IMPACT OF PATERNAL AGE, EJACULATORY ABSTINENCE LENGTH AND SEMEN QUALITY ON THE OUTCOMES OF INTRACYTOPLASMIC SPERM INJECTION (ICSI) IN AN EGG-SHARING DONATION PROGRAM

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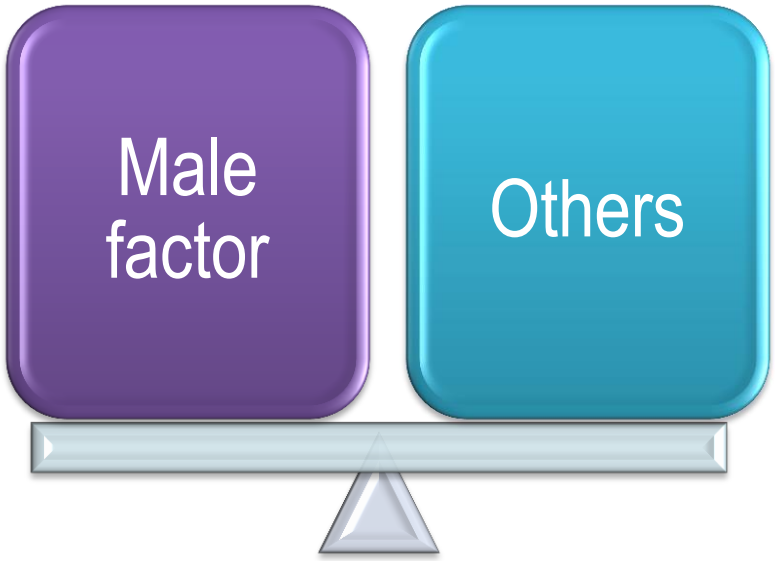
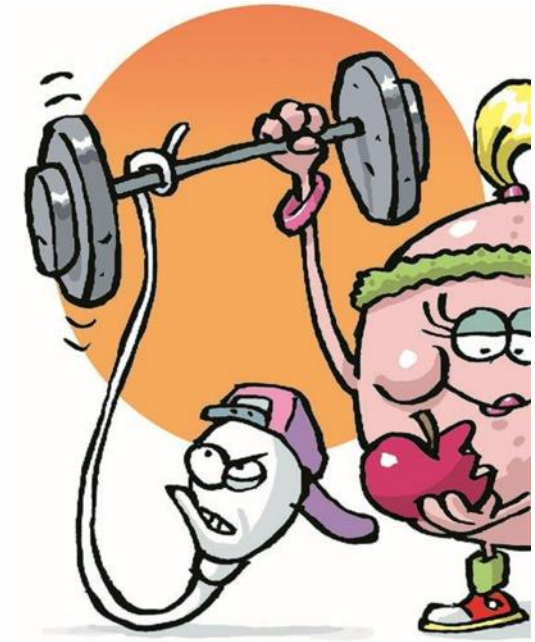
1 FERTILITY MEDICAL GROUP

2 Associação Instituto Sapientiae

INTRODUCTION

Infertility: 15% of the couples





Male partner factors → ? → IVF

Most of the existing literature focuses on female infertility or on the fertility of both partners

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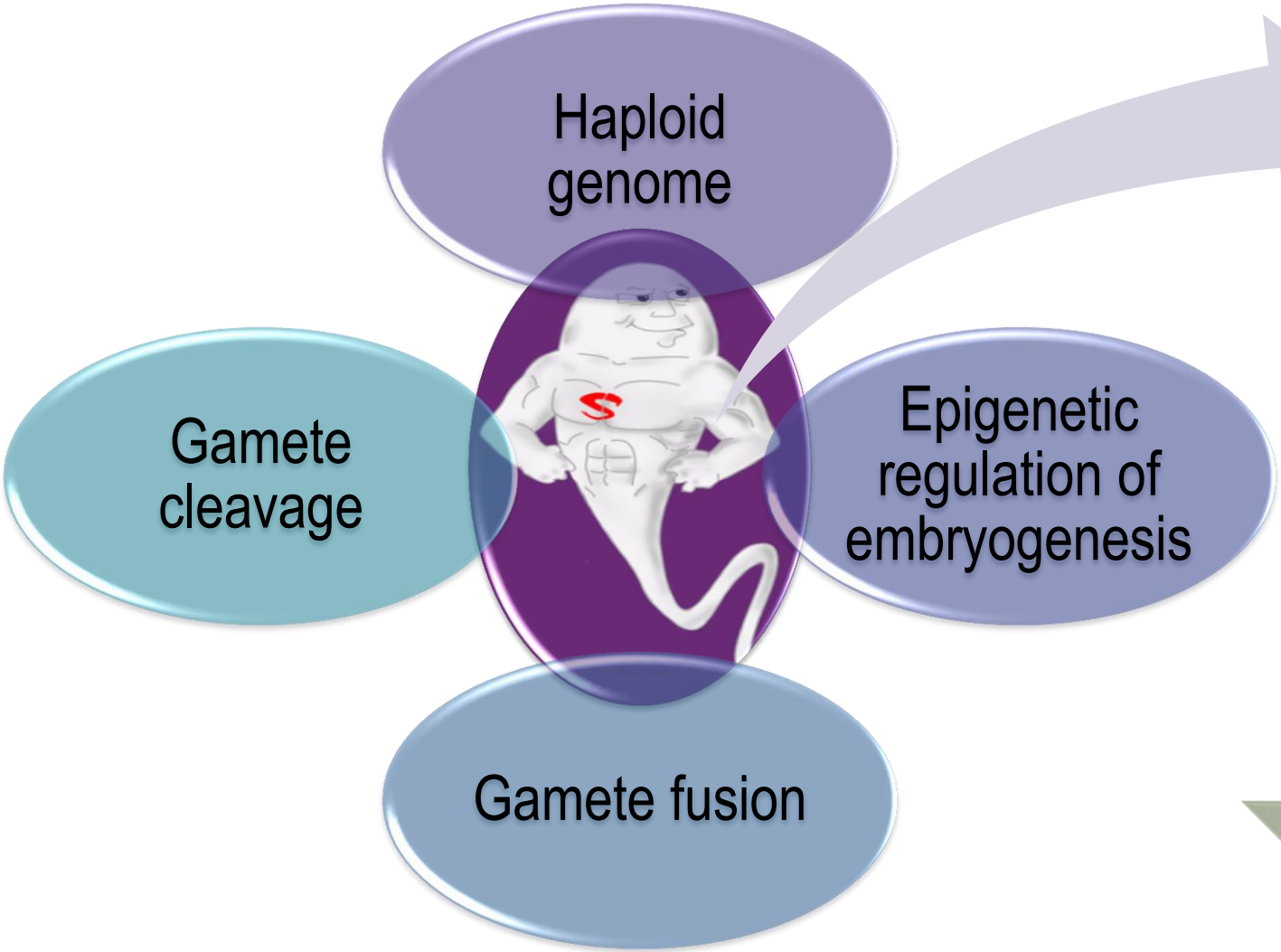
INTRODUCTION



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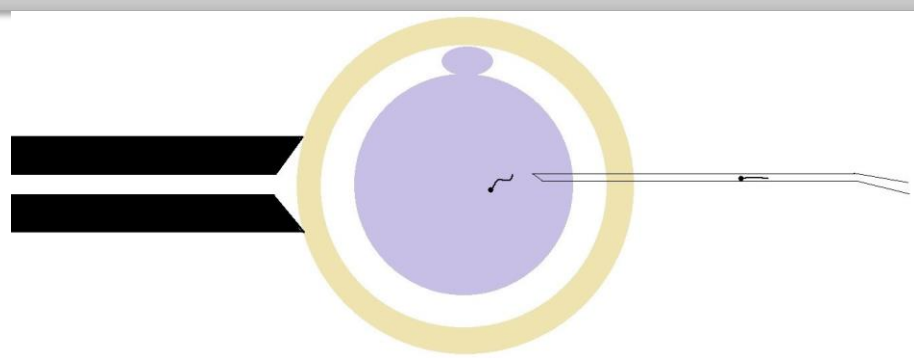
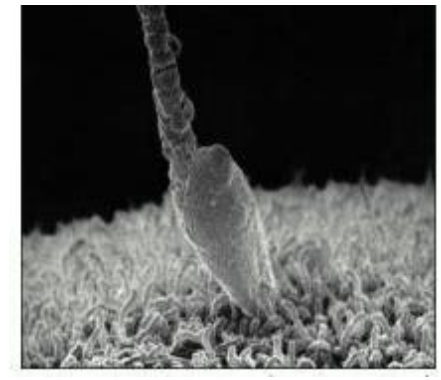
INTRODUCTION



concerns about the contribution of the male factor to IVF outcomes

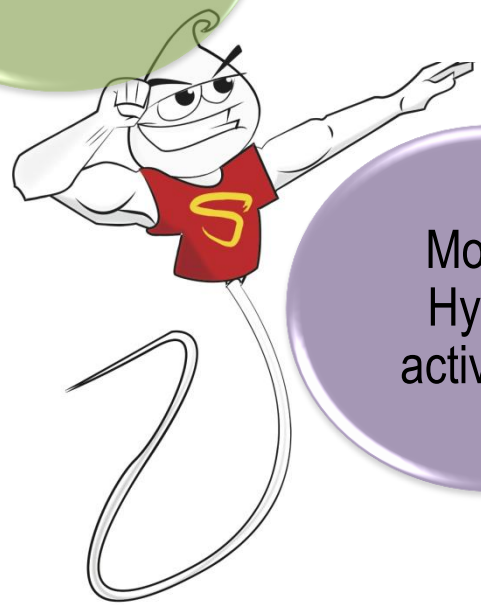


Molecular Biology of the Cell, 4th ed.

ICSI improve outcomes over conventional IVF for male factor infertility

INTRODUCTION

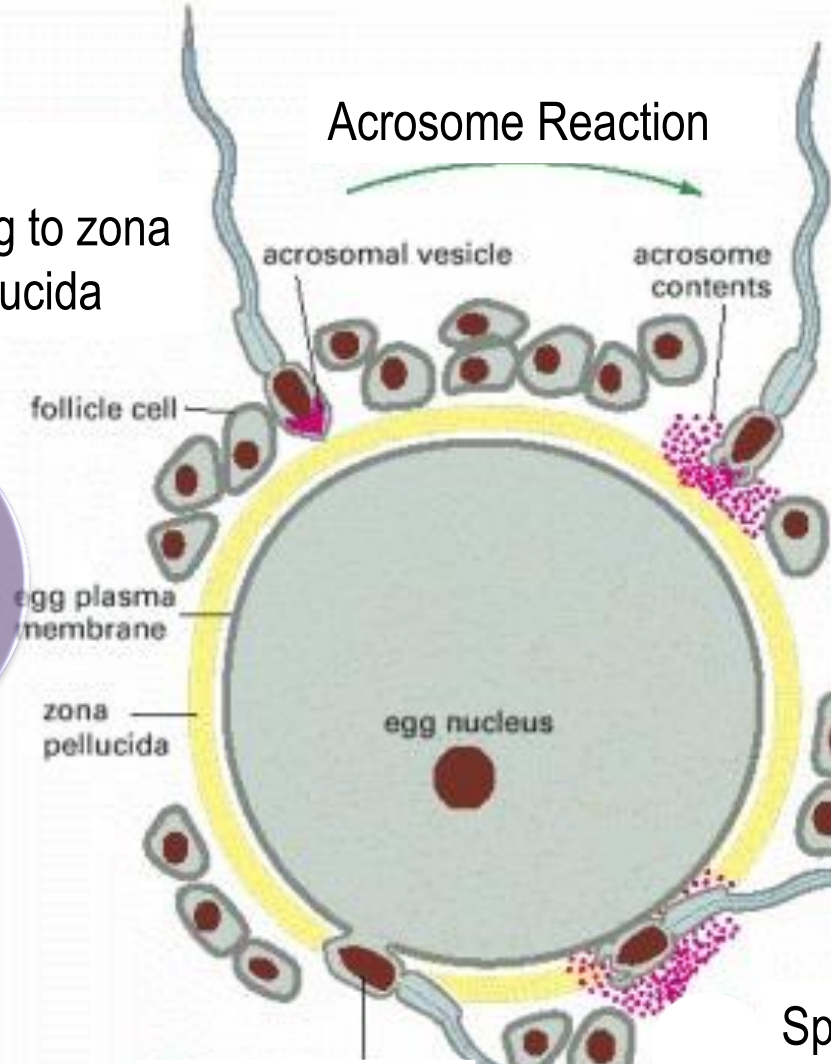
Capacitation



Motility Hyper-activation

Binding to zona pelucida

Acrosome Reaction



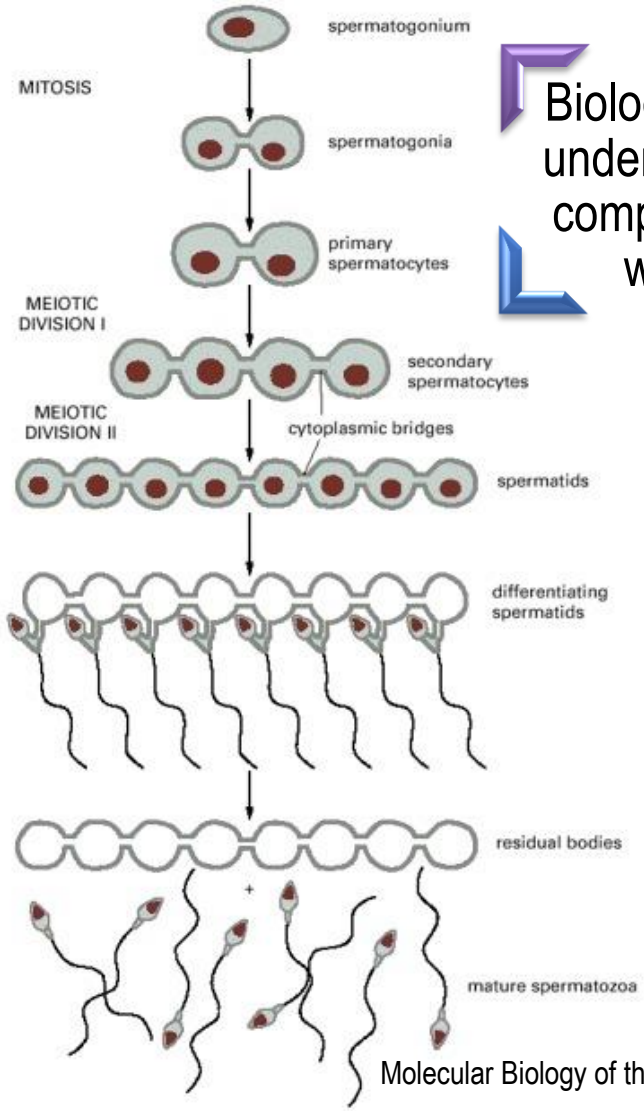
Cumulus Dispersal and Penetration through ZP

Sperm activation

Male gamete entrance

Molecular Biology of the Cell, 4th edition

INTRODUCTION



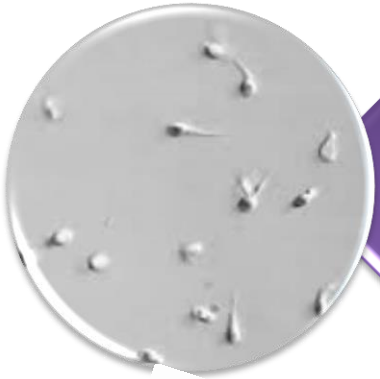
Molecular Biology of the Cell, 4th edition

Biological clock underestimated compared with women

Recently, the potential role of paternal age has been investigated with conflicting results

Men produce sperm through the entire life

INTRODUCTION



The same is true for impact of abnormal sperm parameters on embryo implantation

ANDROLOGIA 30, 91–95 (1998)

The outcome of clinical pregn… plasmic sperm injection is not

R. Mercan, S. E. Lanzendorf, J. Mayer, Jr., A. Nassar,

The Howard and Georgeanna Jones Institute for Women's Health, Do… Virginia Medical School, Norfolk, USA

Andrology

three basic sperm…

Z.P. Nagy, J. Liu, H. Joris, G. Ver…

Human Reproduction, Volume 10, Issue 5, …

https://doi.org/10.1093/oxfordjournals.humrep…

Chapuis et al. Basic and Clinical Andrology
DOI 10.1186/s12610-016-0045-4

RESEARCH ARTI…

Sperm…

ORIGINAL ARTICLE: ASSISTED REPRODUCTION

Journal Article

Effect of the male factor on the clinical outcome of intracytoplasmic sperm injection combined with preimplantation aneuploidy testing: observational longitudinal cohort study of 1,219 consecutive cycles

…eutsch[4],

…al Andrology

Access

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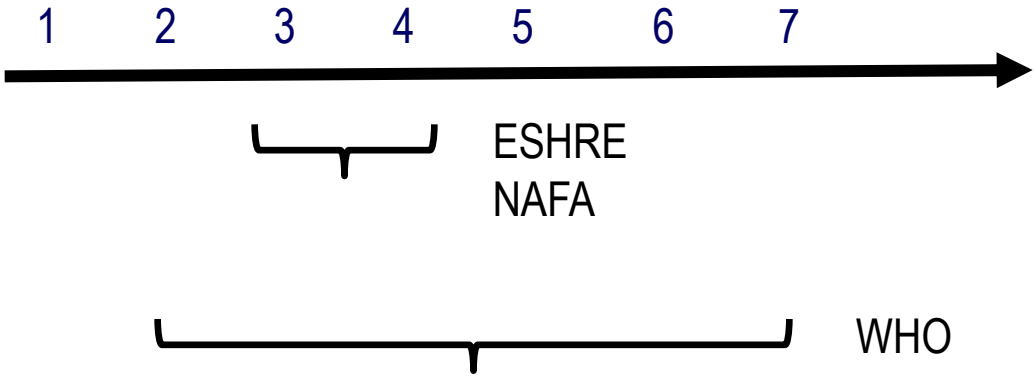
INTRODUCTION

EA

The same lack of consensus is noted when it concerns the ejaculatory abstinence length

Recomendations for EA



Effect of EA on seminal parameters and sperm quality

Effect of EA on embryo development and implantation

The scientific evidences behind these recommendations are limited

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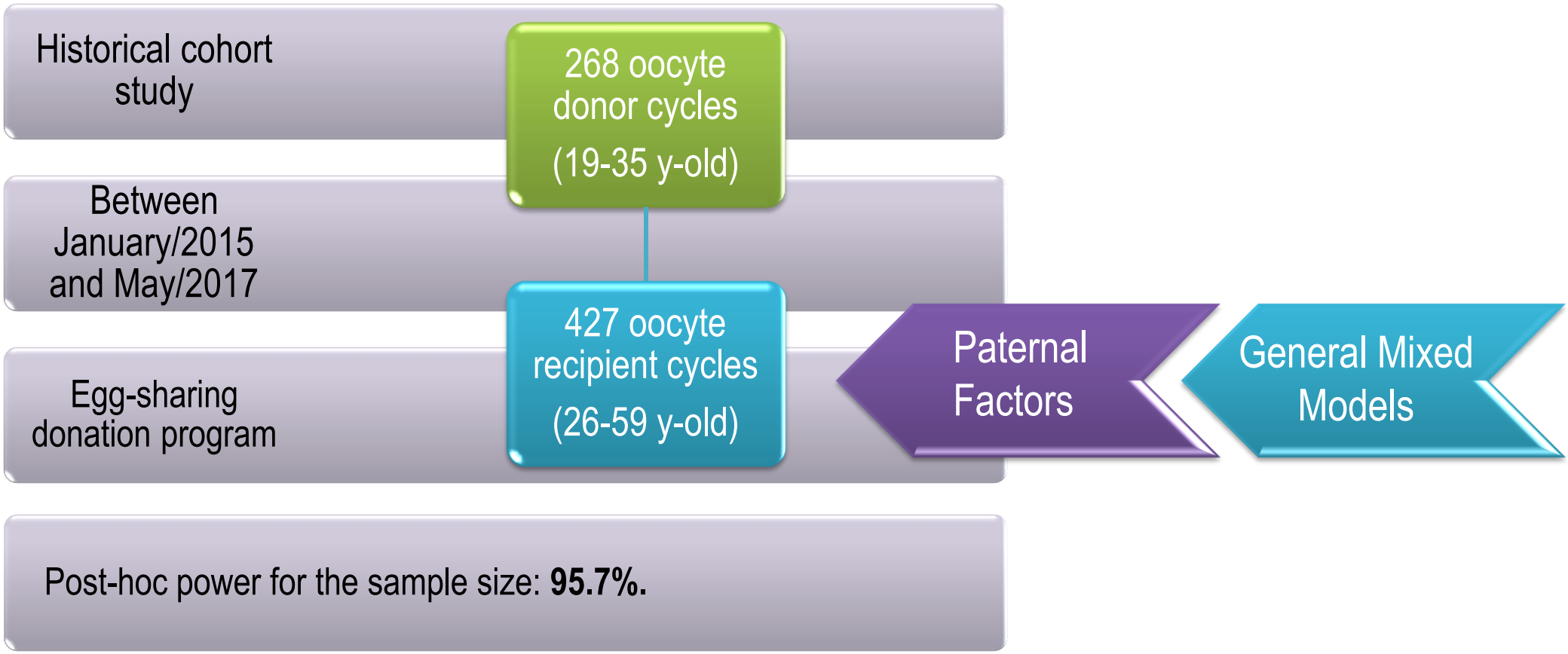
OBJECTIVE

To evaluate the effect of paternal age, ejaculatory abstinence length and semen quality on ICSI outcomes in recipients' cycles in an egg-sharing donation program

MATERIALS AND METHODS

- STUDY DESIGN



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MATERIALS AND METHODS

Predictive variables

- Paternal age
- Ejaculatory abstinence length
- Sperm count
- Progressive sperm motility
- Total motile sperm count

Response variables

- Fertilization rate
- High-quality embryos rate on D3
- Normal embryo development rate on D3
- Blastocyst development rate
- High-quality blastocysts rate
- Implantation rate
- Pregnancy rate

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MATERIALS AND METHODS

Controlled Ovarian Stimulation

GnRH Antagonist

Recombinant FSH

Recombinant hCG

E2

Ovum Pickup

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Menses

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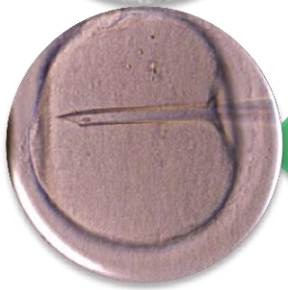
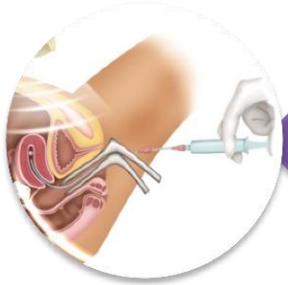
MATERIALS AND METHODS

Incubation, denudation and nuclear maturation evaluation



ICSI performed after denudation for donors or 3 hours after warming for recipients

Embryo culture until day 5



One or two blastocysts transferred

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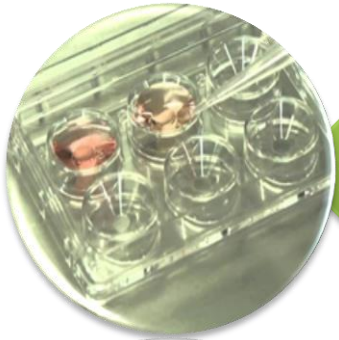
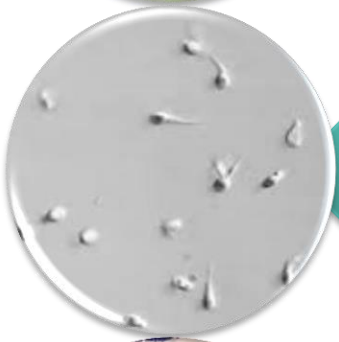
MATERIALS AND METHODS



Vitrification and the warming: Cryotop method



Semen samples were evaluated according to the threshold values established by the WHO in 2010

Sperm preparation: 2-layered density gradient centrifugation technique

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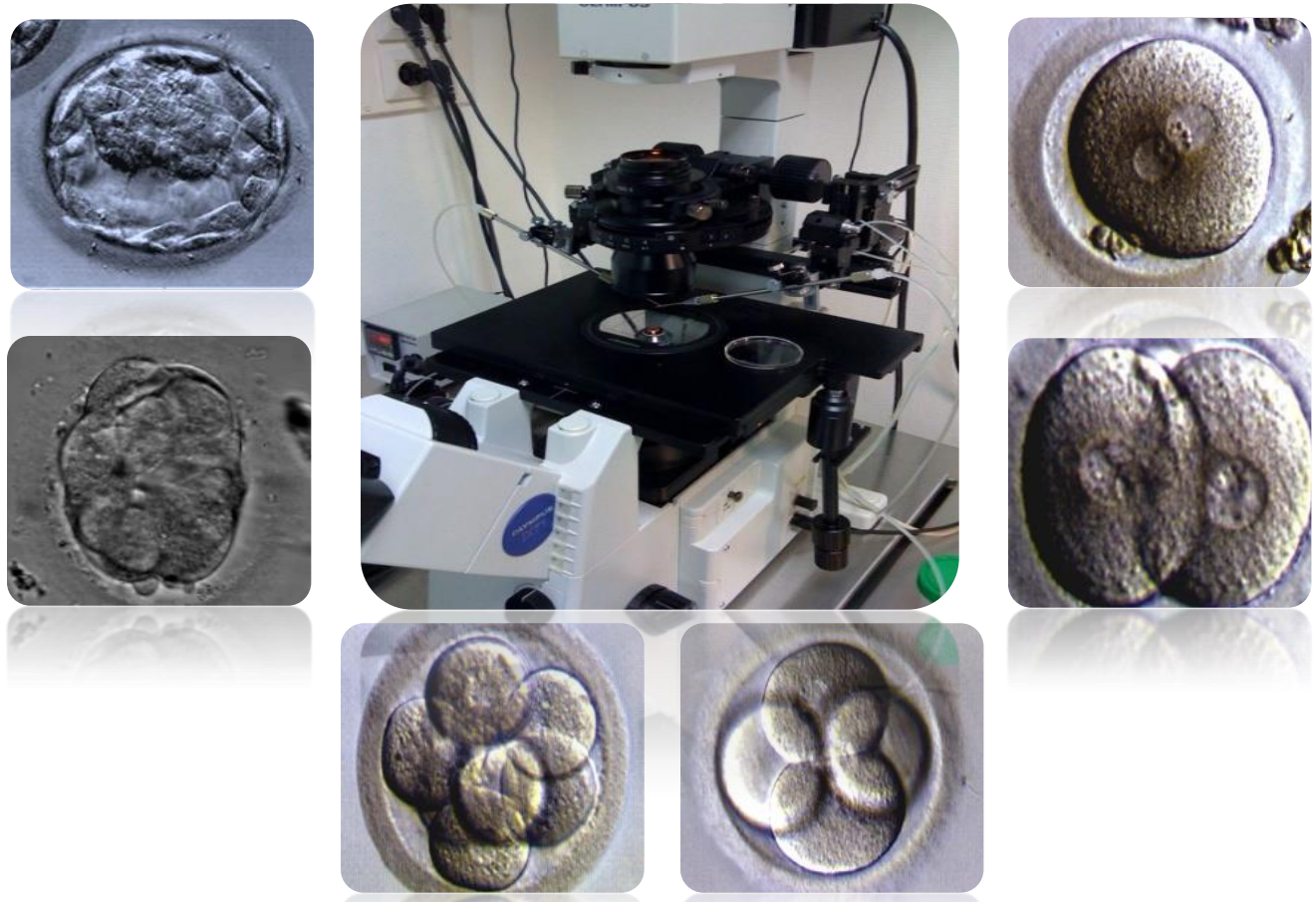
MATERIALS AND METHODS

- EMBRYO MORPHOLOGY



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RESULTS

Association between paternal age and ICSI outcomes

Variables	Paternal Age			
	B	SE	CI	p
Fertilization rate	-0.276	0.085	-0.442 – -0.110	0.001
High-quality embryos rate on D3	-0.040	0.017	-0.072 – -0.006	0.021
Normal embryo development rate on D3	-2.750	0.8625	-4.441 – -1.059	0.001
Blastocyst development rate	-0.070	0.035	-0.139 - -0.002	0.043
High-quality blastocysts rate	-44.058	20.248	-84.065 - -4.051	0.031
Implantation rate	-0.060	0.007	-0.075 - -0.045	< 0.001
Pregnancy chance	Exp(B): 0.664		0.457 – 0.967	0.033

RESULTS

Association between ejaculatory abstinence length and ICSI outcomes

Variables	Ejaculatory Abstinence Length			
	B	SE	CI	p
Fertilization rate	-0.083	0.847	-0.442 - -0.110	0.765
High-quality embryos rate on D3	-0.003	0.015	-0.006 – -0.001	0.028
Normal embryo development rate on D3	-0.300	0.014	-0.058 – -0.020	0.036
Blastocyst development rate	-0.589	0.243	-1.067 - -0.111	0.016
High-quality blastocysts rate	13.812	88.143	-160.341 – 187.966	0.876
Implantation rate	-0.012	0.003	-0.203 - -0.353	< 0.001
Pregnancy chance	Exp(B): 0.051	1.803	0.001-1.870	0.103

RESULTS

Association between sperm count and ICSI outcomes

Variables	Sperm Count			
	B	SE	CI	p
Fertilization rate	0.075	0.020	0.035 – 0.115	< 0.001
High-quality embryos rate on D3	2.296	7.074	-11.587 – 16.179	0.746
Normal embryo development rate on D3	-0.884	0.568	-1.999 - 0.232	0.120
Blastocyst development rate	2.155	0.884	0.420 – 3.891	0.015
High-quality blastocysts rate	-36.970	27.177	-90.666 - 16.727	0.176
Implantation rate	0.025	0.003	0.020 – 0.031	< 0.001
Pregnancy chance	Exp(B): 0.920	0.167	0.658 - 1.284	0.617

RESULTS

Association between progressive sperm motility and ICSI outcomes

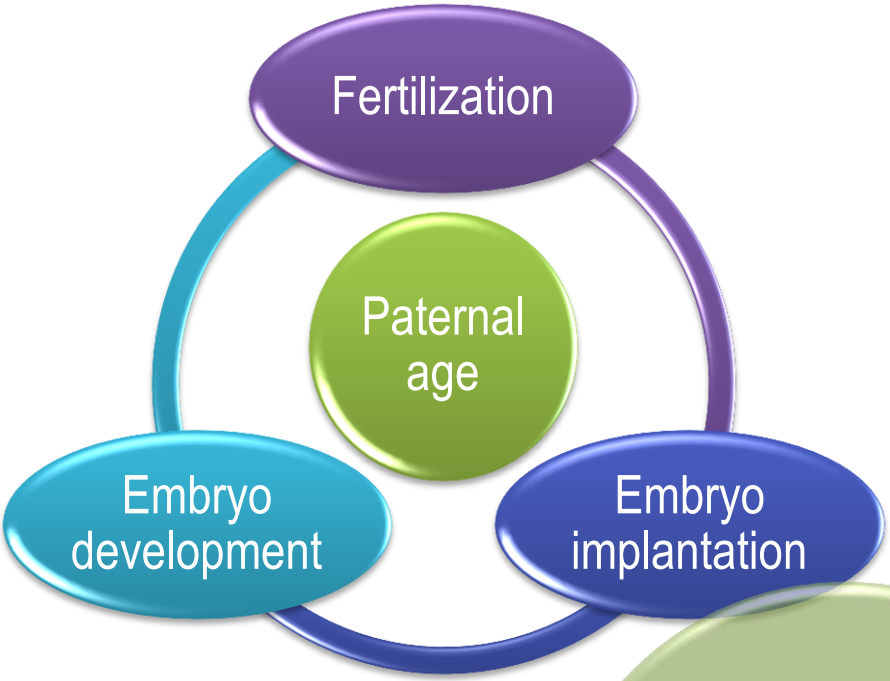
Variables	Sperm Motility			
	B	SE	CI	p
Fertilization rate	-0.003	0.0462	-0.093 – 0.088	0.951
High-quality embryos rate on D3	-1.573	20.270	-41.352 – 38.206	0.938
Normal embryo development rate on D3	0.017	0.077	0.002 – 0.032	0.024
Blastocyst development rate	0.412	0.586	-0.739 - 1.563	0.483
High-quality blastocysts rate	-5.955	5.453	-16.729 - 4.819	0.277
Implantation rate	0.183	0.010	0.163 – 0.204	< 0.001
Pregnancy chance	Exp(B): 1.037	0.031	0.974 - 1.104	0.253

RESULTS

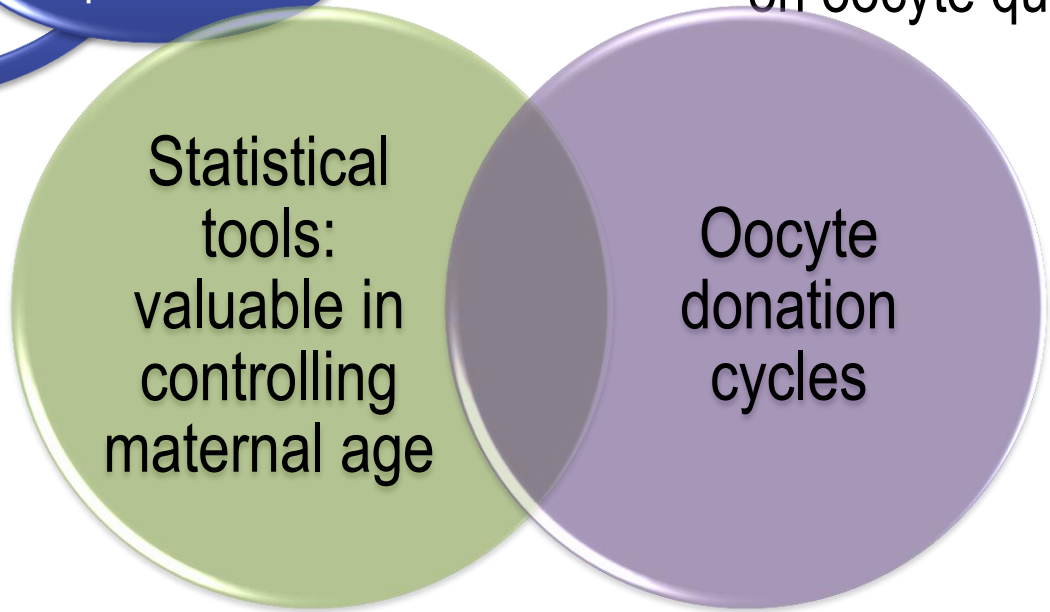
Association between total motile sperm count and ICSI outcomes

Variables	Total Motile Sperm Count			
	B	SE	CI	p
Fertilization rate	-0.007	0.030	-0.065 – 0.051	0.809
High-quality embryos rate on D3	2.841	2.297	-1.667 - 7.350	0.216
Normal embryo development rate on D3	-2.914	2.327	-7.480 - 1.652	0.211
Blastocyst development rate	1.057	0.508	0.060 – 2.054	0.038
High-quality blastocysts rate	9.779	6.442	-2.949 - 22.508	0.131
Implantation rate	0.008	0.003	0.002 – 0.014	0.009
Pregnancy chance	Exp(B): 0.957	0.062	0.845 - 1.083	0.475

DISCUSSION



Bias of the effect of maternal age on oocyte quality



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DISCUSSION

Oocyte donation cycles

Egg sharing donation population

VS

Decreased IVF outcomes:

(Frattarelli et al. 2008; Luna et al. 2009)

No effect of paternal age on IVF outcomes

(Whitcomb et al. 2011; Begueria et al. 2014; Ghuman et al. 2016)

Young fertile oocyte donors

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DISCUSSION

This creates an interesting situation

Oocytes from the same cohort can be compared

The impact of paternal age on the functionality of oocytes derived from infertile-couples can be analysed

This is different from most other published studies in which data comes from oocyte donor populations

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DISCUSSION

EA

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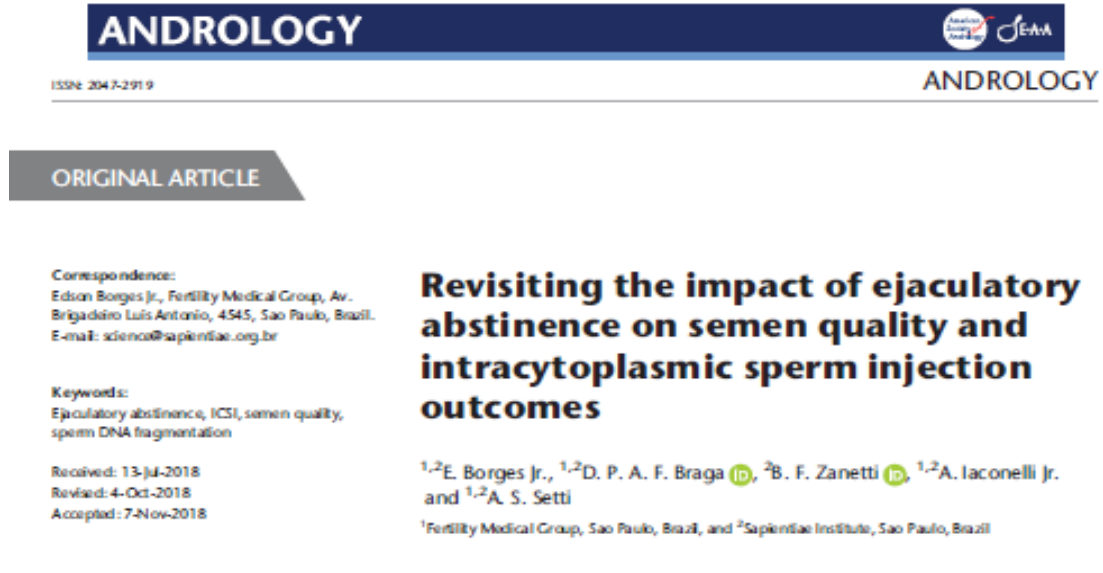
Embryo development and implantation competence



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ORIGINAL ARTICLE

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Keywords:
Ejaculatory abstinence, ICSI, semen quality, sperm DNA fragmentation

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Accepted: 7-Nov-2018

Revisiting the impact of ejaculatory abstinence on semen quality and intracytoplasmic sperm injection outcomes

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EA

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SDF

EA

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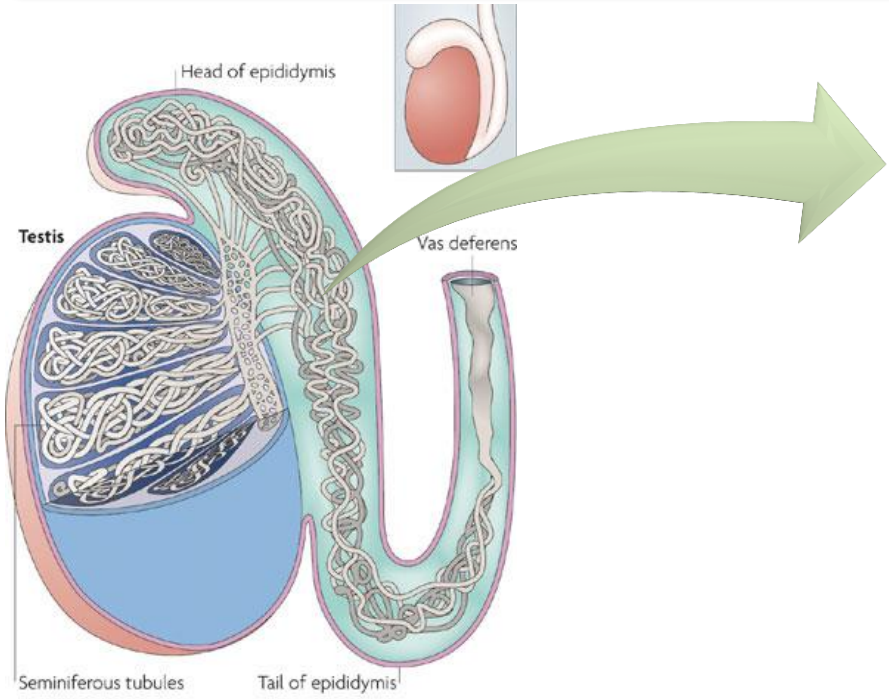
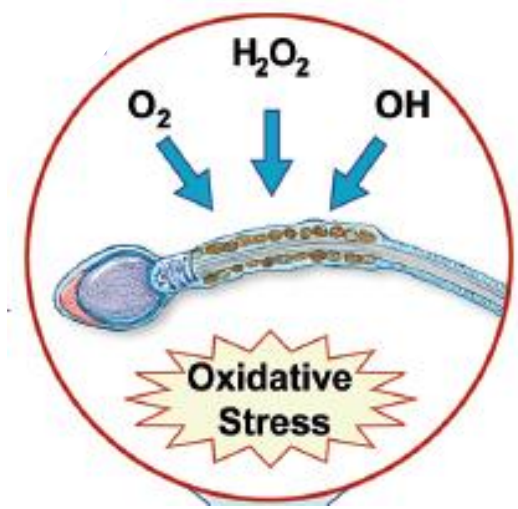
fertilization, blastocyst formation, implantation, and pregnancy

DISCUSSION



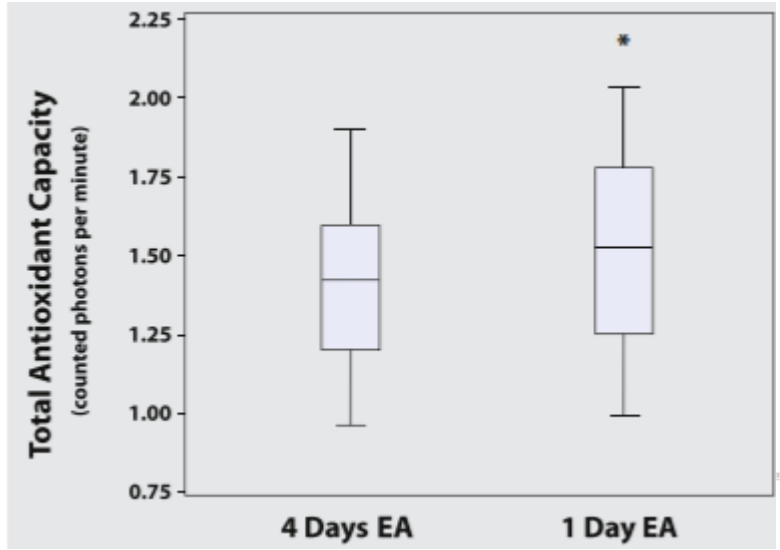


Kourouma et al., 2015

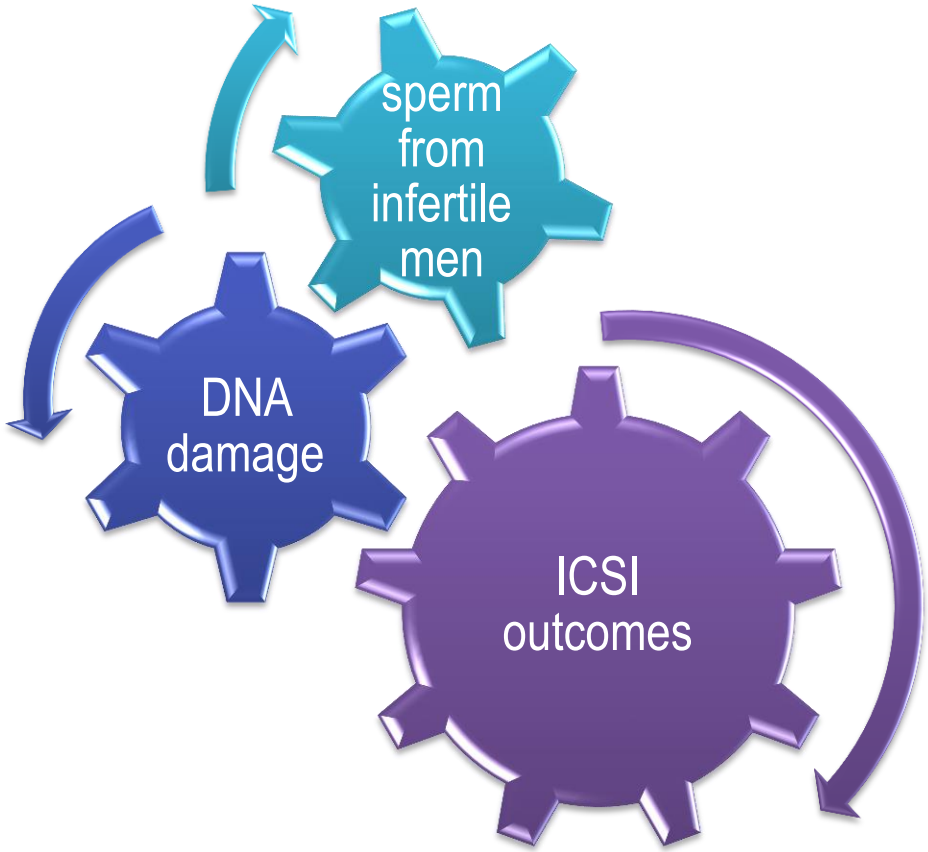
Influence of ejaculatory abstinence on seminal total antioxidant capacity and sperm membrane lipid peroxidation

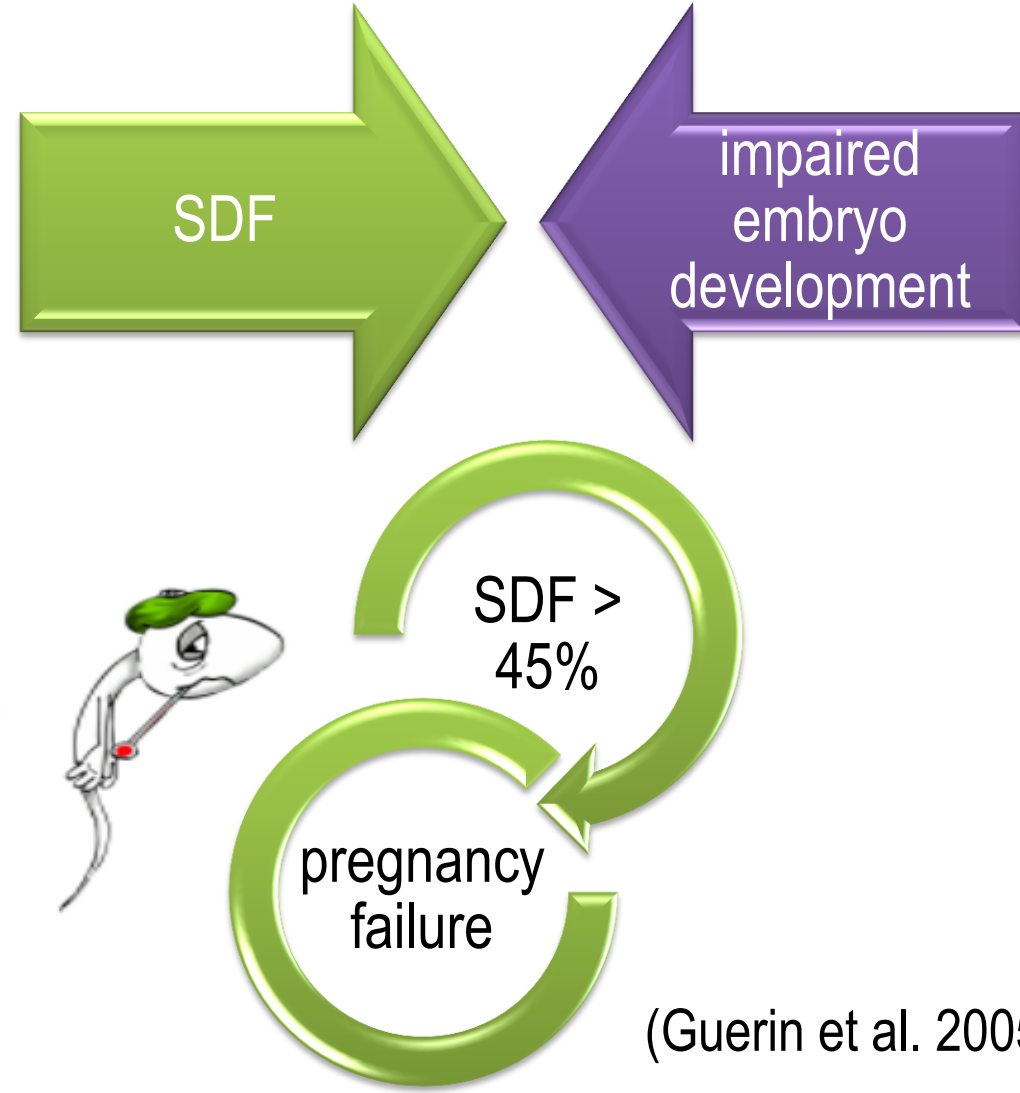
Paul B. Marshburn, M.D.,[a,b] Allie Giddings, M.D.,[b] Stephanie Causby, M.S.,[a,b] Michelle L. Matthews, M.D.,[a,b] Rebecca S. Usadi, M.D.,[a,b] Nury Steuerwald, Ph.D.,[c] and Bradley S. Hurst, M.D.[a,b]

[a] Division of Reproductive Endocrinology and Infertility, [b] Department of Obstetrics and Gynecology, and [c] Cannon Research Center, Carolinas Healthcare System, Charlotte, North Carolina



DISCUSSION

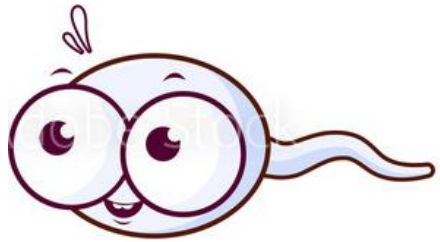


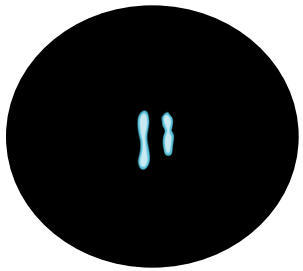


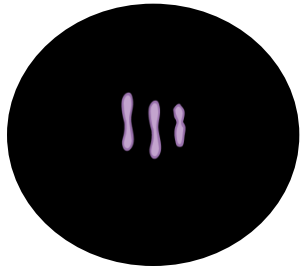
(Guerin et al. 2005)

Antonouli et al. 2019; Al Omrani et al. 2018; Evgeni et al. 2015

DISCUSSION







severe male factor

aneuploid embryos

decreased implantation in man with poor semen quality

(Silber et al. 2003; Magli et al. 2009; Coates et al. 2015)

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CONCLUSION

Increasing paternal age and EA, and poor semen parameters negatively impact ICSI outcomes, from fertilization to pregnancy

Therefore further tracking of the impact of paternal characteristics on ICSI outcomes should be encouraged

Despite paternal age is uncontrollable, and there are not so many things that can be done concerning semen quality, shortening of EA interval could be used as a strategy to optimize ICSI outcomes.

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DISCUSSION