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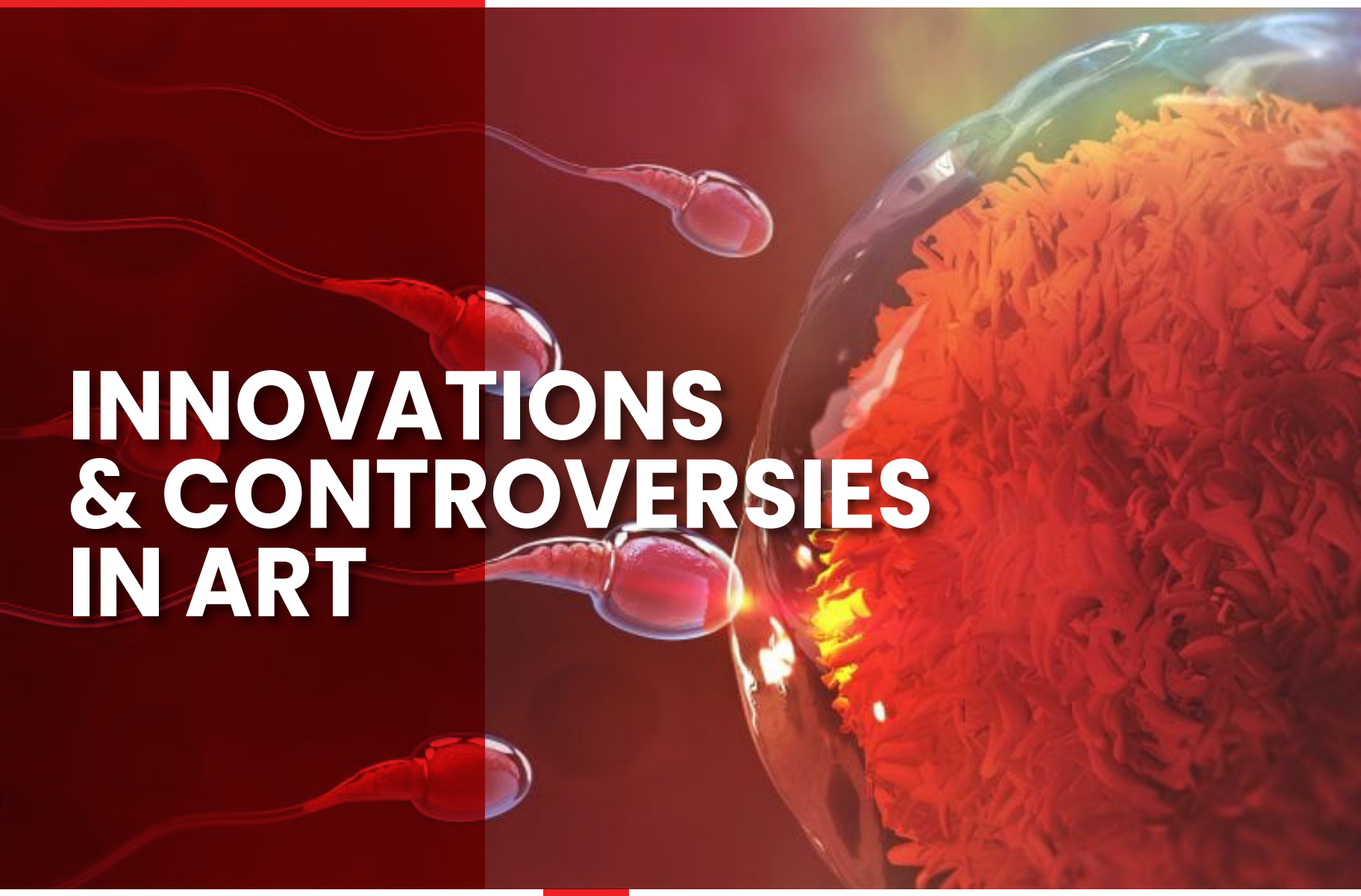
Volume 10 (2019)

INNOVATIONS & CONTROVERSIES IN ART



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MESSAGE FROM THE PRESIDENT'S DESK

DR GOURI DEVI
President - IFS

Dear Friends

This issue of IFS conversation covers various interesting topics like endometrial receptivity assay, freeze all, non invasive PGT and PGT for low ovarian reserve, dual trigger for oocyte maturation ,social egg freezing and role of stem cells in fertility etc.

IFS conversation is not only a showcase of recent academic activities but also covers various academic topics encompassing fertility treatments and diagnostics with all the practical tips, which will be beneficial for practising fertility specialists.

I also extend my invitation for our forth coming annual congress Fertivision 2019 to be held between 6-8th December 2019.No congress is complete without whole hearted participation and contribution. We have tried our best to have a plethora of eminent speakers from all across the globe. The conference topics are well chosen keeping in mind the advances in the field to improve fertility treatment outcomes. We hope each one of us goes back richer in knowledge at the end of this academic bonanza.

With Best wishes

Dr M. Gouri Devi

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MESSAGE FROM THE SECRETARY'S DESK

DR (PROF) PANKAJ TALWAR
Secretary General - IFS

Dear Friends,

IFS conversation is an interesting platform to receive all the updates on IFS activities. It gives me immense pleasure to announce release of our latest update covering various topics like endometrial receptivity assay, freeze all, non invasive PGT, dual trigger for oocyte maturation and role of stem cells in fertility etc.

We have reached the end of the year and are eagerly awaiting out annunal congress Fertivision 2019 which will be held between 6th - 8th December 2019 at Leela Ambience, Gurugram. We extend our invitation and would be thrilled to host everyone. It will be an academic feast covering ten precongress workshops and followed by two day main congress. There is a galaxy of international and national speakers and you can get enlightened by their vast knowledge. The congress would also entail various post congress cultural entertainment program.

We hope you are updated and enriched with IFS activities through this issue of IFS conversation. We would encourage our readers to further give their academic contributions to forth coming IFS conversation editions.

Dr (Prof) Pankaj Talwar

MESSAGE FROM THE EDITOR'S DESK

DR SURVEEN GHUMMAN
Editor - IFS

DR SHWETA GUPTA
Jt. Editor - IFS

Dear Members,

Greeting from team IFS!

This issue of IFS Vision brings us "Innovations and Controversies in ART". It discusses new innovations with their controversies like ERA, non invasive PGS, Stem cells, Dual trigger, and Social egg freezing. The issue also debates controversies on PGS in low ovarian reserve, Blast for all, Double vs single IUI , IUI in unilateral tubal blockage, Freezing all embryos with transfer in next cycle and DNA fragmentation test and its impact on decision making. We have hoped to address some important controversies and evidence for and against it.

This issue coincides with our annual conference - Fertivision. The annual academic event of our society which gets together global and national leaders in the field of ART. We are looking forward to more debates, discussions, evidence and experienced based sharing of data on this single platform and we hope to see you as part of this academic bonanza

IFS being a society rich in academics,it has held numerous CME, focused meetings, workshops, round table meets country wide in 2019. The fellowship program in ART and embryology are running successfully. The journal published by IFS - Fertility Science and Research is biannual and we invite contribution from members.

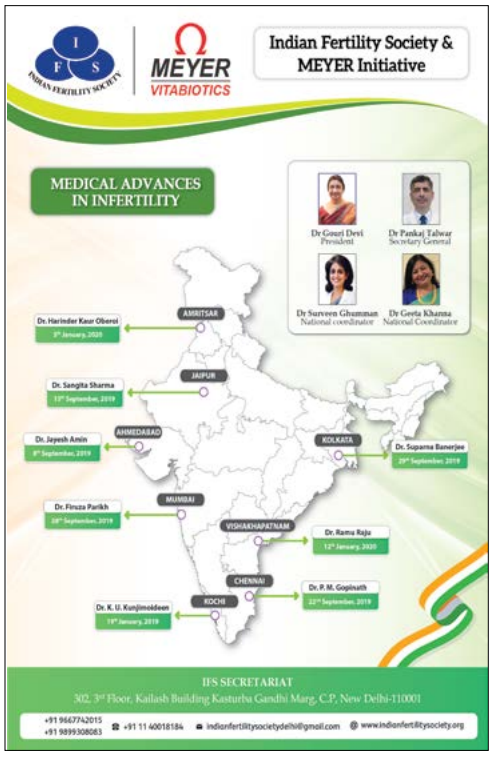
In 2019 IFS has expanded to 27 chapters distributed all over the country with over 2700 members. The theme - "Reaching the Outreach" has been truly fulfilled with members increasing in every corner of the country. Here, we would like to specially acknowledge our chapter secretary at Kashmir, Dr Sayed SajjadHussain for his special efforts to comply with our request for an article in this issue, with limited internet connectivity. IFS stands united at all fronts!

We wish you a merry Christmas and a happy 2020!

Dr Surveen Ghumman

Dr Shweta Mittal Gupta

INDIAN FERTILITY SOCIETY INITIATIVES



ASKING THE EXPERTS

Selecting The Best Embryo

Dr Kuldeep Jain

Past President, IFS
Chairperson, International exchange committee, IFS
Editor, Fertility Science and Research
Director, KJIVF and laparoscopy centre Delhi
Program Director, Asian - KJIVF, Faridabad

In my view, an embryo which results in a healthy live pregnancy can be termed a good embryo. This is logical but not applicable to clinical scenario. So, every lab needs to develop their own criteria to select the best embryos for transfer. There are many methods which can help in selecting the best embryo but selection of embryos based on morphology is still the core of daily laboratory practice. Various methods which have been used and suggested are morphological assessment and time lapse technology. Other technologies which are not practiced widely are

- Pyruvate, Lactate, Glucose or AA levels in embryo culture media
- Assessment of oxygen consumption by embryo
- Genomic and proteomic profiling
- Assessment of embryonic metabolome

A multivariable prediction model to rank embryos according to their implantation potential has been suggested . This model is based on sequential morphological assessment to predict implantation potential of the embryo . Five factors included in the final prediction model are early cleavage, number of blastomeres on days 2 and 3 , morphological score and presence of morula on day 3.
Our routine selection is still based on Cleavage rates and Morphology. Faster cleavage is better Morphological appearance : Based on the consensus, following is the ideal timing of observation of fertilized oocytes and embryos, and expected stage of development at each time point

Type of observation Timing	(hours post insemination)	Expected Stage
Fertilization check	17±1	Pronuclear stage
Syngamy check	23±1	
Early clevage check	26±1 post-ICSI; 28±1 h post-IVF	2-cell stage
Day 2 embryo assessment	44±1	4-cell stage
Day 3 embryo assessment	68±1	8-cell stage
Day 4 embryo assessment	92±2	Morula
Day 5 embryo assessment	116±2	Blastocyst

Following are important indicators of best quality embryos.

- Cell number should be appropriate to the age of the embryo (in hours post-insemination)
- Both slow and fast embryos have reduced implantation potential and are abnormal
- The degree of fragmentation of an embryo is strongly correlated with chromosomal mosaicism and embryos that display fragmentation are less likely to implant
- Polarization of NPB in both pronuclei is a reliable marker of implantation; However, Pronuclear morphology assessment improves embryo selection only when it is combined with embryo morphology evaluation on day 3
- Blastocyst culture is not a means for improving embryo quality; It is simply a tool for selecting the best embryo

Limitations:
- Subjectivity
- Time pressure
- Inability to accurately estimate the reproductive potential of embryo.

- Assessment Problems
- Fragmentation
- Blastomere size
- Multi-nucleation

Selecting the best embryo morphology by sequential embryo assessment
- 18- 19 Hr- Post insemination
- 25- 26 Hr- Post insemination
- 42- 44 Hr- Post insemination
- 66-68 Hr- Post insemination
- 106-108 Hr- Post insemination

What is Ideal ? – Sequential embryo scoring system
+ Zygote – 2pn score
+ Early Cleavage – 24h PI
+ Day 2 embryo score
+ Day 3 embryo score
+ Blastocyst score

- Minimal time in suboptimal environment
- The New and exciting powerful tool - sequential embryo assessment.
- Gives information about development parameters that differs between implanting and more implanting potential.

Multi nucleation defined as presence of more than one nucleus in a blastomere(including micronuclei)
and is associated with reduced implantation potential, increased risk of chromosomal abnormality and miscarriage
Assessment should be performed on day 2 at 44 + 1 hpi
Grading is binary: present or absent

A: grade 4
+ fully compacted with all blastomeres compacting
+ cell boundaries not clear; some nuclei can be identified

B: grade 3
+ more than three-quarters of blastomeres compacting
+ spherical shape with a smooth profile

C: grade 2
+ - irregular morphology with a deep indentation

D: grade 1
+ less than 50% of the blastomeres compacting
+ fragments/non-compacted blastomeres identifiable

TABLE 1: Consensus scoring system for day 4 embryos

Grade	Rating	Description
1	Good	• Entered into a fourth round of cleavage. • Evidence of compaction that involves virtually all the embryo volume.
2	Fair	• Entered into a fourth round of cleavage. • Compaction involves the majority of the volume of the embryo
3	Poor	• Disproportionate compaction involving less than half of the embryo, with two or three cells remaining as discrete blastomeres

How useful is embryoscope in routine clinical practice?

Embryoscope is one of the most technologically advanced and innovative devices. It integrates a multi-gas incubator, a microscope with an integrated camera shooting continuous image and an advanced software for the acquisition and subsequent analysis of all data relating to the development of embryos. It operates in a completely safe and non-invasive manner . Time lapse video analysis provides precise division kinetics of cultured embryos which correlates with blastocyst formation and quality. It is very useful in training new embryologists embryoscope however the utility of the embryoscope in clinical practice still remains to be proven. It is extremely expensive - and is very unlikely to provide cost-effective use in clinical practice today.
There is a need of a software based on a multivariate analysis of information from images recorded by all the centers that use the Embryoscope to create a predictive algorithm, which will provide the embryologist with further and useful indications to choose the embryo to implant.
Following is the time line for checkpoint using embryoscope morphokinetics based on algorithm developed.

Embryo Dynamics – Embryo Scope

Meseguere tal. 201 Stage	Check-point (hpICSI)
PN Fading	22 - 25
1st Cleavage (2 Cells)	24.6 – 28.2
2nd Cleavage (3 Cells)	35.6 – 40.5
3rd Cleavage (4 Cells)	36.0 – 41.6
Cleavage Dynamics (2 to 3 Cells)	<12 h
Cleavage Dynamics (3 to 4 cells)	<0.67 h
Five Cells	49.6 – 56.7

Non-invasive Quantification of Utilization & Metabolome

Techniques such as metabolomics / PGS may help in selecting best embryo and moving towards SET but there routine use requires to be substantiated by RCT'S. Additional methods for embryo selection, such as selection based on chromosomal status (preimplantation genetic screening) and metabolomic profiles of culture media, have been introduced, but upon proper evaluation these methods have been shown to be unable to increase pregnancy rates

Genetic markers
- PGS
- polar body analysis

Morphokinetics
- time-lapse

Biochemical markers
- amino acid profiling
- Infra-red spectroscopy
- PAF

Respiration
- oxygen consumption
- pyruvate/glucose turnover

Advantage
- Without damaging the embryo
- Quickly
- Consistently and accurately

Three approaches
- Analysis of carbohydrate utilization
- Turnover of Amino acids
- Analysis of Embryo metabolism
- Promising but have limitation, cumbersum and need standerdization

So what is ideal method?

Combined approach
- Currently used embryo assessment strategies are largely based on embryo morphology and cleavage rates. Their precision is a limiting factor .
- Sequential morphological assessment, may be with time lapse at designated time combined with glucose uptake and estimation of other metabolic products
- Sequential assessment is important in selecting process and data from time lapse and may prove beneficial in improving selection
- Need for an objective, fast, accurate and affordable test

ASKING THE EXPERTS

COS – How To Get The Best Outcome?

Dr Sonia Malik

DGO, MD, FICOG, FIAMS
Past President-IFS
Director & HOD, Southend Fertility & IVF
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ART has witnessed a sea of change over the three decades of its existence. This has primarily happened because of a better understanding of the physiology of reproduction and the advances in diagnostic aids like ultrasound and hormonal assays. Despite all this, 100% success still eludes us.

So, while we talk of the best embryo and the best sperm or the best lab, can we define the " best patient"? The parameters that would define the best patient have not been explored. Many attempts have been made to categorise the women who come to us for treatment. WHO divided women with Ovulatory dysfunction into 3 groups in 1976. Ever since then, ovarian stimulation for IVF has been carried out using the Baird's theory after categorizing the patient into one of the three groups.

Over time we realized that there were many sub types within these groups and that every woman required individualized treatment. Hence came the concept of "iCOS" – individualized controlled ovarian stimulation. With it also came the realization that each woman responds differently to the same drug/ protocol. And thus, women were further reclassified into

- Hyper responders
- Normo responders
- Poor responders

Each group has their own idiosyncrasies and challenges. Stimulation needs to be tailored according to the type of patient.

Hyper responders
These are patients who have the following:

- Young age
- AFC > 20,
- AMH > 3.5 pg/ml

COS is a challenge because of premature LH Surge and the strong association and risk of OHSS. The best protocol is gonadotrophins with an Antagonist followed by an agonist trigger and freeze all for the embryos formed. FET is done in a subsequent cycle. This " segmentation of IVF" was proposed by Paul Devroy and holds true for majority of cases. It nearly eliminates the risk of OHSS and also doubles the pregnancy rates. This is the standard protocol in all our centres. All our patients are pre treated with OCP's or/ and metformin in order to stabilize the hormones and then stimulation is begun. In certain severe cases, GnRH agonist maybe required to down regulate the cycle. In such cases, the stop protocol is preferred wherein the agonist is stopped at the onset of period and a normal antagonist protocol is begun. This gives us the flexibility to use the agonist trigger once again. Our target is to limit the number of oocytes to not more than 20 in case of a severe PCOS or else just 14 -15. This gives us a pregnancy rate of 67% on carrying out a frozen embryo transfer.

Normo responders

Normo responders are defined as patients who fulfill the following criteria:

- AFC of 5 -18
- AMH of 1.2 – 3.5ng/ml

These patients could actually be considered as the " best patient" that we are looking for. They respond well to any drug or protocol and give the best pregnancy rate. However, a small subgroup may be seen showing an unexpected hyper or hypo response to drugs. Hence one needs to be cautious even while stimulating this group. The starting dose of gonadotropins is 225 iu in both agonist or antagonist protocol. Our aim is to give the patient one fresh and one frozen embryo transfer and this can be achieved with this dose.

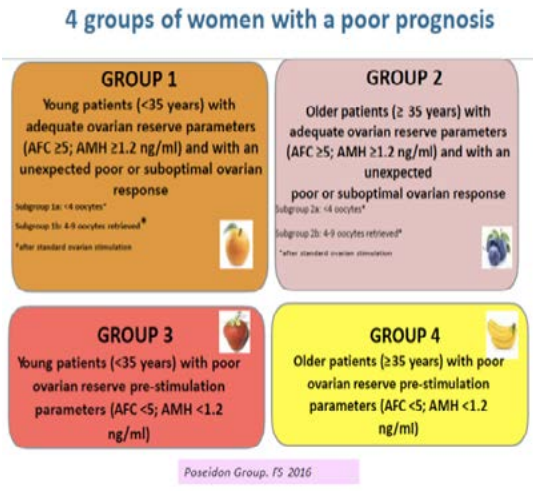
Poor responders

Nearly 24 -25% of our patients fall in this category and can be of any age group ranging from 25 yrs to 40yrs. Generally have the following criteria:

- AFC < 5
- AMH < 1.2ng/ml.

Recently poor responders have been stratified into the following four categories (POSIEDON) and each one has to be dealt with depending on the category that she falls in. (Fig. 1)

Fig 1: POSIEDON categorization of Poor Responder



Posiedon stratification for poor response.

Table 1

	POSIEDON (N=218)
Group 1	93 (42.6%)
Group 2	59(27%)
Group 3	19(8.7%)
Group 4	45 (20.6%)

In a recently concluded study carried out at our centre, we found the incidence of various groups in a total of 200 patients. The largest group was 1 which is alarming. (Table 1) It was interesting to note that most of the patients were those with an unexpected poor response whether they were young or old.

Group 1
These young normo gonadotropic women with normal ovarian reserve parameters, may be having an increased sensitivity to FSH hence will benefit by

- Increasing the starting dose of rFSH
- Adding 150 UI rLH to the rFSH.

Group 2
These older women above age 35 years, maybe showing a normal ovarian reserve but do not respond to normal stimulation. This is due to a fall in androgen production by theca cells as a result of age. This group will do well by pretreating with DHEAS or testosterone gel. Stimulation requires innovation so that the number of blastocysts produced are more in number. Hence, we may:

- Add 150 UI r.LH to 300 UI r.FSH from the beginning of stimulation
- Duo-stimulation: FPS +LPS to increase in the number of oocytes and therefore, euploid blastocysts

Group 3 & 4

This group comprises of women where the ovarian reserve is low and again, may have women younger than 35 yrs or more than 35yrs. Not much can be done for them except carrying out multiple cycles for oocyte and embryo collection. This is called Accuvit - an acronym for accumulation and vitrification. This maybe helpful in the younger patient but in the older patient, because of the high incidence of aneuploidies, even this intervention may not give us a healthy live baby. The best option for such patients then is to go in for donor oocytes.

Conclusion

There have been major developments in the field of ovarian stimulation and despite a fair amount of fine tuning, we still are unable to accurately predict response and outcome in all our patients. Controlled ovarian stimulation still continues to be challenge in all the patients but more so in both hyper or hypo responders. It is important to strike a balance in order to give good results. Many times one maybe swayed by the hopelessness of the condition of the patient, tempted to do away with COS and directly offer third party options to the patient. We must however always remember that the lady who has come to us, desires to have her own child. Moreover, science has evolved only when people have taken bold and unconventional steps. We should therefore not give up easily and try at least once to give the woman her own genetic child rather than taking a short cut.

ASKING THE EXPERTS

Embryo Transfer – The Best Technique

Prof. Sudha Prasad

President Elect - IFS
Director, Matritava Advanced IVF & Training Centre, Vasant Vihar, Delhi

Embryo transfer is the placement of an embryo into the uterus.

A viable embryo, a receptive endometrium and an optimal embryo transfer technique are the prerequisite for the successful IVF procedures. Although embryo transfer is considered to be an easy procedure by most of the clinicians, but it is a very crucial stage which requires the skill. Hence a meticulous training and standard protocols for the procedure are desirable. If a standard embryo transfer protocol is followed the results will certainly increase.

Several variables play a role in the success of a transfer, including catheter type, atraumatic technique, and the use of ultrasound guidance. Because of the adverse effects of controlled ovarian hyperstimulation on the endometrium, frozen embryo transfers have demonstrated improved pregnancy rates.

Improvements in embryo culture, improved culture media have helped to grow viable blastocyst-stage embryos in vitro. The advent of successful methods of vitrification of blastocysts has facilitated storage of these embryos for later transfer without compromising viability. In addition, the evolving methods for embryo selection, which are noninvasive, seem to hold great promise for the future.

Variables which can affect ET success include the performance of a trial/mock transfer, and contamination of the catheter tip with blood, mucus, or endometrial tissue. The success rate are also affects if the embryos are retained or expelled. Important variable is to choose type of catheter, the volume and type of transfer media.
It is very important to do cervical culture because the presence of bacteria in the cervix or on the catheter tip will directly hamper the implantation.
Placement of embryos is a skill and should be done as gently as possible to avoid any uterine contraction. Thus, avoiding difficult ET is important to optimize clinical outcomes, and ultrasound guided transfer definitely seems to be a key adjunct toward this goal. To avoid or minimize uterine contractility and to reduce the expulsion rates of embryos progesterone is to be started from the day of oocytes retrieval or in cases of frozen transfer, as a good triple line vascular endometrium is achieved.
There are several catheters available in the market which may be soft or stiff, pre-curved or straight. Soft and pre-curved catheters follow the contour of uterine cavity easily but may be difficult to introduce in tight cervical os, where as stiff one may be more traumatic which may lower the pregnancy rates. Hence, mock/trial transfer which mimics the actual transfer must be done few weeks before the ET irrespective of ultrasound guided transfers.

Flushing of cervix with culture media and removal of thick mucus plug is an important step before transfer.
In a retrospective comparison, Tomás et al.1 evaluated 4,807 ETs with regard to the degree of difficulty. Easy or intermediate transfers resulted in a 1.7-fold higher pregnancy rate than difficult transfers (P<.0001; 95% confidence interval 1.3–2.2). Contamination with blood and mucus indicates difficult transfer and are associated with an increased risk for poor ET outcome.

The timing surrounding ET is also an interesting variable involved in success. After retrospective assessment of timings, Matorras et al.2 demonstrated that the interval between catheter loading and the transfer of the embryos into the uterine cavity affected IVF outcomes. When this delay was greater than 120 seconds, there was a decrease in pregnancy rates from 31.6% to 19.1% and a decrease in implantation rate from 15.9% to 9.4%. This may be related to how long the embryos are "outside the incubator." The delay in injection might be a surrogate marker as well for the difficulty of ET. Therefore, minimizing the time between loading and transfer would seem to be important point to achieve better pregnancy rate.

To avoid the risk of multiple pregnancy it is advisable to do elective single embryo transfer (SET)3 Not more than two embryos are to be transferred in case SET is not done.

Another concern is amount of media taken in transfer catheter. Minimal the media (12 to 20 microliters), better the pregnancy rate. The position of the air bubble transferred at the time of ET and its relation to pregnancy rate is also important. More recently, it was demonstrated that pregnancy and implantation rates in relation with air bubble flashes located <15 mm from the fundus were significantly higher than those with embryo flashes located >15 mm from the fundus4.

After transferring embryos, the catheter should be slowly withdrawn, maintaining pressure on the syringe plunger to avoid disrupting placement of the embryos/catheter contents.

After ET, bed rest has been a controversial subject, with some recommending extended bed rest and some virtually no bed rest. It has been suggested that it should be individualized for patients' preferences and anxiety, anything more than a short period of bed rest is without proven benefit.

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Fig 1a.
Rocket catheter

Fig 1b.
Labotect catheter

Fig 1c.
Sydney cook catheter

ASKING THE EXPERTS

Selecting The Best Sperm

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The sperm is one of the most specialised cells of the human body. Eukaryotic DNA present in the mammalian sperm is sixfold more highly condensed than the DNA in somatic chromosomes. Selecting the best spermatozoa and elimination of damaged spermatozoa are important for successful ART outcomes in infertility clinics.

Most sperm selection protocols in use today fall in one of the following categories: sperm migration, filtration, density gradient centrifugation (DGC) or a combination of these methods. In semen samples with normal parameters, wash & swim up technique is used to isolate motile sperms. In patients with oligozoospermia, teratozoospermia or asthenozoospermia, density gradient centrifugation is the method of choice. The recovery of motile spermatozoa is higher in DGC than swim up technique. However these methods cannot differentiate between morphologically normal and abnormal sperms or sperms with fragmented DNA. Centrifugation also generates ROS which damages the spermatozoa. Hence, a number of advanced techniques have been designed in the recent years to select the best sperm. During the decision-making process, to select a sperm separation protocol it is important to consider both the type of infertility and the particular assisted reproductive approach to be used to treat it. For instance, high sperm numbers with vigorous motility are required for successful intrauterine insemination. On the other hand, few motile sperm cells, in the order of thousands, are required for conventional IVF, and even fewer to perform ICSI.

Application of advanced procedures for sperm selection have improved assisted reproductive technology (ART) outcomes. Some of these have been discussed below:

1. Selection of non-apoptotic spermatozoa-Magnetic activated cell sorting (MACS)

This allows the separation of apoptotic sperms from non-apoptotic ones. MACS technology uses conjugated supermagnetic microbeads to separate non-apoptotic spermatozoa from those with deteriorated plasma membranes and externalized phosphatidylserine. MACS beads are biodegradable and do not alter the structure, function or activity of spermatozoa. Hence, it does not need any separate step for separation of the microbeads.

Principle: Externalisation of phosphatidyl serine is an early process in apoptosis. Depending on the concentration of calcium ions, phosphatidyl serine has a high affinity for Annexin V. Annexin V cannot cross the plasma membrane, so the binding of Annexin V to spermatozoa signifies disturbed sperm membrane integrity. Based on Annexin V binding and magnetic separation, 2 fractions are obtained: Annexin negative (unlabeled intact membrane; non-apoptotic) and Annexin positive (labeled altered membrane; apoptotic). Though MACS is highly effective in removing apoptotic sperm cells, it is not able to eliminate leukocytes, immature germ cells, seminal plasma and other contaminants from the semen sample. This is why MACS separation is normally performed in conjunction with Density gradient centrifugation.

1. Selection of motile spermatozoa - Microfluidics

Microfluidics is the science and technology of accurate manipulation of small amounts of fluids, which is typically done in microchannels with dimensions of a few hundred micrometers. The principle of sperm selection by this method is laminar flow by gravity-driven pumps in the microchannels. Microfluidic sperm sorter selects sperm cells that had>80% improvement in DNA integrity relative to the heterogeneous population present in the raw semen, and the selection was performed in <20 minutes. This method bypasses centrifugation and thus lessens the amount of DNA damage in the resultant sample.

2. Selection based on live sperm morphology

a. Intracytoplasmic morphologically selected sperm injection, IMSI

Sperm evaluation at 400 magnification for ICSI is unable to provide enough resolution for an accurate sperm morphological assessment. Real-time sperm evaluation is known as motile sperm organelle morphology examination (MSOME). MSOME sperm evaluation is performed under an inverted light microscope equipped with high-power differential interference contrast optics (Nomarski/ DIC; magnification x150) enhanced by digital imaging (magnification, ×44) to achieve a total magnification of over 6000. At this magnification, it is possible to define the morphological normalcy of five sperm organelles (acrosome, post-acrosomal lamina, neck, tail and nucleus). Among these organelles, evaluation of sperm nucleus (shape and chromatin content) by MSOME appears to be the most important feature conditioning ICSI outcome. Intracytoplasmic morphologically selected sperm injection (IMSI) is a modification of ICSI, in which the injected spermatozoon is selected by the technician at high magnification using MSOME normalcy criteria.

b. Polarising microscopy

Another optical system used to select live sperm for ICSI is based on birefringence generated by the incidence of polarized light on longitudinally oriented protein filaments on the post-acrosomal region of the sperm. The proportion of birefringent sperm in a sample is correlated positively with sperm concentration, motility and viability. In addition, using this optical system, it is possible to differentiate acrosome-reacted from acrosome-intact sperm before microinjection.

3. Selection based on sperm membrane maturity-Hyaluronic acid sperm binding (PICSI)

The presence of HA binding sites on the sperm outer membrane is regarded as a sign of sperm maturity, and constitutes the basic principle for this assay. Hyaluronic acid, HA is immobilized on a solid surface (polystyrene culture dish) and the washed sperm sample is allowed to interact with the HA coated surface for 15 min. An individual sperm attached to the dish is picked up with the ICSI pipette and used for oocyte injection. The device called PICSI (physiological intracytoplasmic sperm injection), uses a conventional polystyrene culture dish enhanced with microdots of hyaluronan where the sperm suspension is added. Sperm maturity has been associated with certain desirable sperm traits such as: improved viability and motility, intact acrosomes, lower caspase-3 activation and lower frequency of chromosomal aneuploidies.

4. Sperm surface charge for sperm selection

There are two different approaches to select sperm based on the differential net electric charge on the sperm plasma membrane: electrophoretic system and zeta potential method.

a. Electrophoretic system

The electrophoresis-based technology uses an electric field to separate sperm cells
based on size and electronegative charge. It is composed of four chambers: two outer chambers and two inner chambers (incubation and collection). The outer chambers (filled with buffer) house the platinum-coated titanium mesh electrodes. A membrane separates the outer chambers from the inner chambers allowing for the movement of small molecules, water and ions between them. The inner chambers comprise the inoculation compartment and the collection compartment separated by a polycarbonate separation membrane whose pore size excludes leukocytes and precursor germ cells that normally contaminate semen samples. The semen specimen is loaded into the incubation chamber and allowed to equilibrate for 5 min before applying a current of 75 mA and variable voltage (18-21 V). The selected sperm subpopulation is recovered from the collection chamber after 5 min of application of the electric field.

b. Zeta potential method

Sperm cells can be selected based on their negative zeta electrokinetic potential which is the overall charge a spermatozoon acquires in a specific medium. A mature sperm cell has a negative zeta potential of -16 to -20 mV(differential potential between the sperm membrane and its surroundings). The zeta potential method is very simple to perform and does not require special equipment and is therefore inexpensive. Washed sperm in serum-free medium isintroduced in a conical tube which has been positively charged by rubbing or rotating the tube on a latex glove. Electronegatively charged sperm (mature) attach to the walls of the tube by electrostatic force and the non-adherent sperm fraction alongwith other contaminants are removed by inverting the tube. Selected adherent sperm cells are recovered by rinsing the tube with serum-supplemented medium. This method scores over the conventional DGC in terms of percentage of morphologically normal sperm, hyperactivation, DNA integrity and maturity, but not motility.

5. Emerging Techniques

a. Raman spectroscopy

Raman spectroscopy is a spectroscopic technique that examines the inelastic scattering of photons (a change in frequency of photons) caused by molecular bonds. The photons originated from a laser source are absorbed by the sample and then reemitted with a frequency different to that in the original source what is called Raman effect. In biological specimens, photon shifting provides information about conformation, composition and intermolecular interaction in macromolecules (e.g. DNA-protein).

b. Confocal light absorption and scattering microscopy (CLASS)

It is an optical system that combines confocal microscopy, a well-established high magnification microscopic technique, with light-scattering spectroscopy. This combination allows for observation of submicrometer structures in viable cells attaining the spatial resolution of electron microscopy.

Conclusion

In light of the known influence of the fertilizing spermatozoon on early and late embryonic development, selection of the best sperm from heterogeneous sperm samples is important for ART outcome. Accurate identification of healthy spermatozoa is of special importance during ICSI, in which a sperm cell is injected into the mature oocyte bypassing all natural barriers. There is great concern about the risk ofusing sperms with chromosomal abnormalities and/or damaged DNA which can lead to inadvertent transmission of genetic diseases to the offspring. Hence improvement in sperm selection techniques is extremely important. Despite encouraging preliminary results obtained with advanced sperm selection techniques, more research is warranted to address safety issues before widespread application of these methods.

INVITED ARTICLES

Freeze All – Should it be the Norm?

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Many clinicians have started freezing all embryos and transfering at another cycle. There are many advantages but it is still not established whether the advantages are for all sects of patients

Advantages of freezing embryos

1. Better Endometrial Receptivity
2. Safety with Elimination of OHSS
3. Better Embryo-Endometrial Interaction
4. Better Pregnancy Outcome
5. Lesser Birth Defects
6. Lesser Ectopic Pregnancy
7. PGS/PGD

How does Superovulation affect endometrial receptivity?[1]

- Superovulation affects the depth of the surface epithelium, the number and length of microvilli, and the mitotic activity in the surface epithelium and stromal cells
- Superovulation lowers the expression of specific integrins associated with the window of implantation
- Superovulation brings Premature appearance of endometrial nuclear channels systems, subnuclear vacuoles, pinopodes, and secretory changes
- Superovulation affects the timing of window of implantation More so in younger patients with high E2
- Endometrial advancement of >3 days is detrimental for Implantation

With Superovulation, A significant difference in gene expression which are known to be important in estrogen-mediated uterine growth and implantation and STC1, which has been shown to be important in angiogenesis is seen A difference in gene expression of >150 genes regulating angiogenesis and early implantation is seen with superovulation which is consistent with a 2–4 day acceleration in maturation and associated shift in the window of receptivity.[2]

Table: 1[3]

TABLE 1

Gene expression profiles of simulated and nonstimulated human endometrium during the window of embryo implantation.

Study	No. of samples	Fold change considered to be significant	Number of genes Up	Down
Mirkin et al. (45)	13	≥1.2	5–6[a]	1–6[a]
Horcajadas et al. (46)	19	≥3	281	277
Simon et al. (47)	28	≥2	22–88[a]	24–100[a]
Horcajadas et al. (48)	49	–	69	73
Liu et al. (49)	13	≥2	5–244[a]	2–159[a]
Haouzi et al. (50)	84	≥2	321–657[a]	0–4[a]

[a] Ranges represent variation seen between different stimulation protocols.

Weinerman. Frozen vs. fresh ET: translational rationale. Fertil Steril 2014.

- Superovulation alters the immune environment of the endometrium
- A lower concentrations of NK cells is seen in the endometrium compared to non-superovulated controls
- As implantation occurs, NK cells via IL-15, which turn into decidual NK cells which secrete multiple factors important for implantation and angiogenesis like VEGF and cytokines and growth factors like leukemia inhibiting factor (LIF)

Safety with Prevention of OHSS without compromising results

- COS in high responders who receive a "trigger" of hCG can land up in OHSS
- Frozen embryo transfer reduces early-onset OHSS and to eliminate late OHSS risk with the use of a GnRH agonist "trigger" for final oocyte maturation,
- The use of agonist trigger has been associated with abrupt termination of the luteal phase, complete and irreversible luteolysis, and reduced live birth
- In PCOS, FET resulted in a higher frequency of live birth (49.3% vs. 42.0%), a lower frequency of pregnancy loss (22.0% vs. 32.7%), and a lower incidence of OHSS (1.3% vs. 7.1%)[4]
- Methods to improve Luteal phase after GnRHa Trigger like Dual Trigger or low dose HCG in LPS or E+P does not eliminate OHSS risk and ART outcomes were significantly low[5]

Superovulation affects Embryo-Endometrial Interaction

- Superovulation is an independent factor adversely affecting placentation and fetal growth probably via impaired trophoblast differentiation
- Superovulation affects methylation of the developing oocyte, and de-methylation of the developing embryo, especially paternally imprinted genes which may have effects on placentation and fetal growth6

Pregnancy outcome is better with Frozen vs. Fresh

Risks linked to fresh transfer after Superovulation:[7]

» Pre-eclampsia
» Low birth weight (LBW)
» Small for gestational age (SGA)
» Preterm
» Antepartum hemorrhage,
» Placental abruption
» Perinatal death

- Eleven studies : Singleton pregnancies after the transfer of frozen thawed embryos were associated with better perinatal outcomes compared with those after fresh IVF embryos.
- The relative risks (RR) and 95% confidence intervals (CI) APH (RR = 0.67, 95% CI 0.55–0.81) PT (RR = 0.84, 95% CI 0.78–0.90) SGA(RR = 0.45, 95% CI 0.30–0.66) LBW (RR = 0.69, 95% CI 0.62–0.76) Pr. MORTALITY (RR = 0.68, 95% CI 0.48–0.96) were lower in women who received frozen embryos[7]
- American registry showed increased risk of LBW in fresh probably due to uterine exposure to COS[8]
- Japanese registry showed in 48,158 deliveries a reduced incidence of SGA, LBW, and prematurity in FET.[9]

Birth Defects Frozen vs. Fresh

» The increase in blastogenesis defects appears greater for fresh embryo transfer (more than 3-fold)
» Cryopreservation process acting as a 'selection gate' for more viable embryos
» Excessive ovarian hormonal exposures puts adverse effects on the very early pregnancy

Ectopic Pregnancy

- Probably becoz of supraphysiologic hormone levels resulting in altered uterine contractions or the effect of elevated progesterone on cilia
- FET has a reduced risk of ectopic pregnancy (both visualized ectopic pregnancies and pregnancies of unknown location) when compared with fresh transfer[10] (Table 2)

Table: 2[11]

Comparison of Fresh vs.FET with respect to maternal and Fetal Risks

Reduced Risks in FET	Risks without a clear difference
• OHSS	• Implantation Failure
• LBW(<2500G)	• Ectopic
• PreTerm(<37 wks)	• PreEclampsia
• PreTerm LBW	• Very PreTerm(<32 wks)
• SGA	• Very LBW(<1500 g)
• Placenta Previa	• NICU Admissions
• Abruptio	• Congenital Abnormalities
• APH	
• Perinatal Mortality	

The advantages of freezing all embryos is established for OHSS and thin endometrium. To establish it for all patients further studies are needed.

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PGS in poor responders – Should it be advocated?

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The European Society of Human Reproduction and Embryology (ESHRE) published the Bologna criteria in 2011 in order to standardize the definition of poor ovarian response (POR) in a simple and reproducible manner[1]

At least two of the following three criteria had to be present to establish the definition:

1. Advanced maternal age (>40 years) or any other risk factor for POR.
2. A previous POR (≤3 oocytes with a conventional stimulation protocol).
3. An abnormal ovarian reserve test [i.e. antral follicle count (AFC) less than 5–7 follicles or anti-Müllerian hormone (AMH) below 0.5–1.1 ng/ml.

Though the POSEIDON criteria,[2] now helps us categorize women depending on an expected poor response based on the above criteria and the unexpected poor response in the presence of normal ovarian reserve parameters, for the scope of this article we would be considering women who would fulfill the Bologna criteria and are expected to have a poor response.

Preimplantation genetic testing for aneuploidy (PGT-A) has been demonstrated to improve implantation and pregnancy rates and decrease miscarriage rates over standard morphology-based embryo selection. However, there are limited data on its efficacy in patients with diminished ovarian reserve or a poor response to stimulation who may have fewer embryos to select amongst.

Despite consensus guidelines defining what constitutes DOR , there is still great debate regarding whether the low pregnancy rates observed in poor responders are simply a reflection of the quantitative challenge of starting with fewer oocytes, or if there is also a diminution in oocyte quality and an increase in aneuploidy.[3,4] This is an important question in the context of PGT-A, because a young poor responder may have a different prognosis than an older poor responder.

Application of PGT-A in all the poor responders runs the risk of no embryos being available for transfer, if the initial numbers are too low, and also if none of those few tested are reported to be euploid. However, a poor responder may still benefit from this by avoiding futile transfers with aneuploid embryos[5] and expeditiously moving into either another stimulation cycle or egg or embryo donation. Thus, time to pregnancy may be a better metric with miscarriage rate being a useful secondary measure. However, one has to consider the potential downside of the possibility of a false aneuploid result.

Arguments in favour of PGS

Early findings demonstrate that PGT-A reduces the miscarriage rate and decreases the time to delivery in poor responders. PGS significantly decreased time to live birth by an average of three months in patients with diminished ovarian reserve. Further, PGS appears to have a decreased risk for ongoing aneuploid gestations.[6]

In one study looking at all responders 40 years or older at the time of oocyte retrieval, the CPR was 62.4%, OPR was 60.0%, and clinical miscarriage rate was 15.3%. This compares to a miscarriage rate of 12.9% in women younger than 40 years (p=0.68), and also gives similar CPR and OPR (7) In a study by Rubio et al,[8] involving women between the ages of 38-41 years, the authors reported that although more patients in the PGT-A arm had no transfer performed because of no euploid embryos being available, the PGT-A arm had a higher delivery rate per randomized patient (36 versus 21.9%). This improvement was because of a significantly higher pregnancy rate per transfer (52.9 versus 24.2%, $P < 0.001$) and a significant reduction in miscarriage (2.7 versus 39%, $P < 0.001$) in the PGT-A arm. As a result, despite more cycles being cancelled prior to embryo transfer, the time to ongoing pregnancy was significantly shorter in the PGT-A arm (7.7 versus 14.9 weeks).

The SOLAIRE study utilized AMH less than 1.1 or antral follicle count of less than 8 as inclusion criteria. This study also performed all embryo biopsies at the blastocyst stage unlike the Rubio study[6] The preliminary data demonstrated a 90-day reduction in the achievement of ongoing pregnancy in the PGT-A arm. There was also a trend toward reduction in clinical pregnancy losses

Thus preliminary data conclude that, the true benefit of PGT-A in these patients is the avoidance of futile transfers and associated loss of time and emotional burden of miscarriage and ongoing aneuploid pregnancies

Arguments against PGS

Despite many studies examining the clinical performance of patients with DOR or POR, there is still a lack of consensus regarding whether the poor IVF outcomes observed in these patients are solely the product of the inability to produce a sufficient number of oocytes to withstand the normal attrition seen at each stage of the ART process, or whether there is an additional qualitative penalty.[9] In other words, does an oocyte derived from a poor responder also demonstrate reduced developmental potential or an increase in aneuploidy when compared to age-matched controls with better ovarian responsive-ness? It has been difficult to assess this since most studies about poor responders have not been adequately controlled for the confounding impact of age. It is important to see if these patients also exhibit evidence of an accelerated reduction in oocyte quality to understand the true impact of applying PGT-A to this group.

Without knowledge of how often an embryo diagnosed as aneuploid produces an ongoing gestation, it is difficult to make an informed decision regarding whether the benefits of PGT-A (avoidance of futile transfer, miscarriages, and associated lost time) are worth the risk of a false diagnosis of aneuploidy

Studies have also demonstrated that different subpopulations of patients with low response exhibit different clinical characteristics and hence need to be looked at as separate subgroups.

The additional diagnostic categories of mosaicism and segmental imbalance and whether and which mosaic embryos can be transferred in the absence of euploid embryos in this group of patients with very few embryos, further complicate this issue and prospective, blinded data regarding the reproductive potential of such embryos is sorely needed.[10]

Poor responder patients may have very few embryos going to the blastocyst stage and adding a PGT-A to these may carry a risk of no transfer or the risk of wrong diagnosis of aneuploidy preventing a transfer. It is to be borne in mind that biopsy at blastocyst stage means fewer available embryos for transfer, particularly so among women of advanced age who may actually benefit more from this procedure than good prognosis ones. Also, procedural damage to the embryos, however rare, could be a significant loss for this category of patient.

Conclusion

Defining the role of PGT-A in ART for poor responders is slowly emerging. Early results suggest that utilizing aneuploidy screening improves efficiency in these patients by avoiding the time lost to futile transfers and associated miscarriages and ongoing aneuploid gestations. However, a complete assessment of the efficacy in this population will require a better understanding and more information is needed on characterizing the physiology of ovarian aging across multiple phenotypes of diminished ovarian reserve and establishing the predictive value of aneuploid results across multiple PGT-A platforms. However, initial data suggests benefit of PGT-A in poor responders.

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Sperm DNA Fragmentation - Incorporating It In Infertility Practice

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Infertility is described as inability to establish pregnancy within 12 consecutive months of unprotected intercourse in couples of reproductive age. Among infertile couples around 20% contribute to male factor alone.[1]

Conventional semen analysis till date has been considered as a cornerstone laboratory examination during evaluation of male infertility. When performed under strict guidelines and quality control this test can give information regarding male fertility potential. Also, one can find out radical forms of sperm dysfunctions like azoospermia or globulozoospermia which has negative consequences on conception. An estimated 15% of men with normal basic semen analysis profiles have been associated with infertility.[2] Various factors which cause male infertility includes varicocele, oxidative stress, genetic abnormalities, systemic diseases,, infections, altered lifestyle and exposure to xenibiotics.[3] All these factors can influence Sperm DNA fragmentation which acts as potential mediator for establishing an infertility status in men. Many recent studies demonstrated that spermatozoal DNA integrity is a prerequisite for normal fertilization and transformation of paternal genetic information to the offspring.[4] Also, reproductive timeline in men is one of the factors affecting sperm parameters.

In general semen volume, pH, sperm concentration, motility, vitality and morphology are determined according to WHO 2010 guidelines. But, it cannot accurately differentiate fertile from infertile men. Nearly 15% of infertile men have normal sperm parameters according to WHO 2010. This clearly indicates the presence of other subcellular and nuclear factors that have a major contributions towards male infertility that is not identified by conventional semen analysis.

Nuclear component of spermatozoa, especially DNA integrity, is essential for normal fertilization, implantation, pregnancy and fetal development.[5] Within the last decade, infertility researchers have turned their attention to sperm molecular architecture for good reason—mammalian fertilization and subsequent embryo development depend in part on the inherent integrity of sperm DNA.[6]

Sperm cell is different from other somatic cell at the expense of Cytoplasm and hence cell mass. Reduced cell mass means impaired production of enzymes required for genetic repair. Chromatin in somatic cells is a relatively loose structure but in sperm cell it is very tightly packed, Compacted, haploid genome which must adopt to a volume 40 times less than a somatic cell.
The extremely tight complexes formed by the interaction of spermatozoal DNA with proteins generate highly stable and transcriptionally inert chromatin. The replacement of the largest part of histones (85%) by transition proteins (TPs) and subsequently by protamines takes place during spermiogonesis and epididymal transit.[7]

Etiology of DNA Fragmentation- it is multifactorial but this is best explained on the basis of three mechanisms; [8,9]

1. Abnormal Chromatin/Remodeling.
2. Oxidative Stress.
3. Abortive Apoptosis.

Causes for Sperm DNA Fragmentation

Intrinsic Factors

- Remodelling and packaging problems.
- Stage specific transient DNA Strand Breakage are introduced during Spermatogenesis. DNA breaks are needed for transient relief of torsional stress, favouring the Histones replacement with protamines during the final maturation from round to elongated spermatozoa. These physiological, temporary breaks if not repaired leads to Sperm DNA fragmentation or genetic mutation in ejaculate.
- Protamine deficiency or complete absence of it in some leads to defective packaging.
- Damage by ROS-excessive reactive oxygen species (ROS) production and/or decreased seminal antioxidants.
- Apoptotic events during sperm maturation within the epididymis.

Extrinsic Factors

- Chemotherapy.
- Cigarette smoking.
- Genital tract infection.
- Testicular Hypothermia.
- Varicoceles.
- Advanced age.
- Febrile illness.

Types of DNA Fragmentation

- Single Stranded Breaks (SSB)-due to unrepaired DNA nicks and ROS.
- Double Stranded Breaks (DSB)- due to abortive apoptosis, gross alteration in chromosomal structure. This leads to more serious and deleterious effect development of progeny.

Effect on Reproductive outcome

Oocytes and early embryos have shown to repair DNA damage. Also fertilization is independent of DNA damage. Post fertilization development is affected by improper repair by oocyte. This leads to implantation failure, early miscarriages, and diseases in offspring.

Currently, there seems to be insufficient evidence to support the routine use of SDF in male factor evaluation. Nevertheless the importance of DNA fragmentation in spermatozoa has been acknowledged in the latest American Urological Association (AUA) and European Association of Urology (EAU) guidelines on male infertility(10). Although a precise understanding of the specific utility of such tests in different clinical scenarios is still lacking, studies defining specific indications for DNA testing are now emerging.[11,12]

Diagnostic Tests

There are two types of assays that have been developed to measure SDF: Those that can directly measure the extent of DNA fragmentation through the use of probes and dyes and those that measure the susceptibility of DNA to denaturation, which occurs more commonly in fragmented DNA.

Below are the various diagnostic tests.
AO test: Metachromatic shift in fluorescence of AO when bound to single strand (ss) DNA. It works on principle of fluorescent microscopy. It is a rapid, simple and inexpensive but there are inter-laboratory variations and lack of reproducibility.

AB staining: There is Increased affinity of AB dye to loose chromatin of sperm nucleus. It works on the principle of optical microscopy. It is rapid, simple and inexpensive but there is an inter-laboratory variations and lack of reproducibility.

CMA3 staining: CMA3 competitively binds to DNA indirectly visualizing protamine deficient DNA. It works on thevprinciple of fluorescent microscopy. It yields reliable results as it is strongly correlated with other assays. There is an inter-observer variability.

TB staining: There is increased affinity of TB to sperm DNA phosphate residues. It works on the principle of optical microscopy. It is rapid, simple and inexpensive but there is inter-observer variability

TUNEL: It quantifies the enzymatic incorporation of dUTP into DNA breaks. It can be done using both optical microscopy and fluorescent microscopy. It uses optical microscopy, fluorescent microscopy and flow cytometry. It is very sensitive, reliable with minimal inter-observer variability. This can be performed on few sperm. Although it requires standardization between laboratories.

SCSA: Measures the susceptibility of sperm DNA to denaturation. It is a cytometric version of AO test. It works on the principle of flow cytometry. It gives the reliable estimate of the percentage of DNA damaged sperm. But requires the presence of expensive instrumentation (flow cytometer).

SCD or Halo test: This test assesses dispersion of DNA fragments after denaturation. It works on the principle of optical or fluorescent microscopy. It is a very simple test, but there is inter-observer variability

SCGE or comet assay: This is electrophoretic assessment of DNA fragments of lysed DNA. It works on principle of fluorescent microscopy. This can be done in very low sperm count. It is sensitive and reproducible, but requires an experienced observer. There is inter-observer variability.

Clinical Utility

Most studies define upper normal level of percentage of cells with DNA fragmentation. Unit of measurement is DNA Fragmentation Index (DFI). Percentage of spermatozoa with fragmented DNA less than 15% is good fertility potential, 15-25%is average and more than 25% is poor fertility potential.

Advantages and Disadvantages

These assays do not differentiate between clinically significant or insignificant DNA damage. Some DNA nicks occur as a normal process during winding or unwinding of DNA and these analysis do not differentiate between physiological and pathological nicking. Assays do not evaluate genes that may be affected by the fragmentation, as fragmentation in area containing certain genes may be more detrimental than area in relatively inactive region of genome. All assays depend on the concept that more nicking, and more fragmentation is pathologic.

What should be the practice?

- Successful human reproduction depends on inherent integrity of Sperm DNA.
- There appears to be a threshold of sperm DNA damage beyond which embryo development and subsequent pregnancy outcomes are impaired.
- Spermatozoa of infertile men possess substantially more DNA damage as compared to fertile men. Our

understanding of the etiology of sperm damage is still rudimentary.

- During any ART procedure sperm handling should be done to avoid DNA damages.
- Life style modifications should be done to avoid such circumstance.
- More research is required to understand the concept and its implication to improve reproductive outcome.

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Stem cells – Is their role in reproductive medicine a reality?

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Infertility affects about 10% of couples of reproductive age globally. Stem cells are considered as new therapeutic agents for infertility treatment. Stem cells are undifferentiated cells that are present in the embryonic, fetal and adult stages of life and give rise to differentiated cells that make up the tissues and organs. Recently there have been progress in potential of stem cells into oocyte production and ovarian regeneration in female infertility. Similarly, derivation of male germ cell from pluripotent undifferentiated stem cells.[1]

Pluripotent stem cells are able to differentiate into cells that arise from the three germ layers—ectoderm, endoderm and mesoderm—from which all the tissues and organs develop. Commonly, stem cells are derived from the following two main sources: early embryos [embryonic stem cells (ESCs)] and adult tissue (adult stem cells).[1] ESCs are pluripotent stem cells derived from the inner cell mass of the blastocyst. The essential characteristics of ESCs include derivation from the preimplantation embryo, prolonged proliferation in their pluripotent state and stable developmental potential to form the derivatives of all three embryonic germ layers. Stem cells can also be derived from the extraembryonic tissues (amnion, chorion, placenta and umbilical cord). The advantage of stem cells derived from extraembryonic tissues is the efficient isolation from tissues normally discarded at birth avoiding ethical concerns that plague the isolation of human ESCs.[2] Mesenchymal stem cells (MSCs) are one of the most common adults, multipotent stem cells. They can be derived from a variety of tissues including the bone marrow, adipose tissue, bone, Wharton's jelly, umbilical cord blood and peripheral blood.

Male infertility accounts for approximately half of all cases of infertility. ESCs can differentiate into male germ-like cells in vitro, but they are genetically unrelated to the patients, and the sources of human hESCs are limited. The ectopic expression of transcription factors leads to the reprogramming of somatic cells to induced pluripotent stem cells (iPSCs), which resemble ESCs in morphology, pluripotency marker expression and differentiation ability. hiPSCs can be generated from patients' somatic cells but may not faithfully recapitulate the characteristics of hESCs at both genetic and epigenetic levels. Hayashi et al.[3] made the remarkable finding that primordial germ cell-like cells PGCLCs could be obtained from mouse ESCs and mouse iPSCs. The PGCLCs could be differentiated into spermatozoa in vivo resulting in the birth of healthy offspring via ICSI. In spite of the progress in mice, the differentiation of hiPSCs to male germ cells still presents a significant challenge. Unlike miPSCs in naive state, hiPSCs exhibit a primed pluripotency with less potential for the germ cell fate. Therefore, the success rate of germ cell derivation from hiPSCs is much lower than that from miPSCs. hiPSCs may not lead to clinical approaches addressing infertility resulting from defects in gametogenesis. Currently, human studies cannot be validated by transplantation or the production of offspring. At present, stem cells in male infertility is not leading to realistic treatment approach but has provided us new area of research.

For female infertility, stem cell-based strategies for ovarian regeneration and oocyte production have been proposed as future clinical therapies. White et al[4] identified a rare population of mitotically active germ cells in human ovaries that can be purified and cultured in vitro to spontaneously form oocytes. Herraiz et al[5] introduced the beneficial effects of autologous stem cell ovarian transplant (ASCOT) on ovarian reserve and IVF outcomes for poor reserve. Herriaz et al[6] studied 17 poor responder young women, bone marrow derived stem cells (BMDSC) were delivered directly to one ovary for each patient to optimize the recruitment of existing dormant follicles to improve IVF outcomes. The study consisted of BMDSC mobilization to peripheral blood by granulocyte colony stimulating factor treatment and subsequent collection by aphaeresis. Cells were delivered into the ovarian artery by intra-arterial catheter. The contralateral ovary in each patient served as a control. Patients then proceeded with controlled ovarian hyperstimulation for IVF with preimplantation genetic screening. Results after ASCOT were promising for poor responders, ASCOT resulted in a significant improvement in AFC two weeks after treatment. They defined success as an increase in AFC ≥3 follicles and/or two consecutive increases in AMH levels and with these criteria ovarian function improved in 81.3% of women. These positive effects were associated with the presence of fibroblast growth factor-2 and thrombospondin in the aphaeresis sample. Among the 15 patients, five pregnancies were achieved: 2 after embryo transfer and 3 by natural conception. In allogeneic stem cell transplant (SCT), the recovery of ovarian function ranges from 14 to 24%, and the interval from SCT to first spontaneous menstruation ranges from 21 to 87 months. Recovery rates as high as 84% have been reported among patients with favourable predictors.

Stem cells has also been considered for the regeneration of human endometrium disorder like Asherman syndrome and thin endometrium. Azizi e al[7] evidenced that the transplantation of different stem cells with a diverse source in the endometrial zone had effects on endometrium such as decrease of fibrotic area, an elevated number of glands, stimulated angiogenesis, the enhanced thickness of the endometrium, better formed tissue construction, protected gestation, and improved pregnancy rate. Though role of stem cells looks promising, but it has still not become standard treatment, it requires further larger trials to recommend it as safe effective option.

Current assisted reproductive technology has become more successful but unable to help couples who lack functional gametes, unless donor gametes are used. Most couples wish to have their own genetically related child. With the rapid development of stem cell technology, the possibility to derive artificial gametes from human pluripotent stem cells may provide new therapeutic strategies for infertile couples. Presently, evidence is limited, whether healthy offspring can be produced from the gametes derived from pluripotent stem cells remains unclear.

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Blast for all - Should it be the norm?

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A blastocyst transfer involves transfer of embryo at later stage of development at blastocyst stage. It is usually done on 5th day after follicular aspiration. The stages of development are: pronuclear stage on day1 (fertilized egg), 2-4 cell stage on day 2, 8 cell stage on day 3, the morular stage on 4th day, and the blastocyst stage on 5th day. Recent advances in cell culture media have led to shift in IVF practice from early stage cleavage embryo transfer to blastocyst stage transfer with many advantages.

Advantages of blastocyst transfer

1. **More Physiological:** Synchronization of embryo transfer with the stage of endometrium as in natural conception is more physiologicl. During natural pregnancy, it takes around 5 days after fertilization for the embryo to reach the uterine cavity.
2. **Selection of best quality embryo.** This is based on the fact that best embryo will self select themselves and poor quality ones will fail to reach the blastocyst stage.
3. **Improved pregnancy & implantation rates:** Several studies suggest higher implantation rate of blastocyst stage as compared to early cleavage stage transfer on day 3. Recent Cochrane review of 12 RCT that reported live birth rate per couple favoring blastocysts culture (Day 2 to 3: 31% Day 5 to 6 : 38.8%). This means that for clinics that use early cleavage stage cycles, the rate of live births would increase from 32% to 42% if clinics used blastocyst transfer.[1]
4. **Decreased risk of multiple pregnancy:** The high implantation rates of blastocyst transfer accompanied by the methods used for selecting the best embryo for transfer makes it possible to achieve a respectable ongoing pregnancy rate after the transfer of a single embryo with no dizygotic twinning.[2]
5. **Pre-implantation Genetic Diagnosis (PGD):** Blastocyst culture facilitates PGD of biopsied blastomeres as well as trophoectoderm. Following the biopsy of the cleavage stage embryo on day 3 post insemination, continued culture up to day 5 gives time for genetic analysis as well as assessment. Culture of embryos till trophectoderm makes it possible to biopsy the trophectoderm for PGD. Trophectoderm biopsy has the advantage over cleavage stage in that more than 2 cells can be removed improving the accuracy of analysis.[3] Furthermore, biopsy of the trophectoderm reduces the incidence of mosaicism which is nearly just about 10% as compared with nearly 43% with cleavage stage embryos.[4] Nevertheless, technically, biopsy of trophectoderm is more difficult that the cleavage embryo.
6. **Derivation of Human Embryonic Stem (hES) cell:** One of the most vital applications of blastocyst culture is the derivation of hES cell lines from the ICM of the blastocyst.

Limitations of blastocyst transfer

1. **Poor Rate of Blastocyst Development in Vitro and Cancellation of Transfer:** One of the major limitation of blastocyst transfer is that not all cleavage stage embryos develop into blastocyst. Some patients may not have any blastocysts available for transfer on day 5 despite having cleavage stage embryo on day 3 leading to cancellation of transfer. The question that would then remain unanswered is that would that woman have conceived with a day 3 transfer?
2. **Monozygotic Twinning:** Da costa et al. (2001) reported that 3% of the pregnancies following blastocyst transfer were complicated by monozygotic twinning as compared with 0.7% after 4-8. cell stage embryo transfer[5] while 0.42%of natural pregnancies result in monozygotic twinning (Bulmer et al, 1970). In a recent retrospective analysis of 14,956 clinical pregnancies from single blastocyst transfer indicated a 1% monozygotic twinning with an odds ratio of 2.0 irrespective of zona drilling. ICSI or type of stimulation used.[6]
3. **Failure of Blastocyst Development and No Embryos Available for Transfer:** Large offspring Syndrome: In vitro culture of embryos for 5-7 days in vitro has been associated with large offspring syndrome in certain animal species. This has been attributed to the suboptimal embryo culture conditions. This syndrome manifests as abnormal growth and development at fetal, neonatal and later stages of life.[7] It has been shown that extended culture of embryos to the blastocyst stage can compromise many aspects of development including metabolism, differentiation, gene expression, imprinting and subsequent fetal development after embryo transfer in several mammalian species.

Blastocyst culture, although a little time consuming with its inherent limitations, is an important step ahead in the field of ARTs. However, before it can be routinely applied in an ART laboratory, it is essential that the laboratory first has the requisite infrastructure, maintenance and skills. Although, the pregnancy rate per blastocyst transfer is higher than pregnancy rates following cleavage stage transfer but if one were to look at the cumulative pregnancy rate per cycle started or per patient, then the result are not that dramatic. Because, the number of embryos that grow to blastocyst and are available for transfer or cryopresentation are much lesser.

One should use extended culture to blastocyst only when there are multiple cleavage stage embryos available for transfer so that those that do not develop to the blastocyst get deselected. As of now, its routine blast transfer for all does not seem justified. Further studies are still required to have an optimal understanding of the metabolism of embryos and nutritional requirements. In the luminal secretions, the embryo is exposed to a variety of growth factors and cytokines while these are not routinely added to culture media. Growth factors are known to have pleiotropic effects on embryo development including blastocyst formation and hatching and it needs to be seen whether the addition of these would further improve the development of blastocysts in vitro. Development of culture media closer to physiological environment might lead to blast for all.

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Non-invasive PGS – Is it Accurate?

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Forty years since the first IVF baby, the development of an accurate method to assess embryo competency, thereby allowing the transfer of a single embryo and leading to improved live birth rates, remains one of the main challenges. Around 20–80% of human embryos are estimated to be chromosomally aneuploid1. In the recent years, advent of trophectoderm biopsy and preimplantation genetic testing (PGT), supported by rapid advances in molecular based screening technologies have provided significant improvement in embryo selection by comprehensive chromosome screening. Clinical applications of PGT may be imperative, but it is not without shortcomings. Two challenges remain – one, technical aspects like specialized equipment, trained operators, suitability of embryos and concern regarding possible damage to embryo from the biopsy. Another major concern is regarding the embryo mosaicism2. Taken together, interest in non-invasive alternatives seems very timely and reasonable.

The field of prenatal aneuploidy testing was revolutionized by the isolation of cell-free DNA of fetal origin in the peripheral blood of pregnant women (Lo et al., 1997). More recently, human embryos were demonstrated to release DNA fragments by diffusion into their environment – inwards into the blastocoel and outwards through zona pellucida into the culture media (Assou et al., 2014)3. These cell-free DNA are short fragments of double-stranded molecules released following physiological cell apoptosis and pathological necrosis4. Identification and amplification of these molecules in combination with improved genetic sequencing technology were key elements in the breakthrough concept of non-invasive pre-implantation genetic testing (NI-PGT).

Blastocoel Fluid (BF) Analysis

Palini et al. reported for the first time the identification of cell-free DNA by real-time PCR in 90% of expanded blastocysts prior to vitrification5. The researchers demonstrated amplification rate of 95% for the testis-specific protein Y-linked 1 (TSPY1) multicopy gene on the Y chromosome, for the identification of male embryos. But a study by Tobler et al in 2015, showed high amplification failure and diagnostic non-concordance rates, thereby calling for more technical improvements6. But the research by other investigators was more supportive, especially underlining the role BF cell-free DNA analysis in screening monogenic disorders.

Limitations and future research

Technical reliability of the procedure and appropriate sample volume required for successful DNA isolation and amplification have not yet been defined. Blastocentesis or BF aspiration is not a non-invasive method but is rather a less invasive method than PGT for obtaining embryo-derived DNA. But, in view of the practice of collapsing artificially expanded blastocysts before vitrification

gaining popularity to improve ART success rates, BF analysis is being studied extensively7. However, it is not known whether depletion of the BF would alter the cell-to-cell communication within the developing embryo and how it would impact the embryo competency and its interaction with the environment.

Spent Blastocyst culture Media (SBM) analysis

Cell-free DNA from blastocysts culture media can be isolated, amplified and analysed by 24 chromosomes comprehensive screening NGS. This represents a potential source of DNA for non-invasive detection of chromosome abnormalities. Assou et al. in a proof-of-concept study using quantitative PCR (qPCR), confirmed the presence of cf DNA in the media of Day-5/6 embryos, measuring up to 27 ng/ml DNA per sample. They were successful in amplifying the multicopy gene TSPY1 on the Y chromosome enabling identification of embryos based on gender3. These findings heralded the way for a newer and non-invasive approach to the pre-implantation diagnosis of sex-linked diseases. Soon after, numerous reports from different research groups followed. Multiple studies have compared cf DNA from SBM with the standard PGT-A from trophoectoderm biopsies. Amplification rates of cell-free DNA from spent culture media in various studies ranged between 80 – 100%, however, concordance rates have been variable. This may be attributed to discrepancies in methodologies applied in – Embryo culture – drop volume, time in culture, single vs sequential culture; Blastocyst manipulation – assisted hatching, vitrification and associated blastocentesis; DNA analysis – different amplification and detection methods and finally different criteria being used to define concordance rates. A recent study in 2019 by Rubio et al, using an optimised protocol, accounting for the above-mentioned discrepancies, found high concordance rates (78.7 – 84%) between TE biopsies and SBM analysis. The investigators also found threefold greater implantation rates for euploid TE/ euploid SBM embryos than for euploid TE/aneuploid SBM embryos (52.9% vs. 16.7%). And no clinical miscarriages were reported in euploid TE/ euploid SBM embryos group8.

Limitations and future research

Sample collection

It is still unclear whether the choice of a sequential or single culture medium system potentially influences the yield of cell-free DNA. Feichtinger et al. (2017) proposed culturing embryos in a single continuous medium system until blastocyst formation in order to improve the cumulative yield of cell-free DNA9. However, higher testing accuracy was demonstrated by Lane et al. (2017) when the culture medium has been in contact with embryos from Day 4 to 5 compared to Day 3 to 510. This observation may be explained by the increase in the embryonic-to-maternal DNA ratio, which occurs with the exponential rise in the embryonic cell number at blastulation. In a study by Rubio et al. (2019), higher concordance rates were noted for day 6/7 samples compared to day 5 samples8. Further studies are required to identify ideal sampling times in relation to the stage of embryo development that are associated with better DNA detection, amplification and concordance rates.

Controls and contamination[11]

Control samples were obtained from embryo free culture droplets, but human DNA is often noted in embryo free droplets of protein supplemented culture media. Further, DNA from residual cumulus cells could lead to maternal DNA contamination leading to decreased sensitivity and false negatives. Some studies have shown sex discordance between SBM and TE biopsies – male SBM identification from TE diagnosed female embryo – this could be attributed to external DNA contamination from plasticware, media or manipulation during IVF. Also, presence of residual polar bodies can lead to discrepancies in sex or complementary aneuploidies.

Origin of cell-free DNA and significance:

The biological significance of fragmented cell-free DNA is yet unknown. Some studies have suggested a role in cell-to-cell communication within the developing embryo and its surroundings (Hammond et al., 2017)12. Some researchers believe them to be generated from apoptosis during normal embryo development or should mosaic embryos shed their excluded cells into the blastocoel cavity/ culture media during development as part of a natural repair mechanism then this could then result in a potential mismatch between the ploidy profile of the cell-free DNA and its corresponding embryo.
Research remains inconclusive regarding the origin of cf DNA – is it from ICM / TE? Questions also remain if the obtained DNA material is truly indicative of the genetic constitution of the embryo as a whole.

Over the past few years, with the rapid emergence of efficient molecular platforms for genetic testing, utilisation of PGT has been increasing in ART. Trophoectoderm biopsies are a definite representative of meiotic errors but for mitotic errors and mosaicism, embryonic cell-free DNA might open new avenues for insight and understanding. While liquid biopsy (Cf DNA) seems like an attractive option especially considering that it avoids invasiveness, potential embryo harm, minimises lab and personnel expenses and extends feasibility and accessibility to wider population, several challenges must be addressed before accepting NI-PGT as a reliable method of pre-implantation genetic testing. Hurdles include questions regarding the completeness of representation of the embryonic genome by cell-free DNA present in the BF and spent culture media. Further techniques are required to minimise external DNA contamination and optimise DNA isolation and amplification methods. Molecular testing and analytical platforms for cell-free DNA also need rigorous validation before clinical applications. Well-designed studies are required to improve this technology for potential translation into standard genetic testing and better pregnancy outcomes.

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Dual Trigger- Is it beneficial?

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Poor Responder to ovarian stimulation remains one of the most challenging aspects in the field of infertility management. Stimulating ovulation using exogenous human chorionic gonadotrophin remains the standard trigger in women undergoing ovulation induction but there remains a risk of ovarian hyperstimulation syndrome and premature luteinizing hormone surge with its use.

Physiology behind the use of HCG and GnRH

During the follicular phase of the menstrual cycle, there is pulsatile release of Gonadotrophin hormone (GnRH) which then results in release of Follicular stimulating hormone (FSH) and luteinising hormone (LH) in pulsatile pattern thereby regulating the follicular growth. Rapidly rising oestradiol from the dominant follicle along with a small rise of progesterone leads to gonadotrophin surge during midcycle. Increased LH surge ultimately results in ovulation. LH exposure results in resumption of meiosis with maturation of the oocyte from the immature "metaphase I" phase to the mature "metaphase II" phase of development. A critical step in current IVF protocol is a well-planned LH exposure thereby enabling the efficacious retrieval of mature oocytes.

Human chorionic gonadotrophin being structurally similar to LH and with a longer half life has been the most widely used trigger to stimulate ovulation as well as for pick-up of mature oocytes from stimulated ovaries in cases of in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) cycles. Nakano et al. showed that LH surge could be induced using a bolus of GnRH agonist (GnRHa) when given intravenously1. The endogenous surge of LH and FSH via use of GnRHa closely resembles the natural midcycle surge. This midcycle FSH surge is important due to the fact that that it up regulates LH receptor site formations in granulosa cells. FSH also promotes resumption of oocyte meiosis, expansion of cumulus cells - critical steps in the oocyte maturation process. Hence, one of the anticipated benefits of GnRH-a trigger is retrieval of increased number of mature oocytes. Another added advantage of GnRH trigger is that it reduces the risk of ovarian hyperstimulation syndrome. Researchers have shown a higher abortion rate with reduced implantation, ongoing pregnancy and live birth rates in GnRH-agonist trigger as compared to standard luteal phase support and hCG trigger. Difficulty with GnRH agonist trigger when used alone is that it reduces early corpora lutea thereby

requiring luteal phase support. Several methods have been proposed to eliminate this risk of luteal insufficiency with GnRH a trigger. One such method is Dual trigger.

Dual trigger

It involves combining GnRHa with a low dose of hCG to trigger oocyte maturation. It has been seen that use of hCG simultaneously with GnRHa trigger negates its luteolytic effects. It was first used by Shapiro et al. in GnRH antagonist cycles for the purpose of Ovarian Hyperstimulation syndrome (OHSS) prevention.[2] Various studies have been conducted in the past comparing the efficacy of hCG with GnRHa as ovulation trigger for IVF with varying results. Griffin et al conducted a retrospective cohort study to compare live birth rates with dual trigger versus GnRHa alone and found that dual-trigger group had a significantly higher live birth rate (52.9% vs. 30.9%), implantation rate (41.9% vs. 22.1%), and clinical pregnancy rate (58.8% vs. 36.8%) as compared with the GnRHa trigger group.3 Haas et al. suggested that co-administration of GnRH-agonist and hCG for final oocyte maturation, 40 and 34 hours prior to ovum pick up, respectively (double trigger) yields significantly higher number of oocytes retrieved as compared to their previous hCG only trigger group in patients with low/poor oocyte yield.[4]

In another retrospective cohort study conducted by Zhou et al, women with normal ovarian reserve were grouped by whether oocyte maturation was triggered with GnRH agonist plus 5000-10 000 IU of hCG (dual trigger) or hCG alone. Though the live birth rate did not differ significantly between the two groups (P=0.083), the mean number of two-pronuclear embryos (P=0.004), the mean number of embryos available (P=0.001), and the mean number of high-quality embryos (P=0.011) was higher in the dual trigger group.[5]

Ding N et al conducted a meta-analysis involving 4 RCT with 527 patients, to investigate the efficacy of the dual trigger in comparison with hCG alone. The results of this meta-analysis showed that the dual trigger group had a significantly higher pregnancy rate (relative risk [RR], 1.55; 95% confidence interval [CI], 1.17-2.06) as compared to the hCG-only trigger group but no significant differences were noted in the number of retrieved oocytes, number of mature oocytes retrieved number of fertilized oocytes, number of good-quality embryos, or implantation rate between the two groups.6 In a retrospective cohort analysis using 427 GnRH antagonistic cycles, Lin and colleagues investigated the role of dual trigger in improving live birth rates in women with diminished ovarian reserve. The control group (n = 130) received standard dose of 6500 IU of recombinant hCG for trigger, and the study group (n = 297) had 0.2 mg of triptorelin along with 6500 IU of recombinant hCG for trigger. They found significant improvement in mature oocytes, implantation rate, clinical pregnancy rate and live birth rate in their dual trigger group.[7]

In summary, though dual trigger seems to be a promising trigger for oocyte maturation yielding the number of retrieved oocytes and improving reproductive outcomes, further randomised controlled trials need to be undertaken to prove its efficacy.

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Social egg freezing- Should it be propagated as the future reproductive technique?

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Initiated by the success of contraception in the 1960s and accelerated by the subsequent rise in female employment and tertiary academic opportunity, the age of first-time mothers continues to rise. While this has enhanced female reproductive autonomy, advanced reproductive age coincides with a decrease in oocyte quantity and quality, which manifests clinically with reduced fecundity and an exponential age-related increased risk of miscarriage. It is therefore unsurprising that the trend of postponing childbearing has coincided with increased rates of involuntary childlessness.

The development of oocyte vitrification techniques has significantly improved oocyte survival (81–89% versus 46–67%) and clinical pregnancy rates (38–64% versus 13–29%), when compared with traditional freeze/thaw techniques. This improvement is exemplified by recent data demonstrating there is now no difference in pregnancy, miscarriage or live birth rates between autologous fresh and cryopreserved oocyte cycles. This has created the opportunity for women to freeze their eggs electively prior to the inevitable physiological decline, nullifying further age-related oocyte deterioration and allowing the preservation of their reproductive potential.

Although delaying childbearing to physiological extremes for social reasons is a reproductive gamble, some women have no alternative, e,g, single women approaching the end of their reproductive years. While follow-up data currently remain scarce, the most comprehensive study included 1382 women who underwent social egg freezing (SEF), 120 (8.7%) of whom returned to use their eggs after a mean duration of 2.2 years. The oocyte survival rate was 85%, with subsequent clinical and ongoing pregnancy rates of 39 and 27%, respectively. Despite the short follow up, the fact that 45 of the 95 women who were single at the time of cryopreservation had a partner when they returned, truly epitomises the potential of SEF. Although the best chance of successful live birth is following oocyte cryopreservation prior to the age of 34, the most cost-effective time is before 38 years, where it has been shown to reduce the costs of obtaining a live birth. We therefore argue that single women approaching their late thirties, who desire biologically related children in the future, should consider SEF. Not only does it extend the window of opportunity to find a partner but it also retains the possibility of using a sperm donor as a last resort.

Oocyte freezing consists of two separate steps that are clearly distinct in time: first, ovarian stimulation, oocyte retrieval, cryopreservation and storage. At the time of the first step, women who request social freezing are healthy persons who ask for a procedure that results in stored oocytes that may or may not be used, depending on the further course of their lives. From a medical point of view, we have to consider the balance between the risks of the procedures (ovarian hyper stimulation, oocyte pick up and pregnancy) and the benefits, for the mother and the child. In bioethical terms the balance between the respect of the woman autonomy (including the reproductive autonomy) and the beneficence both for the mother and the child.

Extensive fertility and preconception counseling are essential, including the risk of age-related obstetrical complications and the possibility of future unsuccessful treatment. It is also important that good clinical practice for IVF treatment continues to be adopted to ensure women achieve pregnancy in their natural reproductive years, to avoid potential negative social aspects and economic implications of raising children near retirement age. This is further safeguarded by HFEA regulations that only allow the storage of eggs for up to 10 years.

But there are points against SEF. First, the majority of women are taking measures to preserve their fertility too late, as a 'last ditch' effort, instead of a planned and informed choice in their early to mid-thirties.

Second, the majority of published studies on egg freezing efficacy are from experienced centres with large egg freezing numbers, and these data cannot necessarily be extrapolated to smaller clinics that have only recently started oocyte vitrification.

Third, egg freezing is indirectly encouraging women to have children at an advanced maternal age, which carries with it significantly increased risk of medical complications in pregnancy. This is especially relevant to women freezing their eggs when they are already in their late thirties.

Finally, social egg freezing is not government funded. Because of lower success rates per egg, women in their late thirties would need approximately 30 eggs to have a good chance of achieving pregnancy. They would therefore require on average three cycles of stimulation and the cost for the same. This does not include the annual storage fee or the cost of the fertility treatment she would need in the future to use her frozen eggs.

Success rates for egg freezing have improved significantly in recent years so offer an opportunity for women to freeze their eggs for social reasons if they're not ready to have children yet. However, it must be stressed that egg freezing does not guarantee a baby in the future.

"While women should be supported in their choices, they must be informed about the relatively low success rates, high costs and side effects associated with egg freezing and IVF treatment. If a woman does decide to freeze her eggs for social reasons, she should have counselling with a reproductive specialist and choose a clinic that has plenty of experience. The clinic should provide a realistic idea of potential success related to her age. Evidence suggests that the best time to freeze eggs is in a woman's early twenties and certainly under the age of 37 years old. It is extremely important to provide accurate and balanced information about fertility and how it changes with increasing age. Relationships and sex education, particularly for young people, must include information to enable women and their partners to make informed decisions about when to start a family to ensure the healthiest outcomes.

Today, Israel is one of the first countries in which egg freezing for non-medical reasons has been regulated and authorised for public support, with the justification of "permitting egg freezing to prevent both disease- and age-related fertility decline … so women are then free to exercise their reproductive autonomy and decide for themselves whether or not the technology is beneficial to them". This choice is based on conviction that social egg freezing is grounded in liberal ideology promoting the individual autonomy exercised through informed consent, supporting that a relational approach to autonomy may be a more suitable model for considering women's choices about egg freezing, also for non-medical purposes

In conclusion, doctors should continue to perform egg freezing for those single women in their late thirties for whom the high costs and low success are acceptable. However, the future focus should be on providing accurate information by educating women from an early age. This would allow women to plan their reproductive behaviour more realistically, present to fertility clinics at a younger age, thus reducing the chance of involuntary childlessness.

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IUI with unilateral tubal block- Is it justified?

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Tubal dysfunction with or without associated peritoneal pathology accounts for about 35% of all infertility and accounts for more than 50% of female infertility. It has become one of the most common causes of infertility and its incidence is increasing, mainly because of increasing incidence of sexually transmitted infection and resultant pelvic inflammatory disease.[1,2]

Risk factors for tubal disease[2,3]

Prior pelvic infection	Prior ectopic pregnancy
Intrauterine device use	Septic abortion
Appendiceal disease	Tubal surgery
Diethylstilbestrol exposure	

Hysterosalpingography (HSG) or laparoscopy are the two most common procedures used for evaluation of tubal patency. HSG is often the first line approach to check for tubal patency. Treatment of women presenting with infertility with bilateral patent or obstructed tubes detected on HSG is clear and direct. However, there is no standard management for patients with unilateral occlusion.

Proximal tubal occlusion prevents the sperm from reaching the ampullary portion of tube where fertilization happens. Whereas, distal tubal occlusions affect the ovum capture from the ovary. Proximal tubal occlusion is all or none phenomenon, whereas distal tubal occlusion exhibits a spectrum ranging from mild (fimbrial agglutination) to moderate (varying degree of fimbrial phimosis) to severe (complete obstruction).

The possible option for patients with unilateral tubal occlusion are:

- Repeat HSG
- Laparoscopy and hysteroscopy for evaluation and possible correction of tubal block
- Selective salpingography and fluoroscopic tubal catheterisation
- Controlled ovarian hyperstimulation (COH) and intrauterine insemination (IUI) through one patent tube and an attempt to achieve pregnancy
- In-vitro fertilization (IVF) to bypass the problem

In some cases, when an HSG, shows a proximal tubal block, there is actually no blockage. It is just a false reading in which the tube is actually open on subsequent testing. Most often tubal spasm, temporary mucous plugging and underfilling of the tube may cause a false-positive by HSG. The false-positive rate for proximal tubal obstruction may be as high as 15% in some studies. (4) Whenever HSG shows a proximal occlusion, most often confirmation by repeat HSG or laparoscopic chromopertubation should be considered. In one study, a second HSG showed a bilateral tubal patency in 60% of patients who were diagnosed with proximal tubal obstruction.[5]

IUI with One Blocked Tube

When one fallopian tube is blocked, IUI can still give a good chance of conception, but the location of the blockage itself on the tube (proximal or distal) is likely to determine the chances of success. Patients with a proximal-only blockage do better than those with a distal-only block, and both have lesser chances of conception compared to patients who undergo IVF.

In a study published by Lin et al in 2012, where 133 patients with unilateral tubal occlusion underwent stimulated IUI and control group of 570 patients of unexplained infertility. The pregnancy rate was better in patients with proximal occlusion (25.0%) than in those with distal occlusion (13.9%) or unexplained infertility (16.5%). Therefore, stimulated IUI can be suggested as the initial treatment option in women with unilateral proximal tubal occlusion. They suggested that stimulated IUI can be offered as the first-line option in women with unilateral distal tubal occlusion because the pregnancy rate was similar to those with unexplained infertility.[6]

Farhi et al (2007) reported that the cumulative pregnancy rate in women with unilateral mid or distal tubal occlusion (19%) was lower than in those with unilateral proximal tubal occlusion (38.2%) and was significantly lower than in those with unexplained infertility (42.6%). Thus, in this study the authors concluded that in patients with unilateral proximal tubal occlusion stimulated IUI can be suggested as the initial treatment option but in patients with unilateral distal tubal occlusion on HSG should be referred for laparoscopic assessment or IVF.[7]

Yi et al (2012) study compared 17.3% pregnancy rate for the unilateral tubal occlusion group and 16.5% for the unexplained infertility group. The pregnancy rate was higher in patients with proximal occlusion (25.0%) compared with distal occlusion (13.9%) or unexplained infertility, but not statistically significant.[8] Thirty-seven infertile women (52 cycles) with unilateral tubal occlusion diagnosed by HSG and without other causes of infertility against one-hundred fourteen patients with unexplained infertility who served as a control group (182 cycles). There was about

Therefore, some studies have suggested that stimulated IUI can be the first-line option in women with unilateral proximal tubal occlusion whereas patients with unilateral distal tubal occlusion on HSG, should be referred for laparoscopic assessment or IVF. Other studies have proposed that stimulated IUI should be recommended as the first-line option in women with unilateral proximal or distal tubal occlusion.

In younger women with mild distal tubal occlusive disease, laparoscopic surgery can be considered as an alternative to IVF. In cases where disease is severe or pregnancy does not occur during the first postoperative year, IVF should be considered. For older women with any significant degree of distal tubal disease, IVF should be considered as first and best option because cycle fecundability after distal tubal surgery is low (1% to 2%), time is limited, and IVF is both more efficient and more effective.[9]

The risk of ectopic pregnancy in patients with one blocked tube who undergo IUI is slightly high compared to patients with bilateral patent tubes. This is because most conditions that affect the tubes, like endometriosis or pelvic inflammatory disease, tend to impact both tubes. A tube that is open, but has issues, is more likely to have difficulty passing the embryo into the uterus, so the embryo can become embedded in the tube resulting in an ectopic pregnancy. The patients should be counseled about this risk.

Conclusion

- Unilateral proximal tubal occlusion, stimulated IUI can be offered as the first line option
- Whenever HSG shows a proximal occlusion, most often confirmation by repeat HSG or laparoscopic chromopertubation should be considered as it is just a false reading in which the tube is actually open on subsequent testing.
- The success of IUI in women with only one patent fallopian tube is comparable to those with both patent tubes.
- Pregnancy rates seems to be more affected by the woman's age and male factor infertility if present.
- For women with mid-distal tubal occlusion, stimulated IUI might not be a good choice because of a lower success rate, and either surgical intervention or IVF might be preferred
- These patients undergoing IUI should be counseled about a small but increased risk of ectopic pregnancy

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Single versus double Intrauterine Insemination

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Intrauterine insemination in modern era is a refined technique that originated from artificial insemination of semen in to the vagina by John hunter in 1770 (for managing childlessness of a couple whose husband had hypospadiasis) and later in to the uterine cavity by J Marion Sims in 1866 for a women with prolonged infertility with vaginal narrowing. Currently the indications have broadened that include most commonly unexplained infertility, mild male factor infertility, minimal or mild endometriosis, cervical factor and azospermia requiring donor semen. The procedure is undertaken with washed or frozen semen of husband or donar for women during natural cycle or with ovulation induction depending on the clinical situation after consent of the couple.

The aim is to make sperms available for fertilisation around the time of ovulation so as to improve success of achieving pregnancy. There are many factors that are responsible for success like total motile sperm count, vitality, semen collection and storage, semen preparation techniques, ovulation, tubal factors , uterine and endometrial factors. The key to success is the contact and cross talk of the sperm within 12 hours of ovulation as ovum lives only for 12 hours. Keeping this concept in mind to enhance the chances of conception intrauterine insemination is being undertaken twice around the time of ovulation. There are some studies which reported increase rate of success with double IUI and others did not show any such increase in success rate. As we need to practice a procedure only when benefits outweigh the risks or costs it is essential to examine or know the evidence whether one needs advice or undertake the procedure.

Indications for Intrauterine Insemination in the era of IVF and ICSI

IUI is the first line of treatment for mild factor male infertility and unexplained infertility. The success of IUI is better than timed intercourse with ovulation induction. But it can be done for couples when the female partner age is less than 40 years without any tubal factor. If no conception after 4 cycles of IUI , IVF/ICSI to be offered.[1]

Success of IUI

Success is optimum with normal semen parameters and is about 10-20% per cycle. The success increases up to 3 to 6 cycles and not beyond that. The success decreases when TMSC (total motile sperm count) is less than 10 million, sperm survival less than 70% and normal spermatozoa are less than 5%.Because of the low success rates IVF/ICSI is considered to be more cost effective but the results of randomized controlled trials using live birth rates revealed that IUI is the initial treatment for unexplained infertility when complications, efficacy and patient compliance was taken in to account.[2]

Timing of IUI

IUI is performed usually by 34±2 hours after HCG trigger when the dominant follicle is ≥ 18 mm expecting ovulation to occur. Ovulation is not always confirmed by USG or LH kits in a clinical set up. Hence to achieve the objective of the presence of sperms around the time of ovulation a double IUI has been undertaken usually after 24 to 48 hours and or after confirming ovulation. A study undertaken on 1146 stimulated cycles concluded that a single IUI timed post –ovulation gives higher pregnancy rates in non male factor infertility and double IUI gives better pregnancy for male factor infertility.[3]

Success rates more with Double IUI

Matilsky and colleagues in 1998 reported the probability of 2 times the cumulative pregnancy rate with double IUI over 15 cycles with frozen-thawed donor semen.[4] Liu W and colleagues in 2006 undertaken double IUI initially at 18 to 24 hours after hCG trigger and second insemination 36 to 48 hours later among 1270. Pregnancy rates were 19.87% when compared to 11.06% with single IUI undertaken 34 hours after trigger.[5] Randall and Gant in 2008 reported statistically significantly high success rates with double IUI when compared to single IUI 19.5% vs 12.9% in women with Ovarian dysfunction and 17.5% vs 7.9% in couples with mild male factor.[6]
A Cochrane systematic review on single versus double IUI in stimulated cycles for subfertile couples published in 2003 which included 5 trials concluded that double IUI was beneficial as it resulted in increased clinical pregnancy rates.[7]

Success not significantly higher with Double IUI

A randomised controlled trial from Iran published in 2016 concluded that there was no statistically increased pregnancy rate in double IUI group compared to single IUI though the pregnancy rate was marginally high (Single Vs Double:11.7% Vs13.4%).[8] A prospective randomised controlled study in 2017 undertaken in 197 subjects found a success rate of 13.86% with single IUI and 18.75% with double IUI and the difference is not statistically significant.[9]

A meta analysis which included 6 trials found no significant difference in clinical Pregnancy rates per cycle between single versus double IUI in women with unexplained infertility.[10]

Choudhary and collegues in 2018 published a study in a small sample size of 100 subjects and concluded that though there was no statistically significantly higher pregnancy rates overall with double IUI, in women who received gonadotropins for ovulation induction double IUI resulted in higher pregnancy rates.[11]

Key Messages

- IUI is the first line of therapy for couple below 40 years of age.
- The success rates are typically 10-20%
- Success rates may be increased with double IUI in certain clinical situations like mild male factor infertility or unexplained infertility
- Overall single IUI is as effective as double IUI when properly timed. Single IUI timed post-ovulation for non-male factor infertility and double IUI performed pre-ovulation for male factor result in better pregnancy rates. However each case has to be individualized and IUI should be done close to the time of ovulation or very soon after ovulation.

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Endometrial Receptivity Array (ERA) & its Clinical Implications

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This article highlights the need for methods to objectively diagnose endometrial receptivity as a factor contributing to infertility in female patients. The correct identification of the appropriate window of implantation in a given patient, by using endometrial receptivity biomarkers, can help to prevent reproductive failure resulting from misplaced timing of the endometrial window of implantation (WOI). Although to date no single, clinically relevant morphologic, molecular, or histologic marker capable of indicating endometrial receptivity status has been identified, global transcriptomic analysis of human endometria performed in the last decade has given us insights into a genomic signature that is capable of identifying endometrial receptivity. As a consequence, a genomic tool named the Endometrial Receptivity Array (ERA), based on a customized microarray, was developed, and along with it a specially trained bioinformatic prediction computer algorithm was created to identify WOI timing in the endometrium. This tool has proven more accurate and consistent than histologic (Noyes) dating at identifying the personalized WOI day, thus leading to the new clinical concept of personalized
Embryo transfer (pET) on the optimum day of endometrial receptivity, identified individually case by case.

Window of Implantation

The embryo is unable to adhere to the endometrium through most of the menstrual cycle in humans, except during a short, self-limited period, in which the endometrial tissue acquires a functional and transient status that permits blastocyst adhesion[1] and is therefore receptive. This specific period, which is regulated by a combination of ovarian steroid hormones and genetic factors, is known as the window of implantation (WOI) and lasts 5 to 6 days after an exogenous or endogenous P impregnation.

Markers of Endometrial Receptivity

Unfortunately, no single specific endometrial receptivity biomarker has been identified, meaning that objective diagnosis of endometrial receptivity remains neglected in the patient infertility workup. Despite the historical relevance of traditional Histologic endometrial dating: Histologic endometrial dating criteria defined by Noyes,[2,3] its accuracy, reproducibility, and clinical utility has been repeatedly questioned in randomized[4, 5] and prospective studies,[6-12] and thus it is no longer used to guide clinical practice owing to its real and perceived limitations. It has been suggested that pinopodes, ectoplasmic projections on the surface of endometrial epithelial cells,[13, 14] may be a good morphologic marker for diagnosing endometrial receptivity status. However, it has been reported that pinopodes are still present in the postreceptive period and therefore cannot be used as a reliable morphologic receptivity marker.[15]

Biochemical markers: Biochemical markers like integrins,[16] mucin 1 (MUC1),[17] calcitonin,[18] leukemia inhibitory factor (LIF),[19] cyclo-oxygenase 2,[20] and homeobox A10 (HOXA10)[21] have been studied , but none of them has been translated into clinical practice as an endometrial biomarker.[22]

Microarray technologies: Microarray technologies now allow more reliable, quantifiable gene expression monitoring, [23] and these technologies have been used to investigate the transcriptomics of human endometria in the different phases of the menstrual cycle, including within the receptivity phase,[24, 25] Importantly, these studies demonstrated that differential gene expression patterns exist in different phases, thus allowing the molecular status of the endometrium to be classified according to its transcriptomic signature regardless of its histologic appearance.

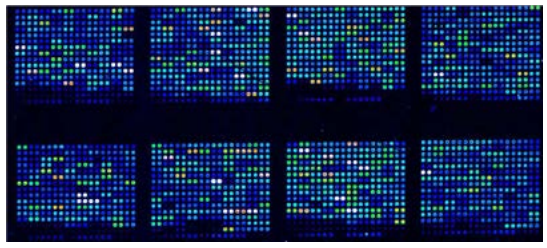
Transcriptomics Of The Human Endometrium

The transcriptome reflects the genes that are actively expressed at any given time within a specific cell population or tissue.

Endometrial Receptivity Array

The Endometrial Receptivity Array (ERA) is a customized array based on the transcriptomic signature of human endometrial receptivity, specifically when human endometrium is receptive to blastocyst adhesion (26). It has been designed to identify endometrial receptivity by comparing the genetic profile of a test sample with those of LH+7 controls in a natural cycle, or on day 5 of P administration (P+5) after E2 priming in a hormonal replacement therapy (HRT) cycle. It consists of a customized array, containing 238 genes that are differentially expressed between these profiles, which is coupled to a computational predictor that can diagnose the personalized endometrial WOI of a given patient regardless of their endometrial histology.[26] To select the genes for inclusion in the ERA platform, this group analyzed the expression profile of endometrial samples obtained on day LH+7 in a natural cycle compared with the prereceptive phase (LH+1, +3, +5).[27] Using stringent criteria of a 3.0-fold change increase and false discovery rate of <0.5, 238 genes were selected that were incorporated into a customized Agilent gene expression microarray using the 569 probes already existing on the array. The ERA expression values for the training set were used to train the bionformatic predictor to classify an endometrial sample as "receptive" or "nonreceptive." (Fig 1)

Fig 1: Customized microarray (238 genes)



↓

Bioinformatic analysis of data obtained by the customized microarray

↓

Classification and prediction from gene expression (as receptive or nonreceptive)

Once the array and the predictor were designed, a cohort of samples obtained in the prereceptive (LH+3, +5), receptive (LH+7), and proliferative phases (days 8–12 of the menstrual cycle) were used to validate this transcriptomic signature. Specificity and sensitivity figures of 0.8857 and 0.99758, respectively was obtained.[26]
The reproducibility of the ERA was tested by analyzing a second biopsy obtained from the same patient, on the same day of the menstrual cycle, 2 to 3 years after the first one. Paired-sample gene expression analysis showed the reproducibility of the tool and demonstrated that the transcriptomic profile of the mid-secretory phase endometrium did not substantially change between cycles for over relatively long periods of the women's reproductive life. Concordance for ERA endometrial receptivity dating against the LH peak showed a value of 0.922 (0.815-1.000), and the reproducibility of the ERA test was 100% consistent (28) (table 1)

Table 1: Consistency of ERA
ERA test analyzed in the same patient, same day, 3-years apart

Code	Date First Biopsy	Date Second Biopsy	Months between	First Biopsy Results	Second Biopsy Results
CON1	09/2009	02/2012	29	Receptive	Receptive (0.908)
CON2	09/2009	03/2012	30	Receptive	Receptive (0.908)
CON3	05/2009	04/2012	35	Receptive	Receptive (0.908)
CON4	05/2009	05/2012	36	Proliferative	Non Receptive (0.864)
CON5	01/2009	05/2012	40	Proliferative	Non Receptive (0.864)
CON6	07/2009	05/2012	35	Receptive	Receptive (0.908)

Ref: Díaz-Gimeno, et al. Fertil Steril 2013

Hence, for the first time, a molecular tool based on the expression of a cluster of endometrial biomarker genes can be clinically used in reproductive medicine to assess the endometrial receptivity factor with proven accuracy and consistency.

Clinical Applications

The diagnostic and clinical value of the ERA test has been tested in a prospective, interventional, multicenter, clinical trial[28] in which patients with recurrent implantation failures (RIFs) and controls underwent endometrial receptivity diagnosis using an endometrial biopsy obtained either on

- day LH+7 in a natural cycle or on
- day P+5 in an HRT cycle.

Patients with at least three previous failed ovum donation cycles, and IVF patients aged <40 years, with at least three failed IVF cycles, made up this group. The ERA test identified 73.7% of the samples as receptive and 26.3% of them as nonreceptive. Patients with a receptive ERA diagnosis achieved a 62.8% pregnancy rate and a 37.9% implantation rate, when transferred the day after the receptive ERA diagnosis, which was similar to controls for whom the embryos were transferred in a subsequent cycle.
At the clinical level, the most important contribution of the ERA test is the objective diagnosis of the window of implantation, thus leading to the creation of the concept of personalized ET (pET) (Fig. 2).

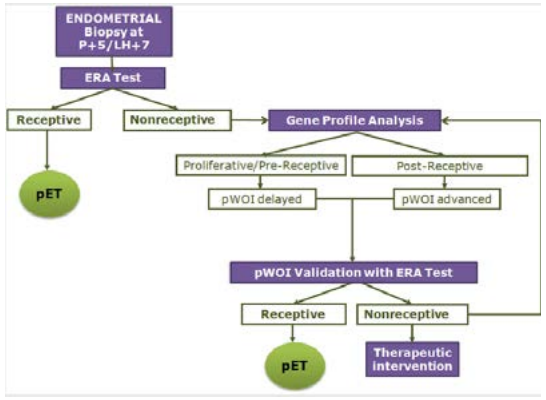


Fig 2: Clinical algorithm for pET.

Ref: Ruiz-Alonso. Personalized ET in patients with RIF. Fertil Steril 2013[28]

Personalised medicine is a well-accepted concept in reproductive medicine However, the medical community has always considered that all infertile patients must be equally treated in terms of the day of ET, which is guided by the embryo development stage and supported by the administration of P/hCG in the luteal phase. Given that personalized endometrial receptivity diagnosis is now possible, it is considered of utmost importance that a personalized approach to improving clinical success from the endometrial perspective be used.
This test is recommended for patients RIF with apparently normal uterus and with normal endometrial thickness (>6mm), in which no problems are apparent.

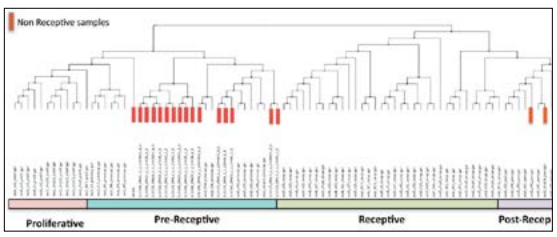
A displaced implantation window is detected in approximately 20% of these patients.

Further plan of action based on ERA report

The ERA test informs us whether the endometrial biopsy obtained during the expected WOI is really in a receptive state or whether it is nonreceptive at the time of testing. In the first case, ET must be performed in a subsequent natural or HRT cycle on the designated day. In case the result is nonreceptive, it can then be classified by our predictor as pre- or postreceptive (Fig 3) , and a second ERA test following this guideline can be performed to validate a personalised WOI resulting from displacement caused by some intrinsic genomic alteration inherent in the patient, an observation which has been made in one in four RIF patients (29). This new concept has been functionally proven by applying pET, following ERA results indicating a displaced WOI, in RIF patients with a previously non-receptive endometrium, either on days LH+9 or P+7; their implantation rate and pregnancy rate rose to similar levels as those in normally receptive control patients.[29]

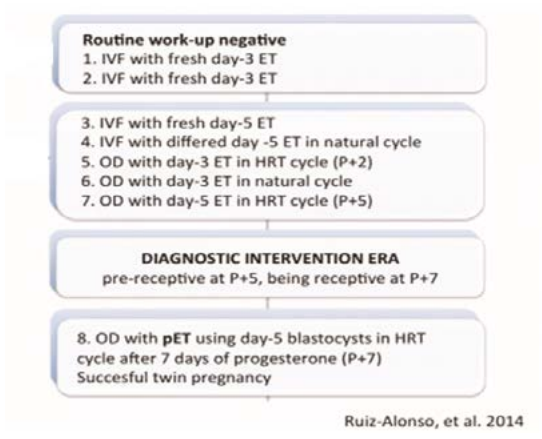
Fig 3:

The importance of pET can be understood by a case presented by Ruiz Alonso et al in 2014, where 7 embryo transfers failed including all possibilities viz self day 3 transfer, self day 5 transfer, IVF with donor oocyte in a natural cycle, IVF with donor oocyte in a HRT



day 3 and day 5), including both fresh and frozen transfers. On performing ERA, the WOI was found to be displaced, and the women conceived with pET by transferring day 5 blastocysts (with donor oocytes) in HRT cycle after 7 days of progesterone supplementation (P+7). So it is evident what a difference two days can make. (Fig 4).[30]

Fig 4. Successful Treatment after pET



Wider implications of ERA in future

Although this molecular tool currently focuses on RIF patients, research is underway to test the ERA in patients with endometriosis and hydrosalpinx. However, a prospective, randomized study on the effectiveness of the ERA test in the infertility workup, to guide pET in patients receiving assisted reproductive technology treatments, is the need of the hour. Whether these technological improvements will translate into clinical diagnostic advances, remains to be seen. Moreover, this molecular tool could be useful not only for clinical diagnosis but also for research based on the analysis of variations in receptive expression profiles due to different treatments or conditions.

Summarized from - Garrido Gomez et al, Fertil Steril_2013 ;99:1078–85. 2013 by American Society for Reproductive Medicine

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IFS – Contributing To The Society And Touching Livs

Kerala

Tribal Fertility Healthcare project

- 116 TRIBAL VILLAGES IN KERALA with an average population of 17,000-21,500 women of reproductive age age group in extreme poverty.

Aims:

- Women's healthcare screening
- Supply of healthy food
- Reproductive care - Obstetric care
- Fertility support

Project approved by Govt of Kerala and partially funded; Will be operational with the help of Reproductive Health committee of KFOG.

Flood - 2 relief activities

- Northern Kerala affected
- 1800 plus families totally dislocated
- 46 families could not be traced following landslide in western ghats
- 20 member team from IFS Kerala Chapter joined with IMA and local health admin and visited many camps and supplied medicines, food materials and dress items worth total 7 lakhs rupees
- Follow up activities are on place

Uttarakhand

Infertility Camp under aegis of IFS held in Muzaffarnagar

Chattisgarh

Dr Manoj Chelani Founder Secretary is doing free check up once a month Dr Yeronica Yule jt. Secretary is doing free checkups

Rajasthan

Infertility Awareness & Free Consultation Camp & Talk on 16th May, 2019 at Jhunjhunu Attended by 21 Patients

UP West

Regular out station IVF Camps organised by Deptt of Obs & Gynae, SRMSIMS

19.02.2019	Pilibhit
26.03.2019	Badaun
27.03.2019	Sambhal
08.05.2019	Badaun
04.05.2019	Pilibhit
19.06.2019	Ujhani
10.07.2019	Bisoli
23.07.2019	Rudrapur
And many more to come…	

Fertility Science and Research Journal – An IFS Publication…

Fertility Science and Research, a publication of Indian Fertility Society, is a peer-review journal with triannual print on demand compilation of issues published. The journal's full text is available online at http://www.fertilityscienceresearch.org. The journal allows free access (Open Access) to its contents and permits authors to self-archive final accepted version of the articles on any OAI-compliant institutional / subject-based repository. The journal does not charge for submission, processing or publication of manuscripts and even for color reproduction of photographs.

We are circulating an approximate of 2500 copies. Initially frequency of publication was biannual. Now it has been made triannual.

The Current Issue .....The current issue deals with interesting and pertinent issues faced by the current day ART specialists. Stem-cell therapy, although still in its nascent stage, has come out with certain options in the management of male as well as female infertility. The subsequent articles deal with the extremely important and burning issue of ovarian reserve and its testing and a study of poor responders and comparison of their managements in the diagnosis as well as the management of infertile couples. Another retrospective analysis of the antagonist cycles to assess the ovarian reserve parameters gives an overall view of the clinical parameters assessing the success of in vitro fertilization (IVF) cycles. An interesting analysis correlates the interleukin concentrations in the follicular fluid states it to be a reliable predictive marker of successful IVF/ outcome. Comparison of fresh versus frozen embryo transfer in IVF cycles highlights the utility of frozen embryo transfer cycles in polycystic Ovarian syndrome (PCOS) and hyperstimulated patients, with comparable efficacy. An article clearly specifies the use of single versus double IUI in ovulation induction cycles. This issue has been nicely brought out the importance of mental and psychological health of patients undergoing treatment of infertility.

Articles can be submitted online http://www.fertilityscienceresearch.org

IFS PATHSALA - Certified Master Courses

In its endeavor to spread knowledge in the field of fertility, IFS organized two editions of IFS Pathsala -Certified Master Courses in year 2018-2019.

Master courses were uniquely designed with very precise and specific modules covering concepts and latest advancements alongside state of ART laboratory techniques and procedures. Due to excellentcourse content, Experienced faculty, and effective management, master courses was well received and in fact organizers have to increase minimum limit of participants per session.

Master courses also put lot of effort to bring in very heterogenous mix of participants with experience and established practitioners along with young enthusiasts so that participants can tap in to each other experience along with the knowledge shared by faculty. It also had clinicians and embryologists synchronizing among each other.

Master courses in its holistic approach covered "Triad" of Concepts, Hands on laboratory techniques and Standard operating procedures. Experienced faculty with national repute shared their experiences in the field of ovulation induction, reproductive endocrinology and applied genetics. Master courses also witnessed hands on laboratory procedures like semen analysis, IUI setup, comprehensive advanced andrology techniques, cryopreservation of semen, oocytes, embryos and Concepts of embryo culture , media and labware. Master courses also detailed QA/QC (Quality Assurance and Quality Control) measures along with ICMR guidelines for ART Centre.

IFS Pathsala with its first edition laid foundation for future of training in field of fertility with extremely encouraging and satisfying feedback, many enquiries are already flowing in for next and bigger version of IFS Pathsala.

IFS E-PATHSALA
IFS - Reaching Every Corner of the Nation

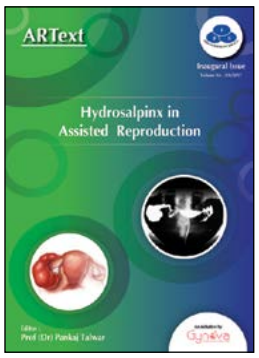
DR GOURI DEVI
President, IFS

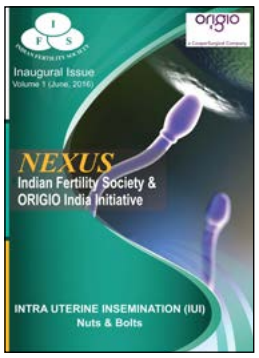
DR PANKAJ TALWAR
Secretary General , IFS

ART TEXT : this has been brought out on various topics like hydrosalpinx , Poor ovarian reserve, adenomyosis and thin endometrium. This was an initiative by Prof Pankaj Talwar who is the chief editor .

NEXUS: An embryology update brought out by Indian fertility society on topics like Semenanalysis, Intrauterine insemination, Semen freezing, sperm function test, media, vitrification, oocyte retrieval and embryo Transfer . This was an initiative by Prof Pankaj Talwar who is the chief editor.
New editions onco navi

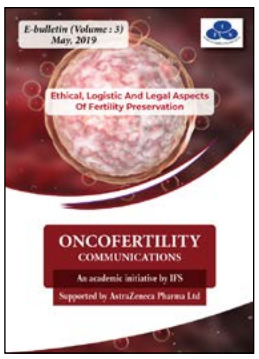
DR PANKAJ TALWAR
Chief Editor



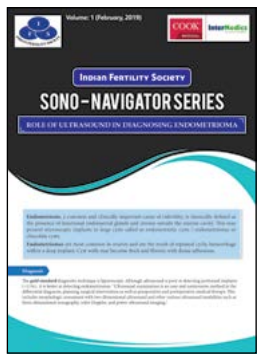


FERTILITY NEWS

CATALYST



ONCOFERTILITY



SONONAVIGATOR

Compiled by
DR SWETA GUPTA

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DR MOHAN KAMATH

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DR PUNEET RANA ARORA

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DR GUNJAN BHATNAGAR

TRAINING AND EDUCATION – A PRIORITY WITH IFS

IFS Conducts along with Amity University a one year Diploma in Clinical ART and Diploma in Clinical Embryology 2019
18 candidates of Diploma in Clinical ART and 5 of Diploma in Clinical Embryology passed out successfully

Congratulations to all the candidates successfully passing the Examination DCR & DCE 2018-2019

DCR			
NAME	CENTER	NAME	CENTER
Ms Shrotri Tejashri Murlidhar	SGRH	Ms Niti Vijay	Ridge IVF
Ms Nikita Jindal	SGRH	Ms Deepmala	KJIVF
Ms Renu Lamba	Southend	Ms Jyoti Gupta	KJIVF
Ms Aneesha Minocha	Southend	Ms Indrani Ghosh	Guwahati
Ms Divya Lakshmi A	Jindal	Ms Rachita Chawla	Kochi, Kerala
Ms Princy Mittal	Akanksha IVF	Ms Simmi Arora	Jodhpur
Ms Ruchi Chhabra	Pune	Ms Manvi Tyagi	Ahmedabad
Ms Zeepee Godha	Akanksha IVF	Ms Shilpa Singhal	Primus
Ms Soumya Dash	Mother & Child		

DCE	
NAME	CENTER
Ms Charu Goel	Jindal
Ms Nupur Ahuja	Primus
Mr Shivam Malhotra	SGRH
Ms Andleeb Rubab Shuaib	Southend IVF
Ms Swati Mishra	Akanksha IVF

An IFS - ESHRE Initiative

IFS Embryology Certification & Preparatory Course for ESHRE on 4th & 5th Dec 2019 at IHC Delhi With Dr kuldeep Jain, Prof Arne Sunde, Norway, Dr Jayant Mehta, UK and Dr Gouri Devi
Candidates taking preassement exams, exhaustive teaching and evaluation for 72 hours. Total 30 Candidates with 10 Delegates from Thailand

DR GOURI DEVI
President, IFS

DR PANKAJ TALWAR
Secretary General , IFS

DR KULDEEP JAIN
Course Chairperson

DR JAYANT MEHTA
Course Director

DR ARNE SUNDE
Course Director

IFS - Representing India At Global Level

ESHRE 2019

Dr Gouri Devi (President IFS) At ESHRE 2019 – IFS/ISAR Session

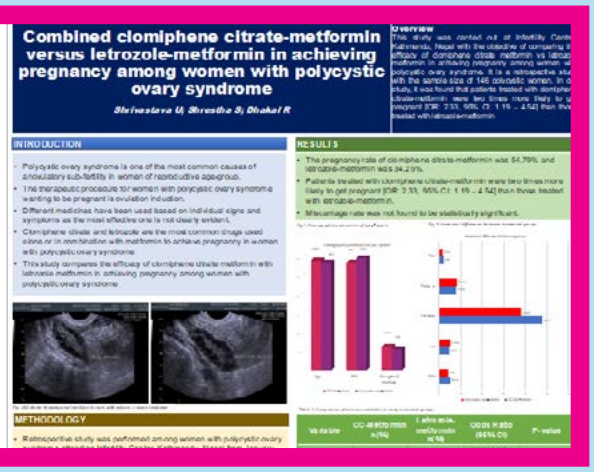
Dr Gouri Devi, Dr KD Nayar and Dr Neena Malhotrs at the IFS ISAR session in ESHRE 2019, Vienna

Dr KD Nayar
(Vice President, IFS)
Oral presention at ESHRE Vienna 2019

Faculty/Oral Presentation at European Society for Human Reproduction & Embryology (ESHRE), Date and Time: 26th June 2019, 14.30 hours.
O- 280 Topic: **"Evaluation of the hormone Dehydro-epiandrosterone sulphate (DHEAS) as a potentially compelling 'oocyte-related factor' in mammalian oocyte activation : A paradigm shift?"**

Dr Uma Srivastava
(Nepal Chapter)

Poster presentation in World Conference on PCOS in Abu Dhabi

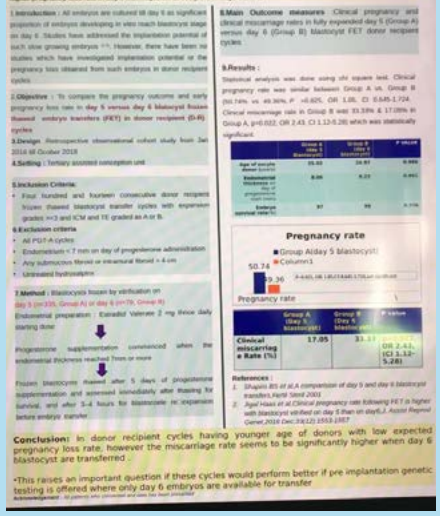


Dr Randir Singh and Dr Monica Singh
from
Bhopal (MP Chapter, IFS) - 3 Posters presented at ESHRE 2019

O- 003 Topic: "Mapping the follicular fluid bio-molecular profile: Dynamic interactions set the algorithm for oocyte maturation, embryo development and successful outcomes in IVF cycles"

Dr Shweta Mittal
Presented a poster at ESHRE

Poster: Impact of day 5 versus day 6 blastocyst on pregnancy outcome of frozen thawed donor recipient cycles, Poster presentation, ESHRE, VIenna, June 2019



Dr. Bindu N. Chimote
(Nagpur, Vidharbha Chapter IFS)
Presented an Oral Presentation at ESHRE

Dr. Natchandra M. Chimote
(Nagpur, Vidharbha Chapter IFS)
Faculty/Oral Presentation at European Society for Human Reproduction and Embryology (ESHRE),
Date and Time:
24th June 2019, 10.00 am

Dr Monica Varma from Punjab Chapter IFS presented a poster at ESHRE 2019 "Higher risk of preeclampsia in singleton pregnancies from donor versus autologous oocytes, with similar endometrial preparation, in a healthy, young cohort: a prospective study" She had also suggested seven points for the ESHRE 2019 Guidelines for Good Practice Recommendations for Ultrasound in ART: Oocyte Pick- up and all 7 were accepted in the final guidelines. Her name is in the Reviewers List of these guidelines.

Congratulations! Dr Bindu and Dr Natachandra Chimote on receiving Peoples Choice Best Video Poster Award

Congratulation! Dr Monica Verma for being part of Reviewers List in ESHRE GUIDELINES 2019 Good Practice Recommendations for Ultrasound in ART

The Joint session of IFS / ISAR was conducted at IFFS world congress Held in Shanghai from 11th - 13th April, 2019

3 panels on improving ART outcome - clinical and embryology perspective and Recurrent implantation failure were held which were highly appreciated and well attended

IFS represented by Dr Kuldeep Jain, Dr Gouri, Dr KD Nayar, Dr Shweta Mittal, Dr Kunjumoiddin, Dr Mohan Kamath, Dr Gaurav Majumdar, Dr Saumya

Congratulations! Dr Kuldeep Jain for being selected on the IFFS Scientific Board for 3 years

Akanksha IVF Centre team lead by DR. K.D. Nayar

Oral Presentations : International

1. Oral presentation : Role of recombinant Luteinizing hormone as adjuvants to antagonist protocol in poor responders - *Kanad Dev Nayar, Minal Singh, Monica Gupta, Gaurav Kant, Divya Nayar, Shweta Gupta*
2. Trigger Day Progesterone level ã: A guide towards Fresh or frozen transfer and clinical outcome - Shweta Gupta, K D Nayar

Oral presentation / poster presentation (National)

Impact of day 5 vs day 6 blastocyst on pregnancy outcome of frozen thawed donor recipient cycle. Shweta Mittal Gupta, Gaurav Majumdar. 15th May 2019. Sir ganga Ram Hospital research day

26th Annual Scientific Meeting of Middle Eastern Fertility Society (MEFS) 31st Oct -2nd Nov. at Cairo, Egypt

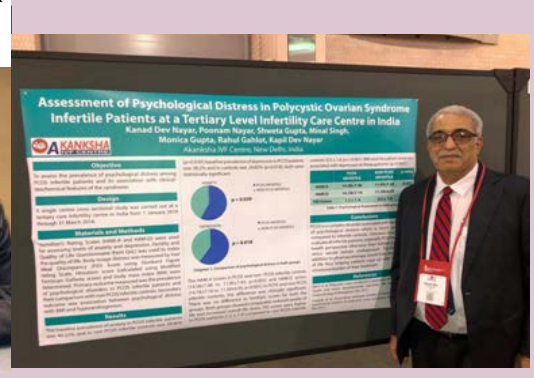
Dr Gouri, President IFS with Dr. Michel Ab dallah, Exc. Director of MEFS and Dr Johnny Avaad, The Scientific Chair

Dr Gouri President IFS with Botros Rizk, President MEF at the Annual Meet

American Society for Reproductive Medicine (ASRM) Annual Meeting 2019 Philadelphia

Dr Kuldeep Jain and Dr KD Nayar representing IFS at ASRM

Moderated the Oral Abstract Session OR03-10 on Professional Development along with Rachel Whynott



Dr KD Nayar Poster Presented

CHAPTER ACTIVITIES 2019

TELANGANA

Chapter Secretary
Dr. Roya Rozati

Vision Statement : "Vision for IFS Telangana chapter is to encourage research, broadcast educational information, and promote the advanced clinical care of patients in all aspects of reproductive medicine, Assisted Reproduction Technology (ART) and embryology related research in stem cells and cloning."

Executive Committee

Chief Patron : Prof PP Reddy
Secretary : Dr. Roya Rozati
Joint Secretary : Dr.Meera Raj Gopal
Treasurer : Dr.Krishna Leela .B
Executive Council Members :
Dr. Padmaja, Dr. Charulata Chatterjee, Dr. Srilatha Gorthi, Dr. Ch Swapna, Dr. Survachala Vardan Chekuri, Dr. Srinivas Warangale

Activity 1

CME - The Setting up of an ART LAB/ Clinic on 24th March 2019 at Hotel Mariott Tankbund.

Inauguration of the CMEwas done by the dignitaries Secretary Dr. RoyaRozati,Dr. Renu Mishra- Executive member of IFS, Prof PP Reddy The chief patron & Joint Secretary Dr. MeeraRajgopal.The CME program was divided into three sessions, Shift from Gynecology to ART, Ethical Challenges & Daily Challenges, Shift from Gynecology to ARTAn informative talk was given on Setting up of an IUI facility by Dr. Renu Mishra the Executive Member IFS Another talk was given on how to Set up of an IVF lab- Dr. SuvarchalaVardhanChekuri, QA QC at an ART Centre was given by Dr. CharulataChatterjeeEthical ChallengesAnother informative talk was given on ICMR guidelines Part b-Dr.RoyaRozati, Part A-SwetaAgarwal Desirable and Mandatory at an ART Lab was given by Dr.ChandanaLakkireddyThe session was concluded by Vote of Thanks By Dr. Krishna Leela B Meeting was well covered by Press.

The academic activity was well organized & appreciated by all delegate

It was an interactive CME, well attended and appreciated. About 60 delegates attended it, both clinicians and Embryologists

Activity 2

Environment and Reproduction in ART On 7th April 2019 at Hotel Mariott Tankbund

Inauguration by Dr. RoyaRozati , Dr. RS Sharma Executive member Secretary ICMR,Dr. Sweta Gupta and other IFS members& Prof P.P.Reddy represented as Patron of the IFS Telangana Chapter.

Mesmerizing talk on Environment Toxicants and Female Reproduction by Dr. RoyaRozati, Secretary IFS Telangana with an interactive session with queries addressed by the audienceThe entire hall was spell bound by an enlightening talk on Interesting cases (Testicular Dysgenesis syndrome malformation, miscarriages etc, by Dr. Sweta Gupta. A talk was presented given on options and advances in air purification technologies by –MrDilipPatil . A talk on optimizing the culture environment in the IVF lab was given by Dr. CharulataChatterjee On 7th April CME was conducted on Environment and Reproduction in ART which focuses on the importance of Environmental chemicals exposure in men and women were associated with reduced fertility and a higher risk of adverse outcomes, whereas some dietary factors improved the probability of successful reproductive outcomes Dr RS Sharma our chief guest of ICMR delivered a talk oh biomagnetic and hazardous effects of mobiles on our reproductive health which now has scientific evidence.Vote of Thanks was given by Dr. RoyaRozati.

Around 60 gynecologists mostly from Telanagana had participated in the CME.

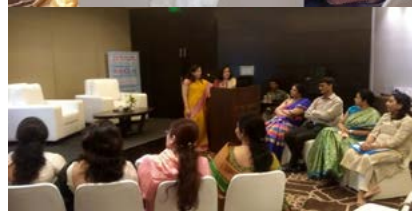
Activity 3

CME at Hotel Park Hyatt, on 11th August 2019 in Banjara Hills, Hyderabad.

It was represented by Prof P.P.Reddy represented as Patron of the IFS Telangana Chapter.The program was jointly inaugurated by IFS Telangana Chapter Secretary Dr. RoyaRozati& Joint Secretary Dr. Meera Rajgopal and other dignitaries. Inauguration and Welcome Speech was delivered Prof P.P. Reddy. Lectures on Newer Trends in ART was given by Dr. Meera Rajgopal and Endometriosis-A Challenge was given by Dr. Krishnaleela.B. Poor Ovarian Reserve - IVF Protocol was given by Dr. Srilatha Gorthi Panel

Discussion :
Trouble Shooting in IVF moderated by Dr. Charulata Chaatterjee Dr. Sweta Agarwal.

Around 50 gynecologists mostly from Telanagana had participated in the CME .



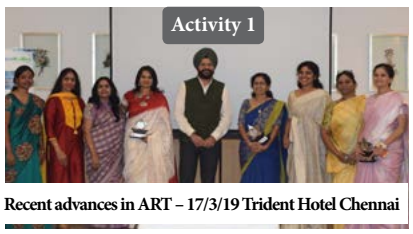
TAMIL NADU

Chapter Secretary
Dr. PM Gopinath

Vision Statrment : Moving and marching towards the academic and clinical excellence under the umbrella of IFS.

Executive Committee

Secretary : Dr P M Gopinath
Joint Secretary : Dr. RajapriyaAyyappan
Treasurer : DrRamaniCheniappan
Joint Treasurer : Dr. PriyaKannan
Patrons : Dr. Mirudhubashini,
Dr. Geetha Haripriya
Executive members
Dr Buvaneswari, Dr. A Charmila,
Dr. Uma Maheswari, Dr Krithika Devi,
Dr. Rajeswari, Dr. Manu Lakshmi,
Dr Gayathre



Recent advances in ART – 17/3/19 Trident Hotel Chennai

IFS Regular RTM–22nd Feb at Hotel Ramada, Egmore
Interesting or difficult case discussions
Critical Appraisal of an Article

RTM – 28th Sept Interesting or difficult case discussions. Critical Appraisal of an article

RTM – 21st June - Interesting or difficult case discussions. Critical Appraisal of an article

FEB 23-2019 Infertility Camp

NADI women infertility camp Madhavaram MARCH 8,2019 Womens Day

Peripheral Manali Camp 5/19

Muthamilnagar camp June2019

DON BOSCO School- PCOS awareness talk 6/2019

IFS -GENETICS 17/5/19 CME

Genetics CME- LILAC insights

IFS –IMA CME 23/6/19

Male infertility SIG CME 2/6/19

Dr Gopinath SIG Activity-SIMS

PUDUCHERRY

Chapter Secretary
Dr. Papa Dasari

Vision Statement : The vision is to create awareness of fertility and related issues among the general public

Executive Committee

Chapter Secretary - Dr. Papa Dasari
Chapter Jt. Secretary - Dr. Jisha R.
Chapter Treasurer - Dr. Chitra T.

IFS Puducherry Chapter organized Annual CME at Annamalai International, Puducherry on Male Infertility on 7.4.2019

Lecturesdelivered on

1. DNA Fragmentation Index & Its implication delivered by Dr.Siddarth, Porur, Chennai
2. Effectivity of Oral Formulation on sperm DNA Fragmentation Pilot Study by Dr.SayaliKandare, Mumbai.
3. Management of Vericocele in Infertile men – Current Consensus by Dr.Ashok Kumar, Chennai.
4. Medical Management in Male Infertility by Dr.Raghavendra, K Urologist & Andrologist, Hyderabad.
5. Management of Anejaculation by Dr.Kubera, Puducherry.
6. The programme was well attended by the Post Graduates and the practioners of Puducherry and TamilNadu.

GREATER CHANDIGARH

Chapter Secretary
Dr. Swati Verma

Vision Statement : "To deliver evidence based academic content in the national annual conference Fertivision 2020 in Chandigarh, in collaboration with Haryana, Himachal and Punjab Chapters. To encourage young members to improve communication and participation. Motto is to impart quality education to our fellows and achieve excellence in the field of teaching, learning and research"

Executive Committee

Patron - Dr Umesh Jindal
Secretary - Dr Swati Verma
Joint secretary - Dr lavleen Sodhi
Treasurer - Dr Sanjeev Maheshwari
Advisors - Dr Umesh Jimdal, Dr Dhaliwal, Dr Yash Bala, Dr Shalini Gainjender
Executive Members - Dr Lovleen Sodhi, Dr Nirmal Bhasin, Dr Shanujit Sodhi, Dr Harpreet Sidhu, Dr Sheetal Jindal, Dr Bharti Joshi

ACTIVITY 1
SIFCON 2019: 21 April 2019 at Chandigarh

Organizing chairperson - Dr Lovleen Sodhi
Organizing co-chairperson – Dr Shalini Gainder

More than 200 Delegates

Dr Abha Majumdar, Dr Pankaj Talwar, Dr Vineet Malhotra and other local faculty discussed various issues related to cryopreservation and updated current trends in male infertility management.

Press coverage of the event

ACTIVITY 2
16th ART Update 25-27th May 2019

Preconference workshops
- Endo -suturing
- Hystero- trainer
- IVF lab set up

More than 50 participants in each

- Poster presentation session to encourage the young talent
- Case discussion

Debates
- Septum removal before ART
- D3 Transfer v/s blastocyst transfer

ACTIVITY 3
Genetics Conference "How to apply genetics in ART practice: Basics to Advance" 7th Oct 2018

Attended by more than 100 delegates.
Dr Ratnapuri, Dr Michal Richardson and Dr Manisha Vajpayee interacted with the delegates and highlighted about Aneuploidy screening, role of ART in genetic predisposition and case selection of PGD.

VIDHARBHA

Chapter Secretary
Dr. Shilpi Sud

Vision Statement : To sort out controversies in infertility management and come to consensus with clear understanding of subjectAim is to create awareness regarding evidence based management of infertility To reach every corner of Vidarbha

Executive Committee

Secretary - Dr. Shilpi Sud
Joint Secretary - Nishad Chimote
Treasurer - Dr. NeelamPuniyani
Past Secretary - Dr. Rohini Dravid
Past Joint Secretary - Dr. Anjali Bhandarkar

ACTIVITY 1
CME on Cancer and Fertility on 10th March 2019 at TuliImperial, Nagpur

Dr Anand Pathak, renowned Oncologist spoke on "Fertlity concerns in cancer patients" and highlighted the fact that not just the disease itself but the treatment modalities like chemotherapy, radiotherapy used for the cancer treatment may lead to sexual dysfunction, gonadal –toxicity and impaired reproductive function in male and females. Dr. Sadhana Patwardhan, IVF specialist spoke on Clinical Aspect on infertility. Dr. Pankaj Talwar, National Secretary IFS delivered lecture on techniques on fertility preservation. Dr. Amol Dongre spoke on "Challenges in fertility management & need of proper counselling. Dr Pankaj moderated panel on Facts and dilemmas of fertility preservation. Panelist were Dr Darshana Pawar, Dr. Tanushree Jain, Dr. Naresh Jadhav, Dr. Anita Salpekar, Dr. Bindu Chimote.

ACTIVITY 2
Annual Conference of IFS Vidarbha Chapter Fertiquest 2019

One day annual conference held 15th September 2019 at Hotel Centre point Nagpur. ART Expert from all over India shared their knowledge. IFS President Dr. Gouri Devi delivered lecture on Newer Approach For Poor Responders. First LateDrMeenaChimote Oration was delivered by IVF Specialist Dr. MamtaDeendayal on "Managing Congenital Genital Tract Abnormalities, My Experience Of 36 Years". Dr. Kuldeep Jain Past President spoke on Double Stimulation, Double Trigger, Double Transfer: Double Trouble? Dr. K.D. Nayar spoke on Explaining Unexplained Infertility. Conference was appreciated by faculty and delegates.

Patron -
Dr CharuRanade, Dr Natchandra Chimote
Dr. Narendra Mohta, Dr. Raju Khandelwal, Dr.Vinay Tule

Executive Members -
Dr Amogh Chimote, Dr Bindu Mehta Chimote, Dr Chaitanya Shembekar,
Dr Darshana Powar, Dr Kanchan Sortey, Dr Riju Chimote, Dr Sushma Deshmukh

KERALA

Chapter Secretary
Dr. KU Kunjimoideen

Vision Statement : "Our Mission: Our mission is to educate the reproductive healthcare personnel topromote research and to encourage the superior ethical healthcare for patients seeking fertility treatments
Our Vision: All women to have access to quality fertility health care."

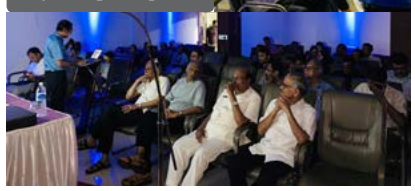
Executive Committee

Chapter Secretary-Dr KU Kunjimoideen
Jt Secretary – Dr M Venugopal
Treasurar – Dr G Parasuram
Executive members -
Dr KK Gopinath, Dr Fessy Louis, Dr Raju Nair, Dr Sheela Balakrishnan, Dr Sunil G Nayar, Dr Sankalp Singh, Dr Ramgopal Pillai

ACTIVITY 1
CME on Infertility management and Fetal Anomaly Scans

IMA Perinthalmanna– Gynaecologists, Obstetricians, Urologists attended. 62 delegates

ACTIVITY 2
CME on Endometriosis and Fibroids In association with OG Club Mannarkkad34 Gynaecs participated



ACTIVITY 3
CME on Male infertility Management at Kondotty, Kerala Organized in association with IMA and Urology Club

ACTIVITY 4
CME on what's new in Infertility Management Organised in association with Calicut OG Society & IMA73 Gynaecs attended Half day CME Program

Participation in IFFS China

ACTIVITY 5
Projects
360 degree Andrology

- In association with 1300 member KFOG
- For orientation of all gynaecs and urologists
- For uniform training of all registered and un registered laboratory technicians
- Uniform pattern and quality of Semen analysis reporting
- Started the project with first meeting at Calicut in April 2019
- Two more meetings conducted at Thrissur and Kannur
- One training program for lab technicians conducted at Kochi
- Submitted the project to Government of Kerala for state funding

Program at Thrissur – June 2019

ACTIVITY 6
Tribal Fertility Healthcare project

- 116 TRIBAL VILLAGES IN KERALA with an average population of 17,000-21,500 women of reproductive age age group in extreme poverty
- Aims:
  - Women's healthcare screening
  - Supply of healthy food
  - Reproductive care – Obstetric care
  - Fertility support

Project approved by Govt of Kerala and partially funded; Will be operational with the help of Reproductive Health committee of KFOG

ACTIVITY 7
Public Health Activities Flood - 2 Relief Activities

- Northern Kerala affected
- 1800 plus families totally dislocated
- 46 families could not be traced following landslide in western ghats
- 20 member team from IFS Kerala Chapter joined with IMA and local health admin and visited many camps and supplied medicines, food materials and dress items worth total 7 lakhs rupees
- Follow up activities are on place

ACTIVITY 8
Training programme for IVF Nurses

ACTIVTY 9
World Womans Day

ACTIVITY 10
World Health Day

ACTIVITY 11
Menstrual Hygiene Awareness Class

IFS Kerala Chapter in association with OG Society organisedan awareness class on menstrual hygiene and menstrual disorders at Sai Snehatheeram tribal hostel, PERINTHALMANNA on 8th October 2019. Dr Kochu S Mani delivered the lecture on the importance of menstrual hygiene and its impact on future reproduction. About hundreds of students were attended the class.

ACTIVITY 12
International Girl Child Day

A Seminar was conducted on reproductive health and importance of healthy food habits, hygiene and excercise for higher secondary school girls of Tharakan's High School, Angadipuram in connection with observance of International Girl Child Day. Dr. Kuchu S. Mani inaugurated the seminar. The seminar was conducted by IFS Kerala chapter, POGS and Malabar Dictrict Police. A sensitization about sexual atrocities and training on self defence were given by District Police Superintendent team. More than 300 students participated in the seminar.

ACTIVITY 13
World Menopause Day

World Menopause Observance day was inaugurated by IFS Kerala Chapter Secretary, Dr. Kunjimoideen at ARMC Aegis Hospital, Perinthalmanna. In observation of World Menopause Day, a free medical camp on women's health and wellbeing was conducted by IFS Kerala Chapter in association with ARMC AEGIS hospital, Perinthalmanna. The seminar was organised on the subject 'Reproduction after 40' and highlighted the proposed surrogacy bill etc. The medical camp was envisioned to raise awareness on the impact of menopause in women above 45 years of age. Bone Mineral density test, Ultrasound scanning and medicines are offered to the attendees free of cost.

ACTIVITY 14
CME on Care of ART Pregnancy

IFS Kerala chapter has organised a CME on 'Care of ART pregnancy' on 17th November at Perinthalmanna in association with local OG Society. Prodf Muralidhar Pai from KMC Manipal, delivered the lecture. There was a panel discussion on 'Case scenarios in ART Pregnancy' moderated by Dr Seneeshkumar and Dr Mumthaz. 88 delegates participated

HARYANA

Chapter Secretary
Dr. Neeru Thakral

Vision Statement : "Our main focus is on increasing Awareness about infertility and IFS ideology among Gynecologist as well as General population in Haryana."

Executive Committee

Secretary - Dr. Neeru Thakral
Jt.Secretary- Dr. Shalu Gupta
Treasurer- Dr. Priya Varshney
Executive Members -
Dr.Meenakshi Chauhan,
Dr. Seema Mittal , Dr. Astha Chakravorty
Dr. Veenu Sangwan, Dr. Meenakhi Dua
Dr. Sonu Balara, Dr. Reema Goel

ACTIVITY 1
Infertility Camps

For awareness among general public, we had organized infertility camps in rural areas. We have chosen two villages (Patoudi & faruknagar) in Haryana for this purpose.

ACTIVITY 2
ME Organised on 10th Feb 2019 at REWARI

- conducted on 10th February at Golden Huts Resorts, Rewari.
- This fertility update well attended by more than 60 delegates. Update started with comprehensive talk by DrSohaniVerma on " Recurrent abortions ". Ouite Interactive Panel on Endometriosis & infertility moderated by Drshweta Mittal & Dr. NeeruThakral.
- Drumeshjindal from Chandigarh gave Fantastic talk on "Endometrial Receptivity ". Lastly panel on Male infertility by DrpankajTalwar. He left no stone unturned in Demystifying Male infertility.
- Meeting was well covered by Press coverage like - Amar Ujala, DanikBhasker, DanikJagran. The academic activity was well organized & appreciated by all delegates.


बाझपन के कारण और निवारण पर की चर्चा

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ACTIVITY 3
IFS Haryana Chapter Annual Conference
19th May 2019

- IFS Haryana Chapter First Annual Conference Superbly arranged on 19th May at Hotel Leela Ambiance. Conference was well attended by 360 infertility specialists & Gynaecologists from all over Haryana& Delhi NCR. Two hands on workshops (IUI and Ovum pick- up / Embryo transfer) along with free paper session.
- Conference was inaugurated by Dr. Satish Aggarwal (DGHS Haryana) & Guest of Honour Dr Smiti Nanda (HOD PGI Medical College Rohtak) and CMO Dr B.K. Rajora.
- Academic session is backbone of any conference and our conference was academic bonanza with particiption of almost all national faculty along with international speaker Mr. Jose miravet from Spain to make it rich and satisfying experience for the delegates. It was an honour to have all stalwarts under one roof imparting the pearls of knowledge and wisdom and sharing recent updates & best clinical practices.
- Conference started with mesmerising panel discussion on "Azoospermia – What next"by Dr Pankaj Talwar and Dr Priya Varshney. It gave clear guidelines, how to proceed in these males and what all need to be done.Our international expert Dr Jose Miravat from Spain - unravelled the role of endometrium in successful implantation.
- Wonderful panel discussions were conducted on "Ovulation induction- Different Case Scenario" by Dr. Neeru Thakral and Dr Shalu Gupta. The discussion started from basic level to IUI then IVF cases so that every gynaecologist and beginners could understand do's and don'ts of ovulation induction.Final Key points were highlighted by our expert advisor Dr Sonia Malik.
- This was followed by plenary session with guest lecture by Dr Hrishikesh Pai on Testing and Editing of embryo followed by Key Note Address by Dr Alka Kriplanion Adenomyosis &infertility.Entire hall was spell bound by Presidential Oration by Dr Gouri Devi on Vision – Future of ART.
- Post lunch video session by Dr Kuldeep Jain and Dr Dinesh Kansal gave insight on Fertility Enhancing surgeries. It was followed by debate on need of the day By Dr Neena Malhotra from AIIMS and Dr Vikas Swarnkar from Jaipur on, whether freeze all for all should be done or not. Dr umesh Jindal gave insight by her talk on unexplained infertility its management.
- Dr Sudha Prasad highlighted on Managing ART pregnancies and obstetrical complications. Dr Kuldeep Singh simplified the role of ultrasound in infertility. Lastly the ROLE PLAY and Expert Dr Abha Majumdar summarised about managing patients with recurrent implantation failure and medicolegal issues.
- IUI hands - On workshop was attend by almost 50 delegates and OPU & ET workshop (Hands - on simulator) by 32 delegates. Dr. Shweta Mittal, Dr. Surveen Gumman, Dr Rashmi Sharma, Dr Ila Gupta, Dr Neeru Thakral guided delegates by giving tips on various steps. CME was awarded by 5ICOG credit point & 4 Haryana Medical Council credit Hours.
- Academic feast was appreciated by one and all.


गुड़गांव : लीला एम्बीयन्स में बांझपन पर कार्यशाला

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ACTIVITY 4
Round Table Meet Campus

ACTIVITY 5&6
Two Camps at Patoudi & Farrukhnagar

NORTH EAST

Chapter Secretary
Dr. Mujibur Rahman

Vision Statement : "Taking Infertility trearment to every nook and corner of Northeast....Making sure the benefits of recent advences in Reproductive medicine reach every one."

Executive Committee

Secretary - Dr Mujibur Rahman
Jt. Secretary - DrArpitasharma
Treasurer - Dr. DigantaChetia
Executive Members -
Dr. Diganta Deka, Dr. J.B. Bhattacherjee
Dr. M. Belho, Dr. Clarindya,
Dr. PankajBarua, Dr. F..R. Choudhury,
Dr. Salim Ahmed

ACTIVITY 1
The 1st CME was conducted in Hotel Lily in Guwahati

Organising Secretary Dr. M.Rahman
The topic was Fertility preservation. The local cancer hospitals were involved in the CME with the Director B.Barooah cancer institute was made the chief guest. Around 50 delegates participated in the CME..There was active discussion with some case presentations. The Q&A session was very interesting with a lot of delegates coming up with lot of questions. There were speakers from Delhi and our General secretary Dr.Pankaj Talwar was the guest of honour.

ACTIVITY 2
IUI Workshop was held on 22nd June in Dimapur, Nagaland

45 delegates participated in the hands on workshop. Dr M.Belho was the organising chairperson...speakers in the workshop included Dr Gouri Devi Dr Umesh Jindal, Dr Rupali Bassi, Dr M. Rahman.

ACTIVITY 3
Another IUI Workshop was held on 23rd June in Kohima

20 delegates participated and there was a good discussion between the faculty and the delegates.

ACTIVITY 4
Awareness Programme on Reproductive Health 27th August

On 27th of August an awareness programme on Reproductive health was conducted in Beltola college. DrM.Rahman addressed the girl students. Around 350 girls attended the programme. There was a Q&A session after the talk

GUJRAT

Chapter Secretary
Dr. Jayesh Amin

Vision Statement : "To Increase the No of IFS Members from Gujarat and Provide Qualitative Academics and Learingprogramme to the Fraternity."

Executive Committee

Secretary - Dr Jayesh Amin
Jt. Secretary - Dr Nimesh Shelat
Treasurer - Dr. Paresh Makawana
Jt. Treasurer - Dr. HitendraSomani
Executive Members -
Dr Sanjay Desai, Dr. MineshPrajapati, Dr. Divyang Kadakiya, Dr. Bharat Thakkar, Dr. BhavinPrajapati, Dr. Jaya Goyal, Dr. Shailendra Rathod, Dr. Nila Mehta, Dr. Ravindra KhoratDr. AmitKalyaniDr. Paresh Patel

CME on Medical Advances in Infertility
8th Sep 2019 at Hotel Starottel, Ahmedabad - Meyer-IFS Initiative

MADHYA PRADESH

Chapter Secretary
Dr. Monica Singh

Vision Statement : "To start an initiative to tackle infertility in couples by offering evidence based medicine at an affordable cost"

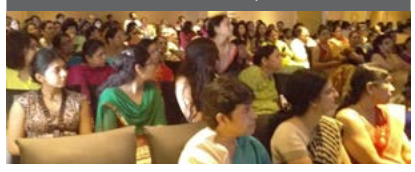
Executive Committee

Chapter secretary – Dr Monica Singh
Jt Secretary - Dr Anju Verma
Treasurer- Dr Asha Jindal
Executive Members -
Dr Viraj Jaiswal, Dr Abha Jain,
Dr Archana Srivastava,
Dr Manju Rathi, Dr Sunita Pandey,
Dr Yatinder Verma, Dr Gajender Tomar

ACTIVITY 1
JAN 2019: Flag hosting-cultural programme, Free Camps – Sehore, Raisen

ACTIVITY 2
MARCH: CME with BOGS : Endomeroisis

ACTIVITY 3
MAY: CME –with BOGS ; Male Factor



ACTIVITY 4
JUNE : Work-Shop- IUI With BOGS

ACTIVITY 5
JULY:Free Camp Ashok Nagar

ACTIVITY 6
Aug: Green Planet-Plantation Drive / Flag Hosting-Independence Day

ACTIVITY 7
Organ Donation Day Motivation (11/08/19)

ACTIVITY 8
Every Month on 09th PMSMA:IFS-IMA- Members Participate

PUNJAB

Chapter Secretary
Dr. Harinder Kaur Oberoi

Vision Statement : "Core value IFS –Punjab Chapter believe that everyone you meet daily knows something that you don't, hence regular meetings and interaction spreads knowledge and make you wiser than you were on the previous day. The other priority of our organization would be to mass aware the public about the fertility fears, myths and facts through our regular community activities.
Moto - Regular workshops, CMEs and meetings are arranged so that knowledge is shared and spread."

Executive Committee

Secretary - Dr Harinder Kaur Oberoi
Jt Secretary - Dr Sukriti Bansal
Treasurer - Dr Sarabjeet Singh

Executive Members

Dr Sarabjit
Dr Sukriti
Dr jasmine dahiya
DrRitu nanda
Dr Jaslin
Dr Monika verma
Dr Anupama Chopra

ACTIVITY 1
IUI work shop on 28th April 2019 at Jalandhar

Under the expert guidance of our esteemed leadership of IFS general secretary and president Dr Gauri Devi madam, IFS Punjab chapter conducted Annual conference on Fertility Concepts at Jalandhar and IUI work shop on 28th April 2019. For the conference and IUI work shop honorable Punjab Medical Council granted us 8 credit hours. Worthy Speakers from Delhi Dr Pankaj Talwar highlighted on 'ultrasound in infertility "Dr Neena Malhotra gave deliberation On optimization outcome inpoor responders " Dr Sonia Malik through light on "ovulation induction in obese Pcos and Nonpcos ". DrUmesh Jindal very well discussed 'Trouble shoots in OPU and embryo transfer" .DrAloksharma from Shimla threw light on Endometriosis updates "DrArunArora from Jammu highlighted on pearls of wisdom in treating infertility with out ivf". mDrHarinderKaurOberoi discussed latest tips on ' Repeated implantation failure ". "Solving mysteryof thin endometrium " was dealt by DrRimmy from Chandigarh.Many points on" practical dilemmas in infertility management " werediscussed by experts panelists.One more panel on Tips and Tricks in achieving faster success rate ininfertility management " discussed in detail.Efforts of Ifs Punjab chapter appreciated and applauded by faculties and allthe delegates.They learnt many newer advances in management of ART.

ACTIVITY 2
CME - 16th of June 2019 at Ranjit Avenue Amritsar

IFS Punjab chapter organized a CME in collaboration with sun pharma on16th of June 2019 at Ranjit Avenue Amritsar from 11am to 3pm.
List of organizing committees Dr Harinder Kaur Oberoi, Dr Sarabjeet, Dr Archana Berry, Dr Jyotsna.
Name of speakers Dr C Nagori, Dr Sonal Panchal from Ahemdabad, Dr Jyotsna and Dr Sarabjeet Singh
Worthy speaker Dr C Nagori highlighted on "Role of progestrone in luteal phase defect"
Dr Sonal Panchal discussed on " Sonoendocrinology"
Dr Sarabjeet delivered lecture on diagnosis of PCOS
Dr. Jyotsna Gupta highlighted on chromosomal defect by sonograph. All topics were very interesting and informative . All lectures appreciatedand applauded by faculties and all the delegates of Amritsar.

ACTIVITY 3
Conference on Infertility Updates & ART Workshop
22ndSeptember 2019 at Harpal Tiwana Hall at Patiala

IFS Punjab chapter in association with POGS organized a conference on infertility updates and art workshop on 22nd September 2019 at Harpal Tiwana hall at Patiala.
Organizing Committee - chairperson : Dr Harinder kaur Oberoi and Dr Sarita Agrawal
Organizing Secretary:Dr Monica Verma & Dr Ranjana
Joint Organizing Secretary: Dr Sarabjit, Dr Shalini and Dr Sarabpreet Singh
Workshop Coordinator : Dr Deepa Goel, Dr Sukriti and DrJaslin
Guest Speakers: Dr K D Nayar, Dr Surveen Ghuman, Dr Umesh Jindal, Dr Shweta Mittal, Dr Sarabpreet Singh, Dr Lakhbir Dhaliwal, Dr Sarla Malhotra, Dr Manjit Mohi, Dr Shalini Gaindher, Dr Lovleen Sodhi.
215 delegates and 35 faculty members attended the conference, 80 attended the Hysteroscopy work and 25 attended the OPU and ET workshop. This was wonderful gathering from all over North. Topics and discussion were excellent with good interactions. Punjab medical council granted 4 CME hours. There was a good panel discussion which was appreciated by audiences and faculty members Topics- free papers, unexplained infertility, panels on fibroids and male infertility, PGD In aneuploidy, ovulation induction , first trimester treatments of IVF pregnancy, pregnancy in art and workshop on Hysteroscopy, OPU and embryo transfer, vitrification and cryobiology workshop were discussed in detail. Panels and Hysteroscopy workshop Appreciated by delegates
Whole conference was enjoyed and applauded by all the faculty and delegates.

ACTIVITY 4
CME on1st Navrata day at Jalandhar
Hotel Ramada encore conducted on 29thSept 2019

Shivani meeting with IFS Punjab chapter conducted a CME on1st Navrata day at Jalandhar, Hotel Ramada encore, conducted on 29th September 2019 from 9 to 2pm. 40 delegates participated including Embryologist Attendance good with good discussion and exchange of views. Very good informative and interactive topics

ACTIVITY 5 & 6
2 Camps Organized

S.no.	Date	Venue	PatientsSeen
2.	Oct 2018	Sultanpur Lodhi	106
3.	March 2019	Basti Sheikh Jalandhar	50

Dr Monica Varma from Punjab Chapter IFS presented a poster at ESHRE 2019

Higher risk of preeclampsia in singleton pregnancies from donor versus autologous oocytes, with similar endometrial preparation, in a healthy, young cohort: a prospective study" She had also suggested seven points for the ESHRE 2019 Guidelines for Good Practice Recommendations for Ultrasound in ART: Oocyte Pick-up and all 7 were accepted in the final guidelines. Her name is in the Reviewers List of these guidelines

RAJASTHAN

Dr. Sangita Sharma
Chapter Secretary

Vision statement : "Strengthening the chapter by increasing the number of members. Aim of increasing awareness on infertility issuesUpdating on recent evidence based approaches .
Benefitting the society by planning awareness programmes (eg PCOS in schools/colleges) and free OPDs (eg in rural areas)Strengthening Embryology part in the state."

Executive Committee

Patron : Dr. M. L. Swaankar
Advisors : Dr. NeelaBaheti,
Dr. Sanjay Makwana
Dr. NamitaKotia
Secretary- Dr. Sangita Sharma
Joint Secretary – Dr. Nidhi Kabra
Treasurer - Dr. Hemant Chakarwarty
Executive Members - Dr. Usha Shekhawat, Dr. Narendra Gupta, Dr. Anita Sharma, Dr. Sunita Yogi, Dr. Sapna Basandani, Dr. Harpreet Bajwa, Mr. Rahul K Sen

ACTIVITY 1
CME on "Updates on Embryology" (30th March, 2019 at Jaipur)

Attended by 40 Clinicians & Embryologists.
First Talk : Trouble Shooting in IVF lab : Different Case Scenarioes by Dr Sangita Sharma.
Second Talk : Evidence on Newer Technologies in IVF Lab by Dr. Rahul K Sen, Senior Embryologist, Jodhpur

ACTIVITY 2
RTM of IFS Rajasthan Chapter

Agenda :Discussion on PCPNDT issues and different forms (After FOGSI lost the case regarding PCPNDT issues in Supreme Court)
* 8.04.2019, Jaipur *Attended by 14 members of IFS.

ACTIVITY 3
RTM - Recent Updates in Management of PCOS (16 May2019 at Jhunjhunu)

ACTIVITY 4
Infertility Awareness & Free Consultation Camp & Talk (16th May 2019 at Jhunjhunu)

ACTIVITY 5
CME on Updates on Ovulation Induction (26th May2019 at Jaipur)

ACTIVITY 6
CME on Updates on Ovulation Induction (26th May2019 at Jaipur)

WEST BENGAL

Dr Suparna Banerjee
Chapter Secretary

Vision Statement : "To increase awareness of infertility problems and early referral of those couple to specialised fertility clinic.Increase IFS members in west Bengal"

Executive Committee

Secretary : Dr Suparna Banerjee
Jt Secretary: Dr Piya Ray
Treasurer: Dr Kausiki Ray
Executive members :
Dr Rohit Gutgutia, Dr Debashree Ganguly
Dr Madhumita Roychwdhury,
Dr Sudip Basu, Dr Madhab Das,
Dr Aindri Sanyal, Dr Sunita Sharma

ACTIVITY 1
TVS Workshop - March 2019

- Attended by 10 PG students, 2 junior gynae practitioners, one senior gynaecologist.
- Encouraged juniors to become life members and informed the training courses organised by IFS.

ACTIVITY 2
Round Table Meet - April 2019

- Core committee members
- Plan for regional conference
- Plan for public awareness programme
- Plan for regular update programme and journal club

ACTIVITY 3
Regional Conference- July 2019

Chief guest was Dr BN Chakraborty, we felicitated him. Our guest speaker was Dr Vineet Malhotra . Our whole team was present with all the fertility specialist from Kolkata were present along with many eminent Gynaecologists of Kolkata were present. IUI workshop was a hit among our junior colleagues.

ACTIVITY 4

Meyer IFS Initiative 29th September Inauguration and lamp lighting was done along with Rabindra Sangeet The meeting was blessed by Geeta Ganguly a very senior Colleague of Prof BN Chakraborty Speakers were renowned Gynaecologists of Kolkota
Dr Kaushiki Ray Dr Indrani Lodh Dr S. Chatterji Dr SM Rehman Dr Mamta Dighe from Pune

UP (EAST)

Dr. Renu Makkar
Chapter Secretary

Vision Statement : "To engage and involve gynecologists of UP in understanding importance of infertility management and management of ART pregnancies
To develop simple protocol system for investigation, diagnosis and management of infertile couples in a structured manner in order to save time and energy, reduce time to pregnancy and financial burden."

Executive Committee

Chief Patron - Dr Chandrawati
Secretary - Dr Renu Makker
Jt. Secretary- Dr Surheeta Kareem
Treasurer - Dr Manju Shukla
Executive Council :
Dr Malvika Mishra, Dr Geeta Khanna
Dr Sunita Chandra, DrAmitaPandey
DrYogeshKhanna, Dr G C Makker

ACTIVITY 1
IFS Annual CME on 27th April,2019

UP (WEST)

Dr. JK Goel
Chapter Secretary

Vision Statement : "To create awareness among the general masses. Bridging up the gap between general public and professionals. Promote a forum for the exchange of ideas and information.
To update the knowledge and skill of health professionals through continued medical education, by organizing workshops, conferences and CME's on regular basis. To promote and grant recognition to research in the field of ART. To make IFS Chapter visible to common mass of the state."

Executive Committee

Secretary- Dr J K Goel
Joint Secretary - Dr Neera Agrawal
Treasurer - Dr Ruchica Goel
Executive Council :
Dr Lata Agrawal, Dr Nutan Jain
Dr Poonam Goyal, Dr Anshu Jindal
Dr Shashi Bala Arya, Dr Jyoti Bhaskar
Dr Shashi Singh

ACTIVITY 1
Infertility Summit 2019- 24th February 2019

Attended by around 120 delegates from different parts of Uttar Pradesh and Uttarkhand.

ACTIVITY 2
Setting up an ART Lab- 21st April 2019

ACTIVITY 3
Fertimed 2019

A CME cum Workshop on "FertiMed" 2019 with the theme 'optimizing infertility management' was organized by Department of Obstetrics and Gynecology, Teerthanker Medical College, Moradabad on 20th October 2019 under the aegis of IFS Western UP Chapter.
This prestigious event was inaugurated by Dr. Neena Mohan, senior most President, Moradabad Obstetrics and Gynaecological Society. It was graced by renowned Obstetrician& Gynecologist from Aligarh, Meerut, Bareilly, Noida, Haldwani and Moradabad.
Huge spectrum of topics were discussed like follicular monitoring, present status of IUI, setting up IUI lab, luteal phase support in IUI, optimizing its results, and when to stop IUI and think of IVF,ICSI, endometriosis &infertility, ovarian rejuvenation so that all can be benefitted starting from general practitioners, post graduates, practicing gynecologists and faculty in various medical colleges.
Dr. J.K.Goelenlightened the audience about the medicolegal& ethical aspects of ART. The event had panel discussions on Ovulation Induction Protocols and Male Subfertility. A hands on workshop on IUI-tips and trickswas conducted by Dr.KanthiBansal, Dr. MukeshBansal and team, renowned IVF specialist from Ahemdabad.
The response was very heartening and overwhelming. Around 11o delegates from various places of Uttar Pradesh and Uttarakhand attended the CME. Feedback from delegates was very positive and complimentary on both professional and administrative arrangements

Research Projects

- Role of Real Time PCR to diagnose Genital Tuberculosis in infertile women- concluded that the role of Real Time PCR is not very certain in diagnosis of Genital Tuberculosis in infertile women.
- Ultrasonography and Doppler study to predict uterine receptivity in infertile patients undergoing embryo transfer- on going project.
- Study of sperm morphology and motility using Strict criteria as a prognostic factor in Intrauterine Insemination- on going project.

Outreach Activities : Regular out station IVF Camps organised by Deptt of Obs&Gynae, SRMSIMS (2019)

22/1/2019- Rudrapur
19/2/2019- Pilibhit
26/3/2019- Badaun
27/3/2019- Sambhal
8/5/2019- Badaun
4/5/2019- Pilibhit
19/6/2019- Ujhani
10/7/2019- Bisoli
23/7/2019- Rudrapur
And many more to come…

CHATTISGARH

Dr. SangeetaSinha
Chapter Secretary

Vision statement : "Aim is to disseminate Basic and Advanced Knowledge, Stimulate Research and Encourage Best Clinical Practice in field of infertility and reproductive medicine. Training the doctors at periphery, general practionersand junior doctors. Public awareness programmer to be done. Increase membership"

Executive Committee

Patron - Dr. (Prof) Abha Singh
Secretary - Dr. SangeetaSinha
Joint Secretary - Dr. Veronica Yuel
Treasurer - Dr.PrakritiVerma
Executive Members
Dr. Vijiya Wakodkar, Dr Palak Gawri
Dr Neeraj Pahlajani, Dr Sushma Verma
Dr Anuradha Tiberewal,
Dr. Jyoti Jaiswal,Dr Nalini Madharaia

ACTIVITY 1
Reaching The Outreach

Adopting two villages will be the doing free check up of infertile patient on monthly basis

ACTIVITY 2
Social Contribution

Dr Manoj Chelani our Founder Secretary is doing free check up once a month. Dr Veronica Yule our Joint Secretary is doing free checkups

ACTIVITY 3

Awarness programme for general practitioner-**Knowledge sharing activity** is done every month in collaboration with The Srijjan Bhilai Test Tube Baby Center

ACTIVITY 4 : PCOS Awareness Programme

PCOS awareness programme under the agesis of IFS C.G chapter at THE Srijjan Bhilai Test Tube Baby Center on 15th April 2019

ACTIVITY 5
Training

Adopting two villages will be the doing free check up of infertile patient on monthly basis

UTTRAKHAND

Dr Anupama Bahadur
Chapter Secretary

Vision Statement : "Conduct CMEs: to train doctors & paramedical staff. Conduct Conferences: to update knowledge of recent advances in infertility Organize Awareness Camps for patients in remote regions of Uttarakhand to start investigations early"

Executive Committee

Patron - Prof Jaya Chaturvedi
Advisor - DrSavitriUniyal
Secretary - DrAnupama Bahadur
Joint Secretary- Dr Latika Chawla
Treasurer- Dr Ritu Prasad
Executive Members :
Dr Sumita Prabhakar,
Dr Vinita Gupta, Dr ArchanaTandon,
Dr Arti Marwah Luthra, Dr Usha Joshi,
Dr Vandana Grover, DrAditiGutpa

ACTIVITY 1
Infertility Camp under aegis of IFS
(31st March 2019 at Muzaffarnagar)

Dr Pankaj Talwar Secretary General IFS, Dr Sumana Gurunath, Bengaluru, Dr S.M Rahman, Kolkatta, Dr Aditi Gupta, Haridwar, Dr Arti Marwah Luthra, Dehradun, Dr Chitra Joshi, HOD Doon Medical College, DrRitu Prasad Senior Consultant IVF, Rishikesh, Dr Archana Tandon Associate Professor SGRR Dehradun

Poster presentation by Junior Residents from AIIMS Rishikesh, SGRR Dehradun & Himalayan Hospital well appreciated by Judges

ACTIVITY 2
CME under aegis of IFS "Basic Essentials for Fertility"
(14th April 2019 at AIIMS, Rishikesh)

ACTIVITY 3
Annual CME at Seyfert Sarovar
6th October, 2019 in Dehradun (Uttarakhand)

Annual CME at Seyfert Sarovar Premiere on 6th October, 2019 in Dehradun, Uttarakhand on "Optimization of Ovarian Stimulation". It was jointly inaugurated by the National Coordinator of IFS, Dr. Leena Wadhwa, Dr. Shweta Mittal, Dr. Neeti Tiwari and Dr. Anupama Bahadur

KASHMIR

Dr Sayed Sajjid Hussain
Chapter Secretary

Vision Statement : "Our Vision is to support and facilitate the process of conception through Assisted Reproductive Technologies (ART) for couples facing infertility and to promote interest in research findings in human reproduction and embryology to the concerned doctors.
Mission: The mission of IFS Kashmir Chapter is to make the ART (Assisted Reproductive Technology) affordable & accessible to every infertile couple of J&K State at their door steps with quality expertise to achieve positive outcome."

Executive Committee

Patron- Prof (Dr) ShahnazTeng
Advisor - Prof (Dr) Aabida Ahmed
Spokesperson- Dr. Samiya Mufti
Executive Body
Jt. Secretary - Dr. Ambreen Qureshi
Treasurer - Dr. Gulshan Ara
Executive Council -
Dr. Samiya Mufti, Dr. Masooda Shah,
Dr. Zohra Bano, Dr. Kripal Kour,
Dr. IramShafi, Dr. SajadaTak,
Dr. Zeenat u Nisa

NEPAL

Dr Rashmi Shirish
Chapter Secretary

Vision Statement : "We hope to do public awareness camps , Andrology and ultrasound workshops and more CME this year..we are proud to be a part of academically rich IFS.."

Executive Committee

Patron - Dr Rita Bakshi
Advisor - Dr Uma Srivastav
Secretary - Dr Rashmi Shirish
Jt Secretary - Dr Mira Thapa
Treasurer - Dr Swasti
Executive members -
Dr Girdhari , Dr Pradeep Srivastav
Dr Rajesh Adhikari, Dr Da lucky
Dr Nutan, Dr Chetana, Dr Nikita
Dr Sangeeta Chakravarty

Annual CME at Pokhara on 29th March 2019

IFS Nepal Chapter hosted their Annual CME at Pokhara on 29th March 2019. IFS were represented by the treasures Dr. Neena Malhotra prof. AIIMS &Dr. Rita Bakshi - Patron of the IFS Chapter Nepal.

Pokhara has around 50 gynecologists and we are glad to inform our turned out was around 50 with a few doctors from Kathmandu, Butwal and Biratnagar also. In fact according to Pokhara doctors it was a rare day with nearly all doctors except a few on Call/ Duty not attending.

1. Dr. Uma Srivastava - History of IVF in Nepal
2. Dr. Kanchan Prasad - Asst. Prof. TMMC Moradabad spoke on Genital Tuberculosis.
3. Dr. Rita Bakshi - Patron IFS Nepal Chapter spoken unexplained infertility.
4. Dr. Neena Malhotra - Prof. AIIMS Ovulation Induction followed by
5. Dr. Asma - Fibroids & Endometriosis in infertility

IUI workshops were attended by the entire 50 gynecologist and practical demonstration of Sperm Washing & IUI procedure was done. 8 out of 50 people became IFS members there itself and also paid up.

PANEL on Male Infertility Moderators
Dr. Rita Bakshi, Dr. Kanchan Prasad

JHARKHAND

Dr. Archana Kumari
Chapter Secretary

Vision Statement : "To make the state of art infertility treatment services to people of Jharkhand so that they don't need to move to Metro cities, thus preserving their valuable time and money. Also,to create awareness about fertility services outreaching every district of Jharkhand.".

Executive Committee

Patron – Dr KarunaJha
Secretary - Dr. Archana Kumari
Joint Secretary - **Dr. Sunita Jha**
Treasurer - **Dr Rupashree Purshottam**
Executive Members -
Dr. Anubha Vidyarthi,
Dr. Nirmalasingh, Dr. Puja Rani,
Dr. Jyoti Gupta, Dr. Kaushik Das,
Dr. Rupashekhar, Dr. Sashibala

ACTIVITY 1 : IUI Workshop
12.08.2019/Hotel Capitol Hill, Ranchi

Guest Speaker : Dr (Col) Pankaj Talwar, Delhi, Dr Suparna Banerjee, Kolkata
The pleasant cloudy weather in the holy month of Sawan on 12thAugust, 2019, Monday, witnessed the 1st annual conference of IFS Jharkhand Chapter, exactly one year after the formation of Jharkhand Chapter on 11thAugust 2018. The conference started with welcome address by Patron Jharkhand chapter, Dr. Karuna Jha and traditional lamp lighting by the dignitaries. It was followed by Secretary general IFS Dr Pankaj Talwar reportwhere he presented the mission and vision of IFS, the outreach programme, the academic calender of IFS for 2019-2020, various courses conduted by IFSand about FERTIVISION -2019. Half day live workshop on intrauterine insemination was conducted byInfertility stalwart Dr Pankaj Talwar. Live demonstrations of semen analysis and various semen preparation methods was very informative as well as interactive.A detailed discussion on semen analysis (WHO 2010) and male factor infertility by Dr. Pankaj Talwar kept the audience mesmerized. Dr. Suparna Banerjee, secretary IFS Bengal chapter, discussed evidencebased practices in IUI and tricks to improve the success rate in IUI.Both the sessions were very interactive and held the utmost attention of the audience. A case based panel discussion on secondary subfertility was moderated by Dr. Archana Kumari, Dr. Sunita Jha being the co- moderater. Panelists were infertility specialists of Ranchi-Dr. SashiBala Singh, Dr, Nirmala Singh, Dr. RupashreePuroshotam, Dr. Sakshi Singh.Expert inputs were made by Dr.Karuna Jha and Dr. Pankaj Talwar. The programme ended with vote of thanks proposed by Dr. Archana Kumari ,Secretary Jharkhand Chapter.
Around 70 delegates attended the workshopwhich included the postgraduates students from Rajendra Institute of Medical Sciences,Ranchi

Learning Point:
1. Clinical understanding of Semen analysis(WHO-2010), male factor infertility.
2. Methods of semen preparation for IUI
3. Evidence based practice in IUI.

Comment from audience:
"A very interesting and captivating workshop which gave everyone a chance to understand the very basis of IUI and semen analysis"…..Dr. Suman Sinha
"A new insight to old topic" ….Dr.SoumyaSinha
Very helpful for newcomers in the field of infertility especially who wish to start IUI setup…. Dr. Reena Godsara

Comment from faculty :
A very enthusiastic audience and in such large number with active participation in all sessions , gives the reason to promote many such basic workshops in future and give Jharkhand more importance in academic activities of IFS in future... Dr. Pankaj Talwar


सोसाइटी
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40% पुरुष बांझपन से पीड़ित

WEST MAHARASHTRA

Dr. Mamta Dighe
Chapter Secretary

Vision Statement : Making, quality Reproductive Medicine and IVF training available to Gynaecologists, along with training Postgraduates and creating awareness regarding increasing burden of infertility .

Executive Committee

Secretary- Dr. Mamta Dighe
Jt Secretary- Dr Nikita Naredi
Treasurer- Dr Shebaaz Daruwala
Execuive Members :
Dr Bharati Dhorepatil , Dr Nitin Lad
Dr Kishore Pandit, Dr Jyotsana Daule,
Dr Anjali Patil, Dr Bushra Khan

ACTIVITY 1
Annual Conference of Western Maharashtra Chapter of IFS, 13th and 14th July 2019 at Hotel Hyatt, Pune

Attended by over 350 delegates100 eminent faculty from all over the Nation2 orations, Ssmile IVF Oration by Dr. Jatin Shah and Xenith IVF Oration by Dr. Firuza Parikh
4 targeted workshops-
- Ovulation Induction and COH
- IUI and IVF Lab setup
- Male Infertility and IUI
- Recurrent Implantation Failure

Panel discussions were held on various topics such as USG in Infertility, Endometriosis, Management of PCOS, etc, which had a very interactive discussion. The Chief Guest was Prof Rekha Diwekar, Prof of Chemistry and well known Nutritionist. She spoke on Diet and Fertility and the impact food can have on increasing infertility. The program was highly appreciated and the faculty was extremely well chosen and were authorities in their field. It was a crisp, completely academic focused conference with precise take home points for the delegates.

ACTIVITY 2
IFS WMC organized Masterclass on Infertility for the Post graduate students

The intention was to expose the postgraduate students to practical infertility practice.
Four modules were created,
- Female Infertility,
- Male Infertility,
- Controlled Ovarian Stimulation and IUI
- IVF and Recent advances.

Lectures and in depth discussions on all aspects right from Pathophysiology to work up and management were discussed.
The highlight of the sessions, were the Panel Discussions, which had the postgraduates participate as panelists and a senior faculty presided as the Expert. The students enjoyed the active participation and got the opportunity, to participate and experience as panelists.
ACTIVITY 3Practical session on Laboratory aspects of Semen Analysis and Semen Preparation taken at IVF Centre, Armed Forces Medical College.
Over 40 participants attended and all practical tips and methods were taught to them.
CMEs are planned in January and February in Pune and nearby cities like Ahmednagar and Nashik.

ANDRA PRADESH

Dr. Usha Prasad
Chapter Secretary

Vision Statement
To make state of art infertility treatments accessible to the poor and unreached

Executive Committee

Secretary- Dr Usha Prasad
Jt Secretary- Dr Potharaju Nalluri
Treasurer- Dr Sailaja Nalluri
Executive Council : Dr Ganti Ratna,
Dr P. Himabindu, Dr J.Sowjanya Kumari,
Dr Paidi Durga Kumari, Dr Rekha,
Dr Deepthi Shalini, Dr Ravella Sowjanya

inauguration of 27th chapter of IFS Andra Parades Chapter on 22nd Sept 2019 at Hotel Fortune Murali Park at Vijayavada. Chief guest Dr Gouri Devi and guest of honor Dr Roya Rozati were present. The secretary Dr Usha Prasad, joint secretary Dr P Jayanthi and treasurer L Shalaja organized the CME

KARNATAKA

Dr Divyashree PS
Chapter Secretary

Executive Committee

Secretary – Dr Divyashree P S
Jt Secretary – Dr Vyshnavi A Rao
Treasurer – D rChandrikaKulkarni
Executive Members
Dr Mangala Devi, DrJyothi Patil
Dr Chaitra Naik, Dr Rekha Rajendra
DrYogitaRao, Dr Mir Jaffar,
Mr Hemanth Kumar

ACTIVITY 1
- CME on Luteal phase support on 24/03/2019
- Original research presented : 2

1. The prognostic value of endometrial receptivity array in women with RIF – Dr Divyashree P S
2. Triple stimulation vs conventional stimulation for embryo pooling : to optimise IVF outcome in poor responders- Dr Shravya T. External faculty : Dr Raju Nair from Kerala. Total number of faculty: 11. Total number of delegates: 43

ACTIVITY 2 : CME on Setting up ART Lab/Clinic on 19/05/2019
Original research presented : 2
1. PGS - 2 studies, the learning so far– DrGautham T Pranesh
2. Does PGT-A impact live birth rate and reduces time to pregnancy in RPL - DrAshwiniKarjol

External faculty :DrNympheaWalecha. Total number of faculty: 10
Total number of delegates: 64

ACTIVITY 3 * CME on Implantation on 28/07/2019 * Original research presented : 2
1. Obstetric complications and neonatal outcomes in donor egg IVF vs self egg IVF vs Natural conception – Dr Rinki Tiwari
2. Comparison of clinical outcome of IVF cycles with or without PGT –A, A prospective case control study- Dr Sumi Maria

• External faculty :DrRumaSatwik, Delhi • Total number of faculty: 10 • Total number of delegates:77

ACTIVITY 4
• CME on Practical tips to Ovarian stimulation on 29/09/2019 • Sponsored by Cipla Pharmaceuticals • Original research presented : 2 • External faculty :Dr SachinKulkarni, Kolhapur • Total number of faculty: 11 • Total number of delegates:70

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CoQ10	100 mg
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Vitb 6	3 mg
Calcium Pantothoate	12.5 mg
Folic Acid	1 mg
Vit A	5000 I.U
Vit D3	500 I.U
Vit E	25 I.U
Zinc Oxide	15 mg
Cupric Oxide	2.5 mg
Sodium Selenate	60 mcg
Mangnese Chloride	1.4 mg
Chromium Chloride	65 mcg

In

- Infertile couple
- Male Infertility
- Prostate Cancer
- Pre-eclampsia & IUGR
- Uterine Fibroid Tumours
- Habitual & Spontaneous Abortion

Tackles complicated conditions .... naturally