creando familias

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Autoimmune thyroiditis and its impact on fertility and pregnancy: an integral analysis

The miracle of **implants**

The important work of the **embryologist** in assisted reproduction processes

Reproduction International Group

Dr. José Jesús López Gálvez
CEO of the UR Group

We are leaving behind a very important year for the UR Group,

celebrating our 40 years at the service of assisted reproduction, and starting a 2024 full of challenges and very important advances for our Units and our patients.

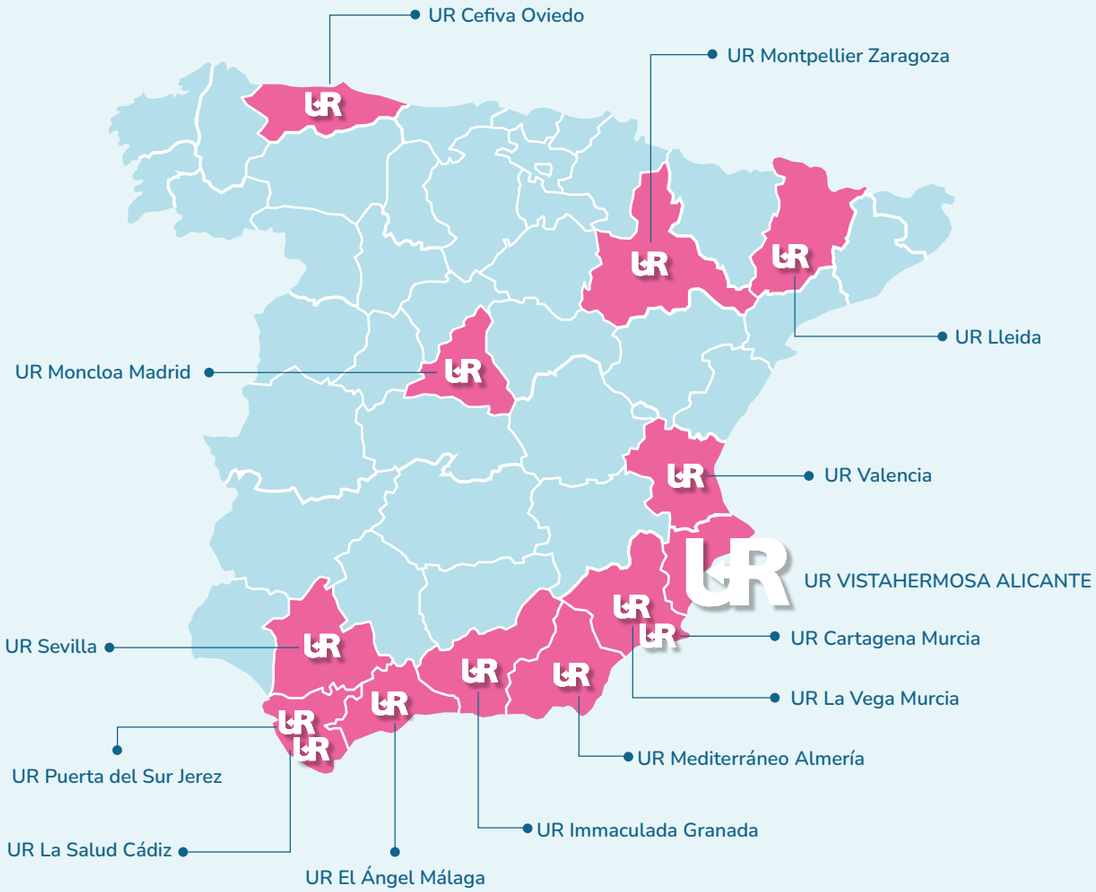
We are at a time, in the field of fertility, when we are facing the challenge of personalised medicine. And we must be leaders in this, with the aim of being more efficient and preventive.

Prevention will be the workhorse and our first line of combat, in order to offer the best service to our patients and achieve greater efficiency in our processes and treatments. And that must be the main objective of all of us in each of our centres, that the main priority should be to try to reduce and prevent rare diseases in newborns.

Assisted reproduction must take the baton of informing those patients who are going to try to get pregnant, both artificially and naturally, knowing that more than **27%** of the population are carriers of autosomal recessive diseases, and that if, in any case, the partner is also a carrier of the same genetic alteration, **25%** of their children could develop the disease; this constitutes a serious family and social problem, due to the need for the treatments and care that this would entail.

And this is where all of us who work in the field of assisted reproduction must take the lead in eradicating this problem. By simply advising future parents to have a simple test, we are already tackling a possible solution. It would be a matter of locating these carriers, before the woman becomes pregnant, and in this way we would be able to detect this possible complication preventively.

I would therefore like to end by encouraging you to continue to be ahead of what our patients need, seeking the best options in the face of possible difficulties and, most importantly, stepping into the **future of preventive medicine.**



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Index

AUTOIMMUNE THYROIDITIS

and its impact on fertility and pregnancy

An integral analysis

Dr. Germán Fernández

Medical Director - UR Managua

Autoimmune thyroiditis (AIT) is endocrine condition that has become an area of growing interest to the medical community due to its link to fertility problems and obstetric complications in women.

The thyroid gland performs a fundamental function in regulating many body functions, including **metabolism and reproduction.**

When the body's **immune system** turns against the thyroid, AIT can develop, with significant consequences for reproductive health.

This series of essays seeks to explore in depth the relationship between AIT and fertility, as well as its impact on pregnancy. Over the course of several segments, we will examine scientific research findings, review clinical studies, and discuss the clinical implications of AIT on women's reproductive health.

Prevalence in infertile patients

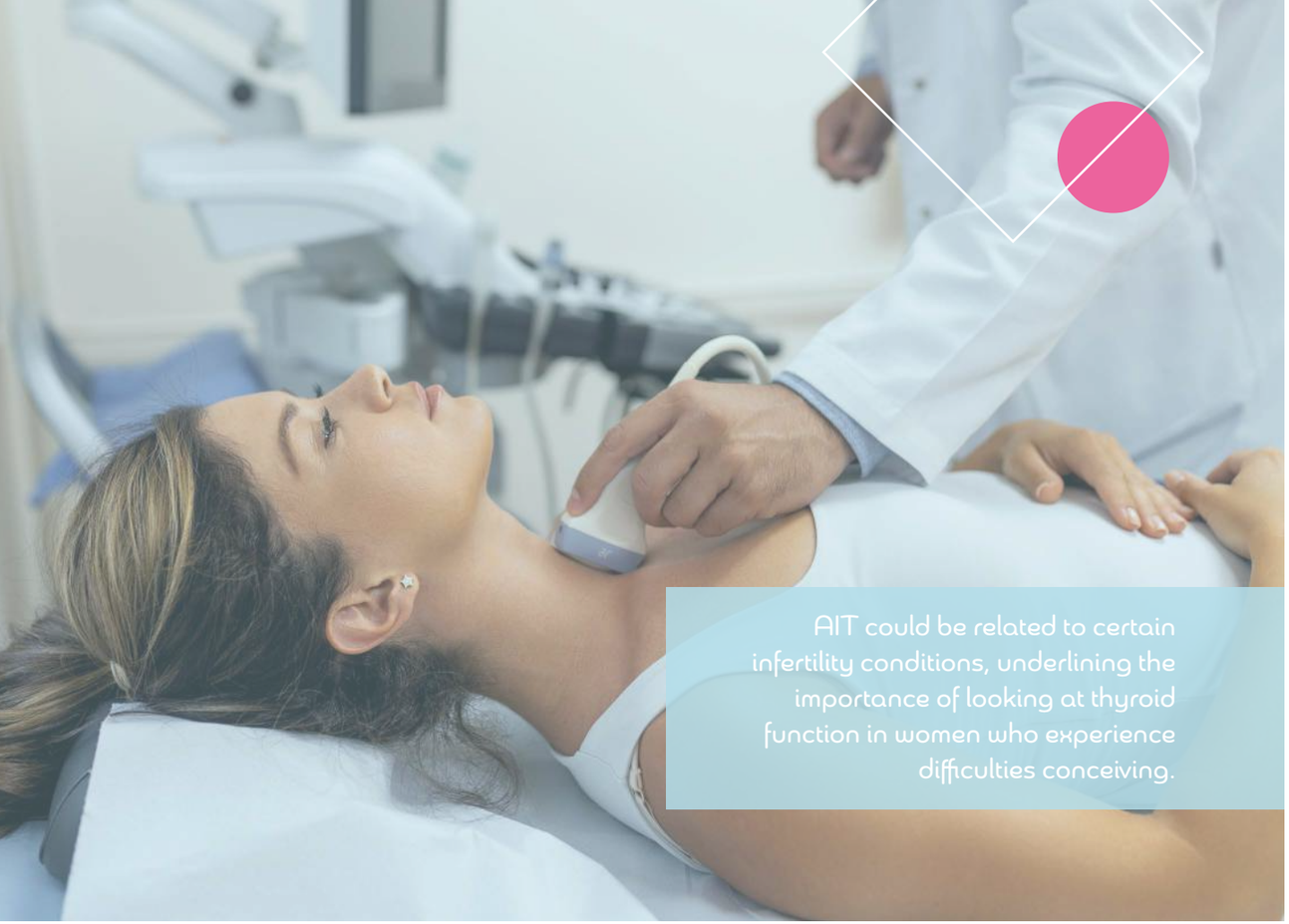
The first aspect to be tackled is the prevalence of the AIT in women experiencing fertility problems. As we mentioned previously, AIT is an immune system condition of the body that attacks the thyroid glands, leading to chronic inflammation and, in some cases, reduced production of thyroid hormones. This can have a significant impact on reproductive health.

Studies have revealed variability in the prevalence of AIT in infertile women, and this could be influenced by a number of factors, such as the population studied and the test methods used. Some studies have suggested greater prevalence of AIT in women with certain causes of infertility such as polycystic ovary syndrome (PCOS), idiopathic infertility and endometriosis For example, a review of studies of women with different infertility causes found a significant link between AIT and infertility. Some studies have also found greater prevalence of AIT has also been found in women with PCOS.

These findings suggest that AIT could be related to certain infertility conditions, underlining the importance of looking at thyroid function in women who experience difficulties conceiving. It is important to point out, however, that the relationship between AIT and infertility is not uniform in all studies and the research in progress is shedding new light on this complex connection.

Impact on results from assisted reproduction technology (ART)

An area of great interest in medical research is the impact of the AIT on assisted reproduction technology results (ART). ART includes



AIT could be related to certain infertility conditions, underlining the importance of looking at thyroid function in women who experience difficulties conceiving.

in vitro fertilization (IVF) techniques and Intrauterine Insemination (IUI) and is used widely to help couples with fertility problems to conceive.

Some initial studies suggest that women with AIT could have less favourable results from ART, including lower pregnancy rates and higher miscarriage rates. However, more recent research has questioned this negative link and no significant adverse effect has been found for AIT on ART results. It has been suggested that the fertilization technique used, such as intracytoplasmic sperm injection (ICSI), could mitigate the negative effects of AIT on ART.

It is important to note that the relationship between AIT and ART is an evolving one, and further research is required to fully comprehend how AIT could be affecting women seeking assisted fertility treatments. In the next part of this essay, we will delve deeper into this issue and review the most recent studies on this topic.

Maternal obstetric risks

The link between Autoimmune Thyroiditis (AIT) and obstetric complications is an important subject of study and medical concern. Several investigations have shown that women with AIT have a higher risk of experiencing complications during pregnancy. These complications can include a higher risk of spontaneous miscarriage, premature birth, pre-eclampsia, gestational diabetes, anaemia and others.

One of the most widely documented risks is the increase in spontaneous miscarriage rates among women with AIT Studies have shown that women with positive antithyroid antibodies have a significantly higher risks of spontaneous miscarriage in comparison to those without these antibodies. This risk is particularly important in women with a history of recurrent miscarriage, where AIT could be an important underlying factor.

As well as the risk of spontaneous miscarriage, women with AIT also face a higher risk of premature birth. Studies have shown that women with positive antithyroid antibodies have a significantly higher risks of spontaneous miscarriage in comparison to those without these antibodies. Premature birth could lead to complications for the newborn baby, such as respiratory or development problems.

Pre-eclampsia, a potentially serious condition characterised by a high arterial pressure and damage to the organs, has also been linked to AIT. Research has shown that women with AIT have a higher risk of developing pre-eclampsia during pregnancy. This underlines the important of early detection and adequate medical treatment for these women.

Gestational diabetes, a form of diabetes that develops during pregnancy, has also been shown to be linked to AIT. Women with AIT have a higher risk of developing gestational diabetes, which could have implications for the health of mother and child.

In summary, AIT is linked to increased risk of maternal obstetric complications, including miscarriage, premature birth, pre-eclampsia, and gestational diabetes. These findings highlight the importance of appropriate screening and management of AIT in women who are pregnant or planning to become pregnant.

Risks for the Foetus

Thyroiditis autoimmune (IS) can impact both the mother and the fetus.

As well as risk for the mother, autoimmune thyroiditis (AIT) can also have an impact on the health of the foetus during pregnancy. The thyroid gland performs an essential role in foetal development, especially in the first trimester when the foetus depends entirely on the mother's thyroid hormones.

One of the principal risks for the foetus linked to AIT is maternal hypothyroidism. When a pregnant woman with AIT develops untreated hypothyroidism, there may be an insufficiency of thyroid hormones available for the foetus to develop. This could have serious consequences, including delay to brain development and neurological problems.

Studies have shown that children of mothers with untreated AIT have a higher risk of having a lower intelligence quotient (IQ) and higher risk of cognitive development problems compared to children of mothers with normal thyroid function. This underlines the importance of detection and early treatment of hypothyroidism in pregnant women with AIT.

In addition to maternal hypothyroidism, AIT has also been linked to a greater risk of intrauterine growth restriction (IUGR), which is a condition where the foetus fails to grow sufficiently within the uterus. This can lead to babies with low weight and greater risk of complications over the long term.

Another worrying aspect is the risk of transient fetal hyperthyroidism. In some cases, the mother's antithyroid antibodies can cross the placenta and affect the thyroid function of the foetus, resulting in an excess of thyroid hormones. This can cause foetal tachycardia, heart failure and other serious problems.

In summary,

AIT can have a significant impact on foetal health, including the risk of maternal hypothyroidism, IUGR and transient foetal hyperthyroidism. Detection and management of AIT during pregnancy are essential for reducing these risks and ensuring healthy foetal development.

Conclusion

Autoimmune thyroiditis (TAI) is a complex medical condition that affects thyroid function and has a major effect fertility and pregnancy. We have explored the different aspects of the relationship between AIT and reproductive health

Ultimately, it is clear that AIT is a condition that required careful attention and integral management in the context of reproductive health. The implications for AIT go beyond thyroid dysfunction and could have a deep impact on the capacity to conceive and on the development of the pregnancy.

For couples facing fertility problems and pregnant women with AIT, it's essential to seek the guidance of health professionals with experience in endocrinology and reproductive medicine. Early detection, adequate treatment and regular monitoring are fundamental pillars for ensuring optimal reproductive health and reducing the risks associated with AIT.

Managing fertility and pregnancy

Having seen the complex relationship between autoimmune thyroiditis (AIT) and fertility and its impact on pregnancy, it is important to consider effective management strategies. For couple look to conceive and for pregnant women with AIT, the correct handling of this condition is crucial to ensuring optimal reproductive results.

1. Evaluation of thyroid function

In the context of infertility, it is crucial to evaluate the thyroid function on an integral basis. This includes thyroid stimulating hormone tests (TSH), the free thyroxine hormone (T4) and anti-thyroid antibodies (TPO and TG). Unusual numbers should be treated according to clinical guidelines, and treatment with levothyroxine should be considered if necessary.

2. Regular monitoring

Women with AIT who are looking to become pregnant should be subject to regular monitoring to ensure thyroid hormone levels are maintained within optimal range. This is fundamental for the health of the mother and the foetus.

3. Integrated management

Treatment of AIT is not limited to administration of synthetic thyroid hormone. It is also essential to tackle lifestyle factors like diet and stress, which could influence immune and thyroid function.

Research into this field continues to evolve and it's important that medics and scientists continue researching the relationship between AIT, fertility and pregnancy. This will help us better understand the underlying mechanisms and develop the most effective treatment strategies.

BREAST CANCER AND FERTILITY

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Gynaecologist - UR Mexico

- Sociological changes among women have caused them to delay maternity and there has been a consequent increase in cases of infertility.

Moreover, breast cancer has experienced an uptake in prevalence, and the age at which it appears is increasingly younger. Fortunately, early diagnosis and current treatments have achieved a highly favourable recovery rate, with reported survival greater than 80%.

Infertility is a problem among young patients diagnosed with breast cancer, where the majority of those who receive treatment for cancer do not receive enough information on the changes that will occur in their reproductive capacity. These treatments often cause amenorrhoea (absence of menstrual periods) and it is not rare for this to become a permanent condition.

There is overwhelming proof that the chemotherapy treatments administered have a negative impact on fertility due to a direct effect on the ovary, with diminished ovarian reserve, produced by programmed cell death called apoptosis. Thus, there is a progressive increase in the demand to preserve fertility, for which there are a range of different therapies. The most promising that is also recommended by the American Society of Clinical Oncology is ovarian stimulation with oocyte vitrification.

Oocyte cryopreservation is one alternative that single women should consider who do not want to use a donor sperm and/or do not accept embryo freezing. The procedure requires approximately two weeks of ovarian stimulation, starting at the beginning of the patient's menstrual cycle. This makes it extremely important for these patients to be adequately informed that they should go into an assisted reproduction centre as soon as they are diagnosed with cancer.

The medication protocols that are recommended for ovarian stimulation are those that cause the lowest increase in oestrogens. It merits mention that, depending on each woman's ovarian reserve, they could end up having between 6 and 12 oocytes in one stimulation cycle. It is also essential to point out that these oocytes can remain vitrified for a long period of time, even years, and that when devitrification occurs, they will have the quality they had at the time they were frozen. The younger the woman is, the better they will be. Once the woman has overcome breast cancer and is sure she wants to be a mother, the oocytes are thawed, and an in vitro fertilisation technique is performed for conception.

Today, oocyte vitrification is no longer considered an experimental technique, as several children have been born alive from women with cancer who had previously vitrified their oocytes. It is also necessary to stress that there is no proof that any fertility treatment increases the risk of getting breast cancer and it is always recommendable to have a mammography before the assisted reproduction technique, especially for women older than 40 years of age.

> The advances that are taking place, both in the field of fertility and in oncology, are promising and ensure that a women suffering from breast cancer today can have the future opportunity to make her dream of becoming a mother come true.

OVARIAN PRP

How platelet-rich plasma can improve fertility

Dra. Valeria Sotelo

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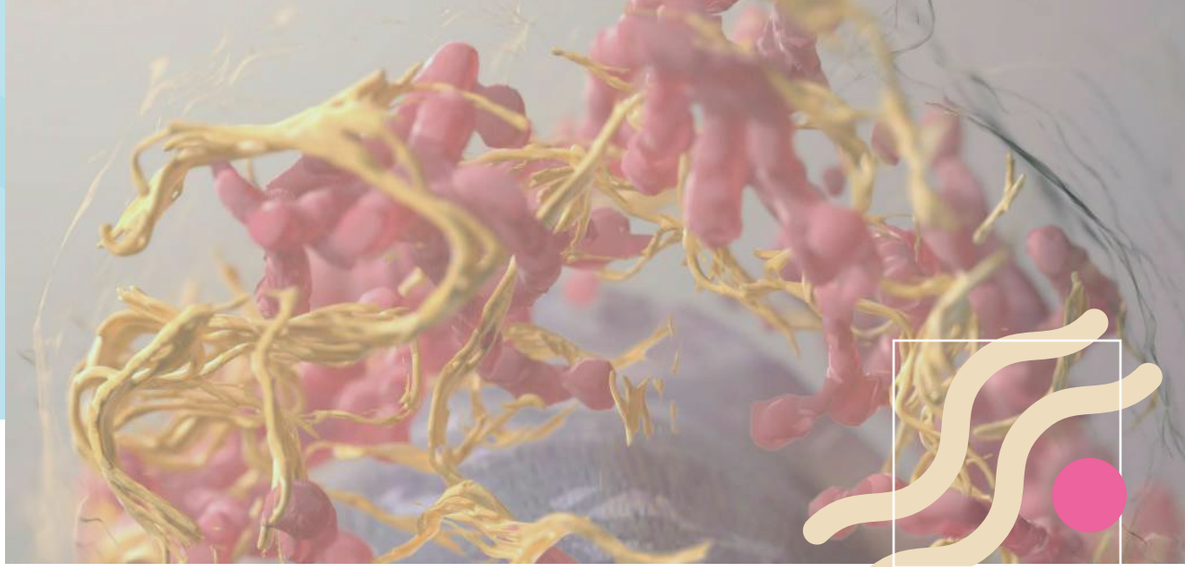
- Diminished ovarian reserve affects the possibility of getting pregnant. Ovarian rejuvenation is one option that may improve the quality and number of oocytes.

Age is a determining factor that can affect women who decide to have children at a later age, as this can often mean being almost at the limit of possibilities of conceiving naturally.

However, assisted reproduction techniques and processes may be an alternative in these cases. Diminished ovarian reserve is related to advanced age, and is the factor that most influences women's possibilities of becoming pregnant with their own ovaries, leading many women to turn to donor eggs, with ovules or eggs from a donor, to achieve their desire to conceive.

Until recently, it was widely accepted that female reproductive life depended on a fixed reserve of eggs available at birth, which were completely used up during menopause. It was unacceptable to think that women could form new ovules in the ovaries after birth. However, many scientists now confirm that there are stem cell groups in the ovaries, called oogoniums, which can be stimulated and reactivated with the ovarian rejuvenation technique, based on plasma rich in growth factors (PRGF). With the passage of time, stem cells gradually lose their ability to multiply, and platelet-rich plasma can do its work, activating them and assisting with their maturation. Based on our admittedly short time using this technique, we have observed an improvement in hormone levels, and a better response in egg quantity and quality.

The aim of injecting platelet-rich plasma (PRP) is to improve ovarian function to then have a better result in a later IVF, and to improve the chances of getting pregnant naturally when this is feasible.



Application of PRP in diminished ovarian reserve

Platelets release a large number of **growth factors**, which favour the repair and regeneration of different tissues. In other words, this technique boosts ovarian rejuvenation and ovarian response. As explained above, the administration of PRP directly into the ovary can increase their concentration and assist in activating residual **dormant follicles**.

The procedure consists of obtaining **10 cubic centimetres of blood** by venipuncture, which is processed in a laboratory to obtain the fraction of platelet-rich plasma, which is subsequently injected into the ovaries by means of a transvaginal ultrasound-guided injection. It is an outpatient procedure done in an operating theatre under a mild sedative. After the procedure, the patient continues with the prescribed **ovarian stimulation treatment** with the pertinent monitoring. There is zero risk of rejection since the blood of the patient herself is used.

Although the desired effect does not always occur, the results that we steadily keep seeing, as well as those published in literature, are very interesting. Like what happens in all experimental treatments, as case histories progressively increase, actual efficacy will be able to be determined. **Ovarian rejuvenation** would be recommended for women with diminished ovarian reserve, generally with a past assisted fertilisation treatment in which there was a low ovarian response to stimulation. Advice will depend on the assessment of the patient's overall context.

It merits mention that this is an **experimental treatment**, with promising results, for which the medical team must assess the suitability of its administration in each case, evaluating the probabilities of success and of improved ovarian response. Moreover, we must remember that no treatment available will improve oocyte quality **after a certain age**.

MICROFLUIDIC SPERM SELECTION

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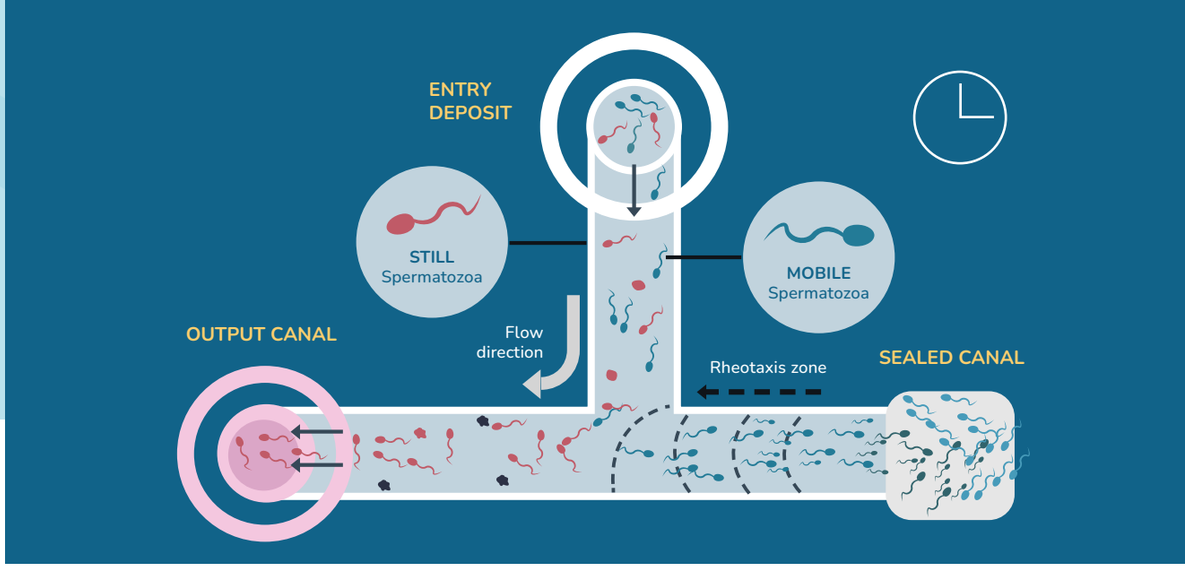
Embryologist
UR La Vega Murcia

- It is estimated that one in six couples have difficulties attempting to have children; 15-20% of couples of childbearing age resort to in vitro fertilisation techniques.

In terms of sterility factors, we can find female causes, male causes and in most cases mixed causes that affect both members of the couple. If we focus on the study of the male, basic diagnostic testing involves conducting a seminogram and training to see the seminal quality related to sperm concentration, mobility and morphology, but we can broaden and deepen this study in order to obtain more information on the functional capacity of the spermatozoa by performing a sperm DNA fragmentation

Sperm DNA fragmentation are small breaks or lesions in one or both strands of the genetic material, causing damage to the spermatozoa. A high rate of fragmentation is related to lower probability of capacity to conceive, embryos of lower morphological quality, lower implantation rates and higher miscarriage rates.

Microfluidic sperm selection is based on the selection of spermatozoa by migrating them through fluids, passing through microchannels that mimic the physiological conditions of the female uterine tract. In the female reproductive system, spermatozoa have the function of finding the egg to fertilise it. For that they must move against a light fluid through the vagina, cervical



canal and uterus until they reach the fallopian tube. This technique attempts to select the healthier spermatozoa within the semen sample, that is, those with the best mobility and the lowest DNA fragmentation.

This is due to fact that only morphologically normal spermatozoa with the best mobility are capable of swimming through the chip channels to the outlet well and are recovered for in vitro fertilisation through the sperm microinjection (ICSI). These devices are manufactured in biocompatible material single use, avoiding cross contamination between samples. They can be found on the market under the names Fertil Chip and Zymōt.

The only limitation of the devices is that it cannot be used in semen samples with a low concentration of spermatozoa. It has been determined that the samples must have a minimum of 5 mill/ml concentration and 20% of spermatozoa with progressive mobility. It is also not recommended for use with frozen samples.

This technique has the following advantages:

- EJACULATED SEMEN IS USED FRESH. DOES NOT REQUIRE CAPACITATION OF THE SEMEN SAMPLES, REDUCING OXIDATIVE STRESS
- AVOIDS SPERM DAMAGE FROM CENTRIFUGATION
- THE DEVICE IS UNIQUE FOR EACH PATIENT
- PROCESSING TIME REDUCED

Indications:

- PATIENTS WITH SPERMATOZOA WITH HIGH DNA FRAGMENTATION, BOTH SIMPLE CHAIN AND DOUBLE CHAIN.
- PATIENTS WHO HAVE SUFFERED IMPLANTATION FAILURES IN PREVIOUS CYCLES WITH CONVENTIONAL ICSI.
- POOR EMBRYONIC QUALITY IN PREVIOUS CYCLES WITHOUT AN OOCYTE FACTOR.
- PATIENTS WITH SLOW EMBRYONIC DEVELOPMENT IN PREVIOUS CYCLE.
- IN CASES OF REPEATED MISCARRIAGES WITH NO REASON IDENTIFIED.

The miracle of IMPLANTS

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Medical Director - UR Sevilla

Of all the stages of gestation, both spontaneous and through Assisted Reproduction Techniques, embryo implantation is the most unknown process. We speak of this crucial moment when the human embryo interacts with the endometrium to commence its intra.

The first step of this "miracle" starts with the interaction between embryonic cells and maternal cells. This is an extremely complex process about which we still know very little, remaining the "Achilles heel" for specialist in reproductive medicine.

In this molecular "dialogue", both the embryo and the endometrium are involved, as well as molecules segregated at peripheral level. All of these factors must be in perfect harmony so that, finally, we have a successful pregnancy and a new-born baby at home.

Although we are largely unaware of this process, we know that it is necessary that both the embryo and the endometrium and the environment meet a series of criteria:

1.

We need a receptive endometrium. The definition of this concept is challenging. We know that, between the third and fifth day after ovulation, the endometrium must open its implantation window, thanks to progesterone, the hormone responsible for the transformation of the endometrial proliferative phase to its secretion phase. Through these changes, the endometrium, which has proliferated thanks to oestrogen dominance, must have the capacity to receive the embryo, in this phase in which progesterone is our essential protagonist.

2.

Together with these two hormones, in the endometrial development, there are angiogenic factors at play that allow for the endometrium to receive the embryo whose antigenic identity is at least 50% different from that of the mother, must act in endometrial development. At the same time, we also need a healthy embryo, genetically competent enough for implantation, the quality of both gametes is fundamental to achieve this.

In this context, implantation is a crucial moment in the treatment and the team of specialists should assess all the factors involved to develop it adequately.

3.

The endometrium must be monitored by ultrasound to ascertain its thickness and morphological pattern, and if necessary, measure blood oestradiol levels, since we know that adequate values for these parameters develop with higher rates of embryo implantation.

4.

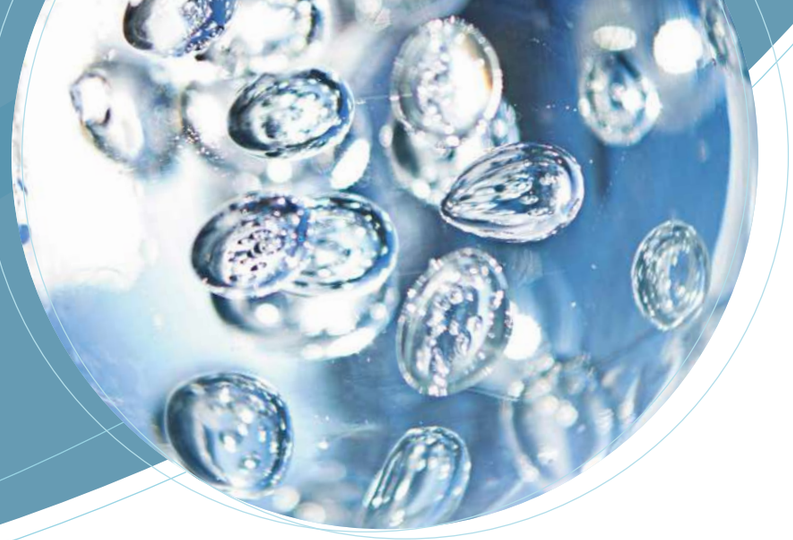
We must identify the best embryo to transfer to the maternal uterus, based on its potential for implantation. To do that we have a number of laboratory tools. The most commonly used is the morphological classification according the ASEBIR criteria. Another valuable resource for this selection are DNA studies like pre-implantation genetic diagnosis (SecureIVF) and the innovative non-invasive embryo chromosomal screening study (Secure Select), which allow us to know much more efficiently the individual implantation potential of each embryo.

5.

Once we have these two elements necessary for a successful implantation, we must synchronize both and choose the ideal moment for embryonic transfer, otherwise the embryo cannot nest. This window of implantation occurs in most cases between the 3rd and 5th day of development after fertilization, which in some cases must be studied by the endometrial receptivity test.

All this in the context of appropriate vascular and immune factors that must be studied and treated appropriately.

Is it better to freeze embryos for deferred transfer or to transfer fresh?



Dr. María Jesús Franco

Gynaecologis
UR Montpellier Zaragoza

- Since the 1990s, the freezing of embryos has been a common practice as part of in vitro fertilization.

In the early years of this practice, the results obtained upon thawing and transferring embryos were disappointing and always below those obtained for fresh transfer. The introduction of the embryo vitrification method was a real landmark in the terms of the survival of the embryo after thawing, leading to substantial improvement in the gestation rate.

Using this technique, results were progressively improved so that some reproduction units began to show that, as published in the academic journals, that better gestation rates were obtained when embryos were transferred dry. It was argued that ovarian stimulation could create certain hormonal conditions, mainly in the endometrium, making implantation difficult.

Due to this, and the fact that the risk of ovarian hyper stimulation was avoided (for fresh transfer), the practice of freezing eggs and transferring then in previous years on arrival became widespread. This technique is known as deferred transfer or "freeze all". In 2010, the Spanish Fertility Society (SEF) published that only 4% of cycles were carried out using the freeze all technique, while by 2020 that figure had risen to 35%.

In terms of the rate of gestation by transfer in cycles with own eggs, the SEF has published that in 2010 the figure was 35% for fresh embryo transfer and 40% for frozen. Data from the SEF also show that with donated eggs, the rates this year were 57% and 46%, respectively. The results are similar, although in some cases better with frozen and in others better with fresh. There is some debate, therefore, whether this technique should be implemented in all cases or only in part of the cycles performed, where there is a medical indication.

The medical literature review shows that, when analysing large series of cycles, gestation rates show no differences after a first fresh transfer compared to a first frozen transfer. However, fresh transfer reduces the time to achieving pregnancy, since pregnancy can occur already in the same stimulation cycle.

There is also a lower incidence of hypertension in pregnancy and bigger newborn babies than with the freeze all practice. On the contrary, in favour of the freeze all process, most studies agree that the risk of ovarian hyperstimulation syndrome is much lower (practically null, except in rare cases of premature hyperstimulation).

Given that the results are similar, we could conclude that it would be ideal to make the first transfer fresh (except where there is a risk of ovarian hyperstimulation), as it reduces the time to achieve pregnancy, and because although it reduces costs, avoiding subsequent controls that require the preparation of the endometrium for Frozen Embryo Transfer (FET). It also reduces the rate of the described pregnancy complications, mainly the risk of hypertension. It would appear that this risk is increased by the use of oestrogens for endometrial preparation, and by the lack of endocrine function of the corpus luteum. It would appear that this risk is increased by the use of oestrogens for endometrial preparation, and by the lack of endocrine function of the corpus luteum. This has seen an increasing trend in performing endometrial preparation in ECT cycles using the natural cycle.

Ultimately, with this practice, an accumulated gestation rate similar to that for freeze all is achieved but in a shorter period of time, as indicated. Nonetheless, it is necessary to insist that, if there is a risk of ovarian stimulation, freeze all would be preferable, with no fear of depletion in results, which was an issue in the earliest embryonic freezing attempts.

The important work of the

EMBRYOLOGIST IN ASSISTED REPRODUCTION PROCESSES

Juan Íñiguez

Embryologist - UR Valencia

Reproduction Units constitute their own special discipline within medicine, requiring a multidisciplinary team encompassing personnel with diverse training backgrounds.

Close cooperation, communication and coordination must be maintained if we want to achieve the ultimate objective which is to take a newborn baby home.

However, within this group, the embryologist is usually the great unknown, and their work is often overlooked, especially by patients, as they are often unaware of the work they do when it comes to delivering an assisted reproduction treatment.

What's the profile of the embryologist?

The embryologist is a specialist reproductive health professional, with a Degree in the Biomedical Sciences (Biology, Medicine, Chemistry or Veterinarian Studies) who must have extensive knowledge of genetics, cellular cultures, physiology, biotechnology, scientific methodology. It is also recommended that they hold a Master's in Assisted Reproduction. What's more, taking into account the rapid progress made within the field of reproduction and the ethical and legal debates that come with it, the acquisition of knowledge in both bioethics and legislation is crucial. As established in Royal Decree 413/1996 of 1 March, for a centre to be authorised for Assisted Reproduction Treatments, it must have the personnel to meet the requirements above.

The role of the embryologist is not a merely clinical role, but must also establish and implement a quality system that ensures the quality of the service delivered to patients not only guaranteeing the safety of the patient, but also that of the entire staff. Assisted reproduction techniques cover a wide range of procedures of both low and high complexity. One way or another, all of these factors are interrelated, so each process or procedure must be fully standardised, with protocols established.

Among the procedures to be carried out by the embryologist are those relating the basic study of the male, including a seminogram, studies of the minimum parameters necessary including volume, count, mobility and morphology. While the results of semen analysis won't enable us to determine the infertility of the make to a certainty, it does provide us with the information that lead us towards possible causes of infertility of masculine origin.

Another procedure performed as part of the study of the male is sperm capacitation which consists of the processing of the semen sample to obtain the mobile spermatozoa. Depending on the final count, one technique or another may be recommended. Finally, with respect to the basic study of the make, it is worth pointing out the DNA fragmentation studies, which take on greater important e very day in the assessment of the masculine factor, as they offer.

All the results of the different tests should be reflected in a report, which is submitted to both the urologist and the gynaecologist. That's why the embryologist should not only be able to complete these studies but should know how to interpret them.

Low-complexity techniques

Low-intensity procedures include:

ARTIFICIAL INSEMINATION

Can be performed with partner's semen or from an anonymous donor.

PRESERVATION OF FERTILITY

Fertility of both the woman and the male can be preserved through vitrification of eggs and the freezing of semen:

FREEZING OF SEMEN

The embryologist is responsible for processing the sample. Generally, washing, capacitation and concentration processes are performed prior to freezing.

When no spermatozoa are found in the ejaculate sample, efforts may be made to recover spermatozoa from the testicle, either by testicular biopsy or epididymal aspiration, a process in which the embryologist collaborates in the recovery of the aspirate or testicular tissue in order to proceed to search for spermatozoa. Finally, the sample is frozen, provided the spermatozoa are recovered.

VITRIFICATION OF OOCYTES

Perhaps the most complex preservation technique carried out at laboratories, due to the special characteristics of feminine gamete. However, for a number of years now, the vitrification technique has enabled us to approach female fertility preservation with extensive guarantees. This process requires controlled ovarian stimulation and follicular puncture-aspiration in advance. The embryologist is responsible for oocyte collection, denudation of the granulose cells (GCs), and subsequent classification of the oocytes according to their degree of maturity, to finally proceed to their freezing by vitrification and storage in liquid nitrogen.

In each of these techniques for the preservation of fertility and for each process carried out in the laboratory, the embryologist must ensure that the correct identification of the sample is made at all times, that quality criteria established for the processing are met and that it is possible to perform the traceability of the sample once processed and over time. This increases the security of the patient and minimises the errors in subsequent identification. In all steps, it is vitally important to maintain their traceability and quality standards.

High-complexity techniques

High-complexity techniques, in vitro fertilisation in both conventional IVF and Intracytoplasmatic sperm injection (ICSI), the precedent for the rest of the techniques. These include embryonic transfer, vitrification of embryos, embryonic cryotransfer and egg donation (applied to donor and executed in recipient).

In IVF, the embryologist will participate in all of steps taken after the PUNCTURE - FOLLICULAR ASPIRATION.

DAY 1 STEPS

- ☐ **OOCYTE RETRIEVAL**
  They will decide the final technique to apply to the valuation of the sample
- ☐ **SEMEN PREPARATION**
  In case of ICSI: decumulation and microinjection of oocytes. Next-day evaluation of the fertilization. Notify and inform patients of the situation.

DAYS 2 TO

- ☐ Perform cultivation of embryos obtained.
- ☐ Decide together with the gynaecology team whether or not to perform fresh transfer.
- ☐ Select the embryo to transfer and vitrify those possible.

Each step of the way, the embryologist must ensure traceability and ensure quality standards are met.

In the case of egg donation, the laboratory process is the same as for IVF. In this case, the donor is stimulated, who cedes their eggs to the recipient who will prepare as if for a cryotransfer. With this treatment, apart from technical execution, the embryologist, together with the gynaecologist, performs the selection of. They're also responsible for explaining the genetic matching and resolving doubts that may arise.

For the embryonic transfer process, this can take the form of fresh or vitrified embryos, the later referred to as cryotransfer. If the transference is performed from vitrified embryos, the embryologist assumes responsibility for the devitrification process, ensuring traceability of the sample to be devitrified, and ensuring the viability of the embryo. In the case of fresh transfer, they are responsible for selecting the best embryo to transfer and the selecting those suitable for cryotransfer. In both cases, they participate in the decision on the number of embryos to transfer together with the gynaecologist and the patients. During all of these processes, the embryologist remains in contact with patients to inform them of the progress of their case.

To finish, we must also mention the pre-implantation genetic test, which is also a genetic analysis of the embryo, which requires ICSI in advance.

In conclusion, the role of the embryologist is fundamental in in assisted reproduction treatments, and while naturally everyone's role is important in a multidisciplinary area such as this, it is only fair to recognise the work of these professionals.

PRE-IMPLANTATION GENETIC TESTING

for Aneuploidies Towards Healthier Pregnancies

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Pre-implantation genetic testing (PGT) is a very useful tool in the area of assisted reproduction, allowing couples to improve their chances of conceiving a healthy baby. In particular, the PGT for aneuploidies (PGT-A) focuses on identifying and selecting embryos with a sufficient number of chromosomes, minimising the risk of aneuploid genetic disorders and facilitating a successful pregnancy in the highest number of transfers possible.

Aneuploidies are genetic alterations that occur when an embryo presents an abnormal number of chromosomes, the structures into which our DNA is organized. This chromosomal imbalance in embryos is more frequent in couples with some conditions, such as advanced age in the female or the existence of a severe male factor, and can produce serious conditions such as Down's syndrome (Trisomy 21), Edwards syndrome (Trisomy 18) and Patau syndrome (Trisomy 13), among others.

The role of PGT in the detection of aneuploidies PGT-A is a highly effective technique carried out during in vitro fertilization (IVF). After fertilization of the eggs with the sperm, the resulting embryos are subject to a biopsy in the blastocyst phase, generally in which cells are extracted from the embryo and their genetic material is analysed to determine the number of chromosomes.

This precise analysis allows us to select euploid embryos, that is, those that have the correct number of chromosomes, significantly improving the probability of successful pregnancy and reducing the possibilities of spontaneous miscarriage.

Indications for the PGT-A

The PGT-A is indicated for couples facing certain risk situations, like:

1. Advanced maternal age

As women get older, the probability of eggs presenting abnormal chromosomes increases, which increases the possibilities of aneuploidies in embryos. In these situations, the PGT-A becomes essential for older women looking to conceive a healthy baby.

2. Severe masculine factor

Serious alterations in sperm quality of the male can contribute to an increase in the aneuploidies in the embryos obtained. Much like the case of older maternal age, the PGT-A will be indispensable for identifying the aneuploid embryos

3. Recurrent miscarriages

If a couple has experienced recurrent spontaneous miscarriages, aneuploid embryos could be a possible cause. Conducting the PGT-A could help identify and select aneuploid embryos for implantation.

4. Failed previous IVF treatment

If the couples have already gone through unsuccessful IVF treatment, the presence of aneuploidies could be a factor. PGT can improve the chances of success in future attempts using IVF.

PGT-A: a shortcut to pregnancy

PGT-A offers couples the chance to conceive a healthy baby directly. What's more, pregnancy and delivery rates are significantly higher in PGT-A cycles compared to conventional cycles, or according to data from the Spanish Fertility Society (SEF). The use of PGT-A to identify embryos with adequate chromosomal endowment helps couples by reducing the emotional and financial burden associated with miscarriages. This makes it possible the number of transfers necessary before identifying an euploid embryo thanks to PGT-A.

In conclusion, the pre-implantational genetic test represents a significant advance in reproductive medicine. This technique offers couple the possibility of identifying chromosomally healthy embryos, increasing the probabilities of a successful pregnancy, reducing the wait time and fostering conscious maternity and paternity.

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