IMMATURE OOCYTE INCIDENCE: CONTRIBUTING FACTORS AND EFFECTS ON INTRACYTOPLASMIC SPERM INJECTION CYCLES

Daniela Paes de Almeida Ferreira Braga[1,2] , Bianca Ferrarini Zanetti[1,2], Amanda Souza Setti[1,2], Assumpto Iaconelli Jr.[1]Edson Borges Jr[1,2,];

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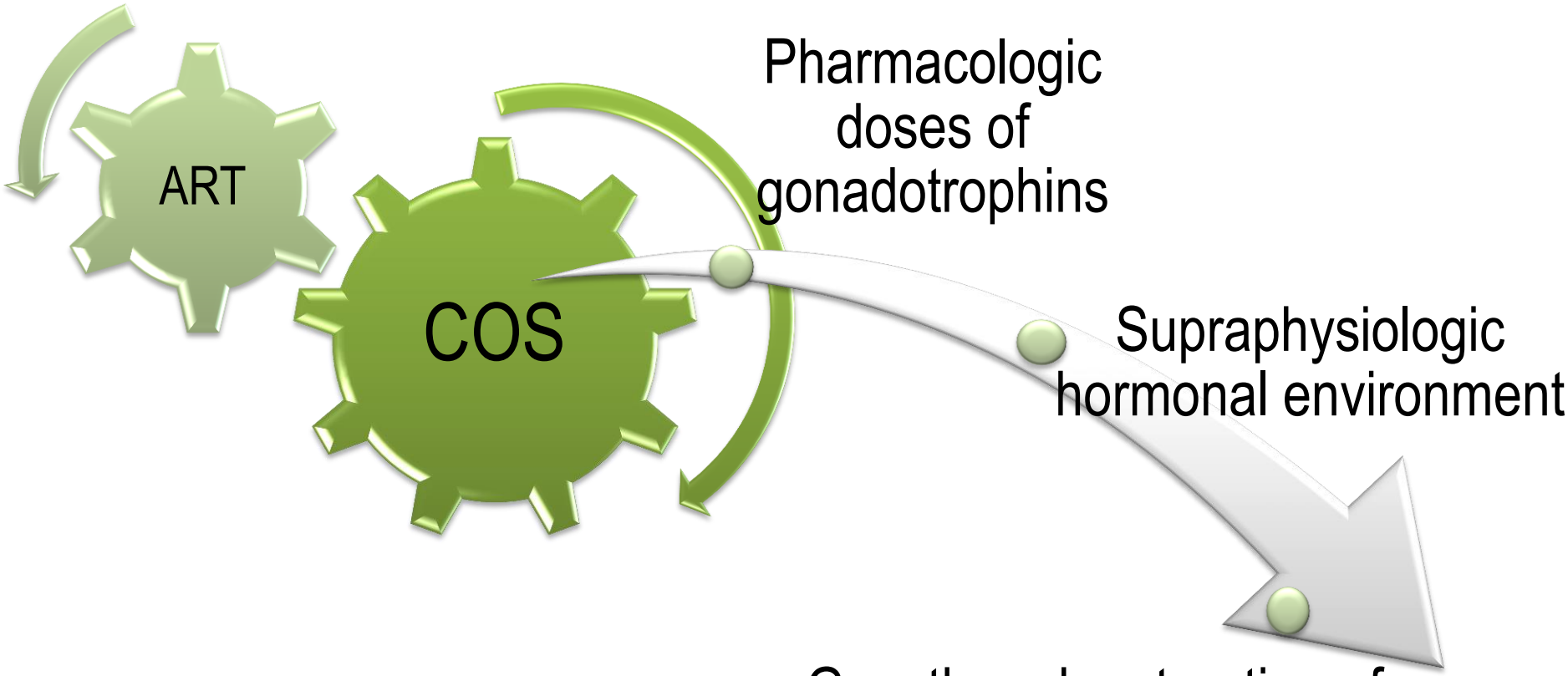
Associação Instituto Sapientiae

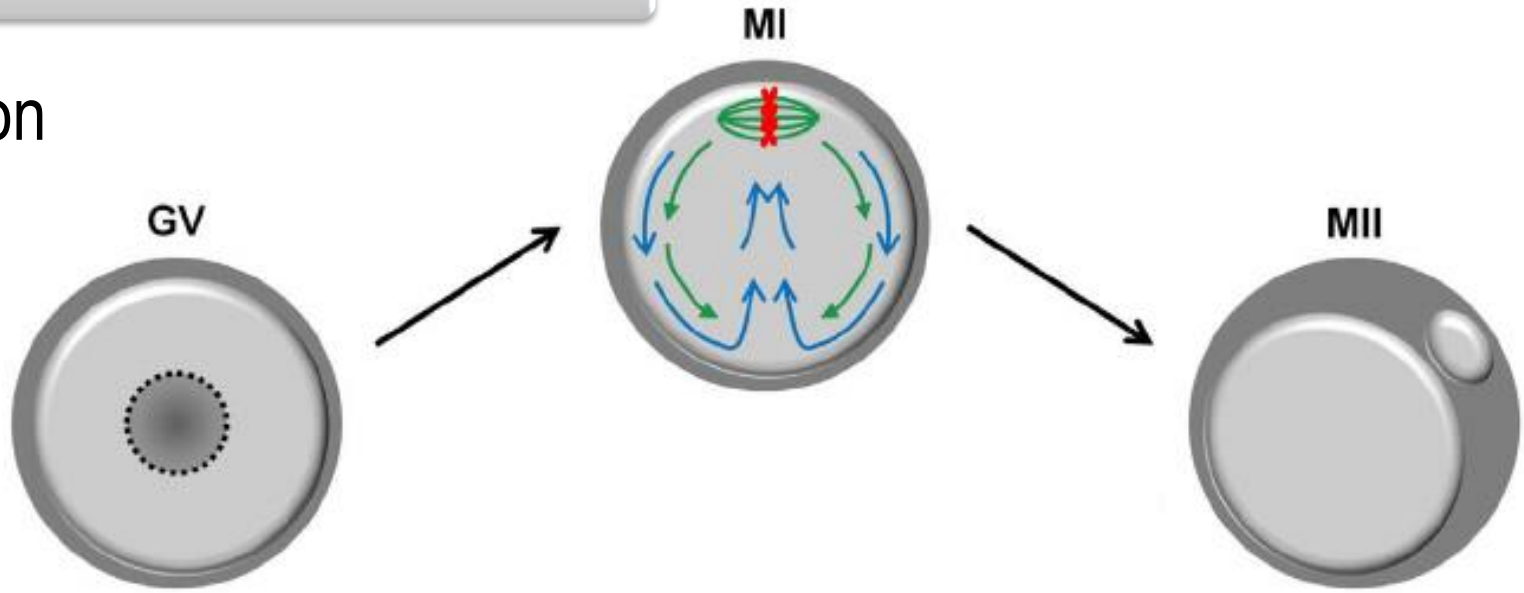
INTRODUCTION

✓ Controlled Ovarian Stimulation (COS)



INTRODUCTION

✓ Oocyte maturation



Nuclear maturation

Cytoplasmic maturation

- Cytoplasmic enzymes
- mRNAs
- Organelles
- Metabolic substrates

Fertilization

Early embryonic development

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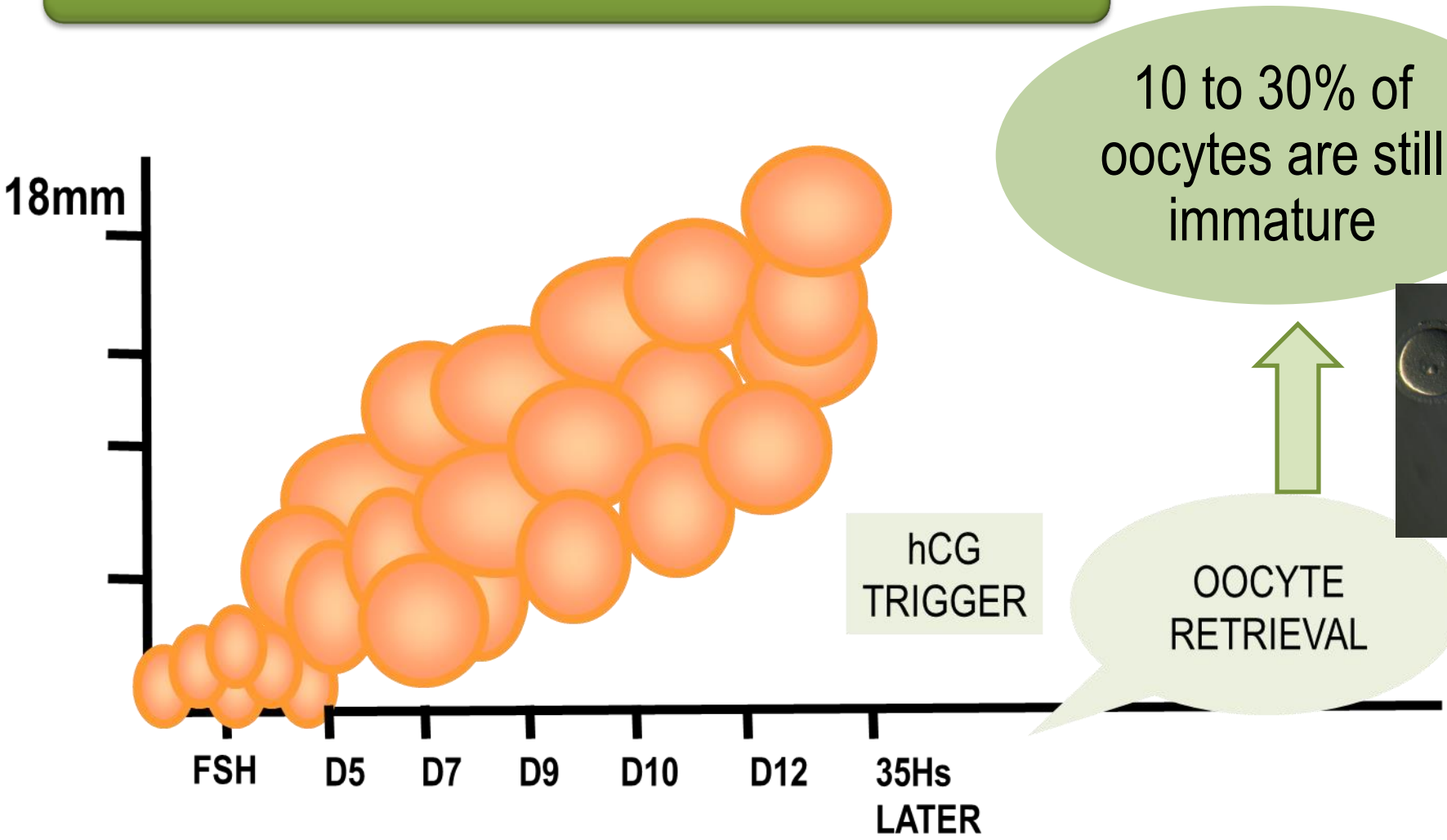
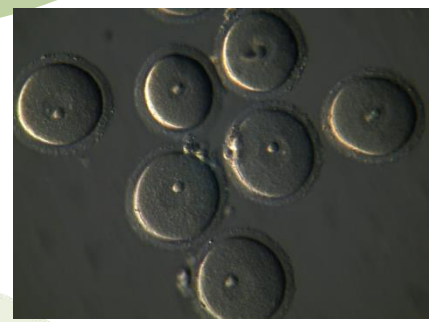
INTRODUCTION

CONTROLLED OVARIAN STIMULATION





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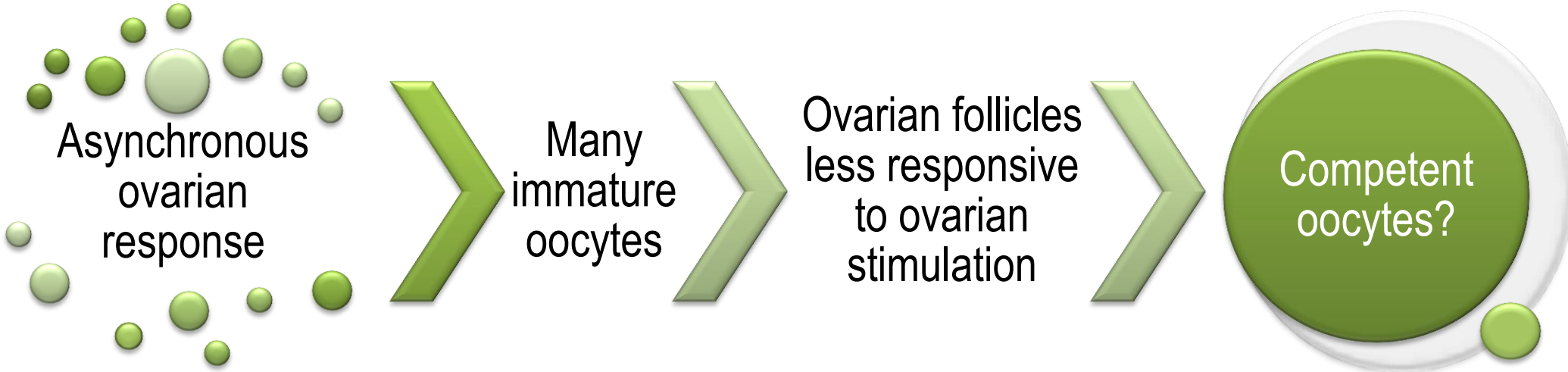
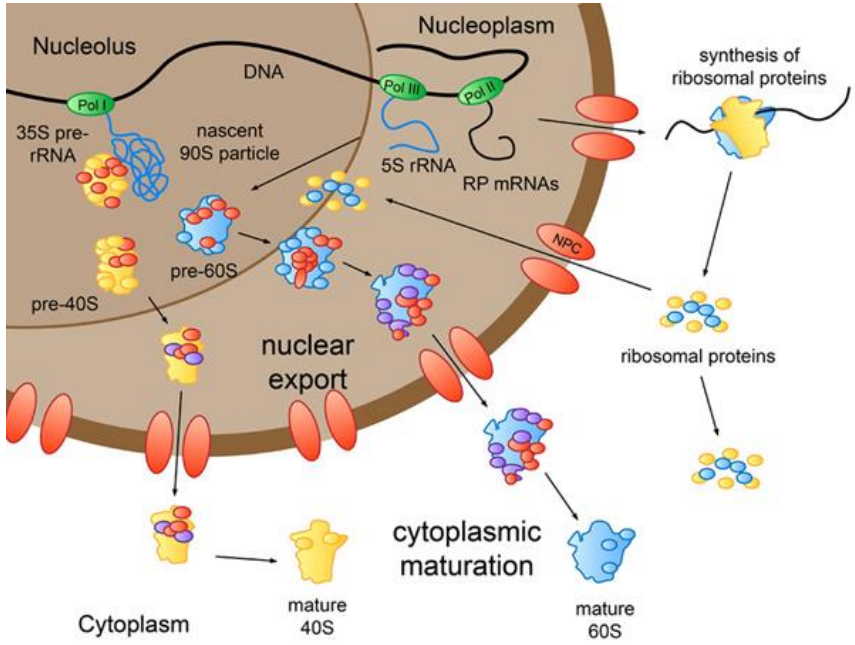
INTRODUCTION



Oocytes considered mature in the same cohort may not be fully competent for fertilization and embryo development

INTRODUCTION



Cytoplasmic maturation completion

- No macroscopic markers
- No single observable factor

✓ Data about the impact of higher immature oocytes incidence in the developmental competence of the MII oocytes from the same cohort are scarce

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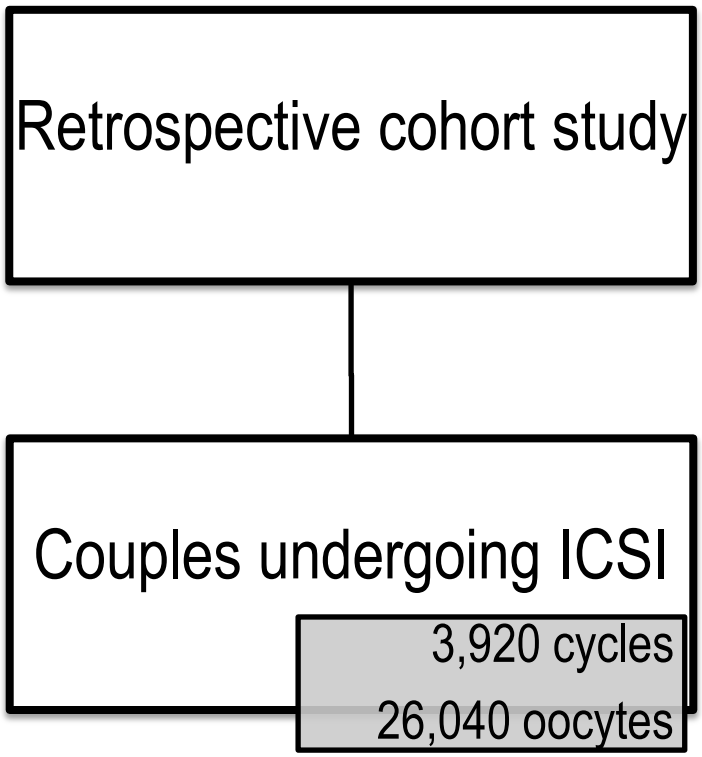
OBJECTIVE

To investigate which factors contribute to the incidence of immature oocytes

To investigate how immature oocytes impact the outcomes of mature oocytes from the same cohort

MATERIALS AND METHODS

- STUDY DESIGN



Generalized linear models

- Influence of COS protocols and FSH doses on immature oocyte incidence and rates

Regression models

- The effects of immature oocytes rates on ICSI outcomes

MATERIALS AND METHODS

Discriminant analysis for pregnancy outcome prediction

- MI/oocyte rate
- GV/oocyte rate
- Female age
- Total FSH dose
- Number of retrieved oocytes
- Number of transferred embryos
- Endometrial thickness

Data grouped according with established cut-off for MI/oocyte rate

MATERIALS AND METHODS

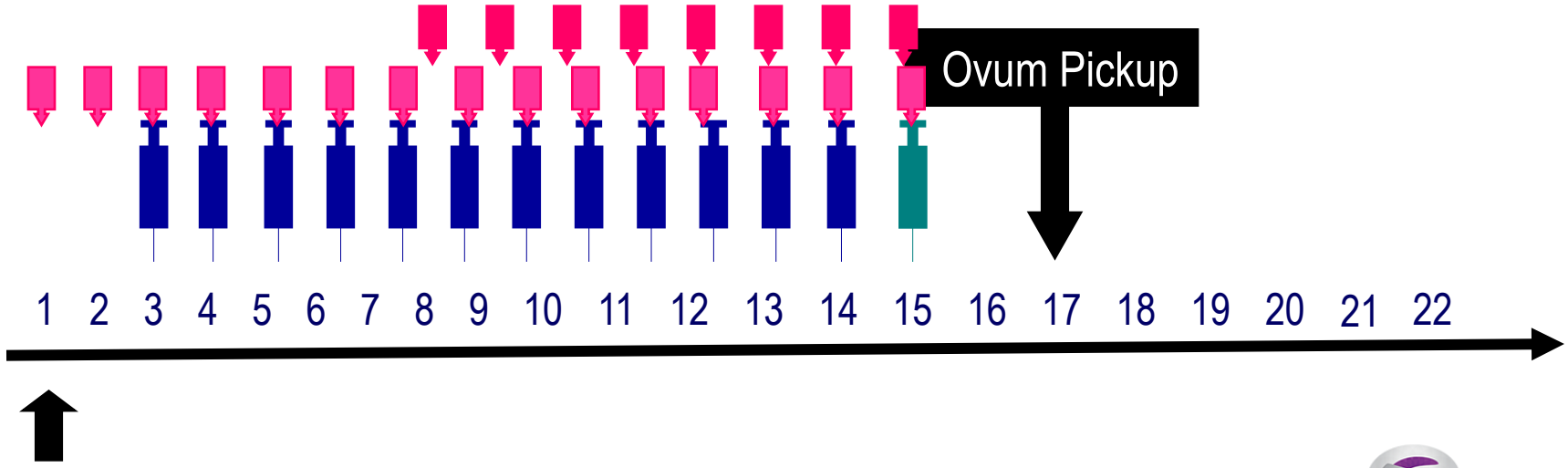
Controlled Ovarian Stimulation

GnRH Antagonist or Agonist

rFSH or rFSH + rLH

rhCG

E2



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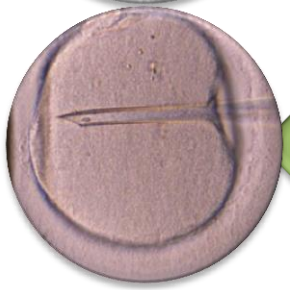
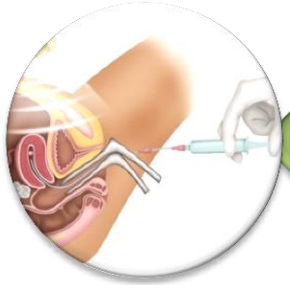
MATERIALS AND METHODS

Incubation, denudation and nuclear maturation evaluation



ICSI - (Palermo et al., 1992)

Embryo culture until day 5



One or two blastocysts transferred

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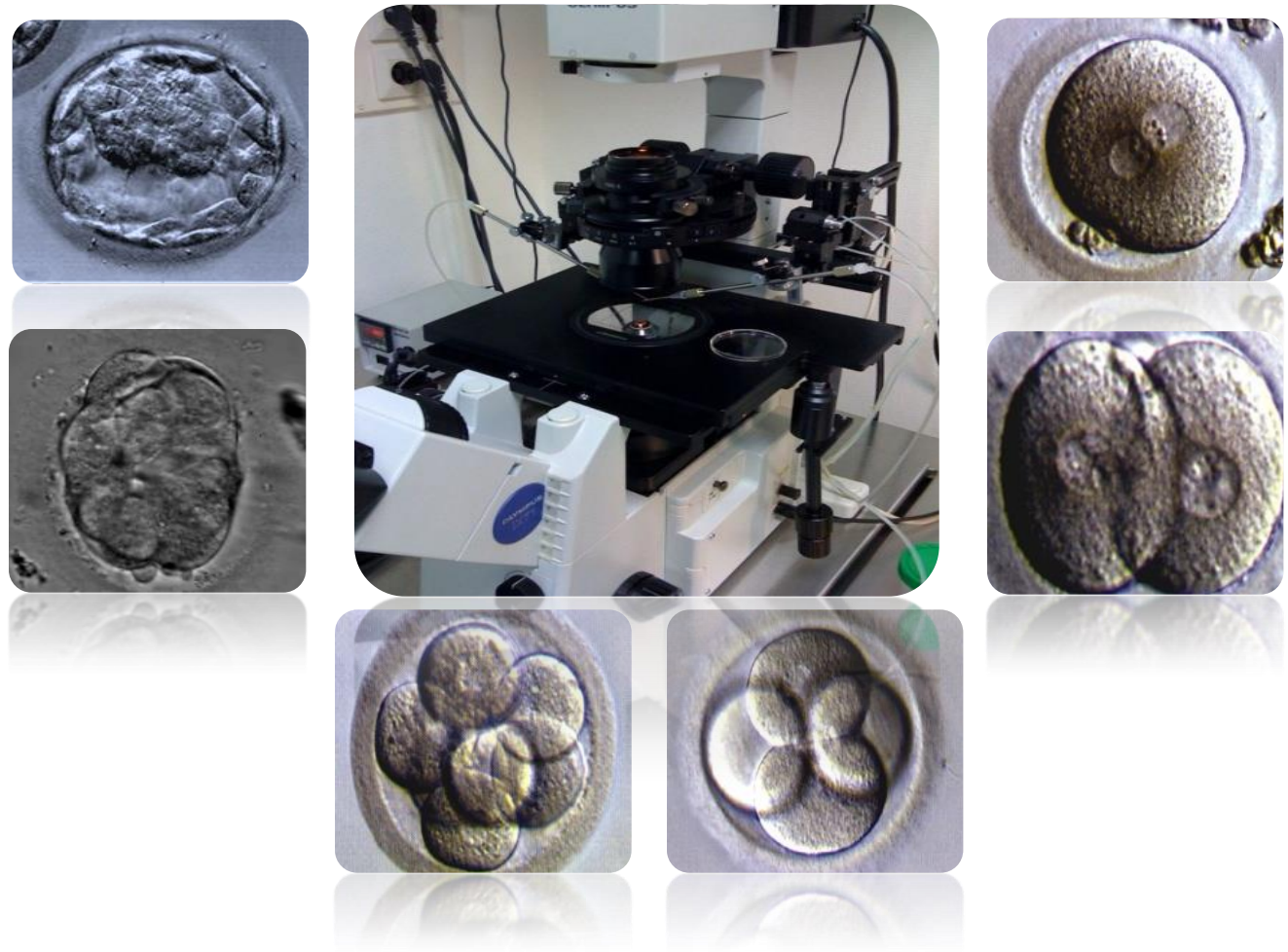
MATERIALS AND METHODS

- EMBRYO MORPHOLOGY AND EMBRYO TRANSFER



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RESULTS

Linear model analysis of the contributing factors for the number of immature oocytes and immature oocytes rates (n=3,920).

	GV incidence			MI incidence		
	R^2	β	p	R^2	β	p
FSH dose	0.050	-0.035	0.029	0.042	-0.046	0.004
E2 levels	0.155	0.342	<0.001	0.146	0.324	<0.001
hCG interval	0.050	-0.014	0.385	0.042	-0.015	0.368
	GV / retrieved oocytes			MI / retrieved oocytes		
	R2	β	p	R2	β	p
FSH dose	0.002	0.009	0.592	0.001	-0.009	0.567
E2 levels	0.003	0.034	0.107	0.001	0.015	0.491
hCG interval	0.003	-0.015	0.356	0.002	-0.025	0.135

RESULTS

Effect of the pituitary blockage and COS protocol on the number of immature oocytes and immature oocytes rates (n=3,920).

	GnRH antagonist			GnRH agonist		
	rFSH (n=1570)	rFSH + rLH (n=980)	p	rFSH (n=658)	rFSH + rLH (n=712)	p
MI	1.13±0.03	1.12±0.05	0.928	1.45±0.10	0.38±0.68	0.119
GV	1.33±0.05	1.36±0.08	0.731	1.46±0.14	0.40±0.93	0.263
MI/oocyte	10.75±0.36	11.33±0.59	0.405	13.40±0.91	6.32±6.19	0.147
GV/oocyte	11.01±0.36	5.93±5.40	0.042	11.52±1.12	1.86±2.10	<0.001

RESULTS

Regression analysis of the association between immature oocytes rate and ICSI outcomes

	MI/oocyte			GV/oocyte		
	R^2	β	p	R^2	β	p
Fertilization rate	0.035	-0.096	<0.001	0.029	-0.059	<0.001
High-quality embryos rate D2	0.014	-0.102	<0.001	0.008	-0.066	<0.001
High-quality embryos rate D3	0.020	-0.090	<0.001	0.020	-0.087	<0.001
Blastocyst rate	0.073	-0.066	<0.001	0.071	-0.053	<0.001
Implantation rate	0.059	-0.074	<0.001	0.056	-0.042	0.033
	B	OR	p	B	OR	p
Pregnancy rate	-0.011	0.989	0.002	-0.009	0.992	0.013
Miscarriage rate	0.010	1.011	0.220	0.006	0.944	0.418

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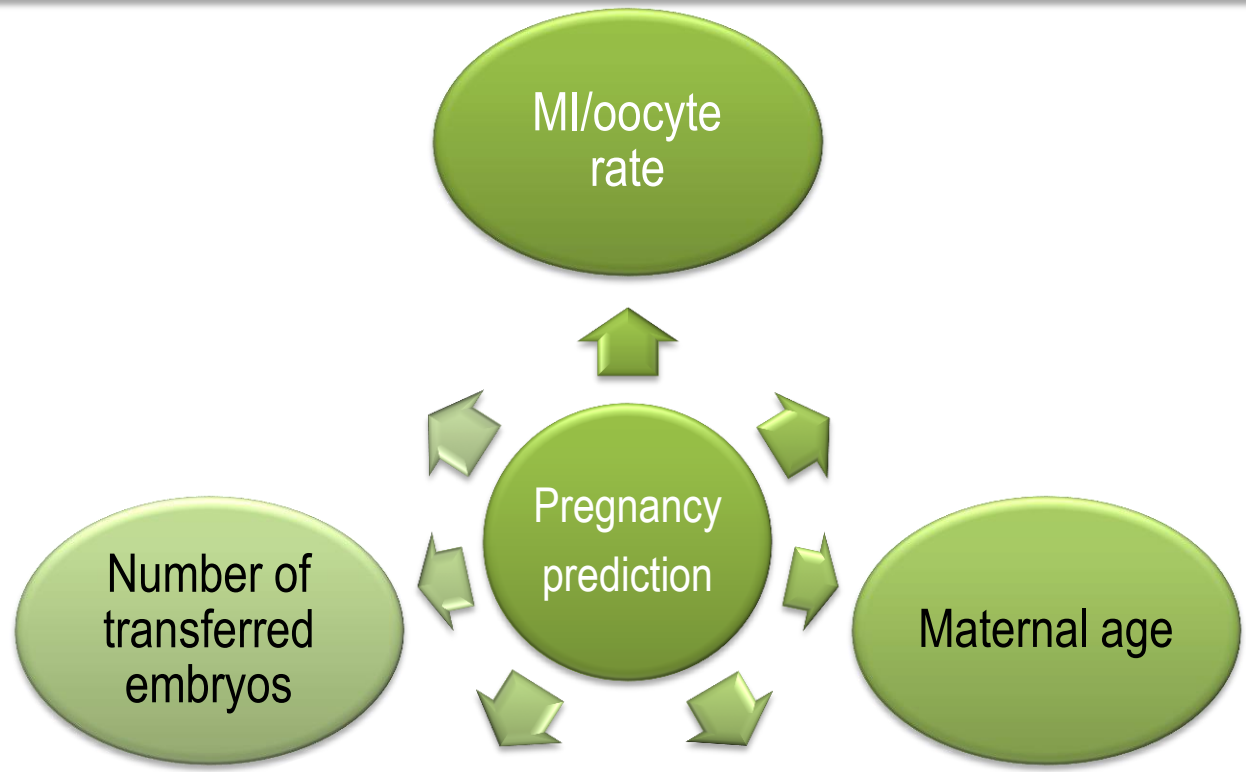
RESULTS

Discriminant analysis for pregnancy outcome prediction



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RESULTS

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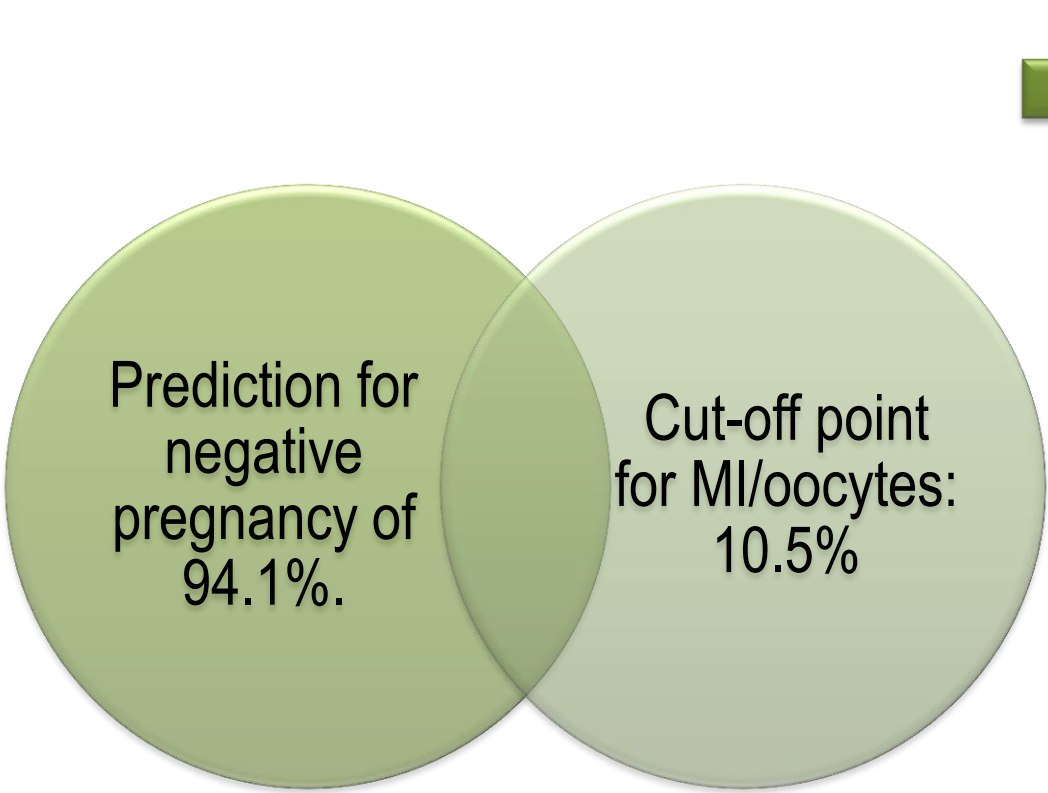

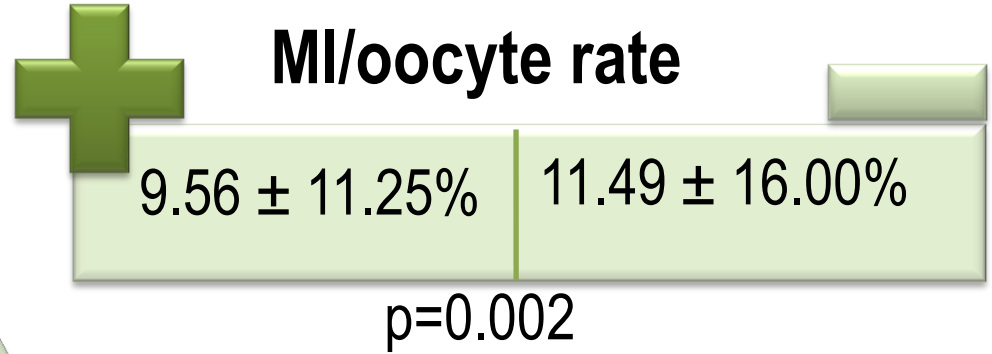

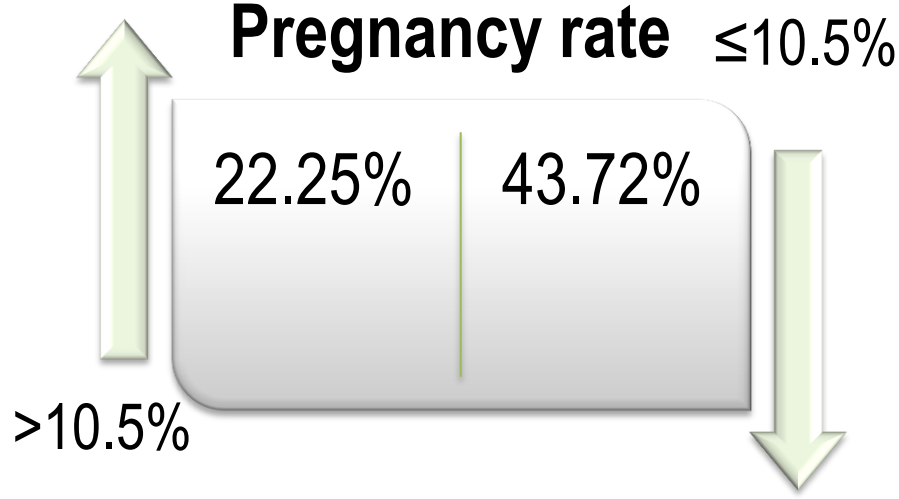

CONCLUSION

The immature oocyte incidence is affected by the COS protocol

Immature oocyte incidence negatively impacts laboratorial and clinical ICSI outcomes

Immature oocyte incidence may be considered a predictive toll for the outcomes of ART cycles

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WIDER IMPLICATIONS OF THE FINDINGS

The incidence of immature oocytes may reflect the competence of the whole cohort

Mature oocytes derived from cycles with higher incidence of immature oocytes may have poor embryo development and low implantation potential

These findings highlight the importance of the COS protocol and the gonadotrophin dose for the outcomes of assisted reproduction cycles

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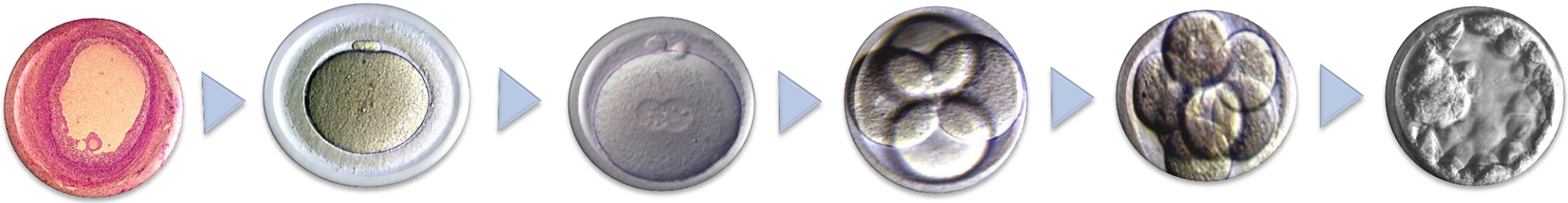
DISCUSSION



High incidence of immature oocyte

Inefficient biological machinery

Detrimental effects on clinical outcomes

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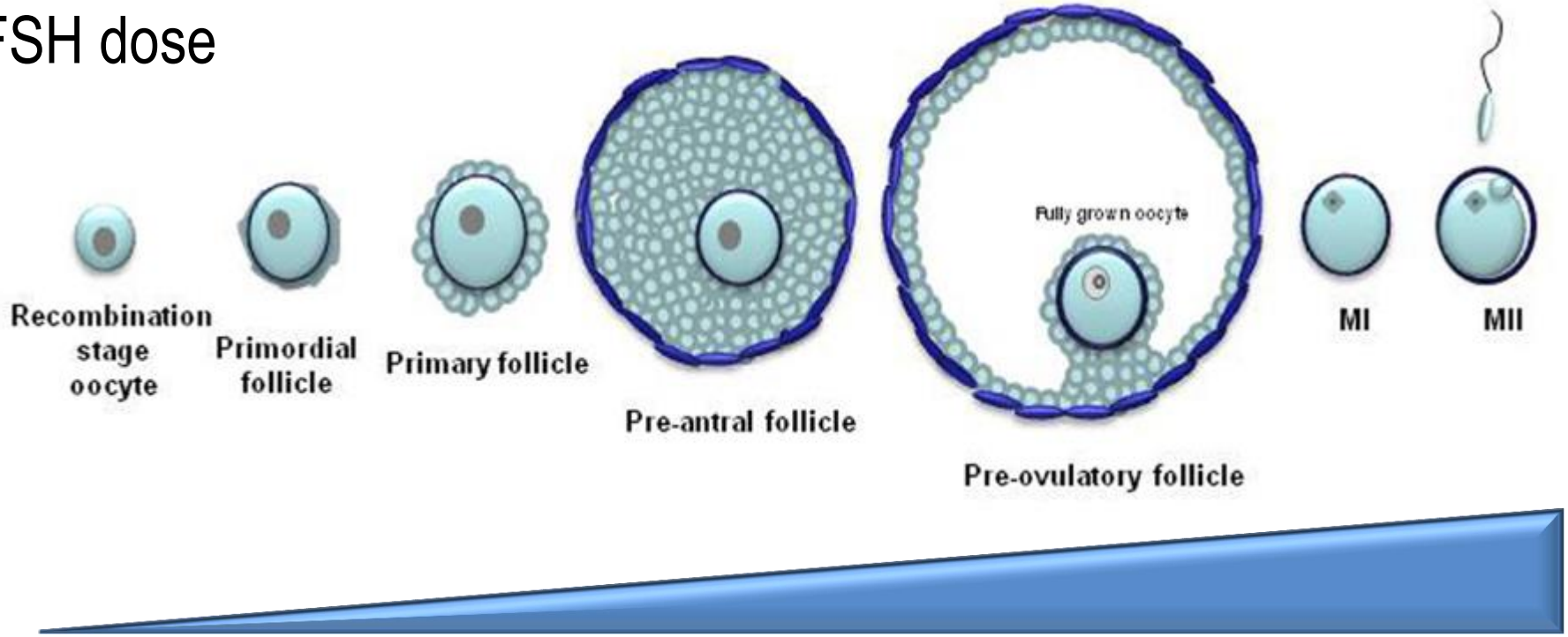
DISCUSSION

- ✓ FSH dose



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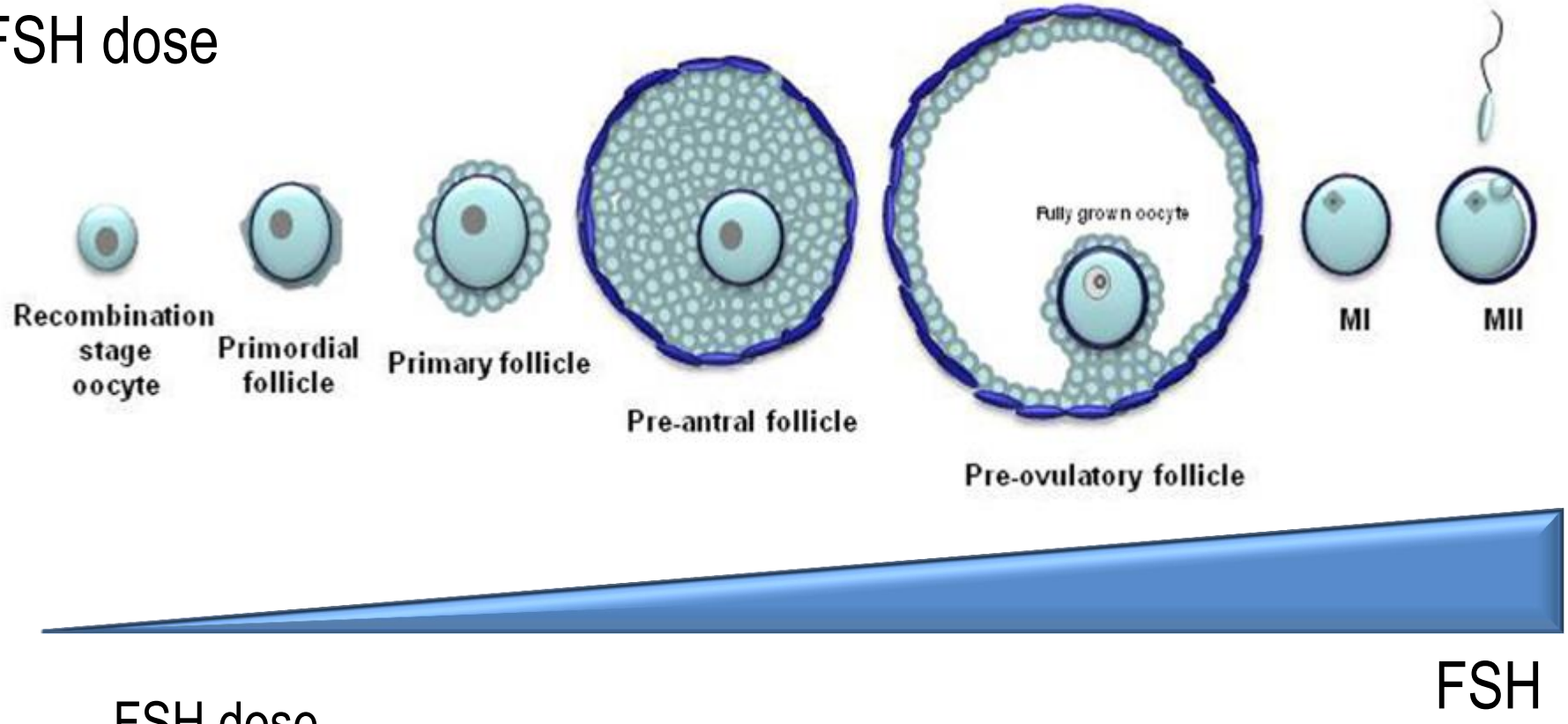
DISCUSSION

✓ FSH dose



FSH dose

- Homogeneous cohort development

Number of GV and MI

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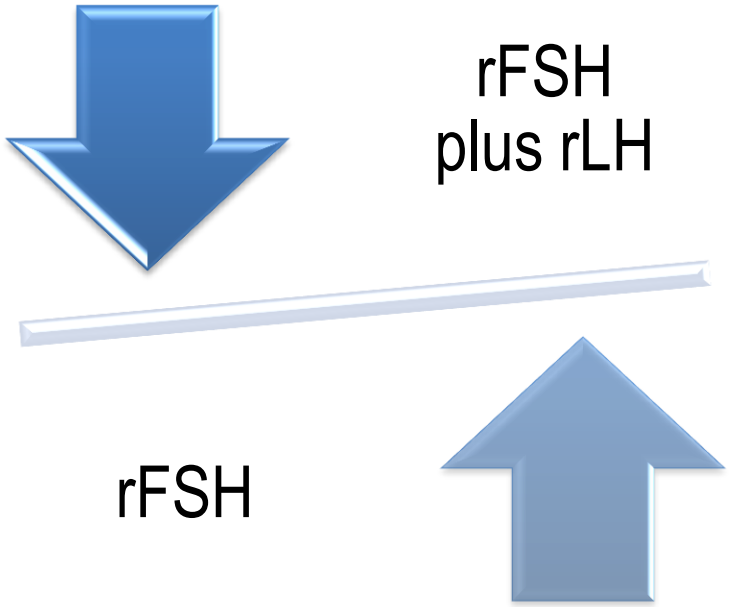
DISCUSSION

- ✓ GV/oocyte rate in GnRH agonists protocols



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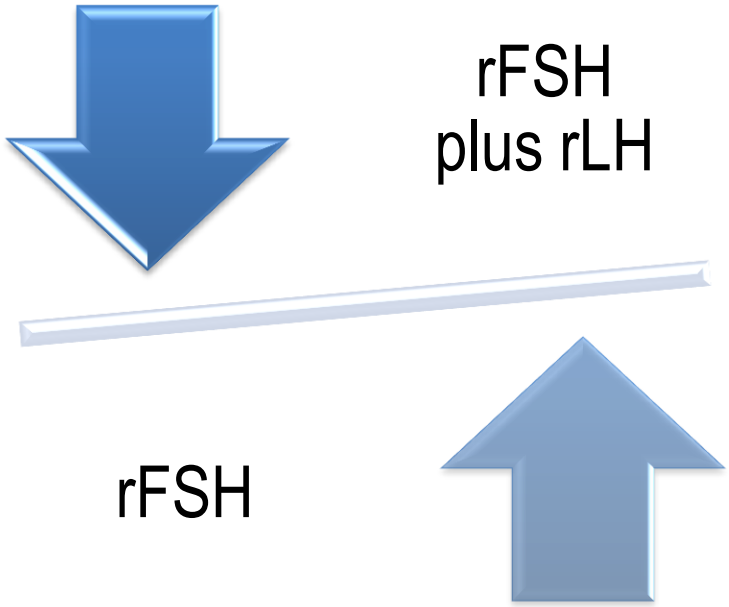
DISCUSSION

✓ GV/oocyte rate in GnRH agonists protocols



frontiers in Endocrinology

ORIGINAL RESEARCH
published: 01 June 2017
doi: 10.3389/fendo.2017.00114

Efficacy of Follicle-Stimulating Hormone (FSH) Alone, FSH + Luteinizing Hormone, Human Menopausal Gonadotropin or FSH + Human Chorionic Gonadotropin on Assisted Reproductive Technology Outcomes in the "Personalized" Medicine Era: A Meta-analysis

*Daniele Santi[1,2], Livio Casarini[1,3], Carlo Alviggi[4] and Manuela Simoni[1,2,3]**

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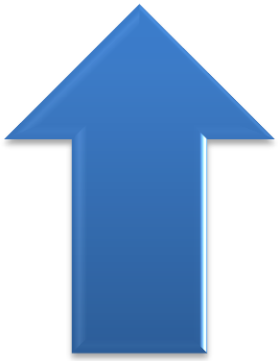
DISCUSSION

- ✓ Estradiol levels at hCG trigger day



E2 level

Follicles

Oocytes

Journal of Assisted Reproduction and Genetics, Vol. 9, No. 3, 1992

CLINICAL ASSISTED REPRODUCTION

The Prognostic Importance of the Number of Oocytes Retrieved and Estradiol Levels in Poor and Normal Responders in in Vitro Fertilization (IVF) Treatment

JEHOSHUA DOR,[1,3] DANIEL S. SEIDMAN,[1] IZHAR BEN-SHLOMO,[1] DAVID LEVRAN,[1] AVRAHAM KARASIK,[2] and SHLOMO MASHIACH[1]

ELSEVIER

European Journal of Obstetrics & Gynecology and Reproductive Biology 56 (1994) 121–127

OBSTETRICS & GYNECOLOGY

Number of follicles, oocytes and embryos in human in vitro fertilization is relative to serum estradiol and progesterone patterns during different types of ovarian hyperstimulation

Ernest Suchanek*[a], Koraljka Huderer[a], Danko Dobec[a], Visnja Hlavati[a], Velimir Simunic[b], Veselko Grizelj[b]

[a]*Laboratory for Reproductive Endocrinology and Embriology,* [b]*Department of Obstetrics and Gynecology, Zagreb University School of Medicine, Petrova 13, 41000 Zagreb, Croatia*

Received 24 February 1994; accepted 31 May 1994

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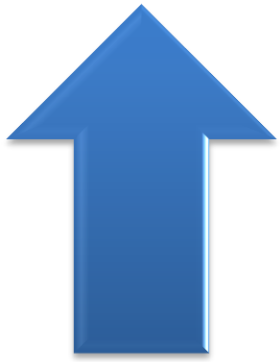
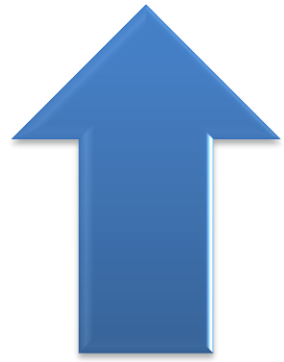
DISCUSSION

- ✓ Estradiol levels at hCG trigger day



E2 level



Follicles

Oocytes

MII

MI

GV

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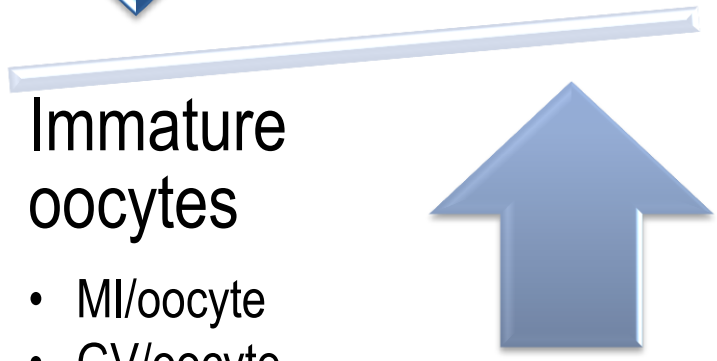
DISCUSSION

MII fertilization rate



Immature oocytes

- MI/oocyte
- GV/oocyte

Human Reproduction vol.15 no.6 pp.1389–1395, 2000

The ability to generate normal Ca^{2+} transients in response to spermatozoa develops during the final stages of oocyte growth and maturation

Alan Cheung[1], Karl Swann[1] and John Carroll[1,2,3]

[1]Department of Anatomy and Developmental Biology and
[2]Department of Physiology, University College London, Gower Street, London WC1E 6BT, UK

[3]

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DISCUSSION

MII fertilization rate

Immature oocytes

- MI/oocyte
- GV/oocyte

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Insights in Reproductive Medicine

2017
Vol.1 No.1:4

Consequences of Asynchronous Follicle Growth during Controlled Ovarian Stimulation: Management Strategy

Laura de la Fuente, Inmaculada Mejía, Nerea Ruiz, Elisa Escalante, Magdalena Abad and Pilar Moreno

Department of Obstetrics and Gynaecology, University Hospital October 12, Madrid, Spain

J Assist Reprod Genet (2012) 29:803–810
DOI 10.1007/s10815-012-9799-6

ASSISTED REPRODUCTION TECHNOLOGIES

The effect of immature oocytes quantity on the rates of oocytes maturity and morphology, fertilization, and embryo development in ICSI cycles

Iman Halvaei · Mohammad Ali Khalili · Mohammad Hossein Razi · Stefania A. Nottola

Middle East Fertility Society Journal (2015) 20, 37–42

Middle East Fertility Society

Middle East Fertility Society Journal

www.mefsjournal.org
www.sciencedirect.com

ORIGINAL ARTICLE

Oocyte maturation-index as measure of oocyte cohort quality; a retrospective analysis of 3135 ICSI cycles

Kemal Ozgur [a], Hasan Bulut [a], Murat Berkkanoglu [a], Kevin Coetzee [b,*], Serdar Ay [c]

[a] Antalya IVF, Halide Edip Cd. No: 7, Kanal Mh., Antalya 07080, Turke
[b] Vitale, Kadin Hastalıkları ve Doğum Hastanesi, Antalya, Turkey
[c] Sinanpaşa Family Health Center, Sinanpaşa Mah., Sinanpaşa Köprüsü Sok No: 21, Beşiktaş, 34353 Istanbul, Turkey

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DISCUSSION

Embryo quality

- Cleavage-stage days 2 and 3
- Blastocyst rate

Immature oocytes

- MI/oocyte
- GV/oocyte

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DISCUSSION

Embryo quality

- Cleavage-stage days 2 and 3
- Blastocyst rate

Immature oocytes

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J Assist Reprod Genet (2017) 34:895–903
DOI 10.1007/s10815-017-0935-1

ASSISTED REPRODUCTION TECHNOLOGIES

The effect of follicle size and homogeneity of follicular development on the morphokinetics of human embryos

Semra Kahraman[1] · Caroline Pirkevi Cetinkaya[1] · Murat Cetinkaya[1] · Hakan Yelke[1] · Yesim Kumtepe Colakoglu[1] · Melih Aygun[1] · Markus Montag[2]

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DISCUSSION

Clinical outcomes

- Implantation rate
- Pregnancy rate

Immature oocytes

- MI/oocyte
- GV/oocyte

FERTILITY MEDICAL GROUP

DISCUSSION

Clinical outcomes

- Implantation rate
- Pregnancy rate

Immature oocytes

- MI/oocyte
- GV/oocyte

MI/oocyte 10.5%

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DISCUSSION

Clinical outcomes

- Implantation rate
- Pregnancy rate

Immature oocytes

- MI/oocyte
- GV/oocyte

MI/oocyte cut-off

Pregnancy rate 43.72%

Pregnancy rate 22.25%

2 times lower

MI/oocyte 10.5% cut-off

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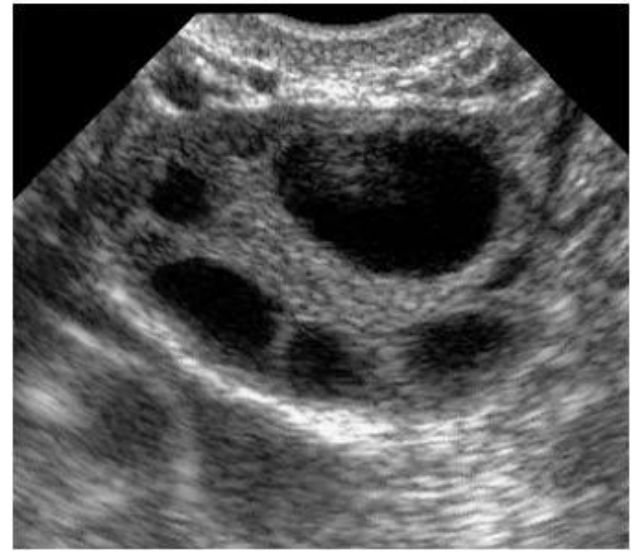
INTRODUCTION

Follicular asynchrony

Different COS protocols

Variations in oocyte number and quality



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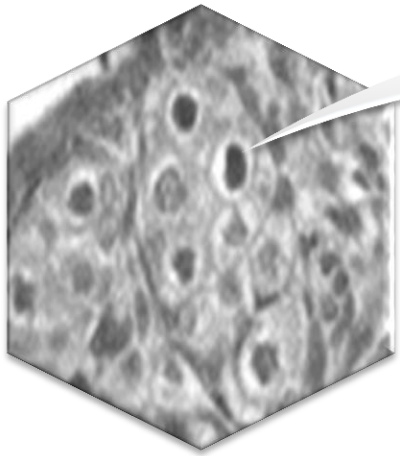
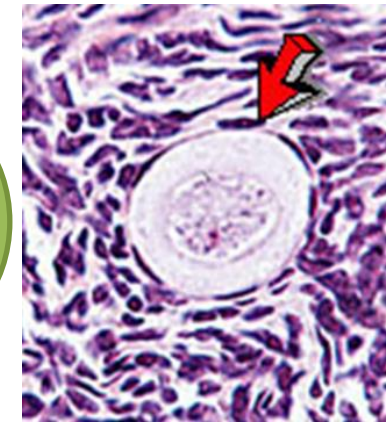
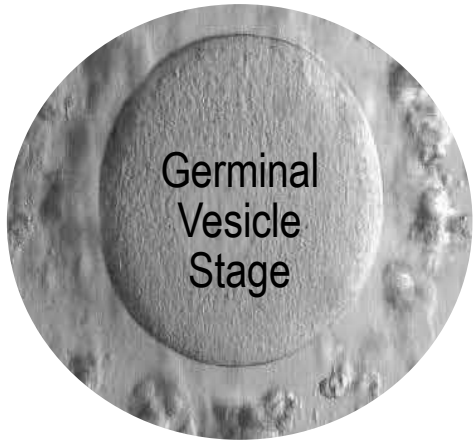
INTRODUCTION



Pool of quiescent primordial follicles





Fate of each follicle controlled by endocrine as well as paracrine factors

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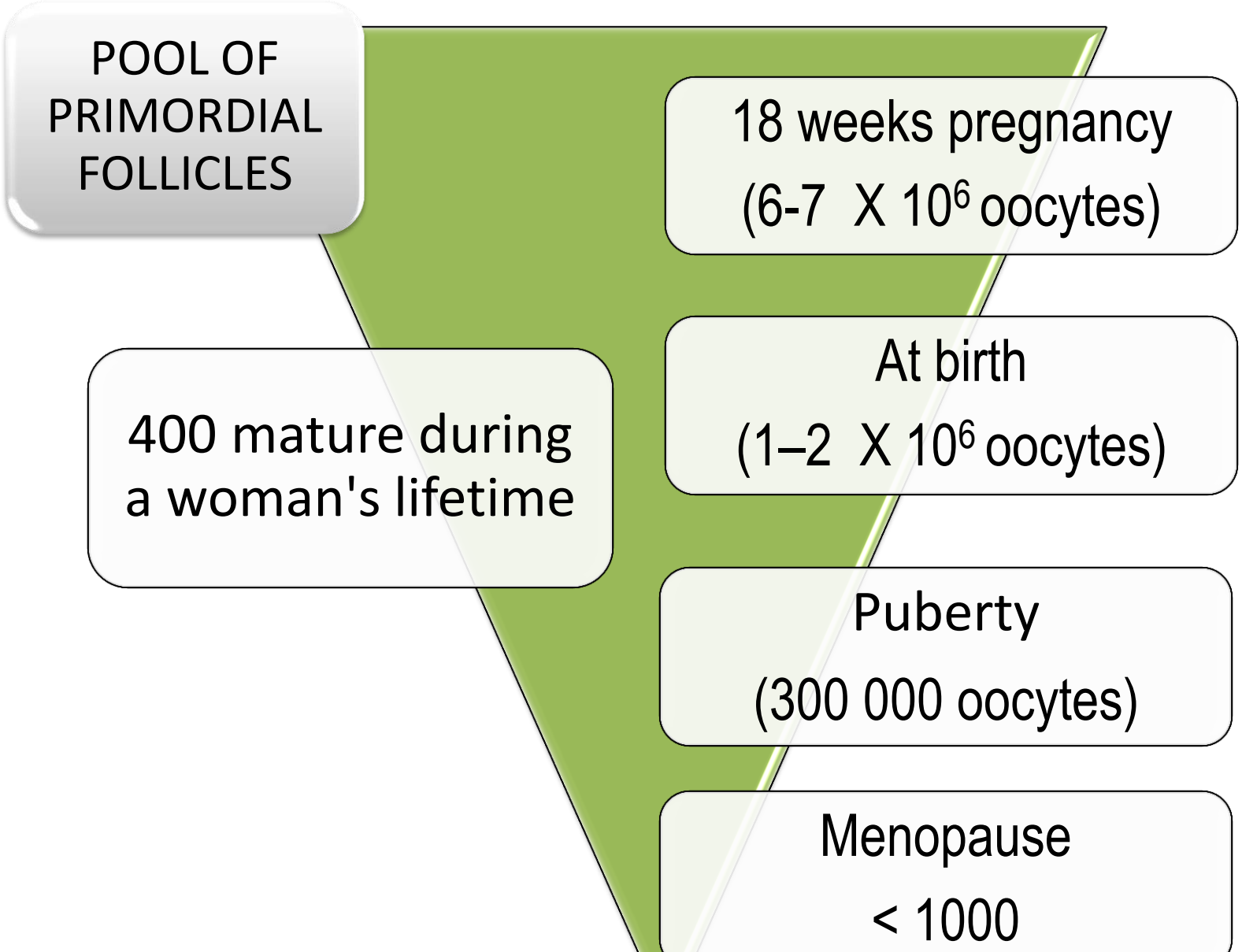
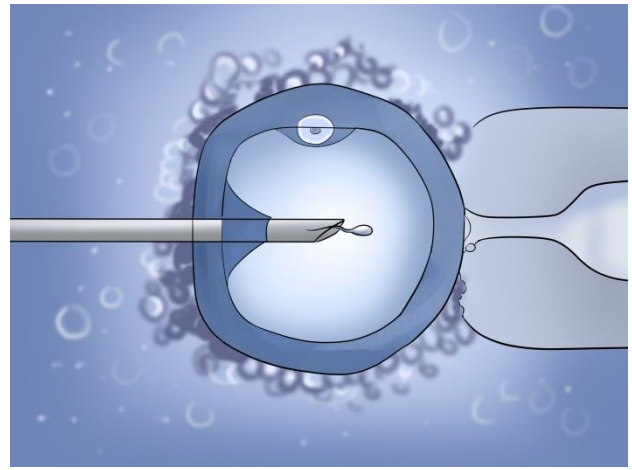
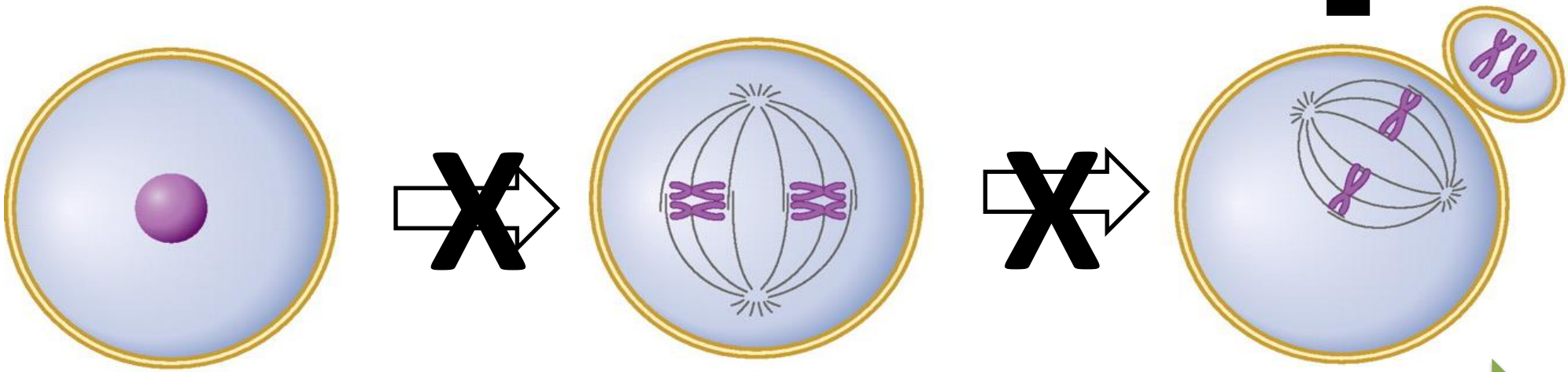
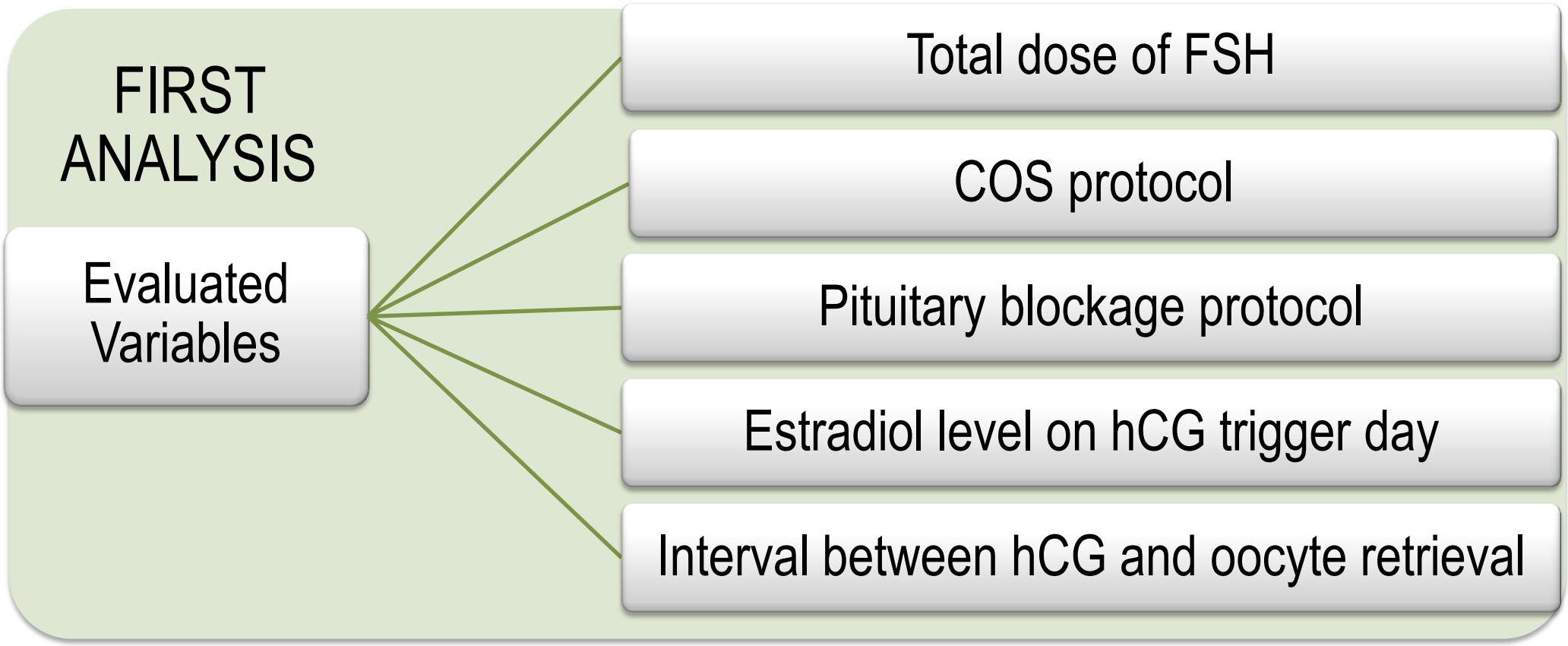


INTRODUCTION





MATERIALS AND METHODS



MATERIALS AND METHODS