

Análise crítica dos bebês nascidos por FIV/ICSI:

Existe diferença?

Edson Borges Jr.

Declaração:

Declaro o recebimento de honorários para palestras e/ou ensaios clínicos da Merck, Ferring e Abbott (não relacionados ao assunto desta palestra).

Nenhum outro conflito de interesse para divulgar.

**Resolução do Conselho Federal de Medicina
nº 1.595/2.000**

Agenda

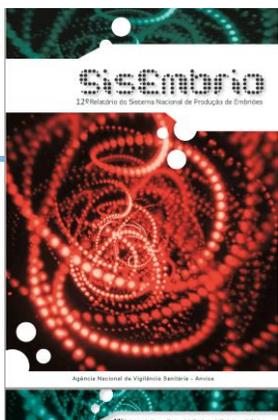
- ➔ **Desfechos obstétricos e perinatais**
- ➔ **Malformações congênitas**
- ➔ **Gestações múltiplas**
- ➔ **Riscos epigenéticos**
- ➔ **Consequências na prole**

<i>IDADE</i>	<i>TOTAL</i>	<i>HOMENS</i>	<i>MULHERES</i>
20 a 24 anos	17.224.257	8.618.804	8.605.453
25 a 29 anos	17.058.327	8.435.709	8.622.618
30 a 34 anos	15.698.467	7.691.887	8.006.581
35 a 39 anos	13.861.798	6.751.619	7.110.179
40 a 44 anos	12.995.913	6.312.954	6.682.958
	76.838.762	37.810.972	39.027.790
		49,2%	50,8%

Fonte: Censo 2.010

- **Infertilidade conjugal: 15%**
- **Homens: ~ 5.670.000**
- **Mulheres: ~ 5.850.000**

**~ 11.500.000 pessoas c/
infertilidade**



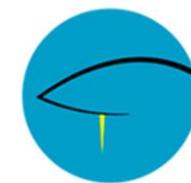
- **Brasil: 43.098 ciclos FIV/ICSI 2.018**
- **70.908 embriões transferidos**
- **~ 3.000.000 nascimentos / ano no Brasil**
- **~ 15.000 crianças nascidas FIV/ICSI/DESCONGELAMENTO**

~ 0,5% crianças nascidas Brasil

- **USA: 2%**
- **Europa – Japão: 6%**
- **Dinamarca – Finlândia: 8%**

Desfechos obstétricos e perinatais





Human Reproduction Update, Vol.18, No.5 pp. 485–503, 2012

Advanced Access publication on May 19, 2012 doi:10.1093/humupd/dms018

human
reproduction
update

Obstetric and perinatal outcomes in singleton pregnancies resulting from IVF/ICSI: a systematic review and meta-analysis

**Shilpi Pandey¹, Ashalatha Shetty², Mark Hamilton¹,
Siladitya Bhattacharya³, and Abha Maheshwari^{3,*}**

¹Assisted Reproduction Unit, Aberdeen Maternity Hospital, Aberdeen AB25 2ZL, UK ²Aberdeen Maternity Hospital, Aberdeen AB25 2ZL, UK ³Division of Applied Health Sciences, University of Aberdeen, Aberdeen Maternity Hospital, Aberdeen AB25 2ZL, UK

TRA: desfechos obstétricos e perinatais

Desfecho	Efeito global: RR (IC-95%)
Hemorragia anteparto	2,49 (2,30 a 2,69)
Anomalias congênitas	1,67 (1,33 a 2,09)
Hipertensão	1,49 (1,39 a 1,59)
Ruptura prematura de membranas	1,16 (1,07 a 1,26)
Cesariana	1,56 (1,51 a 1,60)
Peso ao nascer < 2.500 g	1,65 (1,56 a 1,75)
Peso ao nascer < 1.500 g	1,93 (1,72 a 2,17)
Mortalidade perinatal	1,87 (1,49 a 2,37)
Nascimento antes de 37 semanas	1,54 (1,47 a 1,62)
Nascimento antes de 32 semanas	1,68 (1,48 a 1,91)
Transferência para UTI neonatal	1,58 (1,42 a 1,77)
Diabetes gestacional	1,48 (1,33 a 1,66)
Indução do parto	1,18 (1,10 a 1,28)
Pequeno para idade gestacional	1,39 (1,27 a 1,53)

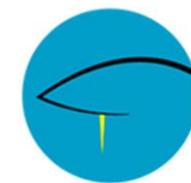
Pandey S, *et al. Hum Reprod Update.* 2012 Sep-Oct;18(5):485-503.

Why do singletons conceived after assisted reproduction technology have adverse perinatal outcome? Systematic review and meta-analysis

A. Pinborg^{1,*}, U.B. Wennerholm², L.B. Romundstad³, A. Loft¹,
K. Aittomaki⁴, V. Söderström-Anttila⁵, K.G. Nygren⁶, J. Hazekamp⁷,
and C. Bergh⁸

Critérios de nascimentos pré-termo (PT) (1982 – 2012, PUBMED, Cochrane, 65 trabalhos)

- ➔ Férteis x subférteis (CE e TOG > 1 ano) (AOR= 1,35)
- ➔ FIV/ICSI x subférteis (AOR= 1,55)
- ➔ IO/IIU x férteis (AOR= 1,45)
- ➔ *Vanishing co-twin* x gestações únicas (AOR= 1,73)
- ➔ ICSI x FIV (AOR= 0,80)



Perinatal outcomes associated with assisted reproductive technology: the Massachusetts Outcomes Study of Assisted Reproductive Technologies (MOSART)

Fertility and Sterility® Vol. 103, No. 4, April 2015

Eugene Declercq, Ph.D.,^a Barbara Luke, Sc.D., M.P.H.,^b Candice Belanoff, Sc.D.,^a Howard Cabral, Ph.D.,^a Hafsatou Diop, M.D.,^c Daksha Gopal, M.P.H.,^a Lan Hoang, M.P.H.,^a Milton Kotelchuck, Ph.D.,^d Judy E. Stern, Ph.D.,^e and Mark D. Hornstein, M.D.^f

➔ *334.628 nascimentos, 2004-2008*

➔ *TRA: 11.271, subferteis: 6.609, ferteis: 316.748*

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Eugene Declercq, Ph.D.,^a Barbara Luke, Sc.D., M.P.H.,^b Candice Belanoff, Sc.D.,^a Howard Cabral, Ph.D.,^a Hafsatu Diop, M.D.,^c Daksha Gopal, M.P.H.,^a Lan Hoang, M.P.H.,^a Milton Kotelchuck, Ph.D.,^d Judy E. Stern, Ph.D.,^e and Mark D. Hornstein, M.D.^f

➔ TRA único x subfértil: > pré-termo e baixo peso

(AOR=1,23 – 1,26, respectivamente)

➔ TRA e subfértil x fértil: > pré-termo e baixo peso (OR= 1,3)

Perinatal outcome of singleton siblings born after assisted reproductive technology and spontaneous conception: Danish national sibling-cohort study

Fertility and Sterility® Vol. 95, No. 3, March 1, 2011 **959**

*Anna-Karina Aaris Henningsen, M.D.,^a Anja Pinborg, M.D.Sc.,^a Øjvind Lidgaard, M.D.Sc.,^b
Christina Vestergaard, M.P.H.,^b Julie Lyng Forman, M.Sc., Ph.D.,^c and Anders Nyboe Andersen, M.D.Sc.^a*

Setting: Denmark, from 1994 to 2008.

Patient(s): Pairs of siblings (13,692 pairs; n = 27,384 children) conceived after IVF, intracytoplasmic sperm injection (ICSI), frozen embryo replacement (FER), or spontaneous conception subcategorized into five groups according to succession: [1] IVF-ICSI vs. spontaneous conception (n = 7,758), [2] IVF-ICSI vs. FER (n = 716), [3] FER vs. FER (n = 34), [4] IVF-ICSI vs. IVF-ICSI (n = 2,876), and [5] spontaneous conception vs. spontaneous conception (n = 16,000).

- ➔ TRA (todos tratamentos) 65 g mais leves x pares concepção natural
- ➔ ICSI/FIV x Concepção Natural: > risco baixo peso (OR= 1,4) e gestação prematura (OR= 1,3)



Assisted reproductive technology and perinatal outcomes: conventional versus discordant-sibling design

Nafeesa N. Dhalwani, Ph.D.,^{a,b,c} Sheree L. Boulet, Dr.P.H.,^a Dmitry M. Kissin, M.D.,^a Yujia Zhang, Ph.D.,^a Patricia McKane, M.P.H.,^d Marie A. Bailey, M.S.W.,^e Maria-Elena Hood, M.P.H.,^f and Laila J. Tata, Ph.D.^b

Fertility and Sterility® Vol. 106, No. 3, September 1, 2016

TABLE 4

Association among ART and low birth weight, preterm birth, low Apgar score, and SGA.

Type of analysis	ART group, n (%)	Non-ART group, n (%)	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Conventional analysis	n = 32,762	n = 3,863,480				
Low birth weight	2,762 (8.4)	230,048 (6.0)	1.46 (1.40, 1.51)	<.001	1.38 (1.32, 1.43)	<.001 ^a
Preterm birth	3,813 (11.6)	307,327 (8.0)	1.52 (1.47, 1.58)	<.001	1.51 (1.46, 1.56)	<.001 ^b
Low Apgar (<7)	424 (1.3)	45,599 (1.2)	1.09 (0.99, 1.21)	.059	0.99 (0.90, 1.09)	.888
SGA ^d	593 (1.8)	67,350 (1.7)	1.04 (0.96, 1.13)	.316	1.11 (1.03, 1.21)	.01 ^b
Discordant-sibling pair analysis^e	n = 6,458	n = 6,458				
Low birth weight	436 (6.8)	314 (4.9)	1.41 (1.24, 1.62)	<.001	1.33 (1.13, 1.56)	<.001 ^a
Preterm birth	627 (9.7)	516 (7.9)	1.24 (1.11, 1.38)	.001	1.20 (1.07, 1.34)	.002 ^b
Low Apgar (<7)	64 (1.0)	84 (1.3)	0.76 (0.55, 1.06)	.101	0.75 (0.54, 1.05)	.096
SGA ^d	94 (1.4)	75 (1.2)	1.25 (0.93, 1.69)	.132	1.22 (0.88, 1.68)	.237 ^b

^a Adjusted for maternal age, year of birth, parity, infant's sex, gestational age, and time since last recorded delivery.

^b Adjusted for maternal age, year of birth, parity, infant's sex, and time since last recorded delivery.

^c Adjusted for maternal age, year of birth, parity, infant's sex, gestational age, delivery type, and time since last recorded delivery.

^d 2 SD lower than the mean birth weight for gestational age and sex.

^e One sibling was conceived naturally, and the other one was conceived through ART.

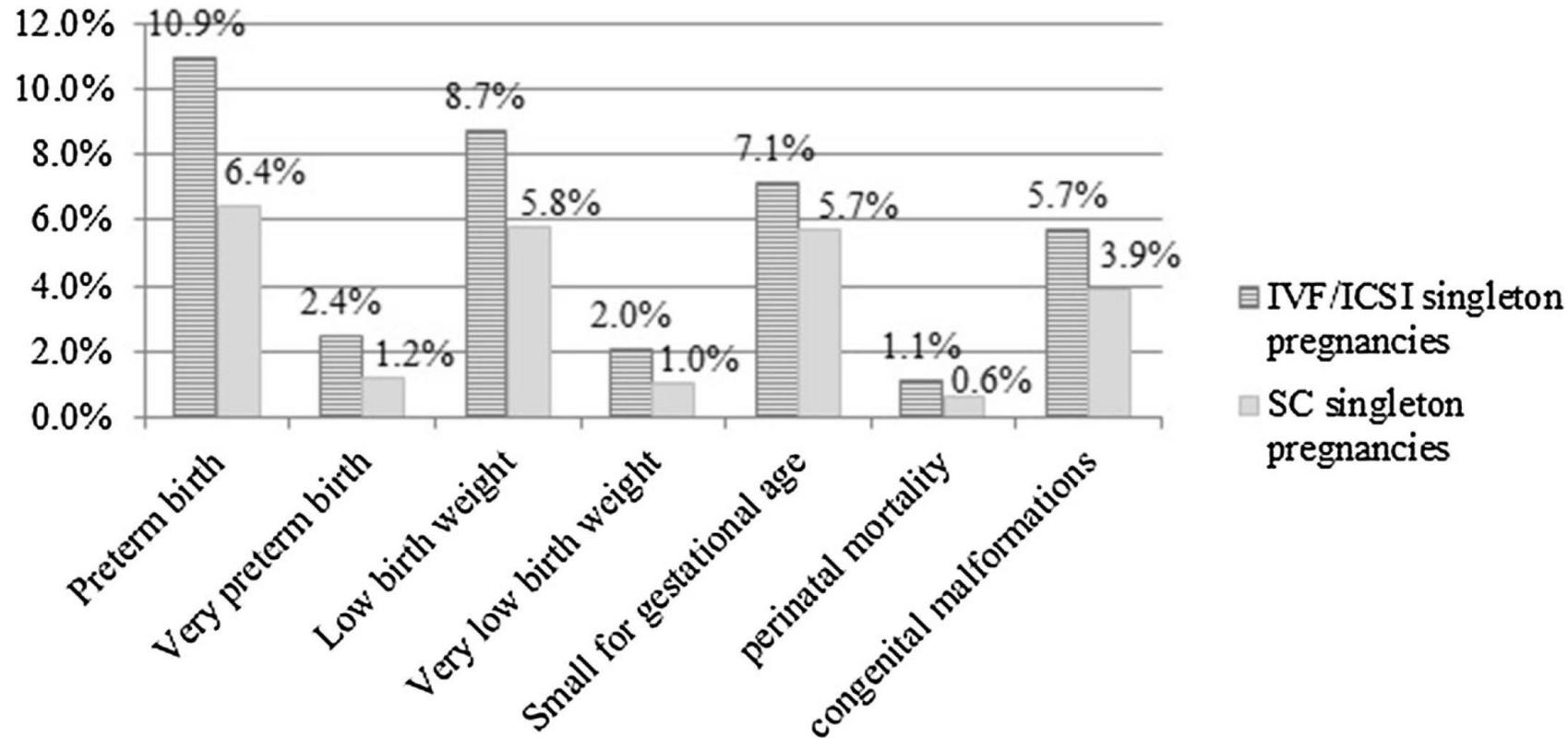
Dhalwani. ART and perinatal outcomes. Fertil Steril 2016.

Rectangular Snip

Worldwide prevalence of adverse pregnancy outcomes among singleton pregnancies after in vitro fertilization/ intracytoplasmic sperm injection: a systematic review and meta-analysis

Jia-Bi Qin^{1,2} · Xiao-Qi Sheng² · Di Wu³ · Shi-You Gao⁴ · Yi-Ping You⁵ ·
Tu-Bao Yang⁶ · Hua Wang²

52 estudos coorte, 181,741 nascimentos de únicos por FIV/ICSI e 4,636,508 nascimentos de únicos por concepção espontânea.



Neonatal health including congenital malformation risk of 1072 children born after vitrified embryo transfer

F. Belva^{1,*}, M. Bonduelle¹, M. Roelants², G. Verheyen³,
and L. Van Landuyt³



Table V Unadjusted and adjusted ORs for neonatal characteristics in singletons and twins following vitrified embryo transfer compared with fresh embryo transfer.

Neonatal outcome	Singletons		Twins	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Low birthweight	0.83 (0.59–1.1)	0.76 (0.457–1.28)	0.44 (0.24–0.79)	0.53 (0.20–1.44)
Small-for-gestational age	0.62 (0.45–0.87)	0.55 (0.34–0.90)	0.62 (0.40–0.96)	0.46 (0.20–1.04)
Large-for-gestational age	2.22 (0.77–6.44)	1.85 (0.42–8.06)	/	/
Preterm delivery	1.08 (0.80–1.43)	0.91 (0.57–1.43)	1.02 (0.74–1.41)	1.40 (0.74–2.66)
Perinatal death	0.94 (0.39–2.26)	0.97 (0.40–2.36)	0.35 (0.12–1.04)	0.37 (0.12–1.10)
Major congenital malformations	0.93 (0.53–1.63)	0.91 (0.47–1.78)	0.87 (0.04–19.6)	0.88 (0.15–4.96)

Adjusted for treatment variables (number of embryos transferred and embryo stage at vitrification/transfer: cleavage-stage or blastocyst) and maternal characteristics (age, BMI, parity, smoking and pregnancy-induced hypertensive disorder).

➔ **Parâmetros da saúde neonatal em únicos nascidos após vitrificação embrionária, são similares ou um pouco melhores que aqueles nascidos por transferência de embriões frescos, exceto para “grandes para a idade gestacional”**

Doação de óvulos

- ➔ **Doença hipertensiva da gestação (DHG): 16-40%, 2-3X maior FIV/ICSI**
(van der Hoorn et al., 2010; Malchau et al., 2013; Masoudian et al., 2016; Nejd et al., 2016; Savasi et al., 2016; Storgaard et al., 2017);
- ➔ **Pré-termo e leve-idade gestacional: 2-3X maior FIV/ICSI**
(Adams et al., 2015; Nejd et al., 2016; Storgaard et al., 2017).

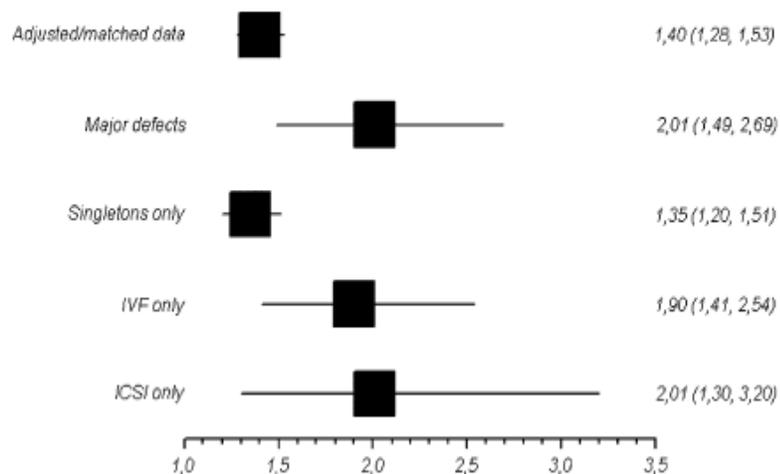
Malformações congênitas



Assisted reproductive technologies and the risk of birth defects—a systematic review

Michèle Hansen^{1,3}, Carol Bower¹, Elizabeth Milne¹, Nicholas de Klerk¹
and Jennifer J.Kurinczuk²

Estimates of congenital malformation risk (pooled odds ratios) in children born after ART. Published by Hansen et al. 2005.



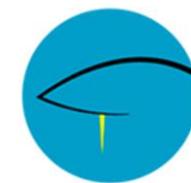
Ceelen. Growth and development of children born after IVF. Fertil Steril 2008.

- revisão sistemática
- 25 estudos
- risco aumentado em 30-40% para malformações

Assisted reproductive technology and major structural birth defects in the United States[†]

J. Reefhuis^{1,3}, M.A. Honein¹, L.A. Schieve¹, A. Correa¹, C.A. Hobbs² and S.A. Rasmussen¹, and the National Birth Defects Prevention Study

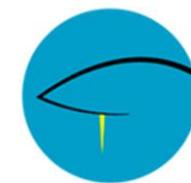
¹National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, 1600 Clifton Road N.E., MS E-86, Atlanta, GA 30033, USA ²University of Arkansas for Medical Sciences, Little Rock, AR 72202, USA



➔ Gestações únicas:

- defeitos septo cardíaco (aOR=3.1)
- lábio/palato / fenda (aOR=2.4)
- atresia esôfago (aOR=4.5)
- atresia ano-retal (aOR=3.7)

The National Birth Defects Prevention Study: 18.000 crianças



Human Reproduction, Vol.25, No.1 pp. 59–65, 2010

Advanced Access publication on October 22, 2009 doi:10.1093/humrep/dep364

human
reproduction

ORIGINAL ARTICLE *Early pregnancy*

Increased risk of blastogenesis birth defects, arising in the first 4 weeks of pregnancy, after assisted reproductive technologies

Jane L. Halliday^{1,2,7}, Obioha C. Ukoumunne^{1,2}, H.W. Gordon Baker^{3,4}, Sue Breheny⁵, Alice M. Jaques¹, Claire Garrett⁴, David Healy^{5,6}, and David Amor^{1,2,3}

➔ Aumento dos defeitos da blastogênese (período entre fecundação e 4 semanas de desenvolvimento) em cças nascidas por FIV/ICSI (embriões frescos): OR=3,65

☞ *defeitos do tubo neural, parede abdominal, atresia anal e esôfago, gêmeos monozigóticos*

Birth defects in children conceived by in vitro fertilization and intracytoplasmic sperm injection: a meta-analysis

Fertility and Sterility® Vol. 97, No. 6, June 2012

Juan Wen, B.S.,^{a,b} Jie Jiang, B.S.,^{a,b} Chenyue Ding, B.S.,^d Juncheng Dai, M.D.,^b Yao Liu, B.S.,^b Yankai Xia, M.D., Ph.D.,^{a,c} Jiayin Liu, M.D., Ph.D.,^{a,d} and Zhibin Hu, M.D., Ph.D.^{a,b}

➔ 124.468 nascidos: FIV/ICSI comparado com Concepção Natural

- RR Anomalias congêntas: **1,37** (95%; CI: 1,26-1,48)
- FIV (46.890) x ICSI (27.754): **sem diferença** (RR: 1,05, 95%; CI: 0,91-1,02)

Assisted reproductive technology and birth defects: a systematic review and meta-analysis

Michèle Hansen^{1,*}, Jennifer J. Kurinczuk², Elizabeth Milne¹,
Nicholas de Klerk³, and Carol Bower^{1,4}

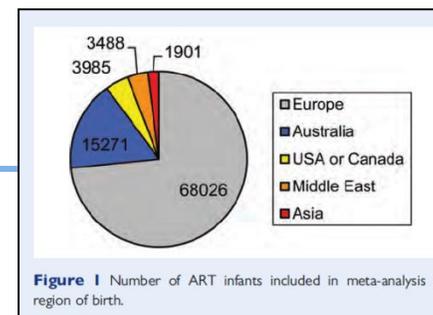
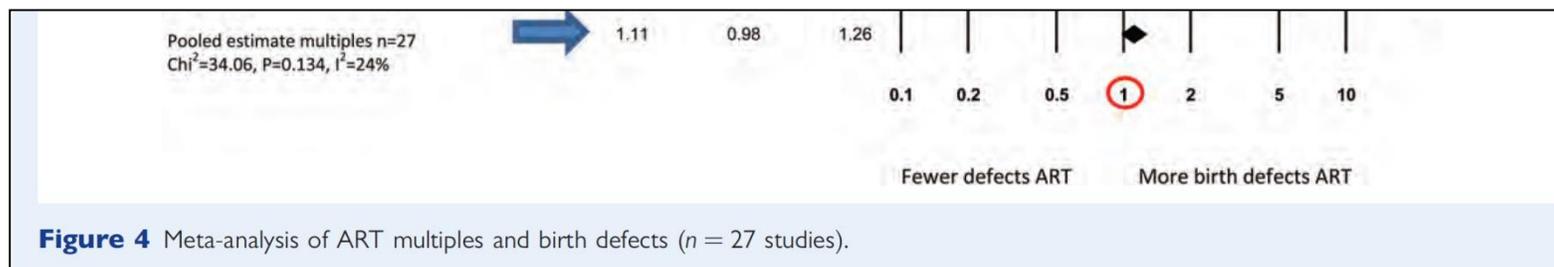
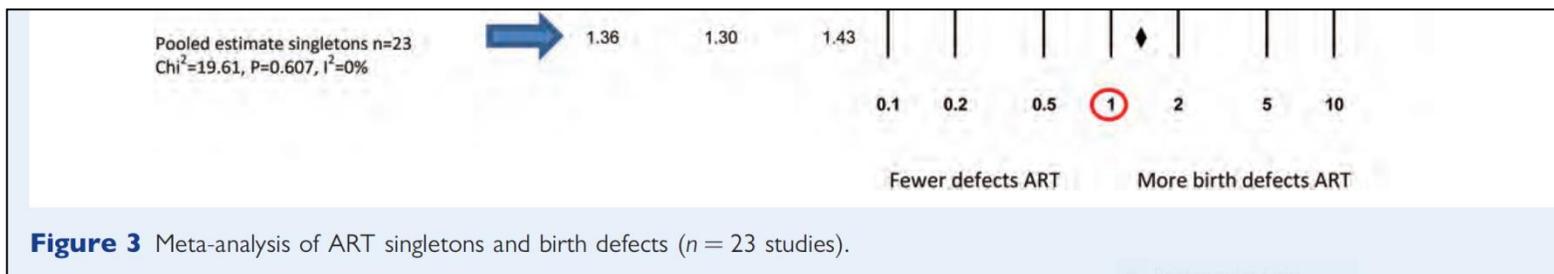
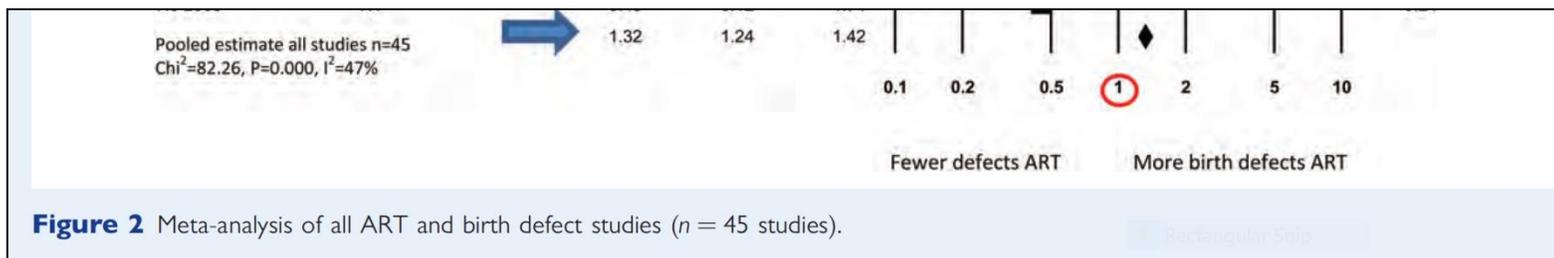


Figure 1 Number of ART infants included in meta-analysis by region of birth.



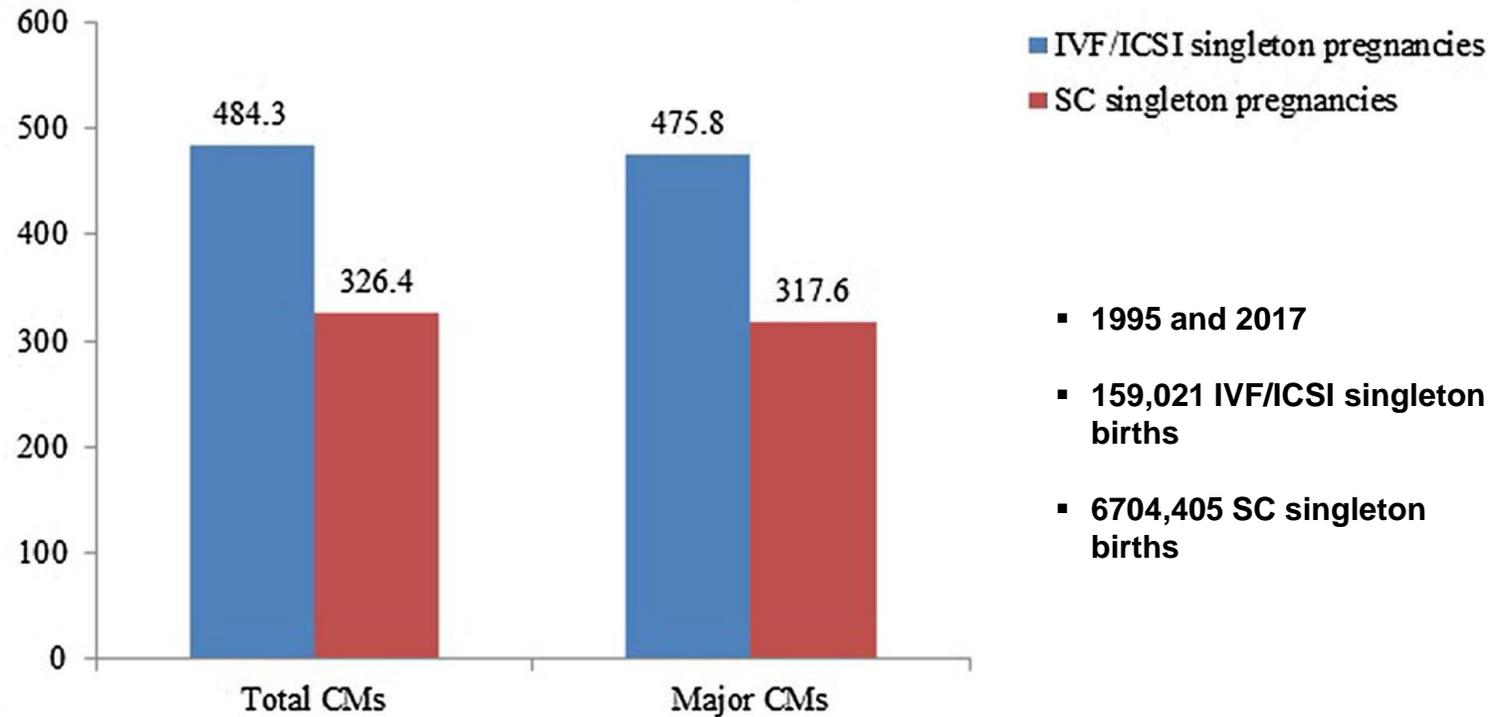


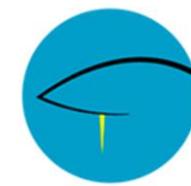
Birth prevalence of congenital malformations in singleton pregnancies resulting from in vitro fertilization/intracytoplasmic sperm injection worldwide: a systematic review and meta-analysis

Letao Chen¹ · Tubao Yang¹ · Zan Zheng¹ · Hong Yu² · Hua Wang² · Jiabi Qin¹

Captura Retangular

prevalence (per 10,000 births)

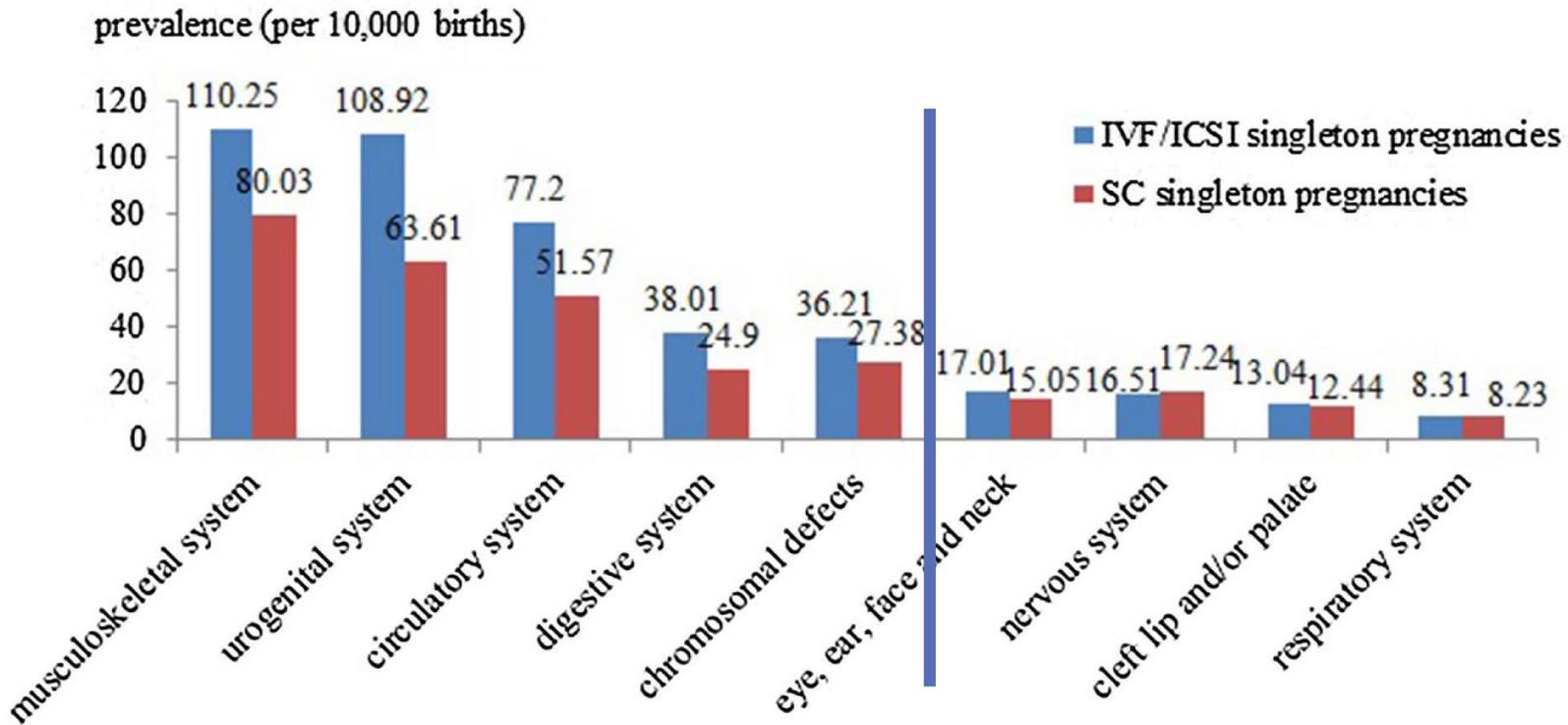




Birth prevalence of congenital malformations in singleton pregnancies resulting from in vitro fertilization/intracytoplasmic sperm injection worldwide: a systematic review and meta-analysis

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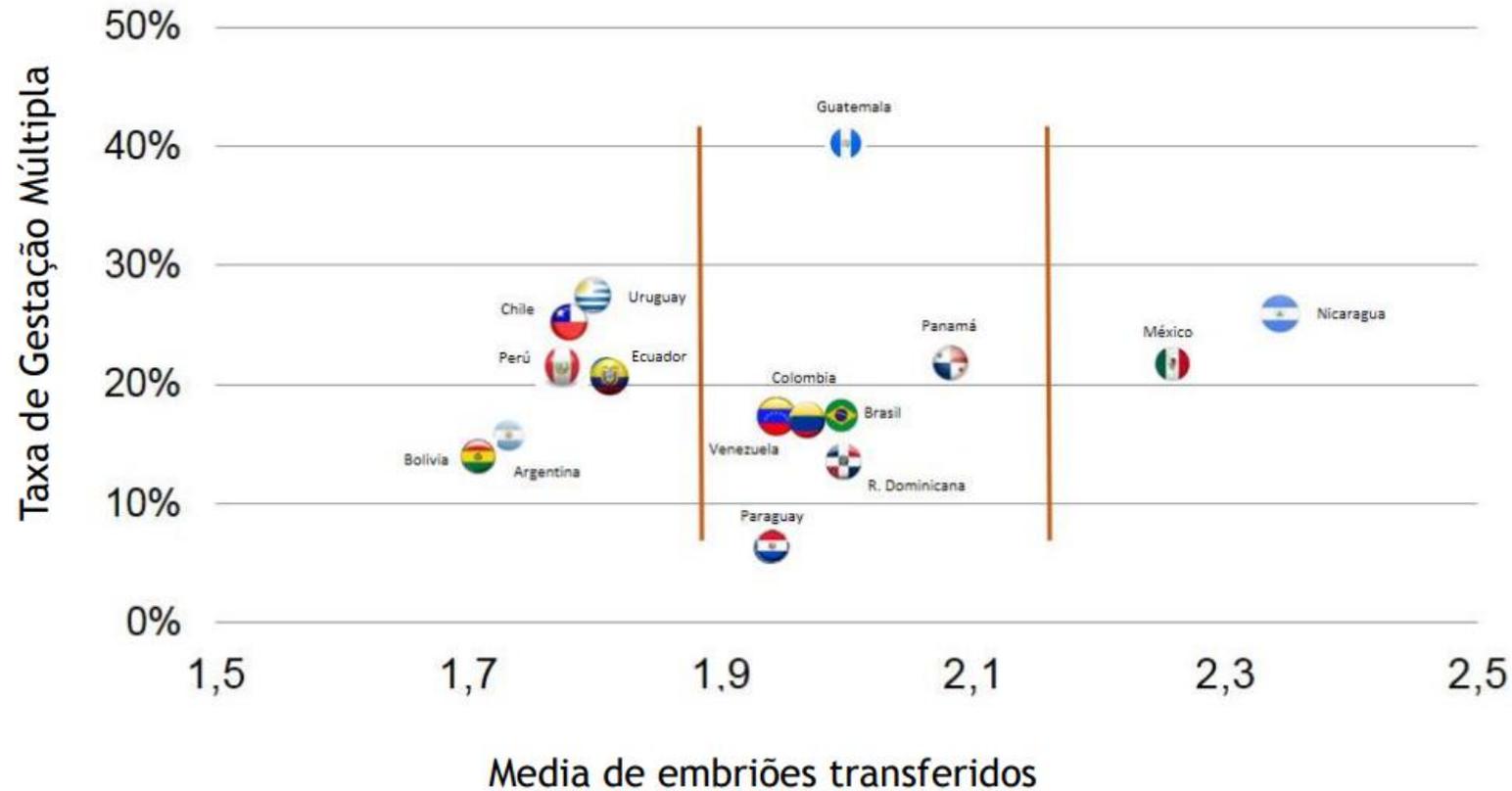
Captura Retangular

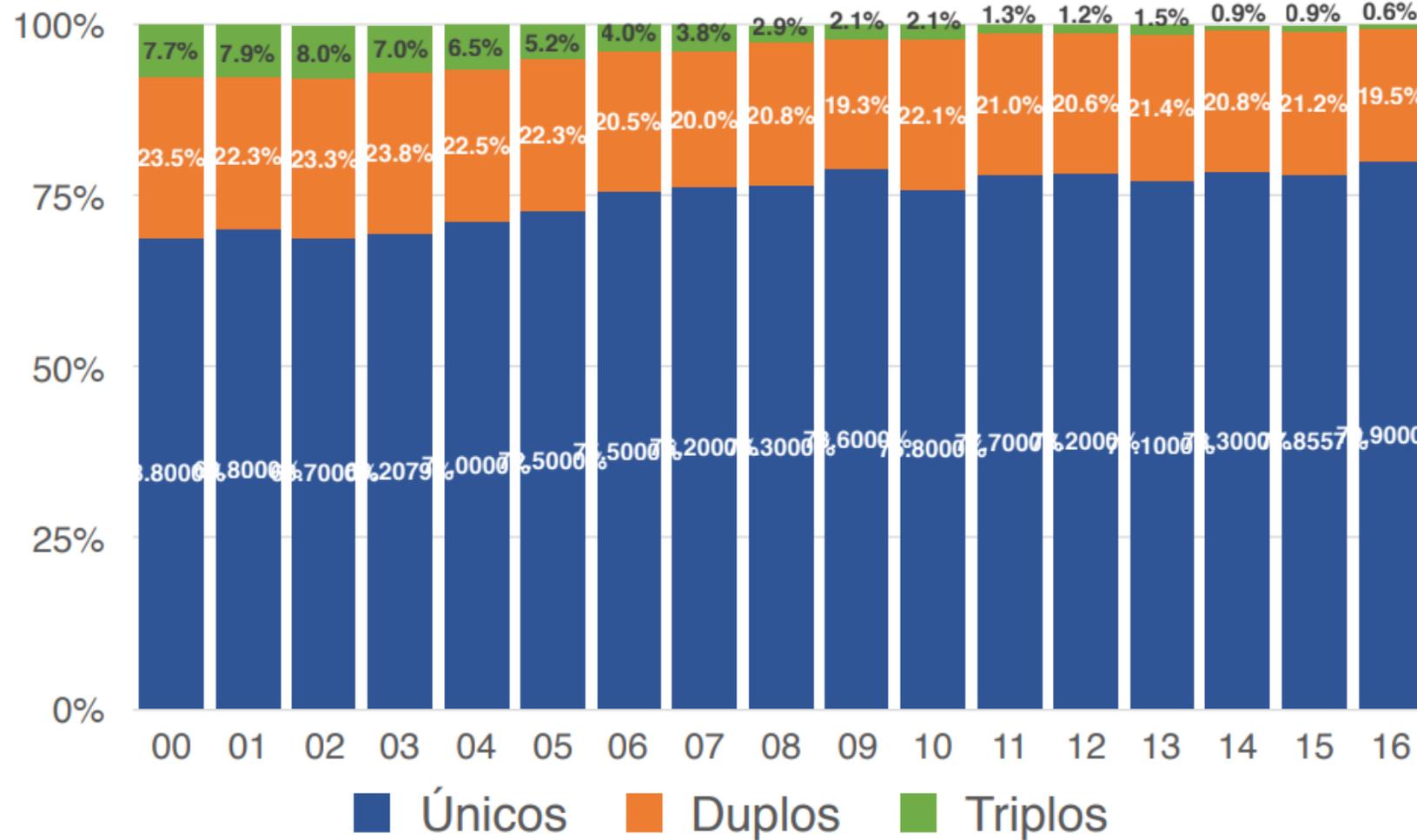


Morbidade da gestação múltipla



Media de embriões transferidos e taxa de gestação múltipla
FIV/ICSI 2016





	Únicos	Duplos	≥ Triplos
Nascidos vivos*	116523	67472	13037
Natimorto	1069	1028	462
Neomorto	539	855	487
Mortalidade Perinatal**	13,6 %	27,2 %	67,8 %

* Excluem-se os neomortos

** Mortalidade perinatal =
$$\frac{\text{Natimortos} + \text{Neomortos}}{\text{nascidos vivos}^* + \text{natimortos} + \text{neomortos}}$$

Human Reproduction Update, Vol.15, No.6 pp. 639–648, 2009
Advanced Access publication on May 19, 2009 doi:10.1093/humupd/dmp019

human
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update

Monozygotic twinning, cerebral palsy and congenital anomalies

P.O.D. Pharoah^{1,4} and Y. Dunder²

→ Paralisia Cerebral e Anomalias Congênitas
compartilham o mesmo mecanismo etiológico não diretamente
relacionadas à prematuridade (mas não diretamente relacionadas à prematuridade)

maior incidência de anomalias congênitas e paralisia

cerca de 4-5 X maior risco de paralisia cerebral no feto sobrevivente

- ❖ Risco relacionado com prematuridade / baixo peso
- ❖ Risco aumentado para o feto sobrevivente (“vanish twim”)





Riscos epigenéticos

A systematic review and meta-analysis of DNA methylation levels and imprinting disorders in children conceived by IVF/ICSI compared with children conceived spontaneously

Gabija Lazaraviciute¹, Miriam Kauser¹, Sohinee Bhattacharya¹, Paul Haggarty², and Siladitya Bhattacharya^{1,*}

¹Division of Applied Health Sciences, University of Aberdeen, Foresterhill, Aberdeen AB25 2ZD, UK ²Division of Lifelong Health, Rowett Institute of Nutrition and Health, University of Aberdeen, Greenburn Road, Bucksburn, Aberdeen AB21 9SB, UK

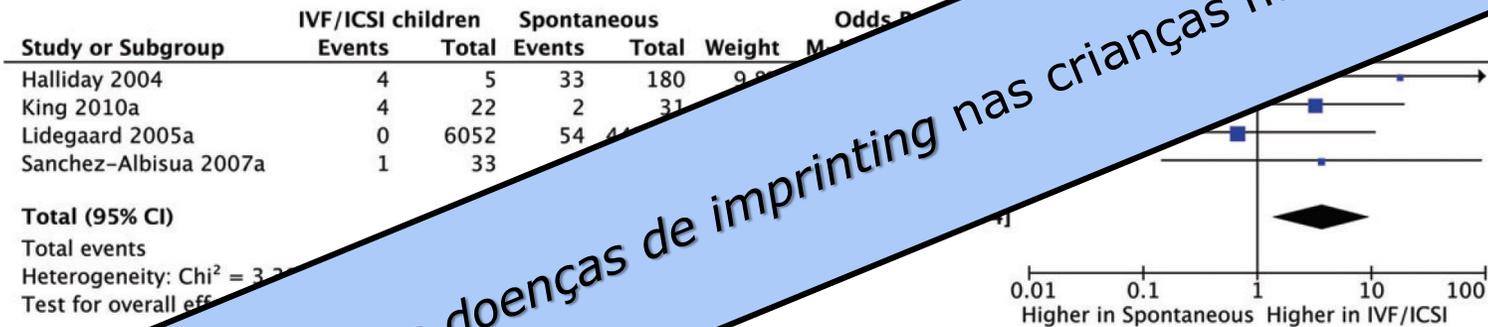


Fig. 1. Odds ratio for imprinting disorder between IVF/ICSI versus spontaneously conceived children.

❖ Aumento das doenças de imprinting nas crianças nascidas por FIV/ICSI, incluindo o síndrome de Prader-Willi (PWS), o síndrome de Angelman (AS), o síndrome de Beckwith-Wiedemann (BWS), o síndrome de Silver-Russell (SRS).

RESEARCH

Association of four imprinting disorders and ART

Hiromitsu Hattori^{1,2†}, Hitoshi Hiura^{1†}, Akane Kitamura¹, Naoko Miyama¹,
Hiroaki Okae¹, Koichi Kyono², Masayo Kagami³, Tsutomu Ogata⁴

→ frequências aumentadas associadas à ART

Beckwith-Wiedemann

→ trans

un

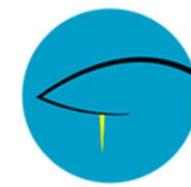
o

Transmissão de defeitos de metilação do DNA de espermatozoides e ovócitos é possível.
TRA pode induzir variação epigenética que pode ser transmitida à próxima geração.

SRS e PWS

Silver-Russell syndrome (SRS).

TRA pode ocorrer logo após a fertilização em indivíduos vulneráveis e pode ser afetado por técnicas utilizadas para FIV ou ICSI e pelo meio de



REVIEW ARTICLE

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Keywords:

children, follow-up, ICSI, intracytoplasmic sperm injection, offspring

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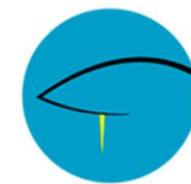
Long-term follow-up of ICSI-conceived offspring compared with spontaneously conceived offspring: a systematic review of health outcomes beyond the neonatal period

^{1,2,3}S. R. Catford , ^{1,2}R. I. McLachlan, ⁴M. K. O'Bryan and ^{3,5}J. L. Halliday

¹Hudson Institute of Medical Research, Clayton, VIC, Australia, ²Department of Obstetrics and Gynecology, Monash University, Clayton, VIC, Australia, ³Public Health Genetics, Murdoch Childrens Research Institute, Parkville, VIC, Australia, ⁴The School of Biological Sciences, Monash University, Clayton, VIC, Australia, ⁵Department of Paediatrics, University of Melbourne, Parkville, VIC, Australia

Filhos de ICSI e concepção espontânea parecem comparáveis:

- ➔ desenvolvimento cognitivo e motor, comportamento e relações familiares (como indicado por muitos estudos de boa qualidade);
- ➔ visão e a audição também sugerem que não há diferenças prejudiciais (menos trabalhos e de menor qualidade);



REVIEW ARTICLE

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Keywords:

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Long-term follow-up of ICSI-conceived offspring compared with spontaneously conceived offspring: a systematic review of health outcomes beyond the neonatal period

^{1,2,3}S. R. Catford , ^{1,2}R. I. McLachlan, ⁴M. K. O'Bryan and ^{3,5}J. L. Halliday

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Filhos de ICSI e concepção espontânea parecem diferentes:

- ➔ mais intervenções cirúrgicas, cirurgias urogenitais e criptorquidia, hospitalizações, doenças da infância e necessidade de terapias médicas;
- ➔ maior risco cardiometabólico, como indicado pelo aumento da resistência à insulina, diferenças no cortisol e vascularização retiniana anormal;
- ➔ maior pressão arterial e triglicerídeos, disfunção vascular e intolerância à glicose.



REVIEW ARTICLE

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➔ **Espermatogênese prejudicada em homens adultos jovens concebidos por ICSI, como indicado pela redução da qualidade do sêmen, e possivelmente maiores níveis de FSH e menores níveis de inibina B, em comparação com seus pares de CN**

Reproductive hormones of ICSI-conceived young adult men: the first results

Florence Belva^{1,*}, Mathieu Roelants², Jean De Schepper³,
André Van Steirteghem⁴, Herman Tournaye⁴, and Maryse Bonduelle¹

Homens concebidos por ICSI
eram mais propensos a ter
níveis baixos de inibina B e
FSH alto (percentil 90)

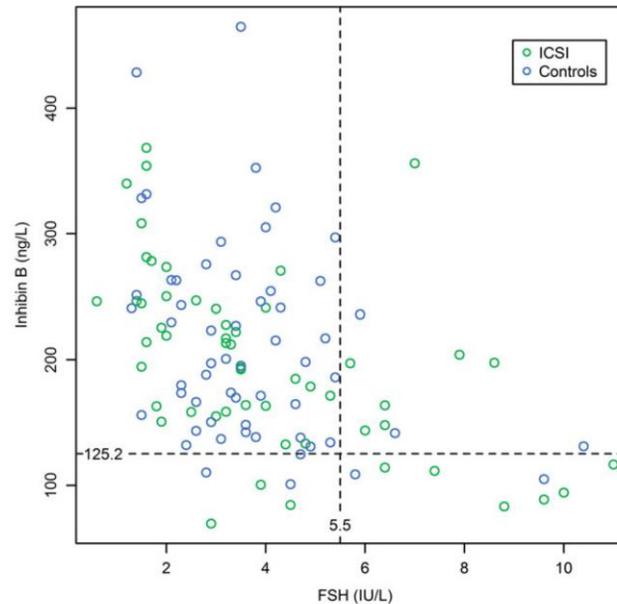
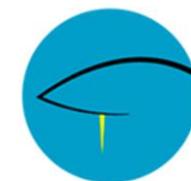


Figure 1 Serum inhibin B and FSH levels in ICSI and control men.



Reproductive hormones of ICSI-conceived young adult men: the first results

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Table III Correlations between reproductive hormone levels and semen parameters and testis volume.

	FSH		Testosterone		LH		Inhibin B	
	<i>r</i>	<i>P</i> -value	<i>r</i>	<i>P</i> -value	<i>r</i>	<i>P</i> -value	<i>r</i>	<i>P</i> -value
Sperm concentration	−0.3	0.001	0.1	0.30	−0.2	0.01	0.2	0.02
Total sperm count	−0.3	0.001	0.1	0.62	−0.2	0.02	0.2	0.01
Total motile count	−0.4	0.01	0.1	0.31	−0.2	0.06	0.2	0.01
Sperm morphology	−0.2	0.03	0.1	0.23	−0.1	0.1	−0.1	0.84
Testis volume	−0.2	0.05	0.2	0.04	−0.1	0.6	0.4	<0.01

INVITED SESSION

SESSION 01: KEYNOTE SESSION

Monday 2 July 2018

Forum (Auditorium)

08:30–09:30

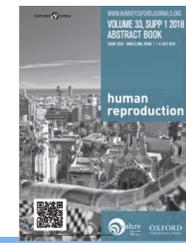
O-001 Human Reproduction Keynote Lecture - Semen quality of young adult ICSI offspring: The first results

F. Belva¹, M. Bonduelle¹, M. Roelants², D. Michielsen³, A. Van Steirteghem⁴, G. Verheyen⁴, H. Tournaye⁴

- ➔ UZ Brussel, entre 03/2013 – 04/2016, 54 jovens
- ➔ Saúde reprodutiva e metabólica de jovens 18-22 anos, nascidos de ICSI com espermatozóide ejaculado x concepção natural (CN)

O-001 Human Reproduction Keynote Lecture - Semen quality of young adult ICSI offspring: The first results

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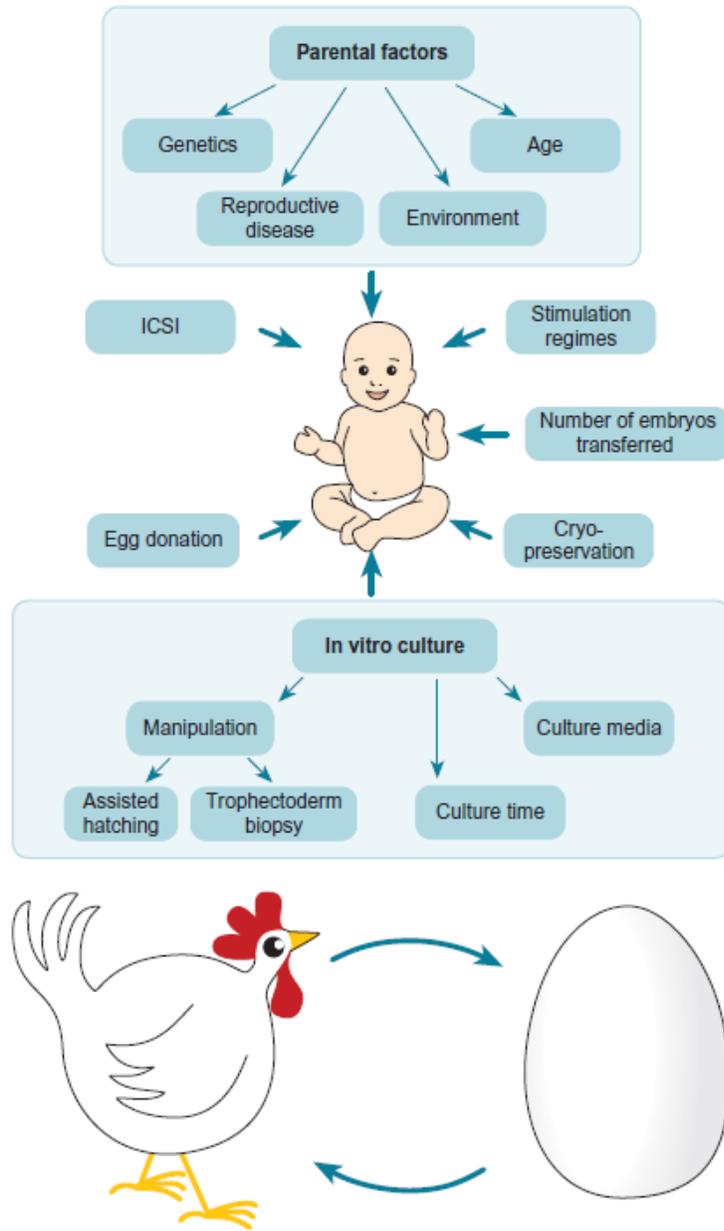


→ ICSI:

- menor concentração espermática/mL, total, TMSC (17,7 mil/ml, 31,9 mil e 12,7 mil) que os nascidos por **CN** (37 mil/ml; 86.8 mil; 38.6 mil)
- **CN**: dobro na concentração espermática/mL (ratio 1.9, 95% CI 1.1-3.2)
- **ICSI**: duas vezes menor concentração espermática total (ratio 2.3, 95% CI 1.3-4.1) e TMSC (ratio 2.1, 95% CI 1.2-3.6)

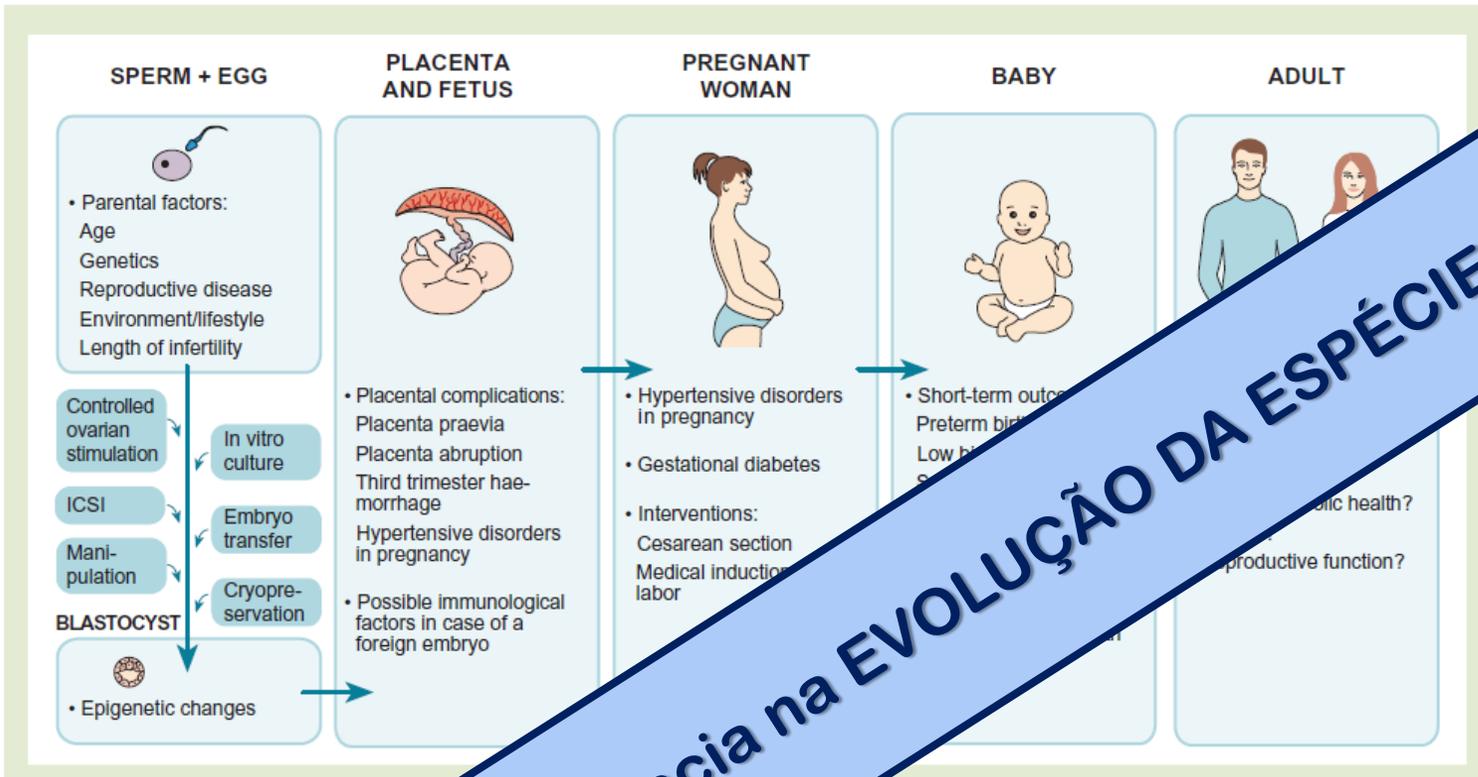
→ ICSI:

- 3X menor chance de ter concentração espermática/mL (15 mil/mL) abaixo OMS (AOR 2.7; 95% CI 1.1–6.7)
- 4X menor chance de ter concentração espermática total (39 mil) (AOR 4.3; 95% CI 1.7-11.3)



- ➔ A técnica de ICSI pode interromper fenômenos epigenéticos normais com consequências para o desenvolvimento e saúde a longo prazo;
- ➔ Possíveis mecanismos de mudanças epigenéticas induzidas por ICSI incluem a origem, preparação e congelamento de espermatozoides; microinjeção física de um espermatozoide em um ovócito;
- ➔ E outros fatores comuns a todos os procedimentos de fertilização in vitro, como exposição a hormônios suprafisiológicos, congelamento e condições de cultura e desenvolvimento dos embriões.

FIV / ICSI



Human Reproduction Update, Vol

Influência na EVOLUÇÃO DA ESPÉCIE HUMANA ???

- ➔ Tratamento para a infertilidade também uma intervenção tecnológica no ponto em um organismo humano, onde a seleção natural opera no seu mais forte;
- ➔ Aumenta a aptidão reprodutiva de casais subfértiles, removendo tecnologicamente vários tipos de barreiras seletivas e alterando outras barreiras;
- ➔ De acordo com o princípio básico da evolução, as gerações subsequentes serão, assim, geneticamente e epigeneticamente adaptadas a um ambiente em qual reprodução depende cada vez mais da intervenção tecnológica.