MONASH IVF GROUP

repromed
Fertility Specialists.

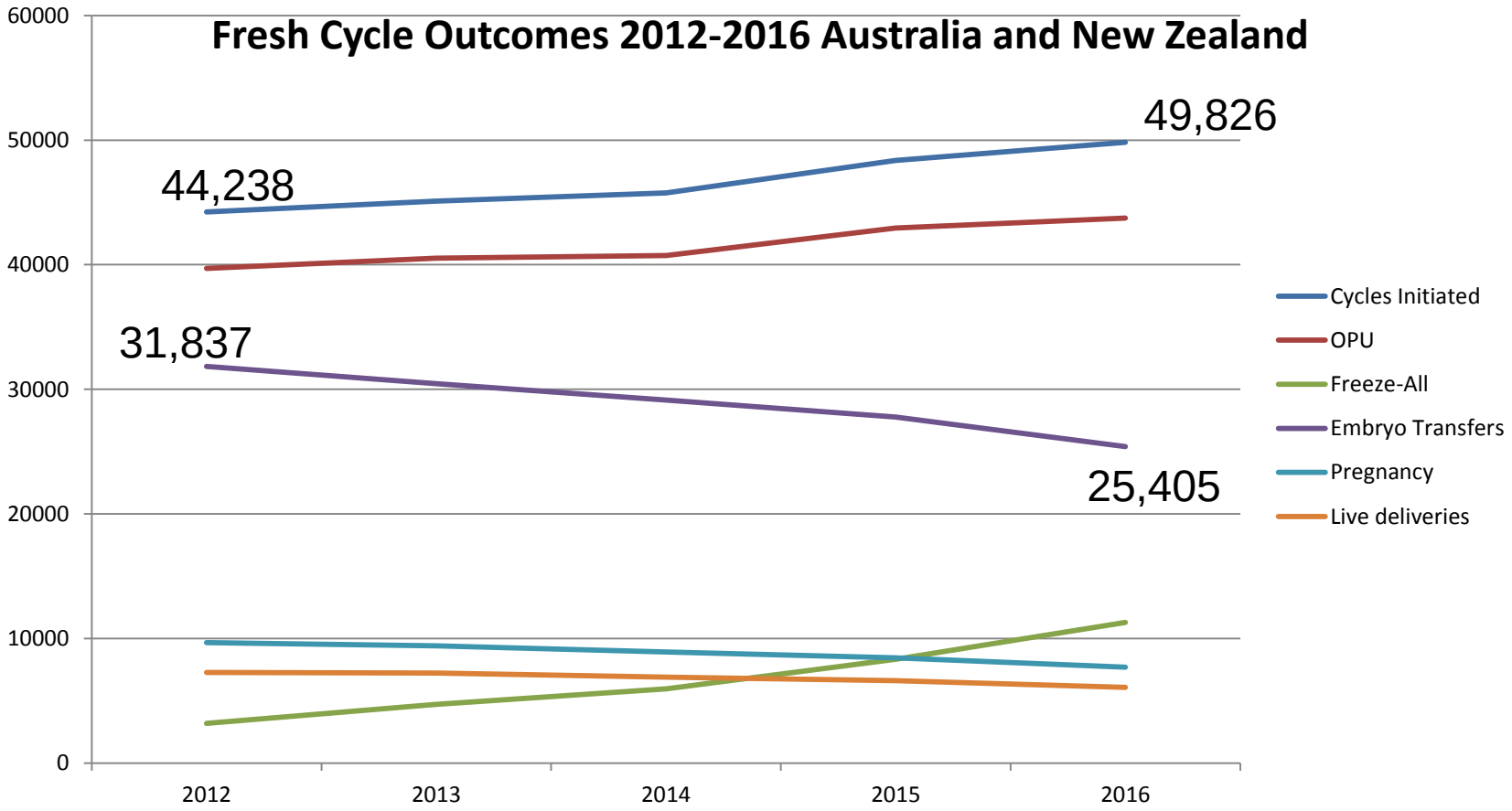
INSIDE IVF: HOW SCIENCE CARES FOR PATIENTS

DR DEIRDRE ZANDER-FOX
MONASH IVF GROUP
HDA GRAND ROUND OCTOBER 31ST 2018

IVF-THE ULTIMATE GOAL

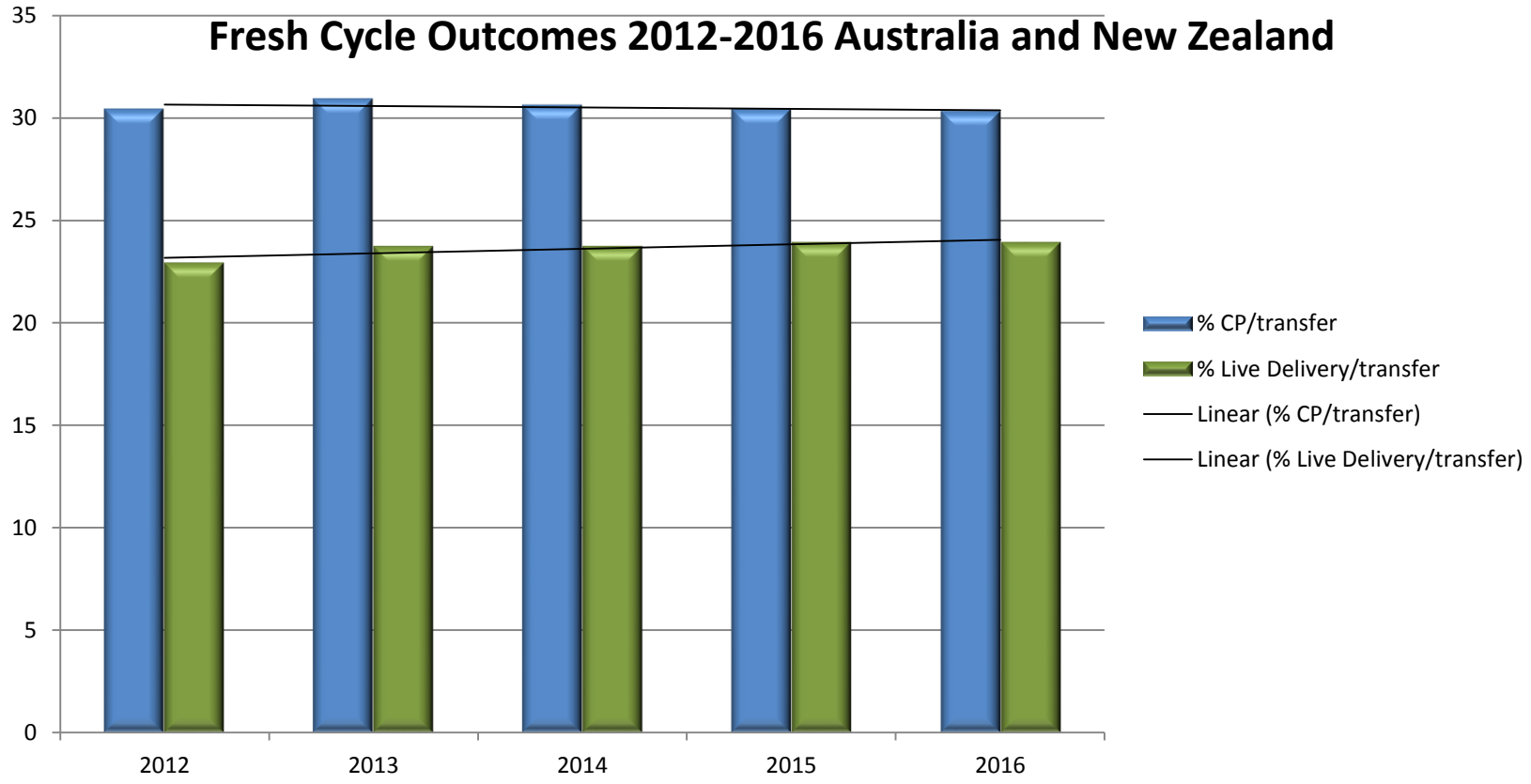
- FERTILISATION
- EMBRYO CLEAVAGE AND DEVELOPMENT
- POSITIVE HCG
- POSITIVE SAC ON ULTRASOUND
- POSITIVE FETAL HEART
- LIVE BIRTH (SINGLETON, TWIN, TRIPLET)
- SINGLETON, LIVE, HEALTHY, TERM BABY
- **HEALTHY FOR LIFE** ♥

IVF-AUSTRALIA AND NZ



ANZARD Report 2016 (published 2018)

IVF-AUSTRALIA AND NZ



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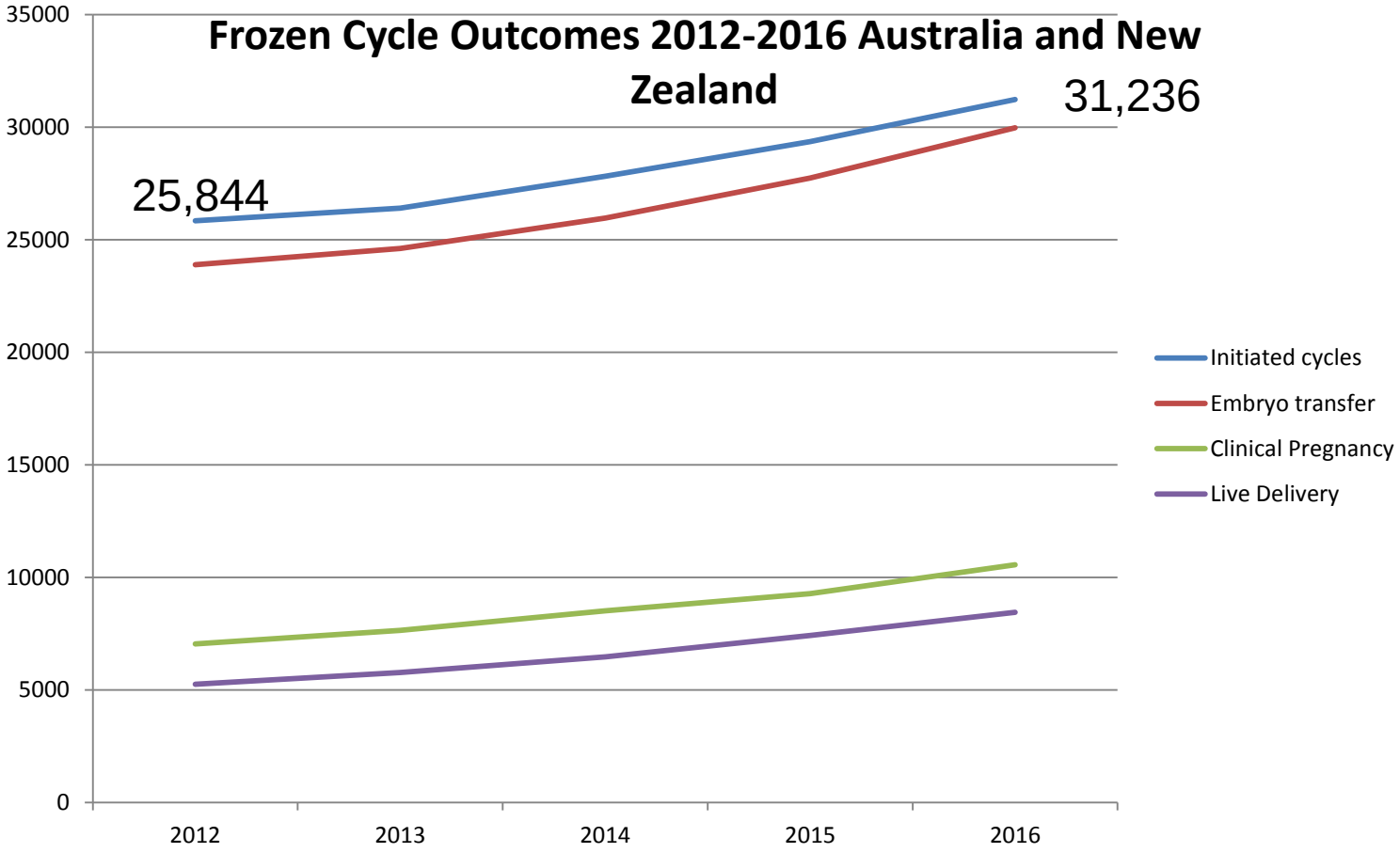

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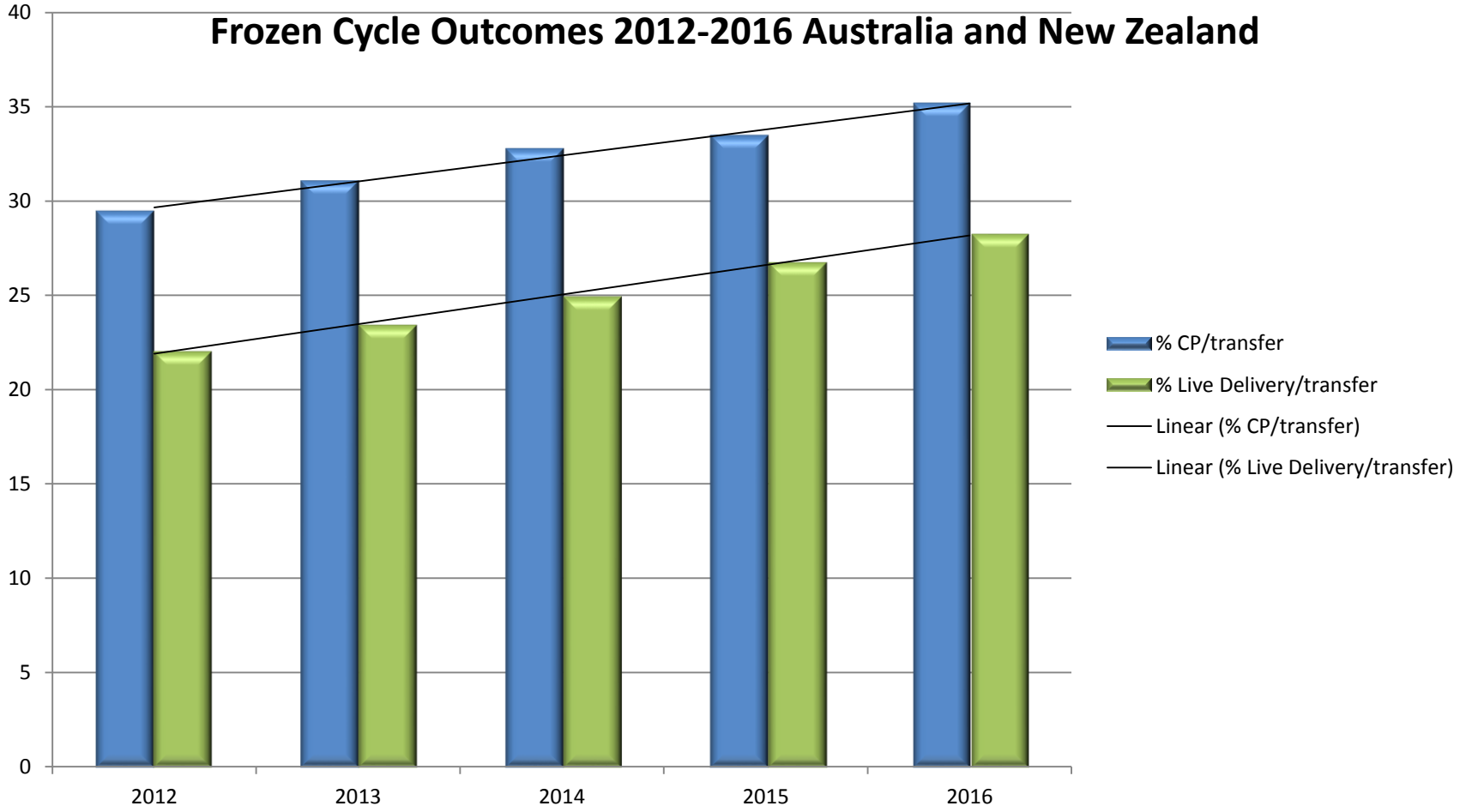
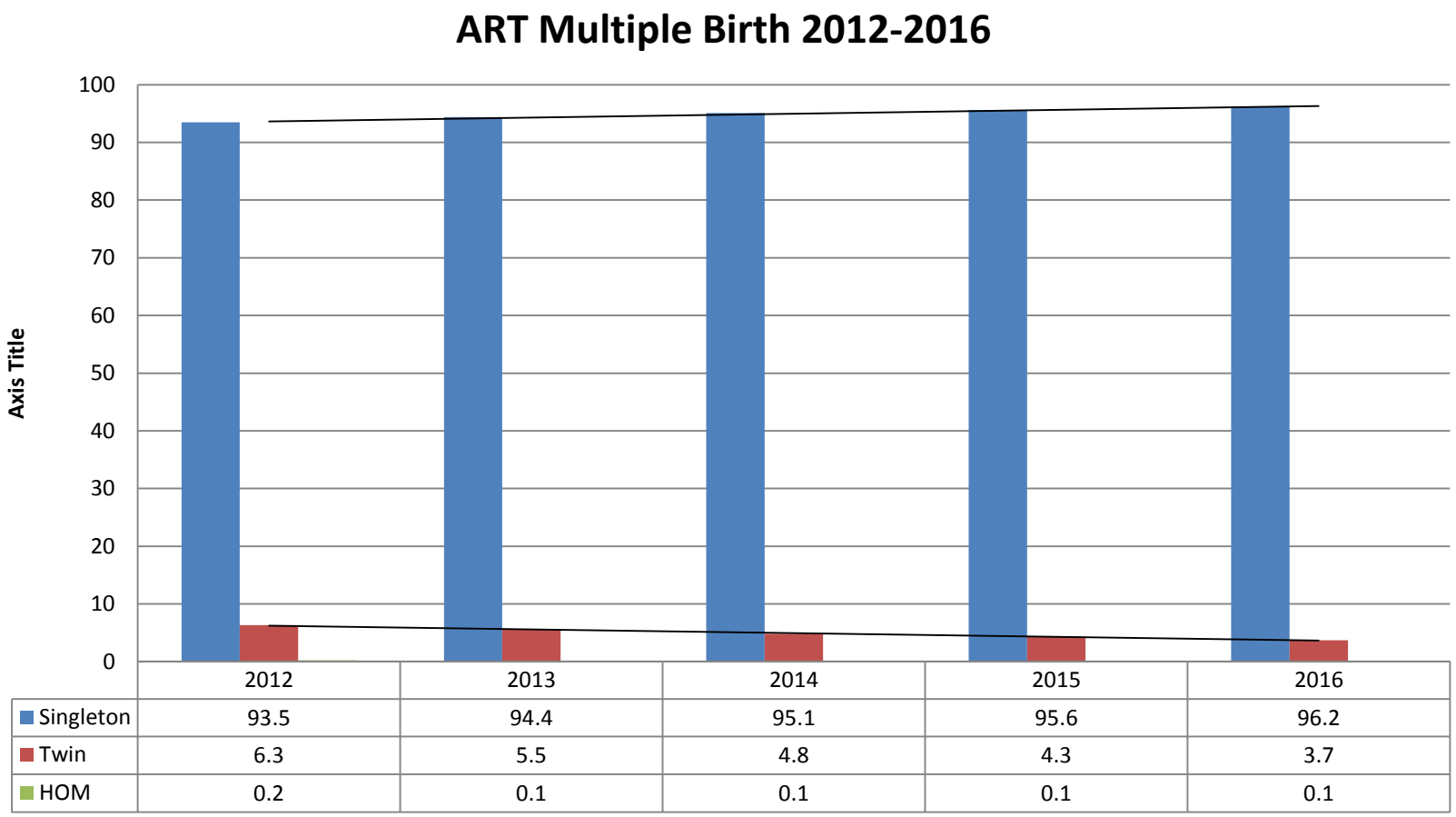
MULTIPLE BIRTH



ANZARD Report 2016 (published 2018)

MULTIPLE BIRTH



	2012	2013	2014	2015	2016
Singleton	93.5	94.4	95.1	95.6	96.2
Twin	6.3	5.5	4.8	4.3	3.7
HOM	0.2	0.1	0.1	0.1	0.1

ANZARD Report 2016 (published 2018)

PATIENT DEMOGRAPHIC

Maternal Age	Cycles	%
<30 years	4678	9.9%
30-34 years	12,447	26.4%
35-39 years	16,804	35.6%
40-44 years	12,200	25.9%
≥45 years	1,043	2.2%
Total	47,172	

Cause of Infertility:
10.7% Male Factor
31.3% Female factor
12.2% Combined
24.8% Unknown

ANZARD Report 2016 (published 2018)

LIVE BIRTH RATES

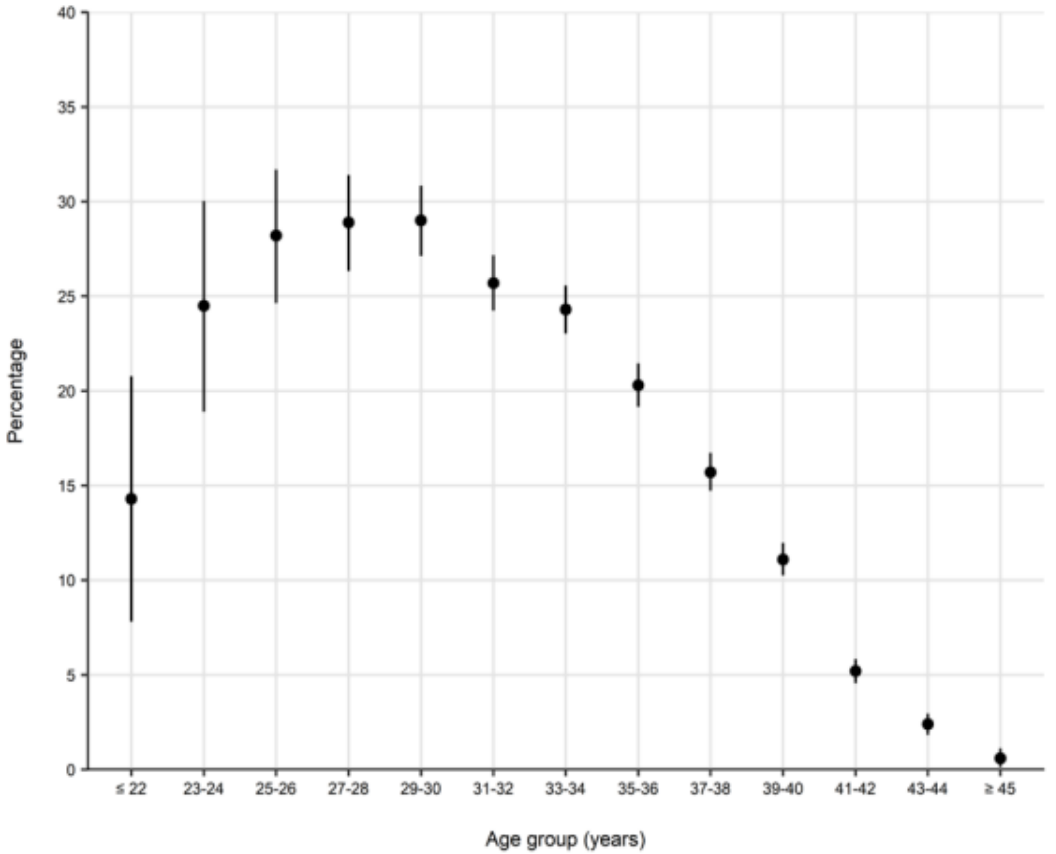
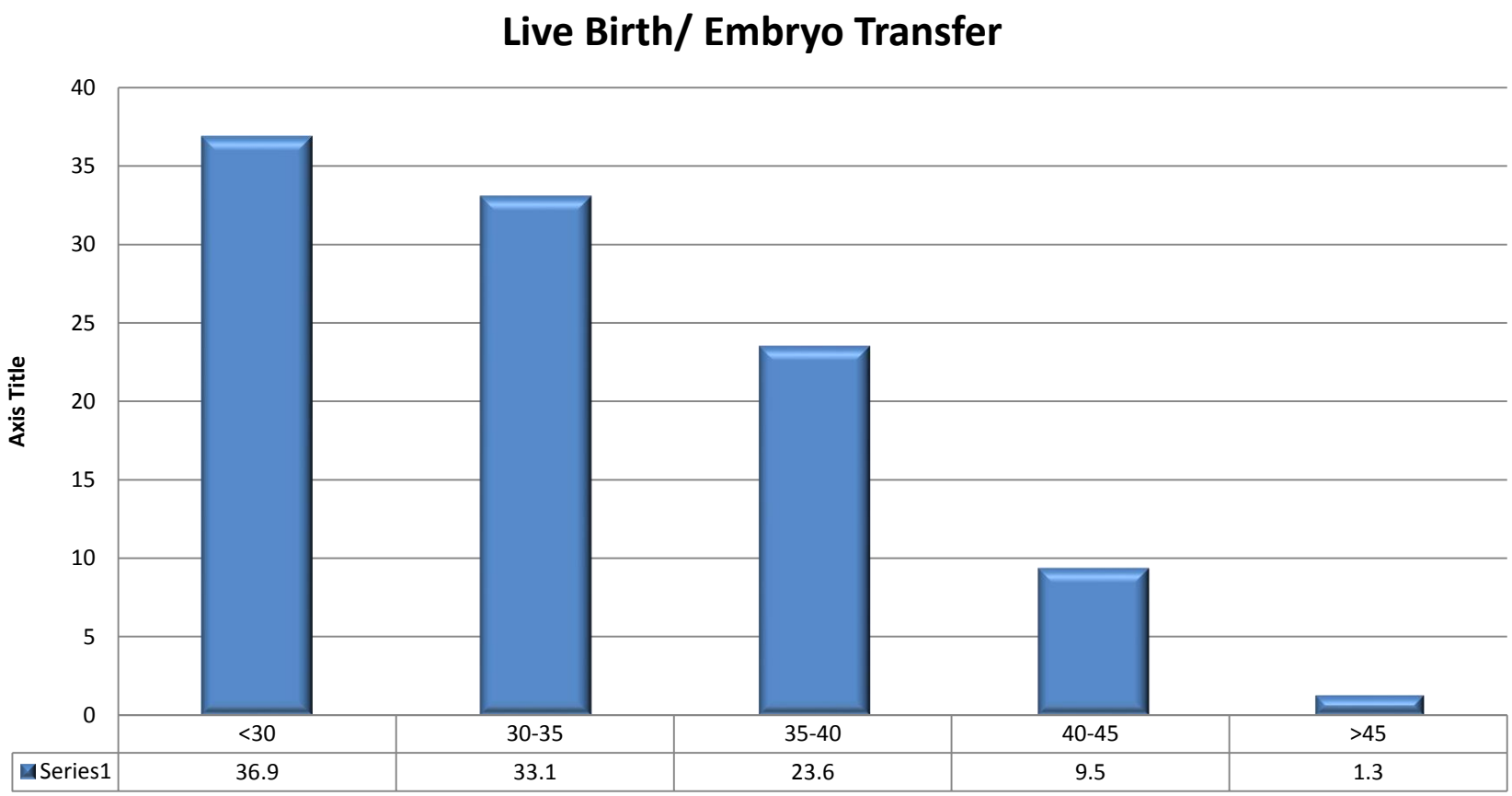


Figure 3: Live delivery rate (with 95% confidence interval) per initiated autologous fresh cycle (excluding *freeze-all*) by women's age at start of a treatment cycle, Australia and New Zealand, 2016

LIVE BIRTH


Live Birth/ Embryo Transfer
Axis Title
40
35
30
25
20
15
10
5
0
<30
30-35
35-40
40-45
>45
Series1
36.9
33.1
23.6
9.5
1.3

THE LATEST IVF SCIENCE: THE AGE OF AUTOMATION

AUTOMATED SEMEN ANALYSIS

- Historically performed manual semen analysis
- Takes 1 hour
- Manual counting
- Automated semen analysis
- IVD
- Computer/AI programs to perform (with <6% CV- most are <2%)
    - Count
    - Motility
    - Morphology
    - DNA damage
    - Vitality
    - WBC
- 2 minutes
- Fully automated reporting
- Images and video can be provided
- More accurate

AUTOMATED SA

Automation is the key to standardized semen analysis using the automated SQA-V sperm quality analyzer

Ashok Agarwal, Ph.D., H.C.L.D.,[a,b] *and Rakesh K. Sharma, Ph.D.*[a,b]

[a] Reproductive Research Center, Glickman Urological Institute; and [b] Department of Obstetrics-Gynecology, Cleveland Clinic Foundation, Cleveland, Ohio

Objective: To evaluate the performance of the automated semen quality analyzer system for assessing sperm quality.
Design: Double-blind prospective study.
Setting: Tertiary care hospital.
Patient(s): Fifty healthy men donated semen samples.
Intervention(s): None.
Main Outcome Measure(s): Precision, accuracy and agreement between automated and manual semen analysis methods was assessed for sperm concentration, motility, morphology, and known concentrations of latex bead quality control media.
Result(s): A good agreement was seen between the results of sperm concentration reported by the SQA-V automated analyzer (Spermalite/SQA-V; Medical Electronic Systems Ltd, Caesarea Industrial Park, Israel) and those obtained manually. A similar linearity was seen when the SQA-V results were compared with the manual data and also when the manual results of individual operators were compared with each other. The automated assessment of morphology showed high sensitivity (89.9%) for identifying percent normal morphology, and the precision of the SQA-V was considerably higher when compared with the manual method. The interoperator variability for manual assessment was significant. The automated analysis was quick compared with the manual method.
Conclusion(s): The SQA-V can be used interchangeably with manual semen analysis methods for examining sperm concentration and motility. The automated SQA-V analyzer is more precise and shows the ability to accurately classify normal versus abnormal sperm morphology. (Fertil Steril® 2007;87:156–62. ©2007 by American Society for Reproductive Medicine.)

Key Words: Male infertility, semen analysis, sperm concentration, motility, SQA-V

TABLE 3

Coefficient of variation of automated SQA-V versus manual semen analysis results for sperm concentration, motility, and morphology and for the quality control for concentration.

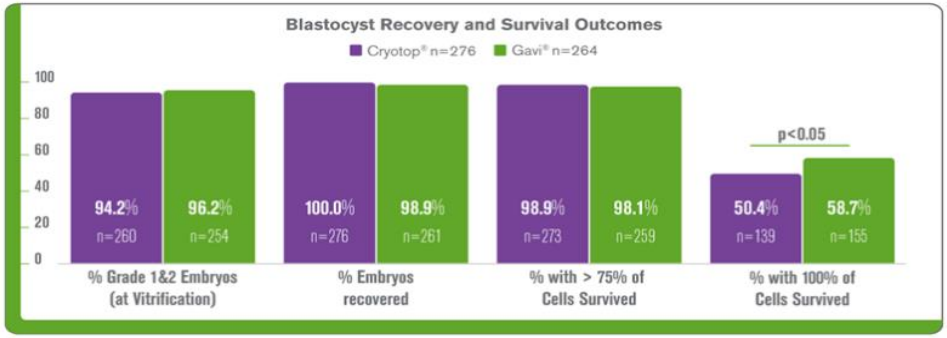
	CV (%)		
Variable	SQA-V	First operator	Second operator
Sperm concentration	1.4	6.0	5.1
Motility	2.5	5.7	5.4
MSC	2.4	7.9	7.9
Morphology	2.7	14.0	14.7
Quality control			
Control beads 1	0.0	10.4	4.4
Control beads 2	0.0	10.4	9.7

Note: CV = coefficient of variation; MSC = motile sperm count

Agarwal. SQA-V versus manual semen analysis. Fertil Steril 2007.

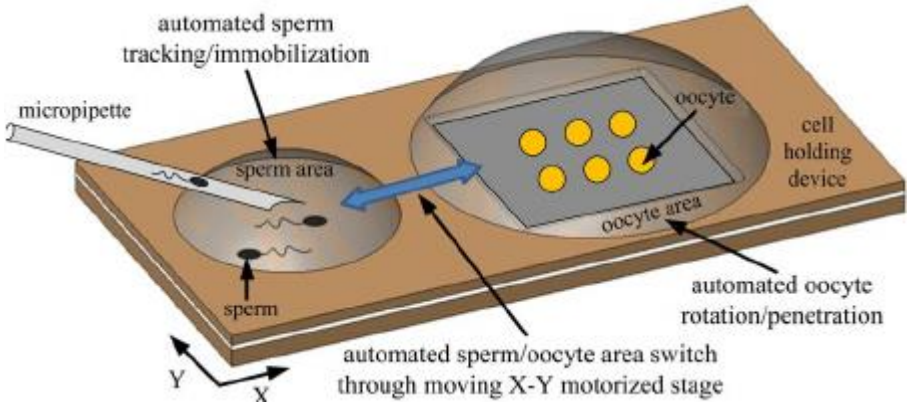
AUTOMATED VITRIFICATION

- GENEA BIOMEDEX
- VITRIFICATION IS THE BEST METHOD FOR OOCYTE AND EMBRYO CRYOPRESERVATION
- REMOVAL OF WATER FROM CELLS AND REPLACE WITH HIGH LEVELS OF CRYOPROTECTANT (WHICH CAN BE TOXIC) WITHIN 30-45 SECONDS
- STEEP LEARNING CURVE
- INTENSE FOCUS, SPEED AND PRECISION
- GAVI REMOVES THE OPERATOR VARIABILITY
- STANDARDISED VITRIFICATION
- MICROFLUIDICS



AUTOMATED ICSI

- PROTOTYPE DEVELOPED
- AUTO INJECTORS (ALREADY USED IN TRANSGENICS)
- USE OF MICRO-ROBOTICS- SPERM IMMOBILISATION
- FORCE SENSORS TO ENSURE EGG IS NOT LYSED (90% SURVICAL RATES)
- AI IMAGE TRACKING
- HUMAN TRIALS HAVE COMMENCED



2102 IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, VOL. 58, NO. 7, JULY 2011

Robotic ICSI (Intracytoplasmic Sperm Injection)

Zhe Lu, *Member, IEEE*, Xuping Zhang, *Member, IEEE*, Clement Leung, Navid Esfandiari, Robert F. Casper, and Yu Sun*, *Senior Member, IEEE*

TIMELAPSE

TIMELAPSE

- Dry incubator
- 15 patient capacity
- 16 embryos/dish
- Image taken of each embryo every 5 minutes
- Placed into a timelapse video

- 24hour monitoring of development compared to static observations
- Uninterrupted observation
- Gas mixer- negates need for pre-mixed gas
- Allows flexibility of staffing time
- Morphokinetic assessment to aid in embryo selection

TIMELAPSE

RBM ONLINE

ELSEVIER

Review

Time-lapse culture with morphokinetic embryo selection improves pregnancy and live birth chances and reduces early pregnancy loss: a meta-analysis

CrossMark

Csaba Pribenszky [a,], Anna-Maria Nilselid [b], Markus Montag [c]*

[a] University of Veterinary Science, Istvan u. 2., Budapest 1078, Hungary
[b] Vitrolife Sweden AB, Box 9080, Göteborg SE-400 92, Sweden
[c] ilabcomm GmbH, Eisenachstr. 34, Sankt Augustin 53757, Germany

Table 4 – Chi-squared analysis of the time-lapse monitoring effect on clinical outcome.

	Time-lapse monitoring, n (%)	Conventional culture and evaluation, n (%)	P-value
Ongoing pregnancy	400/784 (51.0)	340/853 (39.9)	<0.0001
Early pregnancy loss	72/472 (15.3)	92/432 (21.3)	0.0186
Live birth	84/190 (44.2)	91/291 (31.3)	0.0040
Stillbirth	9/190 (4.7)	7/291 (2.4)	NS

NS, not statistically significant.

- Five studies with 1637 patients
- Time-lapse coupled with morphokinetic algorithm increased pregnancy rate and decreased pregnancy loss
- Increased live birth rates
- Multinucleation, reverse cleavage, direct abnormal cleavage, duration of cell cycles
- Multiple other studies claim no difference (equivocal pregnancy rates)

TIMELAPSE

- TIMELAPSE HAS ALSO BEEN USED TO PREDICT ANEUPLOIDY
- t3 (TIME BETWEEN ICSI AND DEVELOPMENT TO THE 3-CELL) AND t5-t2 (TIME BETWEEN 2-CELL AND 5-CELL) HAS BEEN STRONGLY ASSOCIATED WITH COMPLEX ANEUPLOIDY
    - PROPOSED COULD BE USED TO DISCARD HIGH RISK EMBRYOS
- EUPLOID EMBRYOS HAVE SHORTER TIME PERIODS TO START, COMPLETE AND EXPAND AND HATCH DURING BLASTOCYST DEVELOPMENT COMPARED TO ANEUPLOID EMBRYOS
- USED THIS INFORMATION TO ASSESS THOSE PREDICTED TO BE LOW RISK- RESULTED IN HIGHER IMPLANTATION RATES AND LIVE BIRTH RATES

Modelling a risk classification of aneuploidy in human embryos using non-invasive morphokinetics

Alison Campbell [a,*], Simon Fishel [a], Natalie Bowman [b], Samantha Duffy [b], Mark Sedler [b], Cristina Fontes Lindemann Hickman [c]

TIMELAPSE

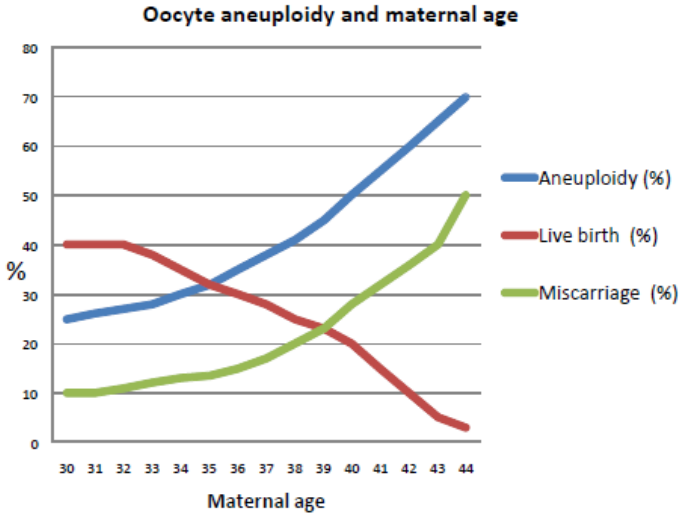
- OTHERS HAVE FAILED TO BE ABLE TO DIFFERENTIATE BETWEEN ANEUPLOID AND EUPLOID EMBRYOS USING MORPHOKINETIC PARAMETERS
  - MATERNAL AGE
  - MATERNAL BMI
  - SMOKING STATUS
  - STIMULATION REGIME
  - EMBRYO CULTURE MEDIA
  - OXYGEN CONCENTRATION
  - OIL OVERLAY
  - TEMPERATURE
- EMBRYOS WITH IRREGULAR CLEAVAGE CAN STILL BE EUPLOID
  - SELF CORRECTION (MOSAIC EMBRYOS DISCARD ANEUPLOID CELLS)
- CANNOT BE USED FOR PGT-A BUT COULD BE USED AS A RANKING SYSTEM

PGS

- Chromosome aneuploidy can cause IVF failure, miscarriage and birth defects.

- Chromsome aneuploidy occurs in the oocyte and increases with maternal age.

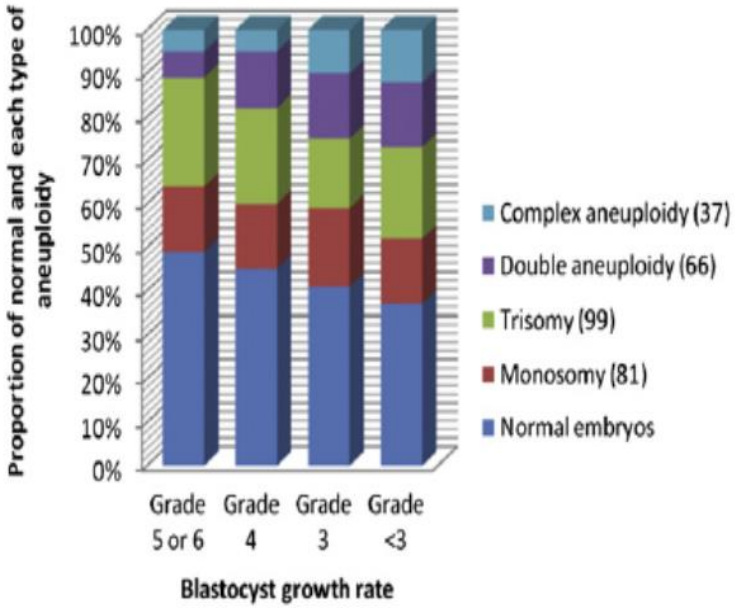
- Thus patients with;
  - Repeated IVF failure
  - Recurrent Miscarriages
  - Increase Maternal Age



Aneuploidy and Morphology

FIGURE 2

Blastocyst morphologic grading and the proportion of euploid and aneuploid (divided by type) embryos.



Alfarawati. Aneuploidy and blastocyst morphology. Fertil Steril 2011.

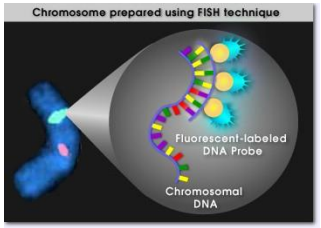
PGS 1.0 and 2.0

•FISH (FLUORESCENCE IN SITU HYBRIDISATION)

•PROBES HYBRIDISED TO DNA

•~3 SPOTS/CHROMOSOME

•STUDIES DEMONSTRATED THAT FISH SCREENING WITH CL BIOPSY DECRAESES PREGNANCY RATES (BY ~12%) (MASTENBROEK ET AL 2007, CHECA ET AL 2009, MASTENBROEK ET AL 2011)



•MICROARRAY BASED COMPETITIVE GENOMIC HYBRIDISATION (ARRAY-CGH)

•ANALYSES ALL 22 AUTOSOME PAIRS AND SEX CHROMOSOMES (X AND Y)

•COMPARES TO REFERENCE MALE AND FEMALE DNA

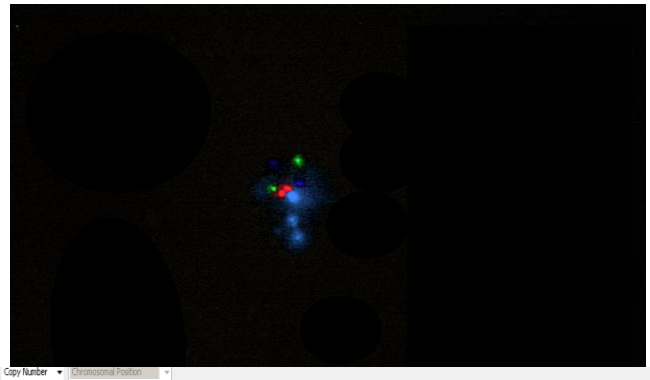
•3000 SPOTS

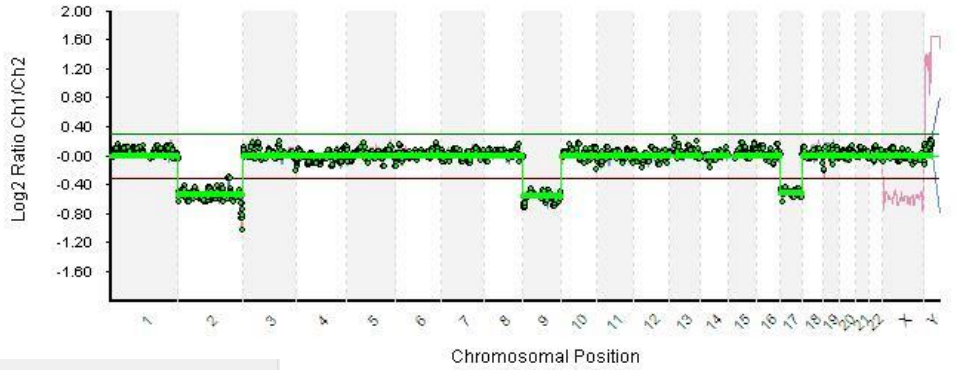
•SUCCESS VERIFIED IN RCT 69.1% VS. 49.7% (YANG ET AL 2012)

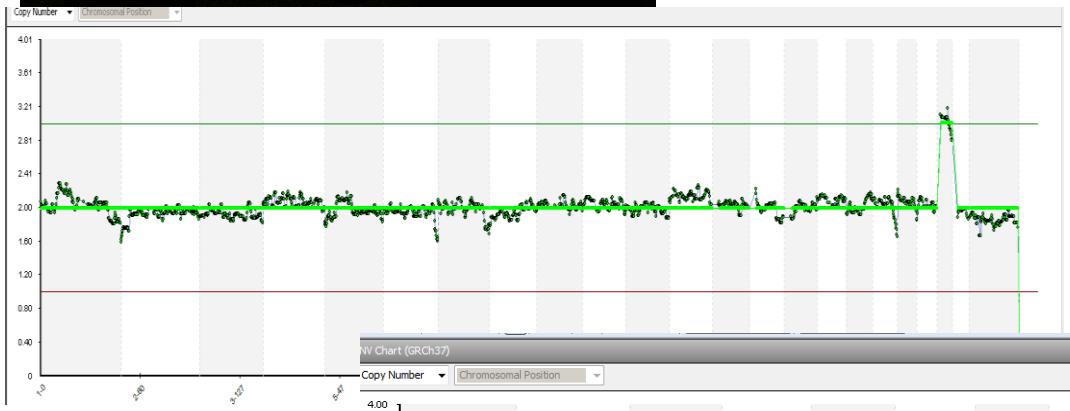
NEXT GENERATION SEQUENCING

- SCREENS ALL 22 PAIRS OF AUTOSOMES PLUS THE SEX CHROMOSOMES
- THE CHROMOSOMES ARE FRAGMENTED, SEQUENCED AND ALIGNED TO THE HUMAN GENOME.
- 1,000,000 SEQUENCE READS.

PGS




Log2 Ratio Ch1/Ch2
2.00
1.60
1.20
0.80
0.40
-0.00
-0.40
-0.80
-1.20
-1.60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 + -
Chromosomal Position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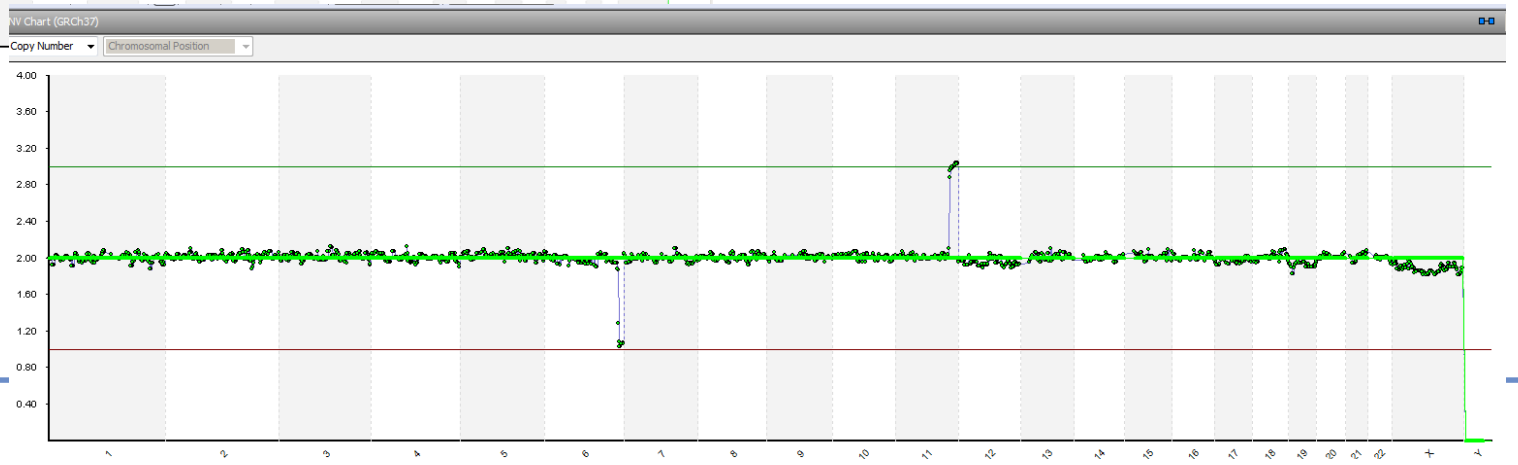
Chromosomal Position
4.01
3.61
3.21
2.81
2.41
2.00
1.60
1.20
0.80
0.40
0


NV Chart (GRCh37)
Copy Number
Chromosomal Position
4.00
3.60
3.20
2.80
2.40
2.00
1.60
1.20
0.80
0.40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 X Y

Aneuploidy Rates

ORIGINAL ARTICLES: ASSISTED REPRODUCTION

The nature of aneuploidy with increasing age of the female partner: a review of 15,169 consecutive trophectoderm biopsies evaluated with comprehensive chromosomal screening

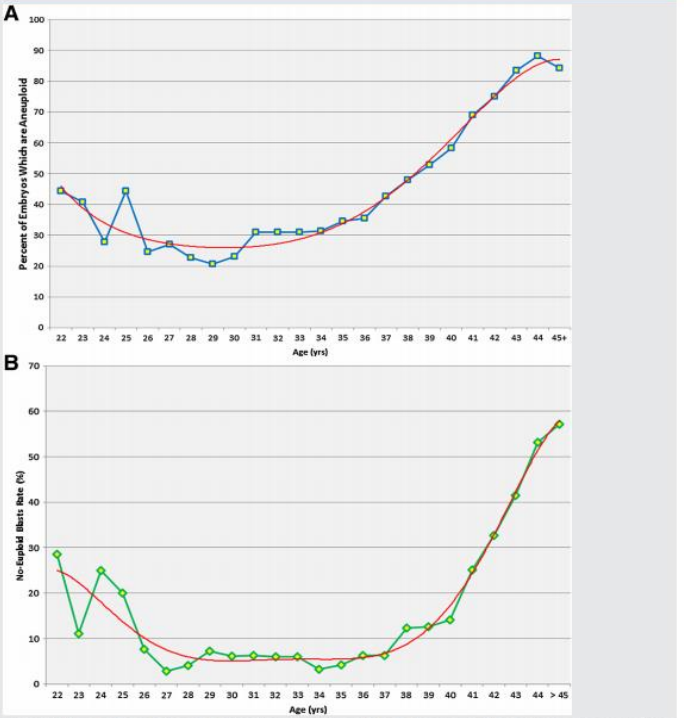
Jason M. Franasiak, M.D.,[a] Eric J. Forman, M.D.,[a,b] Kathleen H. Hong, M.D.,[a,b] Marie D. Werner, M.D.,[a,b] Kathleen M. Upham, B.S.,[b] Nathan R. Treff, Ph.D.,[a,b] and Richard T. Scott Jr., M.D.[a,b]

[a] Division of Reproductive Endocrinology, Department of Obstetrics, Gynecology and Reproductive Science, Robert Wood Johnson Medical School, Rutgers University, New Brunswick, and [b] Reproductive Medicine Associates of New Jersey, Morristown, New Jersey

- Aneuploidy increases after 26 years of age
- Also found to be higher in young infertile women <23 years (>40%)
- Patients with no euploid blasts after PGS increases with maternal age and is 60% for women aged >45
- % of patients in older age group that don't have embryos suitable for biopsy.
- 50% of cases had 3 or fewer embryos to biopsy, 20% had only 1x embryo to biopsy

ORIGINAL ARTICLE: ASSISTED REPRODUCTION

FIGURE 2



Prevalence of aneuploidy. (A) The prevalence of aneuploidy relative to the age of the female partner demonstrates the lowest risk in women from their middle to late twenties, with significantly higher rates in embryos obtained from both younger and older women ($P<1*10^{-6}$). The relationship between age and the rate of aneuploidy is a best fit at the 5th degree polynomial (regression line shown). (B) The relationship between maternal age and the probability that no euploid blastocysts will be available within a single cohort demonstrates a uniformly low risk between the maternal ages of 26 and 37 years. Higher risks are present in younger and older patients ($P<.0003$ or less).

Franasiak. Aneuploidy versus age. Fertil Steril 2014.

Effectiveness of PGS

ORIGINAL ARTICLE: GENETICS

Comprehensive chromosome screening improves embryo selection: a meta-analysis

Elias M. Dahdouh, M.D., M.Sc.,[a,b,c] Jacques Balayla, M.D.,[c] and Juan Antonio García-Velasco, M.D., Ph.D.[d]

[a] Assisted Reproduction Center, CHU Sainte-Justine, University of Montreal, Montreal, Quebec, Canada; [b] PROCREA Clinics, Montreal, Canada; [c] Department of Obstetrics and Gynecology, University of Montreal, Montreal, Canada; and [d] Instituto Valenciano de Infertilidad (IVI) Madrid and Rey Juan Carlos University, Madrid, Spain

- 763 citations, 29 met inclusion criteria and 3x RCT and 8 OS were analysed
- 3x RCT (TE biopsy)-
  - clinical IR RR 1.29 (95% CI 1.15-1.45)
  - sustained IR RR 1.39 (95% CI 1.21-1.60)
- 8x OS (TE Biopsy)-
  - clinical pregnancy RR 1.78 (95% CI 1.60-1.99)
  - sustained IR RR 1.75 (95% CI 1.48-2.07)

Cost Effectiveness

J Assist Reprod Genet
DOI 10.1007/s10815-017-1001-8

CrossMark

ASSISTED REPRODUCTION TECHNOLOGIES

Cost-effectiveness of preimplantation genetic screening for women older than 37 undergoing in vitro fertilization

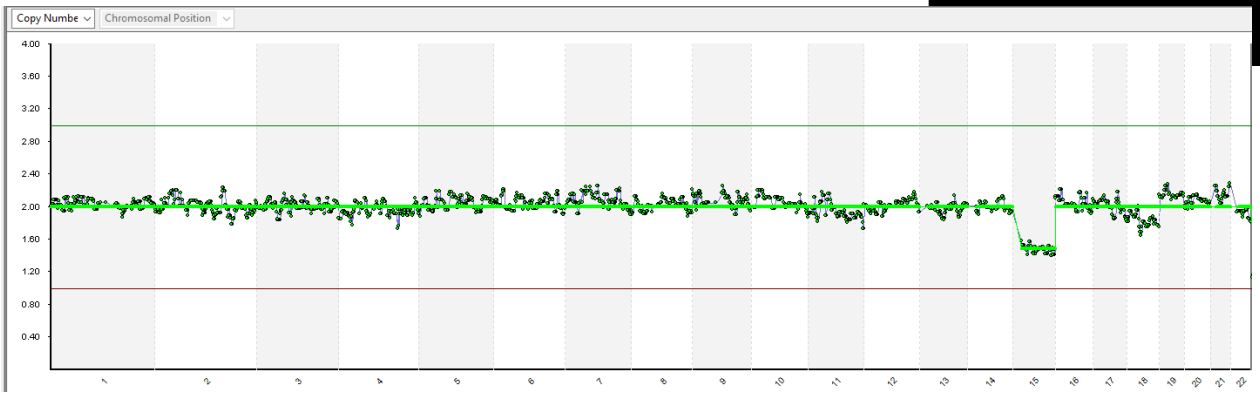
Stephen C. Collins[1] · Xiao Xu[1] · Winifred Mak[1]

- Analytic model for women >37 having a fresh ET vs PGS (based on pregnancy rates)
- PGS increased live birth rate by 4.2% for a cost of $4509
- Cost of achieving a live birth without PGS= $145,063
- Cost of achieving a live birth with PGS=$105,489
- Therefore PGS is cost effective in women aged >37

Mosaicism- Unforeseen complexity

A New Last Chance
There could soon be a baby-boom among women who thought they'd hit an IVF dead end.

By Stephen S. Hall



Mosaicism

- Mosaicism is seen in approximately 10-30% of embryos (Vera-Rodriguez et al 2016, 2017 Weisseman et al 2017)
- Different levels of mosaicism from different clinics (culture media, temperature, clinicians)
- Able to be quantified using NGS due to increased dynamic range
- >30%-<70% is classified as mosaic or euploid-aneuploid mosaic
- 1-2% of pregnancies have confined placental mosaicism
- CVS sampling that identifies mosaicism also had a risk of fetal mosaicism after amnio
- Not associated with AMA or DOR

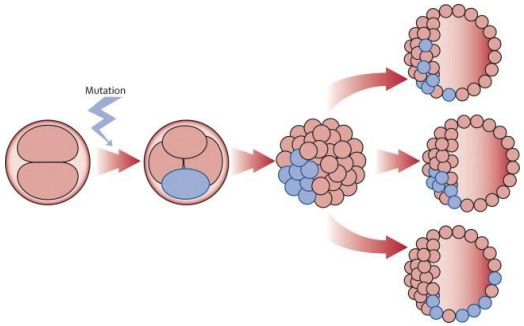


FIGURE 1

Mosaicism type	Possible TE biopsy	Diagnoses accuracy
Total Mosaic	Euploid	Misdiagnosis
	Mosaic	Accurate
	Aneuploid	Misdiagnosis
ICM Mosaic	Euploid	Misdiagnosis (Mosaicism never detectable)
TE Mosaic	Euploid	Misdiagnosis
	Mosaic	Accurate
	Aneuploid	Misdiagnosis
ICM/TE Mosaic Type I	Euploid	Misdiagnosis (Mosaicism never detectable)
ICM/TE Mosaic Type II	Aneuploid	Misdiagnosis (Mosaicism never detectable)

Mosaicism

Table 1. Clinical Outcomes of Single Mosaic Blastocysts Transferred.*

Patient No.	Chromosomal Constitution	Mosaicism†	Karyotype‡	Clinical Outcome
		percent		
1	arr(4)x1,(10)x1	40	46,XX	Baby healthy at birth
2	arr(6)x1,(15)x1	50	46,XX	Baby healthy at birth
3	arr(2)x1	40	46,XX	Baby healthy at birth
4	arr(2)x1	35	46,XY	Baby healthy at birth
5	arr(5)x1	50	46,XX	Baby healthy at birth
6	arr(5)x1,(7)x1	40	46,XX	Baby healthy at birth
7	arr(11)x1,(20)x3,(21)x3	30	NA	No pregnancy
8	arr(1)x1,(6)x3,(10)x3,(12)x3,(13)x3,(14)x3,(21)x3	50	NA	No pregnancy
9	arr(3)x1,(10)x3,(21)x3	35	NA	No pregnancy
10	arr(1)x3	50	NA	Biochemical pregnancy§
11	arr 9p21.2q34.3(26,609,645-140,499,771)x3	45	NA	Biochemical pregnancy§
12	arr(15)x3	30	NA	No pregnancy
13	arr(18)x1	50	NA	No pregnancy
14	arr(18)x1	50	NA	No pregnancy
15	arr(18)x1	40	NA	No pregnancy
16	arr(4)x1	50	NA	No pregnancy
17	arr(5)x3	40	NA	No pregnancy
18	arr 10q21.3q26.3(67,216,644-134,326,648)x3	50	NA	No pregnancy

* NA denotes not available.
† The approximate percentage of aneuploid cells in the transferred blastocyst is listed (see the Supplementary Appendix).
‡ The karyotype was determined by means of chorionic-villus sampling.
§ Biochemical pregnancy was defined by the presence of a low peak in levels of the beta subunit of human chorionic gonadotropin (β-hCG) (<100 mIU per milliliter), a rapid decrease in the urinary or serum β-hCG concentration, and no substantial delay in the onset of the next menstrual period, but with no detection of an identifiable pregnancy by means of ultrasonographic examination.

- Assessed 3802 blastocysts
- 4.8% mosaic
- Transferred 18 mosaic (euploid/aneuploid) embryos
- Signed patient consent with councelling
- Mosaicism range from 35%-50%
- +ve hCG of 44.4%
- All ongoing had CVS and all were NAD karyotype
- Live healthy birth of 33.3%

Mosaicism

Detailed investigation into the cytogenetic constitution and pregnancy outcome of replacing mosaic blastocysts detected with the use of high-resolution next-generation sequencing

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- 143 mosaics from 6 centers
- Mosiac rate of 9.55%- included those that had the potential for affected live birth (13, 18, 21, XY and UPD: 7, 14, 15)
- Implantation rate of 53% overall (76/143)
- Fetal Loss Rate of 24% (18/76)
- Ongoing implantation rate: 41% (58/143)
- Complex mosaic IR 10% (3 or more mosaicisms)
- 20-40% mosaic OIR of 56% vs. >40% OIR of 22%
- No karyotypes of babies or MC available

Mosaicism- PGDIS Statement

1. Transfer euploid as 1st priority
2. Embryos with >70-80% of cells demonstrating full aneuploidy should not be transferred
3. If only mosaic embryos are obtained another cycle should be offered
4. Mosaic embryos can be considered for transfer in the absence of alternatives
5. Those with 30-40% mosaicism should be considered over those with 50-80% mosaicism
6. If considering transferring a mosaic avoid those that can result in an affected live birth (13, 18, 21, 22) or those commonly associated with uniparental disomy (14 and 15) or those associated with growth restriction (2, 7, 16)- also reported affected individuals with mosaic monosomy of all these as well.

Mosaicism- PGDIS Statement

1. Mosaicism involving chromosomes 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 17, 19, 20, have not been associated with the aforementioned adverse outcomes; only adverse outcomes have been observed when mosaicism is present in the fetus
2. Others could be considered for transfer however the following needs to be considered
    - High level genetic counselling
    - Signed patient consent
    - Pre-natal testing with amniocentesis
    - Follow-up on live birth outcome

Transfer of aneuploid

IN VITRO FERTILIZATION 2

O-151 Tuesday, October 20, 2015 11:15 AM

FURTHER EVIDENCE AGAINST USE OF PGS IN POOR PROGNOSIS PATIENTS: REPORT OF NORMAL BIRTHS AFTER TRANSFER OF EMBRYOS REPORTED AS ANEUPLOID. N. Gleicher,[a] A. Vidali,[b] J. Braverman,[c] V. A. Kushnir,[d] D. F. Albertini,[e] D. H. Barad.[a]
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1. TRANSFER OF ANEUPLOID MONOSOMY
2. CENTRE ALLOWS TRANSFER OF MONOSOMY EMBRYOS
3. 5/8 COUPLES OPTED FOR TRANSFER
4. 3/8 CONCEIVED AND DELIVERED
5. 3X BABIES WITH NAD KARYOTYPE

Patient	n Embryos transferred	Monosomy transferred	Outcome
1	2	13, 15, 1815, 16, 18	normal birth 46XY
2	1	21	normal birth 46XY
3	1	21	normal birth 46XY

Cell Free DNA- PGS 3.0

Genomic DNA in human blastocoele fluid

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Non-invasive pre-implantation aneuploidy screening and diagnosis of beta thalassemia IVSII654 mutation using spent embryo culture medium

WeiQiang Liu, JianQiao Liu, HongZi Du, JiaWei Ling, XiaoFang Sun & DunJin Chen

SEMINAL CONTRIBUTION

Proof of concept: preimplantation genetic screening without embryo biopsy through analysis of cell-free DNA in spent embryo culture media

Mousa I. Shamonki, M.D.,[a,b] Helen Jin, Ph.D.,[c] Zachary Haimowitz, B.S.,[d] and Lian Liu, M.D.[c]

[a] Fertility and Surgical Associates of California, Thousand Oaks; [b] University of California, Los Angeles, Fertility and Reproductive Health Center, Los Angeles; [c] PacGenomics, Agoura Hills; and [d] ART Reproductive Center, Beverly Hills, California

Blastocentesis: a source of DNA for preimplantation genetic testing. Results from a pilot study

Luca Gianaroli, M.D., M. Cristina Magli, M.Sc., Alessandra Pomante, Ph.D., Anna M. Crivello, B.Sc., Giulia Cafueri, B.Sc., Marzia Valerio, B.Sc., and Anna P. Ferraretti, M.D.

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Noninvasive chromosome screening of human embryos by genome sequencing of embryo culture medium for in vitro fertilization

Juanjuan Xu[a,1], Rui Fang[b,1], Li Chen[a,1], Daozhen Chen[b], Jian-Ping Xiao[b], Weimin Yang[b], Honghua Wang[b], Xiaoqing Song[b], Ting Ma[c], Shiping Bo[c], Chong Shi[c], Jun Ren[c], Lei Huang[d,e,f,g], Li-Yi Cai[b,2], Bing Yao[a,2], X. Sunney Xie[d,g,h,2], and Sijia Lu[c,2]

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Research Paper

Presence of embryonic DNA in culture medium

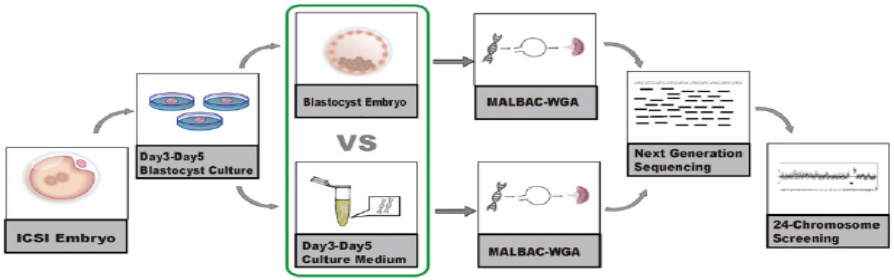
Linlin Yang[1,2,*], Qiaoying Lv[3,*], Wei Chen[1], Jian Sun[1], Yu Wu[1], Yiying Wang[4], Xiong Chen[3], Xiaojun Chen[3] and Zhenbo Zhang[1,2]

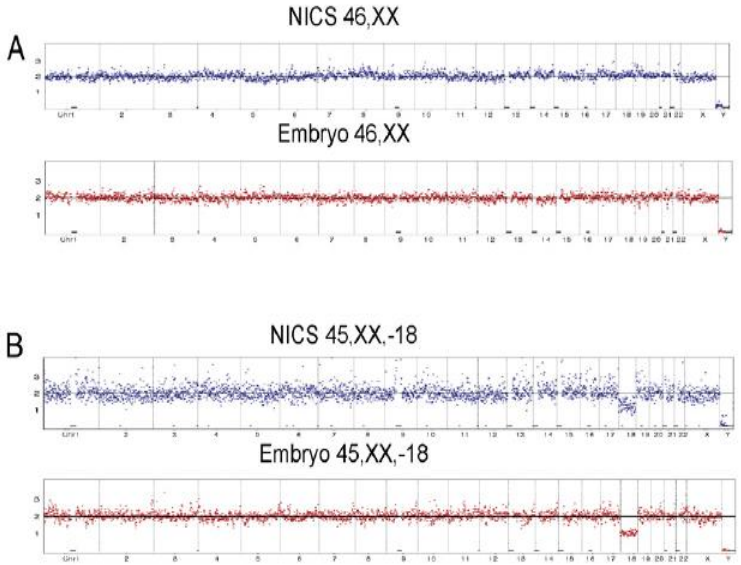
OPEN

Medium-Based Noninvasive Preimplantation Genetic Diagnosis for Human α-Thalassemias[-SEA]

Haitao Wu, MD, Chenhui Ding, MD, Xiaoting Shen, MD, PhD, Jing Wang, MD, PhD, Rong Li, MD, PhD, Bing Cai, MD, Yanwen Xu, MD, PhD, Yiping Zhong, MD, PhD, and Canquan Zhou, MD, PhD

Cell Free DNA





1. CULTURE MEDIA COLLECTED (NICS: NONINVASIVE CULTURE SCREENING)
2. AMPLIFIED
3. SEQUENCED
4. COMPARED TO PGS RESULT
5. >90% SENSITIVITY AND SPECIFICITY

Conclusions

- NEW TECHNOLOGIES ARE MORE PRECISE AND ELEGANT HOWEVER BRING MORE COMPLEXITY TO TREATMENT
- AUTOMATION RESULTS IN
  - RESULTS BEING RELEASED QUICKER
  - MORE ACCURATE
  - REPEATABLE
  - MORE EFFICIENT
  - GREATER DETAIL
  - BETTER OUTCOMES FOR PATIENTS
- NEED TO BE CAREFUL THOUGH AS SO MUCH IS STILL UNKNOWN ABOUT THE EMBRYO THAT WE DON'T WANT TO DISCARD EMBRYOS THAT STILL GIVE THE PATIENT A CHANCE AT A HEALTHY BABY
- UPPER LIMIT OF SUCCESS- IT WILL NEVER BE 100%

repromed
Fertility Specialists.

THANK YOU