

# 1. Internal ERA Papers

## RCT

**A 5-year multicentre randomized controlled trial comparing personalized, frozen and fresh blastocyst transfer in IVF.**  
*Simón, C., Gómez, C., Cabanillas, S., Vladimirov, I., Castillón, G., Giles, et al.*  
Reproductive BioMedicine Online, 2020; 41(3):402-415

## Prospective studies with clinical outcome after pET

**The endometrial receptivity array for diagnosis and personalized embryo transfer as a treatment for patients with repeated implantation failure.**

*Ruiz-Alonso M, Blesa D, Díaz-Gimeno P, Gómez E, Fernández-Sánchez M, Carranza F, Carrera J, Vilella F, Pellicer A, Simón C.*  
Fertil Steril. 2013 Sep;100(3):818-24. doi: 10.1016/j.fertnstert.2013.05.004. Epub 2013 Jun 4. PMID:23756099

## Retrospective studies with clinical outcome after pET

**What a difference two days make: "personalized" embryo transfer (pET) paradigm: a case report and pilot study.**

*Ruiz-Alonso M, Galindo N, Pellicer A, Simón C.*  
Hum Reprod. 2014 Jun;29(6):1244-7. doi: 10.1093/humrep/deu070. Epub 2014 Apr 15. PMID:24737781

**Window of implantation transcriptomic stratification reveals different endometrial subsignatures associated with live birth and biochemical pregnancy.**

*Díaz-Gimeno P, Ruiz-Alonso M, Sebastian-Leon P, Pellicer A, Valbuena D, Simón C.*  
Fertil Steril. 2017 Oct;108(4):703-710.e3. doi: 10.1016/j.fertnstert.2017.07.007. Epub 2017 Aug 30. PMID:28863933

**Window of implantation is significantly displaced in patients with adenomyosis with previous implantation failure as determined by endometrial receptivity assay.**

*Mahajan N, Kaur S, Ruiz-Alonso M.*  
Journal of human reproductive sciences. 2018; 11(4):353

**Do clinical outcomes differ for day-5 versus day-6 single embryo transfers controlled for endometrial factor?**

*Stankewicz T, Ruiz-Alonso M, Soler-Ibañez M, Simón C, Valbuena D.*  
Reprod Biomed Online. 2022 Mar;44(3):478-485

## Other internal publications related to the ERA development and research

**A genomic diagnostic tool for human endometrial receptivity based on the transcriptomic signature.**

*Díaz-Gimeno P, Horcajadas JA, Martínez-Conejero JA, Esteban FJ, Alamá P, Pellicer A, Simón C.*  
Fertil Steril. 2011 Jan;95(1):50-60, 60.e1-15. doi: 10.1016/j.fertnstert.2010.04.063. Epub 2010 Jul 8. PMID:20619403

**The accuracy and reproducibility of the endometrial receptivity array is superior to histology as a diagnostic method for endometrial receptivity.**

*Díaz-Gimeno P, Ruiz-Alonso M, Blesa D, Bosch N, Martínez-Conejero JA, Alamá P, Garrido N, Pellicer A, Simón C.*  
Fertil Steril. 2013 Feb;99(2):508-17. doi: 10.1016/j.fertnstert.2012.09.046. Epub 2012 Oct 23. PMID:23102856

**The impact of using the combined oral contraceptive pill for cycle scheduling on gene expression related to endometrial receptivity.**

*Bermejo A, Iglesias C, Ruiz-Alonso M, Blesa D, Simón C, Pellicer A, García-Velasco J.*  
Hum Reprod. 2014 Jun;29(6):1271-8. doi: 10.1093/humrep/deu065. Epub 2014 Apr 4. PMID:24706003

**Timing the window of implantation by nucleolar channel system prevalence matches the accuracy of the endometrial receptivity array.**

*Nejat EJ, Ruiz-Alonso M, Simón C, Meier UT.*  
Fertil Steril. 2014 Nov;102(5):1477-81. doi: 10.1016/j.fertnstert.2014.07.1254. Epub 2014 Sep 17. PMID:25241377

**Impact of final oocyte maturation using gonadotropin-releasing hormone against triggering and different luteal support protocols on endometrial gene expression.**

*Bermejo A, Cerrillo M, Ruiz-Alonso M, Blesa D, Simón C, Pellicer A, Garcia-Velasco JA.*

*Fertil Steril.* 2014 Jan;101(1):138-146.e3. doi: 10.1016/j.fertnstert.2013.09.033. Epub 2013 Oct 29. PMID:24182413

**Is endometrial receptivity transcriptomics affected in women with endometriosis? A pilot study.**

*Garcia-Velasco JA, Fassbender A, Ruiz-Alonso M, Blesa D, D'Hooghe T, Simon C.*

*Reprod Biomed Online.* 2015 Nov;31(5):647-54. doi: 10.1016/j.rbmo.2015.07.014. Epub 2015 Aug 11. PMID:26385059

**Intrauterine human chorionic gonadotropin infusion in oocyte donors promotes endometrial synchrony and induction of early decidual markers for stromal survival: a randomized clinical trial.**

*Strug MR, Su R, Young JE, Dodds WG, Shavell VI, Díaz-Gimeno P, Ruíz-Alonso M, Simón C, Lessey BA, Leach RE, Fazleabas AT.*

*Hum Reprod.* 2016 Jul;31(7):1552-61. doi: 10.1093/humrep/dew080. Epub 2016 Apr 26. PMID:27122490

**Does an increased body mass index affect endometrial gene expression patterns in infertile patients? A functional genomics analysis.**

*Comstock IA, Díaz-Gimeno P, Cabanillas S, Bellver J, Sebastian-Leon P, Shah M, Schutt A, Valdes CT, Ruiz-Alonso M, Valbuena D, Simon C, Lathi RB.*

*Fertil Steril.* 2017 Mar;107(3):740-748.e2. doi: 10.1016/j.fertnstert.2016.11.009. Epub 2016 Dec 2. PMID:27919438

**Effect of mifepristone on the transcriptomic signature of endometrial receptivity.**

*von Grothusen C, Lalitkumar PG, Ruiz-Alonso M, Boggavarapu NR, Navarro R, Miravet-Valenciano J, Gemzell-Danielsson K, Simon C.*

*Hum Reprod.* 2018 Aug 22. doi: 10.1093/humrep/dey272. [Epub ahead of print] PMID: 30137464

**Inter-cycle consistency versus test compliance in endometrial receptivity analysis test.**

*Stankewicz T, Valbuena D, Ruiz-Alonso M.*

*J Assist Reprod Genet.* 2018 May 26. doi: 10.1007/s10815-018-1212-7

**Obesity Affects Endometrial Receptivity by Displacing the Window of Implantation.**

*Bellver, J., Marín, C., Lathi, R.B. et al.*

*Reprod. Sci.* 28, 3171–3180 (2021)

## 2.Independent ERA Papers

### SUPPORTING ERA

#### Meta-Analysis

**The Clinical Efficacy of Personalized Embryo Transfer Guided by the Endometrial Receptivity Array/Analysis on IVF/ICSI Outcomes: A Systematic Review and Meta-Analysis.**

*Liu Z, Liu X, Wang M, Zhao H, He S, Lai S. et al*

Front Physiol. 2022;13:841437. Published 2022 Apr 27. doi:10.3389/fphys.2022.841437

**Personalized embryo transfer guided by endometrial receptivity analysis: a systematic review with meta-analysis**  
*D Glujovsky, K Lattes, M Miguens, R Pesce, A Ciapponi, July 2023.*

**Comparative effectiveness and safety of 36 therapies or interventions for pregnancy outcomes with recurrent implantation failure: a systematic review and network meta-analysis.**

*Yunan He, Ruonan Tang, Haikun Yu, Hui Mu, Hongbin Jin, Jie Dong, Wenwen Wang, Lu Wang, Shuqiang Chen & Xiaohong Wang*  
Journal of Assisted Reproduction and Genetics volume 40, pages 2343–2356 (2023).

#### Prospective studies with clinical outcome after pET

**Role of endometrial receptivity array for implantation failure in in-vitro fertilization & intracytoplasmic sperm injection.**

*Nafees R, Khan H, Khan Y, Awais A, Farooqi M, Nissar R.*

Biomedica, 37(4), 220-226

#### Retrospective studies with clinical outcome after pET

**Endometrial receptivity array: Clinical application.**

*Mahajan N.*

J Hum Reprod Sci. 2015 Jul-Sep;8(3):121-9. doi: 10.4103/0974-1208.165153. Review. PMID:26538853

**Efficacy of the endometrial receptivity array for repeated implantation failure in Japan: A retrospective, two-centers study.**

*Hashimoto T, Koizumi M, Doshida M, Toya M, Sagara E, Oka N, Nakajo Y, Aono N, Igarashi H, Kyono K.*

Reprod Med Biol. 2017 Jun 27;16(3):290-296. doi: 10.1002/rmb2.12041. eCollection 2017 Jul. PM

**The role of endometrial receptivity array (ERA) in patients who have failed euploid embryo transfers.**

*Tan J, Kan A, Hitkari J, Taylor B, Tallon N, Warraich G, Yuzpe A, Nakhuda G.*

J Assist Reprod Genet. 2018;35(4):683-692. doi:10.1007/s10815-017-1112-2

**Personalized Embryo Transfer Helps in Improving In vitro Fertilization/ICSI Outcomes in Patients with Recurrent Implantation Failure.**

*Patel JA, Patel AJ, Banker JM, Shah SI, Banker MR. J*

Hum Reprod Sci. 2019; 12(1):59-66. doi: 10.4103/jhrs.JHRS\_74\_18

**Endometrial Receptivity Analysis - a tool to increase an implantation rate in assisted reproduction.**

*Hromadová L; Tokareva I; Veselá K; Trávník P; Veselý J.*

Ceska Gynkol. 2019; 84(3): 177-183

**Does personalized embryo transfer based on ERA improve the outcomes in patients with thin endometrium and RIF in Self Versus Donor Programme?**

*Selvaraj P, Selvaraj K, Sivakumar M, Chandrasekar H, Srinivasan V.*

Journal of Gynecological Research and Obsterics, 6(3), 076-080

**Clinical utility of the endometrial receptivity analysis in women with prior failed transfers.**

*Eisman LE, Pisarska MD, Wertheimer S, Chan JL, Akopians AL, Surrey M. et al*

J Assist Reprod Genet. 2021; 38(3):645-650

**Evaluation of Pregnancy Outcomes of Vitrified-Warmed Blastocyst Transfer before and after Endometrial Receptivity Analysis in Identical Patients with Recurrent Implantation Failure.**

*Kasahara Y, Hashimoto T, Yokomizo R, Takeshige Y, Yoshinaga K, Toya M. et al*  
Fertility & Reproduction. 2020; 3(2):35-41.

**Role of endometrial receptivity array in current implantation failure.**

*Samadhiya R, Swarnkar G, Singh A, Chittawar P.*  
Fertility Science and Research, 8(2), 180

**Comparison of the Effectiveness of Endometrial Receptivity Analysis (ERA) to Guide Personalized Embryo Transfer with Conventional Frozen Embryo Transfer in 281 Chinese Women with Recurrent Implantation Failure.**

*Jia Y, Sha Y, Qiu Z, Guo Y, Tan A, Huang Y. et al*  
Med Sci Monit. 2022;28:e935634. Published 2022 Mar 22. doi:10.12659/MSM.935634

**Identifying women with a narrow window of embryo implantation using the endometrial receptivity assay** *Bruce I Rose, December 2022.*

**Assessing endometrial receptivity after recurrent implantation failure in euploid embryo transfer: a retrospective study in private clinic**

*Jesús Estuardo Luján-Irastorza, April 2023.*

**Review of Endometrial Receptivity Array: A Personalized Approach to Embryo Transfer and its Clinical Applications**

*Sarah C. Rubin, Mawardi Abdulkadir, Joshua Lewis, Aleksandr Harutyunyan, Rahim Hirani, Cara L. Grimes*

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**Case report**

**Live birth after embryo transfer in an unresponsive thin endometrium.**

*Cruz F., Bellver J.*  
Gynecol Endocrinol. 2014; 30(7):481-4

**Different Endometrial Receptivity in Each Hemiuterus of a Woman With Uterus Didelphys and Previous Failed Embryo Transfers.**

*Carranza F, González-Ravina A, Blasco V, Fernández-Sánchez M. J*  
Hum Reprod Sci. 2018;11(3):297- 299. doi: 10.4103/jhrs.JHRS\_113\_18

**Why results of endometrial receptivity assay testing should not be discounted in recurrent implantation failure?** *Simrandeep K., Padmaja N.*

The Onco Fertility Journal. 2019; 2(1): 46-49

**The Reproductive Outcomes for the Infertile Patients with Recurrent Implantation failures May be improved by Endometrial Receptivity Array Test.**

*Ota, T., Funabiki, M., Tada, Y., Karita, M., Hayashi, T., Maeda, K. et al.*  
Journal of Medical Cases. 2019; 10(5), 138-140. doi: <https://doi.org/10.14740/jmc3282>

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**CONTROVERSIAL RESULTS**

To evaluate the ERA results, it is important that patients have indication for performing ERA test, this is recurrent implantation failure (RIF) patients. In case of using a control group in a retrospective study, it is difficult to avoid bias, as usually bad prognosis patients are recommended ERA. It is also necessary to strictly follow recommendations given by the report, which include replicating the cycle type, progesterone administration, embryo transfer timing and proper endogenous progesterone control. However, in some of the studies listed below, the ERA protocol has not been properly followed and/or the population analysed is not RIF but good prognosis. Thus, conclusions obtained from these studies must be handled carefully.

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**Letter to editor**

**Inpatient variability in the endometrial receptivity assay (ERA) test.**

*Cho K, Tan S, Buckett W, Dahan MH*  
J Assist Reprod Genet. 2018; 35(5):929-930

**Variations in the Endometrial Receptivity Assay (ERA) May Actually Represent Test Error.**

*Dahan MH, Tan S.*  
J Assist Reprod Genet. 2018; 35(10):1923-1924

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### Prospective studies with clinical outcome after pET

#### **Routine endometrial receptivity array in first embryo transfer cycles does not improve live birth rate.**

Riestedberg C, Kroener L, Quinn M, Ching K, Ambartsumyan G.  
Fertil Steril. 2021; 115(4):1001-1006

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### Retrospective studies with clinical outcomes after pET

#### **Does the endometrial receptivity array really provide personalized embryo transfer?**

Bassil R, Casper R, Samara N, Hsieh TB, Barzilay, Orvieto R, Haas J.  
J Assist Reprod Genet. 2018; 35(7):1301-1305

#### **What is the clinical impact of the endometrial receptivity array in PGT-A and oocyte donation cycles?**

Neves AR, Devesa M, Martínez F, García-Martínez S, Rodríguez I, Polyzos N. et al  
J Assist Reprod Genet. 2019; 36: 1901

#### **Evaluation of the endometrial receptivity assay and the preimplantation genetic test for aneuploidy in overcoming recurrent implantation failure.**

Cozzolino M, Díaz-Gimeno P, Pellicer A, Garrido N.  
J Assist Reprod Genet. 2020; 37(12):2989-2997

#### **The use of propensity score matching to assess the benefit of the endometrial receptivity analysis in frozen embryo transfers.**

Bergin K, Eliner Y, Duvall Jr D, Roger S, Elguero S, Penzias A. et al  
Fertil Steril. 2021; 116(2):396-403

#### **Live birth after transfer of a single euploid vitrified-warmed blastocyst according to standard timing vs. timing as recommended by endometrial receptivity analysis**

Doyle N, Combs JC, Jahandideh S, Wilkinson V, Devine K, O'Brien JE  
Fertil Steril. 2022 Aug;118(2):314-321

#### **Use of the endometrial receptivity array to guide personalized embryo transfer after a failed transfer attempt was associated with a lower cumulative and per transfer live birth rate during donor and autologous cycles.**

Cozzolino M, Díaz-Gimeno P, Pellicer A, Garrido N  
Fertil Steril. 2022 Oct;118(4):724-736

#### **Effect of Timing by Endometrial Receptivity Testing vs Standard Timing of Frozen Embryo Transfer on Live Birth in Patients Undergoing In Vitro Fertilization A Randomized Clinical Trial**

Nicole Doyle, MD, PhD1; Samad Jahandideh, PhD1; Micah J. Hill, DO2; et al  
JAMA, October, 2022

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### Meta-Analysis

#### **Endometrial receptivity array before frozen embryo transfer cycles: a systematic review and meta-analysis**

Sara E Arian, Kamran Hessami, Ali Khatibi, Alvin K To, Alireza A Shamshirsaz, William Gibbons, September 2023.

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### Opinion letter

#### **Personalized embryo transfer reduces success rates because endometrial receptivity analysis fails to accurately identify the window of implantation**

Kevin S Richter, Martin L Richter, July 2023.

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### Research letter

#### **Evaluating the Endometrial Receptivity Assay: a nested diagnostic accuracy study within the Synchrony randomized clinical trial**

Jennifer Chae-Kim, M.D., Nicole Doyle, MD, PhD, Samad Jahandideh, PhD, Jeanne E. O'Brien, M.D., MSC., Eric A. Widra, MD, Michael Levy, M.D., Alan H. DeCherney, MD, Kathleen Devine, MD, Micah J. Hill, DO, September 2023