Table 1 The effects of different post-thawed culture periods on pregnancy and clinical outcomes.

Age	Embryo	IR	CPR	MPR	AR	LBR	EPR
< 35	S	47.7% (3453/7234) $_{A}$	67.7% (2450/3617)$_{A}$	41.5% (1016/2450)$_{A}$	15.1% (371/2450)$^{*}_{C}$	57.1% (2000/3501)$_{A}$	3.9% (95/2450)**
	L	51.1% (2214/4334)$^{**}_{A}$	71.3% (1546/2167)$^{*}_{A}$	44.4% (686/1546)$_{A}$	12.7% (197/1546)$_{C}$	62.5% (1295/2073)$^{**}_{A}$	2.1% (32/1546)
35-39	S	37.3% (1207/3238)$_{B}$	57.4% (930/1619)$_{B}$	30.4% (283/930)$_{B}$	23.9% (222/930)$_{B}$	43.5% (671/1543)$_{B}$	2.4% (22/930)
	L	39.8% (881/2214)$_{B}$	59.6% (660/1107)$_{B}$	34.8% (230/660)$_{B}$	20.8% (137/660)$_{B}$	47.7% (490/1028)$^{*}_{B}$	2.9% (19/660)
> 39	S	17.1% (265/1554)$_{C}$	29.7% (231/777)$_{C}$	16.0% (37/231)$_{C}$	37.7% (87/231)$_{A}$	18.3% (135/738)$_{C}$	1.7% (4/231)
	L	18.7% (204/1090)$_{C}$	31.7% (173/545)$_{C}$	18.5% (32/173)$_{C}$	46.2% (80/173)$_{A}$	16.9% (84/498)$_{C}$	2.9% (5/173)
Total	S	41.0% (4925/12026)	60.1% (3611/6013)	37.0% (1336/3611)	18.8% (680/3611)	48.5% (2806/5782)	3.4% (121/3611)*
	L	43.2% (3299/7638)**	62.3% (2379/3819)*	39.8% (948/2379)*	17.4% (414/2379)	51.9% (1869/3599)**	2.4% (56/2379)

Note: S = short post-thawed culture period (2–3 h) group; L = long post-thawed culture period (18–20 h) group. ** means significant difference at 0.01 level and * means significant difference at 0.05 level of different post-thawed culture period groups in the same age group. Subscript uppercase letters demonstrate the differences of same post-thawed culture period groups in different age groups. Completely different letters indicate a significant difference ($P < 0.05$), and any of the same letters are not significant ($P > 0.05$).

Table 2 The effects of different blastomere growth numbers after long culture of thawed D3 embryos on pregnancy and clinical outcomes

Age	Growth number	IR	CPR	MPR	AR	LBR	EPR
< 35	≤ 2	39.4% (351/890)$^{c}_{A}$	60.4% (269/445)$^{c}_{A}$	31.6% (85/269)$^{c}_{A}$	15.2% (41/269)$^{a}_{B}$	51.8% (216/417)$^{c}_{A}$	3.0% (8/269)$^{a}_{A}$
	One ≤ 2 , another > 2	48.3% (671/1390)$^{b}_{A}$	70.2% (488/695)$^{b}_{A}$	39.1% (191/488)$^{b}_{A}$	11.9% (58/488)$^{a}_{C}$	61.8% (408/660)$^{b}_{A}$	1.2% (6/488)$^{a}_{A}$
	> 2	58.7% (1097/1870)$^{a}_{A}$	77.6% (726/935)$^{a}_{A}$	52.1% (378/726)$^{a}_{A}$	12.1% (88/726)$^{a}_{B}$	68.4% (618/904)$^{a}_{A}$	2.3% (17/726)$^{a}_{A}$
35-39	≤ 2	28.5% (133/466)$^{c}_{B}$	46.4% (108/233)$^{b}_{B}$	24.1% (26/108)$^{b}_{A}$	25.9% (28/108)$^{a}_{B}$	36.8% (77/209)$^{c}_{B}$	2.8% (3/108)$^{a}_{A}$
	One ≤ 2, another > 2	39.0% (272/698)$^{b}_{B}$	59.9% (209/349)$^{a}_{B}$	32.5% (68/209)$^{b}_{A}$	23.9% (50/209)$^{ab}_{B}$	45.6% (151/331)$^{b}_{B}$	3.8% (8/209)$^{a}_{A}$
	> 2	46.3% (433/936)$^{a}_{B}$	65.2% (305/468)$^{a}_{B}$	42.6% (130/305)$^{a}_{A}$	16.1% (49/305)$^{b}_{B}$	54.3% (234/431)$^{a}_{B}$	1.6% (5/305)$^{a}_{A}$
> 39	≤ 2	15.6% (40/256)$^{b}_{C}$	25.8% (33/128)$^{b}_{C}$	24.2% (8/33)$^{a}_{A}$	45.5% (15/33)$^{a}_{A}$	13.3% (16/120)$^{a}_{C}$	6.1% (2/33)$^{a}_{A}$
	One ≤ 2, another > 2	16.6% (57/344)$^{b}_{C}$	29.7% (51/172)$^{ab}_{C}$	11.8% (6/51)$^{a}_{B}$	45.1% (23/51)$^{a}_{A}$	17.2% (26/151)$^{a}_{C}$	3.9% (2/51)$^{a}_{A}$
	> 2	23.6% (92/390)$^{a}_{C}$	38.5% (75/195)$^{a}_{C}$	22.7% (17/75)$^{a}_{B}$	42.7% (32/75)$^{a}_{A}$	21.5% (38/177)$^{a}_{C}$	0.0% (0/75)$^{a}_{A}$
Total	≤ 2	32.5% (524/1612)^{c}	50.9% (410/806)^{c}	29.0% (119/410)^{c}	20.5% (84/410)^{a}	41.4% (309/746)^{c}	3.2% (13/410)^{a}
	One ≤ 2, another > 2	41.1% (1000/2432)^{b}	61.5% (748/1216)^{b}	35.4% (265/748)^{b}	17.5% (131/748)^{ab}	51.2% (585/1142)^{b}	2.1% (16/748)^{a}
	> 2	50.8% (1622/3196)^{a}	69.2% (1106/1598)^{a}	47.5% (525/1106)^{a}	15.3% (169/1106)^{b}	58.9% (890/1512)^{a}	2.0% (22/1106)^{a}

Note: Superscript lowercase letters demonstrate the differences of different blastomere growth number groups in the same age groups, while subscript uppercase letters signify differences of the same blastomere growth number groups in different age groups. Completely different letters indicate a significant difference ($P < 0.05$), and any of the same letters are not significant ($P > 0.05$).

Table 3 Logistic regression analysis of the risk factors affecting the live birth rate

	Wals	*P*-value	OR	OR (95% CI)
Female age	490.27	0.00	0.90	0.89-0.91
Duration of infertility	2.43	0.12	0.99	0.98-1.00
Body-mass index	0.04	0.84	1.00	0.98-1.01
Type of infertility	9.97	0.00	1.17	1.06-1.28
Endometrial preparation	0.39	0.53	1.05	0.90-1.23
D4/D3	18.14	0.00	1.21	1.11-1.32

Note: OR = odds ratio; CI = confidence interval.

Table 4 Neonatal characteristics of live born singletons and twins in different post-thawed culture period groups

Characteristics		S	L	*P* (S vs L)	MD/OR (95% CI)
Gestational age (weeks)	singleton	38.5±1.9**	38.5±1.8**	0.79	0.02 (-0.11-0.15)
	twin	35.9±2.2	36.1±2.0	0.32	-0.11 (-0.34-0.11)
Premature delivery	singleton	8.8% (177/2004)	8.3% (106/1271)	0.66	1.07 (0.83-1.37)

(< 37 weeks)	twin	48.3% (387/802)**	49.2% (299/608)**	0.75	0.96 (0.78-1.19)
Cesarean section	singleton	61.4% (1230/2004)	63.0% (801/1271)	0.36	0.93 (0.81-1.08)
	twin	94.9% (761/802)**	92.9% (565/608)**	0.14	1.41 (0.91-2.20)
Birthweight (g)	singleton	3236.3±494.7**	3242.1±489.9**	0.74	-5.79 (-40.51-28.94)
	twin	2444.6±442.2	2444.3±400.8	1.00	0.30 (-43.96-44.55)
Low birthweight (< 2500 g)	singleton	5.3% (107/2004)	5.1% (65/1271)	0.81	1.05 (0.76-1.44)
	twin	45.1% (724/1604)**	47.0% (571/1216)**	0.34	0.93 (0.80-1.08)
Sex ratio (male/female)	singleton	1.08 (1039/965)	1.09 (663/608)	0.89	0.99 (0.86-1.14)
	twin	1.09 (837/767)	1.09 (633/583)	0.97	1.01 (0.87-1.18)
Sex ratio (male/female)		1.08 (1876/1732)	1.09 (1296/1191)	0.94	1.00 (0.90-1.10)
Congenital malformations		1.2% (45/3608)	1.1% (28/2487)	0.72	1.11 (0.69-1.78)

Note: ** presents $P < 0.01$ when groups singleton vs twins in the same culture period groups. MD = Mean Difference.