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Green ART News Bulletin



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Dr. (Prof) Shweta Mittal Gupta Secretary General, IFS



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Team 7
Team Leader



Dr. Yogesh Kumar

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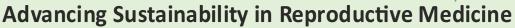


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From the President's Desk..



Dr. Prof.(Col) Pankaj Talwar VSM President. IFS



When we heal the Earth, we heal ourselves **Enhance fertility with Green initiatives!**

In the realm of reproductive health, in vitro fertilization (IVF) has emerged as a beacon of hope for couples facing infertility. However, as the demand for fertility treatments escalates, so also the need to address the environmental impact of these practices. This initiative explores the concept of Green IVF—an innovative approach that prioritizes sustainability without compromising the quality of patient care.

By examining the environmental challenges associated with traditional IVF and presenting actionable solutions, this project aims to inspire a shift toward more ecofriendly reproductive technologies. Traditional IVF practice is largely resourceintensive, that results in a considerable carbon footprint and contributes to environmental degradation. To recognize these grey areas and bring about a paradigm shift in how we introduce green changes in our IVF setup, is of paramount importance.

Green IVF represents a significant evolution in the landscape of reproductive medicine. As we continue to innovate and refine the IVF techniques, the dual goals of enhancing patient outcomes and reducing environmental impact can be achieved; at the same time contributing to lower operational costs, making fertility services more accessible in the long run.

Thus, the Green IVF Initiative aims to catalyze dialogue among healthcare professionals, researchers, and patients, inspiring collaborative efforts to embrace sustainability in IVF practices. By initiating the Green IVF Project in India, Indian Fertility Society (IFS) strives to pave the way for a more responsible, compassionate approach to reproductive health that honors the well-being of future generations.



Green IVF- Sustainable IVF program: A Novel initiative by Indian Fertility Societ

Dr. Prof. Shweta Mittal Gupta Secretary General, IFS

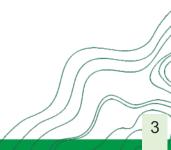


Our environment is the foundation which plays a pivotal role in ensuring our health, economy and well-being. Climate change, resource depletion, and pollution affect every facet of life. There is an urgent need to shift toward sustainable practices which is felt by everyone, including industries like healthcare and assisted reproductive technologies (ART). In a world where IVF and other ART procedures are becoming more common, especially as people turn to these treatments to build families, it is vital that we consider the environmental implications of these technologies. The green world is not just an abstract concept, it's about ensuring a healthy future for all of us, both in terms of the planet's ecosystem and the next generation. There is an urgent need to tie this idea of a "green world" directly to ART and inculcate the habit of sustainable living.

By integrating green technologies and sustainability into ART, we intend not only to minimize harm but also to pave the way for future innovations that will benefit everyone. Countries like India, with growing IVF markets, can pioneer "Made in India" green IVF technologies that can reduce the global carbon footprint. Afterall, green world matters to us all, and by making the IVF process greener, more efficient, and more eco-friendly, we're contributing to a 'healthy' future where both people and the planet can thrive

This innovative step taken by Indian Fertility Society aims at sensitizing ART clinicians, embryologists and stake holders who will collectively work towards the goal of green, sustainable IVF and put India on the global green map.





Pearls of Wisdom



Dr. Sonia Malik Mentor, Green IVF Initiative Chief Clinical Mentor, Nova IVF & Fertility, INDIA



Green Revolution by White Coat, Leading from despair to Hope!

In the 1960's, a global clarion call of 'Green Revolution' was given to increase the agricultural yield in order to meet the increasing food demands of a rapidly rising population. This new mantra indeed proved successful worldwide and also drove India towards becoming a more powerful self-sufficient and economically strong nation. Recently, a new term has started coming up in the field of reproduction – Green IVF! Interestingly, both terms pertain to reproduction: one in the field of plants and the other in animals / humans... dealing with the seed and soil!

The Green Revolution involved the introduction of high-yielding variety (HYV) seeds, advanced irrigation techniques, and chemical fertilizers to boost agricultural productivity Similarly, Green IVF utilizes innovative techniques such as natural cycle IVF, which minimizes hormonal medication and focuses on using advanced imaging and selection technologies for embryo quality assessment. Both movements aim to increase production efficiency. The Green Revolution aimed to alleviate hunger and improve food security whereas Green IVF addresses infertility issues, providing effective sustainable health solutions for couples struggling to conceive.

The biggest challenge with the green revolution has been the change in the genetics and epigenetics profile due to use of insecticides, pesticides and genetically engineered varieties of seeds. Fortunately, in contrast, Green IVF emphasizes a more holistic, innovative and sustainable approach by reducing medication use and environmental impact associated with traditional IVF methods.

I congratulate the present team of IFS led by Col.(Dr) Talwar and ably supported by Dr Shweta Mittal for taking up this very topical subject as the theme of this year. I am sure with the well thought of program, and committed team members, we shall see a change in ART practice in the country very soon.

I wish IFS a thumping success





The IFS Green Brigade



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Dr. Sangita Sharma

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Dr. Meenu Agarwal



Green Teams

IFS Green Initiative proposes to touch every aspect of the IVF field so as to improve sustainability in routine ART practice. Accordingly, a task-force of 9 specialized 'Green Teams' has been formed to investigate and evaluate problem areas where green alternatives can be applied. Phase-wise implementation of novel ideas is envisaged, facilitating a dynamic shift to environmentally friendly techniques in the near future.

1.Understanding green sustainable IVF

- 2. Designing sustainable ART clinics
 - 3. Clinician perspective towards reducing carbon footprint
 - 4 .Low cost IVF to reduce environmental load
 - 5. Bio medical waste disposal and recycling of products
 - 6. Embryology initiatives to reduce environmental carbon load
 - 7. Cryobiology and greenhouse emissions
 - 8. Made in India initiative to reduce GHG emissions
- 9. Novel ideas and net zero by 2045



Team 6 Bulletin

The Environmental Cost of Creating Life

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Addressing the Problem:

Medically Assisted Reproduction (MAR) comprises of established-techniques and ever-growing, new technology for providing improved pregnancy outcomes. This highly evolved standard sub-fertility management is catering to the needs of millions of the couples across the Globe, but also impairing "the planet earth's environment" by contributing to carbon-footprint, both directly and indirectly.

Cryobiology is an integral part of Assisted Reproductive Technology (ART) that plays an important role as requirement of Liquid-Phase Nitrogen (LN2) is inevitable for performing cryopreservation and maintaining the cryo-storage of gametes (oocytes and sperms), all stages of embryos (cleavage stage, morula stage, early/fully-expanded/ expanded/ hatching/ hatched blastocysts) and ovarian tissue.

Cryobiology and Impact:

The cryopreservation is an ancillary of the the overall sub-fertility management and changes the life of innumerable childless couples seeking treatment to achieve parenthood. But then again, this life-changing field of ART comes with an environmental cost, due to excessive use of the LN₂ and Dry-ice (solid-phase CO₂).

LN2 transportation is done using motor vehicles by way of specialized cylinders known as cryocans and cryo-tanks. The fossil fuels used is either diesel or petrol or compressed natural gas (CNG). Also, transportation of frozen reproductive cells after due permission from ART National Board (sperms and oocytes), embryos and tissues, across cities increases the environmental degradation. Altogether, this contributes to more carbon and greenhouse gases (GHGs), increases air pollution and global-warming that eventually creating a significant environmental burden and subsequently will impact the overall reproductive health including fertility, pregnancy and foetal development, sooner or later and will pass from one generation to the other.

GHGs emissions and IVF Embryology-Cryobiology Units:

The system in which we are working demands ever-increasing consumption of resources, however no thought is being spared by many of us to control the emission and accumulation of carbon foot-print and GHG. Several activities being done routinely by us in context to conducting IVF/ICSI-ET treatment cycle and frozen embryo transfer cycles contributes to increasing the carbon footprint. However, in the present day when we are talking about the essence of sustainable development and assisted reproduction in Indian-scenario, it hardly matters for any of us to be mindful of the carbon footprint we are generating. Lack of interest and apathy is prevalent amongst us as most of us are busy in achieving high success-rate in context to existing IVF-centres and lacking foresight of where the future is headed. It is high time to bring in the sustainability initiatives in reproductive medicine in the Indian system. Nitrogen was first liquefied at the Jagiellonian University on 15 April 1883 by Polish physicists Zygmunt Wroblewski and Karol Olszewski. Conversion of nitrogen gas into liquid form by separation and compression via compressor requires energy expenditure. It is well known that nitrous oxide (N₂O) and nitrous trifluoride (N₂F₃) are green-house gases . The carbon footprint of the healthcare sector is 4.4% of global net emissions. Nitrogen oxide is 300 times more potent a greenhouse gas in comparison to CO2 and also plays a role in the breakdown of atmospheric methane. LN2 is produced through cryogenic distillation, which involves distilling, cooling and condensing nitrogen gas from the air. Utilization of LN2, on the other hand, generates significant waste primarily through burn-off during transfer to and from storage tanks and storage itself. The carbon footprint of cryopreservation/cryo-storage is

attributable to the LN2 production process as well as its transportation to and its subsequent utilization .

Nitrogen in liquid form (LN₂) and carbon dioxide (CO₂) in solid form (Dry-Ice) are cryogenic gases that are being used very commonly in all the IVF Labs, Pre-implantation Genetics Laboratories and in Research Laboratories. Cryo-storage of Sperms, Oocytes, Embryos, Ovarian Cortex/Tissue and Growth-factors are routine Cryo-preservation procedures in IVF-Embryology Laboratories. Dry-Ice is being used to transport the embryo-biopsy, Spent Embryo-culture media and embryonic fluid samples from IVF-Embryology Laboratories to Genetic Laboratories for studying assisted reproduction at genetic and molecular level for certain reasons.

LN2 evaporates and evaporates only during its handling for the cryopreservation. It is high time to start taking all measures to prevent unnecessary loss of LN₂ by various means like an autofill system in which LN₂ hoses or pipes directly feed cryo-storage containers/cryo-cans/dewars or large tanks, replacements of aluminium cryo-storage containers/dewars by aluminium containers/dewars as the vaporization rate of LN₂ in a stainless-steel tank is less than that in an aluminium dewars and Stainless steel (10 years warranty) outlasts aluminium (05 years warranty), also.

Ever Increasing numbers of cryopreserved gametes embryos and the tissues and simultaneously the proliferation of gamete banks and banking procedures increasing demand for transport of LN₂ and samples sub-merged in the LN₂ across cities, countries and even continents. Utilization of dry-shippers rather than LN₂ containers can help to reduce the carbon footprint to a larger scale. Just like UK, we can also shift to "Cryocart" rather than using Styrofoam container/cryo-boxes to dispense LN2 and to perform vitrification or to move specimens to and from the cryo-storage Dewars or cryo-containers tanks that can also lead to a significant loss of LN2 making the process much more e cientCryo-banks and Cryo-repositories should be shifted to "all Solar Energy" consumption for economical sustainability. The implementation of some guidelines on sustainability is need of hour in Indian Scenario also by regulatory authorities.

Cryobiology Carbon footprints and GHG-Indian perspective:

Indian Fertility Society (IFS) has taken this initiative and we all must spread the awareness to take this aspect seriously and to act with responsibility to measure, minimize and control the



net carbon-emissions at the IVF-Embryology-Cryobiology Laboratories and Pre-implantation Genetic Testing (PGT)-Laboratories levels. This can also scale the "Embryology-Cryobiology" part of IVF-practice "A-Green-ART-Sustainable-Approach" in "Indian-subcontinental Scenario". Therefore, our nation "BHARAT" can be positioned well in the sustainability arena and can be one of the leading and a responsible country, through efforts put by all of us as "ART-Specialist-Clinicians" and "Clinical-Embryologists" together. It is high time for all of us to initiate all the necessary measures needed to be taken to help reduce the unnecessary evaporation of LN₂ at all levels including LN₂-industrial/commercial production, LN₂-transporation from manufacturing sites to vendors and then till the end users.

Addressing the issue, advocates need to re-think about various applications and role of "Cryobiology-Cryopreservation" in totality to reduce green-house gas emissions.

Open-ended Objectives are needed to be achieved:

- 1. It is the "need of hour" to Inform everyone and spread awareness to all IVF Centre-Embryology Laboratory personnel to understand and adopt the concept of "Green-ART and economical cryopreservation" by minimizing the wastage of LN₂ during transportation and as and when it is used.
- Understanding of the current status of the cryobiology-cryopreservation and modifying it to a eco-friendly approach to tackle "Global-Warming" directly and indirectly.
- 3. There is urgent need to bring some on-ground changes that can provoke all of us to follow the established "Standard Operating Procedure (SOPs)" of "Embryology-Cryobiology" utilizing minimally-standard resources for effective and e cient cryopreservation resources in Indian Scenario.
- 4. Official Green-ART Forum/Committee under aegis of IFS needs to channelize the concept of Green-ART through IVF Centres of its IFS members to start with.



- 5. Need for establishment of "Implementable Rules" to help reduce, record and minimize Greenhouse-Gas emission that can be considered in the form of "Clearly Written-Instructions" for all stakeholders in India.
- 6. Suggestions to the manufacturing companies of freezing media to re-think and individualize the packing of freezing-media for producing specific but separate pack-size of vitrification- cooling (freezing) and warming (thawing) media for Oocytes and Embryos. This will enable utilizing a standard and only-required volume thereby making cryopreservation more economical. Eg.; certain vitrification media kits are unnecessarily suppling 01 vial of Basic Solution (BS) solution and 1 Extra vial Vitrification Solution (VS) within all the packs that is actually not needed every time and thereby increases financial and environmental burden. These companies must separate the vitrification media kits specifically into two different packs 1) Separate for Oocytes vitrification for with only 01-01 vial each of BS, ES and VS (Total 3 vials) and 2) Separate for Embryo vitrification with only 01-01 vial each of ES and VS rather than 02 vial of VS and 01 vial of BS. This will make more sense in comparison to current packsizes being manufactured and supplied all over the world.
- 7. Redesigning the compact smart cryo-box made-up of polycarbonated-plastic having adequate volume-capacity for LN₂ for handling daily cryo-preservation procedure in IVF-Embryology-Cryobiology will reduce the volume that is used concomitantly preventing evaporation, spillage, over-usage and wastage of LN₂ rather than polystyrene box with larger-volume capacities.



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Review of Work (ROW)

Quarter- II, III & IV, 2024



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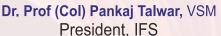
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