

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, et al.

Reprod Biomed Online. 2020;41(3):402-415. doi:10.1016/j.rbmo.2020.06.002

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, et al.

Fertil Steril. 2013;100(3):818-824. doi:10.1016/j.fertnstert.2013.05.004

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;29(6):1244-1247. doi:10.1093/humrep/deu070

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;108(4):703-710.e3. doi:10.1016/j.fertnstert.2017.07.007

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

Mahajan N, Kaur S, Alonso MR.

J Hum Reprod Sci. 2018;11(4):353-358. doi:10.4103/jhrs.JHRS_52_18

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;44(3):478-485. doi:10.1016/j.rbmo.2021.11.010

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, et al.

Fertil Steril. 2011;95(1):50-60.e615. doi:10.1016/j.fertnstert.2010.04.063

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, et al.

Fertil Steril. 2013;99(2):508-517. doi:10.1016/j.fertnstert.2012.09.046

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, et al.

Hum Reprod. 2014;29(6):1271-1278. doi:10.1093/humrep/deu065

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;102(5):1477-1481. doi:10.1016/j.fertnstert.2014.07.1254

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, et al.

Fertil Steril. 2014;101(1):138-146.e3. doi:10.1016/j.fertnstert.2013.09.033

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;31(5):647-654. doi:10.1016/j.rbmo.2015.07.014

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, et al.

Hum Reprod. 2016;31(7):1552-1561. doi:10.1093/humrep/dew080

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

Comstock IA, Diaz-Gimeno P, Cabanillas S, et al.

Fertil Steril. 2017;107(3):740-748.e2. doi:10.1016/j.fertnstert.2016.11.009

Effect of mifepristone on the transcriptomic signature of endometrial receptivity.

von Grothusen C, Lalitkumar PG, Ruiz-Alonso M, et al.

Hum Reprod. 2018;33(10):1889-1897. doi:10.1093/humrep/dey272

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

Stankewicz T, Valbuena D, Ruiz-Alonso M.

J Assist Reprod Genet. 2018;35(7):1307-1308. doi:10.1007/s10815-018-1212-7

Obesity Affects Endometrial Receptivity by Displacing the Window of Implantation.

Bellver J, Marín C, Lathi RB, et al.

Reprod Sci. 2021;28(11):3171-3180. doi:10.1007/s43032-021-00631-1

Endometrial Receptivity Analysis (ERA): data versus opinions.

Ruiz-Alonso M, Valbuena D, Gomez C, Cuzzi J, Simon C.

Hum Reprod Open. 2021;2021(2):hoab011. Published 2021 Apr 14. doi:10.1093/hropen/hoab011

Two studies in the same center, on the same patient population and topic, but with different results: Is the experimental design to blame?

Simon C, Ruiz-Alonso M, Gómez C, Valbuena D.

Fertil Steril. 2023;119(3):514-515. doi:10.1016/j.fertnstert.2022.11.019

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

Valbuena D, Ruiz-Alonso M, Stankewicz T.

Fertil Steril. 2023;S0015-0282(23)01995-7. doi:10.1016/j.fertnstert.2023.11.006

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, 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

Glujovsky D, Lattes K, Miguens M, Pesce R, Ciapponi A.

Hum Reprod. 2023;38(7):1305-1317. doi:10.1093/humrep/dead098

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

He Y, Tang R, Yu H, et al.

J Assist Reprod Genet. 2023;40(10):2343-2356. doi:10.1007/s10815-023-02923-8

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 HL, Khan YL, et al.

BioMedica, 03 (February 2022): 220-226. doi:10.51441/BioMedica/5-296

Retrospective studies with clinical outcome after pET

Endometrial receptivity array: Clinical application.

Mahajan N.

J Hum Reprod Sci. 2015;8(3):121-129. doi:10.4103/0974-1208.165153

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

Hashimoto T, Koizumi M, Doshida M, et al.

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

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

Tan J, Kan A, Hitkari J, et al.

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 Gynecol. 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

Journal of Gynecological Research and Obstetrics. 2020;6(3):76-80. doi: 10.17352/jgro.000092

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

Eisman LE, Pisarska MD, Wertheimer S, et al.

J Assist Reprod Genet. 2021;38(3):645-650. doi:10.1007/s10815-020-02041-9

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, et al.

Fertility & Reproduction. 2023;3(2):35-41. doi.org/10.1142/S2661318221500043

Role of endometrial receptivity array in current implantation failure.

Samadhiya R, Swarnkar GP, Singh A, Chittawar PB.

Fertility Science and Research. 2021;8(2):180-18. doi: 10.4103/fsr.fsr_40_21

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, 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

Rose B.

International Journal of Clinical Obstetrics and Gynaecology. 2022;6(3):52-54. doi: 10.33545/gynae.2022.v6.i3a.1183

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

Lujan-Irastorza J.

The Journal of Reproduction. 2023;2(1). doi.org/10.58779/issn.2954-467X.tjor2023.v2.n1.16

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

Rubin SC, Abdulkadir M, Lewis J, Harutyunyan A, Hirani R, Grimes CL.

J Pers Med. 2023;13(5):749. Published 2023 Apr 27. doi:10.3390/jpm13050749

Case report

Live birth after embryo transfer in an unresponsive thin endometrium.

Cruz F, Bellver J.

Gynecol Endocrinol. 2014;30(7):481-484. doi:10.3109/09513590.2014.900747

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?

Kaur S, Naidu P.

The Onco Fertility Journal. 2019;2(1):46-49. doi: 10.4103/tofj.tofj_9_19

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, et al.

J of Medical Cases. 2019; 10(5):138-140. doi.org/10.14740/jmc3282

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.

RCT

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

Doyle N, Jahandideh S, Hill MJ, Widra EA, Levy M, Devine K.
JAMA. 2022;328(21):2117-2125. doi:10.1001/jama.2022.20438

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. doi:10.1007/s10815-018-1125-5

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

Dahan MH, Tan SL.
J Assist Reprod Genet. 2018;35(10):1923-1924. doi:10.1007/s10815-018-1279-1

Prospective studies with clinical outcome after pET

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

Riestenberg C, Kroener L, Quinn M, Ching K, Ambartsumyan G.
Fertil Steril. 2021;115(4):1001-1006. doi:10.1016/j.fertnstert.2020.09.140

Retrospective studies with clinical outcomes after pET

Does the endometrial receptivity array really provide personalized embryo transfer?

Bassil R, Casper R, Samara N, et al.
J Assist Reprod Genet. 2018;35(7):1301-1305. doi:10.1007/s10815-018-1190-9

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

Neves AR, Devesa M, Martinez F, et al.
J Assist Reprod Genet. 2019;36(9):1901-1908. doi:10.1007/s10815-019-01535-5

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

Cozzolino M, Diaz-Gimeno P, Pellicer A, Garrido N.
J Assist Reprod Genet. 2020;37(12):2989-2997. doi:10.1007/s10815-020-01948-7

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

Bergin K, Eliner Y, Duvall DW Jr, et al.
Fertil Steril. 2021;116(2):396-403. doi:10.1016/j.fertnstert.2021.03.031

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;118(2):314-321. doi:10.1016/j.fertnstert.2022.05.013

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;118(4):724-736. doi:10.1016/j.fertnstert.2022.07.007

Meta-Analysis

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

Arian SE, Hessami K, Khatibi A, To AK, Shamshirsaz AA, Gibbons W. 023.
Fertil Steril. 2023;119(2):229-238. doi:10.1016/j.fertnstert.2022.11.012

Opinion letter

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

Richter KS, Richter ML.
Hum Reprod. 2023;38(7):1239-1244. doi:10.1093/humrep/dead083

Research letter

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

Chae-Kim J, Doyle N, Jahandideh S, et al.
Fertil Steril. 2023;S0015-0282(23)01862-9. doi:10.1016/j.fertnstert.2023.09.004D, Kathleen Devine, MD, Micah J. Hill, DO, September 2023