

Supplemental Data Legends

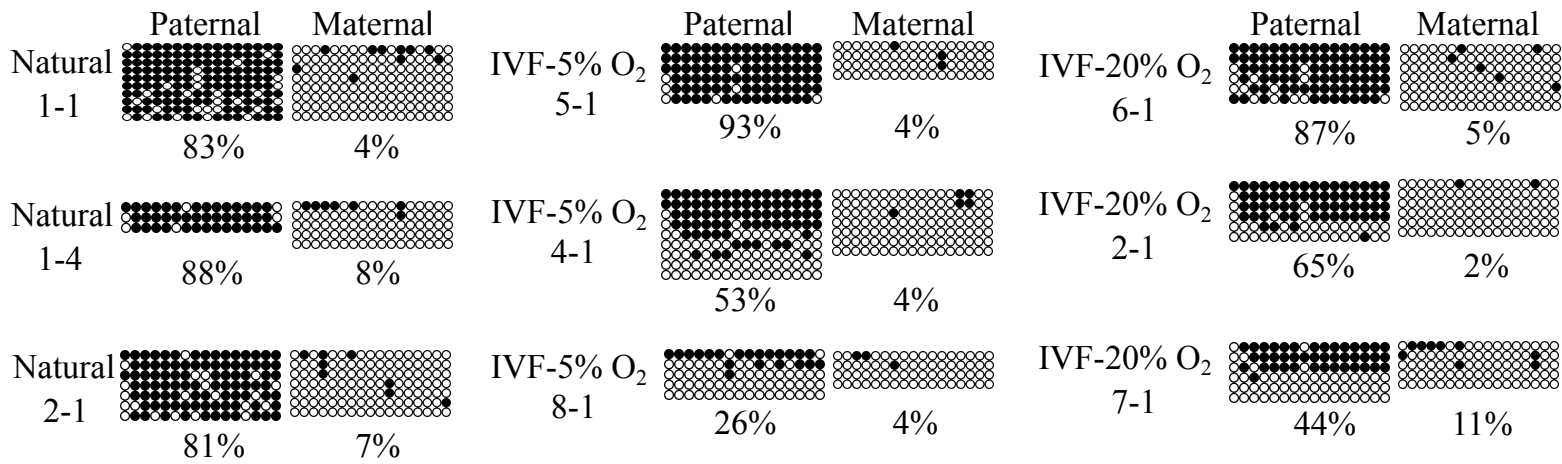
Supplemental Figure S1. Allele-specific DNA methylation analysis of the *H19* (A) and *Peg3* (B) ICRs in placental tissues from naturally conceived and IVF-derived embryos that exhibited both normal and abnormal methylation profiles in the bisulfite pyrosequencing analysis. Each line of circles corresponds to a single strand of DNA, and each circle represents a single CpG dinucleotide (black, methylated; white, unmethylated). The percent of methylated CpG sites is indicated below each set of DNA strands. Sample ID numbers are from Supplemental tables 2 and 3.

Supplemental Table S2. DNA methylation data collected for each embryonic and placental tissue that was analyzed in this study. In total, four maternally methylated (*Snrpn*, *Peg3*, *Kcnq1ot1* and *Peg1*) and two paternally methylated (*H19* and *IG*) ICRs were assessed using bisulfite pyrosequencing. In addition, global methylation was measured using LUMA to evaluate methylation at repetitive elements throughout the genome. The sample number (e.g., 1-1) indicates an individual litter with the first number, and an individual embryo from that litter with the second number. The numbers in the table are the average methylation percentages for either an ICR using pyrosequencing or from LUMA. *H19*, *H19/Igf2* ICR. *IG*, *Dlk1/Gtl2* ICR.

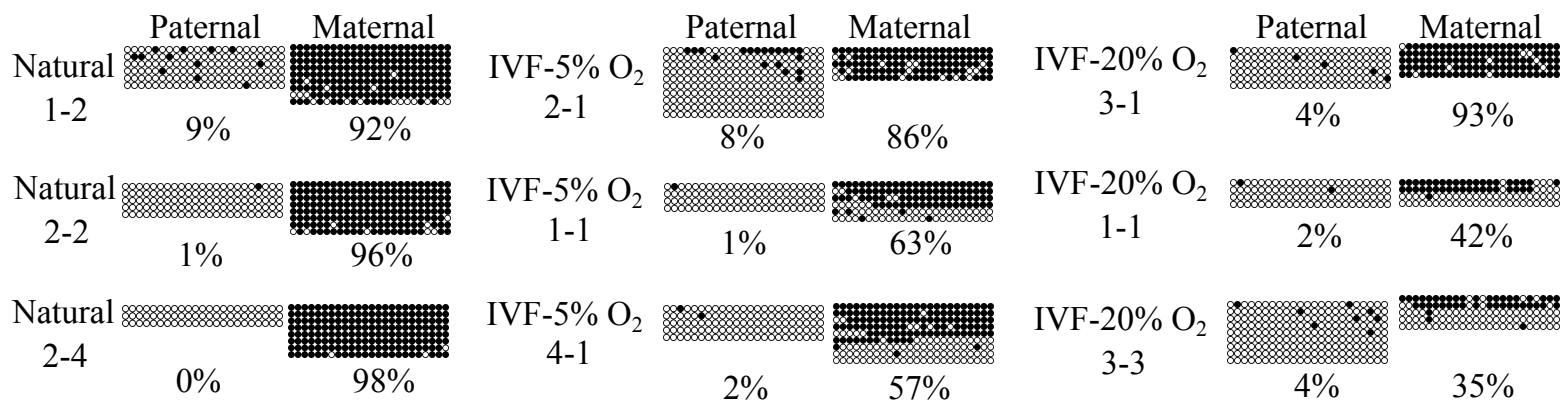
Supplemental Table S3. Allele-specific expression of multiple imprinted genes for each embryonic and placental tissue that was analyzed in this study. In total, two maternally expressed (*H19* and *Cdkn1c*) and four paternally expressed (*Igf2*, *Snrpn*, *Peg3* and *Kcnq1ot1*) imprinted genes were assessed using allele-specific assays that discriminate expression from

different parental alleles. The same sample numbers from Table S2 are used to identify the different tissues. The numbers in the table represent the percent contribution to the total amount of expression from the normally repressed allele. Samples that exhibit 10% or more expression from the repressed allele are considered to be biallelic.

A. *H19* ICR-Placenta



B. *Peg3* ICR-Placenta



Supplemental Table S1. Bisulfite pyrosequencing primers

Locus	Primer	Sequence	CpG Sites	Reference
<i>H19/Igf2</i> ICR	F	GGTAGGATATATGTATTTTTTAGGTTG	6	[9]
	R-Bio	CTCATAAAACCATAACTATAAAATCAT		
	S	TGTAAAGACCAGGGTTGC		
<i>Snrpn</i> ICR	F	GGTAGTTGTTTTTGGTAGGATAT	6	[9]
	R-Bio	ACTAAAATCCACAAACCAACTAACCT		
	S	GTGCAGCCATTGCCTGGG		
<i>Peg3</i> ICR	F	GGTTTTAAGGTAATTGATAAGG	6	[9]
	R-bio	CCCTACACCTAAATAACATCCC		
	S	AATTGATAAGGTTGTAGATT		
<i>Kcnq1ot1</i> ICR	F	AGGTTTTGGTAGGTGGTTT	6	This study
	R-bio	CCTAACTAAACAAAATACCCATCATA		
	S	GTTAGGAGGAATAGTTGTTTTA		
<i>Dlk1/Gtl2</i> ICR	F	GTGGTTTGTATGGGTAAGTTT	5	[22]
	R-bio	CCCTCCCTCACTCCAAAATTA		
	S	GTTATGGATTGGTGTTAAG		
<i>Peg1</i> ICR	F	GGTTGGGTTGGATATTGTAAAG	5	This study
	R-bio	TTCCCTAAAATTCTAACAACCTAAACA		
	S	ATTGTAAAGTTAAAGTTGTAGTAAA		

F, forward primer

R-bio, reverse biotinylated primer

S, sequencing primer

SUPPLEMENTAL REFERENCES (Numbered as presented in manuscript text)

9. Susiarjo M, Sasson I, Mesaros C, Bartolomei MS. Bisphenol A exposure disrupts genomic imprinting in the mouse. *Plos Genet* 2013; 9:doi: 10.1371/journal.pgen.1003401.
22. Messerschmidt DM, de Vries W, Ito M, Solter D, Ferguson-Smith A, Knowles BB. Trim28 is required for epigenetic stability during mouse oocyte to embryo transition. *Science* 2012; 335:1499-1502.

Supplemental Table S2. DNA methylation for embryonic and placental tissues

Type	Sample	Embryonic tissue							Placental tissue						
		H19	Snrpn	Peg3	Kcnq1ot1	IG	Peg	LUMA	H19	Snrpn	Peg3	Kcnq1ot1	IG	Peg1	LUMA
Natural	1-1	60	47	52	51	51	57	75	47	40	45	48	59	39	47
Natural	1-2	55	48	51	50	50	52	73	46	41	47	49	46	45	43
Natural	1-3	57	48	51	46	50	58	72	53	42	49	48	48	39	62
Natural	1-4	55	46	51	49	51	52	79	50	41	48	44	52	36	60
Natural	1-5	60	56	55	52	51	60	83	52	41	50	49	60	49	51
Natural	2-1	52	54	62	51	53	52	73	48	42	51	43	63	38	62
Natural	2-2	50	46	59	41	57	50	68	58	44	46	46	56	52	53
Natural	2-3	59	45	51	45	53	53	77	50	51	57	45	53	49	52
Natural	2-4	63	62	48	47	54	50	74	52	54	52	48	59	40	45
Natural	2-5	56	44	51	46	52	51	70	50	45	57	57	55	55	46
Natural	3-1	51	46	46	43	40	48	75	53	49	46	45	55	43	65
Natural	3-2	54	46	49	47	56	49	79	52	43	56	40	51	46	51
Natural	3-3	56	44	49	48	46	53	81	49	47	46	48	63	38	59
Natural	3-4	55	47	53	49	54	50	75	51	38	45	43	66	39	51
Natural	3-5	54	44	53	48	53	48	72	53	37	49	45	53	37	49
Natural	3-6	57	44	53	46	49	48	73	47	39	46	44	62	41	50
IVF-5%	1-1	56	49	51	51	45	54	79	34	34	25	44	52	24	57
IVF-5%	2-1	62	45	47	50	48	55	78	45	42	43	49	56	33	62
IVF-5%	2-2	56	48	47	50	50	54	70	51	41	44	49	48	39	48
IVF-5%	3-1	51	47	51	43	54	45	80	45	45	46	46	51	44	59
IVF-5%	4-1	60	47	52	53	49	59	71	25	38	28	47	45	35	43
IVF-5%	5-1	58	54	52	51	50	61	81	48	43	48	49	45	36	50
IVF-5%	6-1	58	48	54	46	57	42	73	39	43	44	46	49	37	41
IVF-5%	6-2	59	52	56	48	52	58	73	44	39	44	42	46	47	55
IVF-5%	7-1	59	63	49	48	54	51	70	51	47	53	49	47	52	59
IVF-5%	8-1	57	51	51	51	54	54	81	15	45	48	59	53	52	57
IVF-5%	8-2	54	48	46	46	44	61	80	49	48	47	47	44	44	45
IVF-5%	9-1	52	48	48	47	49	52	78	44	41	37	47	42	36	61
IVF-5%	10-1	56	44	49	45	51	51	75	56	45	52	48	53	47	59
IVF-5%	10-2	53	44	48	48	46	58	83	47	39	43	47	56	40	66
IVF-5%	10-3	56	46	47	48	48	55	81	43	40	35	44	58	31	57
IVF-5%	11-1	54	44	53	46	46	47	75	44	40	31	42	54	37	49
IVF-5%	12-1	55	46	53	47	49	49	75	48	39	46	43	45	38	55
IVF-5%	12-2	56	45	52	47	48	52	75	46	39	36	39	47	37	49
IVF-20%	1-1	54	51	49	49	41	41	69	34	41	31	40	46	35	56
IVF-20%	2-1	57	43	53	51	45	54	70	25	41	32	41	49	36	58
IVF-20%	3-1	58	39	50	52	48	42	78	51	41	49	40	39	25	60
IVF-20%	3-2	54	46	52	52	44	55	87	38	27	31	41	38	35	55
IVF-20%	3-3	56	46	51	55	36	52	83	36	28	17	33	37	25	55
IVF-20%	4-1	54	45	48	45	43	46	82	38	34	33	46	58	40	63
IVF-20%	5-1	53	45	47	48	44	46	82	47	41	30	45	49	33	63
IVF-20%	6-1	51	44	47	46	44	46	77	51	41	47	45	48	39	64
IVF-20%	6-2	54	44	48	49	46	47	80	51	40	45	41	52	38	54
IVF-20%	6-3	53	45	49	47	49	49	81	48	43	41	44	58	44	50
IVF-20%	7-1	57	46	50	47	50	46	78	27	31	27	43	44	27	65
IVF-20%	7-2	55	47	51	47	50	57	79	40	44	41	42	56	43	57
IVF-20%	7-3	53	46	52	50	49	50	76	47	44	37	47	61	30	61
IVF-20%	7-4	54	47	56	46	45	52	60	53	46	50	45	53	53	59
IVF-20%	8-1	56	44	49	47	51	48	76	45	38	39	41	47	40	51
IVF-20%	8-2	54	44	54	47	42	51	71	49	41	47	47	52	41	50

Supplemental Table S3. Allele-specific expression for embryonic and placental tissues

Type	Sample	Embryonic tissue						Placental tissue					
		H19	Igf2	Snrpn	Peg3	Kcnq1ot1	Cdkn1c	H19	Igf2	Snrpn	Peg3	Kcnq1ot1	Cdkn1c
Natural	1-1	4	1	0	6	1	0	4	0	0	25	2	2
Natural	1-2	3	2	0	5	3	0	3	2	0	2	3	3
Natural	1-3	4	0	0	2	2	0	4	1	0	7	1	2
Natural	1-4	3	3	0	4	0	1	3	0	0	3	4	4
Natural	1-5	1	0	0	2	2	1	1	0	0	7	2	1
Natural	2-1	2	0	0	7	2	1	6	0	0	12	6	5
Natural	2-2	4	0	0	8	0	1	7	0	8	7	13	4
Natural	2-3	2	0	0	9	1	0	7	0	0	10	7	2
Natural	2-4	2	0	0	8	2	1	4	0	0	8	2	3
Natural	2-5	5	0	0	9	4	1	4	0	0	8	3	3
Natural	3-1	1	0	0	3	0	2	8	0	9	4	2	1
Natural	3-2	0	0	0	6	0	0	8	0	0	6	4	2
Natural	3-3	0	0	0	6	2	1	4	0	0	5	4	1
Natural	3-4	0	0	0	2	0	0	3	0	0	0	0	0
Natural	3-5	1	0	0	2	1	0	1	0	0	9	0	2
Natural	3-6	3	0	0	3	2	0	6	0	0	7	2	2
IVF-5%	1-1	15	1	0	12	1	1	36	1	0	39	2	1
IVF-5%	2-1	16	0	0	17	3	1	11	1	0	50	5	1
IVF-5%	2-2	1	1	0	13	0	0	7	1	0	17	6	0
IVF-5%	3-1	4	2	0	2	1	0	36	2	22	56	24	0
IVF-5%	4-1	3	0	0	7	2	1	43	2	0	48	3	1
IVF-5%	5-1	2	0	0	18	2	0	7	0	0	18	2	0
IVF-5%	6-1	3	0	0	2	2	1	22	0	5	16	0	3
IVF-5%	6-2	2	0	0	7	1	2	32	2	13	25	0	4
IVF-5%	7-1	7	1	0	8	0	4	50	0	0	27	3	43
IVF-5%	8-1	6	0	0	9	2	0	47	4	24	52	7	7
IVF-5%	8-2	2	1	0	7	0	1	4	0	0	7	2	3
IVF-5%	9-1	3	0	0	12	0	1	28	0	0	53	9	1
IVF-5%	10-1	1	0	0	3	0	0	37	0	15	34	8	20
IVF-5%	10-2	2	0	0	8	1	0	21	0	0	28	2	3
IVF-5%	10-3	6	0	0	36	0	1	34	0	0	44	5	8
IVF-5%	11-1	1	0	29	0	2	0	19	0	0	63	3	5
IVF-5%	12-1	1	0	35	3	2	0	12	0	10	39	3	1
IVF-5%	12-2	1	0	0	5	1	0	16	0	0	54	1	2
IVF-20%	1-1	0	0	0	18	0	3	36	0	0	57	11	6
IVF-20%	2-1	4	0	0	3	0	2	38	0	0	63	3	3
IVF-20%	3-1	0	1	0	5	0	1	24	1	0	44	3	3
IVF-20%	3-2	1	0	0	5	0	1	29	0	18	60	7	3
IVF-20%	3-3	12	1	0	18	1	2	33	0	11	62	29	5
IVF-20%	4-1	1	0	0	8	3	1	42	0	20	57	6	3
IVF-20%	5-1	1	1	0	8	4	0	26	0	9	56	3	3
IVF-20%	6-1	0	3	0	9	3	1	18	0	0	26	3	2
IVF-20%	6-2	1	2	0	0	2	1	15	1	0	40	16	3
IVF-20%	6-3	3	1	0	7	2	1	29	1	15	59	2	6
IVF-20%	7-1	1	0	11	1	0	1	44	0	23	55	24	8
IVF-20%	7-2	1	0	14	0	0	1	44	4	12	43	36	22
IVF-20%	7-3	0	0	0	3	0	0	26	0	0	35	4	5
IVF-20%	7-4	1	0	0	4	0	0	38	0	19	70	0	25
IVF-20%	8-1	7	0	0	20	1	0	23	0	0	44	0	2
IVF-20%	8-2	15	0	22	3	1	0	17	0	9	7	1	3