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Infertility, IUI & IVF Services

Clinical & Embryology Academy of ART

Inaugural issue

Vol: 1

i-Ceat

RESONANCE

UNDERSTANDING OOCYTES

“
A journey of thousand miles begins
with a single step

- Lao Tzu



Preface

As we launch the first volume of our monthly bulletin, the '**i-Ceat RESONANCE**', we aim to revitalize the dynamism of the tenderfoots in the field of Assisted Reproductive Technologies (ART), to galvanize their hidden potentials into actions by taking a leap towards the new dimensions of their careers as researchers, authors and editors in the field. This newsletter is for the students and by the students.

Before going any further we take a pause and go back into the journey of i-Ceat team which started around 2 years back, as they travelled through all the rough paths and turned each pebble into a road to success. It's this struggle which motivated them to create a 'RESONATING' platform, i-Ceat ARTech India, for young and aspiring embryologists and clinicians to learn not only the existing knowledge of ART (Andrology, embryology, IVF, IUI, ICSI, ovulation induction, OPU, ET, cryopreservation) but also about the recent advances in the field. It's the abiding commitment of i-Ceat team to provide education with ethics at enduring and economical price creating quality researchers, teachers and embryologists, which is the crux of the whole project. The academy provides the podium for initiating and perfecting assisted reproductive medicine and embryology skills in you to reach out to the unfortunate couples in society and lower their emotional and financial burden.

This whole journey would not have taken the present shape and hue without the overwhelming and enthusiastic response of our participants. This first volume of our monthly bulletin is about a critical topic, OOCYTE MATURATION, an important part of ART procedures. We take this opportunity to invite on this global platform, all the individuals who have their hearts set on ART field, we welcome you with grace to be a part of I CEAT FAMILY and take the baton ahead and spread the light with your knowledge, write ups and researches.


Guest Editor

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OOCYTE MATURATION STAGE

- Female gamete plays a crucial role in determining embryo competence and therefore in **in vitro fertilization (IVF)** results.

 **Oocyte - Captain of the ship (i.e. Follicle) instead of passenger in the ship** - oocyte plays an active and dominant role in directing follicular growth by establishing bidirectional communication with cumulus-corona cells through gap junctions or paracrine interactions, resulting in its nutrition and maturation. Oocyte also controls its own development by this communication hence the captain.

- Oocyte quality is influenced by oocyte genome (nuclear and mitochondrial both) and also by the microenvironment provided by ovary and preovulatory follicles.

- Oocyte quality is determined mainly by evaluation of following:
 - Oocyte-Cumulus-Complex (OCC)
 - Nuclear maturation
 - Cytoplasmic maturation
 - Extra cytoplasmic factors like Perivitelline space(PVS) and Zona pellucida (ZP)
- Though oocyte morphological assessment in the laboratory is first based on the presentation of cumulus-corona cells (CCs) but **nuclear maturation** is the most important factor to be considered.
- In natural cycles nuclear maturation is in synchrony with OCC maturation but asynchrony can exist in stimulated cycles.

Oocyte maturation Grading can be summarized in the following table:

GRADING	OOCYTE MATURATION (110-120 μm)				OCC	
	NUCLEUS	CYTOPLASM	EXTRA CYTOPLASMIC STRUCTURES		CORONA RADIATA	CUMULUS
			PVS	ZP		
MATURE	M – II (Fig. 1) ▪ GV Absent ▪ I PB present	▪ Clear & smooth ▪ No inclusions	▪ Small ▪ I PB present	▪ Clear & Round	▪ Radiant ▪ Expanded Cloudy or Fluffy Appearance	
IMMATURE	M – I (Fig. 2) ▪ GVBD ▪ I PB Absent P- I (Fig. 3) ▪ GV Present ▪ I PB Absent	▪ Granular ▪ Inclusions present	▪ Large	▪ Deviated from normal	▪ Compact ▪ Adherent	▪ Dense ▪ Compact

❖ M II : METAPHASE OF II MEIOSIS
 ❖ M I : METAPHASE OF I MEIOSIS
 ❖ P I : PROPHASE OF I MEIOSIS
 ❖ GV : GERMINAL VESICLE (i.e. Oocyte Nucleus)
 ❖ I PB : FIRST POLAR BODY
 ❖ GVBD : GERMINAL VESICLE BREAKDOWN (i.e. Nuclear envelope disappears)
 ❖ PVS : PERIVITELLINE SPACE
 ❖ ZP : ZONA PELLUCIDA

💡 **M II is considered to be the best quality mature oocyte for fertility procedures.**

💡 Others can potentially be matured by **in vitro maturation (IVM)**

💡 Though phenotypic appearance of light microscopy states MII as the most appropriate oocyte for insemination, the presence of meiotic spindle (MS) gives more accurate information about the nuclear stage of oocyte, which can be obtained by polarized light microscopy (Fig.4)

💀 **LETHAL / GIANT OOCYTES CONTRAINDICATED:** Giant oocytes exhibit one additional set of chromosomes in nucleus and presence of aggregations of smooth endoplasmic reticulum (SER) in cytoplasm. It is potentially lethal and developmental competence of these oocytes should be interpreted with caution. (Fig. 5)

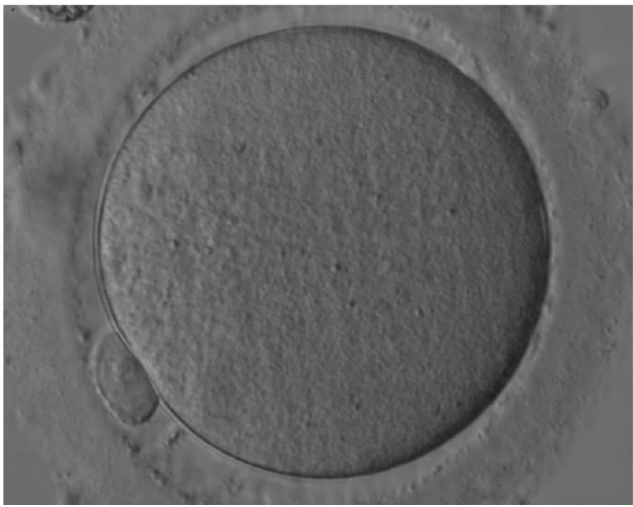


Fig. 1. Denuded MII oocyte; an intact PBI is clearly visible in the PVS (400×magnification).

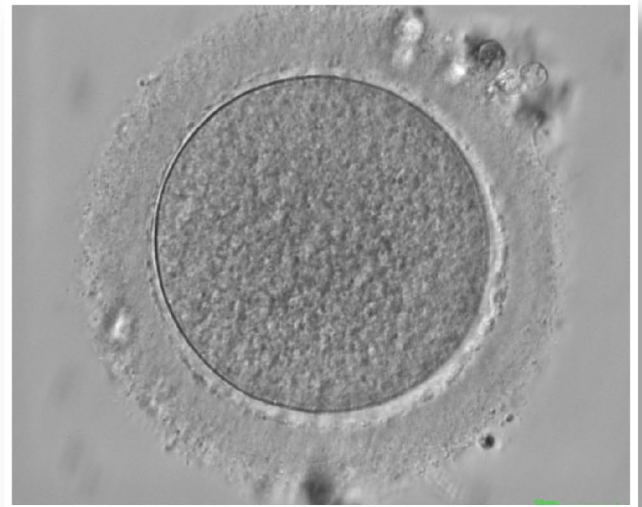


Fig. 2. Denuded MI oocyte. This oocyte has no visible nucleus and has not yet extruded the PBI (400× magnification). PVS is typically narrow.



Fig. 3. Denuded PI- GV oocyte. A typical GV oocyte with an eccentrically placed nucleus and a prominent single nucleolus (400× magnification).

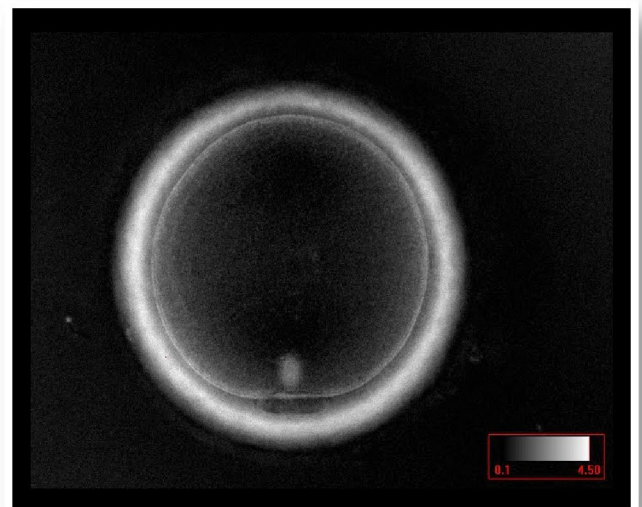


Fig. 4. MII oocyte visualized using polarized light microscopy (400× magnification). The polar body is present at the 6 o'clock position in the PVS, and the MS of the second meiotic division is visible in the cytoplasm perfectly aligned to PB1 position. This is a fully mature MII oocyte.

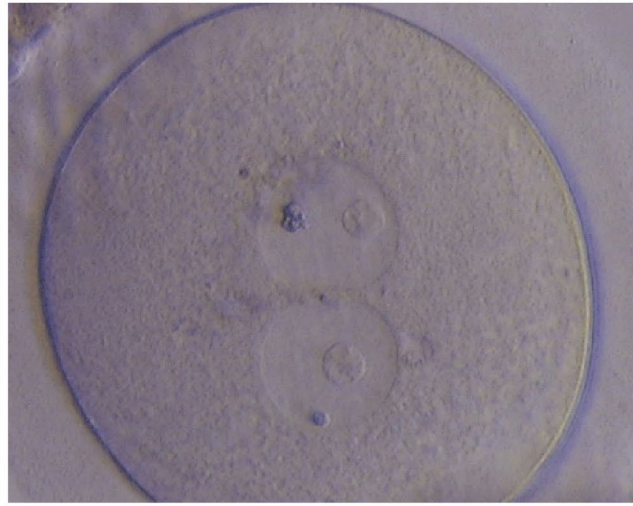


Fig. 5. Giant oocyte with two apparent GV's (centrally located and juxtaposed). This tetraploid oocyte originates from the fusion of two separate oocytes and is usually tetraploid (400× magnification).

Scientific Committee

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On-going Extensive Hands-on Training

14th - 24th March 2021



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Dr Divya Pandey | Emb. Shankhadip Roy | Emb. Morris Hwahar | Emb. Souvik Ray | Dr Gaurav Sharma
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400+ Candidates have been Trained so far
from more than **16 Countries**

“The best thing a human being can do is to help another human being know more
- Charlie Munger”



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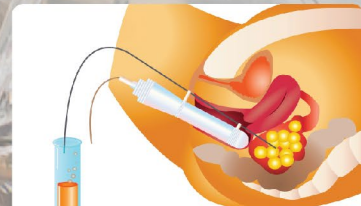
Course 1

Basic to advanced
embryology for Clinicians &
Embryologist - Embryo Culture,
ICSI, Cryobiology & QA/QC



Course 2

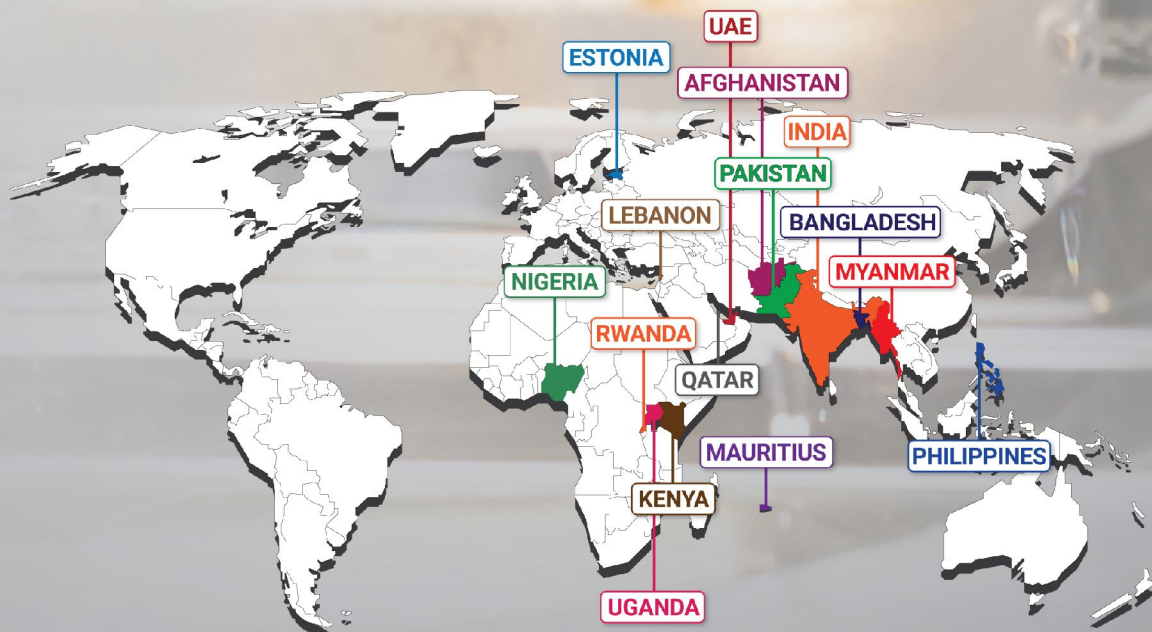
Basic and advanced
clinical andrology, IUI,
Reproductive Ultrasound
and QA/QC



Course 3

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IVF, OPU-ET,
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and QA/QC

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> E-streaming > Extensive hands-on training for 2 days



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