OOCYTE SELECTION AND BANKING

ASEBIR Scoring System

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GI EMBRIOLOGÍA
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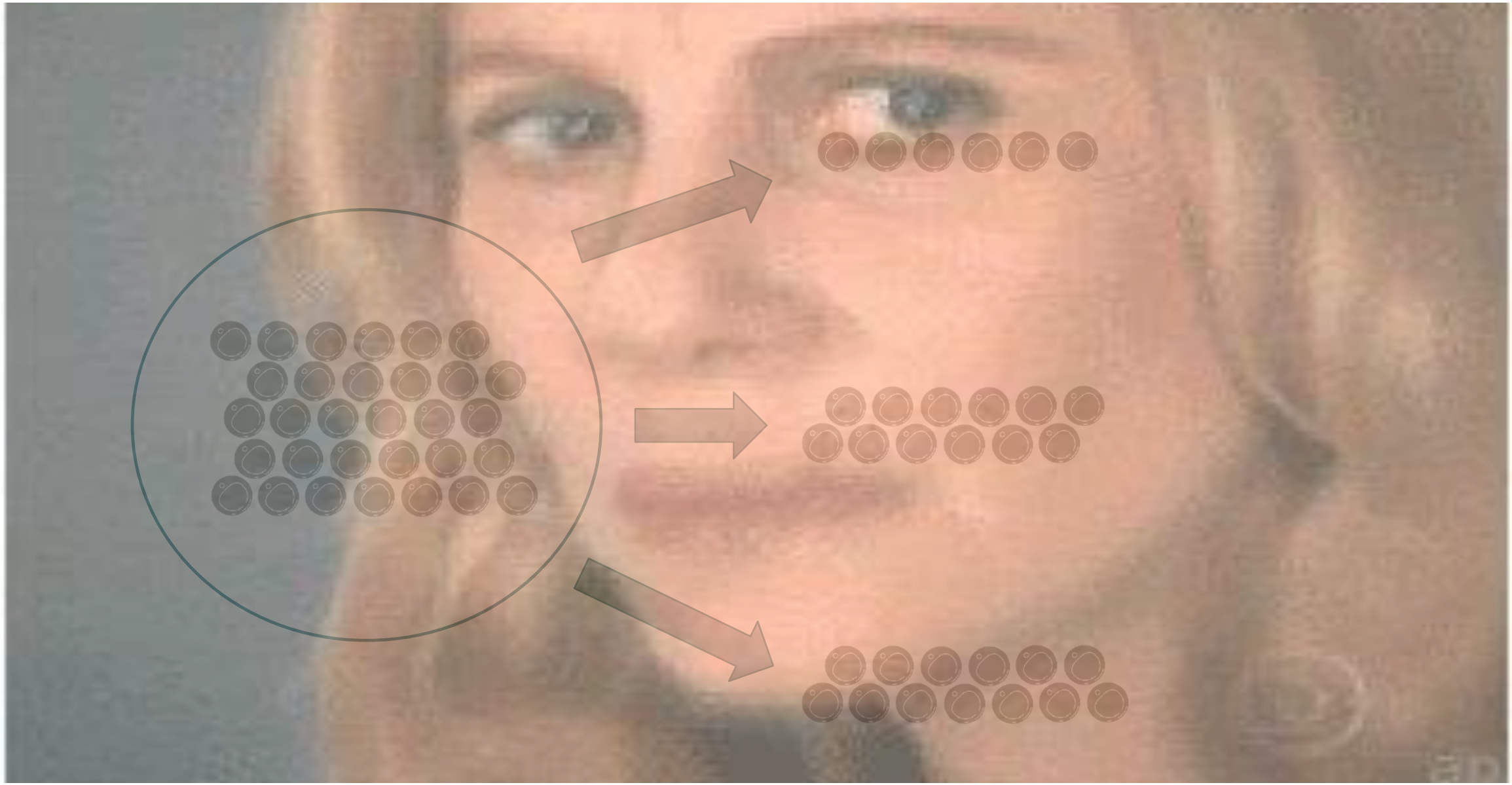
INDEX

1. INTRODUCTION

Final oocyte maturation

Oocyte competence: Nuclear and cytoplasmic maturation

(Abbara et al., 2018)



2. OOCYTE MORPHOLOGICAL FEATURES

2. Oocye morphological features

a) Cumulus-oocyte complex (COC) scoring

b) Morphological cytoplasmic oocyte alterations

- Organelle clustering
- Vacuoles
- Smooth endoplasmic reticulum (SER) clusters
- Cytoplasmic inclusions

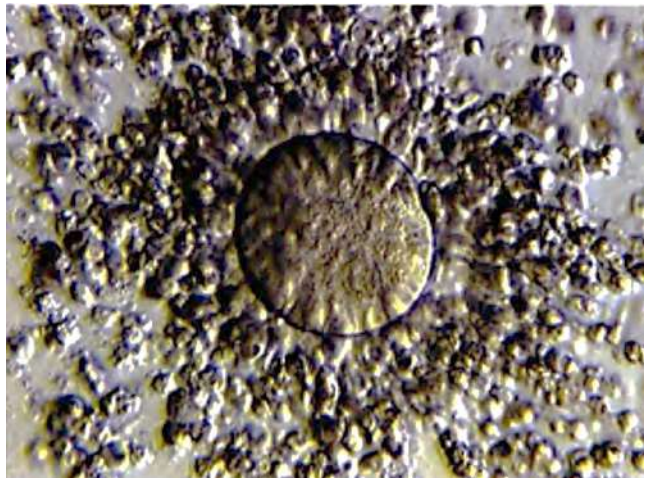
c) Extracytoplasmic oocyte abnormalities

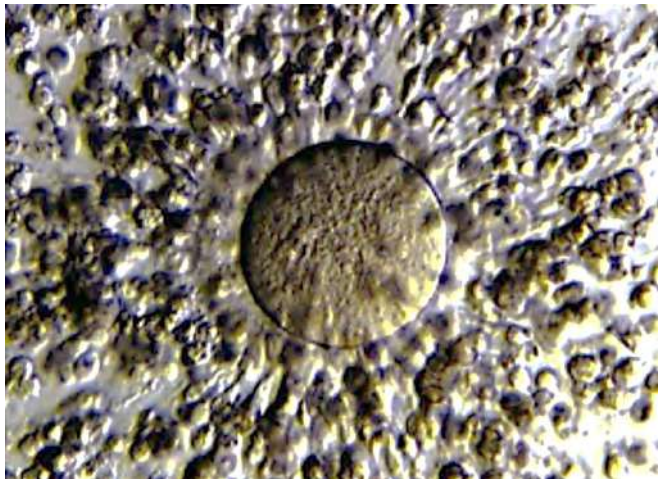
- Zona pellucida (ZP)
- Perivitelline space (PVS)
- Polar Body (PB1)

d) Oocyte size

a) COC SCORING

- Expanded cumulus and a radiating corona





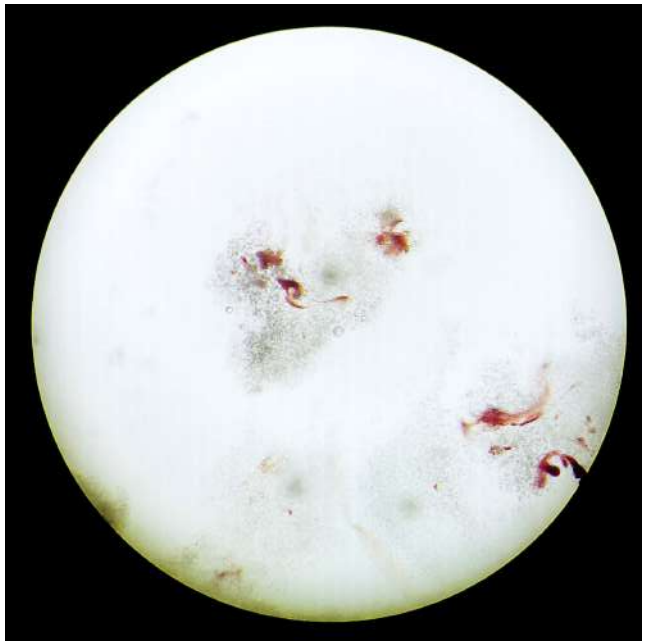
(L. Veek, 1999)

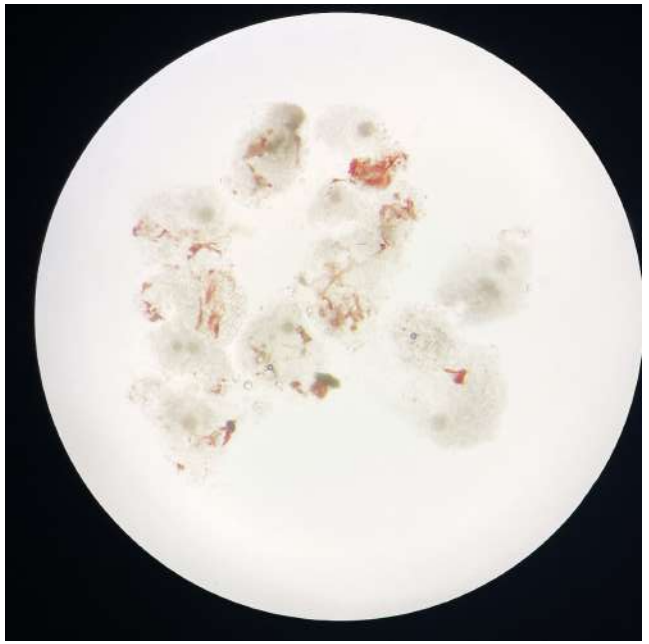
a) COC SCORING

- Presence of blood clots:

↓Fertilization rate

↓Blastocyst formation





Mechanical removal of blood clots cannot rescue the corresponding embryo (Ebner, 2008).

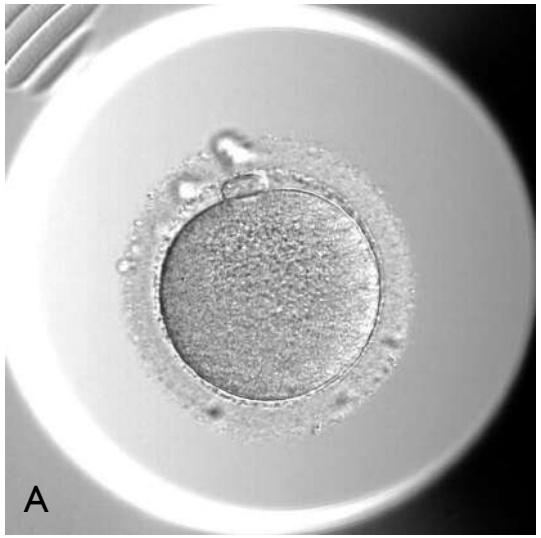
b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

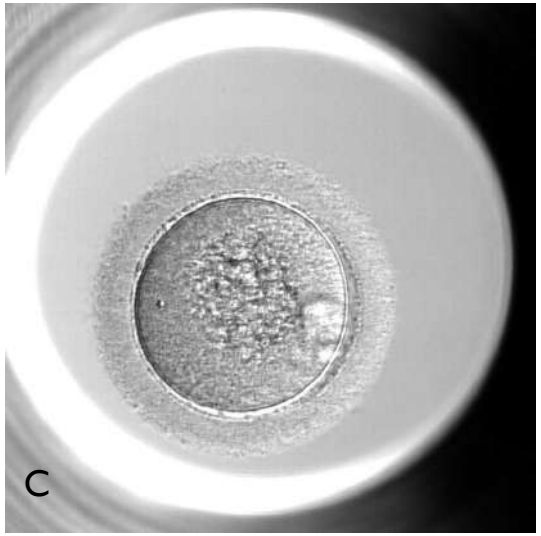
- Organelle clustering: Controversial

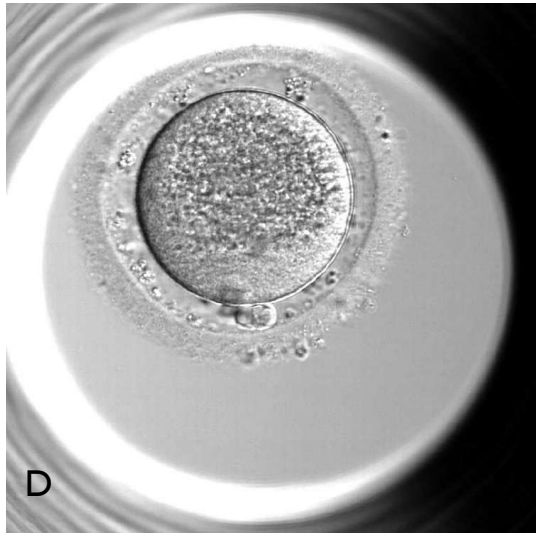
↓ Fertilization

↓ Blastocyst formation

↓ Implantation





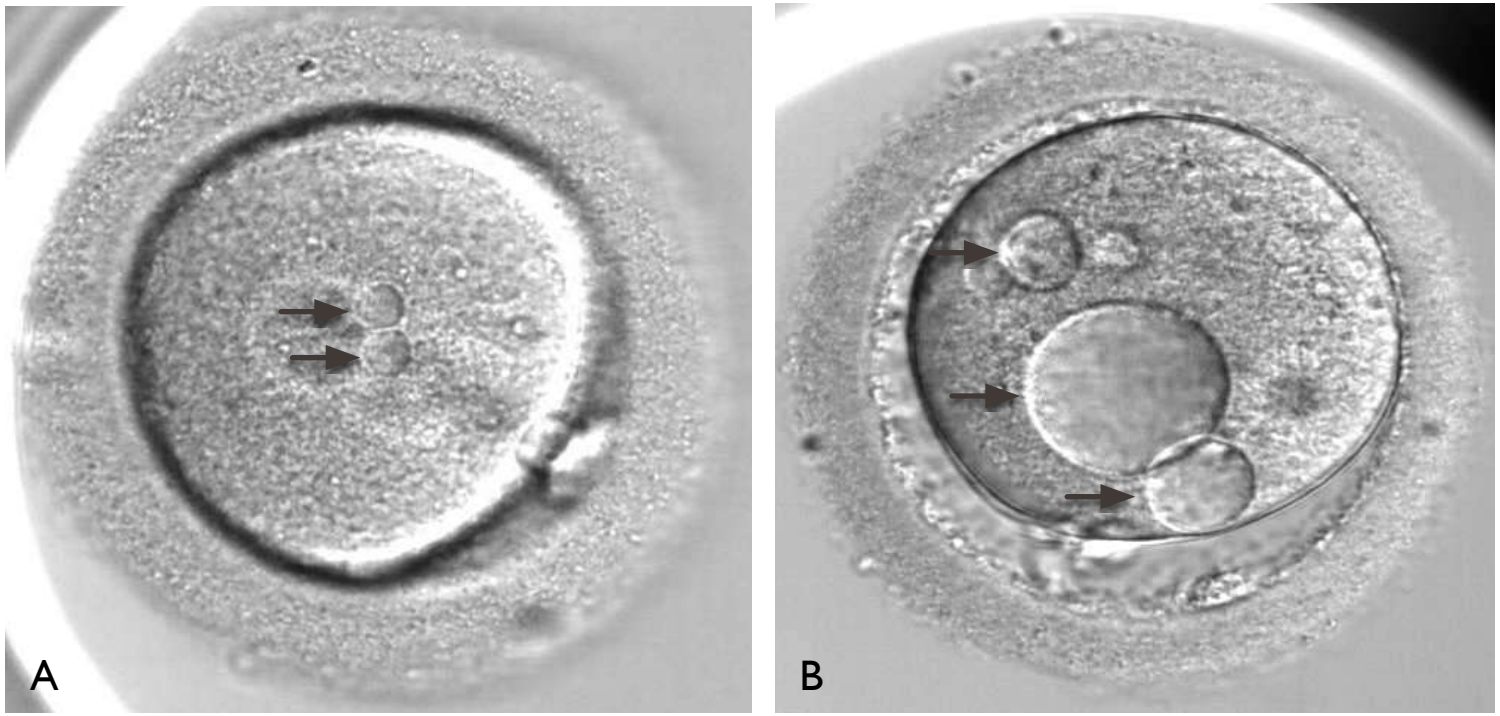


b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

- Vacuoles: detrimental if severe (>25µm).

↓ Fertilization

↓Blastocyst formation



b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

- SER clusters: Controversial

↓ Fertilization

↓ Embryo quality

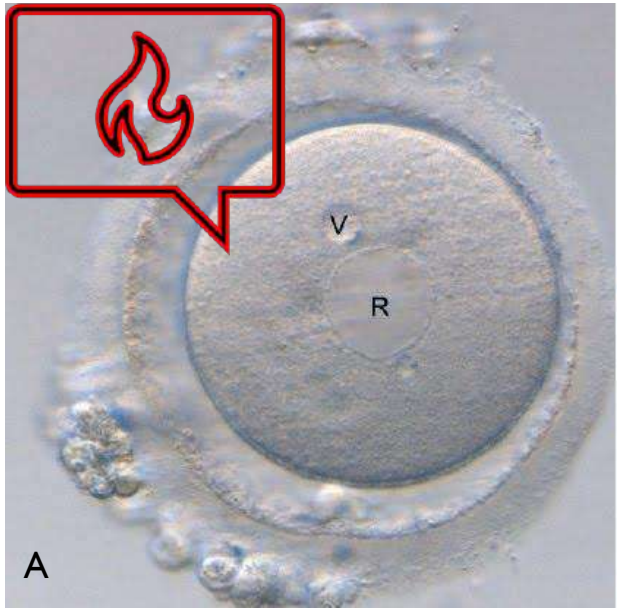
↓Blastocyst formation

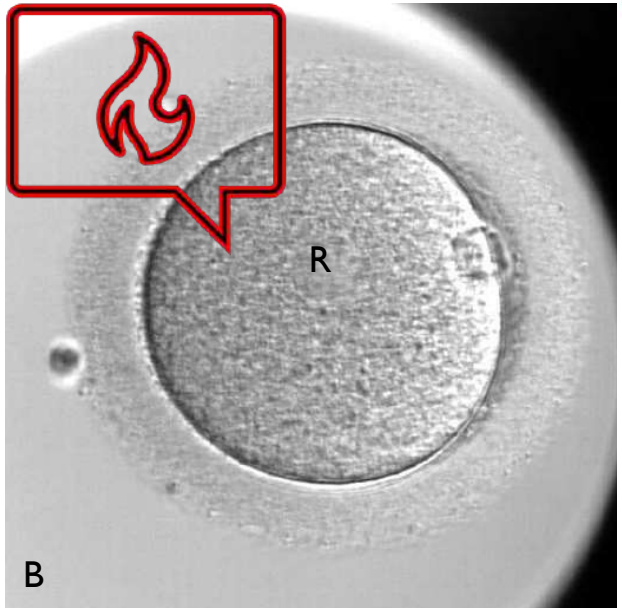
↓ Pregnancy

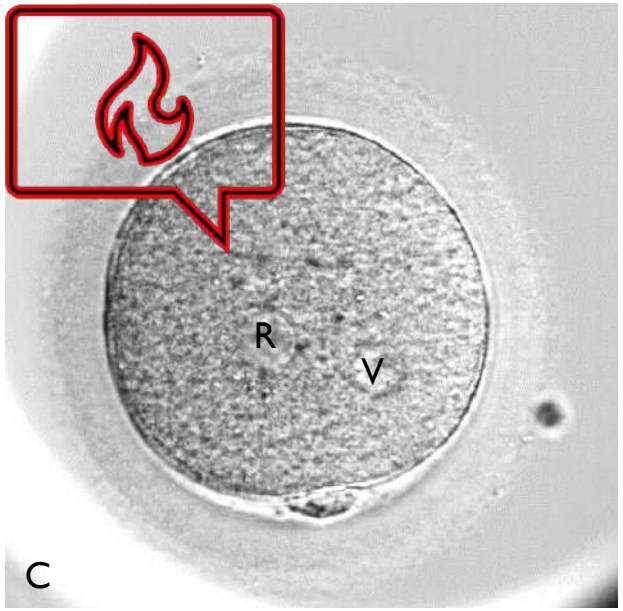
↑ Miscarriage

Perinatal complications

Birth defects







The Istanbul consensus workshop on embryo assessment: proceedings of an expert meeting.

Alpha Scientists in Reproductive Medicine and ESHRE Special Interest Group of Embryology.

b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

- SER clusters: Controversial

Deliveries of babies with normal health derived from oocytes with smooth endoplasmic reticulum clusters

Hiromitsu Hattori [1], Yusuke Nakamura, Yukiko Nakajo, Yasuhisa Araki, Koichi Kyono

Deliveries of normal healthy babies from embryos originating from oocytes showing the presence of smooth endoplasmic reticulum aggregates

I Mateizel [1], L Van Landuyt, H Tournaye, G Verheyen

The impact of **Alpha/ESHRE** consensus regarding oocytes with aggregates of smooth endoplasmic reticulum (SERa) on in vitro fertilization outcome.

Restelli L, Delle Noci S, Mangiarini A, Ferrari S, Somigliana E, Paffoni A.

Is it time to reconsider how to manage oocytes affected by smooth endoplasmic reticulum aggregates?

Ferreux L, Sallem A, Chargui A, Gille AS, Bourdon M, Maignien C, Santulli P, Wolf JP, Patrat C, Pocate-Cheriet K.

b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

- SER clusters: Controversial

The Vienna consensus: report of an expert meeting on the development of ART laboratory performance indicators

ESHRE Special Interest Group of Embryology and Alpha Scientists in Reproductive Medicine. Electronic address: coticchio.biogenesi@grupposandonato.it [1]

The Embryology Interest Group: updating ASEBIR's morphological scoring system for early embryos, morulae and blastocysts

Irene Cuevas Saiz, Maria Carme Pons Gatell, Muriel Cuadros Vargas, Arantzazu Delgado Mendive, Natalia Rives Enedáguila, Marta Moragas Solanes, Beatriz Carrasco Canal, José Teruel López, Ana Busquets Bonet y Mª Victoria Hurtado de Mendoza Acosta

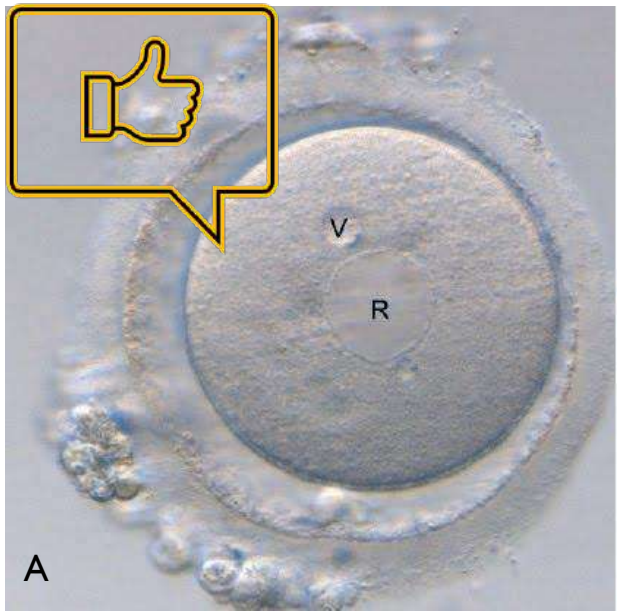
Medicina Reproductiva y Embriología Clínica, 2018-01-01, Volumen 5, Número 1, Páginas 42-54, Copyright © 2018 Asociación para el Estudio de la Biología de la Reproducción y Sociedad Española de Fertilidad

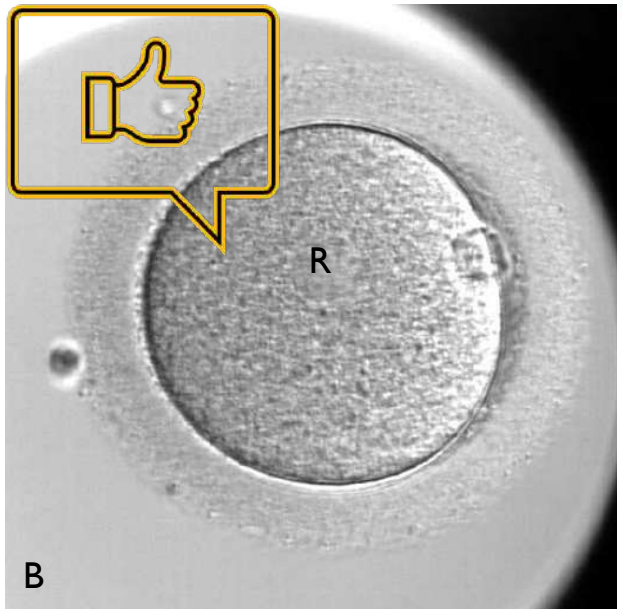
The Istanbul consensus update: a revised ESHRE/ALPHA consensus on oocyte and embryo static and dynamic morphological assessment,.

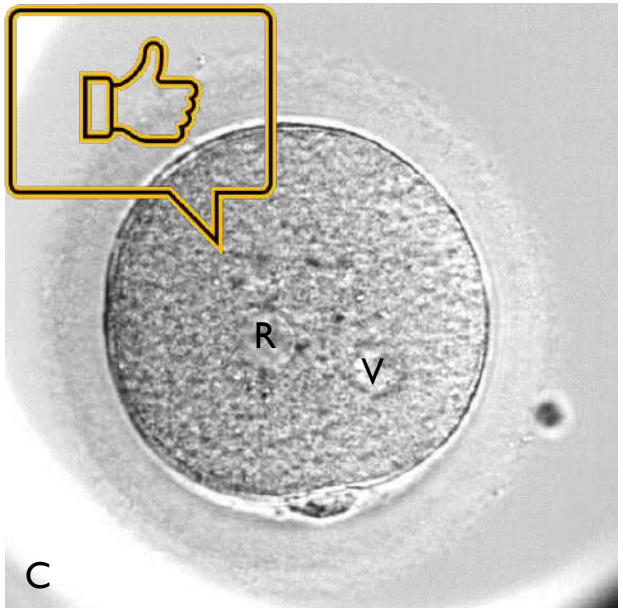
Working Group on the update of the ESHRE/ALPHA Istanbul Consensus; Coticchio G, Ahlström A, Arroyo G, Balaban B, Campbell A, De Los Santos MJ, Ebner T, Gardner DK, Kovačič B, Lundin K, Magli MC, Mcheik S, Morbeck DE, Rienzi L, Sfontouris I, Vermeulen N, Alikani M.

b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

- SER clusters: Case by case evaluation

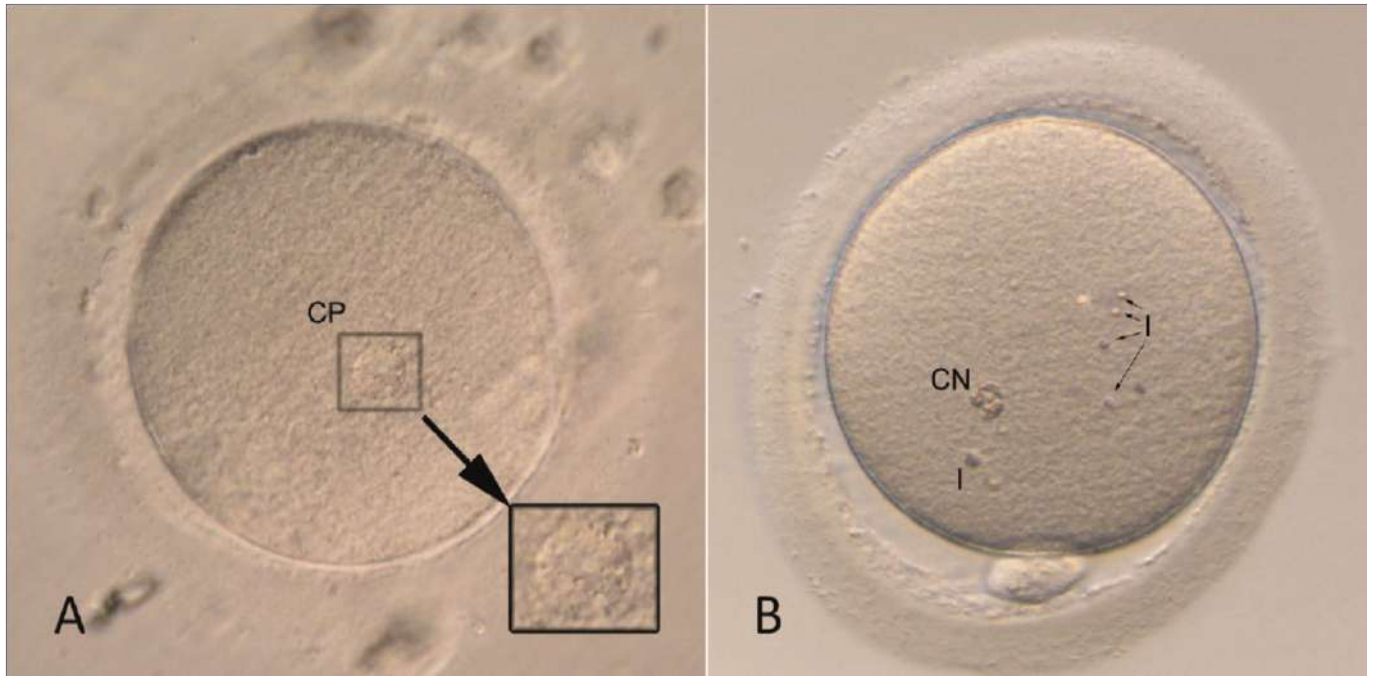






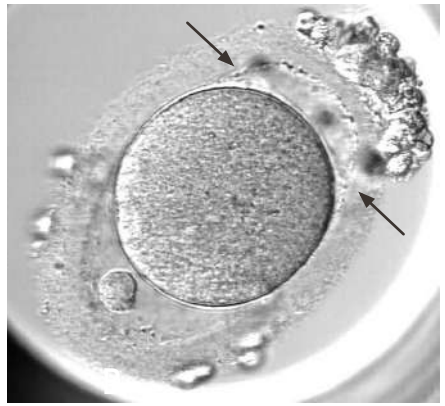
b) MORPHOLOGICAL CYTOPLASMIC OOCYTE ALTERATIONS

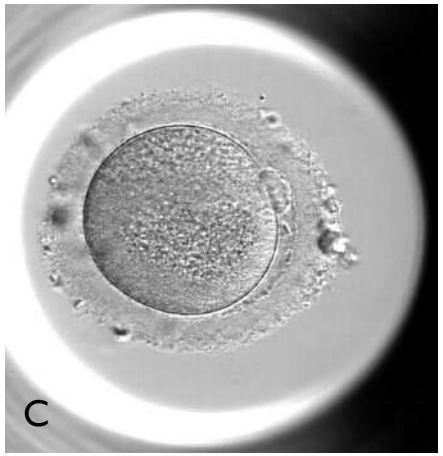
- Cytoplasmic inclusions: Controversial

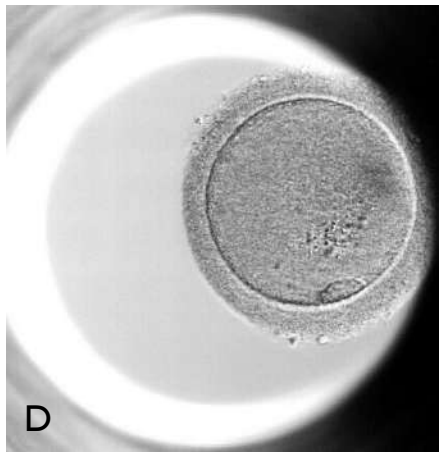


c) EXTRACYTOPLASMIC OOCYTE ABNORMALITIES

- ZP abnormalities: Contradictory results.





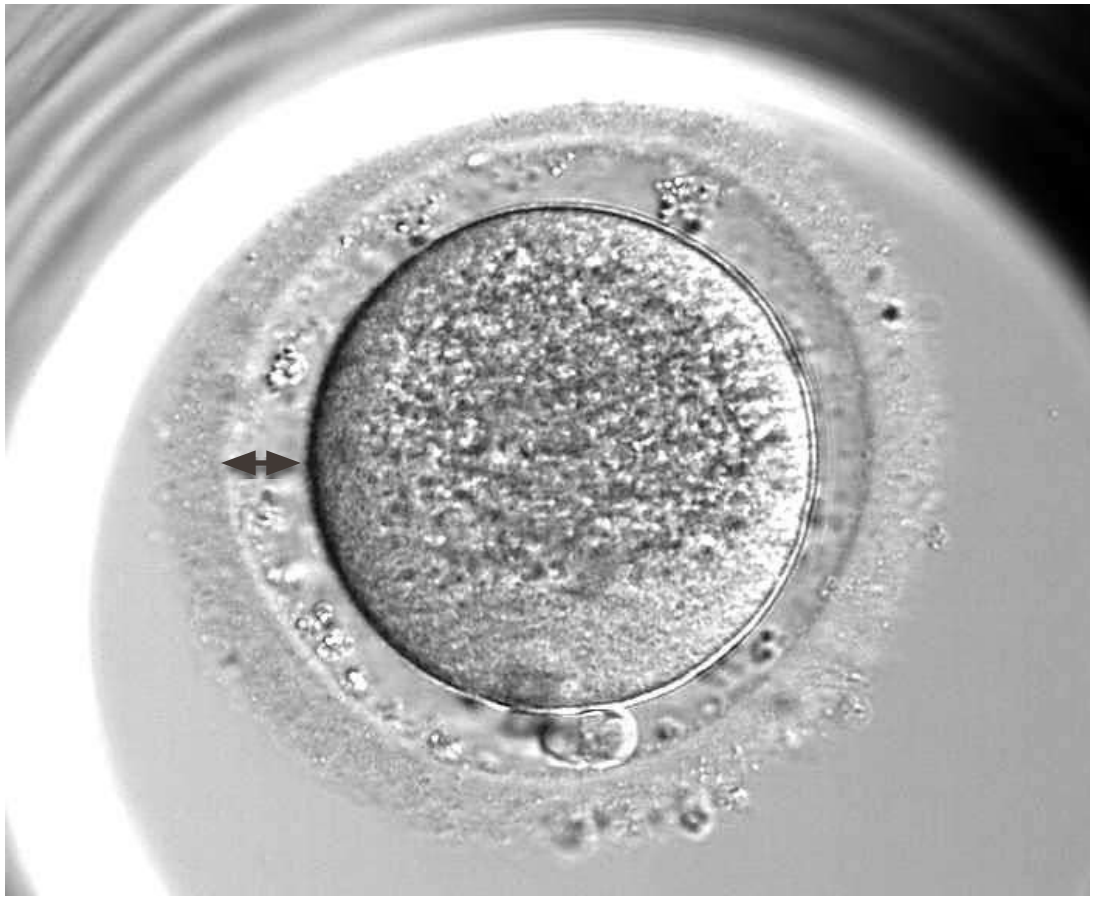


c) EXTRACYTOPLASMIC OOCYTE ABNORMALITIES

- ZP abnormalities

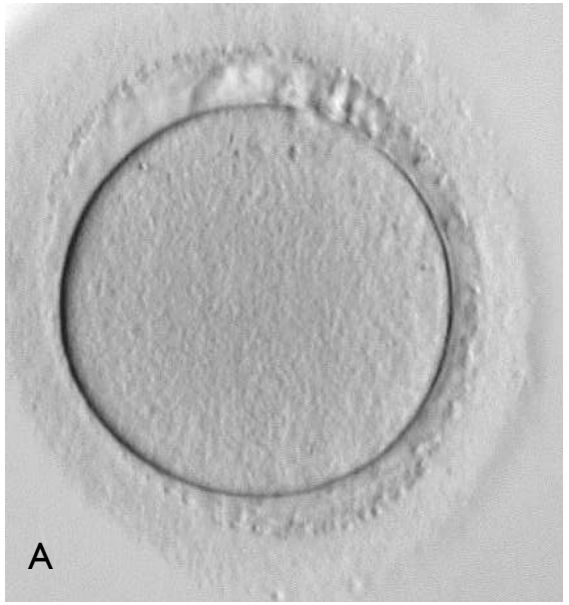
c) EXTRACYTOPLASMIC OOCYTE ABNORMALITIES

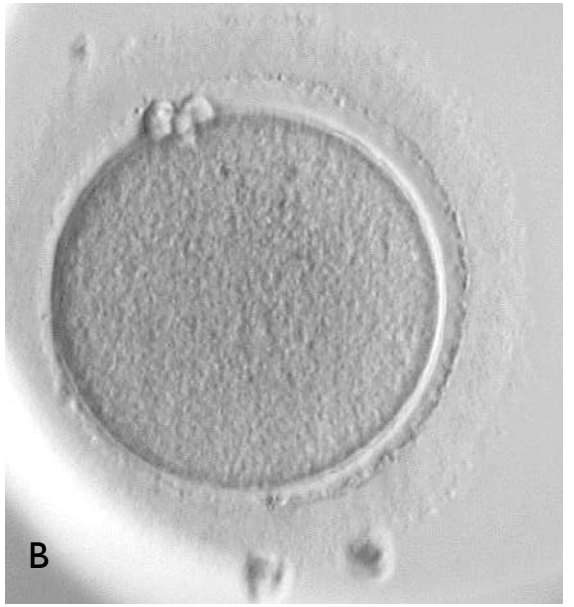
- PVS: ↓ Fertilization

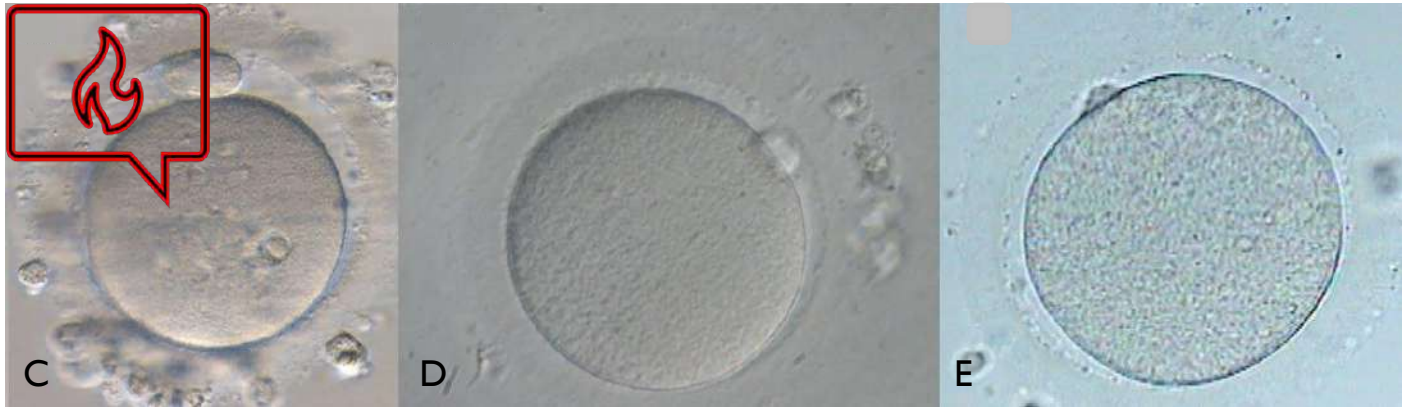


c) EXTRACYTOPLASMIC OOCYTE ABNORMALITIES

- PB1
  - Fragmented
  - Size: Abnormal if Ø >30 µm.

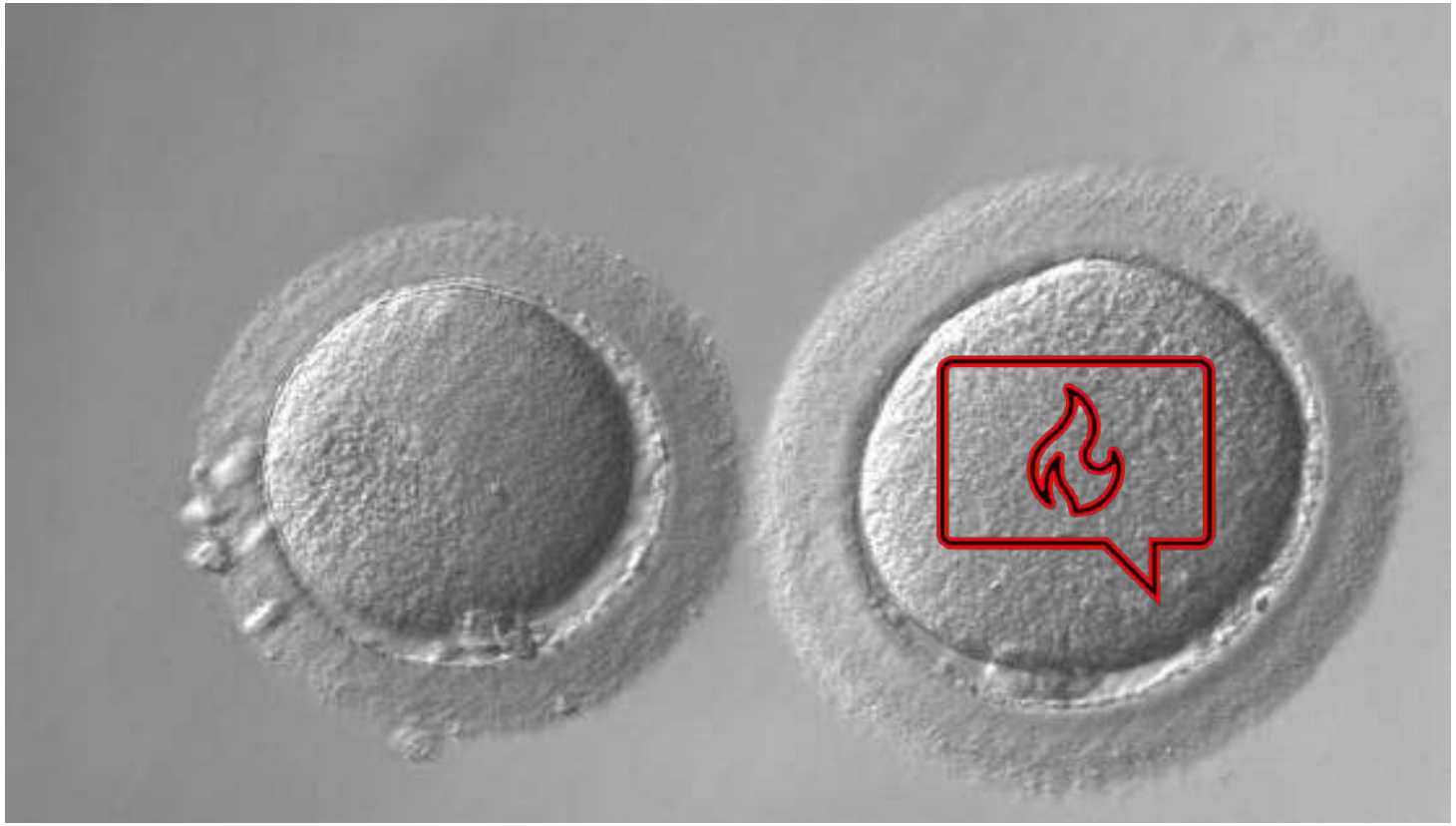






d) OOCYTE SIZE

- Abnormal if Ø >200 µm.



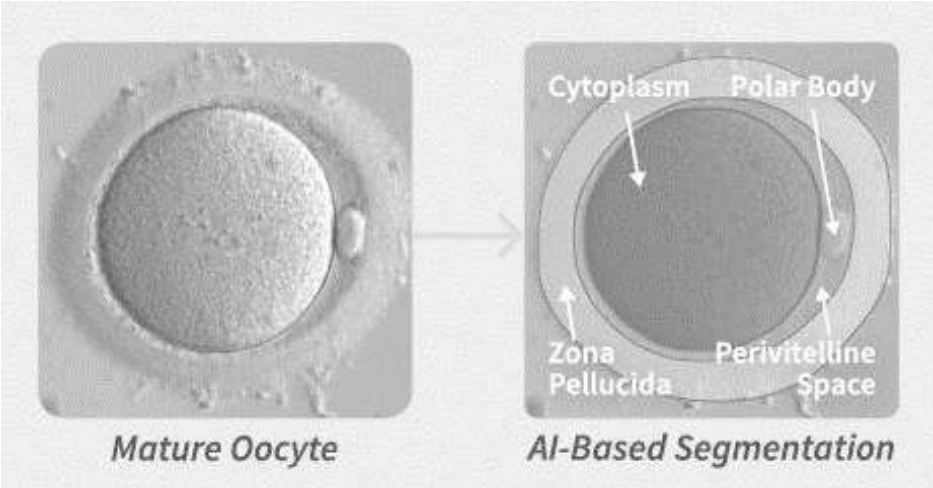
ASEBIR: OOCYTE ASSESMENT

Features	Effect on future development
Dark clusters	Detrimental if severe
Vacuoles	Detrimental if severe
SER	Case by case evaluation
Cytoplasmic inclusions	Controversial
ZP abnormality	Controversial
PVS size	Detrimental if severe
PVS fragments	Controversial
PB morphology	Controversial
Giant PB	Avoid
Giant oocytes	Avoid

Extracted from I. Cuevas-Saiz et al., 2018

3. AI OOCYTE GRADING

IMAGE BASED AI TOOLS



An oocyte assessment tool using machine learning; pedicting blastocyst development based on a single image of an oocyte.

IMAGE BASED AI TOOLS

Violet™ by Future Fertility

Egg Freezing Insights
Image-based AI assessment of egg quality for cryopreservation

EGG CALCULATOR

Magenta™ by Future Fertility

IVF-ICSI Insights
Image-based AI assessment of egg quality for IVF-ICSI cycles

Clinical use case: Donor eggs distribution based on average of quality parameters per cohort and straw

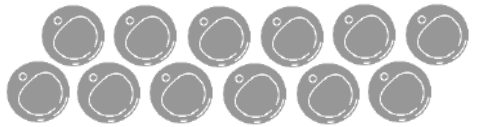
Donor eggs
38 oocytes

86% of probability to develop 12-20 blastocysts

Batch 1: 6 oocytes

74,03% probability to obtain 3-4 blastocysts

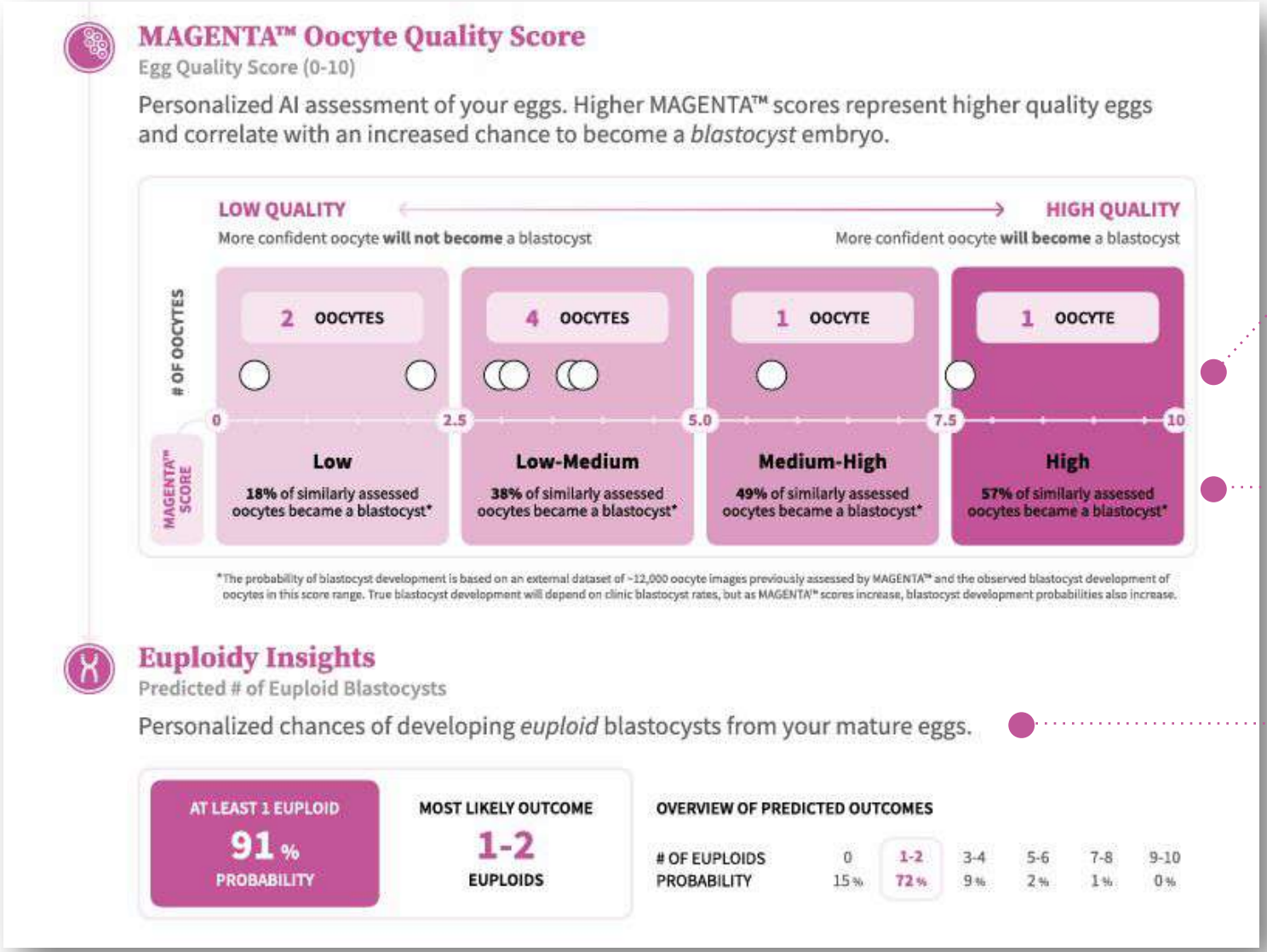
Batch 2: 12 oocytes



74,28% probability to obtain 4-7 blastocysts

Batch 3: 13 oocytes

74,08% probability to obtain 4-7 blastocysts



OOCYTE SCORES

MAGENTA™ scores oocytes on a scale of 0-10.
The assigned score correlates with the reproductive potential of an oocyte to develop into a blastocyst.

SCORE REFERENCE RANGE

EUPLOIDY INSIGHTS

MAGENTA™ now provides euploidy predictions which correlate with the likelihood of each oocyte to develop into a euploid blastocyst.

OPTIONAL ADD-ON

4. TAKE HOME MESSAGE

TAKE HOME MESSAGE

- There are no morphological features of oocytes that have been validated to have prognostic value for further developmental competence.
- ASEBIR: Avoid insemination of large PB and giant oocytes; case by case evaluation on SER+ oocytes.
- As more scientific evidence becomes available, it may be included in the classification of the embryo in the future.
- Deep learning offers promise for the automation and standardization of embryo quality assessment.
- New Image-based oocyte assessment tools require multicenter validation.

THANK YOU

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