

Planet Be

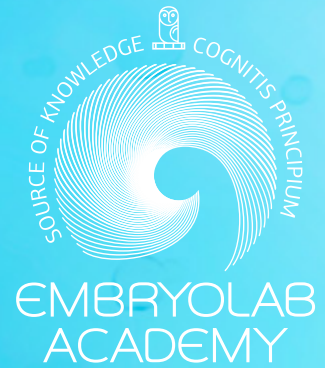
Public Awareness Campaign
on Environmental Impact
on Reproductive Health

page. 4

Egg Freezing

The Science Behind
Fertility Preservation

page. 10



The Fertility

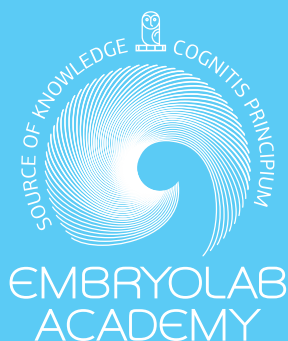
Counseling Service

page. 12



FERTILITY NEWSLETTER 2025

ANNUAL EDITION ABOUT THE NEWS AND ACTIVITIES OF EMBRYOLAB ACADEMY



ABOUT US

Embryolab Academy is a non-profit foundation, focused on education, training and research in assisted reproduction and reproductive medicine. Embryolab Academy organises and hosts international workshops and seminars, focused on state of the art assisted reproduction techniques.

FIND US

173-175 Ethnikis Antistaseos str.
551 34, Thessaloniki, Greece
T. 2310 474747
info@embryolab-academy.org

www.embryolab-academy.org



FERTILITY NEWSLETTER 2025



ISSUE

#09

ISSUE PARTICIPANTS

Alexia Chatziparasidou

MSc, PMI-RMP, Consultant Sr. Clinical Embryologist, Co-Founder of Embryolab, Embryolab Academy Co-Founder and Director

Dr. Nicholas K. Christoforidis

MD, MSc, FRCOG, Consultant Obstetrician & Gynaecologist, Fertility Specialist, Co-Founder & Clinical Director of Embryolab

Kyriaki Mitta

MD, MSc, PHD(c), Gynecologist in Assisted Reproduction

Chara Oraiopoulou

BSc, M.Res., Biologist, Senior Clinical Embryologist, ESHRE certified, Lab Supervisor

Dimitris Michalakakis

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist

Konstantinos Ravanos

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist

Achilleas Papatheodorou

PhD, M.Med.Sc., Senior Clinical Embryologist, ESHRE certified, Lab Director, Embryolab Academy BoD Member

Marianna Papadopoulou

BSc, MSc, Biologist, Senior Clinical Embryologist, ESHRE certified

Anastasia Antonopoulou

BSc, Assisted Reproduction Midwife, Deputy Head of Midwifery Team

Zoi Tarsinou

BSc, MSc, Assisted Reproduction Midwife, ESHRE certified

Argyro Agiomamitou

MD, Gynecologist in Assisted Reproduction

Nikos Anesidis

MD, Gynecologist in Assisted Reproduction, Fertility Specialist, Clinical Head of Donation Program

Michael Kyriakidis

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist, Scientific Director of Embryolab

Martha Moysidou

BSc, MSc, PMI-RMP, Biologist, Senior Clinical Embryologist, ESHRE certified, Lab Deputy Director, Risk Manager

Mary Karagianni

BSc, MSc, Biologist, Senior Clinical Embryologist

Lucy Thivaïou

BSc, MSc, Biologist, Clinical Embryologist

Argyro Sfakianaki

BSc, MSc Head of Midwifery Team, Assisted Reproduction Midwife

Maria Baziakou

BSc, MSc, Biologist



Alexia Chatziparasidou

MSc, PMI-RMP, Consultant Sr. Clinical Embryologist, Co-Founder of Embryolab, Embryolab Academy Co-Founder and Director

a.chatziparasidou@embryolab.eu

Embryolab Academy

12 Years of Education and Awareness

Embryolab Academy was founded in 2013 with a vision to promote education, training, and awareness in the field of assisted reproduction. Twelve years later, its innovative initiatives have expanded worldwide, offering opportunities for learning and knowledge exchange to professionals in reproductive medicine across the globe.

Through our annual Newsletter, we aim to convey to our readers the pulse of the developments and challenges that shape our science.

This year's issue focuses on the **environment and fertility**. Dr. Nikos Christoforidis, founder and passionate advocate of the campaign for environmental and reproductive health, presents the main principles of Planet Be, while K. Mitta highlights the dangers of microplastics. Ch. Oraïopoulou and D. Michalakis discuss how environmental factors affect fertility and laboratory procedures.

In the **"Freeze All"** section on fertility preservation, K. Ravanos explains the science behind oocyte cryopreservation, A. Papatheodorou emphasizes the importance of proper thawing for IVF success, and M. Papadopoulou evaluates the effectiveness of donor frozen oocytes.

The **"Assisted Reproduction Clinic"** section features N. Christoforidis offering valuable advice for IVF success, while A. Antonopoulou and Z. Tarsinou underline the crucial role of the IVF coordinator in the holistic support of patients. N. Anesidis and A. Agiomamitou answer couples' most frequent questions, and M. Kyriakidis presents the EmbryoNet network of collaborating clinics, showcasing how it ensures access to assisted reproduction services throughout Greece.

The issue concludes with a series of **laboratory-focused articles**, addressing the daily challenges of a modern embryology laboratory. Specifically, A. Papatheodorou presents new insights on the management of mosaic embryos in preimplantation genetic testing, M. Karagianni reports on her study results on artificial oocyte activation, while L. Thivaïou and M. Basiakou analyze advanced methods of sperm selection and preparation, focusing on sperm DNA integrity. The section closes with M. Moisidou responding to patients' everyday questions and A. Sfakianaki outlining the latest legal framework changes regarding preimplantation genetic diagnosis.

“

Twelve years on, Embryolab Academy continues with the same dedication to serve the science of life, doing what it knows best: generously sharing scientific knowledge and excellence in the field of assisted reproduction.

”

Planet Be

Public Awareness Campaign on Environmental Impact on Reproductive Health

It is with great concern that we note a systematic increase in the volume of medical literature linking exposure to environmental pollutants with infertility and reproductive health problems in general. However, for the majority of people of reproductive age, this correlation is little known, and it has only recently begun to reach health professionals, particularly specialists in reproductive medicine and assisted reproduction.

This was the main reason that prompted the scientific working group at Embryolab Fertility Clinic, under the name "Planet Be", to plan and communicate an awareness campaign with the same title, aiming to send a clear message about environmental pollutants that act as hormone disruptors.

The "Planet Be" awareness campaign began in the spring of 2025 with press conferences and events open to the general public, pioneering in Greece on issues related to environmental health and human reproduction. The Planet Be scientific team referred to pollutants in the atmosphere, water, food, as well as the presence of endocrine disruptors and microplastics in objects we come into contact with every day in a multitude of daily activities, both in our home environment and in the outside environment, from the air we breathe in the cities we live in to the ubiquitous prevalence of persistent chemicals and nanoplastics.

However, the Planet Be campaign does not limit its mission to informing and raising awareness about the environmental pollutants that surround us in our daily lives. The broader goal of the Planet Be scientific team is to propose measures to limit exposure to environmental pollutants, as well as ways to mitigate the negative effects of exposure to these pollutants. In this way, the public is beginning to familiarize themselves with the most common pollutants, such as airborne particulate matter, heavy metals in water, phthalates, and bisphenols in various everyday plastic products, but also are starting to adopt effective strategies to protect themselves from the side effects that have been recorded, for example by installing appropriate air and water filters, replacing plastic with metal or glass containers, or following a healthier lifestyle, exercise, and diet to strengthen the immune system and better eliminate toxins that enter the human body.



Dr. Nicholas K. Christoforidis

*MD, MSc, FRCOG, Consultant
Obstetrician & Gynaecologist,
Fertility Specialist, Co-Founder &
Clinical Director of Embryolab*

n.christoforidis@embryolab.eu



“

Planet Be's actions will continue, as the goal of the Embryolab Fertility Clinic scientific team is to spread awareness among an even greater number of people of reproductive age, as well as health professionals about the importance of identifying harmful factors in our daily environment and their impact on the frequency of infertility and complications during pregnancy.

”



Kyriaki Mitta

MD, MSc, PHD(c), Gynecologist
in Assisted Reproduction

k.mitta@embryolab.eu



References

1. Hong Y, Wu S, Wei G. Adverse effects of microplastics and nanoplastics on the reproductive system: A comprehensive review of fertility and potential harmful interactions. *Sci Total Environ.* 2023;903:166258.
2. Doroftei B, Savuca A, Cretu AM, et al. Microplastics and human fertility: A comprehensive review of their presence in human samples and reproductive implication. *Ecotoxicol Environ Saf.* 2025;303:118939.
3. Hunt K, Davies A, Fraser A, et al. Exposure to microplastics and human reproductive outcomes: A systematic review. *BJOG.* 2024;131(5):675–683.
4. Zhang C, Zhang G, Sun K, et al. Association of mixed exposure to microplastics with sperm dysfunction: a multi-site study in China. *EBioMedicine.* 2024;108:105369.
5. Geng Y, Liu Z, Hu R, et al. Toxicity of microplastics and nanoplastics: invisible killers of female fertility and offspring health. *Front Physiol.* 2023;14:1254886.
6. Qin X, Cao M, Peng T, et al. Features, Potential Invasion Pathways, and Reproductive Health Risks of Microplastics Detected in Human Uterus. *Environ Sci Technol.* 2024;58(24):10482–10493.
7. Montano L, Raimondo S, Piscopo M, et al. First evidence of microplastics in human ovarian follicular fluid: An emerging threat to female fertility. *Ecotoxicol Environ Saf.* 2025;291:117868.
8. Tian J, Liang L, Li Q, Li N, Zhu X, Zhang L. Association between microplastics in human amniotic fluid and pregnancy outcomes. *J Hazard Mater.* 2025;482:136637.
9. He Y, Yin R. The reproductive and transgenerational toxicity of microplastics and nanoplastics: A threat to mammalian fertility in both sexes. *J Appl Toxicol.* 2024;44(1):66–85.

Fertility & Microplastics:

Protecting Our Future Generations

Why Everyone and Healthcare Workers Should Be Informed

Plastics have made life easier, but their tiny fragments are now invading the most private corners of our bodies.

Scientists call them **microplastics** (smaller than a grain of rice) and **nanoplastics** (invisible to the eye). These particles are everywhere around us. They are found in the air we breathe, the water we drink, the food we eat, and even in household dust and come from the breakdown of larger plastic waste, synthetic clothing fibers, personal care products, packaging, and medical supplies. Because plastic is so widely used and slow to degrade, these particles have spread into every part of our environment and unfortunately, into our bodies too [1,2].

Researchers have now detected microplastics in human blood, lungs, placenta, and even in semen, ovaries and breast milk. This means that plastic particles can cross important body barriers and reach organs that are vital for reproduction. Although research is still developing, growing evidence suggests that these particles can harm fertility in both women and men and may also affect unborn babies [2,3].

For **men**, studies have shown that microplastics can build up in the testes and semen, reducing sperm number, movement, and quality. Animal studies have found that these particles can damage the structure of the testicles and disrupt hormone balance by causing inflammation and oxidative stress [1,2]. Researchers in China found microplastics in every semen sample they studied, with clear links between higher exposure and poorer sperm health [4].

For **women**, microplastics have been found in ovarian tissue, uterus, follicular fluid (the fluid around eggs), and the placenta. These particles may cause inflammation, hormonal imbalance, and changes in the cells that help eggs mature and the uterus stay healthy [5,6,7]. Some studies linked microplastics in the placenta with smaller birth weights and lower Apgar scores in newborns, suggesting possible effects on fetal development. Animal research shows that when mothers are exposed to microplastics, the particles can cross the placenta, reaching the developing baby and leading to developmental and metabolic problems later in life [8,9].

These findings are worrying because infertility is already a growing global problem, affecting about one in six couples. If environmental pollution, especially from plastics, contributes to this trend, we need urgent action. However, many people, including healthcare professionals, are still unaware of this hidden risk.

That is why **awareness and education** are essential. The public should know simple ways to reduce exposure, like choosing glass or stainless steel containers, avoiding heating food in plastic, cutting down on bottled water, and supporting recycling initiatives. Healthcare workers also need to be informed so they can educate patients, especially those planning pregnancy, and encourage research and policies to monitor and limit microplastic exposure.

Although scientists are still learning exactly how microplastics affect fertility and pregnancy, what is already known is enough to **call for caution**. Reducing plastic pollution and understanding its effects on our bodies are important steps to protect not only the environment but also the health of future generations.



Chara Oraipoulou

BSc, M.Res., Biologist, Senior
Clinical Embryologist, ESHRE
certified, Lab Supervisor

c.oraipoulou@embryolab.eu



References

Wu S, Zhang Y, Wu X, Hao G, Ren H, Qiu J, Zhang Y, Bi X, Yang A, Bai L, et al. Association between exposure to ambient air pollutants and the outcomes of in-vitro fertilization treatment: a multicenter retrospective study. *Environmental International*. 2021; 153:106544. DOI:10.1016/j.envint.2021.106544.

Sarah LaPointe, Jacqueline C. Lee, Zsolt P Nagy, Daniel B Shapiro, Howard H Chang, Yifeng Wang, Armistead G Russell, Heather S Hipp, Audrey J Gaskins

Air pollution exposure in vitrified oocyte donors and male recipient partners in relation to fertilization and embryo quality. *Environmental International*. 2024;193:109147. DOI: 10.1016/j.envint.2024.109147.

Denis A Seli, Hugh S Taylor

The impact of air pollution and endocrine disruptors on reproduction and assisted reproduction. *Curr Opin Obstet Gynecol*. 2023 Jun 1;35(3):210-215. DOI: 10.1097/GCO.0000000000000868

The Impact of Environmental Pollutants in the Embryology Laboratory

During assisted reproductive technology (ART) procedures, both the exposure of individuals to environmental pollutants and the quality of the laboratory environment play a decisive role in gamete quality and embryo development. In this context, the investigation of the effects of environmental pollutants -both external and internal- represents an area of growing scientific interest, as studies indicate that they may influence treatment success rates.

Environmental pollutants, such as nitrogen dioxide (NO₂), ozone (O₃), particulate matter, and volatile organic compounds (VOCs), act through various mechanisms. In the human body, their effects may lead to oxidative stress, inflammatory responses, or DNA damage, with diverse impacts during critical stages of oogenesis, spermatogenesis, and embryogenesis. Within the laboratory environment, VOCs potentially released from building materials, cleaning agents, cosmetics or fragrances can interact with ozone to form microparticles capable of penetrating culture media. According to current evidence, the presence of these particles can adversely affect the quality of oocytes and spermatozoa, as well as the development of embryos cultured in vitro.

Research data demonstrate that increased exposure to ambient air pollutants during oocyte retrieval or embryo transfer is associated with lower clinical pregnancy rates. Furthermore, a 2024 study correlated higher exposure of both men and women to elevated levels of air pollution with reduced survival of cryopreserved oocytes, lower fertilization rates, and fewer high-quality embryos. Similarly, a multicenter study in 2021 found that increased exposure to nitrogen dioxide, carbon monoxide, and ozone was associated with reduced implantation and clinical pregnancy rates.

Even low-level introduction of pollutants into an ART laboratory can disrupt the delicate balance of the laboratory environment. Elevated concentrations of VOCs have been shown to negatively affect embryo development, leading to delayed cell division and lower blastocyst formation rates.

Maintaining a “clean” environment in an ART laboratory is of paramount importance for Embryolab, as it contributes to achieving high treatment success rates.

Ensuring optimal laboratory conditions is accomplished through the implementation of practices and protocols that include:

- Specialized air filtration systems to remove particulate matter and VOCs
- Positive air pressure within laboratory areas
- Use of low-emission materials (e.g. specific paints and flooring)
- Avoidance of fragrances by laboratory personnel
- Routine monitoring and documentation of air quality

In conclusion, exposure to environmental pollutants -both at the level of individual reproductive health and within the ART laboratory microenvironment- constitutes a critical factor capable of influencing gamete quality, embryo development, and ultimately treatment efficacy. Maintaining an optimal and controlled laboratory environment is not merely a technical requirement, but an essential element for providing high-quality assisted reproductive therapies.

Environmental Factors and Their Influence on Ovarian Reserve and ART Outcomes

In recent years, our understanding of fertility has expanded beyond the limits of physiology alone. The environment in which we live - **the air we breathe, the water we drink, and the materials we come into contact with each day** - can leave subtle but measurable marks on reproductive health. For many women, these invisible influences may affect ovarian reserve (Gaskins et al., 2019) and, consequently, the outcome of assisted reproductive treatments.

Air pollution remains one of the most extensively studied environmental factors. Exposure to fine particulate matter (PM2.5 and PM10) and gases such as nitrogen dioxide (NO₂), especially in urban areas, has been associated with a reduced ovarian response and lower live birth rates following IVF. A recent systematic review and meta-analysis (Liu et al., 2023) found that women exposed to higher air pollution levels during ovarian stimulation or embryo transfer were less likely to achieve a clinical pregnancy or live birth — emphasizing the importance of minimizing exposure during these critical treatment phases.

Microplastics have now become ubiquitous, reaching from the highest mountain peaks to the deepest ocean waters. Phthalates and bisphenols (BPA), known endocrine disruptors, interfere with hormonal balance and can induce oxidative stress in ovarian tissue and developing follicles. Studies suggest that increased exposure to BPA may disrupt folliculogenesis and oocyte maturation, leading to a lower ovarian reserve and poorer IVF outcomes (Ehrlich et al., 2012; Pandey et al., 2025). Although complete avoidance is impossible, practical changes - such as reducing plastic use, avoiding food storage in plastic containers, and choosing fragrance-free products - can meaningfully reduce exposure.

More recently, attention has turned to the so-called **"forever chemicals"**, or PFAS, found in non-stick cookware and water-resistant fabrics. These substances are extremely persistent and can remain in the human body for years. Evidence suggests that high PFAS exposure is associated with lower fertilization rates and reduced embryo quality among women undergoing IVF (Shen et al., 2024). Using water filters and limiting contact with non-stick materials represent simple but valuable preventive measures.

Heavy metals, including cadmium, lead, and mercury, are also recognized as potential reproductive toxins. Chronic exposure has been linked to lower anti-Müllerian hormone (AMH) levels and, in some cases, earlier menopause (Ding et al., 2024). Everyday actions such as avoiding fish with high mercury content, quitting smoking, and using reliable water filtration systems can reduce exposure - particularly important for women preparing for fertility treatment.

None of these environmental influences acts in isolation, and none solely determines fertility potential. Yet, collectively, they contribute to a broader picture of reproductive health - one where lifestyle, environment, and medical care are deeply interconnected. For women preparing for assisted reproduction, small environmental adjustments combined with evidence-based medical guidance may support ovarian function and improve treatment success.

At Embryolab, environmental awareness is a fundamental part of our Next-Gen IVF philosophy. By guiding our patients toward healthier choices - cleaner air, safer materials, and a more conscious daily lifestyle - we honor both science and the delicate balance that sustains human life.



Dr. Dimitris Michalakakis

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist

d.michalakakis@embryolab.eu



References

1. Gaskins AJ, Mínguez-Alarcón L, Fong KC, et al. Exposure to Fine Particulate Matter and Ovarian Reserve Among Women from a Fertility Clinic. *Epidemiology*. 2019;30(4):486-491. doi:10.1097/EDE.0000000000001029
2. Ehrlich S, Williams PL, Missmer SA, et al. Urinary bisphenol A concentrations and early reproductive health outcomes among women undergoing IVF. *Hum Reprod*. 2012;27(12):3583-3592. doi:10.1093/humrep/des328
3. Pandey AN, Yadav PK, Premkumar KV, et al. Damage mechanisms of bisphenols on the quality of mammalian oocytes. *Hum Reprod*. 2025;40(2):186-198. doi:10.1093/humrep/deae284
4. Shen J, Mao Y, Zhang H, et al. Exposure of women undergoing in-vitro fertilization to per-and polyfluoroalkyl substances: Evidence on negative effects on fertilization and high-quality embryos. *Environ Pollut*. 2024;359:124474. doi:10.1016/j.envpol.2024.124474
5. Ding N, Wang X, Harlow SD, Randolph JF Jr, Gold EB, Park SK. Heavy Metals and Trajectories of Anti-Müllerian Hormone During the Menopausal Transition. *J Clin Endocrinol Metab*. 2024;109(11):e2057-e2064. doi:10.1210/clinem/dgad756

The Importance of Proper Oocyte Warming in IVF Success

Oocyte cryopreservation (egg freezing) enables women to preserve their eggs for future use, whether for personal fertility preservation or through donor egg banks. Recent advancements in both cryopreservation and warming techniques have significantly improved success rates and overall efficiency, paving the way for the establishment of egg donor banks. Today, many IVF clinics and couples choose to collaborate with these banks to facilitate egg donation treatments. Patients or clinics can select already frozen donor eggs from an egg bank, which are then shipped to the IVF clinic for use in treatment. This approach streamlines the process, reducing treatment delays and making egg donation a more accessible and convenient option.

When the time comes for these **frozen eggs** to be used in an in vitro fertilization (IVF) treatment, they must first be **properly warmed**. Oocyte warming is the process of bringing eggs from -196°C in liquid nitrogen storage back to normal body temperature while simultaneously restoring water inside the cells. This process must be performed **gradually and carefully** to avoid damaging the delicate structure of the eggs.



Achilleas Papatheodorou

PhD, M.Med.Sc., Senior Clinical Embryologist, ESHRE certified, Lab Director, Embryolab Academy BoD Member

a.papatheodorou@embryolab.eu

Why is Proper Warming a Critical Step?

The warming process is just as important as the freezing process. During vitrification, the egg is cooled so quickly that **no ice crystals form**, which could otherwise damage it. However, if **warming is not performed correctly**—that is, with the correct warming rate and proper rehydration solutions—there is a risk that ice crystals may form during rewarming, which can **disrupt the egg's structure** and render it non-viable. Simply put, the egg is a fragile cell that can be damaged if exposed to sudden temperature changes or if the correct procedures are not followed. This is why warming is considered a **critical step**: it determines whether the egg will survive in a healthy state and be able to fertilize.

Studies have demonstrated just how crucial proper warming techniques are. In one study, when eggs were warmed using suboptimal methods, **survival and embryonic development rates** were significantly lower compared to carefully optimized techniques. On the other hand, with refined warming protocols, egg survival rates can be remarkably high. For example, research has shown that with advanced vitrification and optimal warming, **about 90% of eggs survive** after warming. Overall, with modern vitrification techniques, the average egg survival rate post-warming is **very high (up to ~95%)**, whereas with older slow-freezing methods, survival rates were notably lower (around 75%). This difference highlights just how crucial proper handling is during both freezing and warming to maintain egg integrity.

How Does It Affect IVF Success?

The success of an IVF cycle depends on many factors, and proper egg warming is one of the most fundamental. If an egg does not survive the warming process, it cannot be fertilized—reducing the number of available embryos and, consequently, the chances of pregnancy. Even if it survives but has suffered microdamage, it may not develop properly after fertilization. Conversely, when eggs are properly warmed and **remain intact**, they can be successfully fertilized (usually via intracytoplasmic sperm injection/ICSI) and develop into viable embryos. Thus, warming directly affects the number and quality of embryos available for transfer to the uterus.

In reality, warming is just **the first step**. Once an egg is warmed, it must be fertilized and develop into an embryo, which then needs to be genetically normal and capable of implanting to achieve pregnancy. All of these steps depend on starting with an intact **egg after warming**. If the warming process fails, the entire sequence ends there. **In simple terms, warming quality “sets the stage”** for what follows in IVF.

Several factors influence the success of warming :

- **The woman's age at the time of freezing:** The younger a woman was when she froze her eggs, the more likely they are to be healthy and withstand warming. For example, eggs frozen at <35 years of age show higher survival and fertilization rates compared to eggs frozen closer to 40 .
- **The number and quality of eggs:** More and higher-quality eggs increase the likelihood that some will survive intact. Healthy, mature eggs have greater resilience, while lower-quality or immature eggs may not perform as well .
- **The freezing technique used:** Vitrification produces significantly better results than older slow-freezing methods. Vitrification prevents ice crystal formation and results in higher warming success rates .
- **The quality of the laboratory and expertise of the staff:** A well-equipped laboratory with experienced embryologists can maintain ideal conditions and strictly follow protocols, maximizing success. The expertise of the team handling the eggs plays a **major role** in whether they will survive warming .

These factors are interdependent. Even excellent-quality eggs can be lost if they are not warmed correctly in an inadequately trained laboratory. Similarly, even the best laboratory can apply the most advanced techniques, but if the original eggs were of poor quality or very few in number, success is still not guaranteed. That is why a **comprehensive approach** is needed: high-quality biological material and excellent technical support.

High-Level Expertise: A Key to Success

It is no exaggeration to say that **IVF success largely depends on the quality of the embryology laboratory**. Experts agree that a high-quality lab, with experienced embryologists and the right protocols, can double success rates in an IVF cycle. The same logic applies directly to egg cryopreservation and warming: the lab team **handles your eggs behind the scenes**, from retrieval to cryostorage, and during the critical moments of warming and fertilization.

The **experience and skill of the embryologist** can make a difference. Studies have shown that **even when using the same standard protocols**, results can vary from clinic to clinic. In one study comparing egg survival rates from the same organization but different locations, there were **significant differences** in successful warming rates. This suggests that the human factor—the technique of the embryologist performing the freezing and warming—plays a **decisive role**. In other words, it is not just about having the best method; it also requires **the right expertise** to apply it correctly.

Specialized Warming Protocols and Personalized Approaches

Each clinic and egg bank may use slightly different freezing techniques and materials. As a result, the best warming process may need to be adjusted on a case-by-case basis. Today, specialized warming protocols have been developed, many of which are tailored to match the freezing method originally used. For example, large egg banks provide specific warming instructions that must be strictly followed based on the medium and method used by each bank. This means the embryology team must be familiar with and capable of applying different protocols depending on the source of the eggs.

The ability to personalize the process is essential. An experienced embryologist will assess factors such as the egg bank, the freezing method used, how long the eggs were stored, and any special characteristics. Based on this, they can choose the best warming protocol or make small modifications to optimize survival for specific eggs.

Our team has extensive experience in oocyte warming procedures and has been actively involved in research contributing to the development of vitrification and warming protocols. This background gives us a distinct advantage, enabling us to carefully evaluate each case and perform the warming process in the most effective and reliable way possible.



Conclusion

Proper egg warming is a **critical step** in the IVF process. It serves as the “bridge” between egg cryopreservation and the creation of viable embryos. A mistake at this stage can result in lost eggs and reduced success rates, whereas **perfect execution ensures that every precious egg has the best chance of developing into a viable embryo**.

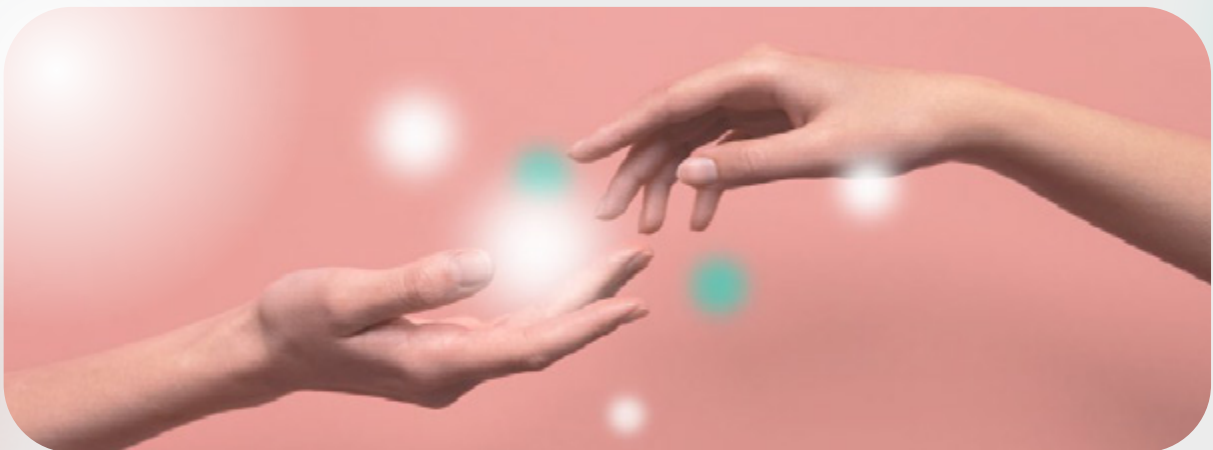
This is why couples should trust a clinic with **high-level expertise** in cryopreservation—where the team understands how crucial warming is and applies the best possible protocols.

With advancements in science, specialized techniques, and personalized care, success rates are continually improving, making it possible for more people to achieve their dream of parenthood.



IVF abroad

Your Fertility Journey, Reimagined



Egg Freezing

The Science Behind Fertility Preservation

The goal of fertility preservation methods is to maintain reproductive capacity and postpone parenthood until the future.

The rapid developments in the field of cryobiology now make it possible to safely and effectively cryopreserve and store eggs for future use with excellent results.

Who is it for?

- Women who are delaying motherhood for social, professional, or personal reasons.
- Women who are about to undergo oncological treatments, such as surgery, radiation, or chemotherapy.
- Women with a family history of premature ovarian insufficiency.
- Women with endometriosis.



The Stages of the Procedure

1. Consultation with a Fertility Gynecologist Specialist

The goal is to personalize the procedure by customizing the medication protocol and the prognostic success models of the method, which will be based on:

- The individual and family medical history.
- The woman's specific physical and psychological needs.
- Laboratory and imaging tests related to the ovarian reserve of eggs, including the calculation of the Anti-Müllerian Hormone (AMH) and the Antral Follicle Count (AFC).

2. Ovarian Stimulation and Egg Retrieval

The woman undergoes pharmaceutical ovarian stimulation with hormones for 10–12 days to promote the development and maturation of multiple follicles. The treatment is absolutely controlled and guided by the treating physician. Egg retrieval is performed via a minor vaginal surgical procedure under ultrasound guidance and sedation, ensuring the process is completely safe and woman-friendly.

3. Egg Cryopreservation and Storage

This is performed using vitrification, the most modern and effective method for the cryopreservation of genetic material. Specifically, it allows for the ultra-rapid freezing of the eggs into a glassy (vitreous) state, preventing the formation of intracellular ice and crystals through the use of special cryoprotective molecules. The eggs are then placed in special vials which are immersed directly in liquid nitrogen at -196°C , where they are stored for a long period (cryobank). Our unit, EMBRYOLAB, was among the first to implement this technique in Greece, utilizing state-of-the-art equipment.

Conclusion

With appropriate medical guidance, egg freezing is a safe and effective method of fertility preservation that increases flexibility in family planning.



Konstantinos Ravanos

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist

k.ravanos@embryolab.eu



Frequently Asked Questions

How many eggs should be cryopreserved?

The success of the method depends on the number of eggs and the woman's age at the time of cryopreservation, with the best results recorded between the ages of 25 and 36, though this does not mean that older ages cannot proceed with this process. Statistically, based on prognostic models, as age increases, the quality of the eggs decreases, resulting in the need to retrieve more eggs to achieve a normal pregnancy.

Is it a safe procedure?

The use of vitrification has provided excellent results, with egg survival approaching 100%. The quality and fertilization capacity of the eggs are not affected by the duration of cryopreservation. Large epidemiological studies have shown that there is no increased risk of obstetric complications and genetic abnormalities in children born from the use of cryopreserved eggs¹. Furthermore, the use of hormonal medications for ovarian stimulation does not de novo increase the risk of breast and ovarian cancer compared to the general population².

Βιβλιογραφία

1. Six-year follow-up of children born from vitrified oocytes Yuya Takeshige 1, Mizuho Takahashi 2, Tomoko Hashimoto 1, Koichi Kyono 3 Reprod Biomed Online 2021 Mar;42(3):564-571
2. Fertility drugs and cancer: a guideline.(ASRM). Fertil Steril. 2024 Sep;122(3):406-420. doi: 10.1016/j.fertnstert.2024.03.026. Epub 2024 May 3.PMID: 38703170

Fresh or Frozen Donor Eggs:

Is There a Difference in IVF Success?

IVF with donor eggs is one of the most effective assisted reproduction treatments, especially for women with low ovarian reserve or genetic contraindications. In recent years, the use of frozen donor eggs - cryopreserved through the process of vitrification - has grown rapidly. This approach offers greater flexibility in scheduling and wider availability of donor options. But how do frozen eggs compare to fresh ones in terms of success?

The Science Behind Vitrification

The vitrification technique has advanced dramatically in recent years. Today, it is performed with exceptional precision, achieving oocyte survival rates exceeding 90%. Several publications worldwide have shown that fertilization and blastocyst formation rates are similar between fresh and frozen donor eggs, as well as the clinical outcomes related to pregnancy and live birth.

A study conducted at our clinic in 2023 confirmed these findings: donor egg survival rates after thawing reached approximately 93%. The research also demonstrated that frozen donor eggs yield comparable results in fertilization, embryo development, blastocyst formation, implantation, clinical pregnancy, and live birth rates when compared to fresh donor eggs.

Why Choose Frozen Donor Eggs?

The use of frozen donor eggs comes with several key advantages. One of the most important is flexibility - treatments can be scheduled without the need to synchronize the donor's and recipient's cycles, significantly reducing waiting times.

Frozen eggs are also available through established egg banks, allowing intended parents to select donors based on phenotypic characteristics such as hair color, eye color, height, weight, ethnicity, and blood type. Some systems even use facial recognition technology to help identify donors who match the recipient's main phenotypic characteristics.

Usually, the intended parent(s) complete a brief questionnaire describing their preferred donor traits, and the egg bank matches them with suitable donors who have passed all necessary medical, laboratory, and genetic screening. Another advantage is cost: cycles using frozen donor eggs are typically less expensive than fresh cycles, since the donor's stimulation and retrieval have already been completed.

A Proven, Safe, and Effective Option

Based on both published research and clinical experience, the use of frozen donor eggs has become a safe, reliable, and highly successful option. With excellent egg survival rates and high chances of achieving pregnancy, this method helps more couples and individuals turn their dream of parenthood into reality.



Marianna Papadopoulou

BSc, MSc, Biologist, Senior Clinical Embryologist, ESHRE certified

m.papadopoulou@embryolab.eu

“

In Summary

Both fresh and frozen donor eggs offer outstanding success rates. The choice between them should be personalised, depending on medical indications, donor availability, and personal preferences. Consulting a fertility specialist is the best way to determine the most suitable path to parenthood.

”



The Fertility Counseling Service

Embryolab Fertility Clinic has recently launched an innovative clinical service aimed at further improving infertility and assisted reproduction services. This service focuses on the importance of counseling in the early stages of fertility investigation and on the appropriate direction that individuals interested in reproductive health issues should take. For the first time, the focus of fertility counseling is shifting one step forward, focusing on individuals of reproductive age who wish to receive accurate and detailed information on issues related to their fertility, the factors that affect it, from their personal and family history to their lifestyle and the impact this may have on their chances of getting pregnant in the future. In this way, young men and women become familiar with the importance of adopting a healthy Mediterranean diet, maintaining a normal body weight, and avoiding harmful factors such as smoking and alcohol.

The Fertility Counseling Service also places great emphasis on the impact of environmental pollutants on fertility, aiming to raise awareness among the reproductive-age population about the various chemical disruptors and their impact on both the likelihood of becoming pregnant and the success of in vitro fertilization treatment. In addition, an important goal of counseling is to offer fertility preservation options when social and economic reasons do not allow for immediate family planning. Treatments such as egg and embryo cryopreservation can be critical options in such circumstances.

Equally important is counseling for individuals who are about to undergo assisted reproductive treatments, where the goal is to highlight the most common issues that concern individuals undergoing in vitro fertilization, such as the effectiveness of the methods, their safety, both for the woman herself and for the health of the children that will result. And, of course, another critical point where counseling as an innovative service is useful is the evaluation of a history of assisted reproduction, in particular about the response to hormone therapy, embryological development in the embryology laboratory, as well as endometrial preparation and pharmaceutical support for embryo transfer.

Overall, this new Fertility Counseling service aims to empower women and couples seeking reliable information on current issues related to reproductive health, how to ensure their fertility, as well as the best choice of methods and treatments to assist reproduction when there are indications for intervention at the level of in vitro fertilization.



Dr. Nicholas K. Christoforidis

MD, MSc, FRCOG, Consultant Obstetrician & Gynaecologist, Fertility Specialist, Co-Founder & Clinical Director of Embryolab
n.christoforidis@embryolab.eu

“

This service focuses on the importance of counseling in the early stages of fertility investigation and on the appropriate direction that individuals interested in reproductive health issues should take.

”





Anastasia Antonopoulou

*BSc, Assisted Reproduction Midwife,
Deputy Head of Midwifery Team*

a.antonopoulou@embryolab.eu



Zoi Tarsinou

*BSc, MSc, Assisted Reproduction
Midwife, ESHRE certified*

z.tarsinou@embryolab.eu

The Role and Daily Life of the IVF Coordinator

The midwife specialized in assisted reproduction is the healthcare professional who serves as an invaluable companion. They are an integral part of assisted reproduction procedures, with a multifaceted role: they manage complex medical procedures, offer psychological support-minimizing negative emotions-and contribute to stress management.

Furthermore, the high rate of patient satisfaction with the care provided highlights the professionalism and knowledge of the Embryolab midwives.

The role of the midwife, deeply rooted in the tradition of care and support, served as the foundation for the creation of a new, innovative service: that of the IVF Treatment Coordinator. This is a natural evolution that reflects our commitment to a personalized and humane approach to fertility care.

The IVF Treatment Coordinator is by the side of every individual and couple from the very first step. They are the person who welcomes, guides, and accompanies patients throughout their entire treatment, ensuring that they feel confident, understanding, and continuous care. From scheduling tests and managing the treatment plan to providing detailed information about every stage of the process, the Coordinator serves as the connecting link between the scientific team and the patients.

Their daily life is full of interaction, communication, and attention to detail. Every day, they are called upon to balance the precision of medical procedures with the patients' need for psychological support. They listen, answer, explain, and translate scientific information into plain, understandable language. For many patients, the IVF Treatment Coordinator is the first and the last person they will speak with-and that, in itself, makes their role essential, deeply humane, and invaluable.

Their presence embodies the philosophy of Embryolab: scientific excellence with a human face. The Coordinator is not limited to coordinating the treatment; they actively participate in creating a relationship of trust, which empowers patients to go through the treatment with confidence and peace of mind. Every success, every new life that begins, also carries their distinctive signature-the dedication, presence, and care of the IVF Treatment Coordinator.

“

Furthermore, the high rate of patient satisfaction with the care provided highlights the professionalism and knowledge of the Embryolab midwives.

”





Nikos Anesidis

MD, Gynecologist in Assisted Reproduction, Fertility Specialist, Clinical Head of Donation Program
n.anesidis@embryolab.eu

Ask the Doctors!

Visiting an Assisted Reproductive Technology (ART) Clinic is often a major step in one's journey to parenthood. It is natural to feel both hopeful and anxious and patients usually arrive with many questions. Below are some of the most common questions asked.

1. What is Assisted Reproduction and when is it indicated?

When a couple has regular unprotected sexual intercourse for 12 months, without achieving pregnancy, a fertility evaluation is definitely recommended and most likely some form of assisted reproduction treatment. In women over the age of 35, this period is reduced to 6 months due to the natural decline in fertility.

Treatment is always personalized, depending on the diagnosis. Options may include:

- In vitro fertilization (IVF). Eggs and sperm are combined in the lab to create embryos.
- Intracytoplasmic sperm injection (ICSI). A single sperm is injected directly into an egg.
- Intrauterine insemination (IUI). Prepared sperm is placed in the uterus around the time of ovulation.
- Egg, sperm or embryo donation, when needed.

2. What causes infertility?

Infertility can result from many factors, sometimes affecting one partner or both.

In women, causes may include premature decline of ovarian reserve or age-related decrease in egg quality, ovulation disorders such as those seen in PCOS, fallopian tubal obstruction and endometriosis.

In men low sperm count, poor sperm motility or abnormal sperm shape can play a role.

In some cases no clear reason is found—what doctors call “unexplained infertility”.

A thorough medical evaluation helps identify the best path forward.

3. How successful are these treatments?

Success rates depend on many factors—most importantly the woman's age and the cause of infertility. On average, women under 35 may have 45-65% success rate per IVF cycle, while rates gradually decrease with age. Advances in reproductive medicine, such as improved embryo culture systems and genetic testing, continue to raise the chances of success.

The most frequent questions in an ART Clinic



Argyro Agiomamitou

MD, Gynecologist in Assisted Reproduction

a.agiomamitou@embryolab.eu

4. Are there any risks?

Fertility treatments today are safer than ever. The main medical risks include ovarian hyperstimulation syndrome (OHSS), multiple pregnancies or minor complications during egg retrieval. Choice of the appropriate protocol and careful monitoring helps minimize these risks.

5. Is there an age limit?

Yes, in Greece, women are allowed to undergo assisted reproduction until the age of 54, with special approval from the National Authority for Medically Assisted Reproduction for women over 50. Because of the decline in oocyte quality associated with advancing age, egg donation is recommended at older ages, with success rates reaching up to 60%.

6. How long does the treatment take?

An IVF cycle usually takes about 3-4 weeks from the start of medication to embryo transfer. Some patients may need more than one cycle to achieve pregnancy.

7. What is oocyte cryopreservation?

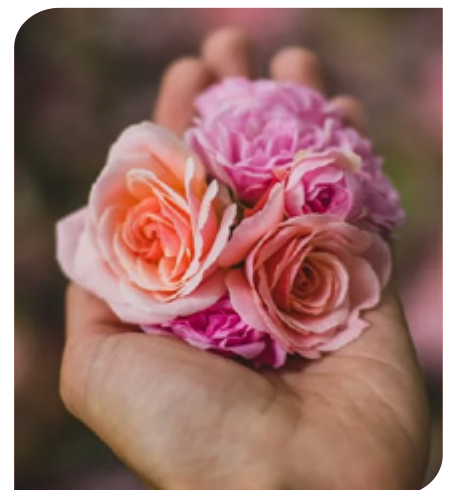
It is a technique that enables women to preserve their fertility and delay motherhood for personal, medical or professional reasons. Similar to IVF, the procedure involves the collection of oocytes followed by cryopreservation through vitrification, a technique associated with very high post-thaw survival rates (95-98%).

8. What can I do to improve my chances?

A healthy lifestyle plays an important role in fertility. Maintaining a normal body weight, a balanced diet, avoiding smoking and excessive alcohol, taking dietary supplements, exercising moderately and managing stress can all support better outcomes for both partners.



At our clinic we believe that informed patients make empowered decisions. Asking questions and understanding every step of your treatment is the key to success. Our team is here to guide you with compassion, transparency and the latest reproductive technologies, every step of the way toward your dream of becoming a parent.



embryonet



Fertility
Doctors' Network

embryolab[®]
Next Gen IVF

Access to fertility

Embryonet: Fertility Network

Infertility is one of the most common problems among couples of reproductive age, affecting approximately 1 in 6 couples. With the advancement of reproductive medicine and technology, the majority of couples can overcome their difficulties and achieve their goal when they turn to a specialized in vitro fertilization (IVF) clinic. Unfortunately, most specialized clinics are located in large urban centers, which means that patients living in rural or remote areas may not have direct access to these services. This is exactly the problem that the Embryonet network of affiliated clinics aims to solve.

Timely investigation and management of an infertility issue are crucial for successful treatment. Couples who do not have immediate access to a specialist may experience delays in diagnosis, which can worsen the underlying causes of infertility. For example, in women with low ovarian reserve, such delays can prove critical for the successful completion of their treatment. Furthermore, couples facing geographical constraints may experience greater psychological and social burdens than those with direct access to such services. In many cases, patients must travel several hours for their treatment, which has financial implications due to time off work and travel costs.

Embryolab designed the Embryonet network of affiliated clinics as a powerful tool to improve access for patients in remote areas to the specialized services offered by reproductive medicine. The common goal of Embryolab and the Embryonet network is the comprehensive management and successful completion of treatment for infertile couples. This collaboration allows patients to receive complete diagnostic assessment, certified ultrasound monitoring, and detailed guidance from their primary physician. The affiliated clinic, being familiar with the couple's individual and local circumstances, ensures continuity and safety throughout treatment.



Michael Kyriakidis

MD, MSc, Gynecologist in Assisted Reproduction, Fertility Specialist, Scientific Director of Embryolab

m.kiriakidis@embryolab.eu

“

Embryolab has invested in the Embryonet network by creating systems and applications that increase patient access to assisted reproduction services within their local community. Through constructive collaboration, we succeed in achieving our mission. To create new families every day!

”





Martha Moysidou

BSc, MSc, PMI-RMP, Biologist, Senior Clinical Embryologist, ESHRE certified, Lab Deputy Director, Risk Manager
m.moysidou@embryolab.eu

Ask the Embryologist!

F.A.Q. - You ask - the Clinical Embryologist answers!

The treatment plan designed for each couple undergoing in vitro fertilization (IVF) is unique and fully personalized. From sperm processing and management to embryo selection for transfer, the laboratory strategy is a key element of success.

For this reason, a fundamental priority for all of us at Embryolab is ensuring that patients have direct access to the embryology team. Clinical embryologists are able to evaluate the male partner's test results (sperm analysis and additional sperm tests), as well as the couple's previous embryological history. This allows them to make the necessary laboratory decisions aimed at achieving the best possible outcome.

1. Sperm processing: which innovative methods improve prognosis?

Beyond the classic semen analysis-which determines sperm concentration, motility, and morphology-innovative tests such as DFI, FISH, and oxidative stress measurement shed light on additional sperm parameters.

Identifying any pathology is crucial, as it determines the man's preparation (vitamin supplementation, ejaculation frequency) and, most importantly, the method used to process the sample during fertilization.

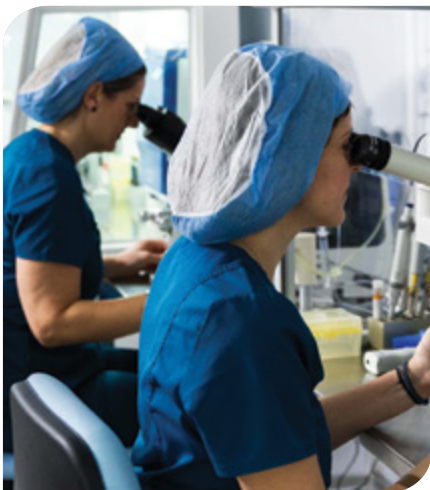
We now have access to microfluidic sperm sorting devices, which isolate sperm with the highest possible DNA integrity. By using these selected sperm cells, we create a stronger foundation for the new life developing in our laboratories, significantly improving prognosis.

2. Embryo morphology: how does it affect developmental potential?

The morphology of an embryo and how it influences its implantation potential is a subject that concerns both reproductive specialists and couples alike.

Years of research have led to a deeper understanding of the preimplantation embryo needs and to improvements in culture conditions. This allows each embryo to reach its maximum developmental potential.

The experience of clinical embryologists, combined with technological expertise-such as optimized culture media, time-lapse incubators, and assisted oocyte activation-leads to optimal embryo morphology and, ultimately, successful outcomes.



The Clinical Embryologist Answers!



3. Use of time-lapse incubators (e.g., EmbryoScope) and artificial intelligence: what are the advantages?

New-generation time-lapse incubators offer a unique advantage in monitoring embryo development: they allow continuous observation of embryos without exposing them to external environmental conditions.

These incubators are nowadays equipped with integrated AI applications, which enhance embryo evaluation even further. This enables reproductive biologists to perform a more detailed ranking of embryos, as subtle developmental differences can reveal the most viable one—reducing the time to pregnancy!

4. Preimplantation Genetic Testing for Aneuploidies (PGT-A): who benefits?

PGT-A is recommended for couples or women who have an increased likelihood of chromosomal abnormalities in their embryos (e.g., advanced maternal age, abnormal parental karyotypes) or those who have experienced recurrent miscarriages.

The technique involves performing a biopsy on the embryo to isolate a small cluster of cells, which are then analyzed in a specialized genetics laboratory. The results reveal which embryos have a normal chromosomal constitution and therefore the potential to result in a healthy child.

This diagnostic tool requires careful consideration: on one hand, it provides valuable information about whether an embryo should be used; on the other, the biopsy removes a small amount of cellular material, which—even minimally—might affect the embryo's developmental potential.

At Embryolab, we present each couple or woman with the embryological data, discuss it thoroughly, and recommend whether or not to proceed with PGT-A, depending on the number of available embryos, their morphology, and the reasons behind considering this option. In every case, the potential benefit of the procedure must outweigh any possible impact on the embryos.

5. Embryo transfer: how does the clinical embryologist select the embryos?

Selecting embryos for transfer—whether in fresh or frozen cycles—is the culmination of an IVF process. Timely and accurate embryo selection maximizes the chances of pregnancy.

An algorithm is formed by assessing multiple factors: the embryo's developmental progress in the incubator, the timing of cell divisions, the percentage of cell fragmentation, its final morphology, and the clinical embryologist's expertise.

When embryos have very similar characteristics, AI applications provide an additional tool to help select the embryo(s) with the best prognosis.

In frozen cycles, the ranking and cryopreservation of embryos are performed in a similar manner, ensuring that each cryostorage unit includes the full developmental history of the embryo it contains. This guarantees precise and targeted thawing and use of each embryo.

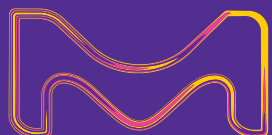
The development of technology and the use of all innovative tools, now available, enable assisted reproduction specialists to offer improved embryological outcomes. Tailoring these applications to the specific needs of each couple or woman, ensures the best possible conditions on the path to parenthood.

reimagining the future, time and again

Merck has been at the forefront of fertility treatment for as long as it has existed. Today, we continue our commitment to scientific excellence, imagining new possibilities for the patients of tomorrow.

Time and again, we support fertility experts worldwide to deliver their best care to patients, aiming to fulfill dreams of parenthood.

**Fertility by Merck.
Enabling wonders, together.**



MERCK

Λ. Κηφισίας 41-45 (κτήριο Β)
15123, Μαρούσι, Αττική
τηλ: 210 6165100
www.merck.gr

The clinical use of Mosaic Embryos:

When Science Meets Hope in the IVF Laboratory

In the fascinating world of assisted reproduction, few topics have attracted as much attention as **mosaic embryos**. These are embryos that contain both **normal (euploid)** and **abnormal (aneuploid)** cells in their chromosomal composition. For many years, such findings automatically excluded these embryos from transfer, as even the presence of a small number of abnormal cells was considered to mark the embryo as non-viable. However, advances in genetic analysis and a deeper understanding of embryonic development have reshaped this perception.

With the progress of **Next Generation Sequencing (NGS)** technology, we can now detect mosaicism with far greater sensitivity. This progress has created new possibilities-but also new challenges. While we know more than ever before, interpreting these findings remains complex.

What does mosaicism mean in practice?

Practically speaking, mosaicism is not an ideal condition for an embryo. For some reason, an embryo that initially had only normal cells may develop some abnormal ones at around day 3 or 4 after fertilization. This appears to represent a biological challenge-one that, according to recent studies, the embryo often tries to manage by eliminating or isolating the abnormal cells. Sometimes it succeeds; other times it does not.

In light of these recent scientific insights, the clinical interpretation of mosaic embryos has evolved, and such embryos are now considered **potentially usable** in IVF treatments.

However, **not all mosaic embryos are the same**. The extent and type of chromosomal abnormality play a decisive role. For instance, embryos with **low-level mosaicism** (a small proportion of abnormal cells) have shown implantation potential and developmental outcomes comparable to euploid embryos. In contrast, embryos with **high-level mosaicism** or involving certain chromosomes may have lower chances of success. Nevertheless, embryos often possess **self-correction mechanisms**, which can lead to normal pregnancies and the birth of healthy children.

Clinical evidence and decision-making

In recent years, an increasing number of studies have shown that transferring mosaic embryos-especially when no euploid embryos are available-can still offer realistic chances of pregnancy and live birth. Large multicentre studies and international registries have demonstrated that, although implantation rates are somewhat lower, the rates of healthy newborns remain highly encouraging.

Major scientific societies, such as **ESHRE** and **ASRM**, now recognize the role of mosaic embryos in clinical practice under specific conditions. They emphasize the need for accurate **genetic counselling**, careful **prioritization based on the level of mosaicism**, and **transparent communication** with the couple.

The human and ethical dimension

For many couples, mosaic embryos represent a bridge between uncertainty and hope. The decision to transfer them is not only a scientific matter-it is also a deeply personal and emotional one. Each case is unique and requires individualized consideration.



Achilleas Papatheodorou

PhD, M.Med.Sc., Senior Clinical Embryologist, ESHRE certified, Lab Director, Embryolab Academy BoD Member

a.papatheodorou@embryolab.eu



At Embryolab

Our team combines state-of-the-art scientific knowledge with responsible, compassionate guidance. We work closely with specialized genetic laboratories to ensure precise interpretation of results and provide detailed counselling so that every decision is informed and confident.

Thus, transferring a mosaic embryo is not a "last resort" but a carefully guided option-a point where science meets hope.

Mosaic embryos remind us that human life is far more dynamic and adaptable than we once imagined-and that even within imperfection, there may lie the beginning of something extraordinary.



Artificial Oocyte Activation: A Promising Strategy for Patients with Low or No Blastocyst Formation

Couples undergoing assisted reproduction often face challenges when embryos fail to reach the blastocyst stage, even after apparently normal fertilization. For such patients, Artificial Oocyte Activation (AOA) presents a valuable laboratory intervention that can potentially enhance embryonic development and increase the likelihood of embryo transfer.

A recent prospective cohort study conducted at Embryolab Fertility Clinic in Thessaloniki, Greece explored the clinical and embryological outcomes of AOA in patients with a previous history of low or no blastocyst formation. The aim was to determine whether AOA could improve fertilization, blastocyst formation, and subsequent clinical outcomes in this challenging group of patients.

The study evaluated 60 ICSI cycles from 30 patients whose earlier cycles showed less than 30% blastocyst development or complete arrest before the blastocyst stage. Each patient served as their own control, with outcomes compared between a cycle without AOA and a subsequent cycle with AOA using Ca^{2+} ionophore.

The results demonstrated a clear improvement in embryological outcomes following AOA. While the number of retrieved and mature oocytes, as well as fertilization rates, did not differ significantly between cycles, the blastocyst formation rate increased substantially from 7.2% in the NO-AOA group to 55.6% in the AOA group. In parallel, the cycle cancellation rate decreased from 80% to 20%, enabling 15 patients who previously had no embryo transfer to proceed to transfer in their AOA cycle. Although pregnancy, clinical pregnancy, and live birth rates did not reach statistical significance—most likely due to the limited sample size—a positive trend was observed in favor of AOA.



Mary Karagianni

BSc, MSc, Biologist,
Senior Clinical Embryologist
m.karagianni@embryolab.eu

These findings suggest that AOA may serve as an effective strategy for improving blastocyst development and reducing cycle cancellation in patients with repeated poor embryonic progression. While larger studies are needed to confirm its impact on clinical outcomes, this approach offers renewed hope for couples with limited or no transferable embryos and highlights the importance of personalized embryology in modern IVF practice.





Lucy Thivaïou

BSc, MSc, Biologist,
Clinical Embryologist

l.thivaïou@embryolab.eu



References

Novoselsky Persky, et al., 2021. Conventional ICSI vs. physiological selection of spermatozoa for ICSI (PICSi) in sibling oocytes. *Andrology*, 9(3), pp. 873-877.

Le, M.T., Nguyen, et al., 2023. Physiological intracytoplasmic sperm injection does not improve the quality of embryos: A cross-sectional investigation on sibling oocytes. *Clinical and Experimental Reproductive Medicine*, 50(2), pp.123-131.

Göde, F., et al., 2023. The effect of advanced sperm selection methods on euploidy rates and live birth rates in PGT-A cycles. *Reproductive BioMedicine Online*.

Evaluating the Role of PICSi in Reducing Paternal Aneuploidies

Developments in assisted reproduction have led to the advancement of techniques aimed at improving fertilization rates and embryo quality. One of these techniques is the PICSi method (Physiological Intracytoplasmic Sperm Injection), which aims to select sperm with intact DNA through binding to an hyaluronic acid (hyaluronan)-coated dish. The rationale behind the method is based on the fact that sperm capable of binding to hyaluronic acid have a lower rate of DNA fragmentation and are mature, thereby reducing the chances of aneuploidies in embryos.

A prospective study conducted at Embryolab Fertility Clinic between July and December 2024 evaluated whether PICSi provides advantages over conventional ICSI. 14 treatment cycles were analyzed, involving 145 mature **oocytes from the same oocyte retrieval** that were randomly allocated between PICSi and ICSI procedures. All resulting embryos underwent preimplantation genetic testing for aneuploidies (PGT-A) to assess chromosomal status.

The study found comparable fertilization and embryo development rates between PICSi and ICSI while aneuploidy rates were similar. However, there was a trend in favor of PICSi regarding fertilization, blastocyst formation, and aneuploidy rates. The proportion of chromosomally normal embryos was slightly higher in the ICSI group. These findings indicate that, under the conditions tested, PICSi did not significantly improve the genetic quality of embryos compared with standard ICSI. Although preliminary, this study contributes valuable data to the ongoing evaluation of advanced sperm selection techniques and underscores the need for larger studies to determine their clinical relevance in assisted reproduction.

iBaby Fertility & Genetic Center (n.d.).
"PICSi – A method of selecting the best possible sperm."
Available at: <https://ibabyfertility.com/en/en-picsi/>

Preimplantation Genetic Testing:

New Data and Indications

Preimplantation Genetic Testing (PGT) is a modern diagnostic procedure performed on fertilized oocytes before their transfer into the uterus during in vitro fertilization (IVF). Its primary goal is to identify genetic abnormalities or diseases that could be transmitted from the parents to the child, thereby allowing the selection of healthy embryos and reducing potential risks. Prior to undergoing PGT, patients receive comprehensive information and specialized counseling regarding the procedure and their available options.

PGT encompasses three main forms:

- 1. Preimplantation Genetic Testing for Monogenic Disorders (PGT-M):** This test screens for diseases caused by a single gene, such as hemophilia, cystic fibrosis, β -thalassemia, sickle cell anemia, Tay-Sachs disease, or Huntington's disease.
- 2. Preimplantation Genetic Testing for Structural Chromosomal Rearrangements (PGT-SR):** This test detects structural chromosomal changes that may result in congenital anomalies, pregnancy loss, or severe cognitive and physical dysfunctions.
- 3. Preimplantation Genetic Testing for Aneuploidies (PGT-A):** This test screens for numerical chromosomal abnormalities, which are associated with miscarriages, impaired embryonic development, or IVF cycle failure.

Additionally, PGT-HLA can be performed in families with an existing child suffering from a serious disease who requires a stem cell or bone marrow donor. In such cases, the new child can be healthy and simultaneously suitable as a donor for their sibling.

Indications for PGT include:

- **Carriers of genetic disorders:** Couples who carry genetic conditions and face a significant risk of having a child affected by a genetic disease (PGT-M / PGT-SR).
- **Recurrent pregnancy loss:** Couples with two or more first-trimester losses of unknown cause, including biochemical pregnancies (PGT-A).
- **Maternal age:** Women aged 38 years and older using their own oocytes (PGT-A).
- **IVF cycle failure:** Couples with three or more failed IVF cycles, where a cycle is considered failed if β -hCG levels are <20 mIU/L at least 14 days after embryo transfer (PGT-A).
- **Chromosomal abnormalities:** One partner exhibits structural (PGT-SR) or numerical (PGT-A) sex chromosome anomalies on karyotype, such as Turner or Klinefelter syndrome.



Argyro Sfakianaki

BSc, MSc
Head of Midwifery Team,
Assisted Reproduction Midwife
a.sfakianaki@embryolab.eu



The implementation of PGT requires authorization from the National Authority for Medically Assisted Reproduction, ensuring that its application complies with scientific and ethical standards. The application for authorization is primarily submitted by the IVF Unit, following the written consent of the couple or the assisted woman.



Comparison of the sperm separator and density gradient centrifugation: Effects on the sperm DNA fragmentation index

Infertility is defined as the inability of a couple to achieve pregnancy after 12 months of unprotected sexual intercourse. Approximately 35–40% of infertility cases are attributed to male factors.

The World Health Organization (WHO) has established specific reference values for semen analysis parameters, which are used to assess male fertility potential. However, around 15% of men with normal semen parameters still experience difficulty achieving pregnancy. In this context, supplementary biomarkers such as the DNA Fragmentation Index (DFI) are increasingly recognized as important markers in the comprehensive evaluation of male fertility.

High levels of sperm DNA fragmentation have been associated with lower success rates in Assisted Reproductive Technologies (ART), such as Intrauterine Insemination (IUI) or In vitro Fertilization (IVF). Studies have shown that conventional sperm processing techniques-such as Density Gradient Centrifugation (DGC) or even the gentler “swim-up” method-may increase DNA fragmentation in sensitive sperm cells.

To minimize the impact of exogenous factors during sperm processing, as well as endogenous pathologies, innovative microfluidic sperm sorting devices have become available. These devices offer an innovative approach, as they mimic the natural sperm selection process that occurs in the female reproductive tract during natural conception. This enables the isolation of only motile, morphologically normal spermatozoa with intact DNA.

At Embryolab, remaining true to our commitment to provide the most advanced techniques for treating infertile couples, we conducted a new clinical study to validate the effectiveness of this specific device.

The study took place between June 2023 and August 2025, and revealed the following results:

1. The average sperm DNA fragmentation in unprocessed samples was 17%.
2. After processing using DGC, fragmentation increased to 41%.
3. Following processing with the microfluidic device, fragmentation decreased to 7%, indicating significant improvement.

When comparing the two methods, the microfluidic sperm selection device isolated 66% more spermatozoa with intact DNA compared to the DGC method.

Although the study was relatively small, it was accepted for presentation at the European level (Poster presentation, ESHRE 2025). The preliminary findings are encouraging and suggest that by selecting sperm with intact DNA, we may compensate for paternal factors that could otherwise affect embryo development.



Maria Baziakou

BSc, MSc, Biologist

m.baziakou@embryolab.eu

“

This innovation paves the way for more effective infertility treatments, aiming to achieve the best possible outcome in assisted reproductive procedures such as IVF.

”

Embryolab Celebrates 21 Years

and Advances Assisted Reproduction for a Better Future

For over two decades, Embryolab Fertility Clinic has been at the forefront of reproductive medicine, changing lives through science, innovation, and always prioritizing the care of those seeking fertility treatments.

Actively promoting the values of reproductive autonomy, transparency, and personalized care, the clinic has combined the effective treatment of infertility with a profound respect for every individual's dream of starting a family.

Guided by evidence-based scientific practice, Embryolab Fertility Clinic has pioneered advancements in cryobiology, genetic science and fertility preservation.

They have introduced innovations such as high-safety therapeutic protocols, mild ovarian stimulation treatments, and cutting-edge technologies for embryos and oocytes in the embryology laboratory. Furthermore, their holistic approach integrates nutrition, lifestyle, and appropriate psychological support, ensuring comprehensive care for everyone undergoing assisted reproduction treatment.

"As Embryolab Fertility Clinic celebrates its 21st anniversary, it looks to the future with optimism and a commitment to advance science, empower patients, and contribute to future generations,"

stated Dr. Nicholas K. Christoforidis, MD, MSc, FRCOG,
Consultant Obstetrician & Gynaecologist, Fertility Specialist,
Embryolab Co-Founder & Clinical Director.



21
Years of Life



embryolab®
Next Gen IVF



21 Years of Creation

A Milestone Celebration

A special evening dedicated to the 21-year journey of Embryolab Fertility Clinic was held in Thessaloniki, the city where, in 2004, a vision was born that would go on to change lives and lead to the birth of more than 12,500 children.

With the vision, "Changing lives, creating families," a small team of people with a shared passion for science and human care created a Clinic that evolved into a benchmark for modern assisted reproduction, offering hope and joy to couples from 82 countries.

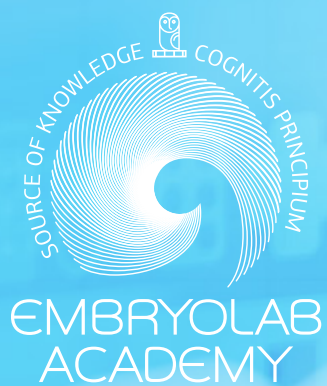
The anniversary event was a warm celebration dedicated to partners, friends, and everyone who believed in the Embryolab vision and consistently supported it over the years. With emotion and pride, the team honored its journey, thanking those who have stood by them from the beginning until today.

"The trust of the people is our strength and our inspiration for the future. Embryolab is my life, but above all, it is its people-patients, colleagues, partners. They are our real miracle,"

said Ms. Alexia Chatziparasidou, MSc, PMI-RMP, Consultant Sr. Clinical Embryologist, Embryolab Academy Co-Founder and Director, Co-Founder of Embryolab Fertility Clinic, confirming that the journey continues with dedication, love, and faith in the value of life.



Embryolab
Next Generation IVF Clinic



Find more
embryolab-academy.org



Contact

173-175 Ethnikis Antistaseos St
551 34, Thessaloniki, Greece
T. 2310 474747
E. info@embryolab-academy.org

