Import-export of spermatozoa and embryos for heterologous insemination program

Mariabeatrice Dal Canto

Clinica Eugin Modena, Reproductive Medicine Centre, Modena, Italy

Address for correspondence:
Mariabeatrice Dal Canto
Clinica Eugin Modena, Reproductive Medicine Centre,
Clinica Eugin
V. L. Nobili 188-f
41126 Modena, Italy
E-mail: bdalcanto@eugin.it

KEY WORDS: gamete shipping, embryo shipping.

Infertility is defined as the “inability to conceive” after one year of unprotected sex. Around the world every year, more than 100,000 cycles of IVF with donated gametes are performed; 25,000 of which are done in Europe. Different European countries have different laws regarding gamete donation control. In some countries “donors” must be anonymous or not anonymous; in others gamete donation is well regulated by specific rules or totally forbidden. Also, the distribution of donors changes from country to country; mainly because of cultural differences and social reasons. Spain is the country with the highest number of organ donors in the world, but also the country with the highest number of donors of gametes in Europe: almost 50% of all European donations in 2012 was performed in Spain (1). This huge source of gametes has induced an intensive cross-border reproductive tourism, for those couples where the only chance to solve their infertility problem is the use of donor gametes.

At Clinica Eugin in Barcelona, in 2014 around 10,000 IVF treatments have been performed, more than five thousands of which with donors. Out of this, more or less 20% involved Italian couples, mainly because IVF with donor gametes was forbidden in Italy at that time. Since 2015, in Italy IVF treatments with donated gametes are finally allowed, anyhow the main problem consists in the lack of donors. Italy is in need of both sperm and eggs donors. Since 1990’s several Sperm banks have been established in Scandinavian countries and Spain. Sperm freezing is an easy and feasible technique which permits the use donor sperms without risks. In fact the Sperm bank, after the donor selection, proceeds to freezing the donated sperms. During the storage of samples the Sperm Bank applies all procedures to investigate the health condition of the donors, in safety intervals, to guarantee that after one year safe samples are available to use for IVF treatments. Finally, the job for a sperm bank is to export frozen samples to IVF centers that need them for Artificial Insemination as well as for IVF. Frozen sperm samples have been travelling everywhere in the world for more than 30 years. In the last decade, The European Union Tissue and Cells Directives have regulated the import-export of reproductive cells (the parent Directive, 2004/23/EC and the two technical directives, 2006/17/EC and 2006/86/EC) providing all the detailed requirements. After that some countries added more specific regulations that should be adopted also. Nowadays only Centres accredited and licensed for the purpose of those activities, that have in place a total quality management system, could perform the import/export of gametes and embryos. The same Directives guarantee the safety of frozen samples, inducing the Centres to specify the screening of cells (Nucleic Acid Testing for HIV, HBV and HCV, etc.), quarantine of the gametes and follow-up and re-testing of donors. The situation is more complicated for women who need donated eggs.
Fifteen years ago, the only possibility to do IVF using donor eggs was to look for a donor and to prepare donor and recipient at the same time: using fresh oocytes from donor, producing fresh embryos to replace in well prepared recipient’s uterus.

The **key point** of this strategy was the use of fresh oocytes.

Unfortunately, donors are distributed mainly in some countries, and the permission to recruit egg donors is allowed only in few countries. As a consequence, the phenomenon called “reproductive tourism” was born: for any couple with severe female infertility and in need of egg donation, it was mandatory to cross the border to perform this specific IVF treatment.

More or less in 2010 the optimization of oocyte vitrification helped to simplify the application of egg donation program. Oocyte vitrification has become one of the routine technique in any IVF centre, demonstrating how embryo development and clinical outcomes are similar to those achieved with fresh or frozen oocytes (2, 3). As a result, this strategy has proven to be a valuable tool for egg donation programs (4). This achievement has permitted the creation of EGG banks, in Spain, Greece, Czech Republic and Ukraine.

Nowadays egg banks look for donors, collect and vitrify eggs. As for Sperm Banks, they can apply all procedures to select the donor without urgency, investigate the health condition of donors, and be ready, at any time, with frozen safe samples to use for IVF treatments.

Exactly as happens with male gametes, frozen oocytes can travel everywhere in the world. First of all it is necessary to prepare a clear request to the egg bank in order to select the donor based on specific characteristics. Than a collaboration between “Egg bank” and IVF center is needed to organize the exportation, paying attention to country legislations and procedures for traceability following EU directives.

Once the frozen eggs arrive to IVF center it’s possible to start the recipient preparation. When the time comes, it’s possible to proceed with the warming of eggs, then ICSI and finally have the embryos ready for transfer.

In this new scenario the **key point** is oocyte vitrification in order to avoid synchronization as well as having the possibility to move samples instead of people.

Of course limits and costs of the moving of oocytes are still to be valued: it’s still not clear if transport in nitrogen vapors is a secure option, and whether small changes in temperature could potentially damage the cells. Sperm resistance to these changes in temperature has already been tested and proved, yet oocytes resistance is still unsure.

Are there other options for couples who need a treatment with donor eggs? Yes, there are.

In July 2015 news appeared on Italian newspaper: embryos have been mailed by post from Spain to Italy.

This new approach has been possible thanks to a collaboration between 2 IVF centres: an Italian one and a Spanish one.

This strategy has been very successfully since the collaboration was between one conventional IVF centre and one “unconventional egg-bank”, an Egg bank that works also as an IVF centre.

Finally we can draw a new scenario:

- **first step:** export “frozen sperm from husband” from IVF center to Egg bank/IVF center;
- **second step:** Egg bank/IVF center starts with donor search. Since the sperms are available in the lab, the Egg bank/IVF center is completely free to decide whether to use fresh or vitrified oocytes and perform ICSI at its any convenience;
- **third step:** Vitrify good quality embryos or blastocyst and export them to IVF center.

This time the **key point** is “**sperm plus embryo freezing**”.

Of course we have more costs due to a double import, but the major advantage is that sperm and embryos are less sensitive than oocytes to freezing and to transportation.

To apply this strategy in any IVF centre the lab needs a robust and clear procedure for import and export of frozen samples.

In 2016, in Clinica Eugin Modena, we supported more than 600 Italian couples through an IVF treatment with donated gametes. In collaboration with Clinica Eugin Barcelona, to help couples who need female donated gametes, we exported “husband frozen sperm sample” and we received “frozen embryos”.

The model is efficient, safe and reliable but it requires a high level of coordination between the centres.

In conclusion, nowadays “the import and the export” of spermatozoa and embryos for heterologous insemination program is a real opportunity: we can freeze gametes, we can safely import
or export frozen sample and we can guarantee the success rate of this procedure.

References


