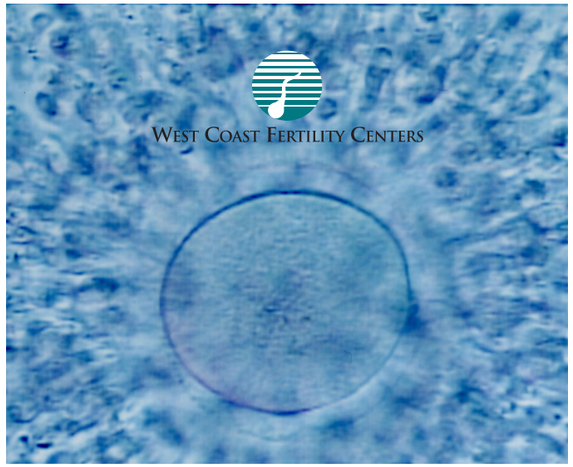


# A Frozen Egg Birth, a Frozen Embryo Birth, and a Fresh Embryo Twin Birth: Multiple Outcomes From a Single IVF Cycle

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## Abstract

**Background:**

Cryopreservation is an established way of storing embryos and sperm, and now there is an efficient method available for freezing unfertilized eggs.

**Case:**

A 42 year-old single patient with tubal factor and diminished ovarian reserve became pregnant with frozen donated eggs/frozen donor sperm. Two weeks after the embryo transferred, the patient's I initial serum β-hCG level was 342 mIU/ml. Two gestational sacs were seen at the initial sonogram exam. One sac aborted spontaneously, but the patient delivered a healthy female infant at 35 weeks.

**Conclusion:**

Offering oocyte freezing can expand the range of services to patients undergoing IVF. Patients who have completed their family and wish to donate their unused genetic tissue can donate frozen oocytes, giving ART programs a viable alternative for the management of surplus oocytes. The recipients of donated oocytes can inseminate them with the provider of choice sperm to create healthy embryos and achieve pregnancy.


## Introduction

Over the past several decades, considerable effort has been expended toward the successful cryopreservation of various human cells. Oocyte cryopreservation certainly represents one of the most attractive developments in the field of assisted reproduction with the aim of extending fertility to women wishing to store their own young healthy eggs. Women diagnosed with cancer may preserve their fertility by egg freezing prior to start cancer treatment. An egg bank can be used by patients needing egg donation by eliminating cycle synchronization with egg donor. Finally patients who are opposed to embryos freezing can now freeze oocytes. Preliminary studies from our laboratory suggest it is possible to offer oocyte cryopreservation as a procedure that is able to compete with embryo freezing in efficiency.

## Materials and Methods

Donated surplus frozen oocytes from successful IVF patients.

## Case Report

A 30-year-old woman with polycystic ovarian syndrome (PCOS) underwent controlled ovarian hyperstimulation (COH) for in vitro fertilization. A limited number of oocytes were inseminated with Intracytoplasmic Sperm Injection (ICSI) due to oligoasthenoteratospermia. Surplus oocytes were cryopreserved by a slow freeze method because the patient declined to freeze a large number of embryos. In November of 2001, the patient delivered healthy twins. The couple decided to donate all unused cryopreserved oocytes and embryos. We decided to offer the donated oocytes to 42 years old matched primary infertility recipient.

## Case Report

7 out of 10 oocytes survived the thaw. Survival was defined as 1) the zona pellucida and cell membrane were observed to be intact, 2) the perivitelline space was of normal size, 3) there was no evidence of cytoplasmic leakage or oocyte shrinkage. Frozen sperm was used to insemination 6 oocytes (day 0) and fertilization check was done 16 hours later, documenting that 5 oocytes were normally fertilized. Twenty-four hours later, 4 embryos had cleaved normally on day 2. The recipient's endometrium had been prepared with oral administration of estradiol ($E_2$) followed by intramuscular progesterone (P) supplementation. The recipient patient elected to receive all 4 embryos, which were transferred by transvaginally guided ultrasound technique.

Fourteen days after embryo transfer, the recipient's initial serum beta-hCG level was 342 mIU/ml. An initial ultrasound examination 28 days after embryo transfer showed two gestational sacs with cardiac activity observed in sac A. No embryo was observed in sac B. Thirty-four days after embryos transfer a repeat ultrasound demonstrated a singleton pregnancy with cardiac activity.

The patient underwent first trimester screening and showing an elevated alpha-fetoprotein (AFP). The result of amniocentesis at 16 weeks was reported normal 46, XX. During the pre-natal course a placenta previa was documented by ultrasound. The patient was hospitalized at 35 weeks for pre-term labor, with a subsequent cesarean delivery and the birth of a 6-pound baby girl.

## Discussion

There are several circumstances in which the ability to store oocytes would be advantageous. The potential benefits of long term storage of unfertilized oocytes apply especially to young female patients wishing to extend their oocyte viability and young cancer patients who are scheduled for chemo-therapy and / or radiation therapy. Oocytes storage is also a potential benefit to patients undergoing fertility treatment who have surplus oocytes, and are opposed to embryos freezing. Oocytes cryopreservation would facilitate banking of oocytes, not only for the patient's own use, but also for possible donation to other infertile couples or research. Finally, oocyte cryopreservation would make donation more efficient by avoiding the need of synchronize donor and recipient treatment cycles.

By lowering the previously high number of cryopreserved oocytes required for a successful implantation, our new freezing solution has overcome some of the previous challenges. Oktay et al., reports that from all slow-freeze thawed oocyte cases reported from 2002-2004, only 4.1% of 688 oocytes thawed resulted in a pregnancy with a 64.9% fertilization rate. These studies reveal that a high number of oocytes is required to produce a viable pregnancy to overcome poor thawing survival and low fertilization rate. Our results reveal that our new slow-freeze/fast-thaw protocol used with the case produces high survival rates (91%) and fertilization rates (90%) leading to a smaller number of oocytes needed for a pregnancy.

When comparing pregnancy rates for frozen oocytes versus fresh oocytes from our 2006 IVF cases, the fresh oocyte pregnancy rate for patients under 35 was 55.7% and the frozen oocyte pregnancy rate was 58% (**Figure 1**).

These results illustrate no noticeable difference between fresh and frozen oocyte pregnancy rates. The 2006 frozen embryo pregnancy rate for patients under 35, 46%, shows a lower rate than the frozen oocytes pregnancy rate, 58% (**Figure 2**).

When compared to both fresh oocyte and frozen embryos for patients under 35, the frozen oocyte pregnancy rate is higher. This technology gives patients the option to freeze surplus oocytes, inseminate fewer oocytes, and avoid freezing surplus embryos. Successful oocyte cryopreservation and thawing has created additional options those seeking infertility treatments have.

Our new Slow-freeze/Fast-thaw protocol and technique may lead to an improved method for oocyte cryopreservation. Interim analysis of outcomes of the initial 34 frozen-thaw oocyte cycles appears to be at least as good as outcomes achieve in our 2006 ICSI and embryo freezing programs. Further study of a large patient population is on going to determine the efficiency and safety of our new protocol.

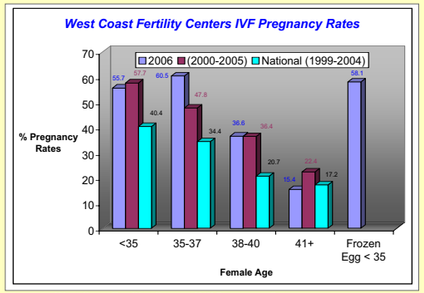


**Figure 1.** West Coast Fertility Centers IVF Pregnancy Rates

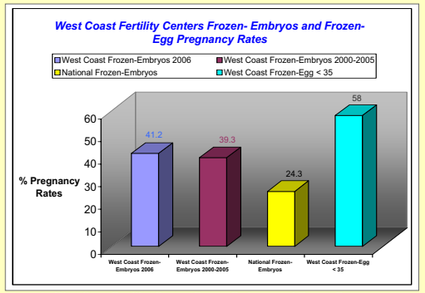


**Figure 2.** West Coast Fertility Centers Frozen-Embryos and Frozen-Egg Pregnancy Rates


## West Coast Fertility Centers

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