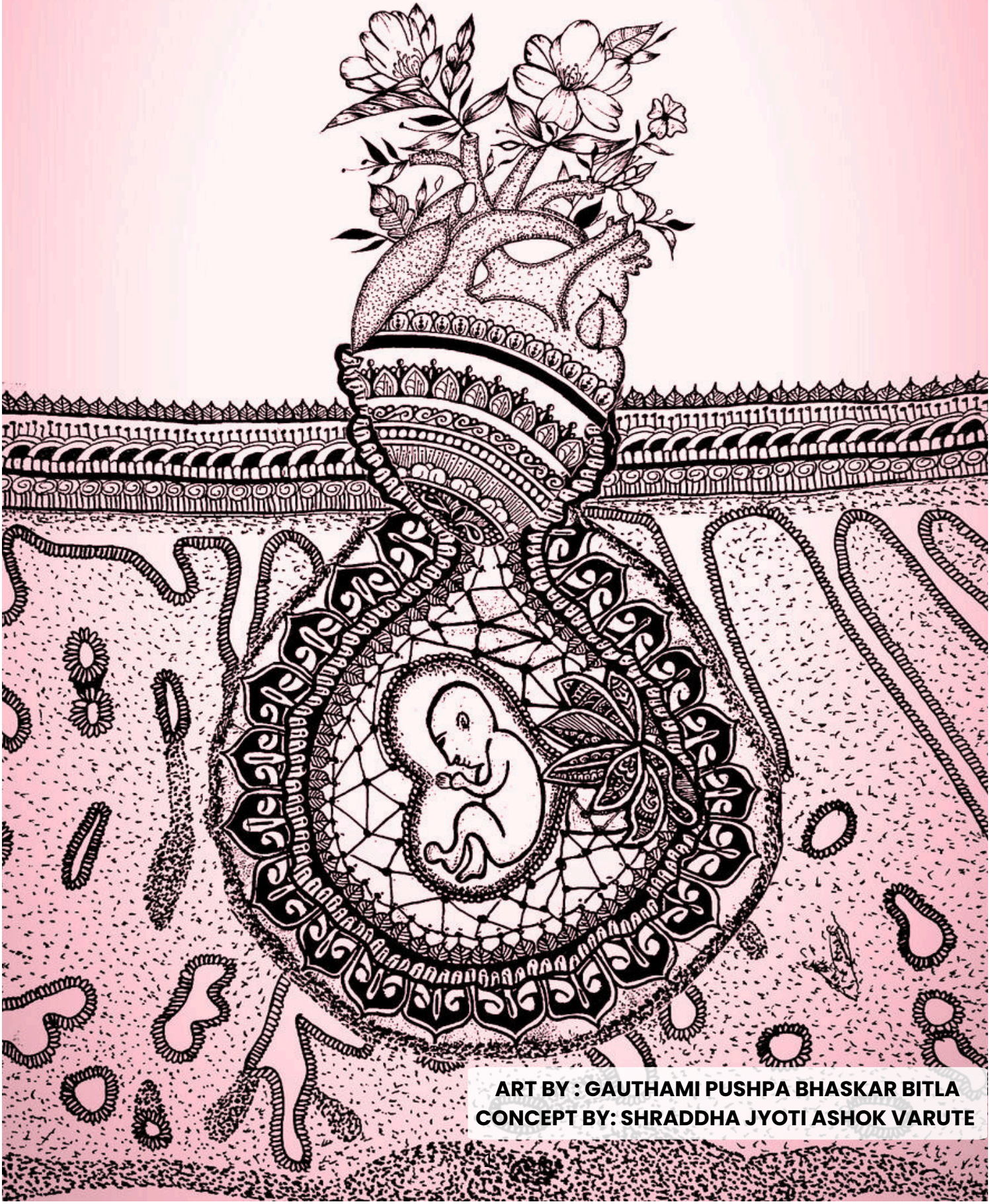
Volume 19 | AUGUST 2025

embrACE

Nurturing the bond between the Indian Embryologists ACADEMY OF CLINICAL EMBRYOLOGISTS



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Contents

President's Message

Dear Friends & Colleagues,

As we stand at the threshold of our 13th Annual Conference in Bhubaneswar, I am filled with immense joy to see this newsletter being released during the meeting. I am certain our members will be delighted by the unique blend of ART and art presented within these pages.
With scientific articles, the andrology survey, the niPGT consensus, and also poem and creative pieces, this edition offers a thoughtfully curated menu. It is not just a newsletter to read and forget, but one to be treasured.

My heartfelt congratulations and gratitude go to the newsletter team, led by Dr. Akash, and to every contributor for their time, talent, and commitment. May your tribe flourish and inspire many more.

Warm regards,
Dr. Sujatha Ramakrishnan
President,
Academy of Clinical Embryologists (ACE)

Secretary's Message

Dear Friends & Colleagues,

It is with great pride and excitement that I welcome you to this special ACE 2025 newsletter, unveiled at our annual conference in Bhubaneswar. This edition, titled Art in ART, is a celebration of the evolving intersections of science, creativity, and clinical excellence in embryology.

Within these pages, you'll find articles that venture into fascinating frontiers — from reproduction in outer space to the epigenetic legacy of sperm, and the rapid evolution of AI in our labs. These contributions reflect the intellectual diversity and depth of our field.

We also share the results of a pan-India survey on andrological practices — an important step in understanding and standardizing male fertility care. The newsletter outlines our progress on the ACE Embryologist Certification Exam, a landmark initiative to ensure uniform standards and accreditation across the country.

The niPGT consensus statement, collaboratively drafted by ISAR, IFS, and ACE, marks a pivotal moment in our journey towards evidence-based and ethically sound adoption of non-invasive techniques.

You'll also find glimpses of our vibrant activities, creative reflections like Vaishnavi's poem, and a tribute to the people who keep this engine running — our dedicated office bearers and committee members.

ACE stands tall because of your participation, passion, and pursuit of perfection. Let's keep pushing boundaries, together.

Warm regards,
Dr. Parasuram Gopinath
Secretary,
Academy of Clinical Embryologists (ACE)

Editor's Message

Dear Friends and Colleagues ,

It gives me immense pride and pleasure to be a part of the 19th Volume of the embrACE Newsletter. Titled Art in ART, it is designed to spark interest beyond the routine. Continuing with the tradition of our cover page illustrating the creative and thoughtful art from the artists within our community, the newsletter jets off into space. Next, it dives into the microworld of epigenetics, to the potential use of A.I. in the field of embryology.

It not only caters to the potential future of embryology, but also enlightens about current Andrology practices in India as part of a survey and also a joint paper on ni-PGT from ISAR, IFS, and ACE.

It has an article on the Embryology Certification Exam, to be conducted by ACE, an initiative addressing a very important need of our fraternity.

The last section contains various activities conducted by ACE, and the people who keep it running, and a thoughtful expression in the form of a poem, once again from within our community.

A heartfelt gratitude to team ACE, ACE - President Dr Sujatha R., ACE Secretary Dr Parasuram G., for giving me this opportunity, and my co-editor Ms. Dhannya B., and Ms. Arthi, without whose support and hard work this newsletter wouldn't be a possibility. Lastly, but definitely not the least, my sincere thanks to all the contributors of the articles and the ART.

We hope that the newsletter helps in expanding the knowledge and looking at embryology from a different lens. Happy reading!

Warm Regards,
Dr.Akash Agarwal and Team.

Reproduction in SPACE - From CRADLE to COSMOS

-**Sanketh Dhumal Satya**, Senior Embryologist & Cluster Manager, Apollo Fertility
Advisory Board SpaceBorn United
-**Sandeep Karunakaran K**, Medical Director, Oval Fertility
Senior IVF Consultant, Advisory Board SpaceBorn United

Earth is the Cradle of Humanity—But Mankind Cannot Stay in the Cradle Forever -These words by Russian rocket scientist Konstantin Tsiolkovsky have echoed through generations of explorers and scientists who have looked up at the stars and envisioned a future where humanity is not confined to one planet. As we enter a new era of space exploration, with private companies launching commercial missions and space agencies discussing settlements on the Moon and Mars, a fundamental biological question emerges:

Can humans reproduce in space?

This question is not just a matter of scientific curiosity—it's a prerequisite for becoming a multi-planetary species. At the heart of our survival and colonization beyond Earth lies the challenge of reproduction in space—both natural and assisted.

Why Reproduction in Space Matters?

If we imagine establishing long-term bases on the Moon or Mars—or embarking on interplanetary voyages that span generations—we must also envision the possibility of conception, pregnancy, childbirth, and healthy development in these extraterrestrial environments. However, the human reproductive system has evolved over millions of years under Earth's gravity, magnetic field, atmosphere, and ecosystem. Removing or altering these factors could have profound consequences.

Understanding reproduction in space is not just about childbirth; it's about preserving the continuity of life beyond Earth. If we are to send humans into deep space or build colonies on distant planets, we must ensure that humans can conceive, gestate, and raise healthy offspring in entirely new environments.

The Challenges of Natural Reproduction in Space

Natural reproduction involves a series of delicately coordinated biological events—sperm transport, fertilization, embryonic development, implantation, pregnancy, and parturition. Each of these steps may be affected by the space environment, especially in microgravity.

1. Microgravity Effects

- Sperm Motility & Fertilization: In microgravity, the lack of directional cues may affect sperm motility and their ability to reach and fertilize the oocyte. Studies in animal models have shown inconsistent sperm behavior under microgravity.
- Oocyte Maturation: Some experiments suggest that oocyte maturation and meiotic spindle formation may be disrupted in altered gravity, potentially leading to aneuploidy or developmental arrest.
- Implantation Challenges: In mammals, embryo implantation requires the right uterine environment, immune modulation, and spatial orientation. Microgravity might alter endometrial receptivity, hormone levels, or even embryo positioning.

2. Radiation Exposure

Space is flooded with ionizing radiation from galactic cosmic rays and solar particles. These can damage DNA, particularly in rapidly dividing cells such as gametes, embryos, and fetal tissue. Without Earth's magnetic shield, reproductive tissues are vulnerable to:

- Sperm DNA fragmentation
- Oocyte degradation
- Embryo developmental arrest
- Long-term heritable mutations

3. Hormonal and Immune Dysregulation

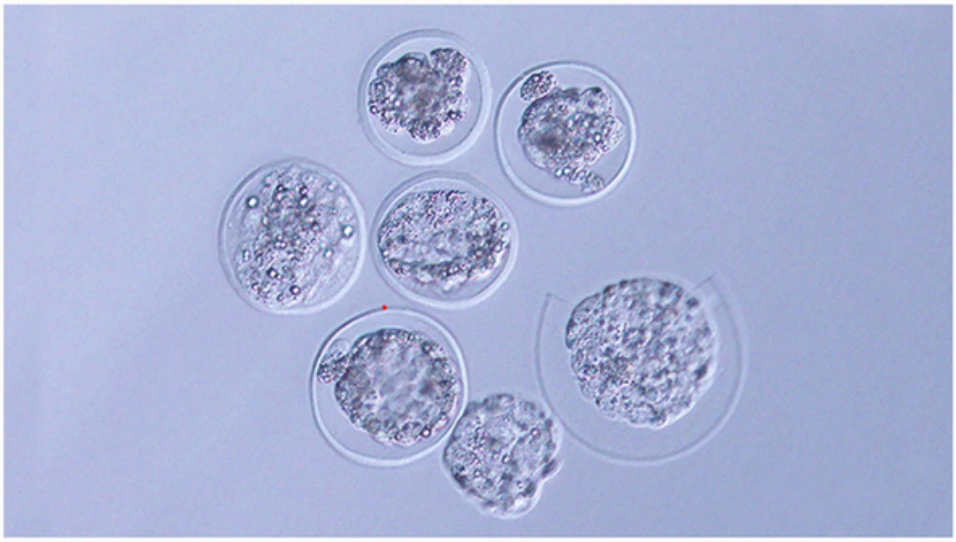
Spaceflight can disrupt the hypothalamic-pituitary-gonadal axis, altering sex hormone levels in both men and women. Also, immune system suppression in astronauts could affect pregnancy maintenance, which relies on precise immune tolerance mechanisms between mother and fetus.

Animal Experiments in Space: What We Know So Far!

Several studies on non-human models have provided initial insights:

- **Frogs and fish** have shown successful fertilization and development in microgravity, although abnormalities were more frequent.
- **Mice studies** aboard the ISS indicated that sperm cryopreserved in space retained fertility upon return to Earth. However, natural mating in orbit has not been successful.
- **Japanese Medaka fish** were able to reproduce in space, but developmental abnormalities were noted.
- **Mouse embryos** cultured in orbit often show delayed development or increased apoptosis.

While these studies hint at feasibility, they also underscore that Earth-like reproduction may not be reliably achievable in microgravity without adaptations.



Two-cell mouse embryos cultured on the International Space Station and returned to Earth formed blastocysts (some shown).
S. WAKAYAMA *ET AL/ISCIENCE* 2023

Enter Assisted Reproductive Technologies (ART): A Possible Solution

Given the challenges of natural reproduction in space, Assisted Reproductive Technologies (ART)—such as IVF, ICSI, embryo vitrification, and artificial wombs—could bridge the gap. ART has revolutionized human reproduction on Earth; could it do the same in space?

1. IVF and ICSI in Space

In vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) allow fertilization to occur outside the human body under controlled conditions. Performing IVF in space would mean:

- Controlled handling of gametes and embryos in closed systems
- Automation of micromanipulation tools & culture conditions to adapt to zero or partial gravity or to develop machines that work at artificial microgravity or partial gravity.
- Maintaining optimal pH, temperature, and gas concentrations in culture systems.

This approach eliminates the need for sexual reproduction and direct embryo implantation in early phases. Embryos could potentially be frozen (vitrified) and stored for later transfer under more favorable conditions.

2. Cryopreservation and Transport

Sperm and oocytes can be cryopreserved and transported across space. Space-based gamete banks could serve as genetic reservoirs for future spacefarers. For example:

- Sperm samples launched and stored in low Earth orbit (LEO) have shown resilience
- Vitrified embryos are stable for years, offering the possibility of "frozen progeny" awaiting future implantation

3. Artificial Wombs and Biobags

The development of ex vivo uterine environments, such as artificial wombs (biobags), could allow gestation of embryos outside the mother's body. Though still experimental, these technologies may:

- Eliminate the risks of microgravity and radiation to pregnant astronauts
- Enable external fetal development under Earth-like mechanical and hormonal conditions
- Allow continuous monitoring of fetal growth and development in deep-space missions.

Pioneering Work: SpaceBorn United and ARTIS Project

Among the most ambitious efforts to explore space reproduction is **SpaceBorn United**, a Netherlands-based startup aiming to perform the first **IVF experiment in space.**

Their **ARTIS (Assisted Reproductive Technology in Space)** project includes:

- A fully automated IVF lab-in-a-box for microgravity
- Microfluidics, sensors, and AI-guided embryo culture
- Plans for Earth orbit tests & enable stages of human reproduction in space environments

In April 2024, the ARTIS IVF minilab prototype successfully flew aboard SpaceX's Bandwagon-3 mission, demonstrating feasibility of space-based fertilization and embryo culture systems.

SpaceBorn United is advancing the frontiers of human reproduction research in space — and **We are proud to be part of this stellar team that dares to dream of reproduction beyond our planet, even in interstellar realms.**

Such projects are laying the groundwork for **autonomous reproduction systems** in orbit— essential for human survival in long-term space habitats.

Partial Gravity: A Better Option than Microgravity?

Microgravity presents major reproductive challenges. However, celestial bodies like the Moon (0.16g) and Mars (0.38g) offer partial gravity, which may be more conducive to reproduction.

Animal studies on Earth using centrifuges and parabolic flights suggest that even small amounts of gravity help maintain:

- Embryo orientation
- Uterine fluid flow
- Normal gene expression during development

Future lunar and Martian bases could serve as **experimental reproductive outposts** to test conception, gestation, and birth under partial gravity, while minimizing the effects of zero gravity.

Ethical and Philosophical Considerations

Reproduction in space is not just a technical challenge—it raises profound ethical, social, and philosophical questions:

- **Consent and autonomy**: Should embryos be created or implanted in space without knowing the outcome?
- **Genetic and epigenetic safety**: How do we ensure the long-term health of offspring born in space?
- **Legal identity**: What laws govern a child conceived or born on the Moon or Mars?
- **Inequality and access**: Will space reproduction be limited to the elite?

It is vital that **bioethicists, space agencies, and policymakers** collaborate proactively to build frameworks before technologies outpace governance.

Conclusion: From Cradle to Cosmos

Humanity has always found a way to survive and thrive—from the savannahs of Africa to the icy poles, and now, to the stars. But for space colonization to succeed, **reproduction must adapt** beyond the constraints of Earth.

Natural reproduction in space may prove biologically precarious—but with the power of assisted reproductive technologies, cryopreservation, and artificial gestation, we may one day **redefine what it means to be born.**

Perhaps, in a not-so-distant future, a child will gaze upon the blue Earth from a lunar window and ask, "Where do I come from?"—only to learn they were **conceived among the stars**!!!

Epigenetic Programming in Sperm: The Hidden Link Between Environment, Fertility, and Offspring Wellbeing

-**Rucha Samant** ,Research Associate, ReproHelix Labs, Kolhapur, Maharashtra, India.
-**Pankaj Kaingade**, Scientific Director, ReproHelix Labs, Kolhapur, Maharashtra, India

The integrity of the sperm epigenome plays a crucial role in shaping reproductive success, embryonic development, and the health of subsequent generations, making it a vital area of investigation in reproductive biology and medicine. Over recent years, accumulating evidence has demonstrated that various lifestyle choices—such as diet, physical activity, smoking, and alcohol consumption—as well as environmental exposures to pollutants, toxins, and radiation, can induce significant modifications in sperm epigenetic marks, including DNA methylation, histone modifications, and non-coding RNA profiles. These epigenetic alterations are not only sensitive to both short-term and long-term exposures but may also be reversible, raising important questions about the potential for lifestyle interventions to restore epigenetic integrity. Understanding how these modifications influence fertilization efficiency, early embryonic gene expression, and ultimately, offspring health outcomes is essential, especially given the rising prevalence of subfertility and the increasing concern over transgenerational inheritance of acquired traits. Moreover, elucidating the mechanisms by which environmental and lifestyle factors impact sperm epigenetics could lead to novel strategies for improving reproductive success and mitigating adverse health effects in children conceived under varying exposure conditions. This article aims to explore the complex interplay between lifestyle and environmental factors and the sperm epigenome, examining their immediate effects on reproductive processes and their long-term implications for offspring health, while also considering potential avenues for intervention and lifestyle modification to enhance reproductive outcomes.

Influence of Lifestyle and Environmental Factors on the Sperm Epigenome

How do specific lifestyle choices (diet, exercise, smoking, alcohol) affect sperm DNA methylation and histone modification?

Specific lifestyle choices—including diet, exercise, smoking, and alcohol consumption—significantly influence epigenetic modifications in sperm, particularly DNA methylation and histone modification, with profound implications for reproductive health and offspring well-being. Diet and obesity have been linked to dynamic changes in spermatozoa epigenetics, such as altered DNA methylation patterns, which can modulate the metabolic health of the offspring and potentially increase the risk of chronic diseases across generations. Similarly, smoking introduces a complex set of molecular alterations, including DNA hypermethylation of genes involved in anti-oxidation and insulin resistance, and it affects the expression and activity of DNA binding factors like SP1, which are critical for early embryogenesis. The hypoxic environment induced by cigarette smoke further upregulates HIF-1α-dependent MAT2a, increasing the synthesis of S-adenosylmethionine—the principal methyl donor for DNA methylation—thereby reshaping methylation landscapes during critical stages of sperm development and early embryonic growth. Alcohol consumption and sedentary behavior, as additional modifiable factors, have been shown to impact both sperm DNA methylation and histone modification, not only reducing the fertilizing potential of sperm but also influencing the success rates of assisted reproductive technologies. These interconnected domains highlight that lifestyle-induced epigenetic changes are not isolated phenomena but are intricately linked to broader aspects of reproductive potential, metabolic health, and transgenerational disease risk. Consequently, targeted interventions and public health strategies aimed at optimizing diet, promoting physical activity, reducing smoking, and moderating alcohol intake before conception are urgently needed to safeguard both male fertility and the long-term health of future generations.

What is the impact of environmental exposures (pollutants, toxins, radiation) on non-coding RNA profiles in sperm?

Beyond traditional epigenetic marks like DNA methylation, non-coding RNAs (ncRNAs) in sperm have emerged as sensitive molecular indicators of environmental exposures, including pollutants, toxins, and radiation. Recent studies demonstrate that sperm from individuals residing in high-pollution areas exhibit marked reductions in Piwi-interacting RNA (piRNA) levels, underscoring the vulnerability of ncRNA profiles to external environmental factors. Furthermore, the expression of 32 microRNAs (miRNAs) implicated in critical biological processes such as intraflagellar transport, oxidative stress response, and spermatogenesis is significantly altered in sperm from these polluted environments, suggesting that environmental stressors not only modify ncRNA abundance but also disrupt processes essential for sperm function and male fertility. These molecular alterations are corroborated by comprehensive projects like EXPOsOMICs, which provide robust evidence linking environmental pollutant exposure to modifications in sperm ncRNA profiles, further supporting the role of these RNAs as both biomarkers of environmental insult and potential mediators of reprotoxic effects. The interplay between pollutant-induced changes in ncRNA expression and concomitant shifts in sperm nuclear basic protein (SNBP) properties hints at a complex molecular network through which environmental factors may compromise reproductive health. Given these interconnected effects, systematic monitoring of ncRNA alterations in sperm is crucial, not only for early detection of environmental impacts on male fertility but also for informing preventive measures and regulatory policies aimed at minimizing reproductive risks associated with environmental contamination.

Are there reversible or permanent epigenetic changes in sperm due to short-term versus long-term exposures?

The reversibility versus permanence of epigenetic changes in sperm, particularly in response to short-term versus long-term exposures, remains an area of active investigation, with current evidence highlighting both dynamic and potentially persistent modifications across interconnected domains of reproductive health. For instance, studies underscore that the alteration of sperm epigenetic markers—such as DNA methylation, histone modifications, and small RNA profiles—can occur during epididymal transit, suggesting that at least some of these changes are dynamic and may be reversible depending on the timing and duration of environmental exposures. Nutritional interventions provide additional support for this dynamic potential; dietary supplementation with folate and vitamin D has been shown to enhance human sperm quality and epigenetic marks, indicating that certain environmentally induced epigenetic changes may be ameliorated or reversed through targeted dietary adjustments. However, the interplay between transient and persistent changes becomes more complex in the context of genetic mutations and critical developmental windows. Mutations in genes such as Mthfr, which are associated with male infertility, highlight that some epigenetic alterations may be more permanent, especially when they are rooted in genetic causes rather than environmental exposures alone. Furthermore, periods of heightened susceptibility during sperm development, when environmental insults can introduce epigenetic errors, are crucial; errors incurred during these windows can have lasting downstream effects on fertility and embryonic competence. These observations collectively suggest that while some sperm epigenetic modifications are reversible and can be mitigated through interventions such as improved nutrition or lifestyle changes, others may be more enduring, particularly when established during sensitive developmental periods or linked to underlying genetic factors. This underscores the importance of identifying critical windows for intervention and developing strategies to both prevent harmful exposures and promote reparative pathways, thereby safeguarding not only male fertility but also the health of future generations.

Implications for Fertilization, Embryo Development, and Offspring Health

How do sperm epigenetic alterations influence fertilization success and early embryonic development?

Sperm epigenetic alterations exert a profound influence on both fertilization success and early embryonic development by modulating the transmission of not only genetic material but also a complex repertoire of regulatory molecules, such as microRNAs and non-coding RNAs, which are critical for post-fertilization events. These epigenetic modifications, including DNA methylation and histone tail modifications, impact the functional competence of sperm, directly affecting their ability to fertilize an oocyte and to support the earliest stages of embryogenesis. The integrity of the sperm epigenome, characterized by precise histone retention, protamine incorporation, and specific patterns of histone methylation—such as H3K4me3 and H3K27me3—serves as a foundational template for normal embryonic gene expression and chromatin architecture. Aberrant epigenetic marks in sperm have been linked to disruptions in embryonic chromatin organization, altered developmental gene expression, and increased risks of pregnancy loss and developmental abnormalities. These interconnections underscore the necessity of thoroughly investigating how environmental factors, nutritional status, and paternal health influence the sperm epigenome, as such insights are vital for improving assisted conception outcomes, ensuring the health of future generations, and informing strategies for the prevention and treatment of disorders rooted in early developmental epigenetic dysregulation. Thus, advancing our understanding and monitoring of sperm epigenetic health represents a critical intervention point in reproductive medicine and developmental biology.

What are the potential transgenerational effects of sperm epigenome changes on offspring health outcomes?

Beyond the immediate effects observed in the F1 generation, alterations in the sperm epigenome have the potential to exert transgenerational impacts on offspring health outcomes, with mounting evidence suggesting that epigenetic marks can be transmitted across multiple generations and regulate gene expression during critical developmental windows. Mechanistically, for these epigenetic modifications—such as changes in DNA methylation, histone modifications, and small non-coding RNA profiles—to influence the next generation, they must evade extensive reprogramming events that typically occur post-fertilization and during early embryogenesis. This escape from reprogramming allows certain environmentally induced epigenetic signatures, whether linked to paternal diet, toxin exposures, or stress, to persist and be incorporated into the zygote's epigenome, thereby affecting embryonic gene expression and developmental pathways. The consequences are wide-ranging, as these inherited marks may lead to altered organ development, metabolic dysfunction, and behavioral phenotypes in descendants, with evidence from animal models and epidemiological studies in humans supporting the persistence of these effects into the F2 and F3 generations. The interconnections between environmental exposures, sperm epigenetic state, and offspring phenotype underscore the need for preventive strategies and targeted interventions aimed at minimizing adverse paternal exposures prior to conception, as well as for further research to delineate the precise pathways of epigenetic inheritance and their implications for public health.

Can interventions or lifestyle modifications mitigate negative epigenetic effects in sperm and improve reproductive outcomes?

Recognizing the impact of environmental exposures on sperm epigenetics, interventions and lifestyle modifications emerge as crucial strategies to counteract these negative effects and promote reproductive health. Lifestyle factors such as nutrition, physical activity, stress management, and sleep play a central role in shaping the epigenetic landscape of sperm, with evidence showing that both positive and negative modifications can be induced by these daily habits.For instance, adopting a balanced diet rich in antioxidants, maintaining regular exercise, and implementing effective stress-reduction techniques have been shown to help reverse detrimental epigenetic changes over time, which may ultimately improve sperm quality and reproductive outcomes. Importantly, these modifications are not only relevant for immediate reproductive success, but also have implications for the health of future generations, since epigenetic alterations in sperm can be transmitted to offspring. Therefore, a proactive approach that emphasizes healthy lifestyle choices is essential, calling for increased awareness, public health interventions, and individualized counseling to mitigate the long-term reproductive and transgenerational consequences of adverse epigenetic changes in sperm.

Conclusion:

The growing body of evidence linking lifestyle and environmental exposures to alterations in the sperm epigenome underscores a paradigm shift in our understanding of male fertility—not as a static genetic trait, but as a dynamic and environmentally responsive process. Epigenetic modifications in sperm, including changes in DNA methylation, histone retention, and non-coding RNA expression, serve as crucial mediators between paternal exposures and reproductive outcomes. These changes can influence not only fertilization capacity and embryonic development but also the long-term health of offspring, with the potential for transgenerational inheritance. Importantly, the reversibility of certain epigenetic marks offers a promising window for intervention through targeted lifestyle modifications. As such, advancing research in this domain is critical for developing preventative and therapeutic strategies that optimize male reproductive health and protect future generations from the lasting impact of harmful exposures. Promoting awareness and integrating preconception care into reproductive medicine can help ensure healthier outcomes for both parents and their children.

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The Present and Future Role of Artificial Intelligence in Clinical Embryology in India.

-**Bama Prasanna Chatterjee**, Senior Embryologist, Nova IVF Fertility.

1. Introduction:-

India faces a growing need for assisted reproductive technology (ART): infertility affects around 15% of married couples of reproductive age, and with over 2,50,000 ART cycles performed yearly according to ISAR, demand continues to climb[1]. However, in vitro fertilization (IVF) success rates in India remain modest—around 30–35% per cycle—mirroring global norms but leaving much room for improvement[2].

Traditional clinical embryology depends on manual, subjective assessments of gametes and embryos—prone to inter-observer variability and inefficiency. That's where artificial intelligence (AI) offers game-changing potential: AI-driven systems can analyze time-lapse embryo imaging, lab metrics, and clinical data to deliver evidence-based assessments, scalable insights that sharpen embryo selection and boost implantation predictions.

Globally, AI-supported embryo selection models achieve median accuracy in the 75–82% range—outperforming human embryologists, especially when image and clinical data are combined[3]. Within India, tools like Life Whisperer (from Presagen) and Blastocyst Evaluation Learning Algorithm (BELA) are being deployed in IVF clinics to help standardize and enhance embryo evaluation processes. Still, broader clinical validation—especially accounting for India's unique genetic, dietary, and environmental diversity—is essential to ensure efficacy and fairness.

As AI tools become more accessible and regulatory landscapes evolve, their applications are set to expand from non-invasive embryo assessment to automated lab workflows and personalized treatment protocols. This article explores the emerging landscape of AI in Indian clinical embryology, highlights current challenges, and underscores the need for India-specific validation and ethical safeguards.

2. Present Role of AI in Clinical Embryology in India

2.1 Embryo Selection and Grading

AI-based imaging systems and time-lapse incubators now enable objective, automated embryo selection— reducing human error. For instance, studies using iDAScore v2.0 have shown significantly higher predictive accuracy in pregnancy outcomes, with Area Under the Curve (AUCs) around 0.736—versus approximately 0.702 using traditional Gardner grading systems[4]. Additionally, in a large multicenter validation, iDAScore v1.0 demonstrated robust generalizability across clinics, achieving AUCs between 0.60 and 0.75 on known implantation data (KID) embryos—on par with or superior to manual grading across varied subgroups[5].

2.2 Sperm Selection

AI-enhanced Computer-Assisted Semen Analysis (CASA) enables time-efficient, more precise sperm evaluation—significantly reducing variability compared to manual methods. For instance, an in-house AI model assessing unstained live sperm morphology from over 12,600 images achieved ~97% accuracy with per-image analysis times averaging about 0.0056 seconds, highlighting both speed and precision over conventional techniques[6]. Additionally, a 2025 retrospective study from Chengdu (West China Second Hospital, Sichuan University) used a portable AI Optical Microscope (AIOM) for on-site semen assessment during fresh IVF cycles. It found that higher immotility%, longer head length, and shorter tail length were each independent predictors of fertilization failure and need for rescue ICSI (R-ICSI)[7].

2.3 Automation of Routine Tasks

AI technologies are increasingly streamlining labor-intensive processes in IVF labs—like embryo tracking, culture monitoring, and laboratory scheduling—through smart incubators and digital tracking systems, thereby improving operational efficiency and reducing human error. For example, AI-driven systems can continuously monitor and annotate time-lapse embryo development, detect anomalies in real-time, and notify staff of deviations, all without manual oversight[8, 9]. A narrative review in the Journal of Gynecology Obstetrics and Human Reproduction (2024–25) emphasizes AI's capability to enhance quality control (QC) and optimize workflow by managing key performance indicators and resource allocation efficiently[9]. Additionally, a comprehensive review in Biology (2024) underscores how AI-based automation standardizes lab procedures, minimizes variability, and improves consistency in processes such as embryo and sperm selection, contributing notably to laboratory efficiency[10].

2.4 Predictive Analytics for IVF Outcomes

AI-driven predictive analytics are increasingly applied in IVF to forecast treatment success by integrating multifactorial inputs such as patient age, anti-Müllerian hormone (AMH) levels, semen quality, and embryo morphokinetic scores. Recent large-scale analysis of 37,042 IVF/ICSI cycles in China using a gradient boosting decision tree model achieved an AUC of 0.704, identifying women's age, AMH, number of top- quality embryos, oocytes retrieved, and endometrial thickness as the most influential predictors[8]. Similarly, ensemble machine learning approaches, including Random Forest and AdaBoost, have reported predictive accuracies ranging from 57 % to 96 %, depending on dataset complexity and feature selection[11]. A Greek study employing an artificial neural network (ANN) to analyze 426 IVF/ICSI cycles demonstrated sensitivity and specificity of 76.7 % and 73.4 %, respectively, in predicting live birth outcomes [12]. Collectively, these findings underscore AI's capability to deliver mid-70 % accuracy in IVF outcome prediction, supporting its integration into personalized counseling and protocol optimization.

2.5 Time-Lapse Imaging and Morphokinetic Analysis

AI-driven time-lapse imaging technologies continuously monitor embryo development in situ, thereby preserving optimal culture conditions. Systems such as iDAScore have demonstrated remarkable efficiency: in a randomized controlled trial, the average evaluation time per embryo was 21.3 ± 18.1 seconds with iDAScore, comparedto 208.3 ± 144.7 seconds under manual assessment, while maintaining similar clinical pregnancy rates—46.5 % with AI vs. 48.2% manually[13].

2.6 AI for Ploidy Prediction

The Blastocyst Evaluation Learning Algorithm (BELA) is a fully automated AI system that utilizes nine time- lapse embryo images alongside maternal age to non-invasively predict euploid versus aneuploid embryos, achieving an AUC of approximately 0.76 when validated against PGT-A outcomes[14]. In contrast, Preimplantation Genetic Testing for Aneuploidy (PGT-A) is the current gold standard involving invasive trophectoderm biopsy and genetic analysis, offering high diagnostic accuracy but carrying potential risks to embryo viability, increased costs, and challenges such as mosaicism, false-positives/negatives, and possible misrepresentation of the embryo's full chromosomal profile[15]. While BELA cannot yet replace PGT-A, it presents a promising adjunct: delivering standardized, non-invasive, scalable assessments with reduced cost and minimal risk. This makes it particularly valuable in contexts where biopsy is impractical or undesired, enhancing accessibility and streamlining embryo selection in IVF workflows.

Summary Table-1

Application	AI Performance (vs. traditional)
Embryo Grading (iDAScore/KIDScore)	Livebirth AUC ~0.67; accuracy ~75% vs ~65% for humans.
Sperm analysis(AI-CASA)	Consistent concentration/motility results; DNA fragmentation in ~40 min
Embryo selection	Implantation +10–20%, pregnancy ~77% vs ~50%
Assessment speed (iDAScore)	~8xfaster(21s vs 208s); clinical pregnancy~46–48%

3. India: Current Scenario s Challenges

Building on global advances in AI-assisted embryology, India has begun embracing these technologies, with tertiary-care IVF centres piloting time-lapse incubators (e.g., EmbryoScope) equipped with AI-based embryo-selection tools— though adoption remains limited. Several significant barriers persist. First, the prohibitive cost of AI-enabled incubators and the necessary computational infrastructure places them beyond the reach of many small and tier-2 clinics. Second, most AI models rely on Western datasets and may not reflect biological variation in Indian embryos: a retrospective Indian study at Nova IVI Fertility Centres found no significant morphokinetic differences (e.g., t5, CC3) between euploid and aneuploid embryos, suggesting that predictive patterns established elsewhere may not hold locally[16]. Recognizing these gaps, Indian initiatives like the multi-centre **Study Protocol: Evaluation of AI-Driven Grading Compared to Manual Grading in Predicting Embryo Viability and Clinical Pregnancy Outcomes in IVF** (ongoing) and the Garbha AI platform—a domestic AI tool trained on over 6,000 real-world embryo images, reporting ~87% accuracy in viability prediction—are actively developing locally relevant data and algorithms. Third, India lacks comprehensive regulatory and ethical frameworks tailored to AI in ART. While the Assisted Reproductive Technology (Regulation) Act, 2021 mandates clinic registration, informed consent, and confidentiality, it does not address AI-based embryo scoring, model validation, or embryo-image data sharing. Similarly, the Digital Personal Data Protection Act, 2023 outlines general data fiduciary obligations but omits specific provisions regarding use of sensitive embryology data for AI training and clinical use. These lacunae create significant legal uncertainty around data privacy, algorithmic bias and informed consent for AI tools. Finally, there is a pressing need to improve AI literacy among embryologists and fertility professionals, so they can interpret AI-derived insights effectively and integrate them into clinical workflows with confidence.

Table-2 Vision for the Future– India

Area	Future AI Role	Indian Context
Personalized COS protocols	AI-driven dosing algorithms tailored to Indian clinical data	Reduced cycle cancellations, optimized outcomes
Decentralized analytics	Cloud-based AI platforms accessible to smaller clinics	Equal access across urban–rural regions
Non-invasive ploidy risk	Widespread use of BELA-like systems over costly biopsy	Safer, lower-cost alternative
Clinical decision support	Dashboards integrating embryo scores with patient metadata	Real-time guidance in Indian ART practices
Regulatory frameworks	Development of ethical standards, AI validation pathways	Ensures safety, standardization, transparency
AI-powered training	Virtual simulators for embryologist skill development	Accelerated capacity building in India

4. Will AI Replace Embryologists in the Future?

While artificial intelligence (AI) is rapidly advancing in clinical embryology, it is unlikely to fully replace embryologists in the foreseeable future. AI systems can efficiently assist in embryo grading, sperm analysis, and lab automation, offering improved consistency and faster results [3]. However, embryologists provide critical clinical judgment, ethical decision-making, and patient-centered care that AI cannot replicate. Current AI tools, such as iDAScore and DeepEmbryo, are designed to support— not replace— human experts [13]. Most experts agree that AI will continue to serve as a valuable decision-support system, automating routine tasks while embryologists retain responsibility for final clinical decisions, complex problem-solving, and patient communication [14].

5. Conclusion

AI is poised to transform clinical embryology in India— from evidence-based, **AI-assisted embryo** selection to decentralized diagnostics and rich decision-support systems. Realizing this potential requires overcoming infrastructural, data, ethical, and educational challenges. A collaborative, India- centric strategy with robust clinical validation and clear governance will unlock AI's promise— leading toward more equitable, efficient, and successful fertility treatments nationwide.

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ACE Andrology Survey 2025

Exploring Practices, Preferences, and Progress in Male Fertility Testing Across India

-Dr. Krishna Chaitanya, Dr. Pankaj Kaingade, Dr. Sanjay Yatnale
Academy of Clinical Embryologists (ACE), India

As Andrology becomes an increasingly critical component of infertility diagnosis and treatment, the Academy of Clinical Embryologists (ACE), India, conducted a nationwide survey to understand current practices, technologies, and challenges faced by professionals in this field. The survey saw wide participation from embryologists and andrologists, offering deep insights into how semen analysis, sperm function testing, cryopreservation, and male infertility management are evolving in clinical settings.

Here are the **key findings** from the survey:

1. Trends in Semen Analysis

- **Frequency of Abnormal Semen Parameters:**
  69% of respondents report encountering abnormal semen parameters frequently.
- **Most Common Abnormalities:**
  - Teratozoospermia (35%)
  - Oligozoospermia (25%)
- **Sperm Morphology Staining:**
  Diff-Quik Stain is preferred by 49% of respondents.
- **Sperm Vitality Assessment:**
  Eosin-Nigrosin staining leads at 47%.

2. Advanced Sperm Testing Practices

- **Routine DNA Fragmentation Testing (DFI):**
  66% include DFI testing as a routine part of semen analysis.
- **Reactive Oxygen Species (ROS) Evaluation:**
  - Chemiluminescence assay is preferred by 60%.
  - 43% do not currently evaluate oxidative stress markers.
  - However, 56% plan to implement ROS screening soon.
- **Advanced Sperm Function Tests:**
  36% rarely perform these tests; 39% do so occasionally — indicating interest but limited practice.
- **Sperm DNA Integrity Assessment:**
  SCSA (67%) is the most widely used method.

3. Technology & Technique Adoption

- **Automation in Semen Analysis:**
  - 63% rely on manual techniques.
  - 21% plan to implement CASA (Computer-Assisted Semen Analysis).
  - SQA (45%) is the most used CASA system.
- **Sperm Preparation Techniques:**
  - Density Gradient Centrifugation remains dominant:
    - 72% for IUI
    - 62% for IVF/ICSI
- **Advanced Sperm Selection:**
  Microfluidic Chip Technology (59%) is the most used method.
- **Handling High Viscosity Samples:**
  Dilution techniques (51%) are preferred over mechanical methods.
- **Sperm Cryopreservation:**
  - 49% use commercial freezing kits.
  - Glycerol-based media used by 41%.
  - Freezing under LN_2 vapor (38%) is the most practiced method.

4. Special Scenarios in Male Infertility

- **Azoospermia Management:**
  Testicular biopsy is the first choice for 59%.
- **Cryptozoospermia Handling:**
  - Micromanipulation (46%)
  - Specialized media concentration (34%)
- **Rare Sperm Cell Integrity:**
  55% prioritize rapid processing for ICSI.

5. Research, AI & Future Trends

- **DNA Fragmentation Detection Tools:**
  - SCD (62%)
  - SCSA (27%)
- **Epigenetic Evaluation:**
  DNA Methylation Profiling is favored by 60%.
- **AI in Semen Analysis:**
  - 63% never use AI currently.
  - 9% use it frequently — suggesting room for growth.
- **Bioinformatics for Data Analysis:**
  40% plan to implement such tools in future workflows.
- **Male Infertility Research:**
  50% are open to collaborative research in this domain.

6. Laboratory Practices & Patient Care

- **Lab Upgrades:**
  - 40% upgrade annually.
  - 32% upgrade every 2–3 years.
- **Staff Training:**
  In-house training is dominant, with 81% relying on internal resources.
- **Equipment Calibration:**
  50% calibrate their equipment quarterly.
- **Patient Counselling Approach:**
  58% prefer joint counselling sessions with clinicians for holistic care.

Conclusion :

This survey offers a comprehensive view of current andrology practices across India. The data reflects a progressive shift toward technological integration and advanced diagnostics while highlighting areas for development such as AI use and oxidative stress evaluation. ACE India continues to promote knowledge sharing and evidence-based practice to elevate the standards in male fertility care.

ACE Embryologist Accreditation

-Dr. Harsha K. Bhadarka & Team

The Academy of clinical Embryology (ACE) was established in 2011 to professionalize and unify the practice of clinical embryology across India. Since its inception, ACE has grown into the country's leading society for embryologists, nurturing a community dedicated to excellence in Assisted Reproductive Technology (ART) with more than 1000 members. guided by the motto **"By the embryologists, for the embryologists."**

The community of clinical embryologists in India is growing exponentially through the years. The ART Law makes it mandatory for the newer generations of Clinical Embryologists to have a Masters in Clinical Embryology. But standardization in practices and uniform good laboratory practices are required. Several international organizations are offering certification programs in clinical embryology, similar certification programme for the benefits of Indian embryologists is the need of the hour. **The Academy of Clinical Embryologists (ACE) is pleased to announce India's first Accreditation Program for Embryologists, named as ACE Accreditation Certificate Examination, open to all eligible clinical embryologists and trainees across India.**

The ACE Accreditation Certificate Examination, initiative is the brainchild of Dr. Sujatha Ramakrishnan, (President of ACE). Dr. Ramakrishnan's vision has been brought to life through the unwavering dedication of Dr. Gaurav Majumdar, (Vice-President of ACE), and Dr. Parasuram Gopinath, (Secretary of ACE),supported by diligent Management Committee and the entire team of ACE office-bearers. This collective effort has transformed an ambitious idea into a robust, India-centric certification program that will elevate standards and ensure excellence in clinical embryology nationwide.

Significance of the Certification

- **Standardization of Practice**: Brings uniformity in skills and knowledge across embryologists, regardless of institutional background.
- **Quality Assurance**: Encourages adherence to best IVF laboratory practices, patient safety protocols, and continuous learning.
- **Professional Recognition**: Offers formal validation of competencies by a respected academic body.
- **Credibility in Career Progression**: Strengthens professional profiles for both national and international opportunities.
- **Supports Regulatory Compliance**: Aligns with recommendations from ICMR, WHO, and ESHRE for lab personnel qualifications and revalidation. Regular regulatory and scientific updates keeps you on fast track.

Benefits for Certified Embryologists

Benefit	Description
Academic Validation	Demonstrates verified knowledge and skill level
Career Advancement	Enhances eligibility for senior roles and international placements
Peer Recognition	Builds professional reputation within the ART community
Continuing Education	Access to ACE webinars, workshops, and re-certification support
Mobility	May support global recognition and licensing applications
Patient Trust	Certified embryologists contribute to transparent, ethical IVF practices

By introducing this certification, **the Academy of Clinical Embryology** reaffirms its commitment to advancing professional standards, empowering embryologists, and contributing to **ethical and effective ART services.**

We encourage embryologists at all levels to participate and join a growing network of certified professionals dedicated to excellence in reproductive science.

Category	A. Senior Embryologist.	B. Junior Embryologist(Entry level)
Eligibility Criteria	As per ART bill(2021)	• M.Sc. in (Clinical Embryology//Life Sciences).,As per ART bill(2021) • Atleast 2 years of lab experience as assistant embryologist
Necessary documents:	• Degree certificates. • Experience letters. • Logbook (with supervisor/ clinician sign-off,) . • Valid photo ID.	• Degree certificates. • Experience letters. • Valid photo ID.
Fees	• 12,000/-+ GST INR • Non-refundable. • Fee includes document review, theory exam, practical/and viva assessment.	• 6,000/- + GST INR • Non-refundable. • Fee includes document review, theory exam.
Exam Pattern:	1. MCQ format 2 hours duration 150 questions Minimum 80% passing marks No negative marking.. 2. Practical exam/hands on skill test. 3. Viva exam. *Minimum 80% marks in Each exam.(1,2,3)*	1. MCQ format. 2 hours duration . 150 questions. No negative marking. Minimum 80% . passing marks

📌 **How to Apply?**

Stay tuned! Complete details will be available soon on the official ACE website.
https://www.theaceorg.in/

📚 **Syllabus**

The syllabus will also be uploaded shortly on our website—watch this space!

📞 **Need Assistance? We're here to help!**

✉️ **Email: admin@theaceorg.in** 📱 **Call/WhatsApp: +91 97406 85293**

Is Non-Invasive Preimplantation Genetic Testing (niPGT) Ready for Clinical Use in India? The Answer is "Not Yet."

-Dr. Deepak Modi, Dr. Varsha Samson Roy and Dr. Parasuram Gopinath

In the evolving landscape of assisted reproduction, non-invasive preimplantation genetic testing (niPGT) has emerged as a concept that promises a gentler alternative to conventional embryo biopsy. The idea is undeniably appealing, where one could understand the ploidy of the embryonic genome without biopsying the embryo itself. This latest version of niPGT is elegant and clinically appealing. The science, however, is still catching up. Given the growing interest, the unchecked expansion of niPGT in some clinical settings in India, three national bodies, viz the Indian Society for Assisted Reproduction (ISAR), the Indian Fertility Society (IFS), and the Academy of Clinical Embryologists (ACE) felt compelled to take a step and critically evaluate whether niPGT, as it stands today and if it is ready for clinical use. The outcome of this initiative is a carefully crafted joint position statement released in June 2025. This can be accessed from the ACE website here https://www.theaceorg.in/wp-content/uploads/2025/07/niPGT-joint-postion-statement-signed.pdf.

What Is niPGT?

Nearly 50% of human blastocysts are aneuploid, and the numbers increase with maternal age. To identify these embryos, the conventional protocol involves biopsy of the trophoblast cells from day 5/6 embryos and assessing them for their ploidy. However, this technique, being invasive, requires a great deal of technical expertise. To circumvent the need for biopsy, scientists have adopted niPGT. The principle of niPGT is an extended version of the liquid biopsy approach. A liquid biopsy is a non-invasive diagnostic approach that analyzes body fluids to detect diseases. In niPGT, the aim is to assess the chromosomal makeup of an embryo non-invasively, using cell-free DNA (cfDNA) that is secreted into the surrounding culture medium during in vitro development. Instead of biopsying the trophectoderm as in traditional PGT-A, niPGT relies on analyzing this extracellular genetic material in hopes of inferring the embryo's chromosomal integrity. The proposed benefits would be no biopsy, no need for specialized instrumentation, reduced risk of harm, and potentially broader accessibility. While the method is appealing, in practice, it remains highly variable, poorly standardized, and error-prone.

Why Was a Position Statement Needed?

Over the last few years, niPGT has entered Indian ART clinics through commercial offerings, often in the absence of adequate validation or regulatory oversight. Alarmingly, it is already being used for embryo selection decisions, despite limited scientific consensus and high variability in test performance. An internal survey revealed that this technology is being used for embryo selection in a significant number of clinics despite no formal regulatory approval and a lack of uniform evidence.

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For embryologists, this raises a critical concern: Are we endorsing technologies that have not been rigorously validated in our own labs? Given our role as custodians of embryo quality and laboratory standards, the use of an unproven test like niPGT may undermine the integrity of embryo selection protocols. For geneticists, the key question is: Does niPGT meet the diagnostic benchmarks required to be classified as a reliable genetic test? Current protocols lack chromosome-specific concordance and reproducibility—standards we routinely demand of any genetic screening or diagnostic tool. For clinicians, the dilemma is equally pressing: Are we offering patients a test that promises more than it can deliver? In an already emotionally and financially sensitive field, using unvalidated tools may create false reassurance, or worse, lead to the loss of viable embryos. At a broader level, the IVF community must ask itself: Are we collectively ready to base embryo selection decisions on technologies that have not been proven to improve clinical outcomes? Without clear evidence of safety, accuracy, and benefit, widespread adoption of niPGT risks doing more harm than good.

These pressing concerns led ISAR, IFS, and ACE to initiate a joint scientific and ethical review. For the first time, the three societies came together to develop a unified position statement that is grounded not in commercial interests or hype, but in data, transparency, and a shared commitment to patient welfare.

How Was the Statement Formulated?

A joint working group was formed with equal representation from clinicians, embryologists, and geneticists. The members were chosen based on expertise and independence, with explicit declarations of non-involvement in any commercial ventures offering niPGT. The modified Delphi method was used to ensure structured and unbiased consensus building. Members systematically reviewed peer-reviewed studies and interpreted the concordance rates, false positive and negative rates, and test failure rates. The committee scored and discussed every conclusion, leading to a set of consensus recommendations.

What Does the Statement Say?

The position statement specifically states that niPGT should not be used in clinical practice in India at this time. It is not recommended for embryo selection, embryo ranking, or transfer decisions.

Why this caution?

The committee observed that the concordance rates are inconsistent, and error margins are too wide for clinical comfort. It was startling to find that the false positives could lead to the discard of viable embryos, and false negatives could result in the transfer of aneuploid embryos. Additionally, many of the studies promoting niPGT were found to have conflicts of interest, with affiliations to companies offering or developing the test. This raised a red flag pointing towards a possible bias in reporting and interpretation.

What Does This Mean for Embryologists?

This document is particularly important for embryologists on the frontline of ART laboratories. Many have already encountered niPGT, some are actively involved in preparing samples, and others are in discussions about integrating it into lab protocols. Some may have even faced pressure from patients or clinicians to prioritize embryos based on niPGT results. This position statement gives the clarity and the authority to pause.

As gatekeepers of embryo integrity, the embryologists have a responsibility to ensure that any intervention that is endorsed or enabled must be based on sound science. The idea of a non-invasive test is deeply appealing, but if it jeopardizes embryo viability, misguides embryo selection, or creates false hope, we are definitely doing a disservice to our patients. Thus, the embryologists must remain alert to these contradictions and advocate for evidence-based practice.

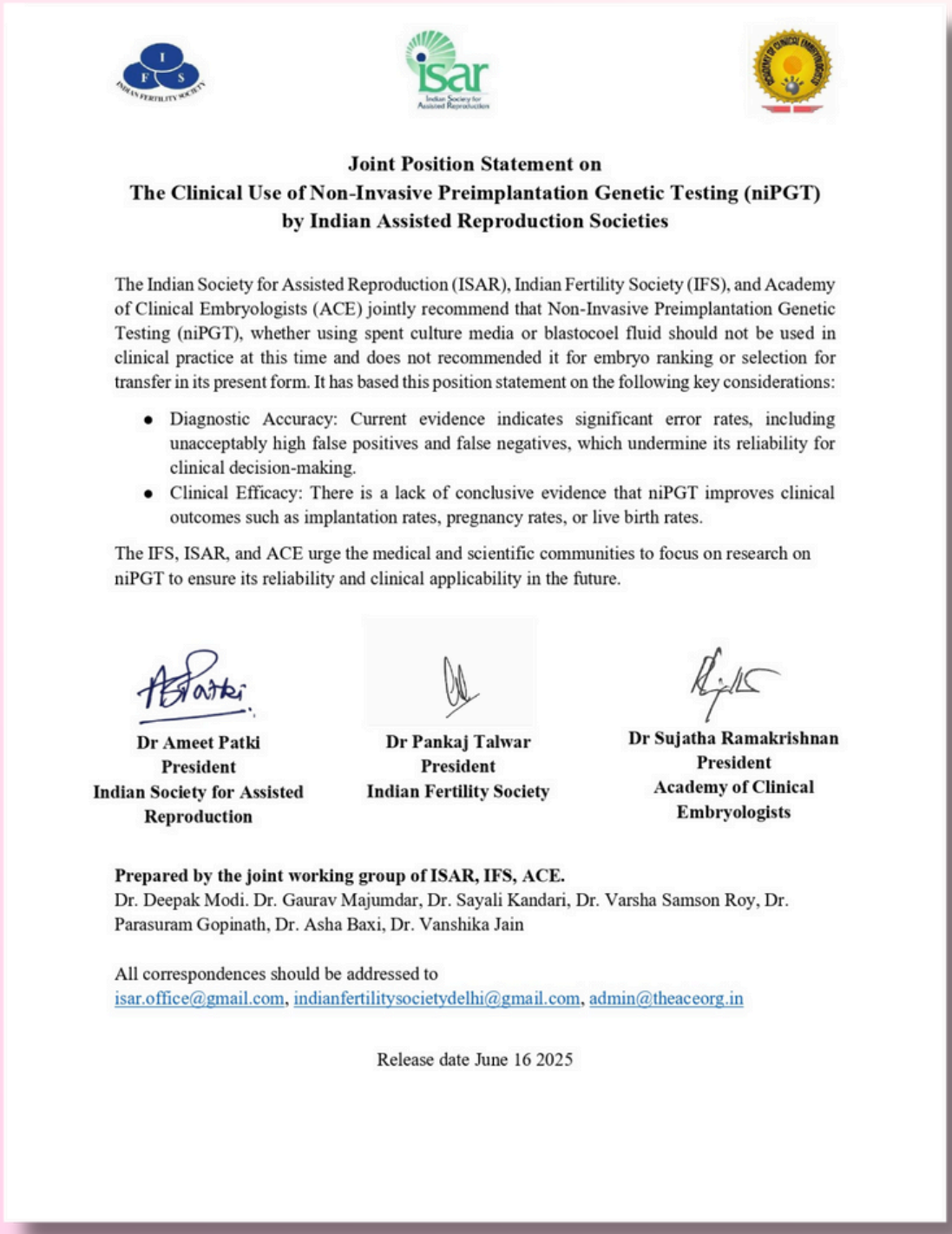
The Way Forward

The statement doesn't oppose innovation. On the contrary, it encourages well-designed, prospective, ethically monitored research studies to improve and validate niPGT technology. But until those studies are completed and independently replicated, niPGT must remain firmly within the research domain. As a society, we must come together and develop a research agenda that includes protocol harmonization, cross-laboratory validations, outcome-based clinical trials, and regular re-evaluation of emerging data. As a professional community, our role is to participate in this evolution, not by blindly adopting the newest technology, but by critically assessing and helping to shape it. We must commit to rigor over rhetoric and data over desire.

Final Word

Innovation must not outpace evidence. niPGT may well be a part of the future of ART but today, it is not ready for clinical deployment. The joint position statement empowers the embryologists and clinicians to engage patients and colleagues in honest and informed discussions. It's time we promote responsible innovation, ethical practice, and above all, better outcomes for the couples we serve.

Note : The authors declare no conflict of interest. ChatGPT4 was used with human inputs for language and grammar editing of this document.



Joint Position Statement on
The Clinical Use of Non-Invasive Preimplantation Genetic Testing (niPGT)
by Indian Assisted Reproduction Societies

The Indian Society for Assisted Reproduction (ISAR), Indian Fertility Society (IFS), and Academy of Clinical Embryologists (ACE) jointly recommend that Non-Invasive Preimplantation Genetic Testing (niPGT), whether using spent culture media or blastocoel fluid should not be used in clinical practice at this time and does not recommended it for embryo ranking or selection for transfer in its present form. It has based this position statement on the following key considerations:

- Diagnostic Accuracy: Current evidence indicates significant error rates, including unacceptably high false positives and false negatives, which undermine its reliability for clinical decision-making.
- Clinical Efficacy: There is a lack of conclusive evidence that niPGT improves clinical outcomes such as implantation rates, pregnancy rates, or live birth rates.

The IFS, ISAR, and ACE urge the medical and scientific communities to focus on research on niPGT to ensure its reliability and clinical applicability in the future.

Dr Ameet Patki
President
Indian Society for Assisted Reproduction

Dr Pankaj Talwar
President
Indian Fertility Society

Dr Sujatha Ramakrishnan
President
Academy of Clinical Embryologists

Prepared by the joint working group of ISAR, IFS, ACE.
Dr. Deepak Modi. Dr. Gaurav Majumdar, Dr. Sayali Kandari, Dr. Varsha Samson Roy, Dr. Parasuram Gopinath, Dr. Asha Baxi, Dr. Vanshika Jain

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HER WORK SPEAKS IN HEARTBEATS

She didn't know the path she'd take,
A girl with dreams that seemed to wake,
In shadows,quite,softly true,
Not knowing what she was meant to do.

Embryology,a world so vast,
Unseen by many,but made to last,
She walked through doors with no clear sight,
And found herself within the light.

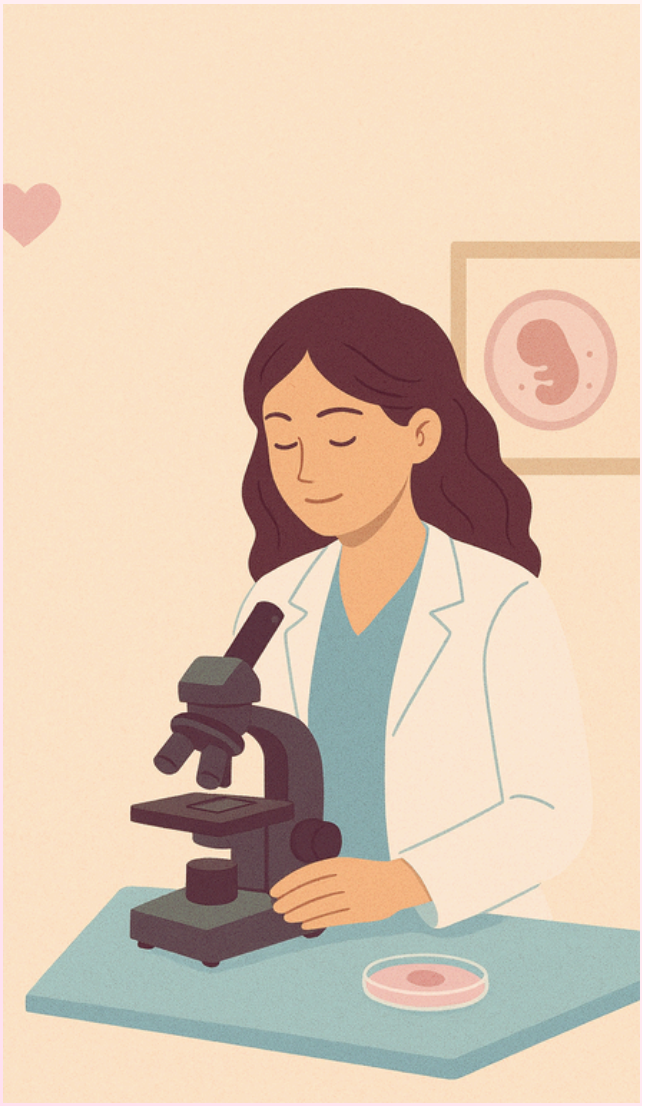
At first ,she wondered what it meant,
A job of cells,of time well spent.
But soon she saw,with eyes wide open,
The magic in her hands had spoken.

Through every struggle,every test,
She worked,she learned,she did her best.
With steady hands and an open heart,
She knew this work was her true art.
And then ,she saw her future clear,
To teach ,to guide,to persevere.

With every junior,every hand,
She shared knowledge, took a stand.
She loved each embryo like her own,
A mother's heart,a love full grown.

Each life she touched,she nurtured deep,
and in her care,their future sleeps.
She proved herself,despite the strain,
And with each child,she eased the pain.

For she,the silent creator,knew,
Her work was magic,pure and true.



-Vaishnavi Chauhan.
Oasis fertility,
Bangalore.

"ACE's Academic Footprints: Pioneering Knowledge

Through Webinars, Journal Clubs & Engaging Conversations"

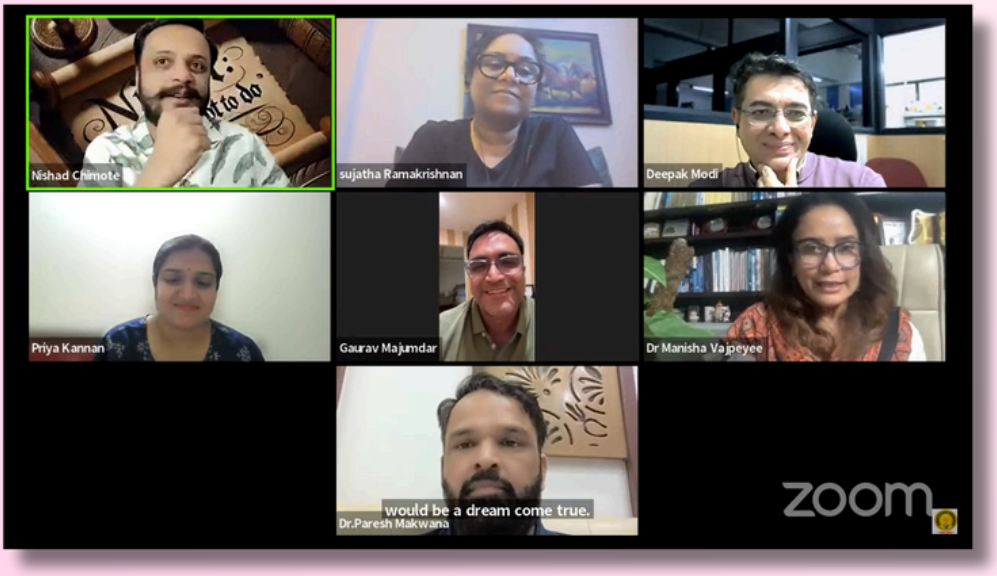
ACE has been at the forefront of academic activities in the field of embryology. As part of its vision of spreading knowledge, ACE has under its banner conducted academic activities in a variety of formats, including Webinars, Journal Clubs, and ACE Conversations. Each format caters to a different way of expanding the horizons of knowledge and enriches the audience experience.

1. Webinar, which is an online version of the traditional physical conferences.
2. The Journal Club discusses articles having a deep impact – the articles are analyzed from different perspectives of eminent embryologists.
3. ACE Conversations gives an inspiring behind-the-scenes glimpse about people who have shaped the field of embryology and changed the way it is practiced, including their beliefs, their journey, struggles, and ways those struggles have been overcome.

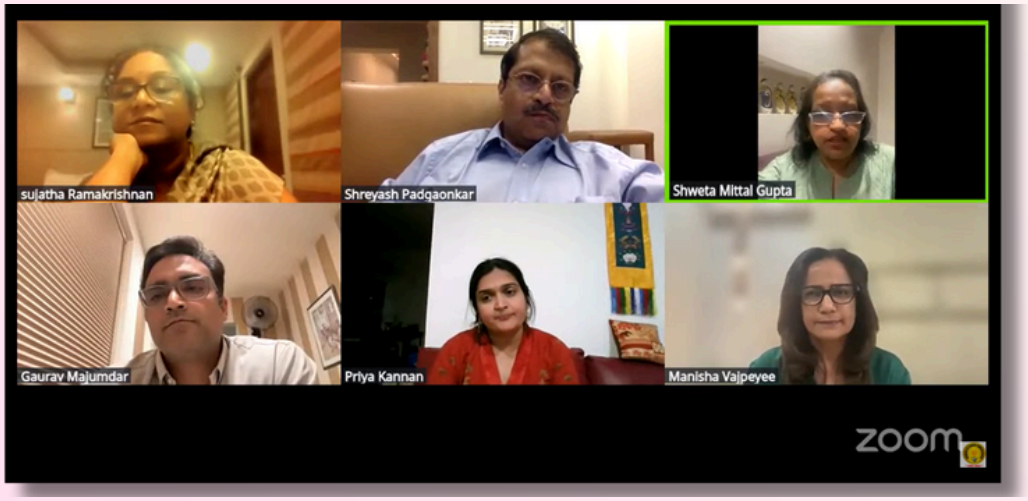
The below activities were conducted by ACE in the preceeding year:

WEBINAR ON:

1. **ni-PGT: Promising Step Forward? (24th October 2024)** which debated the potential of its role as a tool for genetic screening. The essence of the webinar was in the honest opinions and constructive discussions, which gave new insights from a scientific perspective – hence it was one of our most sought after and viewed webinars. https://www.youtube.com/live/6qMzFUgMHs0

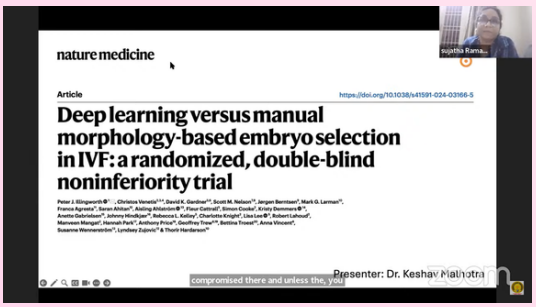


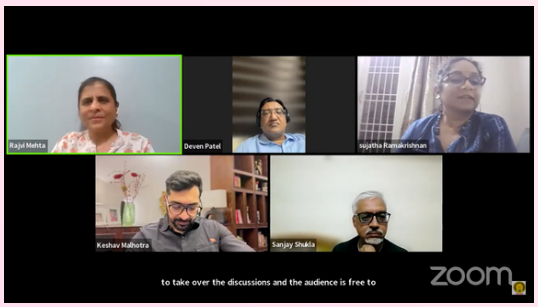
2. **Elective single embryo transfer: Is it idealistic or practical? (17th April 2025)** focused on evidence-based talks followed by an open house, which dealt with questions and real-world challenges, and was loaded with information for both clinicians and embryologists.
https://www.youtube.com/live/g3H5okO2IR4?si=YmPLyKMYjFaZTjfQ

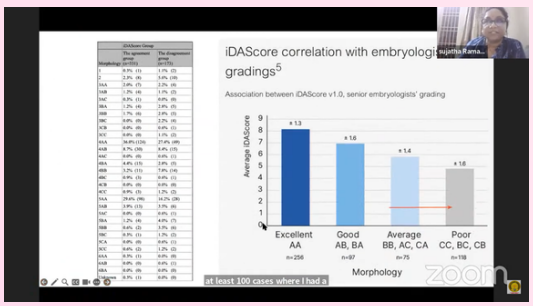


JOURNAL CLUB

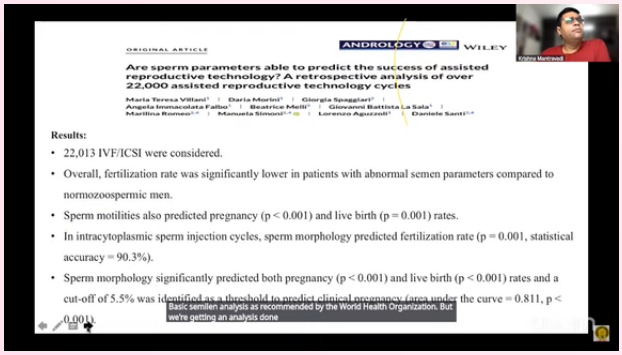
1. **Can AI in embryo selection truly rival the expertise of embryologists? 28th Nov , 2024**, which was an enlightening and thought-provoking discussion orchestrated by a distinguished group of renowned scientists from the fraternity .
https://youtube.com/live/Q3QlJWYYTk8

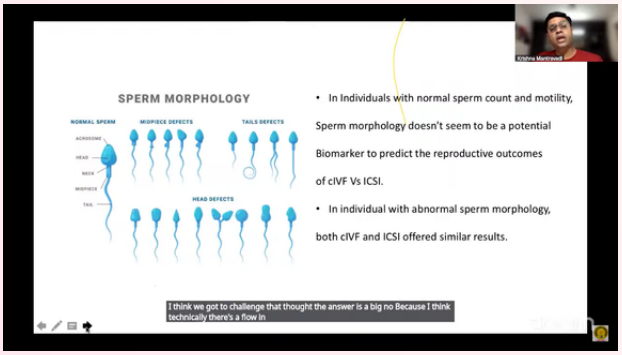






2. **ICSI vs Conventional IVF in normozoospermia infertile couples** – does sperm morphology truly impact success rates? **18th March 2025**, which gave fresh insights on the highly debated topic backed up by evidence from the latest edition of Human Reproduction, 2024.
https://www.youtube.com/live/QlsORHY5dCU?si=hL2x-NP4K4Mv-RWA



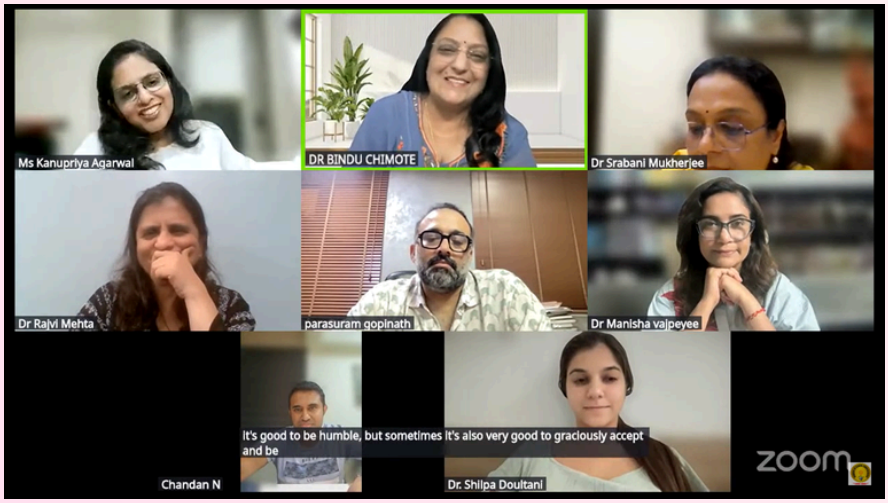


ACE CONVERSATIONS

1. **2nd JAN 2025 -** We began the new year with an evening of inspiration where ACE proudly presented **A Conversation with Kay Elder** the master teacher who had the rare privilege of working closely with the legends Patrick Steptoe and Bob Edwards. This session unraveled untold stories and personal qualities that made her a true legend.
https://www.youtube.com/watch?v=Cnsr_Myo5js&t=4354s

ACE CONVERSATIONS

1. **JUNE 19th 2025 Remembering Dr.Subhas Mukherjee : in conversation with the living miracle Ms. Kanupriya Agarwal** .It was a rare online conversation where Kanupriya, the world's first IVF baby born from a frozen embryo, shared her thoughts on the impact of Dr. Subhas Mukherjee's work and the challenges faced by the scientific community.". Dr. Rajvi emphasized the importance of recognizing Dr. Mukherjee's contributions to science and suggested rephrasing Kanupriya's title for historical accuracy. The discussion also touched on the societal acceptance of IVF in India and the emotional journey of those involved in the field.
https://www.youtube.com/watch?v=HYVSpc4pjlM&t=3594s



HISTORIC CELEBRATION BY ACE:

ACE celebrated the birth of India's first IVF baby, Ms. Kanupriya Agarwal alias Durga, on **3rd October 2024** – the event brought together experts and pioneers in assisted reproduction who elaborated on the journey of IVF in India and discussed the future of fertility treatments. It was not only a tribute to the past but also a step forward in shaping the future of reproductive medicine in India .
https://www.youtube.com/watch?v=OckY-fQhngs

Importantly, ACE achieved an exciting milestone: officially issuing 1000+ certificates, marking a huge moment in our journey, and a testament to the contribution made by ACE in the field.