Together. All the way™

Rapid-i Vitrification System

- Summaries of selected studies

2010 – 2022

Vitrolife

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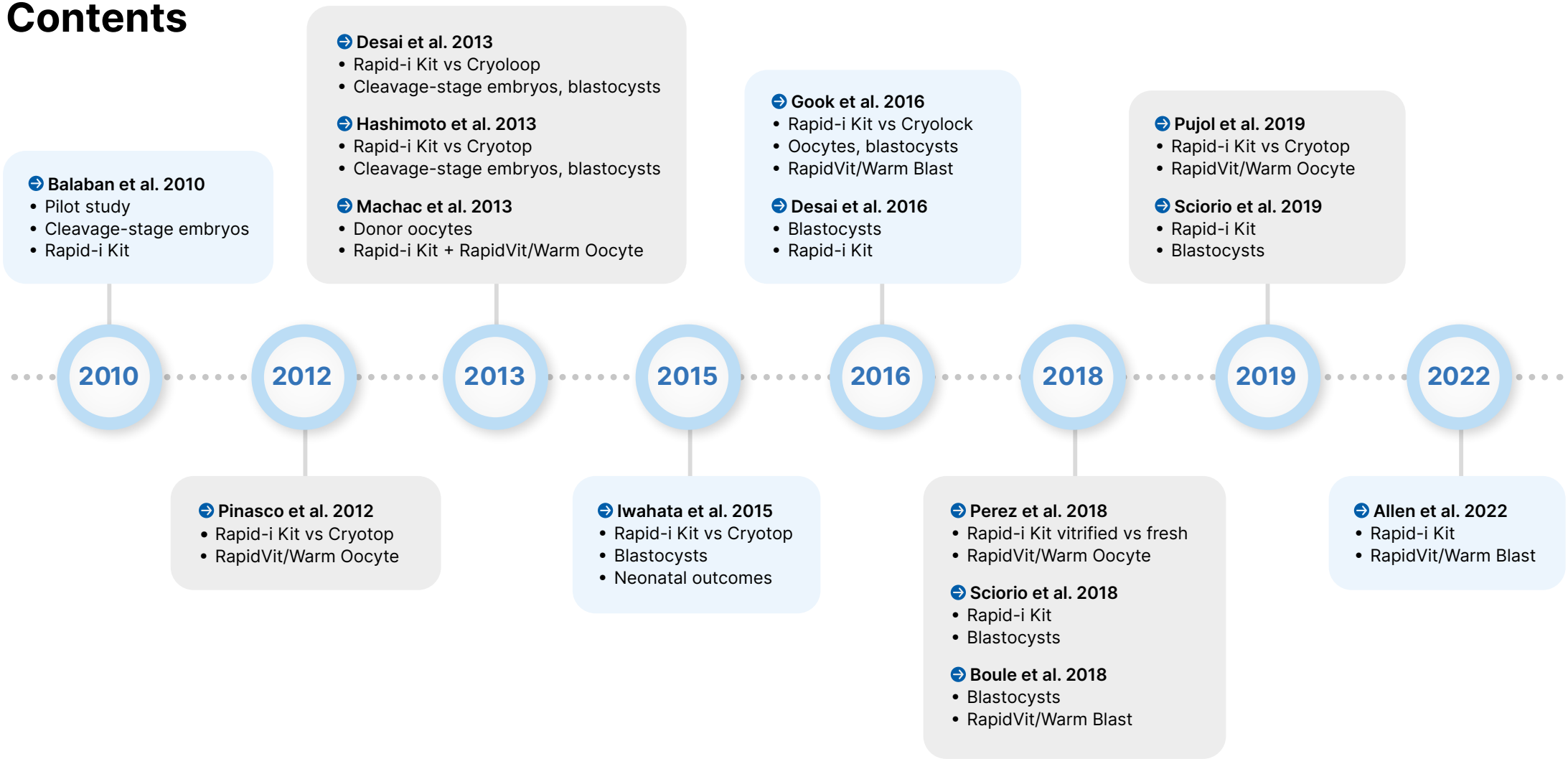
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Vitrification of human cleavage-stage embryos using the Rapid-i Kit

Balaban et al. 2010

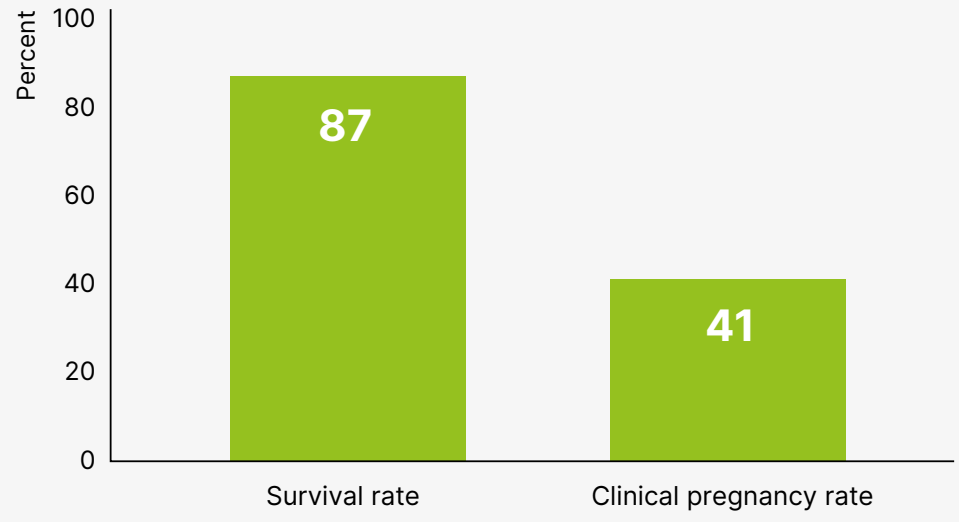
Background

- The **Rapid-i Kit** uses super-cooled air to vitrify gametes and embryos, thereby eliminating direct contact between the sample and liquid nitrogen

Methods

- Day 3 embryos (n=99) from 34 patients were vitrified/warmed using the **Rapid-i Kit** and transferred
- Mean number of embryos transferred: 2.1

Outcomes



The closed Rapid-i Kit safeguards successful vitrification of human embryos

Vitrification of human cleavage-stage embryos using the Rapid-i Kit

Balaban et al. 2010

Objective

This was one of the first studies to describe the outcomes of cryopreservation with the Rapid-i Kit. The Rapid-i Kit was designed to eliminate direct contact between the biological sample and liquid nitrogen, ensuring aseptic handling of precious gametes and embryos. The Rapid-i Kit was developed based on the use of super-cooled air to vitrify the sample. In this publication, Rapid-i Kit was used to vitrify day 3 human embryos.

Materials and methods

Day 3 human embryos from 34 patients were vitrified/warmed and subsequently transferred.

Results

A total of 99 human embryos were vitrified and warmed and 87% of them survived. A mean of 2.1 embryos were transferred resulting in a clinical pregnancy rate (CPR) of 41%.

Conclusions

The Rapid-i Kit, which ensures no direct contact between the sample and the liquid nitrogen during vitrification and storage, safeguards successful vitrification of human embryos.

REFERENCE

Balaban B, Isiklar A, Urman B, Gardner DK, Larman MG. Vitrification of human and mouse embryos using the Rapid-i™. Fertil Steril. 2010 Sep;94(4): S115.

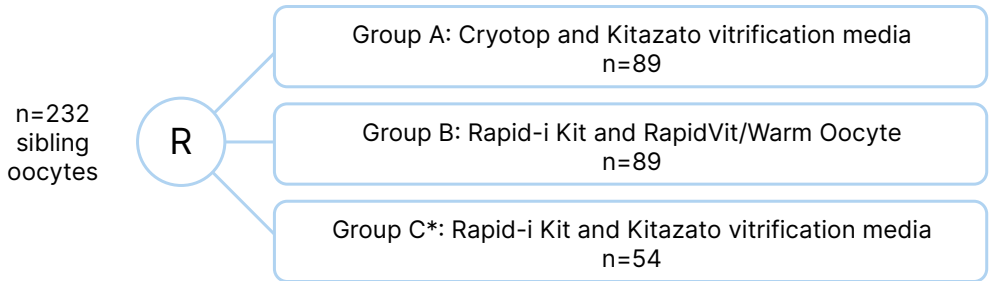
Oocyte vitrification freeze/thaw survival rates using an open versus a closed system

Pinasco et al. 2012

Objective

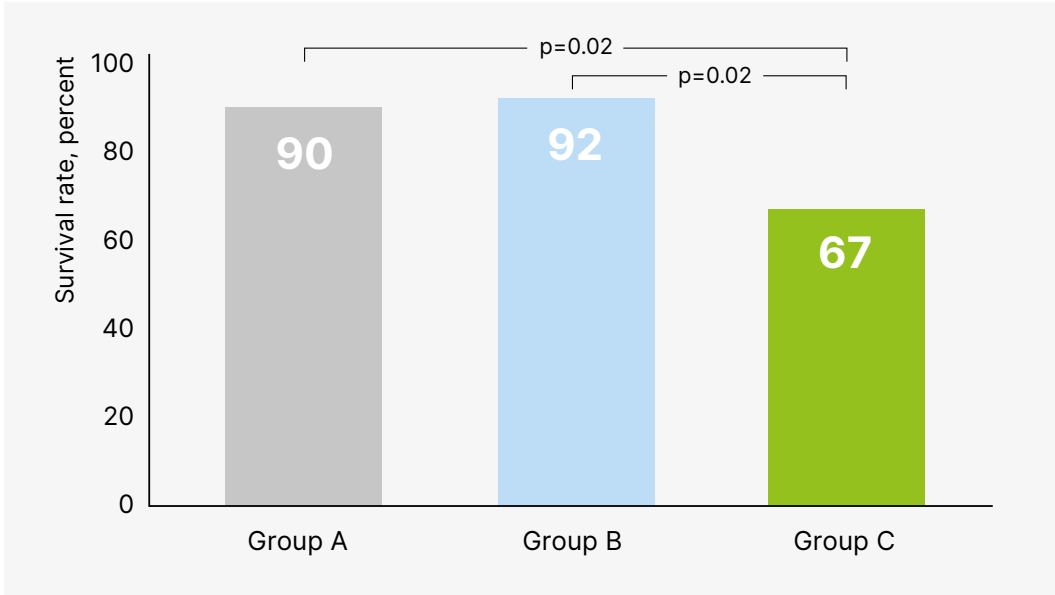
- To compare oocyte survival rates using an open (Cryotop) versus a closed (**Rapid-i Kit**) vitrification system

Methods



*If a sufficient number of sibling oocytes was available

Outcomes



Oocyte survival rates were similar using both systems, but the closed system provides an aseptic alternative to the open system

Oocyte vitrification freeze/thaw survival rates using an open versus a closed system

Pinasco et al. 2012

Objective

The purpose of this randomized trial was to determine whether survival rates of vitrified/warmed oocytes were different when using an open or a closed vitrification system.

Materials and methods

MII oocytes were randomized into Group A (open system, Cryotop with Kitazato vitrification media) or Group B (closed system, Rapid-i Kit with RapidVit/Warm Oocyte). Additionally, a third Group C (Rapid-i Kit with Kitazato vitrification media) was included if a sufficient number of sibling oocytes was available. After vitrification, oocytes were warmed and examined under the microscope for survival/viability. Rates were based on morphological assessment of the cytoplasm, oolema, and zona pellucida.

Results

A total of 232 sibling oocytes were included in the study, of which 178 sibling oocytes (89 pairs) were divided and randomized to Group A or B. If an additional third sibling oocyte was available from the same patient, the oocyte was allocated to the Group C. Freeze/warm survival rates were 90% (80/89) for Group A, 92% (82/89) for Group B and 67% (36/54) for Group C. When groups A and B were compared using McNemar's test (80/89 vs. 82/89; p-value=1.0), no significant difference in survival rates was observed. Survival rates of Group A and Group B were both superior to Group C (36/54; p=0.0164).

Conclusions

Vitrification of human oocytes using closed or open carrier systems results in a similar survival rate. But the closed system provides an aseptic alternative to the open system.

REFERENCE

Pinasco M, Hickman T, Russell H, Rashiv B. Oocyte vitrification freeze/thaw survival rates using an open versus a closed system. Fertil Steril. 2012 March;97(3):S18.

The new Rapid-i carrier is an effective system for human embryo vitrification at both the blastocyst and cleavage stage

Desai et al. 2013

Objective

- To compare outcomes after use of an open (Cryoloop) versus a closed (**Rapid-i Kit**) vitrification system

Methods

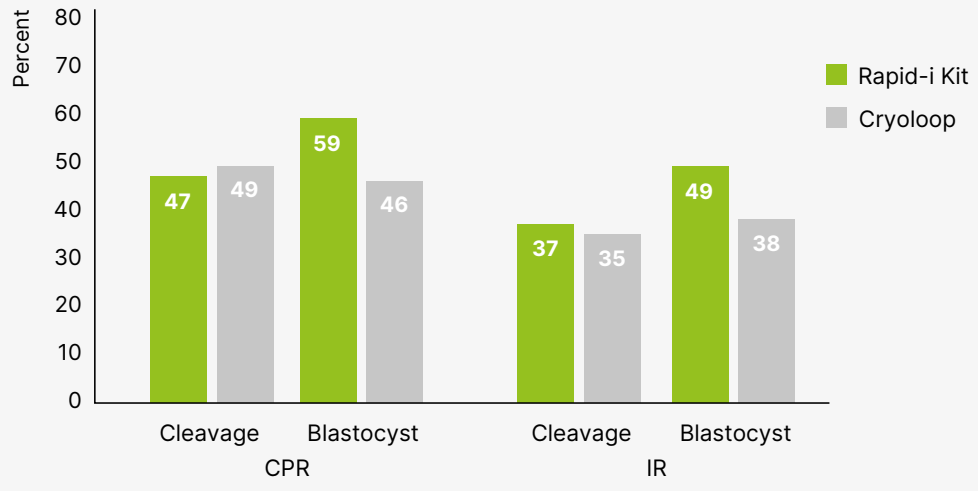
256 patients returning for FET
Aged≤40 years

Embryos vitrified using Rapid-i Kit from 2011
n=95 patients

Embryos vitrified using Cryoloop prior to 2011
n=161 patients

- All embryos (cleavage-stage or blastocysts) were vitrified using DMSO/EG containing media
- 486 vitrified-warmed embryos were assessed and 92% were transferred

Outcomes



31 deliveries of 34 healthy infants from Rapid-i Kit vitrified embryos

The Rapid-i Kit offers an excellent alternative to open vitrification devices for embryo cryopreservation

The new Rapid-i carrier is an effective system for human embryo vitrification at both the blastocyst and cleavage stage

Desai et al. 2013

Objective

The study presented clinical data, as well as live birth outcomes, after use of the Rapid-i Kit in comparison with an open vitrification system. The efficacy of the Rapid-i Kit for the cryopreservation for cleavage and blastocyst stage human embryos was analysed.

Materials and methods

Human embryos were vitrified at either the 8–10 cell stage or the blastocyst stage. The vitrification protocol used DMSO-containing medium, which was removed during the warming procedure. Embryos were vitrified using either the open carrier Cryoloop or the closed device Rapid-i Kit. Clinical outcome data for frozen cycles were stratified according to carrier and cell stage. The student t-test and chi square test were used to compare results.

Results

A total of 486 vitrified-warmed embryos were assessed and 92% of them were transferred. The clinical pregnancy rate and implantation rate with Rapid-i vitrified blastocysts were 59% and 49%, versus 47% and 37%, respectively for cleavage-stage embryos. This was not statistically different from results with the Cryoloop vitrified blastocysts (CPR 46%, implantation rate 38 %) nor the cleavage-stage vitrified embryos (CPR 49%, implantation rate 35%). The study reported 31 deliveries of 34 healthy infants from Rapid-i vitrified embryos.

Conclusions

The Rapid-i offers an excellent alternative to open vitrification devices for embryo cryopreservation at the 8–10 cell stage as well as the blastocyst stage. Reported data and live birth outcomes paved the way toward transitioning to a closed vitrification system at the IVF-center where the research was conducted.

REFERENCE

Desai NN, Goldberg JM, Austin C, Falcone T. The new Rapid-i carrier is an effective system for human embryo vitrification at both the blastocyst and cleavage stage. Reprod Biol Endocrinol. 2013 May 15;11:41.

A closed system supports the developmental competence of human embryos after vitrification

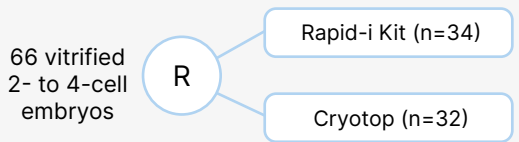
Hashimoto et al. 2013

Objective

- To compare the developmental competence of embryos vitrified using **Rapid-i Kit** vs Cryotop

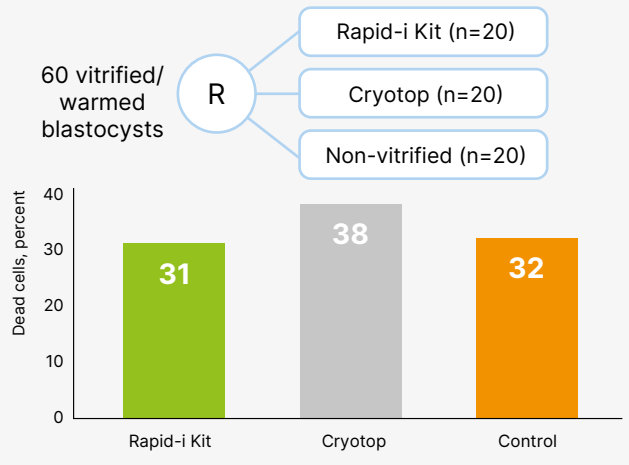
Methods and outcomes

In vitro development after revitrification

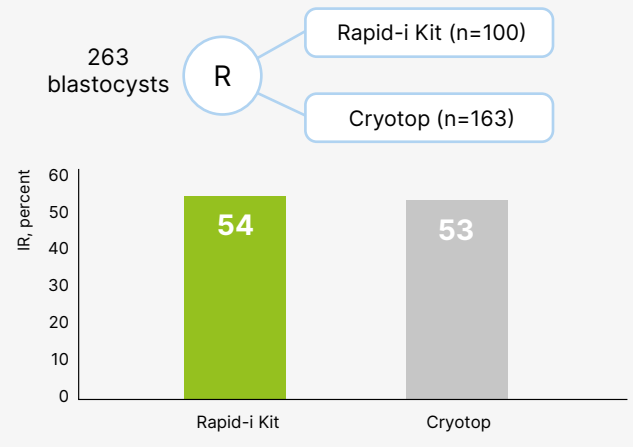


	Rapid-i Kit	Cryotop
Survival rate, (%)	100	97
Blastulation rate at 120 h, (%)	68	56
Good blastocysts, (%)	47	41
Mean number of cells, (n)	137	138

Cell membrane damage after revitrification



Implantation competence after single embryo transfer



Vitrification outcomes are similar after the use of the Rapid-i Kit and an open device

A closed system supports the developmental competence of human embryos after vitrification

Hashimoto et al. 2013

Objective

This study compared developmental competence of human embryos vitrified using the closed vitrification device Rapid-i Kit versus an open vitrification carrier Cryotop.

Materials and methods

A total of 66 human zygotes previously vitrified at a pronuclear stage were included in the study. They were warmed, cultured until the 2–4-cell stage, and randomized for revitrification using either a closed or an open vitrification system. Following rewarming, embryo development and blastocyst cell number were assessed. Additionally, 60 vitrified-warmed blastocysts were randomized into three groups (revitrification using closed system, revitrification using open system and no revitrification). In each group, cell count was performed after fluorescent dye staining. Finally, clinical outcome after using the closed or open vitrification system was also assessed.

Results

There were no differences in survival rate between the closed or open vitrification systems (100 % vs. 97 %), blastulation rate at 120 hours (68 % vs. 56 %), proportion of good blastocysts at 120 hours (47 % vs. 41 %), or mean number of cells in blastocysts (137 vs. 138). The proportion of dead cells in blastocysts revitrified using the closed device (31 %) was similar to that for the open device (38 %) and non-vitrified embryos (32 %). Implantation rate for blastocysts vitrified using the closed vitrification system (54 %) was similar to that with open device (53 %).

Conclusions

Vitrification outcomes after the use of the Rapid-i Kit and an open device are similar.

REFERENCE

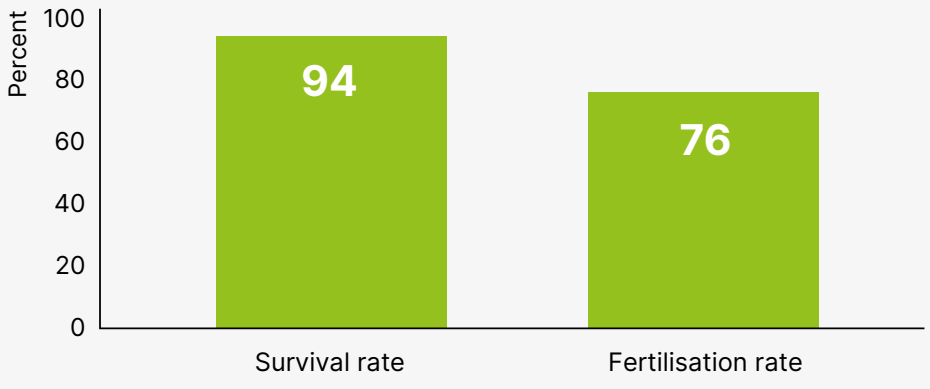
Hashimoto S, Amo A, Hama S, Ohsumi K, Nakaoka Y, Morimoto Y. A closed system supports the developmental competence of human embryos after vitrification: Closed vitrification of human embryos. J Assist Reprod Genet. 2013 Mar;30(3):371-6.

Oocyte vitrification using a newly developed vitrification medium (RapidVit/Warm Oocyte) and the closed device Rapid-i Kit

Machac et al. 2013

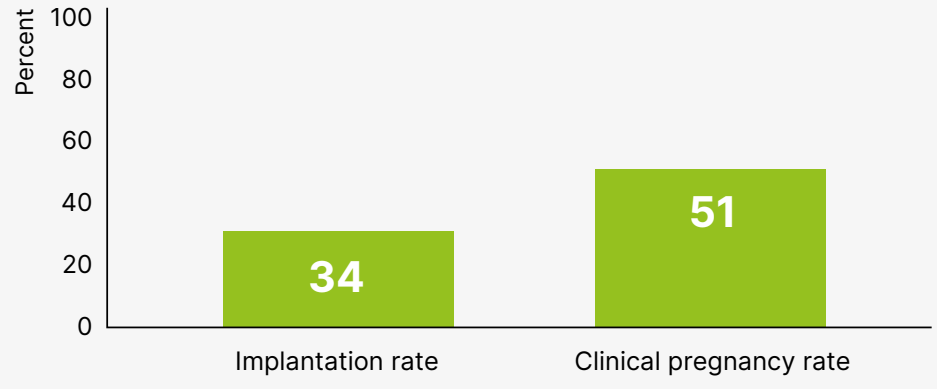
64 donors
Mean age: 24.6 years

593 oocytes vitrified/warmed with **RapidVit/Warm Oocyte** using **Rapid-i Kit**



55 recipients
Mean age: 40.4 years

Mean number of Day 5/6 embryos transferred/patient: 1.8



Human oocytes can be vitrified without direct contact with liquid nitrogen in a closed device (Rapid-i Kit and RapidVit/Warm Oocyte)

Oocyte vitrification using a newly developed vitrification medium (RapidVit/Warm Oocyte) and the closed device Rapid-i Kit

Machac et al. 2013

Objective

This study was performed on donor oocytes with vitrification using Rapid-i Kit and RapidVit Oocyte and RapidWarm Oocyte. Following oocyte warming, parameters such as fertilisation, embryo development, implantation, biochemical pregnancy and clinical pregnancy rates were recorded. The results were compared retrospectively to data from non-vitrified oocytes within the same period from the same clinic.

Materials and methods

593 oocytes from 53 donors (mean age: 24.6 ± 4.0 years) were vitrified using the Rapid-i Kit – a closed vitrification system.

Results

The survival and fertilisation rates were 94 % and 76 %, respectively. A mean number of 1.8 ± 0.5 embryos were transferred on day 5/6 per recipient (mean age: 40.4 ± 4.6 years). The implantation rate was 34.4 % (33/96). The biochemical and clinical pregnancy rates were 65 % (33/51) and 51 % (26/51), respectively. These results were not statistically different from outcomes with non-vitrified oocytes in the same clinic.

Conclusions

This study demonstrates that human oocytes can be vitrified without direct contact with liquid nitrogen in a closed device (Rapid-i Kit and RapidVit Oocyte and RapidWarm Oocyte).

REFERENCE

Machac S, Hubinka V, Larman M, Koudelka M. A novel method for human oocyte vitrification with a closed device using super-cooled air. Fertil Steril. 2013 Oct;100(3):S108.

Neonatal outcomes after the implantation of human embryos vitrified using a closed-system device

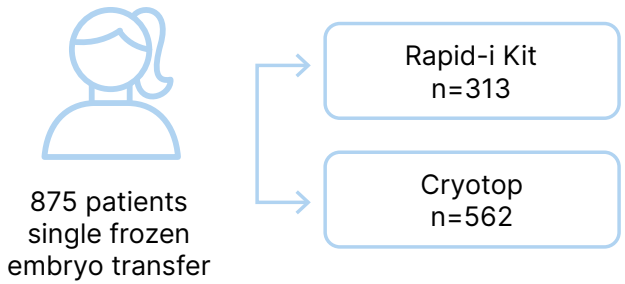
Iwahata et al. 2015

Objective

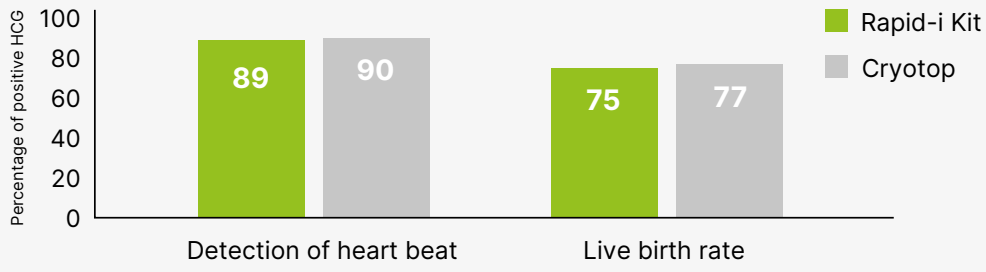
- To compare neonatal outcomes and clinical safety after the implantation of blastocysts vitrified using **Rapid-i Kit** vs Cryotop

Methods and outcomes

- Retrospective cohort study



Outcomes



Neonatal birth characteristics	Rapid-i Kit (n=104)	Cryotop (n=185)
Gestational age, (days)	278.4	277.1
Birth weight, (grams)	3207.5	3125.4
Male babies, (%)	43.3	48.4
Apgar score	9.3	9.3
Congenital anomalies, (%)	2.9	0.5

Data are mean, unless otherwise specified

Neonatal outcomes are similar after vitrification using Rapid-i Kit or an open device

Neonatal outcomes after the implantation of human embryos vitrified using a closed-system device

Iwahata et al. 2015

Objective

A comparison between closed and open vitrification systems was performed by evaluating the neonatal outcomes and clinical safety after single blastocyst transfer.

Materials and methods

This retrospective cohort study included 875 vitrified-warmed blastocysts that were single-transferred in hormone-replacement cycles. Patients were divided into two groups: blastocyst vitrification with a closed system Rapid-i Kit (n=313) or with an open carrier Cryotop (n=562). Developmental competence after implantation, including gestational age, birth weight, sex, Apgar score, and anomalies of newborns were evaluated.

Results

No significant differences were observed between the use of closed and open vitrification systems in terms of embryo development after implantation, gestational age, birth weight, sex ratio, Apgar score, and congenital anomalies of newborns.

Conclusions

Neonatal outcomes after vitrification using the Rapid-i system and an open device are similar.

REFERENCE

Iwahata H, Hashimoto S, Inoue M, Inoue T, Ito K, Nakaoka Y, Suzuki N, Morimoto Y. Neonatal outcomes after the implantation of human embryos vitrified using a closed-system device. J Assist Reprod Genet. 2015 Apr;32(4):521-6.

Closed vitrification of human oocytes and blastocysts: outcomes from a series of clinical cases

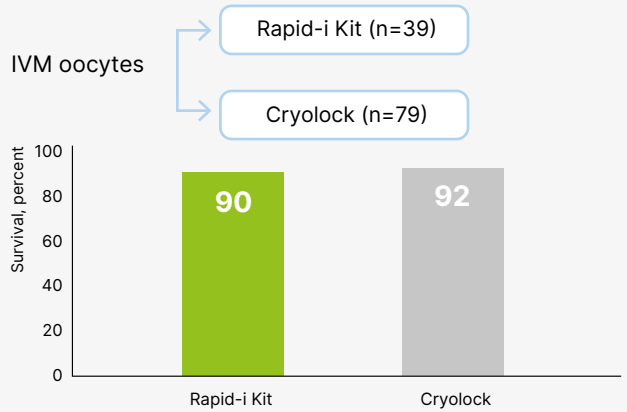
Gook et al. 2016

Objective

- To assess whether similar outcomes could be achieved using the **Rapid-i Kit** vs an open vitrification system (Cryolock) for oocytes and blastocysts

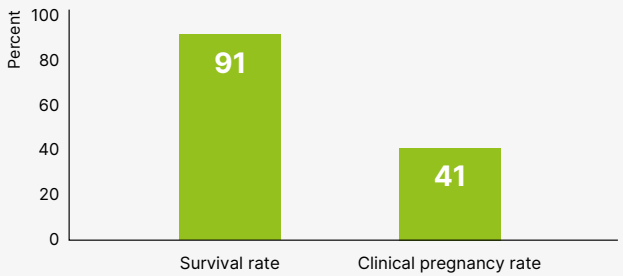
Methods and outcomes

Open vs closed oocyte vitrification



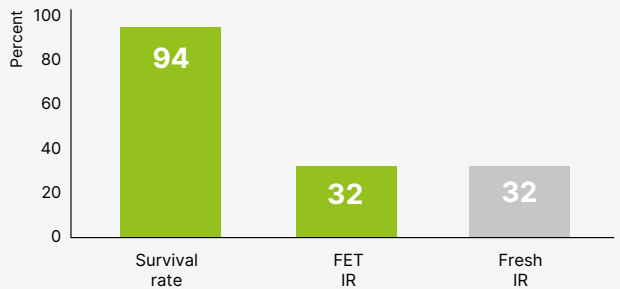
Clinical oocyte vitrification

- 54 patients (n=413 oocytes)
- Fertilisation: ICSI
- Day 2 ET



Blastocyst vitrification

Good quality blastocysts (n=1154) were vitrified/warmed using **RapidVit/Warm Blast** and **Rapid-i Kit**



Vitrification using the Rapid-i Kit achieved high survival and similar implantation rates to fresh cycles for both oocytes and blastocysts

Closed vitrification of human oocytes and blastocysts: outcomes from a series of clinical cases

Gook et al. 2016

Objective

This study assessed whether similar survival and subsequent implantation rates could be achieved using a closed and open vitrification system for human oocytes and blastocysts.

Materials and methods

The study was performed on donated immature oocytes that had undergone in vitro maturation with subsequent vitrification using either the Rapid-i Kit or Cryolock. The closed Rapid-i Kit was subsequently introduced clinically for mature oocyte and blastocyst vitrification.

Results

The survival rate for in vitro matured human oocytes was similar between closed (90 %, 35/39) and open (92 %, 73/79) systems. For clinical oocyte closed vitrification, a high survival rate of 91 % (374/413) and an implantation rate of 33 % (18/55) from the transfer of day 2 embryos was achieved, which is similar to fresh day 2 embryo transfers. Blastocysts have also been successfully cryopreserved using the Rapid-i closed vitrification system with 94 % of blastocysts having an estimated ≥75 % of cells intact and a similar implantation rate (31 %) to fresh single blastocyst transfers.

Conclusions

Vitrification using the Rapid-i Kit system achieved high survival and similar implantation rates to fresh cycles for both oocytes and blastocysts.

REFERENCE

Gook DA, Choo B, Bourne H, Lewis K, Edgar DH. Closed vitrification of human oocytes and blastocysts: outcomes from a series of clinical cases. J Assist Reprod Genet. 2016 Sep;33(9):1247-52.

Delayed blastulation, multinucleation, and expansion grade are independently associated with live-birth rates in frozen blastocyst transfer cycles

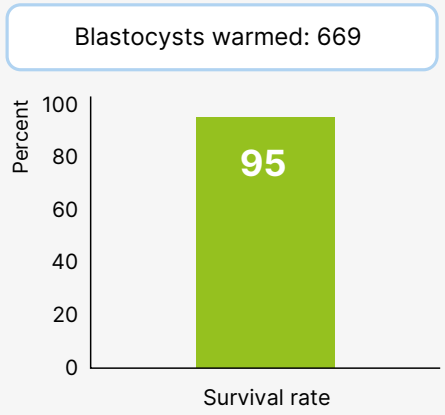
Desai et al. 2016

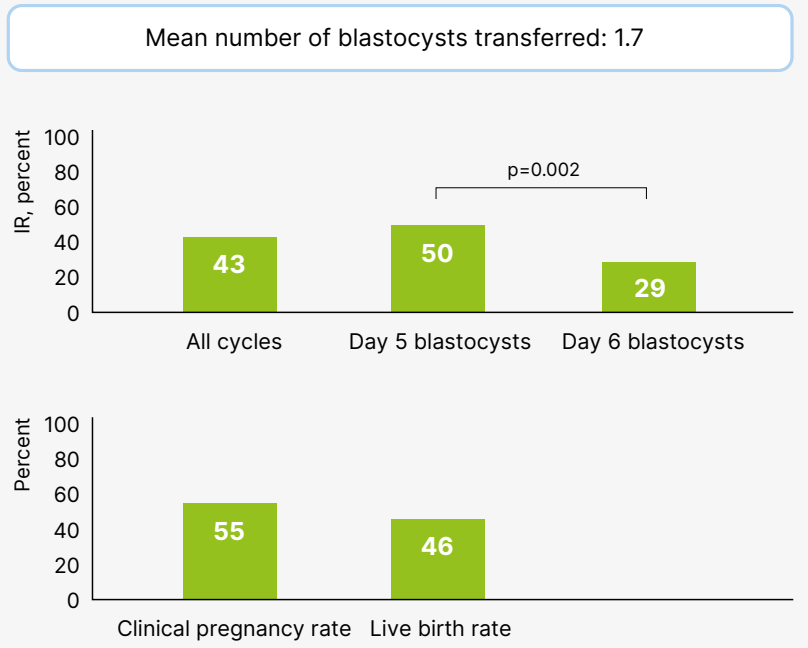
Objective

- To identify vitrified/warmed blastocyst features which are predictive of successful pregnancy and live birth outcomes

Methods and outcomes

342 patients
undergoing blastocyst FET
Rapid-i Kit used for all





Use of Rapid-i Kit for blastocyst vitrification resulted in CPR of 55 %.
Blastocysts which were suitable for vitrification on day 5 had a higher implantation rate than those vitrified on day 6.

Delayed blastulation, multinucleation, and expansion grade are independently associated with live-birth rates in frozen blastocyst transfer cycles

Desai et al. 2016

Objective

This study identified blastocyst features which correlate with successful pregnancy and live births outcomes.

Materials and methods

This study examined outcomes from 354 consecutive cycles from 342 women undergoing frozen embryo transfer of blastocysts. No other selection or exclusion criteria were applied. Outcome data were retrospectively analysed.

Results

A total of 669 vitrified-warmed blastocysts were assessed. The survival rate was 95 %. A mean of 1.7 ± 0.5 embryos were transferred. The clinical pregnancy, live-birth, and implantation rates were 55 %, 46 %, and 43 %, respectively. The implantation rate was statistically significantly higher for day-5 versus day-6 vitrified blastocysts (50 % vs. 29 %, respectively).

Conclusions

The blastocyst expansion grade after warming was predictive of successful outcomes following frozen embryo transfer cycle. Delayed blastulation was associated with lower live-birth rates in frozen cycles.

REFERENCE

Desai N, Ploskonka S, Goodman L, Attaran M, Goldberg JM, Austin C, Falcone T. Delayed blastulation, multinucleation, and expansion grade are independently associated with live-birth rates in frozen blastocyst transfer cycles. Fertil Steril. 2016 Nov;106(6):1370-1378.

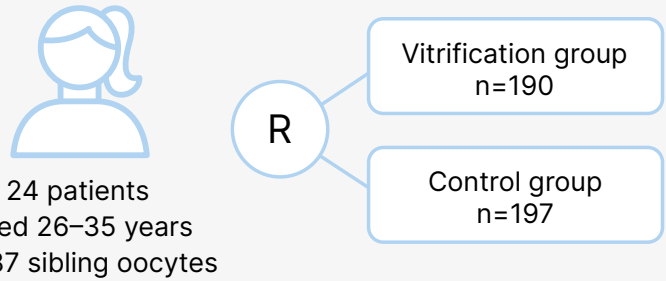
Oocyte vitrification using a new vitrification medium (RapidVit and RapidWarm Oocyte) and a new closed vitrification device (Rapid-i Kit)

Perez et al. 2018

Objective

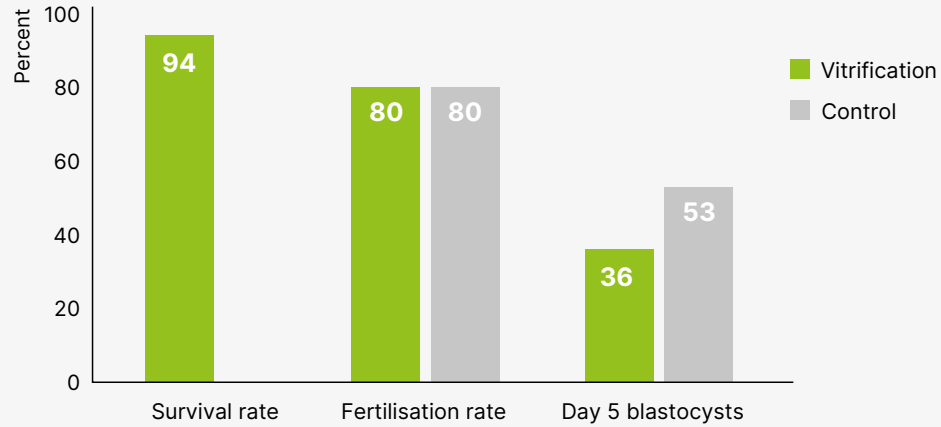
- To analyse the vitrification/warming survival rates and birth outcomes after using **RapidVit/Warm Oocyte** and **Rapid-i Kit**

Methods and outcomes



- Fertilisation: ICSI
- Best quality blastocysts were cryopreserved
- Frozen/thawed blastocysts were selected for FET

Outcomes



8 deliveries out of 14 patients with FET (vitrification group only)

Oocyte vitrification using RapidVit/Warm Oocyte and Rapid-i Kit achieved a high survival rate with no difference in fertilisation rate compared with fresh oocytes

Oocyte vitrification using a new vitrification medium (RapidVit and RapidWarm Oocyte) and a new closed vitrification device (Rapid-i Kit)

Perez et al. 2018

Objective

The objective of this study was to analyse the vitrification/warming survival rates and birth outcomes after using RapidVit Oocyte and RapidWarm Oocyte media and the Rapid-i Kit.

Materials and methods

Oocytes were collected from 24 non-donor patients, aged 26–35 years old. 387 sibling MII oocytes were randomly assigned in two treatment groups. Half of the mature oocytes were vitrified and warmed (vitrification group). The remaining mature oocytes were not vitrified and served as the control group. Oocytes were vitrified between 2–3 hours post-oocyte retrieval using RapidVit Oocyte medium on a Rapid-i device with a warming in RapidWarm Oocyte medium. Vitrified and control oocytes underwent ICSI at the same time and were kept in separate dishes throughout culture. Best quality blastocysts were selected for day 5 cryopreservation in both groups: control and experimental. Frozen/thawed blastocysts from the vitrification group were consequently selected for a frozen embryo transfer.

Results

Oocyte survival rate was 94 % (179/190). The fertilisation rate between fresh and vitrified oocytes groups was not different (80 % in both groups). Eight successful deliveries of healthy babies occurred out of 14 frozen embryo transfers in the vitrification group.

Conclusions

The vitrification/warming media RapidVit Oocyte/RapidWarm Oocyte together with the Rapid-i Kit device ensured a very high survival rate of human oocytes, with no difference in fertilisation rate compared with fresh oocytes.

REFERENCE

Perez O, Tilley B, Navarrete G, Lay L, Little LM, Gada R, Chantilis S. Oocyte vitrification using a new vitrification medium and a new closed vitrification device. A sibling oocyte study. Fertil Steril. 2018 Sep;110(4):E179-E180.

Single blastocyst transfer (SET) and pregnancy outcome of day 5 and day 6 human blastocysts vitrified using a closed device

Sciorio et al. 2018

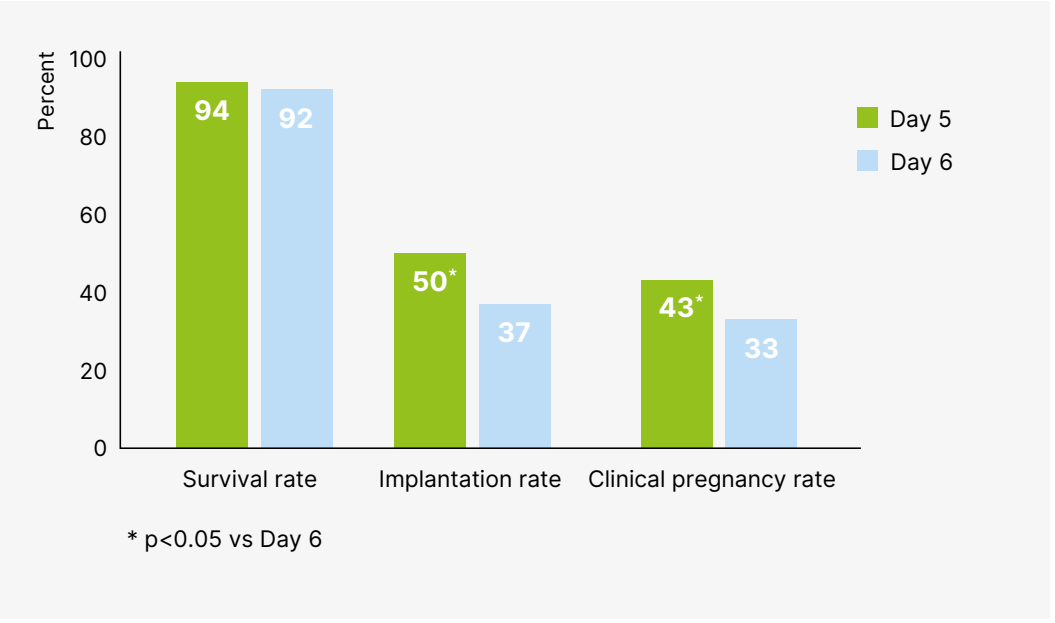
Objective

- This retrospective cohort study investigated the functionality of the Rapid-i Kit for vitrification of day 5/6 blastocysts and the clinical outcomes following SET

Methods and outcomes

- Good quality blastocysts were vitrified on day 5 or 6 using Irvine Vitrification medium and the **Rapid-i Kit**
- After warming, blastocysts were cultured in supplemented G-TL medium for 2 h before transfer
- Outcomes were compared in relation to the day of culture at the time of vitrification in 1090 cryopreserved cycles

Outcomes



Vitrification using the Rapid-i Kit ensured high survival, implantation and clinical pregnancy rates for blastocysts

Single blastocyst transfer (SET) and pregnancy outcome of day 5 and day 6 human blastocysts vitrified using a closed device

Sciorio et al. 2018

Objective

This study investigated the functionality of the Rapid-i closed device for vitrification of day 5/6 human blastocysts and the implantation and pregnancy rates following single embryo transfer.

Materials and methods

A retrospective analysis of good quality blastocysts vitrification using the Rapid-i Kit was performed. After warming, blastocysts were cultured in G-TL medium for 2 h before transfer. The survival, pregnancy and implantation rates were compared in relation to the day of culture at the time of vitrification (D5/D6) in 1090 cryopreserved cycles.

Results

The survival rate was 93 % (1018/1090) with no significant difference between the day 5 and day 6 blastocysts: 94 % (712/758) and 92 % (306/332) respectively. Single embryo transfers of day 6 vitrified/warmed blastocysts resulted in a lower implantation and clinical pregnancy rate compared to day 5 embryos. The difference in implantation rate and clinical pregnancy rates, which were respectively 50 % and 43 % for the day 5 and 37 % and 33 % for the day 6 embryos, was statistically significant.

Conclusions

Rapid-i Kit ensured a high survival rate of human blastocysts and provided solid performance in terms of implantation and clinical pregnancy rates.

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Sciorio R, Thong KJ, Pickering SJ. Single blastocyst transfer (SET) and pregnancy outcome of day 5 and day 6 human blastocysts vitrified using a closed device. Cryobiology. 2018 Oct;84:40-45.

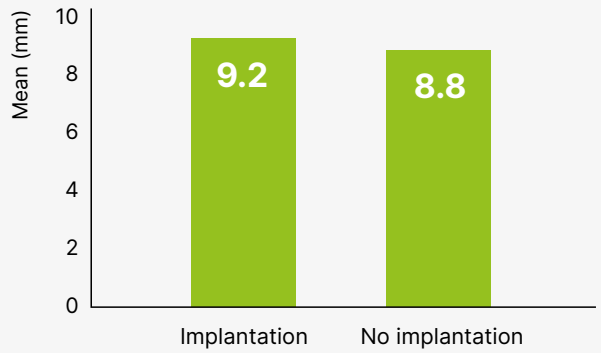
Single vitrified-warmed blastocyst transfer: what are the best predictive factors for success?

Boulet et al. 2019

Methods and outcomes

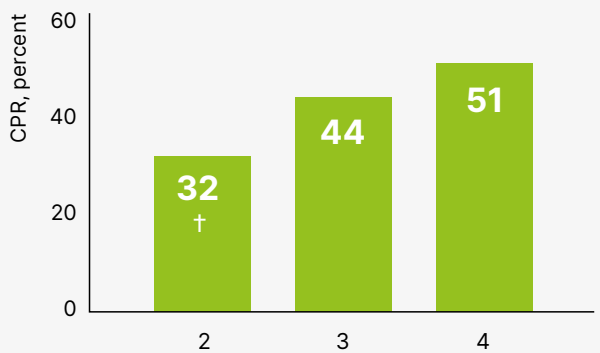
- Retrospective analysis of 771 single autologous FETs
- Exclusion criteria: patients aged >42 years, PGT cycles and gestational carriers
- All embryos were vitrified/warmed using **RapidVit/Warm Blast** and **Rapid-i Kit**

Endometrial thickness



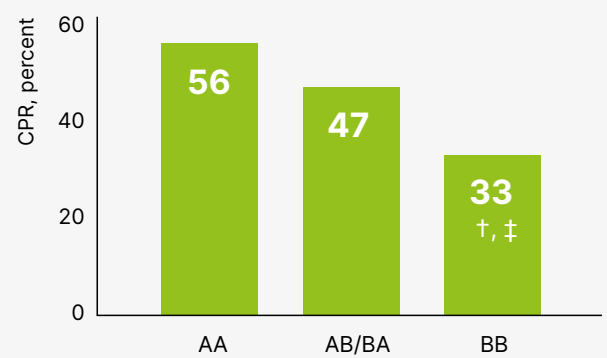
OR (95% CI): 1.17 (1.08–1.28)

Blastocyst expansion size



† p<0.01 vs size 4

ICM + TE grade



† p<0.01 vs AB/BA; ‡ p<0.001 vs AA

The best predictive factors for success are endometrial thickness and ICM + TE quality

Single vitrified-warmed blastocyst transfer: what are the best predictive factors for success?

Boulet et al. 2019

Objective

Are factors such as endometrial thickness, blastocyst expansion, inner cell mass quality and trophectoderm quality of day 5 and day 6 embryos good indicators for predicting clinical pregnancy outcome?

Materials and methods

A retrospective analysis of 771 frozen embryo transfers was performed. In all cycles only a single autologous blastocyst was transferred. Exclusion criteria were patients aged over 42 years and cycles with preimplantation genetic testing and gestational carriers. All embryos were vitrified and warmed with RapidVit Blast/RapidWarm Blast media on Rapid-i devices. All embryos were graded using the Gardner's scoring system immediately prior to transfer.

Results

A total of 733 frozen embryo transfers were analysed. Day 5 frozen embryos had a clinical pregnancy rate of 50 % vs. day 6 of 41 % (P=0.12). Embryos with size-4 expansion (Gardner scale) had a clinical pregnancy rate of 51 % vs. size-3 of 44 % vs. size-2 of 32 % (p=0.003 for size-2 vs size-4; p>0.05 for all others). Embryos with Grade AA had a clinical pregnancy rate of 56 % vs Grade AB/BA of 47 % vs Grade BB of 33 % (p=0.001 for AA vs BB, p=0.05 for AA vs AB/BA, p<0.005 for AB/BA vs BB).

Conclusions

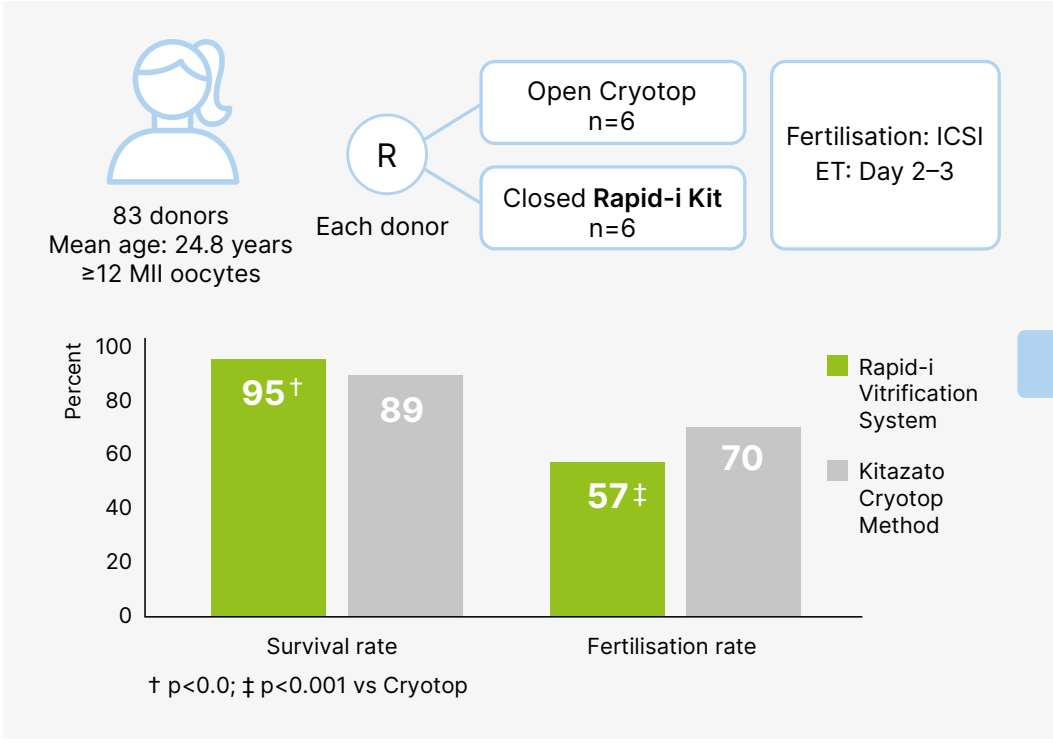
The best predictive factors for success are endometrial thickness and inner cell mass plus trophectoderm quality. The blastocyst expansion can potentially be a good predictive factor, but more data are needed to determine a stronger correlation with the frozen embryo transfer outcome.

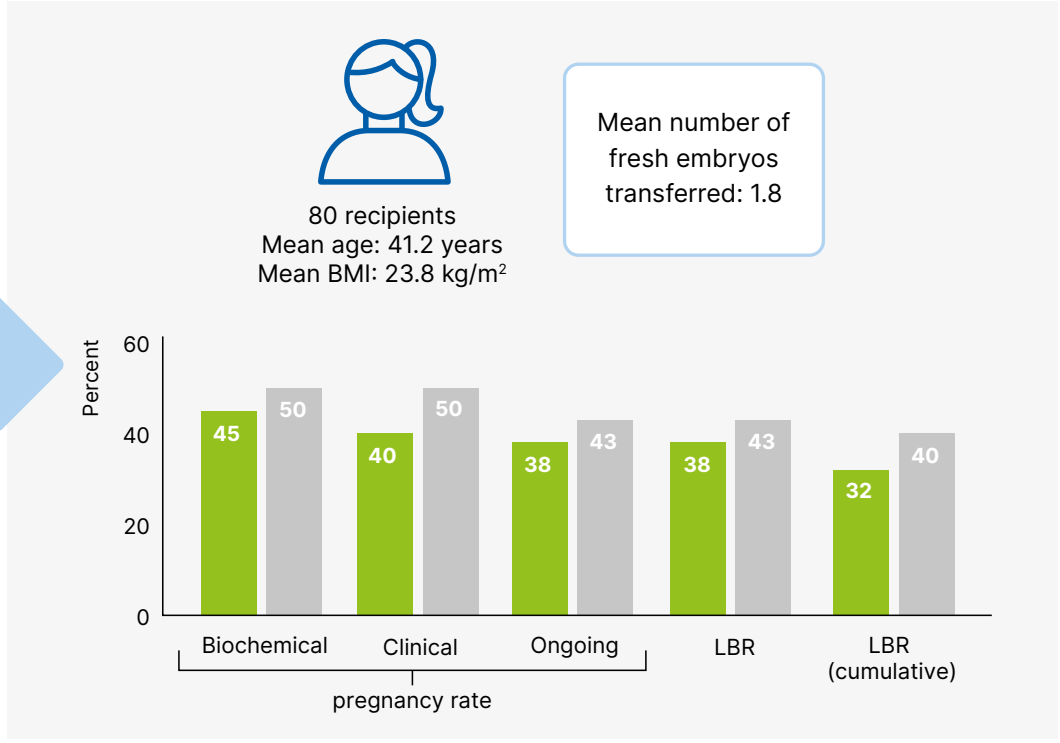
REFERENCE

Boulet E, Ka Man Au J, Mellon JA, Havelock J. Single vitrified-warmed blastocyst transfer: what are the best predictive factors for success? Fertil Steril. 2019 Sep;112(3): SUPPLEMENT, E162-E163.

Comparison of two different oocyte vitrification methods: a prospective, paired study on the same genetic background and stimulation protocol

Pujol et al. 2019





Despite different survival and fertilisation rates, closed and open oocyte vitrification methods offer similar reproductive outcomes up to cumulative live birth rates

Comparison of two different oocyte vitrification methods: a prospective, paired study on the same genetic background and stimulation protocol

Pujol et al. 2019

Objective

To compare closed vs. open vitrification systems using human oocytes.

Materials and methods

The prospective cohort study on sibling oocytes included 83 oocyte donors each providing a minimum of 12 mature oocytes at retrieval. Survival and fertilisation rates, as well as reproductive outcomes (biochemical, clinical, ongoing pregnancy and live birth rates) per embryo transfer and cumulatively between the two methods (Rapid-i Kit for closed vitrification and Cryotop for open method) were compared by chi square tests. Donor oocytes were denuded and 6 mature oocytes from each donor were vitrified using an open method and later assigned to one recipient, while another 6 mature oocytes were vitrified using a closed method and assigned to a different recipient (paired analysis). ICSI was used in all cases and embryo transfer was performed on Day 2–3 in all cases.

Results

Oocyte donors were 24.8 years old on average. Recipient age (average 41.2 years) and body mass index (mean 23.8 kg/m2, SD 4.0) were similar between recipient groups. Oocytes vitrified using the closed method had higher survival rate (94 % versus 89 %, P=0.002), but lower fertilisation rate (57 % versus 70 %, P<0.001) compared to the open method. The number of fresh embryos transferred in the two groups was 1.8 on average (SD 0.4). Biochemical (45 % closed versus 50 % open), clinical (40 % versus 50 %) and ongoing (38 % versus 43 %) pregnancy rates were not different between groups (P>0.05) and neither were live birth rates (38 % versus 43 %, P>0.05). Cumulative reproductive results (obtained after the transfer of all the embryos) were also similar between groups.

Conclusions

The results suggest that, despite different survival and fertilisation rates, closed and open oocyte vitrification methods offer similar reproductive outcomes up to cumulative live birth rates.

REFERENCE

Pujol A, Zamora MJ, Obradors A, Garcia D, Rodriguez A, Vassena R. Comparison of two different oocyte vitrification methods: a prospective, paired study on the same genetic background and stimulation protocol. Hum Reprod. 2019 Jun 4;34(6):989-997.

Increased pregnancy outcome after day 5 versus day 6 transfers of human vitrified-warmed blastocysts

Sciorio et al. 2019

Objective

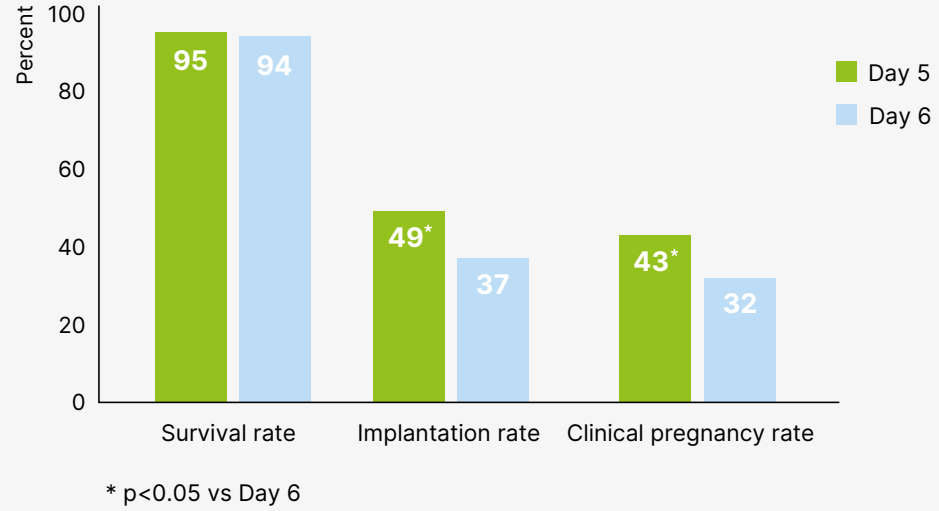
- This retrospective study investigated whether there are differences in clinical outcomes between day 5 and day 6 FETs

Methods

Patients undergoing single FET
Mean age: 34.1 years

- Day 5 blastocysts vitrified using **Rapid-i Kit** n=1563 blastocysts
- Day 6 blastocysts vitrified using **Rapid-i Kit** n=517 blastocysts

Outcomes



Although the transfer of day 6 vitrified-warmed blastocyst remains a reasonable option, priority to a day 5 embryo would reduce the time to successful pregnancy.

Increased pregnancy outcome after day 5 versus day 6 transfers of human vitrified-warmed blastocysts

Sciorio et al. 2019

Objective

The effect of delayed blastulation may be responsible for implantation failures and can negatively affects in vitro fertilisation outcomes. The present study investigated whether there are differences in clinical outcomes between day 5 and day 6 frozen embryo transfers.

Materials and methods

A retrospective study was performed comparing clinical pregnancy and implantation rates following warmed single blastocyst transfer. All patients coming for a programmed warmed transfer were included in the study and were divided in two groups according to the day of blastocyst vitrification: day 5 (n=1563) and day 6 (n=517). Vitrification of blastocysts was performed with Rapid-i Kit.

Results

There was no significant difference in survival rate between the day 5 and day 6 groups: 95 % (1489/1563) and 94 % (487/517) respectively. Transfer of day 6 blastocysts resulted in a lower implantation and clinical pregnancy rate compared with day 5 embryos. The implantation and clinical pregnancy rates were respectively 49 % and 43 % for day 5 and 37 % and 32 % for day 6 embryos, which was statistically significant.

Conclusions

Although the transfer of day 6 vitrified-warmed blastocyst remains a reasonable option, priority to a day 5 embryo would reduce the time to successful pregnancy.

REFERENCE

Sciorio R, Thong KJ, Pickering SJ. Increased pregnancy outcome after day 5 versus day 6 transfers of human vitrified-warmed blastocysts. Zygote. 2019 Oct;27(5):279-284.

Post-warming embryo morphology is associated with live birth: A cohort study of single vitrified-warmed blastocyst transfer cycles

Allen et al. 2022

Objective

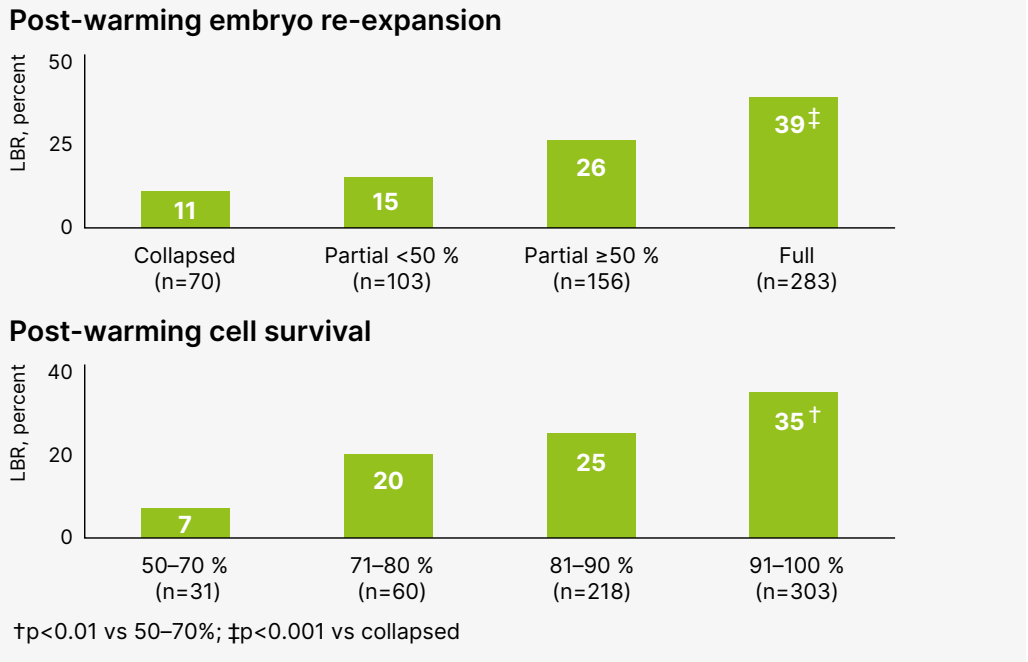
- Does blastocyst morphology post-warming correlate with live birth?

Methods and outcomes

- Retrospective cohort study

612 patients
undergoing single FET

Blastocysts vitrified/
warmed with RapidVit/Warm
Blast using Rapid-i Kit



Blastocyst post-warming re-expansion and high cell survival rate are associated with a higher LBR.
But blastocysts with poor post-warming morphology still had a considerable probability of live birth.

Post-warming embryo morphology is associated with live birth: A cohort study of single vitrified-warmed blastocyst transfer cycles

Allen et al. 2022

This cohort study examined whether blastocyst morphology post-warming correlates with live birth rate (LBR).

Materials and methods

Morphological characteristics post-warming were reviewed in 612 single vitrified-warmed blastocyst transfer cycles.

Blastocoel re-expansion before transfer was graded:

A. Fully expanded
B. Partially expanded ≥50 %
C. Partially expanded <50 %
D. Collapsed

Post-warming cell survival (scale 50–100%) was classified:

- Very low: 50–70 %
- Low: 71–80 %
- Moderate: 81–90 %
- High: 91–100 %

Results

LBR increased from 11.4 % in the collapsed group to 38.9 % in the fully re-expanded group ($p<0.001$) and from 6.5 % for blastocysts with a very low cell survival rate to 34.7 % for blastocysts with high cell survival rate ($p=0.001$). In a multivariate analyses, partial ≥50 % and full blastocyst re-expansion and high cell survival rate were significantly associated with live birth, after controlling for female age, pre-vitrification morphological grading and PGT-A. Similar results were found in a sub-group analysis of only euploid blastocysts.

Conclusions

Post-warming re-expansion and high cell survival rate are associated with higher LBR in euploid and untested blastocysts. However, blastocysts with poor post-warming morphology still had a considerable probability of live birth.

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Allen M, Hale L, Lantsberg D, Kieu V, Stevens J, Stern C, Gardner DK, Mizrachi Y. Post-warming embryo morphology is associated with live birth: a cohort study of single vitrified-warmed blastocyst transfer cycles. J Assist Reprod Genet. 2022 Jan 18. doi: 10.1007/s10815-021-02390-z. Online ahead of print.

Abbreviations

BMI: body mass index; CI: confidence interval; DMSO: dimethylsulfoxide; EG: ethylene glycol; ET: embryo transfer; ICSI: intracytoplasmic sperm injection; ICM: inner cell mass; IVF: in vitro fertilisation; IVM: in vitro maturation; FET: frozen embryo transfer; LBR: live birth rate; MII: metaphase II; OR: odds ratio; PGT: preimplantation genetic testing; PN: pronuclear; RCT: randomized controlled trial; SET: single embryo transfer; TE: trophectoderm

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