF1A	RAF1	REST	RUNX2	SEMA3A	SERPINA1	SFRP2	SOX17	SOX2	SST	SYCP3	SYP	T	TAT	TGDF1	TERT	TFCP2L1	TH	UTF1	WT1	XIST	ZFP42	
I	ACTB	ACTC1	AFP	BXDC2	CD34	CD9	CDH5	CDX2	CGB	COL1A1	18S	COL2A1	COMMD3	CRABP2	CTNNB1	DDX4	DES	DNMT3B	LEFTY2	EEF1A1	EOMES	FGF4	FGF5	FLT1	5
J	FN1	FOXA2	FOXD3	GABRB3	GAL	GAPDH	GATA4	GATA6	GBX2	GCG	GCM1	GDF3	GFAP	GRB7	HBB	HBZ	HLXB9	IAPP	IFITM1	IFITM2	IL6ST	IGF2BP2	INS	IPF1	
K	ISL1	KIT	KRT1	LAMA1	LAMB1	LAMC1	LEFTY1	LIFR	LIN28	MYF5	MYOD1	NANOG	NES	NEUROD1	NODAL	NOG	NPPA	NR5A2	NR6A1	OLIG2	PAX4	PAX6	PECAM1	PODXL	6
L	POU5F1	PTEN	PTF1A	RAF1	REST	RUNX2	SEMA3A	SERPINA1	SFRP2	SOX17	SOX2	SST	SYCP3	SYP	T	TAT	TGDF1	TERT	TFCP2L1	TH	UTF1	WT1	XIST	ZFP42	
M	ACTB	ACTC1	AFP	BXDC2	CD34	CD9	CDH5	CDX2	CGB	COL1A1	18S	COL2A1	COMMD3	CRABP2	CTNNB1	DDX4	DES	DNMT3B	LEFTY2	EEF1A1	EOMES	FGF4	FGF5	FLT1	7
N	FN1	FOXA2	FOXD3	GABRB3	GAL	GAPDH	GATA4	GATA6	GBX2	GCG	GCM1	GDF3	GFAP	GRB7	HBB	HBZ	HLXB9	IAPP	IFITM1	IFITM2	IL6ST	IGF2BP2	INS	IPF1	
O	ISL1	KIT	KRT1	LAMA1	LAMB1	LAMC1	LEFTY1	LIFR	LIN28	MYF5	MYOD1	NANOG	NES	NEUROD1	NODAL	NOG	NPPA	NR5A2	NR6A1	OLIG2	PAX4	PAX6	PECAM1	PODXL	8
P	POU5F1	PTEN	PTF1A	RAF1	REST	RUNX2	SEMA3A	SERPINA1	SFRP2	SOX17	SOX2	SST	SYCP3	SYP	T	TAT	TGDF1	TERT	TFCP2L1	TH	UTF1	WT1	XIST	ZFP42	

Mouse Stem Cell Pluripotency Array

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Port
A	Act1	Alp	Bxdc2	Cd34	Cd9	Cdh5	Cdx2	Col1a1	Col2a1	Commd3	18S	Crabp2	Ddx4	Des	Dnmt3b	Lefty1	Eomes	Fgf4	Fgf5	Flt1	Fn1	Foxa2	Foxd3	Gabrb3	1
B	Gal	Gata4	Gata6	Gbx2	Gcg	Gcm1	Gdf3	Gfap	Grb7	Hbb-b2	Hba-x	Hlx9	Iapp	Ifitm1	Ifitm2	Il6st	Igf1p2	Ins2	Pdx1	Isl1	Kit	Krt1	Lama1	Lamb1-1	
C	Lamc1	Lefty2	Lifr	Linn28	Myf5	Myod1	Nanog	Nes	Neurod1	Nodal	Nog	Nppa	Nr5a2	Nr6a1	Olig2	Pax4	Pax6	Pecam1	Podxl	Pou5f1	Pten	Ptf1a	Rest	Runx2	2
D	Sema3a	Serpina1a	Sfrp2	Sox17	Sox2	Sst	Sycp3	Syp	T	Tat	Tdyl1	Tert	Tcfcp2l1	Th	Utf1	Wt1	Xist	Zfp42	Eras	Actb	Raf1	Ctnnb1	Gapdh	Eef1a1	
E	Act1	Alp	Bxdc2	Cd34	Cd9	Cdh5	Cdx2	Col1a1	Col2a1	Commd3	18S	Crabp2	Ddx4	Des	Dnmt3b	Lefty1	Eomes	Fgf4	Fgf5	Flt1	Fn1	Foxa2	Foxd3	Gabrb3	3
F	Gal	Gata4	Gata6	Gbx2	Gcg	Gcm1	Gdf3	Gfap	Grb7	Hbb-b2	Hba-x	Hlx9	Iapp	Ifitm1	Ifitm2	Il6st	Igf1p2	Ins2	Pdx1	Isl1	Kit	Krt1	Lama1	Lamb1-1	
G	Lamc1	Lefty2	Lifr	Linn28	Myf5	Myod1	Nanog	Nes	Neurod1	Nodal	Nog	Nppa	Nr5a2	Nr6a1	Olig2	Pax4	Pax6	Pecam1	Podxl	Pou5f1	Pten	Ptf1a	Rest	Runx2	4
H	Sema3a	Serpina1a	Sfrp2	Sox17	Sox2	Sst	Sycp3	Syp	T	Tat	Tdyl1	Tert	Tcfcp2l1	Th	Utf1	Wt1	Xist	Zfp42	Eras	Actb	Raf1	Ctnnb1	Gapdh	Eef1a1	
I	Act1	Alp	Bxdc2	Cd34	Cd9	Cdh5	Cdx2	Col1a1	Col2a1	Commd3	18S	Crabp2	Ddx4	Des	Dnmt3b	Lefty1	Eomes	Fgf4	Fgf5	Flt1	Fn1	Foxa2	Foxd3	Gabrb3	5
J	Gal	Gata4	Gata6	Gbx2	Gcg	Gcm1	Gdf3	Gfap	Grb7	Hbb-b2	Hba-x	Hlx9	Iapp	Ifitm1	Ifitm2	Il6st	Igf1p2	Ins2	Pdx1	Isl1	Kit	Krt1	Lama1	Lamb1-1	
K	Lamc1	Lefty2	Lifr	Linn28	Myf5	Myod1	Nanog	Nes	Neurod1	Nodal	Nog	Nppa	Nr5a2	Nr6a1	Olig2	Pax4	Pax6	Pecam1	Podxl	Pou5f1	Pten	Ptf1a	Rest	Runx2	6
L	Sema3a	Serpina1a	Sfrp2	Sox17	Sox2	Sst	Sycp3	Syp	T	Tat	Tdyl1	Tert	Tcfcp2l1	Th	Utf1	Wt1	Xist	Zfp42	Eras	Actb	Raf1	Ctnnb1	Gapdh	Eef1a1	
M	Act1	Alp	Bxdc2	Cd34	Cd9	Cdh5	Cdx2	Col1a1	Col2a1	Commd3	18S	Crabp2	Ddx4	Des	Dnmt3b	Lefty1	Eomes	Fgf4	Fgf5	Flt1	Fn1	Foxa2	Foxd3	Gabrb3	7
N	Gal	Gata4	Gata6	Gbx2	Gcg	Gcm1	Gdf3	Gfap	Grb7	Hbb-b2	Hba-x	Hlx9	Iapp	Ifitm1	Ifitm2	Il6st	Igf1p2	Ins2	Pdx1	Isl1	Kit	Krt1	Lama1	Lamb1-1	
O	Lamc1	Lefty2	Lifr	Linn28	Myf5	Myod1	Nanog	Nes	Neurod1	Nodal	Nog	Nppa	Nr5a2	Nr6a1	Olig2	Pax4	Pax6	Pecam1	Podxl	Pou5f1	Pten	Ptf1a	Rest	Runx2	8
P	Sema3a	Serpina1a	Sfrp2	Sox17	Sox2	Sst	Sycp3	Syp	T	Tat	Tdyl1	Tert	Tcfcp2l1	Th	Utf1	Wt1	Xist	Zfp42	Eras	Actb	Raf1	Ctnnb1	Gapdh	Eef1a1	

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