

Does the ovulation pattern in consecutive menstrual cycles affect the sex ratio of subsequent conceived children?

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Ovulation patterns

O.: Ovulation + oocyte

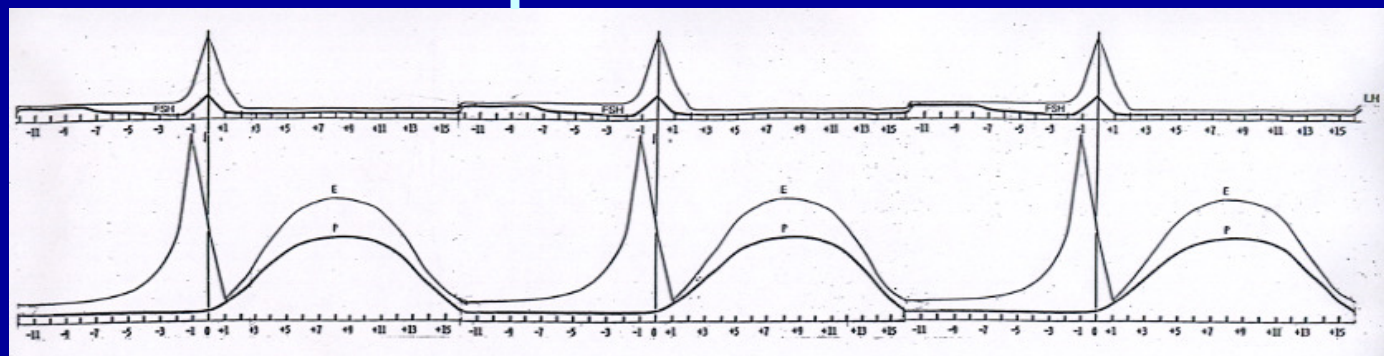
O : Aovulation

Contralateral ovulation:

LR, RL

Ipsilateral ovulation:

RR, LL



1 cycle	2 cycles	3 cycles		Previous second cycle	Previous first cycle	Treatment cycle
R	LR	LLR	Right ovary	O	O	O.
			Left ovary	O.	O.	O
		RLR		O.	O	O.
	RR	LRR		O	O.	O.
				O.	O	O
		RRR		O.	O.	O.
L	RL	RRL		O.	O.	O
				O	O	O.
		LRL		O	O.	O
	LL	RLL		O.	O	O
				O	O.	O.
		LLL		O	O	O

8 ovulation patterns and IVF outcomes in 260 SP and 315 CC cycles

1 cycle	R				L			
2 cycles	LR		RR		RL		LL	
3 cycles	LLR	RLR	LRR	RRR	RRL	LRL	RLL	LLL
Oocyte retrieval rate(%)	79/86 (92)	93/99 (94)	76/94 (81)	62/81 (77)	71/74 (96)	90/103 (87)	48/67 (72)	41/58 (71)
Fertilization rate(%)	72/79 (91)	79/93 (85)	50/76 (66)	43/62 (69)	61/71 (86)	83/90 (92)	35/48 (73)	23/41 (56)
Polyspermia rate(%)	8/79 (10)	0/93 (0)	4/76 (5)	0/62 (0)	1/71 (1)	1/90 (1)	0/48 (0)	0/41 (0)
Cleavage rate(%)	60/72 (83)	66/79 (84)	36/50 (70)	30/43 (70)	54/61 (89)	72/83 (87)	25/35 (71)	18/23 (78)
Rate of pre-embryo formation	60/72 (75)	66/93 (71)	36/76 (46)	30/62 (48)	54/71 (76)	72/90 (80)	25/48 (52)	18/41 (43)
Pregnancy rate(%)	17/78 (22)	13/88 (15)	5/78 (6)	3/64 (5)	10/68 (15)	12/94 (13)	8/59 (14)	3/46 (7)
Implanta- tion rate(%)	17/60 (28)	13/66 (20)	5/36 (14)	3/30 (10)	10/54 (19)	12/72 (17)	8/25 (32)	3/18 (17)

8 ovulation patterns and pregnancy outcome in 872 SP (612 IUI + 260 IVF) and 746 CC (431 IUI + 315 IVF) cycles

1 cycle	R				L			
2 cycles	LR		RR		RL		LL	
3 cycles	LLR	RLR	LRR	RRR	RRL	LRL	RLL	LLL
SP+CC Total	54/202	44/264	34/217	22/219	33/207	27/218	16/148	10/143
(%)	(26.7)	(16.7)	(15.7)	(9.6)	(15.9)	(12.4)	(10.8)	(7.0)
Live birth	44/202	36/264	23/217	20/219	25/207	20/218	13/148	8/143
(%)	(21.8)	(13.6)	(10.6)	(9.1)	(12.2)	(9.2)	(8.8)	(5.6)

SP+CC Total: LLR vs RLR, LRR, RRR, RRL, LRL, RLL, LLL. All P<0.012

Comparison of statistical power of pregnancy rate among different ovulation pattern groups

Contralateral or ipsilateral ovulation pattern in the immediate previous cycle:

Contralateral : LLR + RLR + RRL + LRL = 158/891 (17.7 %)

Ipsilateral : LRR + RRR + RLL + LLL = 82/727 (11.3 %)

P=0.0004

Contralateral or ipsilateral ovulation pattern in the previous second cycle:

Contralateral : LLR + LRR + RRL + RLL = 137/774 (17.7 %)*

Ipsilateral : RLR + RRR + LRL + LLL = 103/844 (12.2 %)*

P=0.0024

Right-sided ovulation (R) vs Left-sided ovulation (L)

R : LLR + RLR + LRR + RRR = 154/902 (17.1%)#

L: RRL + LRL + RLL + LLL = 86/716 (12.0 %) #

P=0.0055

Thus the LLR pattern results in enhanced pregnancy rates

Ovulation patterns and offspring sex ratio (males/males+females)

Fertile women	Infertile women		
	1 cycle	2 cycles	3 cycles
R 210/410 (0.512)	R 226/390 (0.579)	LR 93/148# (0.628)	LLR 48/63 (0.762) RLR 24/49 (0.490) LRR 16/38 (0.421) RRR 21/38 (0.553)
L 132/258 (0.512)	L 128/240 (0.533)	RL 55/100 (0.550) LL 25/62# (0.403)	RRL 25/46 (0.543) LRL 15/26 (0.577) RLL 8/23 (0.348) LLL 5/16 (0.313)

C=LR+RL=148/248 (0.597)*

I =RR+LL=89/178 (0.500)*

*: P=0.0488 #: P=0.0036

LLR vs RLR, LRR, RRR, RRL, RLL, LLL All P<0.05

Offspring sex ratio following anovulation of infertile women

Induced+spontaneous anovulation

	males	females	males/males+females
Before+after	137	111	137/248(0.552)*#
First cycle	24	10	24/34 (0.706)
Second cycle	24	7	24/31 (0.774)#
First+second cycle	48	17	48/65 (0.738)*

*: P=0.0070, #: P=0.0372

Offspring sex ratio following lactational anovulation of fertile women

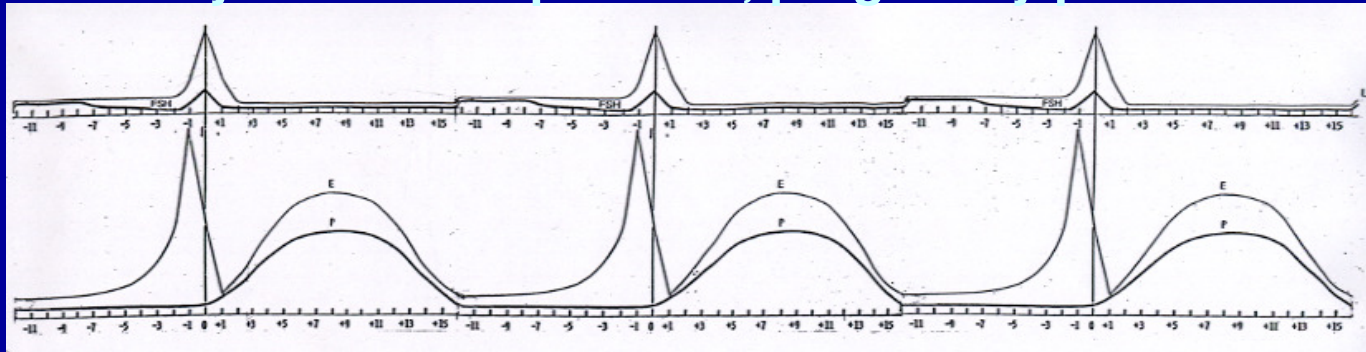
No. of menses following anovulation	male	female	males/males+females	Sex ratio
0	43	27	43/72	0. 597
1	80	41	80/121	0. 661
2	37	45	37/83	0. 446
3	39	33	39/72	0. 542
4	27	25	27/52	0. 519
5	28	31	28/55	0. 509
6	25	30	25/55	0. 455
7-8	26	22	26/48	0. 542
Total	305	254	305/559	0. 546

(0+1) : 123/193 (0. 637)*

(2+3+4+5+6+7+8) : 182/369 (0. 493)*

*: P=0.0013

Summary: Ovulation patterns, pregnancy potential and offspring sex ratio



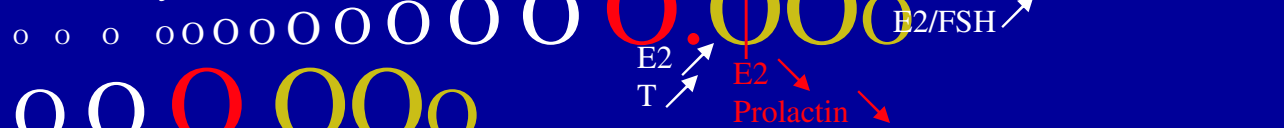
Contralateral ovulation (LLR)

Strong CL patterns
Ovulation patterns
Pregnancy rate (%)
Offspring sex ratio

Right ovary



Left ovary

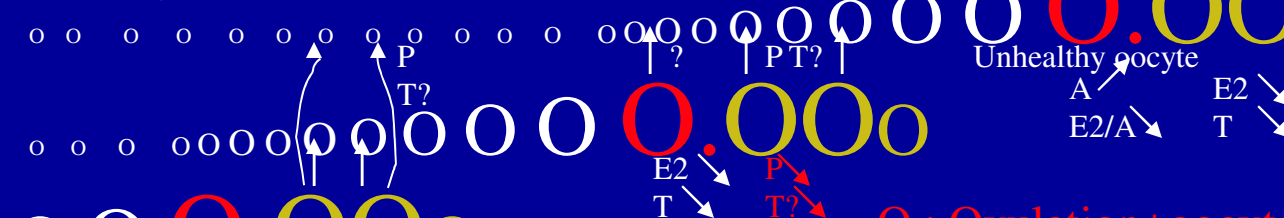


Ipsilateral ovulation (LLL)

Right ovary



Left ovary



O.: Ovulation+oocyte
O: Corpus luteum

LLR	27%(54/202)	0.762(48/63)
RRL	17%(44/264)	0.490(24/49)
LRR	16%(34/217)	0.421(16/38)
RRR	10%(22/219)	0.553(21/38)
RRL	16%(33/207)	0.543(25/46)
LRL	12%(27/218)	0.557(15/26)
RLL	11%(16/148)	0.348 (8/23)
LLL	7%(10/143)	0.313 (5/16)

Conclusion

Ovulation from the right ovary in the group of infertile women tended to result in boys more often than the left ovary, which, however, was not observed in the group of fertile women. Ovulation jumping from one ovary to the other during two consecutive cycles seems to enhance the frequency of boys and especially the ovulation pattern **left-left-right (LLR)** observed during three consecutive cycles results in **boys in three out of four pregnancies**. Induced and spontaneous anovulation also seems to enhance the frequency of boys in the first and second subsequent cycles, increasing the ovulation pattern of LLR.