

Assisted Reproduction

Annual Report 2019



Department of Obstetrics and Gynaecology
Queen Mary Hospital, The University of Hong Kong

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Introduction

The year two thousand and nineteen marks the thirty-third year of the Assisted Reproduction Program at Queen Mary Hospital.

A total of 843 assisted reproduction treatment (ART) cycles were initiated in 758 couples during this period. The numbers of treatment cycles and of patients were similar to those in previous years. The number of frozen-thawed embryo transfer cycles was similar in 2018 and in 2019. The mean number of embryos replaced further reduced to 1.0 per transfer in both conventional IVF and ICSI cycles as we have further promoted elective single embryo transfer. The mean number of embryos replaced in frozen-thawed embryo transfer cycles also reduced to 1.0 per transfer because most of our patients agreed to replace a single frozen embryo. This year, we encountered no triplet after ART.

This year we continued to implement a strict single embryo transfer policy for all women unless for those older than or equal to 38 years old or not pregnant after 2 cycles of IVF. The ongoing pregnancy rate per transfer cycle were 24.6% and 44.1% respectively in Day 2 and Day 5 elective single embryo transfer whereas the corresponding rates in non-elective single embryo transfer cycles were 23.4% and 7.1% respectively.

In 2019, preimplantation genetic testing was performed in 110 (109 stimulated, 1 cycle of vitrified oocytes) and 2 frozen embryo transfer cycles in 95 women at risk of having babies with serious chromosomal or genetic disorders.

Staff list

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Mr. LEUNG Ka Chun, Tim

Ms. LOCK Hiu Yan, Crystal

Mr. NG Kwok Hung, Victor

Mr. TONG Pok Man Tommy (from Feb 2019)

Mr. TSANG Chi Kit, Percy
Ms. TAN Yick-Siew (from Dec 2019)

Hormone Assay

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Laboratory Assistants

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Clerical Staff

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Ms. KO Yuk Chun, Jennie
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Ms. CHOW Fung Yee (from Nov 2019)



Front Row: (Left to Right)

Dr. Kevin LAM, Ms. Chui Pik DO, Professor William YEUNG, Professor Ernest NG, Dr. Ellen LUI, Dr. Heidi CHENG

Second Row: (Left to Right)

Ms. Yick Siew TAN, Mr. Tommy TONG, Ms. Zaolan YANG, Ms. May DO, Ms. Crystal LOCK, Ms. Jenny Jin, Mr. Charles HUANG

Third Row: (Left to Right)

Ms. Sharon HO, Ms. Vani YAM, Ms. Sharon LAU, Ms. Merie YUEN, Ms. Kitty CHOW, Ms. SH CHAN Ms. Ada HO, Ms. Loretta CHIANG

Back Row: (Left to Right)

Mr. TM CHEUNG, Ms. Yueming LIANG, Ms. Chun Kin CHAN, Ms. Fung Yee CHOW



Dr. Estella Lau was awarded the QMH Outstanding Staff Award.

Work-Load Statistics

Table 1: Workload Statistics I

No. of Cycles	IVF	Natural cycle IVF	Oocyte Donation	Sperm donation	Vitrified oocyte	ICSI	MESA	TESE	IVM	PGT	TOTAL
Initiated	448	1	0	4	4	255	14	5	0	110*	843
Cancelled	14 (3.1%)	0 (0%)	0 (-)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	15 (1.8%)
With Oocyte Retrieval	434 (96.9%)	1 (100%)	0 (-)	4# (100%)	-	254 (99.6%)	14 (100%)	5 (100%)	-	109 (100%)#^	821 (97.7%)#^
With Fresh Embryo Transfer	230 (51.3%)	1 (100%)	0 (-)	3 (75.0%)	4 (100%)	126 (49.4%)	5 (35.7%)	2 (40.0%)	-	4 (3.6%)	375 (44.5%)

(“IVF”: Conventional IVF-ET; “IVM”: In vitro maturation; “ICSI”: ICSI with ejaculated sperm; “MESA”: MESA + ICSI; “TESE”: TESE + ICSI; “PGT”: Preimplantation genetic testing; “FET”: frozen embryo transfer)

() % of initiated cycles

*110 fresh (including 1 vitrified oocyte cycles)+2FET

#vitrified oocyte cycles are excluded

^denominator does not include FET cycle

Table 2: Workload Statistics II

No. of cycles	IVF	Natural cycle IVF	Oocyte Donation	Sperm donation	Vitrified oocyte	ICSI	MESA	TESE	IVM	Fresh-PGT	TOTAL
Without Oocyte Retrieved	4 (0.9%)	0 (0%)	0 (-)	0 (0%)	0 (-)	0 (0%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	4 (0.5%)
Without insemination	0 (0%)	0 (0%)	0 (-)	0 (0%)	0 (-)	7 (2.8%)	0 (0%)	1 (20.0%)	0 (-)	1 (0.9%)	9 (1.1%)
Without Normal Fertilization	28 (6.5%)	0 (0%)	0 (-)	0 (0%)	0 (-)	18 (7.1%)	0 (0%)	1 (20.0%)	0 (-)	1 (0.9%)	48 (5.8%)
Without Normal Cleavage	6 (1.4%)	0 (0%)	0 (-)	0 (0%)	0 (-)	1 (0.4%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	7 (0.8%)
Without embryos suitable for transfer	2 (0.5%)	0 (0%)	0 (-)	0 (0%)	0 (-)	2 (0.8%)	0 (0%)	0 (0%)	0 (-)	30 (27.3%)	34 (4.1%)
With ET Postponed	164 (37.8%)	0 (0%)	0 (-)	1 (25.0%)	0 (-)	100 (39.4%)	9 (64.3%)	1 (20.0%)	0 (-)	74 (67.3%)	349 (42.3%)
Without Fresh Embryo Transfer	204 (47.0%)	0 (0%)	0 (-)	1 (25.0%)	0 (-)	128 (50.4%)	9 (64.3%)	3 (60.0%)	0 (-)	106 (96.4%)	451 (54.6%)

() % of oocyte retrieval cycles

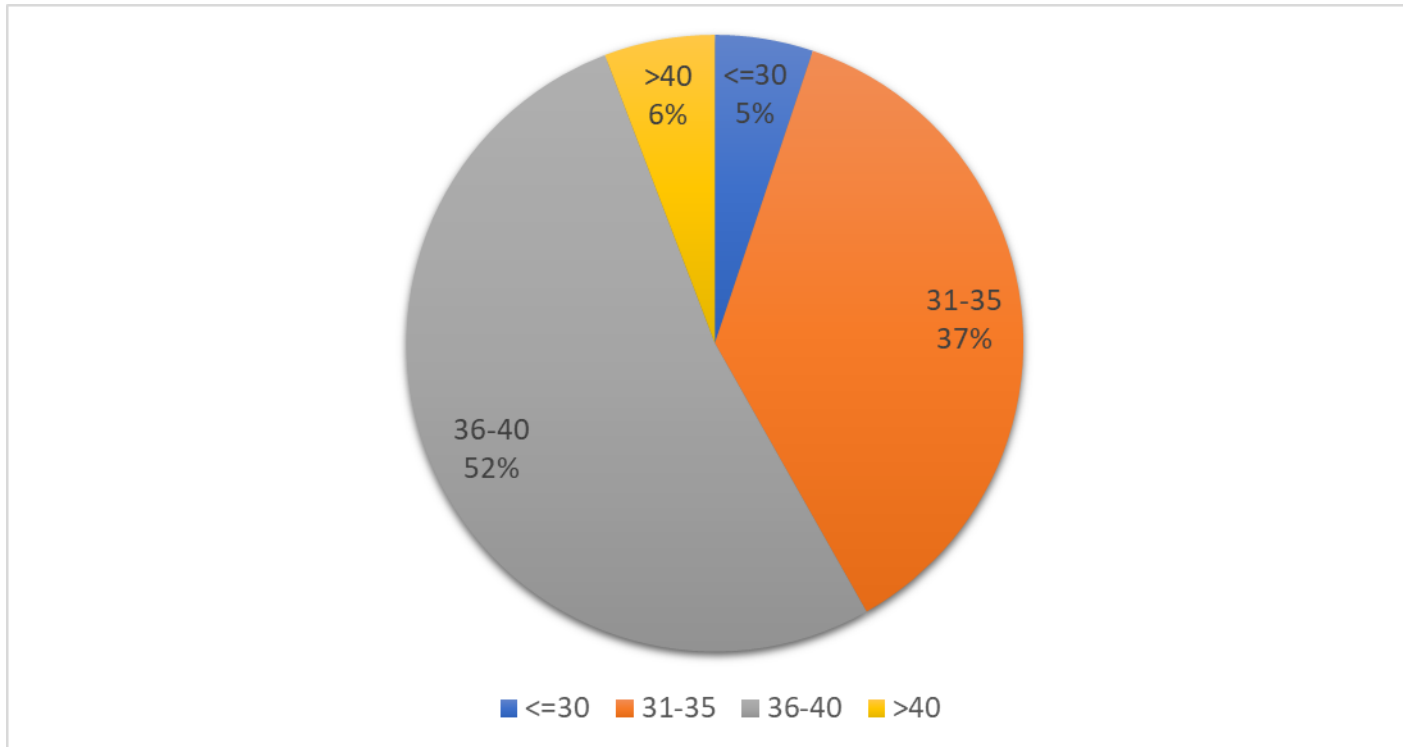


Figure 1: Age Distribution of Patients

Table 3: Ongoing Pregnancy Rates in Different Age Groups

Age (yrs)	No. of ongoing pregnancies / No. of transfer cycles										
	IVF	ICSI	Natural cycle IVF	IVM	Oocyte donation	Sperm donation	Vitrified oocyte	MESA	TESE	PGT	Total
<= 30	2 / 4 (50.0%)	1 / 5 (20.0%)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	0 / 1 (0%)	0 / 0 (-)	0 / 1 (0%)	0 / 0 (-)	0 / 0 (-)	3 / 13 (27.3%)
31 – 35	31 / 80 (38.8%)	14 / 39 (35.9%)	0 / 1 (0%)	0 / 0 (-)	0 / 0 (-)	0 / 2 (0%)	0 / 0 (-)	1 / 2 (50.0%)	1 / 1 (100%)	0 / 0 (-)	47 / 125 (37.6%)
36 - 40	36 / 132 (27.3%)	17 / 77 (22.1%)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	2 / 2 (100%)	0 / 1 (0%)	0 / 2 (0%)	55 / 214 (25.7%)
> 40	1 / 14 (7.1%)	1 / 5 (20.0%)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	0 / 0 (-)	0 / 4 (0%)	0 / 0 (-)	0 / 0 (-)	0 / 2 (0%)	2 / 25 (8.0%)
Total	70 / 230 (30.4%)	33 / 126 (26.2%)	0 / 1 (0%)	0 / 0 (-)	0 / 0 (-)	0 / 3 (0%)	0 / 4 (0%)	3 / 5 (60.0%)	1 / 2 (50.0%)	0 / 4 (0%)	107 / 375 (28.5%)

() % of transfer cycles

In Vitro Fertilization and Embryo Transfer~ IVF-ET

Stimulated cycle IVF-ET

During 2019, 415 couples underwent a total of 448 conventional stimulated IVF cycles at our center. Unexplained cause (36.2%) was the commonest indication, which was followed by tuboperitoneal problem (18.3%), male factor (16.5%) and endometriosis (10.5%). (Table 4)

Table 4: Indications for IVF-ET

Indications	No of Initiated cycles	No of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
Tuboperitoneal	82 (18.3%)	15	35.7%	28.6%
Endometriosis	47 (10.5%)	9	37.5%	20.8%
Male Factor	74 (16.5%)	12	33.3%	27.8%
Anovulation	37 (8.3%)	9	45.0%	35.0%
Unexplained	162 (36.2%)	34	38.6%	31.8%
Others/Mixed	46 (10.2%)	12	60.0%	40.0%
Total	448 (100%)	91	39.6%	30.4%

* Per transfer cycle

A total of 14 cycles (3.1%) were cancelled: 8 due to poor ovarian response, 3 due to premature luteinization and 3 due to other reasons. Oocytes were not obtained in 4 planned retrieval cycles. There were 28 cycles without normal fertilization, 6 cycles without normal cleavage and 2 cycles with only embryos not suitable for transfer. Therefore, no embryo was transferred in these 40 cycles. Embryo transfer was postponed in 164 cycles because of the risk of developing ovarian hyperstimulation syndrome (OHSS), high serum progesterone level or other reasons.

The **oocyte retrieval rate** was 72.4% with an average of 8.9 oocytes obtained per retrieval cycle. The **fertilization rate** was 67.1% and the **cleavage rate** was 95.2%. The oocyte retrieval rate, fertilization rate and cleavage rate were similar to the figures in previous years. The results are summarised in Table 5.

Table 5: Results of Conventional IVF-ET

		per Oocyte Retrieval Cycle	per Follicle Aspirated (Oocyte Retrieval Rate)	per Oocyte Retrieved (Fertilization Rate)	per Fertilized Oocyte (Cleavage Rate)
Number of Oocyte Retrieval Cycles	434				
Number of Follicles Aspirated	5348	12.3			
Number of Oocytes Retrieved	3872	8.9	72.4%		
Number of Oocytes Fertilized	2600	6.0		67.1%	
Number of Fertilized Oocytes Cleaved	2476	5.7			95.2%
Number of Embryos Transferred	231	0.5 (1.0 / ET)			
Number of Pregnancies	91				
Number of Embryos Frozen	1050	2.4			

Most (99.1%) of patients used GnRH antagonist protocol. (Table 6)

Table 6: Ovarian Stimulation Protocols Used

Protocol	No. of Initiated Cycles	No. of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
GnRH antagonist	444 (99.1%)	91	39.6%	30.4%
GnRHα (long)	1 (0.2%)	0	-	-
Progesterone	3 (0.7%)	0	-	-
Others	0 (0%)	0	0%	0%
Total	448 (100%)	91	39.6%	30.4%

* Per transfer cycle

All oocyte retrievals were successfully performed under transvaginal ultrasound guidance using intravenous sedation and analgesia. The degree of difficulty of embryo transfer and the corresponding pregnancy rate are shown in Table 7.

Table 7: Difficulty of Transfer

Difficulty	No. of ET Cycles	No. of Pregnancies	Pregnancy Rate#	Ongoing Pregnancy Rate#
Easy	230 (100%)	91	39.6%	30.4%
Vulsellum	0 (0%)	0	-	-
Vulsellum & Sound Dilatation	0 (0%)	0	-	-
Total	230 (100%)	91	39.6%	30.4%

Per transfer cycle

Among the 434 oocyte retrieval cycles, 2 had moderate to severe OHSS. (Table 8)

Table 8: Complications of Conventional IVF-ET Treatment

Complications	No of Retrieval* Cycles
Nil	426 (99.5%)
Infection	0 (0%)
Significant haemoperitonem	0 (0%)
Moderate to severe OHSS	2 (0.5%)

There were 91 pregnancies resulting from stimulated IVF-ET cycles. The **pregnancy rate** was 20.3% per initiated cycle and 39.6% per transfer cycle (Table 9). The **miscarriage rate** was 19.8%. The **ongoing pregnancy rate** was 15.6% per initiated cycle and 30.4% per transfer cycle. The average number of fresh pre-embryos transferred was 1.0 per transfer. The **multiple pregnancy rate** was 2.2%. Two sets of twins were encountered (Table 10). The **implantation rate** was 36.4%.

Table 9: Pregnancy Rates of Conventional IVF-ET

	Pregnancy Rate	Ongoing pregnancy Rate
per Cycle Initiated	91 / 448 (20.3%)	70 / 448 (15.6%)
per Oocyte Retrieval Cycle	91 / 434 (21.0%)	70 / 434 (16.1%)
per Transfer Cycle	91 / 230 (39.6%)	70 / 230 (30.4%)

Table 10: Outcome of Pregnancies

Outcome	Number of Cycles
Miscarriage	18 (19.8%)
Ectopic Pregnancy	2 (2.2%)
Lost to follow up	1 (1.1%)
Ongoing Pregnancy	70 (76.9%)
Total Pregnancies	91
No. of Fetuses	72
No. of Multiple Pregnancies	2 (2.2%) - all twins

The outcome in relation to the number of embryos transferred is shown in Tables 11 and 12.

Table 11: Number of Embryos Transferred & the Outcome

No. of Embryos	No. of ET Cycles	No. of Pregnancies	Pregnancy Rate [#]	Ongoing Pregnancy Rate [#]	Multiple Pregnancy Rate ⁺
1	229 (99.6%)	91	39.7%	30.6%	2.2%
2	1 (0.4%)	0	0%	0%	0%
Total	230 (100%)	91	39.6%	30.4%	2.2%

#Per transfer cycle
+Per pregnancy cycle

Table 12: Outcome of Single Embryo Transfer

Elective	Day of ET	Average Age of Women (years)	No. of ET cycles	Pregnancy Rate [#]	Ongoing Pregnancy Rate [#]	Multiple Pregnancy Rate ⁺
Yes	2	36.4	97	32.0%	23.7%	3.2%
	5	35.9	62	58.1%	53.2%	2.8%
No	2	36.6	62	33.9%	21.0%	0%
	5	37.5	8	25.0%	12.5%	0%

#Per transfer cycle
+Per pregnant cycle

Intracytoplasmic Sperm Injection~ICSI (with ejaculated sperm)

Two hundred and fifty-five treatment cycles were initiated in two hundred and thirty-six couples (excluding preimplantation genetics testing). ICSI was decided in 224 treatment cycles because of severe male factor infertility. It was also performed in those who had either failed fertilization or poor fertilization rate (less than 30%) in a previous conventional IVF cycle. This latter group accounted for 26 of the cycles initiated (Table 13).

Table 13: Indications for ICSI

Indications	No. of Initiated Cycles	No. of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
Severe male factor	224 (87.8%)	33	30.3%	27.5%
Fertilization problem	26 (10.2%)	7	41.2%	17.6%
Others	5 (2.0%)	0	0%	0%
Total	255 (100%)	40	31.7%	26.2%

*Per transfer cycle

GnRHa antagonist protocol for ovarian stimulation was used in 254 cycles (99.6%) (Table 14), except one in which Medroxyprogesterone acetate was used for ovulation suppression.

Table 14: Ovarian Stimulation Protocols Used

Protocol	No. of Initiated Cycles	No. of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
GnRH antagonist	254 (99.6%)	40	31.7%	26.2%
GnRHa (long)	0 (0%)	0	0%	0%
Progesterone	1 (0.4%)	0	-	-
Total	255 (100%)	40	31.7%	26.2%

*Per transfer cycle

The results are summarized in Table 15.

Table 15: Results of ICSI

		per Oocyte Retrieval Cycle	per Follicle Aspirated (Oocyte Retrieval Rate)	per Oocyte Retrieved (Fertilization Rate)	per Fertilized Oocyte (Cleavage Rate)
No. of Oocyte Retrieval Cycles	254				
No. of Follicle Aspirated	3605	14.2	73.3%	56.9% (70.4% per oocyte injected)	97.9%
No. of Oocytes Retrieved	2643	10.4			
No. of Oocytes Fertilized	1504	5.9			
No. of Fertilized Oocytes Cleaved	1472	5.8			
No. of Embryos Transferred	129	0.5 (1.0/ET)			
No. of Pregnancies	40				
No. of Embryos Frozen	656	2.6			

Insemination was not performed in 7 cycles. Normal fertilization was not achieved in 18 cycles, 1 did not have normal cleavage and 2 did not have embryos suitable for transfer. Therefore, no embryo was transferred in these 28 cycles. Embryo transfer was postponed in another 100 cycles because of the risk of developing OHSS, high serum progesterone concentration or other reasons. The fertilization rate was 70.4% per oocyte injected this year and was similar to that of last year. The mean number of embryos transferred was only 1.0 per transfer and was comparable to that of conventional stimulated IVF cycles. The degree of difficulty of embryo transfer is shown in Table 16.

Table 16: Difficulty of Transfer

Difficulty	No. of ET Cycles	No. of Pregnancies	Pregnancy Rate#	Ongoing Pregnancy Rate#
Easy	126 (100%)	40	31.7%	26.2%
Vulsellum	0 (0%)	0	-	-
Vulsellum + Sound	0 (0%)	0	-	-
Total	126 (100%)	40	31.7%	26.2%

Per transfer cycle

There were 40 pregnancies and 33 were ongoing (Tables 17 & 18). The **multiple pregnancy rate** was 0%. The **implantation rate** was 28.7%. None had moderate or severe OHSS.

Table 17: Pregnancy Rates of ICSI

	Pregnancy Rate	Ongoing Pregnancy rate
per Cycle Initiated	40 / 255 (15.7%)	33 / 255 (12.9%)
per Oocyte Retrieval Cycle	40 / 254 (15.7%)	33 / 254 (13.0%)
per Transfer Cycle	40 / 126 (31.7%)	33 / 126 (26.2%)

Table 18: Outcome of Pregnancies

Outcome	Number of Cycles	
Miscarriage	7	(17.5%)
Ectopic Pregnancy	0	(0%)
Ongoing Pregnancy	33	(82.5%)
Total Pregnancies	40	
No. of Fetuses	33	
No. of Multiple Pregnancies	0 (0%)	

The outcome in relation to the number of embryos transferred is shown in Table 19 and Table 20.

Table 19: Number of Embryos Transferred & the Outcome

No. of Embryos	No. of ET Cycles	No. of Pregnancies	Pregnancy Rate[#]	Ongoing Pregnancy Rate[#]	Multiple Pregnancy Rate⁺
1	123 (97.6%)	39	31.7%	26.8%	0%
2	3 (2.4%)	1	33.3%	0%	0%
Total	126 (100%)	40	31.7%	26.2%	0%

Per transfer cycle
+ Per pregnant cycle

Table 20: Outcome of Single Embryo Transfer

Elective	Day of ET	Average Age of Women (years)	No. of ET cycles	Pregnancy Rate#	Ongoing Pregnancy Rate#	Multiple Pregnancy Rate⁺
Yes	2	36.1	45	33.3%	26.7%	0%
	5	36.1	40	37.5%	30.0%	0%
No	2	36.3	32	28.1%	28.1%	0%
	5	38.8	6	0%	0%	-

#Per transfer cycle
+Per pregnant cycle

Microsurgical Epididymal Sperm Aspiration - MESA

Fourteen couples underwent 14 treatment cycles in 2019. The urological team at Queen Mary Hospital performed a total of 16 MESA procedures, which were arranged before ovarian stimulation or the oocyte retrieval. Indications for MESA cycles are given in Table 21.

Table 21: Indications for MESA

Indications	No. of OPU Cycles	No. of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
Congenital Absence of Vas deferens	2 (14.3%)	0	0%	0%
Obstructive Azoospermia	9 (64.3%)	2	50.0%	50.0%
Severe male factor	1 (7.1%)	0	0%	0%
Ejaculatory problem	2 (14.3%)	1	100%	100%
Total	14 (100%)	3	60.0%	60.0%

***Per transfer cycle**

The antagonist protocol was used in all 14 cycles. Oocyte retrieval was performed under transvaginal ultrasound guidance in all 14 cycles and oocytes were obtained in the retrieval cycles. An average of 14.9 oocytes was retrieved in these 14 cycles. The fertilization rate was 70.1% per oocyte injected (Table 22). Embryo transfer was performed in 5 cycles and embryo transfer was postponed in 9 cycles.

Table 22: Results of MESA+ ICSI

		per Oocyte Retrieval Cycle	per Follicle Aspirated (Oocyte Retrieval Rate)	per Oocyte Retrieved (Fertilization Rate)	per Fertilized Oocyte (Cleavage Rate)
Number of Oocyte Retrieval Cycles	14				
Number of Follicles Aspirated	254	18.1			
Number of Oocytes Retrieved	208	14.9	81.9%		
Number of Oocytes Fertilized	115	8.2		55.3% (70.1% per oocyte injected)	
Number of Fertilized Oocytes Cleaved	114	8.1			99.1%
Number of Embryos Transferred	5	0.4 (1.0 / ET)			
Number of Pregnancies	3				
Number of Embryos Frozen	47	3.4			

No patient developed moderate to severe OHSS.

Table 23: Pregnancy Rates of MESA + ICSI

	Pregnancy Rate	Ongoing pregnancy rate
per Cycle Initiated	3 / 14 (21.4%)	3 / 14 (21.4%)
per Oocyte Retrieval Cycle	3 / 14 (21.4%)	3 / 14 (21.4%)
per Transfer Cycle	3 / 5 (60.0%)	3 / 5 (60.0%)

There were three pregnancies resulting from MESA + ICSI procedures. The **pregnancy rate** was 21.4% per initiated cycle and 60.0% per transfer cycle (Table 23). The **ongoing pregnancy rate** was 21.4% per initiated cycle and 60.0% per transfer cycle. The **implantation rate** was 60.0%. There was no multiple pregnancy (Table 24).

Table 24: Outcomes of Pregnancies

Outcome	Number of cycles
Miscarriage	0 (0%)
Ectopic Pregnancy	0 (0%)
Ongoing Pregnancy	3 (100%)
Total Pregnancies	3
No. of Fetuses	3
No. of Multiple Pregnancies	0 (0%)

The pregnancy rate in relation to the number of embryos transferred is shown in Table 25.

Table 25: Number of Embryos Transferred & the Outcome

No. of Embryos	No. of ET Cycles	No. of Pregnancies	Pregnancy Rate[#]	Ongoing Pregnancy Rate[#]	Multiple Pregnancy Rate⁺
1	5 (100%)	3	60.0%	60.0%	0%
2	0 (0%)	0	-	-	-
Total	5 (100%)	3	60.0%	60.0%	0%

#Per transfer cycle

+Per pregnancy cycle

Testicular Sperm Extraction - TESE

During 2019, five treatment cycles were initiated in four couples (Table 26). The urological team at Queen Mary Hospital carried out twenty-one testicular sperm biopsies. Sperms was found in 9 testicular sperm biopsies and frozen in 6 testicular sperm biopsies prior to start of ovarian stimulation.

Table 26: Indications for TESE

Indications	No. of OPU Cycles	No. of Pregnancies	Pregnancy Rate*	Ongoing Pregnancy Rate*
Non-obstructive Azoospermia	2 (40.0%)	1	100.0%	0%
Obstructive Azoospermia	3 (60.0%)	1	100%	100%
Ejaculatory problem	0 (0%)	0	0%	0%
Total	5 (100%)	2	100%	50.0%

* Per transfer cycle

Five IVF-TESE cycles were initiated. The antagonist protocol was used in all 5 cycles. No cycle was cancelled before oocyte retrieval. Oocyte retrieval was performed in 5 cycles under transvaginal ultrasound guidance and oocytes were obtained in all cycles. An average of 8.6 oocytes were retrieved. Insemination was not performed in 1 cycle and there was no normal fertilization in one cycle. The overall fertilization rate was 37.5% per oocyte injected (Table 27). Embryo transfer was postponed in 1 cycle.

Table 27: Results of TESE+ ICSI

		per Oocyte Retrieval Cycle	per Follicle Aspirated (Oocyte Retrieval Rate)	per Oocyte Retrieved (Fertilization Rate)	per Fertilized Oocyte (Cleavage Rate)
No. of Oocyte Retrieval Cycles	5				
No. of Follicles Aspirated	59	11.8			
No. of Oocytes Retrieved	43	8.6	72.9%		
No. of Oocytes Fertilized	9	1.8		20.9% (37.5% per oocyte injected)	
No. of Fertilized Oocytes Cleaved	9	1.8			100%
No. of Embryos Transferred	2	0.4 (1.0/ ET)			
No. of Pregnancies	2				
No. of Embryos Frozen	11	2.2			

There was no case of moderate to severe OHSS recorded.

Preimplantation Genetic Testing - PGT

We continue to provide preimplantation genetic testing (PGT) to women at risk of having babies with serious chromosomal or genetic disorders. In 2019, PGT was performed in 109 stimulated cycles, 1 vitrified oocyte cycle and 2 frozen cycles for 94 couples and indications for PGT were shown in Table 28.

Table 28: Summary of PGT cycles

Indication	No. of patients	No. of cycles	No. of embryo	
			PGT	Normal
Chromosomal abnormalities				
Numerical chromosomal abnormalities	5	6	21	18 (85.7%)
Reciprocal translocation	16	19	102	27 (26.5%)
Robertsonian translocation	2	3	0	0 (-)
α Thalassaemia	14	15	78	52 (66.7%)
β Thalassaemia	8	12	32	22 (68.8%)
β Thalassaemia/ single gene defect + HLA typing	2	2	2	1 (50.0%)
Others single gene defects	22	23	100	50 (50.0%)
PGT-A#	26	30	87	50 (57.5%)
Total	95	110	422	220 (52.1%)

#PGT for aneuploidy (PGT-A) is done for advanced maternal age, repeated implantation failure or recurrent miscarriage. PGT-A was also performed in suitable blastocysts following PGT-M (monogenic diseases).

FET after PGT

All blastocysts for PGT were frozen after biopsy and frozen-thawed transfer of the blastocysts was arranged after the results were available for counselling. Next generation sequencing was used in PGT-A (aneuploidy) and PGT-SR (structural rearrangement). Each blastocyst was frozen in one straw after biopsy and patients were allowed to replace one blastocyst each time following PGT.

A total of 87 thaw cycles after PGT were initiated. 91 frozen embryos were thawed and 87 frozen-thawed embryos were replaced.

There were altogether 60 **pregnancies** (69.0% per transfer) and 52 **ongoing pregnancies** (59.8% per transfer) resulting from transfer of frozen-thawed embryos. The overall **miscarriage rate** was 13.3%. The **multiple pregnancy rate** was 0%. The **implantation rate** was 64.4%.

Embryo Cryopreservation and Frozen-thawed Embryo Transfer

The results of embryo cryopreservation are summarized in Table 29. As was our experience from previous years, there were excess embryos suitable for cryopreservation in 610 / 826 (73.8%) of the retrieval cycles in 2019.

Table 29: Results of Embryo Cryopreservation

Method of Treatment	IVF	ICSI	MESA	TESE	Others	PGT	Total
No. of Oocyte Retrieval Cycles	434	254	14	5	9	110	826
No. of Cycles with Embryo Cryopreservation	324	191*	12	3*	5	75	610*
Total No. of Embryos Cryopreserved	1050	656*	47	11*	19	218	2001*
Average No. of Embryos Cryopreserved	3.2	3.4*	3.9	3.7*	3.8	2.9	2.4*
Range of Embryos Cryopreserved	1-15	1-14*	1-7	2-7*	1-5	1-9	1-15*

*** with oocyte freezing**

Six hundred and ninety-three women planned to have replacement of frozen-thawed embryos (FET). A total of 936 thaw cycles were initiated. Embryo transfer was not done in 11 cycles because of lysis of all frozen embryo(s) during thawing. Six hundred and eighty-five frozen-thawed embryo replacements were performed in natural (spontaneous ovulatory) cycles, one was in clomiphene citrate-induced cycles, eighty-five were in letrozole-induced cycles, 152 were in total hormone replacement artificial cycles and two was in stimulated cycles.

The pregnancy rates of these different types of transfer cycles are shown in Table 30.

Table 30: Outcome of FET Cycles

Cycle Type	Number of Cycles		Number of Pregnancies	Pregnant Rate	Ongoing pregnancy rate
Natural	685	74.1%	267	39.0%	32.4%
Clomid	1	0.1%	0	0%	0%
Letrozole	85	9.2%	50	58.8%	51.8%
Artificial	152	16.4%	65	42.8%	27.0%
Stimulated	2	0.2%	1	50.0%	50.0%
Total	925	100%	383	41.4%	33.3%

Table 31: Outcome of Pregnancies in FET

Outcome	No. of Pregnancies	Natural	Clomid	Letrozole	Artificial	Stimulated
Miscarriage	72 (18.8%)	44	0	6	22	0
Ectopic Pregnancy	1 (0.3%)	0	0	0	1	0
Molar Pregnancy	0 (0%)	0	0	0	0	0
Lost to follow up	2 (0.5%)	1	0	0	1	0
Ongoing Pregnancy	308 (80.4%)	222 (83.1%)	0 (-)	44 (88.0%)	41 (63.1%)	1 (100%)
Total Pregnancies	383	267	0	50	65	1
No. of Fetuses	311	223	0	45	42	1
No. of Multiple Pregnancies	4 (1.0%) All twins	2	0	1	1	0

The average number of embryos transferred per FET cycles was 1.0. There were altogether 383 pregnancies resulting from transfer of frozen-thawed embryos. The overall **miscarriage rate** was 18.8%. The **multiple pregnancy rate** was 1.0% (Table 31). The **implantation rate** was 38.1%.

Table 32: Number of Embryos Transferred & the Outcome

No. of Embryos	No. of FET Cycles	No. of Pregnancies	Pregnancy Rate#	Ongoing Pregnancy rate#	Multiple Pregnancy Rate⁺
1	914 (98.8%)	379	41.5%	33.7%	1.1%
2	11 (1.2%)	4	36.4%	0%	0%
Total	925 (100%)	383	41.4%	33.3%	1.0%

Per transfer cycle
+ Per pregnant cycle

Ovulation Induction and Ovarian Stimulation & Intrauterine Insemination

Ovulation Induction

Four patients underwent 10 cycles of ovulation induction by gonadotrophin therapy. The mean age of patients was 35.5 years. The cycle characteristics are detailed in Table 33. There were no cancelled cycles. One woman got pregnant and the pregnancy rate was 10.0% per initiated cycle. There was one ongoing singleton pregnancy.

Table 33: Characteristics of Ovulation Induction Cycles

Parameters	Mean ± Standard Deviation
Amount of gonadotrophin used (IU)	1,045 ± 383
Number of follicles ≥ 14mm	1.0 ± 0.0
Number of follicles ≥ 16mm	1.0 ± 0.0
Number of follicles ≥ 18mm	1.0 ± 0.0
Oestradiol on the day of hCG (pmol/l)	1,799 ± 1,253

Ovarian Stimulation & Intrauterine Insemination

Ninety-one women underwent 192 cycles of ovarian stimulation by gonadotrophin or clomiphene citrate in conjunction with insemination. Three cycles were cancelled: 2 cycles for excessive response and 1 for other reasons.

The mean age of patients was 33.0 years. The indications and cycle characteristics are shown in Tables 34 and 35 respectively. Sixteen pregnancies were achieved and the **pregnancy rate** was 8.3% per cycle initiated. There were 10 ongoing singleton pregnancies.

Table 34: Indications for Ovarian Stimulation & Intrauterine Insemination

Indications	Number of Cycles
Male factors	80
Unexplained	70
Endometriosis	4
Coital	21
Anovulation	14
Miscellaneous	3

Table 35: Cycle Characteristics of Ovarian Stimulation & Intrauterine Insemination

Parameters	Mean ± Standard Deviation		
	hMG/ FSH	Clomid	Letrozole
Amount of gonadotrophin used (IU)	2,212± 1035	-	-
Number of follicles ≥ 12mm	1.5 ± 0.7	1.7 ± 0.8	1.3 ± 0.5
Number of follicles ≥ 14mm	1.5 ± 0.7	1.4 ± 0.5	1.2 ± 0.4
Number of follicles ≥ 16mm	1.5 ± 0.7	1.3 ± 0.5	1.2 ± 0.4
Oestradiol on the day of hCG (pmol/l)	536 ± NA	1976 ± 781	427 ± NA

Natural Cycle Intrauterine Insemination

Twelve patients underwent 23 cycles of intrauterine insemination during natural cycles because of coital problems (n=22) or male factor (n=1).

The mean age of patients was 35.6 years. Two pregnancies were achieved and the **pregnancy rate** was 8.7% per cycle initiated. There were two ongoing singleton pregnancies.

Miscellaneous Statistics

	Number
Diagnostic laparoscopy +/- chromotubation	9
Laparoscopic ovarian cystectomy	8
Laparoscopic salpingostomy	6
Laparoscopic adhesiolysis	18
Laparoscopic salpingectomy	3
Laparoscopic segmental resection	31
Laparoscopic ovarian drilling	0
Laparoscopic ablation of endometriosis	1
Laparoscopic salpingo-oophorectomy	1
Myomectomy	1
Diagnostic hysteroscopy	13
Hysteroscopic polypectomy	51
Hysteroscopic adhesiolysis	11
Hysteroscopic lysis of uterine septum	4
Hysteroscopic myomectomy	3
Hysteroscopic proximal tubal cannulation	3
Others	3

Outpatient Clinics

	New	Follow-up
Infertility Clinics	627	603
Nurse Triage Clinic	278	0
Male infertility Clinics*	1	12
Reproductive Genetic Clinic	52	26
Recurrent Miscarriage Clinic	55	42
Sexual Counselling	46	0
Private Clinic – Reproductive Medicine	522	290

*Only those cases seen under Department of Obstetrics and Gynaecology were counted here (mainly cases requiring counselling or treatment on male endocrine problems). Those requiring assessment and management by urologists were seen in the Department of Surgery and were not counted here.

Publications and Conference Reports

Publications

- Cao M., Chan R.W.S., CHENG H.C., Li J.R., LI T., Pang T.K.R., Lee C.L., Li R.H.W., Ng E.H.Y., Chiu C.N. and Yeung W.S.B., Myometrial cells stimulate self-renewal of endometrial mesenchymal stem-like cells through WNT5A/ β -catenin signalling. , *Stem Cells*. 2019. <http://dx.doi.org/http://dx.doi.org/10.1002/stem.3070> (Publication No. : 313717; Weighting : 1.0000)
- Chan C.H.Y., Lau B.H.P., Wong Q.S., Tam M.Y.J., So Y.K.G., Leung H.T., Fung Y.L., Chan C.L.W., Li R.H.W. and Ng E.H.Y., Comparing the effectiveness of I-BMS-informed self-help interventions in alleviating psychosocial distress for women awaiting the outcome of IVF treatment, In: Lee Geok Ling, *Asia Pacific Journal of Social Work and Development*. 2019. <http://dx.doi.org/10.1080/02185385.2019.1578684> (Publication No. : 301466; Weighting : 0.2000)
- Chan H.S.S., Li R.H.W., Lee V.C.Y., Tang M.H.Y. and Ng E.H.Y., Knowledge, Attitude And Ethical Consideration Of Chinese Couples Requesting Preimplantation Genetic Testing In Hong Kong., *J Obstet Gynaecol Res*. 2019. <http://dx.doi.org/10.1111/jog.13940> (Publication No. : 305213; Weighting : 0.6000)
- Chang H, Xie L, Ge H, Wu Q, Wen Y, Zhang D, Zhang Y, Ma H, Gao J, Wang CC, Stener-Victorin E, Ng EH, Wu X. (2019) Effects of hyperhomocysteinaemia and metabolic syndrome on reproduction in women with polycystic ovary syndrome: a secondary analysis. *Reprod Biomed Online*. Jun;38(6):990-998.
- Chen Z.Q., Wang Y., Ng E.H.Y., Zhao M., Pan J.P., Wu H.X. and Teng X.M., A randomized triple blind controlled trial comparing the live birth rate of IVF following brief incubation versus standard incubation of gametes, *Human Reproduction*. 2019, 34, 100-108. <http://dx.doi.org/10.1093/humrep/dey333> (Publication No. : 296569; Weighting : 0.1429)
- Cheng I.S.C., LI R., Leung G.P.H., Li S.L., Kong M., Lao L., Zhang Z., Lin W.L., Ng E.H.Y., Rong J., Chen J., Su J., Zhang Y. and Meng W., Application of UPLC-MS/MS to simultaneously detect four bioactive compounds in the tumour-shrinking decoction (FM1523) for uterine fibroids treatment, *Phytochemical Analysis*. 2019. <http://dx.doi.org/10.1002/pca.2827> (Publication No. : 297958; Weighting : 0.0714)
- Cheng S.S.W., Chan Y.K., Leung K.K.P., Au P.K.C., Tam W.K., Li S.K.M., Luk H.M., Kan S.Y.A., Chung B.H.Y., Lo F.M.I. and Tang M.H.Y., Experience of chromosomal microarray applied in prenatal and postnatal settings in Hong Kong, *American Journal of Medical Genetics Part C: Seminars in Medical Genetics*. 2019. <http://dx.doi.org/10.1002/ajmg.c.31697> (Publication No. : 297491; Weighting : 0.2727)
- Chow J.F.C., Cheng H.Y.H., Lau Y.L.E., Yeung W.S.B. and Ng E.H.Y., Selective transfer of euploid non-carrier embryos with the use of long-read sequencing in preimplantation genetic testing for reciprocal translocation, *Reproductive BioMedicine Online*. 2019, 39, e14-e15. <http://dx.doi.org/10.1016/j.rbmo.2019.04.038> (Publication No. : 312855; Weighting : 1.0000)
- Chow JFC, Cheng HHY, Lau EYL, Yeung WSB, Ng EHY. (2019) Distinguishing between carrier and noncarrier embryos with the use of long-read sequencing in preimplantation genetic testing for reciprocal translocations. *Genomics*. Apr 1. pii: S0888-7543(18)30617-7.
- Kubi J.A., Chen C.H., Fong S.W., Lai K.P., Wong C.K.C., Yeung W.S.B., Lee C.K.F. and Lee C.Y.L., Effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) on the differentiation of embryonic stem cells towards pancreatic lineage and pancreatic beta cell function, *Environment International*. 2019, 130, 104885. <http://dx.doi.org/10.1016/j.envint.2019.05.079> (Publication No. : 298449; Weighting : 0.7500)
- Liang S., Kinghorn A.B., Voliotis M., Prague J.K., Veldhuis J.D., Tsaneva-Atanasova K., McArdle C.A., Li R.H.W., Cass A.E.G., Dhillo W.S. and Tanner J.A., Measuring luteinising hormone pulsatility with a robotic aptamer-enabled electrochemical reader, *Nature Communications*. 2019,

- 10, 852. <http://dx.doi.org/10.1038/s41467-019-08799-6> (Publication No. : 297175; Weighting : 0.0909)
- Lau B.H.P., Yao H., Tam M.Y.J., Chan C.L.W., Ng E.H.Y. and Chan C.H.Y., Gratitude in infertility: A cross-sectional examination of dispositional gratitude in coping with infertility-related stress in women undergoing in vitro fertilization (IVF), *Human Reproduction Open*. 2019, 1-11. <http://dx.doi.org/10.1093/hropen/hoz012> (Publication No. : 304789; Weighting : 0.1667)
- Lee C.L., Veerbeek J.H.W., Rana T.K., van Rijn B.B., Burton G.J. and Yung H.W., Endoplasmic reticulum stress reduces matrix metalloproteinase-2 activity via eIF2a-ATF4 pathway: Implications for trophoblast invasion in complicated pregnancies., *American Journal of Pathology*. 2019, 189, 467-478. <http://dx.doi.org/10.1016/j.ajpath.2018.10.015> (Publication No. : 303073; Weighting : 0.1667)
- Lee C.L., Vijayan M., Wang X., Lam K.W., Koistinen H., Seppala M., Li R.H.W., Ng E.H.Y., Yeung W.S.B. and Chiu C.N., Glycodelin-A stimulates the conversion of human peripheral blood CD16-CD56bright NK cell to a decidual NK cell-like phenotype, *Human Reproduction*. 2019, 34, 689-701. <http://dx.doi.org/10.1093/humrep/dey378> (Publication No. : 302137; Weighting : 0.8000)
- Lensen S, Venetis C, Ng EHY, Young SL, Vitagliano A, Macklon NS, Farquhar C. (2019) Should we stop offering endometrial scratching prior to in vitro fertilization? *Fertil Steril*. Jun;111(6):1094-1101.
- Lensen S, Shreeve N, Barnhart KT, Gibreel A, Ng EHY, Moffett A. (2019) In vitro fertilization add-ons for the endometrium: it doesn't add-up. *Fertil Steril*. 2019 Dec;112(6):987-993. doi: 10.1016/j.fertnstert.2019.10.011.
- Li J, Wu Q, Wang CC, Wang R, Ng EHY, Liu JP, Mol BWJ, Wu XK, Li WT; PCOSAAct Study Group. (2019) Endocrine characteristics, body mass index and metabolic syndrome in women with polycystic ovary syndrome. *Reprod Biomed Online*. 2019 Nov;39(5):868-876. doi: 10.1016/j.rbmo.2019.06.014.
- Li M., Huang T., and Liu K., The histone modification reader ZCWPW1 is required for meiosis prophase I in male but not in female mice, *Science Advances*. 2019, 5, eaax1101. <http://dx.doi.org/10.1126/sciadv.aax1101> (Publication No. : 305011; Weighting : 0.5000)
- Li RHW, Lo SST, Ho PC. Fertility regulation. In: *Practical Obstetrics and Gynaecology*. Hong Kong: Department of Obstetrics and Gynaecology, The University of Hong Kong; 2019. pp. 196-210.
- Li HWR, Ho PC. Termination of pregnancy. In: Arulkumaran S, Ledger W, Denny L, Doumouchsis S (Eds). *Oxford Textbook of Obstetrics and Gynaecology*. United Kingdom: Oxford University Press; 2020. pp. 678-683.
- Li R.H.W., Ko K.Y.J., Lee V.C.Y., Yung S.F.S., Lau Y.L.E., Yeung W.S.B., Ho P.C. and Ng E.H.Y., Comparing antral follicle count and serum anti-Mullerian hormone level for determination of gonadotrophin dosing in in-vitro fertilisation: a randomized trial , *Ultrasound in Obstetrics & Gynecology*. 2019. <http://dx.doi.org/10.1002/uog.20402> (Publication No. : 302142; Weighting : 1.0000)
- Li R.H.W., Resche-Rigon M., Bagchi I.C., Gemzell Danielsson E.K.M. and Glasier A., Does ulipristal acetate emergency contraception (ELLA®) interfere with implantation?, *Contraception*. 2019. <http://dx.doi.org/10.1016/j.contraception.2019.07.140> (Publication No. : 302141; Weighting : 0.4000)
- Li R.H.W. and Gemzell Danielsson E.K.M., Mechanisms of action of emergency contraception pills, *The European Journal of Contraception & Reproductive Health Care*. 2019, 24, 11-12. <http://dx.doi.org/10.1080/13625187.2018.1555663> (Publication No. : 302140; Weighting : 1.0000)
- Li S., Ip K.M., Tang Y.H., Tang K.S., Tong Y., Zhang J., Hassan A.A., Mak A.S.C., Yung S.S.Y., Chan D.T.M., Ip P.C.P., Lee C.L., Chiu C.N., Lee L.T.O., Lai H.C., Zeng J.Z., Shum H.C. and Wong A.S.T., Sialyl LewisX-P-selectin cascade mediates tumor-mesothelial adhesion in ascitic fluid shear flow, *Nat Commun*. 2019, 10(1), 2406. <http://dx.doi.org/10.1038/S41467-019-10334-6> (Publication No. : 300448; Weighting : 0.1111)

- Liu H.B., et A.L., Li M., et A.L., Liu K. and Chen Z.J., SCRE serves as a unique synaptonemal complex fastener and is essential for progression of meiosis prophase I in mice, *Nucleic Acid Research*. US, 2019, 47, 5670. <http://dx.doi.org/10.1093/nar/gkz226> (Publication No. : 305397; Weighting : 0.3333)
- Lui M.W.E., Yeung W.S.B., Ho P.C. and Ng E.H.Y., In vitro fertilisation in Hong Kong: the situation in 2019, *Hong Kong Medical Journal*. 2019. <http://dx.doi.org/10.12809/hkmj198057> (Publication No. : 308805; Weighting : 1.0000)
- Teede H, Misso M, Tassone EC, Dewailly D, Ng EH, Azziz R, Norman RJ, Andersen M, Franks S, Hoeger K, Hutchison S, Oberfield S, Shah D, Hohmann F, Ottey S, Dabadghao P, Laven JSE. Anti-Müllerian Hormone in PCOS: A Review Informing International Guidelines. *Trends Endocrinol Metab*. 2019 Jul;30(7):467-478.
- Mei S., Chen P., Lee C.L., Zhao W., Wang Y., Lam K.K.W., Ho P.C., Yeung W.S.B., Fang C., Chiu P.C.N., The role of galectin-3 in spermatozoa-zona pellucida binding and its association with fertilization in vitro., *Mol Hum Reprod*. 2019, 25, 458-470.
- Wang X., Lee C.L., Li R.H.W., Vijayan M., Duan Y., Yeung W.S.B., Zhang Y.Z. and Chiu C.N., Alteration of the immune cell profiles in the pathophysiology of tubal ectopic pregnancy, *American Journal of Reproductive Immunology*. 2019, 81, e13093. <http://dx.doi.org/10.1111/aji.13093> (Publication No. : 302138; Weighting : 0.8750)
- Wong H.Y.Q., Lui M.W.E., Yung S.F.S., Ko K.Y.J., Li R.H.W. and Ng E.H.Y., Randomized controlled trial of transcutaneous electrical nerve stimulation for pain relief during transvaginal oocyte retrieval using conscious sedation: study protocol for a randomized controlled trial, *Trials*. 2019, 20. <http://dx.doi.org/10.1186/s13063-019-3227-5> (Publication No. : 302139; Weighting : 1.0000)

Conference papers

- Chan R.W.S., Cao M., Ng E.H.Y. and Yeung W.S.B., Microenvironmental regulation of human endometrial mesenchymal stem-like cells., *European Society of Human Reproduction and Embryology*. 2019. (Publication No. : 301784; Weighting : 1.0000)
- Chen X., Leung S.N., Li R.H., Yeung W.S., Lee K.F., Screening and characterization of molecules modulating embryo implantation using a high throughput in vitro co-culture model., P482. The 52nd Annual conference of the Society for the study of reproduction. 18-21 Jul 2019, San Jose, CA, USA.
- Dhillon W.S., LIANG S., Kinghorn A.B., Voliotis M., Prague M.K., Veldhuis J.D., SHIU C.C., Tsaneva-Atanasova K., McArdle C.A., Li R.H.W., Cass A.E.G. and Tanner J.A., Measuring LH Pulsatility in Patients with Reproductive Disorders using a Novel Robotic Aptamer-Enabled Electrochemical Reader (RAPTER), *Journal of the Endocrine Society*, 3, Supplement 1, SAT-LB040, ENDO 2019, New Orleans, USA. 2019. <http://dx.doi.org/10.1210/js.2019-SAT-LB040> (Publication No. : 297921; Weighting : 0.0833)
- Jiang L.H., Fan H.J., Ng E.H., Yeung W.S., Lee K.F., Low-dose bisphenols exposure affecting follicle development in next generation in mice., P149. The 52nd Annual conference of the Society for the study of reproduction. 18-21 Jul 2019, San Jose, CA, USA.
- Lee K.F., Fan H.J., Wong C.K., Yeung W.S., Ng E.H., Differential effect of bisphenols (BPA, BPF and BPS) in regulating gene expression and receptivity in endometrial epithelial Ishikawa cells. P182. The 52nd Annual conference of the Society for the study of reproduction. 18-21 Jul 2019, San Jose, CA, USA.
- Li R.H.W., Ko K.Y.J., Lau Y.L.E., Yeung W.S.B., Ho P.C. and Ng E.H.Y., Role of ovarian response prediction index (ORPI) in predicting ovarian response and live birth of women undergoing in-vitro fertilisation and receiving corifollitropin alpha in an antagonist protocol., 23rd International Federation of Fertility Societies World Congress. 2019. (Publication No. : 302143; Weighting : 1.0000)

- Li R.H.W., Ko K.Y.J., Lee V.C.Y., Yung S.F.S., Lau Y.L.E., Yeung W.S.B., Ho P.C. and Ng E.H.Y., Comparing antral follicle count and serum anti-Mullerian hormone level for determination of gonadotrophin dosing in in-vitro fertilisation: a randomised trial., World Congress 2019 of the Royal College of Obstetricians and Gynaecologists. 2019. (Publication No. : 302144; Weighting : 1.0000)
- Liang S., Kinghorn A.B., Voliotis M., Prague M.K., Veldhuis J.D., SHIU C.C., Tsaneva-Atanasova K., McArdle C.A., Li R.H.W., Cass A.E.G., Dhillon W.S. and Tanner J.A., Robotic aptamer-enabled electrochemical reader (RAPTER) – Diagnosing reproductive disorders from the laboratory to the clinic, Aptamers 2019, 6th Oxford Symposium on Aptamers, Oxford University, United Kingdom. 2019. (Publication No. : 297926; Weighting : 0.0833)
- Yung S.F.S., Lai S.F., Lam M.T., Lui M.W.E., Ko K.Y.J., Li R.H.W., Lau Y.L.E., Yeung W.S.B. and Ng E.H.Y., Hyaluronan-enriched embryo transfer medium for frozen-thawed embryo transfer: a double-blind randomised controlled trial (Human Reproduction), 35th Annual Meeting of the European Society of Human Reproduction and Embryology. 2019, 34 Suppl_1.1, i237. (Publication No. : 306206; Weighting : 1.0000)

Cumulative Statistics

Table 36: Comparative Results of Conventional IVF-ET

	2019	2018	2017	2016	2015
Number of Patients	415	419	304	266	357
Number of Cycles Initiated	448	444	326	284	390
Number of Cycles Cancelled	14	11	17	12	21
Number of Cycles with Oocyte Retrieval	434	433	309	272	369
Number of Oocyte Retrieved	3872	4572	3142	2454	3401
Mean No. of Oocytes / Oocyte Retrieval	8.9	10.6	10.2	9.0	9.2
Number of Oocyte Fertilized	2600	3282	2317	1701	2395
Fertilization Rate	72.4%	71.8%	73.7%	69.3%	70.4%
Number of Cleaving Embryos	2476	3150	2231	1622	2306
Mean No. of Cleaving Embryos/ Retrieval	5.7	7.3	7.2	6.0	6.2
Number of Cycles with Transfer	230	250	201	196	279
Number of Embryos Transferred	231	287	277	298	466
Mean No. of Embryos / Transfer	1.0	1.1	1.4	1.5	1.7
Range	1-2	1-2	1-2	1-2	1-2
Number of Pregnancies	91	97	74	88	114
Pregnancy Rate / Transfer	39.6%	38.8%	36.8%	44.8%	40.9%
Ongoing Pregnancy Rate / Transfer	30.4%	30.4%	33.3%	35.2%	31.2%
Number of Embryos Frozen	1050	1303	839	615	963

Table 37: Comparative Results of ICSI (Ejaculated sperm), excluding PGT

	2019	2018	2017	2016	2015
Number of Patients	236	236	197	240	272
Number of Cycles Initiated	255	264	214	214	297
Number of Cycles Cancelled	1	0	0	0	1
Number of Cycles with Oocyte Retrieval	254	264	214	214	296
Number of Oocytes Retrieved	2643	3714	2094	2164	3180
Mean No. of Oocytes / Retrieval	10.4	10.0	9.8	10.1	10.7
Number of Oocyte Fertilized	1504	1541	1268	1316	2004
Fertilization Rate	70.4%	74.3%	74.4%	73.1%	76.1%
Number of Cleaving Embryos	1472	1503	1268	1298	1966
Mean No. of Cleaving embryos/ Retrieval	5.8	5.7	5.9	6.1	6.6
Number of Cycles with Transfer	126	153	147	149	216
Number of Embryos Transferred	129	187	200	243	349
Mean No. of Embryos / Transfer	1.0	1.2	1.4	1.6	1.6
Number of Pregnancies	40	47	61	58	86
Pregnancy Rate / Transfer	31.7%	30.7%	41.5%	39.8%	39.8%
Ongoing Pregnancy Rate / Transfer	26.2%	21.6%	32.0%	28.2%	29.2%
Number of Embryos Frozen	656	719	580	567	837

Table 38: Comparative Results of Frozen-thawed Embryo Transfer (FET)

	2019	2018	2017	2016	2015
Number of Patients	693	636	513	420	532
Number of Thaw Cycles	936	885	670	520	671
Number of Transfer Cycles	925	874	659	509	660
Total Number of Embryos Thawed	1015	1090	1000	852	1187
Number of Embryos Replaced	936	992	852	753	1025
Mean Number Replaced	1.0	1.1	1.3	1.5	1.6
Type of Transfer Cycle:					
Natural	685	602	482	342	484
Clomid-/ Letrozole-Induced	1	1	6	30	115
Hormone Replacement	152	266	170	135	59
Stimulated	2	2	1	2	2
Number of Pregnancies	383	364	265	208	271
Pregnancy Rate / Transfer	41.4%	41.6%	40.2%	30.7%	41.1%
Ongoing Pregnancy Rate / Transfer	33.3%	29.2%	31.3%	22.4%	32.0%

