

# A live normal baby is possible despite exposure of a cleaving embryo in culture to extensive smoke and heat from a raging fire and exposure to chemicals used to extinguishing the fire

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## Summary

**Purpose:** To demonstrate that some embryos can be exposed to fire and smoke and still be rescued and result in a healthy baby following embryo transfer. **Materials and Methods:** Valiant efforts were made to save cleaving embryos by an embryologist and firefighters exposed to a raging fire. **Results:** Two of three embryos survived the thaw. Initially, there were twins, but eventually a live healthy full-term baby boy was born. **Conclusions:** Hopefully, no other IVF center will experience a fire catastrophe as described. However, if it does occur, this case report shows that it is worth the effort, and possible risk to staff, to save the embryos despite smoke and heat exposure.

**Key words:** Smoke; Fire; Embryo transfer; Embryo rescue.

## Introduction

There is little question that good Samaritans and firefighters may risk their lives to enter a building on fire to save a screaming baby. However, the question exists as to whether that risk should apply to embryos, not because they are not alive, but with their sensitivity to noxious influences, is there any chance that exposure to excessive smoke, with all its noxious fumes, and the heat of the fire, that they could possibly survive and result in a pregnancy?

Raging fires in the IVF facility are fortunately very rare, but can happen. A case is presented of a severe fire that destroyed the entire IVF facility, where some of the brave staff members and firefighters risked their lives to save a set of embryos growing in the incubator. Fortunately, not only did no one get injured in the rescue effort, but these embryos resulted in a full-term healthy baby boy.

## Case Report

A 34-year-old single female presented to Cooper Institute (CIR) for infertility treatment. She had one occluded tube from an ectopic pregnancy in the past, but no other known infertility factors. In vitro fertilization (IVF) using donor sperm was her choice of treatment.

Her first IVF cycle, using cetrorelix, recombinant FSH, and human menopausal gonadotropins, resulted in nine oocytes retrieved. Six fertilized with conventional insemination using donor sperm, and two were transferred into the patient. Both were good

quality eight-cell embryos, transferred on day 3, with assisted hatching performed [1]. Three supernumerary day 3 embryos were cryopreserved using a one-step slow-freeze method [2]. No pregnancy was achieved. Four months later, the patient began a graduated oral estradiol regimen for a frozen embryo transfer (FET) cycle. After 17 days of estradiol, her endometrial lining was 8 mm with a triple line/isoechogenic (TL/IE) endometrial echo pattern. She started progesterone supplementation the following day: progesterone in oil, 50 mg (increased to 100 mg subsequently) and compounded progesterone vaginal suppositories (200 mg once daily for one day, then increased to twice daily subsequently).

The patient's three cryopreserved embryos were thawed early on the third day of progesterone. Two survived. One eight-cell embryo survived fully intact, one seven-cell survived with six cells intact; the third embryo was completely degenerated upon thawing. The two embryos were placed in cleavage medium supplemented with 10% SPS under oil for overnight culture. Each embryo was cultured separately in 0.5 mL of medium in a Nunc four-well plate. Later that day, a fire started in the bathroom of the IVF area. A ventilation fan was the apparent cause. The fan motor seized, the wiring caught fire, and ignited nearby objects, and the fire spread into the ceiling. When smoke began pouring down into the bathroom – and the fire alarm went off – the fire was located. One staff member grabbed a fire extinguisher and began spraying the area. Another informed the office manager of the fire location so that the firefighters could be directed. The extinguisher was ineffective since most of the fire was spreading through the drop ceiling space above, and shortly thereafter all personnel had to evacuate the building. Ladder trucks from four townships arrived. By then the fire was visible, coming out from both roof gables at the eastern end of the building. Firefighters

had to spray water into the space above the drop ceilings to get it under control. Eventually the ceilings partially collapsed into both the IVF lab and the adjacent cryo-lab.

The Embryology Director emphasized to the fire crews that they urgently needed to evacuate the embryos, both fresh and cryopreserved, from the facility immediately. A few staff members were allowed inside, and formed a “dewar brigade” to roll all the storage dewars over to the neighboring building for safekeeping. Meanwhile, the director, and one other staff member, entered the main lab to rescue the recently thawed embryos. Along with some fire personnel, they located the incubator stack and the embryos, and set the embryos aside very carefully in the back of a laminar flow hood which was still upright. Subsequently the laboratory and fire personnel chose the incubator stack which still had some lights visible on it, unplugged it, and began dismantling it. Luckily it was an air-jacketed model so it was lighter. However, the two incubator chambers would not come apart. Since the incubator had to be moved no matter what, the personnel involved removed the laboratory door instead, knocked out a piece of the doorjamb, leaned the entire stack over, and rolled it through the doorway. All the tubing was ripped off, and there was no time to empty the humidity pans. The stack was manhandled through some rubble and down a hallway to a sono-HSG room at the far end of the building, chosen because it was relatively undamaged by the fire and had functioning electricity. Since the incubator chamber, even unplugged, was relatively warmer than the surrounding environment, the authors replaced the embryo dish into it as soon as it was set up. Two CO<sub>2</sub> tanks were rescued from IVF and moved to the incubator location. Connection tubing had to be salvaged from behind some of the destroyed incubators and reconnected to the gas guard and functioning incubator. The chambers soon displayed the correct temperature and CO<sub>2</sub> level (although there was no way to verify it, since the fryite was destroyed).

The incubator functioned through the night. In the morning, a dissecting scope with only minor water damage was located and transported to the makeshift ultrasound room in the adjacent building. No inverted microscope was available, so no close-up examination of the embryos nor assisted hatching were performed. However, the embryologist could see that the eight-cell had grown to ten cells, and the six-cell was either seven or eight cells by the time of embryo transfer.

The patient was prepped for transfer in the usual manner. An

extra light was located for the prep, since the room was fairly dim. Embryos were carried over from the adjacent building and placed on the warmed microscope stage. A Rocket Genesis Echo catheter was loaded with the culture medium (since there were no other options) and loaded with the two embryos, and the doctor transferred the embryos into the patient under ultrasound guidance, as per usual protocol. No embryos returned in the catheter. The patient rested for half an hour and was discharged.

The beta-hCG test performed 11 days later was positive (308 mIU/mL)! Initially she showed two heartbeats – both embryos had implanted – but she ended up delivering a healthy singleton, full-term boy.

## Discussion

The case is important for two reasons. First it shows that embryos exposed to excessive noxious smoke fumes can still create a live baby. Second it provides details of what measures were taken by the embryologists to save these embryos, so that, if God forbid, such a fire happens to another IVF facility, certain protocols may have been created to help ensure a successful outcome.

## References

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