

Tripolar mitosis and partitioning of the genome arrests human preimplantation development *in vitro*

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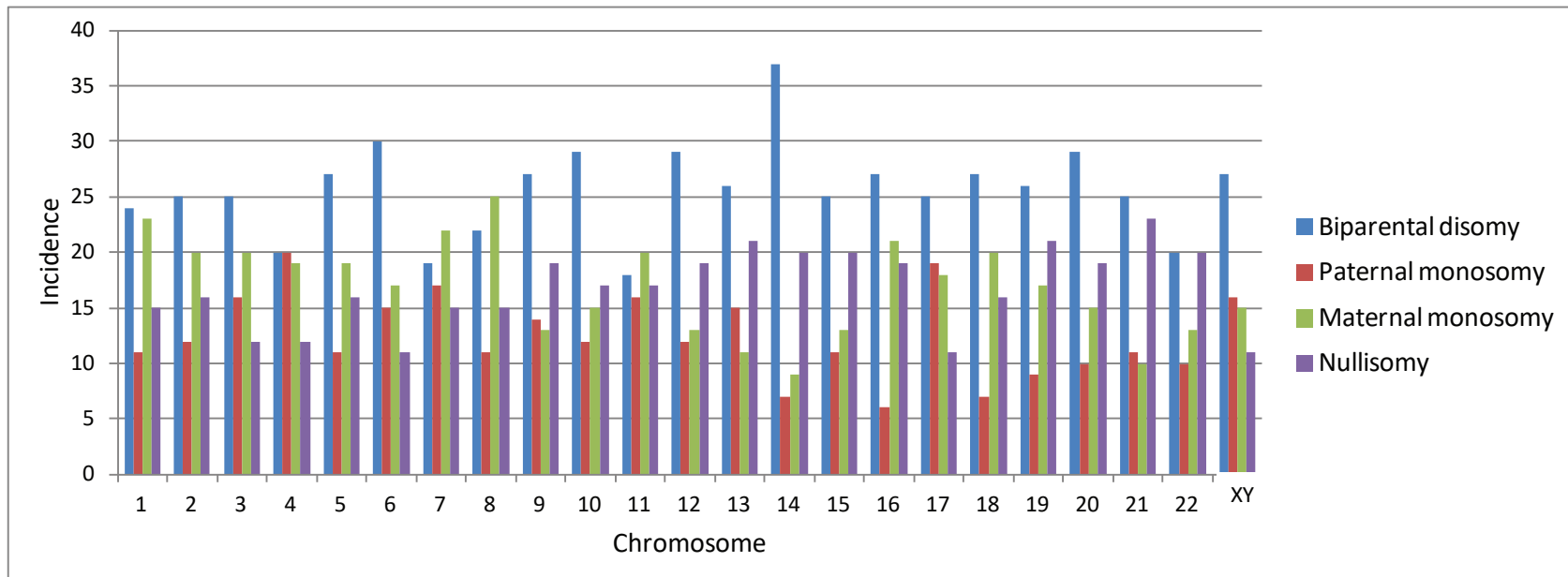
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Figure S1: Distribution of chromosomes identified in single cells disaggregated from arrested embryos or excluded from embryos at the blastocyst stage

(a) The incidence of biparental disomy, paternal and maternal monosomy and nullisomy in single cells for each of the autosomes and the sex chromosomes (n=73). (b) The total number of parental chromosomes identified per single cell. The actual copy number of chromosomes may be greater if more than one copy is present in a particular cell. Also, chromosomes with structural abnormalities (partial gain or loss) are included.

(a)



(b)

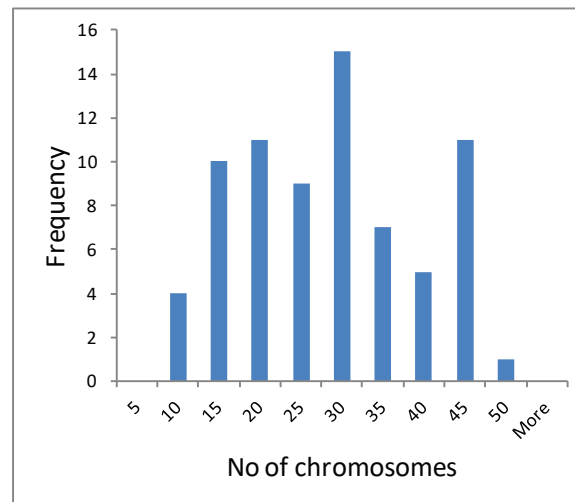
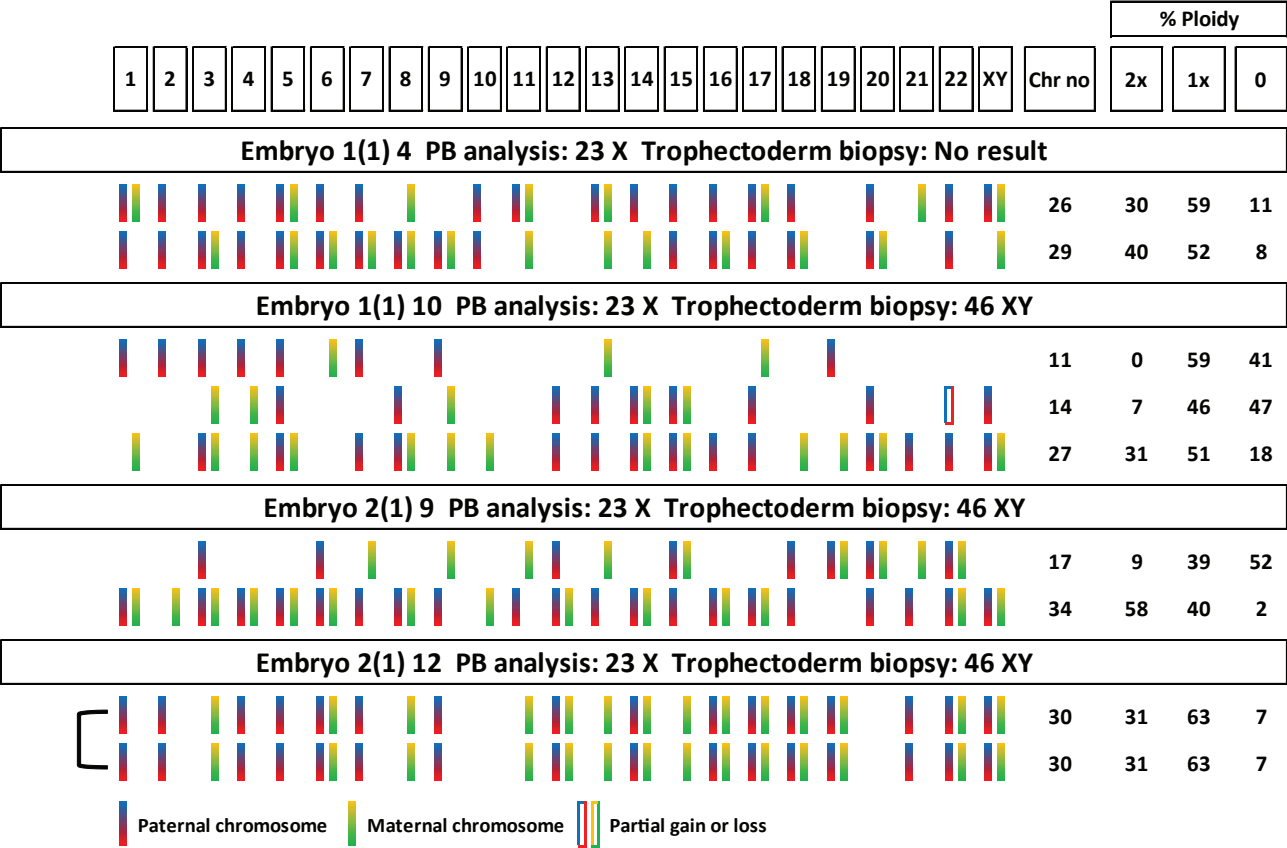


Figure S2: Karyomap profiles of single cells excluded from the embryo at the blastocyst stage
 Complete karyomap profiles of nine single cells excluded from four poor quality blastocyst stage embryos on day 6 post ICSI. As with the cells from arrested embryos, these excluded cells all had significantly reduced total numbers of chromosomes and, all were genomically imbalanced and had one or more nullisomies and genome loss. Within the groups of two or three excluded cells from all four embryos, there are similarities or complementarity in the profiles indicating possible late multipolar divisions as their origin.



Supplementary Table 1: Comparison of maternal chromosome complement predicted by meiomapping of polar bodies and karyomapping of blastocyst stage and arrested embryos (excluding analysis of meiotic structural abnormalities)

Patient (Cycle)	Embryo #	Day post ICSI	Meiomap	Karyomap		Type of embryo sample
				Paternal	Maternal	
Blastocysts n=26						
1 (1)	2	7	Euploid	Euploid	-19	Emb
	4	5	Euploid	No result		Biopsy
	5	5	Euploid	Euploid		Biopsy
	7	5	+16	Euploid	+16	Biopsy
	8	5	+14 -22	Euploid	+14 -22	Biopsy
	10	5	Euploid	Euploid		Biopsy
1 (2)	1	6	Euploid	Euploid		Biopsy
	4	5	Euploid	Euploid		Biopsy
	8	6	-8, 16	Euploid	-8, 16	Biopsy
	11	5	Euploid	Euploid		Biopsy
	14	5	Euploid	Euploid		Biopsy
	15	6	-16	Euploid	-16	Emb x2
2 (1)	16	5	Euploid	Euploid		Biopsy
	2	5	Euploid	Euploid		Biopsy
	3	5	Euploid	Euploid		Biopsy
	4	5	Euploid	Euploid		Biopsy
	9	5	Euploid	Euploid		Biopsy
	10	5	Euploid	Euploid		Biopsy
3 (1)	12	5	Euploid	Euploid		Biopsy
	1	5	+2, 7, 10, 14 -12, 21	Euploid	+2, 7, 10, 14 -12, 21	Emb
	4	5	-3, 22	Euploid	-3, 22	Biopsy
	6	5	-9, 15	Euploid	-9, 15	Biopsy
	9	6	+16	Euploid	+16	Biopsy
	17	5	+13	Euploid	+13	Biopsy
	18	5	-10, 11, 18	Euploid	-10, 11, 18	Biopsy
	19	5	+13, 18 -2, 8	Euploid	+13, 18 -2, 8	Biopsy

Supplementary Table 1 (continued): Comparison of maternal chromosome complement predicted by meiomapping of polar bodies and karyomapping of blastocyst stage and arrested embryos (excluding analysis of meiotic structural abnormalities)

Patient (Cycle)	Embryo #	Day post ICSI	Meiomap	Karyomap		Type of embryo sample
				Paternal	Maternal	
Arrested embryos n=25						
1 (1)	3	6	Euploid	Euploid	Euploid	Single cells
	6	7	-2	Euploid	-2	Whole
			-1, 5, 8, 9, 13, 16, +X	Euploid	-1, 5, 8, 9, 13, 16, +X	Single cells
	9	6				
	11	7	Euploid	Euploid		Whole
	12	6	+4	Euploid	+4	Single cells
1 (2)	2	6	Euploid	Euploid	-1, 2, 4, 6-8, 10, 15, 16, 18-20	Single cells and Partial
	3	6	Euploid	Euploid		Partial
	5	6	Euploid	Euploid		Partial
	6	6	Euploid	Euploid		Whole
	7	6	Euploid	Euploid		Whole
	9	6	Euploid	Euploid		Partial
	10	6	Euploid	Euploid		Partial
	13	6	Euploid	Euploid		Partial
2 (1)	6	6	-3, 10 +16	Euploid	-3, 10 +16	Whole
	7	6	Euploid	Euploid		Whole
	8	6	Euploid	Euploid		Whole
	11	5	Euploid	Euploid		Single cells
	13	5	Euploid	Euploid		Single cells
3 (1)	5	6	-3, 8, 20 +22	Euploid	-3, 8, 20 +22	Single cells
	8	6	+16, 19	Euploid	+16, 19	Whole
	10	6	-1, 16, 20	Euploid	-1, 16, 20	Whole
	12	6	-4 +11, 15, 21, 22		-4 +11, 15, 21, 22	Single cells
	13	6	-1, 21 +22	Euploid	-1, 21 +22	Whole
	15	6	Euploid	Euploid		Whole
	16	6	-2, 11, 16, 19 +18, 22	Euploid	-2, 11, 16, 19 +18, 22	Single cells

Supplementary Table 2: Amplification efficiency and genome loss in single cells from arrested embryos and excluded at the blastocyst stage

Patient (Cycle)	Embryo #	Day	Single cells sampled	No amp/DNA	Amp	No. with ≥ 1 nullisomies	No. with genome loss
Disaggregated arrested embryos							
1 (1)	3	6	7	4	3	3	7
	9	6	12	3	9	9	12
	12	6	9	5	4	4	9
1 (2)	2	6	3	0	3	3	3
	3	6	3	2	1	1	3
	5	6	3	1	2	2	3
	9	6	3	2	1	1	3
	10	6	3	0	3	3	3
	13	6	3	2	1	0	2
	13	6	3	2	1	0	2
2 (1)	11	5	16	2	14	14	16
	13	5	9	2	7	7	9
3 (1)	5	6	4	0	4	0	0
	12	6	7	1	6	3	4
	16	6	6	0	6	5	5
Total (%)	14		88	24 (27)	64	55 (85)	79 (90)
Excluded single cells at the blastocyst stage							
1 (1)	4	5	3	1	2	2	3
	8	5	1	1	0	-	1
	10	5	4	1	3	3	4
1 (2)	15	6	1	0	1	1	1
2 (1)	4	5	1	1	0	-	1
	9	5	1	0	1	1	1
	12	5	2	0	2	2	2
Total (%)	7		13	4 (31)	9	9 (100)	13 (100)
Combined total (%)	21		101	28 (28)	74	64 (86)	92 (91)