

Reproductive behavior in population and consequences for reproductive medicine

T. Mardešić



Sanatorium Pronatal, Prague

E-mail: sanatorium@pronatal.cz
www.pronatal.cz



Brioni 2015

Reproductive behavior in population and consequences for reproductive medicine

- Demographic data
- Reasons
- Medical (social, political) consequences
- Increased reproductive age and subfertility
- Postponing pregnancies and ART
- Future expectations

Sex without (the risk) of reproduction

- Pincus,G., Rock,J., Garcia,C.R.:
Effectiveness of an oral contraceptive.
Science, 1959, 130, 81-85.

Reproduction without sex



Step toe,P.C., Edwards,R.G.:

Birth after the reimplantation of a human embryo.

Lancet, 1978, 366-368.

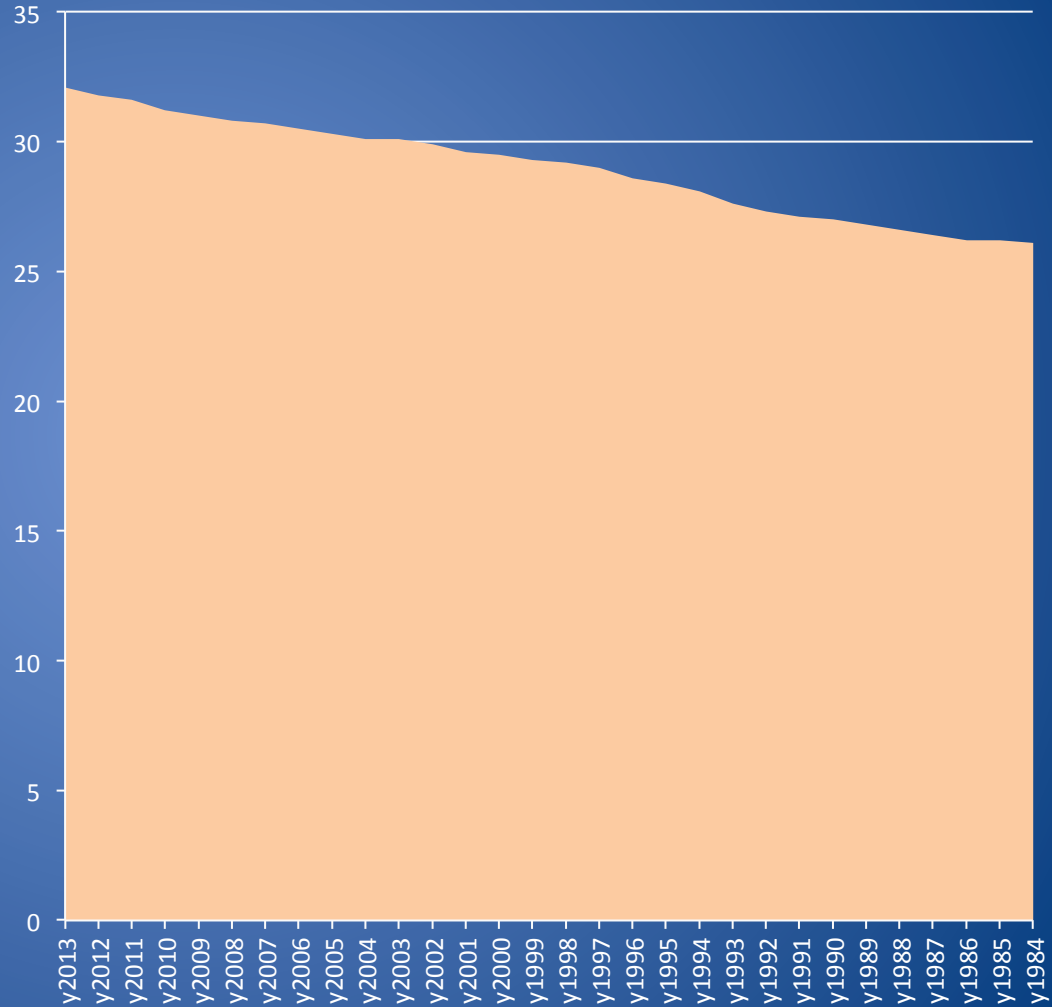
- Homo sapiens is not the last step in evolution of mankind.
- According to the scientist Cadell Last from Global Brain Institute in Brussels there will be a new kind of species Homo on the planet already around 2050.
- Biorythms will slow down, the first child will be delivered at the grandparents age in previous generations.



Delayed maternity....and future?

Each decade \uparrow 2 years

51 years in
22nd
century??



Sex and reproduction: an evolving relationship

Giuseppe Benagiano¹, Sabina Carrara, and Valentina Filippi

Department of Obstetrics and Gynaecology, Sapienza University, Rome, Italy

¹Correspondence address. 28 chemin des Massettes, 1218 Grand Saconnex, Switzerland. E-mail: giuseppe.benagiano@uniroma1.it

TABLE OF CONTENTS

- Introduction
- Methodology: search strategy
- Sex without reproduction
 - Fertility control
 - Sexuality after menopause
 - Sex for pleasure
- Reproduction without sex
 - Assisted reproduction technology
 - Reproduction after menopause
 - Reproduction with one or no gametes
- Where is sexuality going?

Sex and reproduction: an evolving relationship

Giuseppe Benagiano¹, Sabina Carrara, and Valentina Filippi

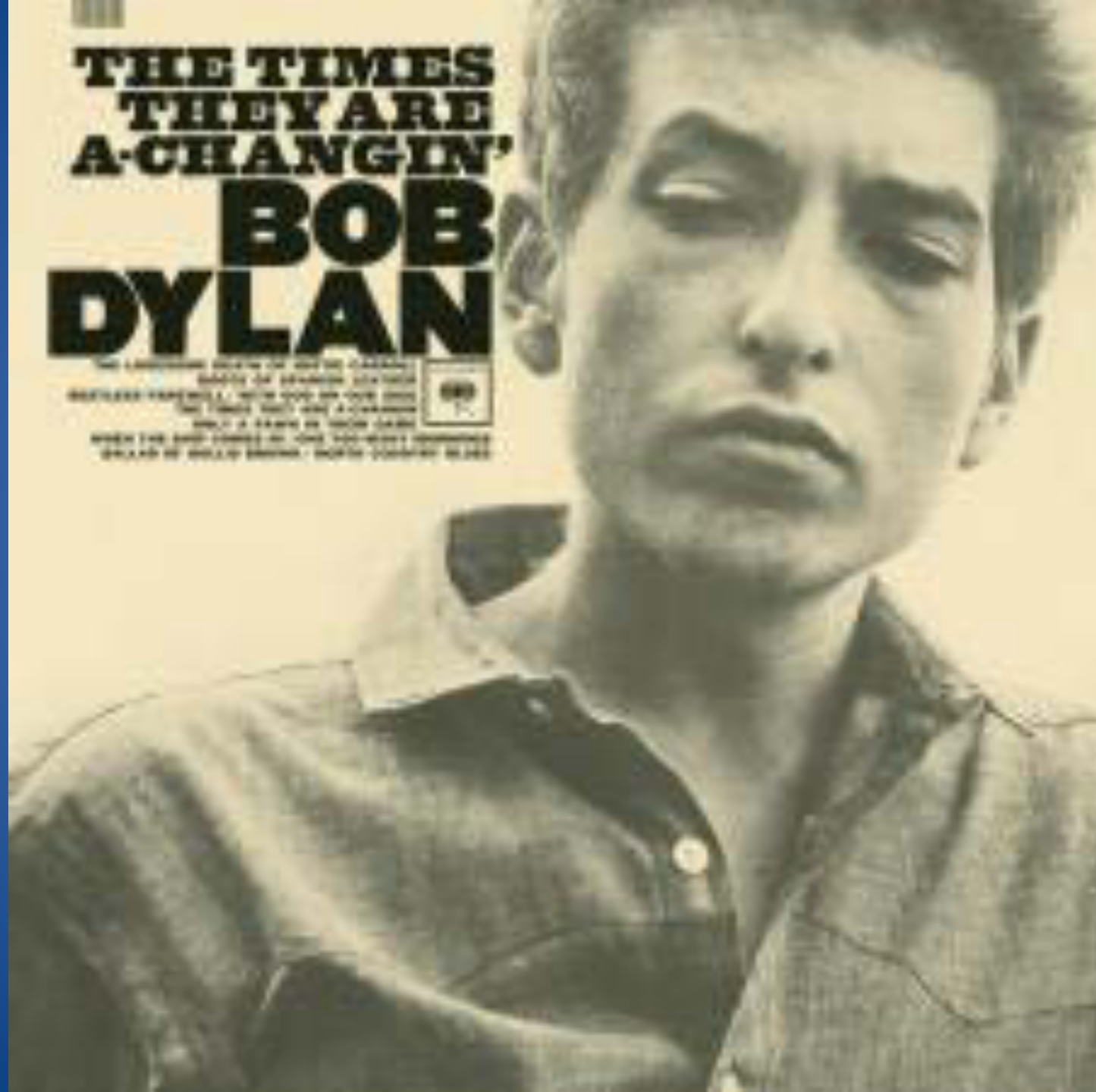
Department of Obstetrics and Gynaecology, Sapienza University, Rome, Italy

¹Correspondence address. 28 chemin des Massottes, 1218 Grand Saconnex, Switzerland. E-mail: giuseppe.benagiano@uniroma1.it

- The classic picture of sex for reproduction is increasingly being replaced by reproduction separate from sexual activity
- It is undeniable that in the modern world, sexual activity will play a decreasing role in reproduction
- Sexuality and reproduction are two separate, although still closely related, human activities

**THE TIMES
THEY ARE
A-CHANGIN'
BOB
DYLAN**

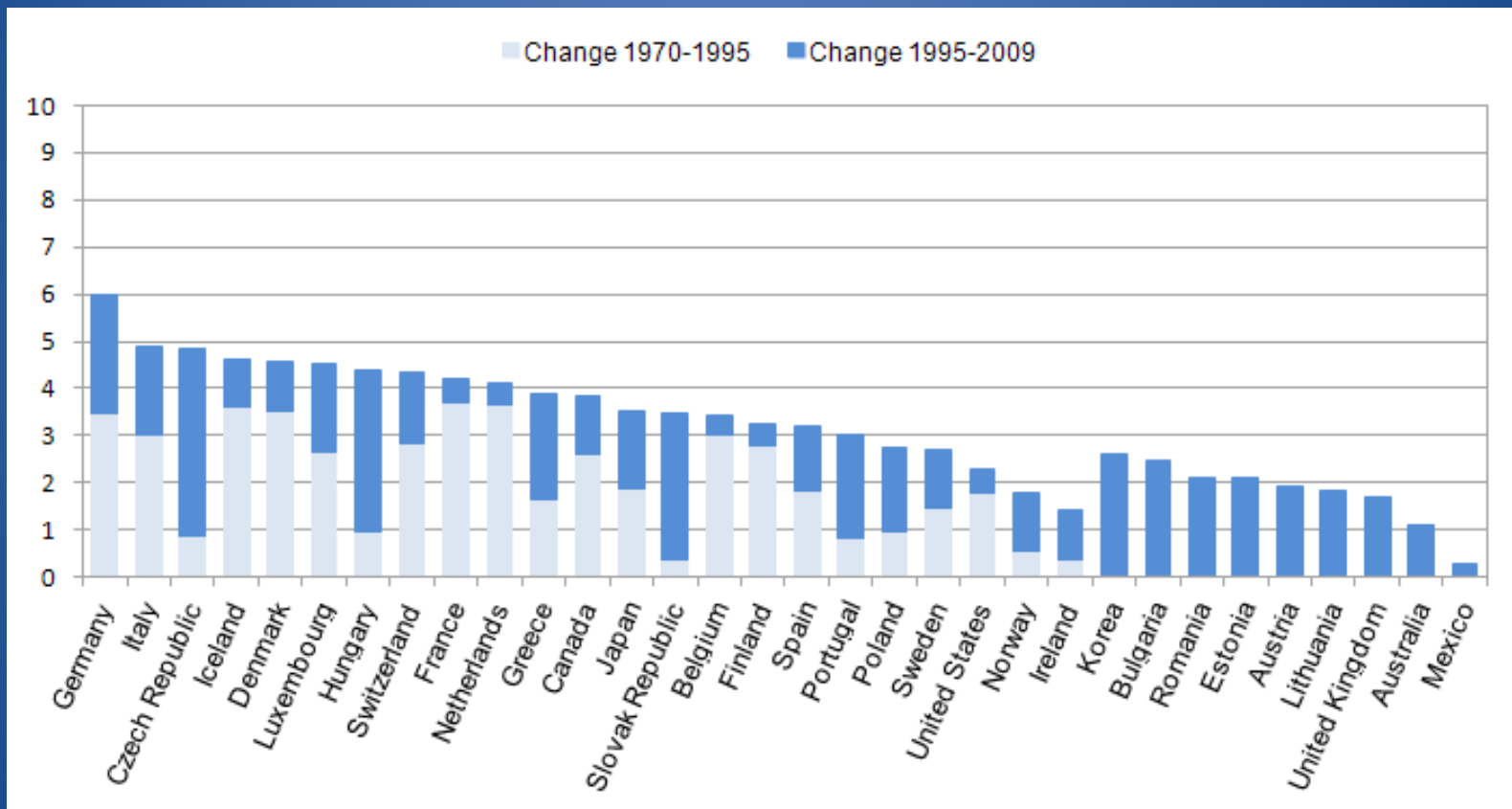
THE LATEST FROM THE MAN WHO SINGS
THE WAYS OF SEASONS, STORIES
WITHOUT PARADES, WITH GOD ON OUR SIDE
THE TIMES THEY ARE A-CHANGIN'
WELL, A FEW OF THEM ARE
WHEN THE SUN COMES IN, THE SUN-WEST WINDS
BLow OF WILD SWING, NORTH-COUNTRY BLUE



The postponement of the first birth in 2009, since 1970

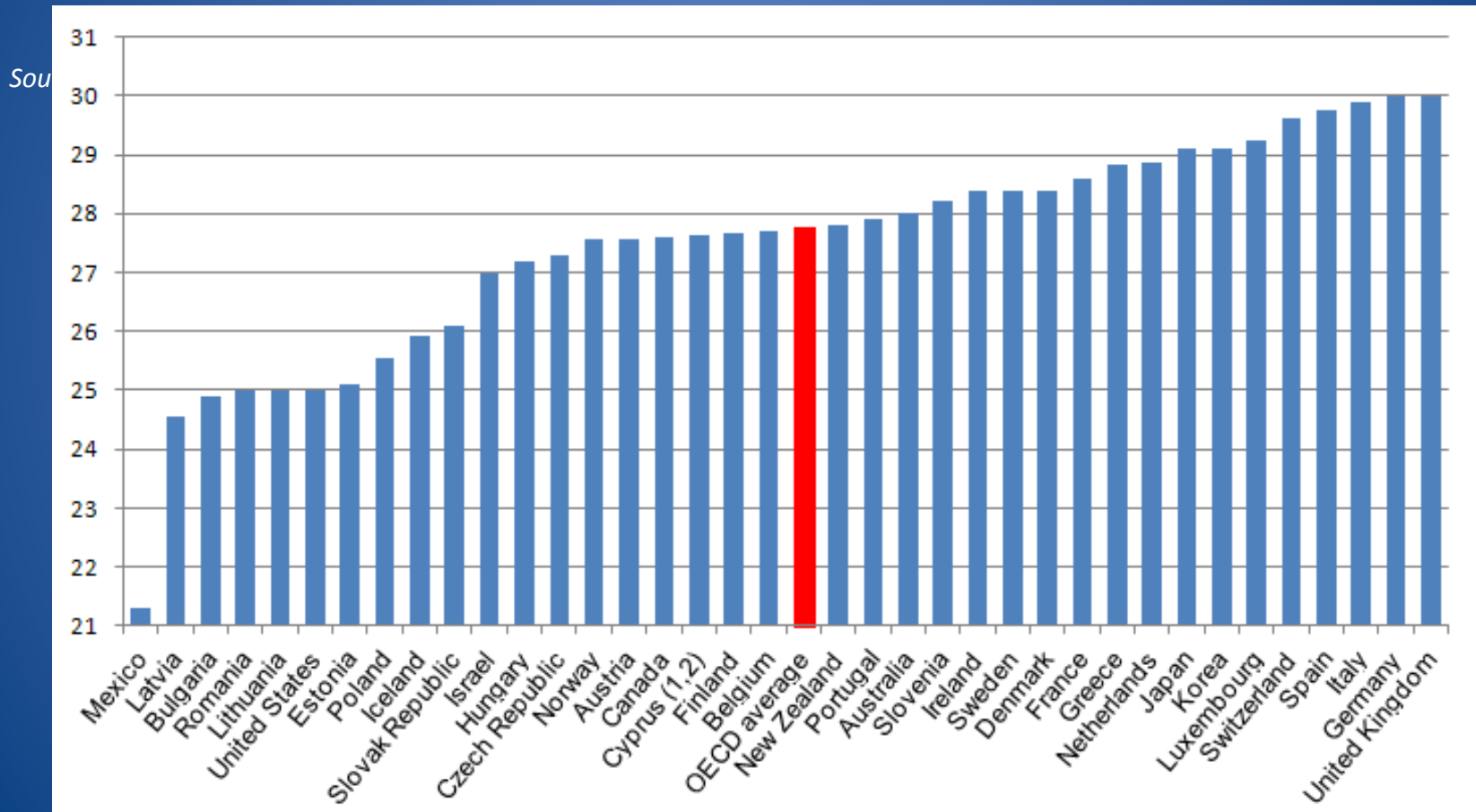
Change in the mean age of women at the birth of the first child

Sources: Eurostat, 2012, United Nations Statistical Division, 2011, and National Statistical Offices, 2011



Mean age of women at the birth of the first child, 2009

Sources: Eurostat, 2012, and United Nations Statistical Division, 2011, and National Statistical Offices, 2011.



Fertility Preservation Group

formed by Fertility Society of Australia (2006)

- Telephone survey of 2,400 randomly selected men and women

	1976	2006
First child < 30 %	92	27

Figure 4.2. Mean age of mother at birth of first child in the Czech Republic, Italy, the Netherlands, and in Sweden, 1960-2002

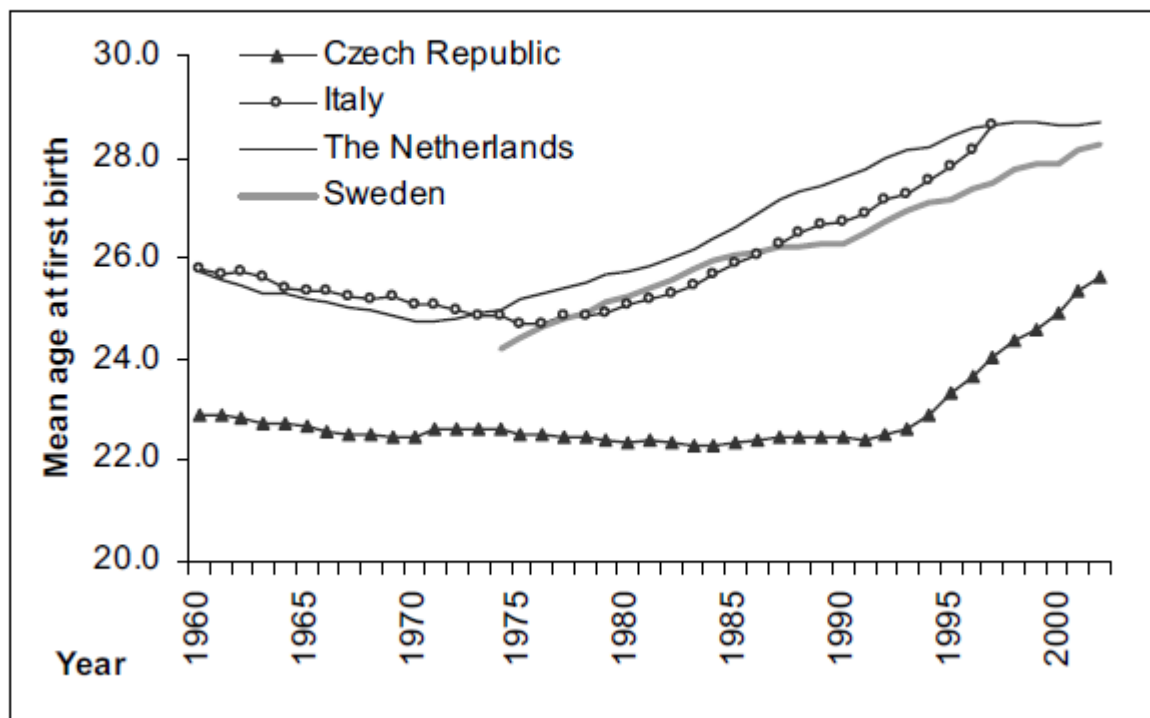
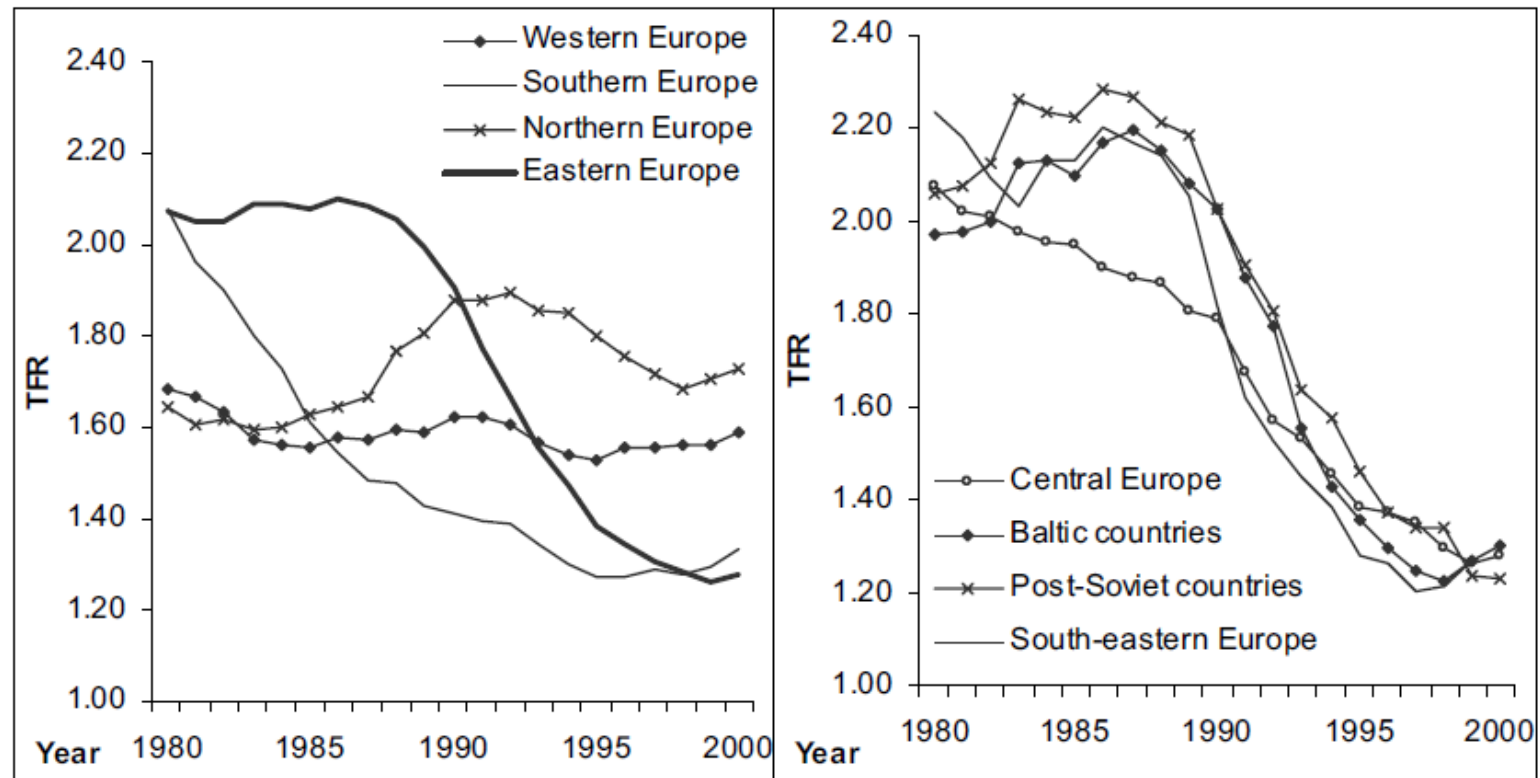
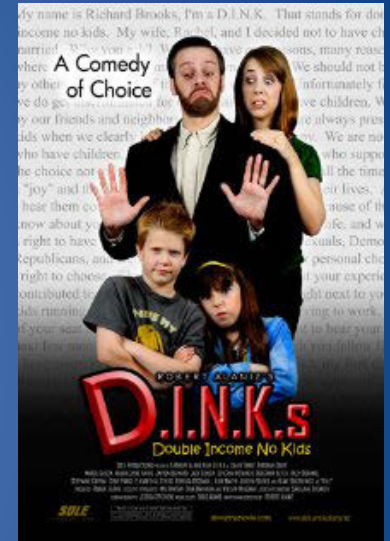


Figure 7.1. Total fertility rate in European and eastern European regions, 1980-2000



SOURCE: Council of Europe (2001, 2002)

DINKS
Double income, no kids



SSS
Single, sexy, successful



Reasons for deferring pregnancies

- finishing education
- establishing oneself on the labour market
- having a stable relationship
- accumulating enough resources
- widespread adoption of the contraceptive pill („reproductive freedom“)
- partnerships have become more fragile, making the decision to have a child more difficult.



ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS

ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS



MGM

ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS

ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS



MGM

ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS

ACADEMY
of COUNTRY MUSIC
awards

MGM GRAND
LAS VEGAS



MGM

Age shock: misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40

K. Mac Dougall¹, Y. Beyene¹, and R.D. Nachtigall^{1,2,*}

¹Institute for Health & Aging, University of California, San Francisco, 3333 California Street, Suite 340, San Francisco, CA 94118, USA

²Department of Obstetrics, Gynecology and Reproductive Sciences, University of California, San Francisco, CA, USA

*Correspondence address. Tel: +1-415-661-3913; E-mail: robert.nachtigall@ucsf.edu

Table II Awareness of age and infertility (n = 61).

	# (%)
Thought fertility declines after age 40	29 (48)
Expected decline to be gradual until menopause	18 (30)
Expected it to be easy to get pregnant at age 40	19 (31)

Table III Presumptions of fertility (n = 61).

	# (%)
Lifetime emphasis on pregnancy prevention	14 (23)
Expected that health, fitness or family history was indicator of personal fertility	16 (26)
Messaging from media/community mislead them about age and fertility	17 (28)

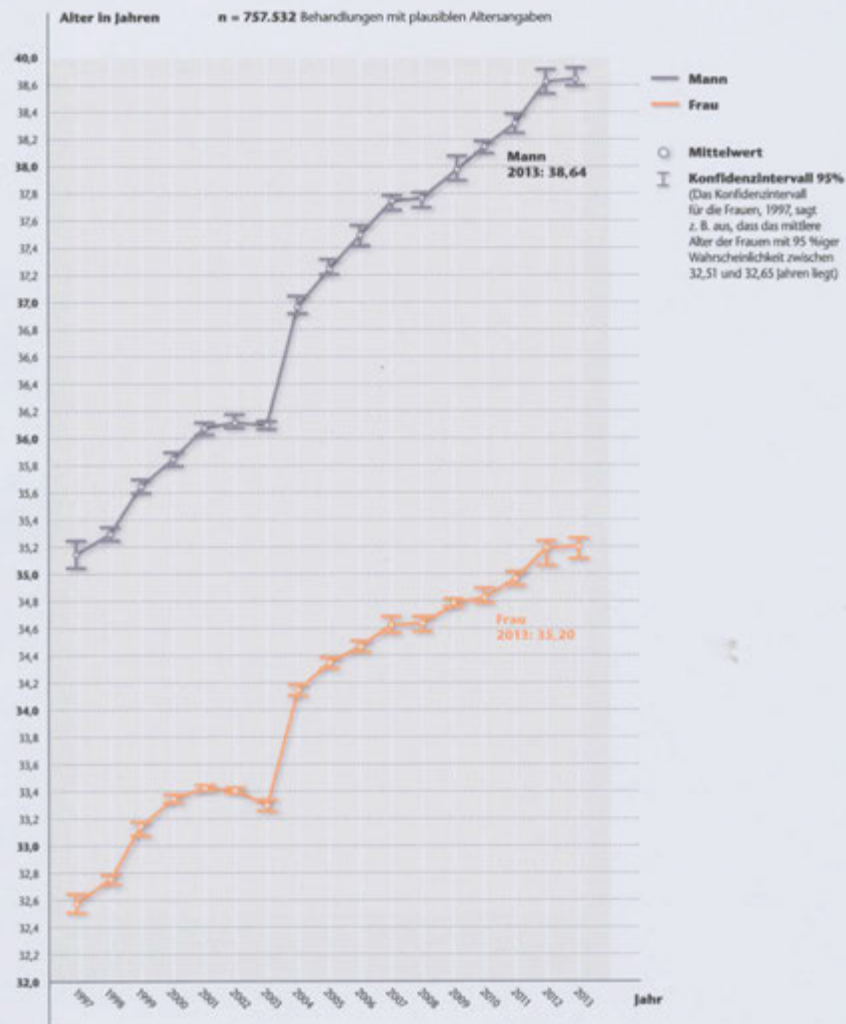
Table IV Feelings about fertility information following IVF ($n = 61$)^a.

	# (%)
Need better fertility education for younger women and men	17 (28)
Would have tried to conceive earlier with better information	14 (23)
Personal circumstances did not permit earlier childbearing regardless of fertility awareness	28 (46)

^aPercentages do not total 100% as not all participants cited each theme, while others mentioned multiple themes.

Mittleres Alter der Frauen und Männer 1997 – 2013*

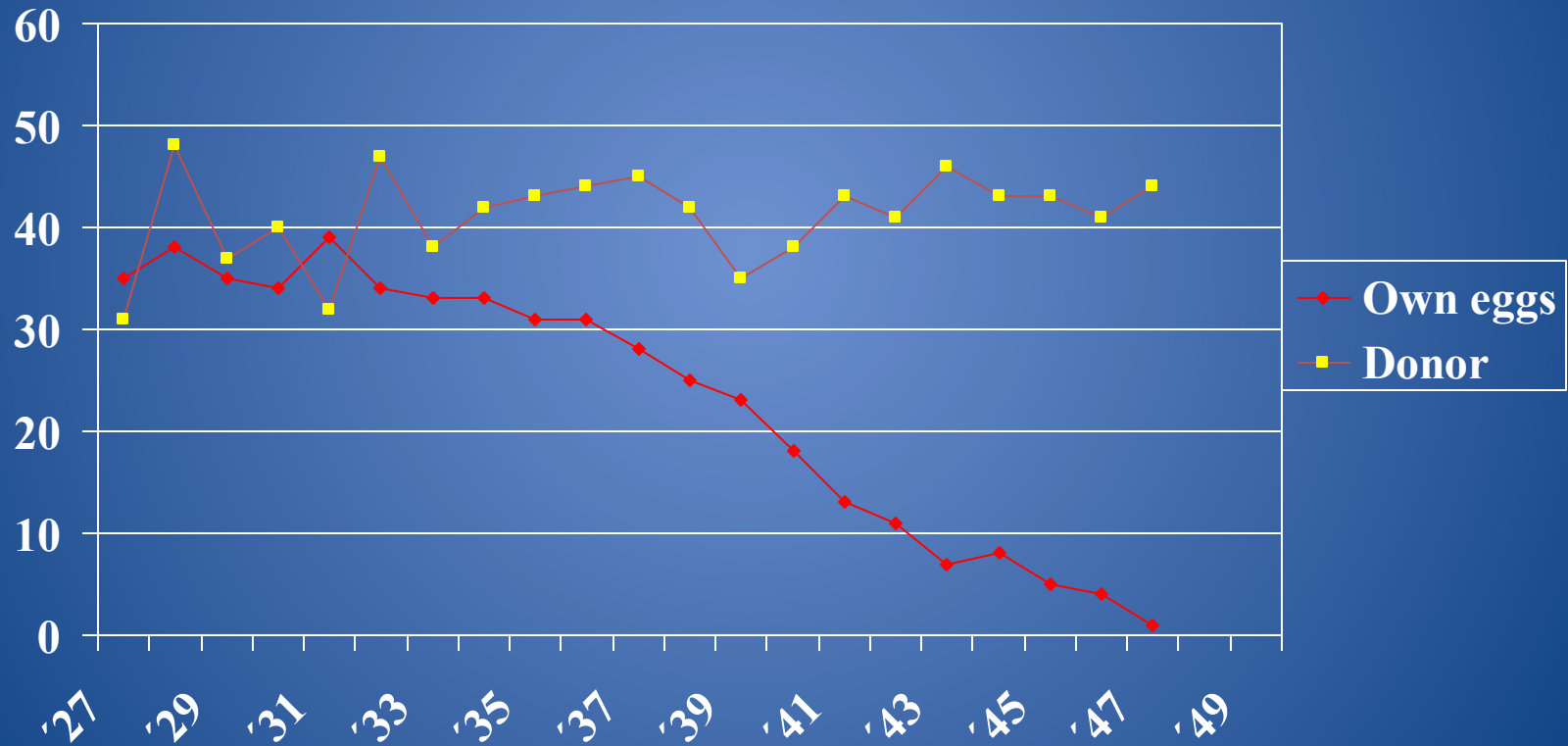
IVF, ICSI, IVF/ICSI – prospektive und retrospektive Daten

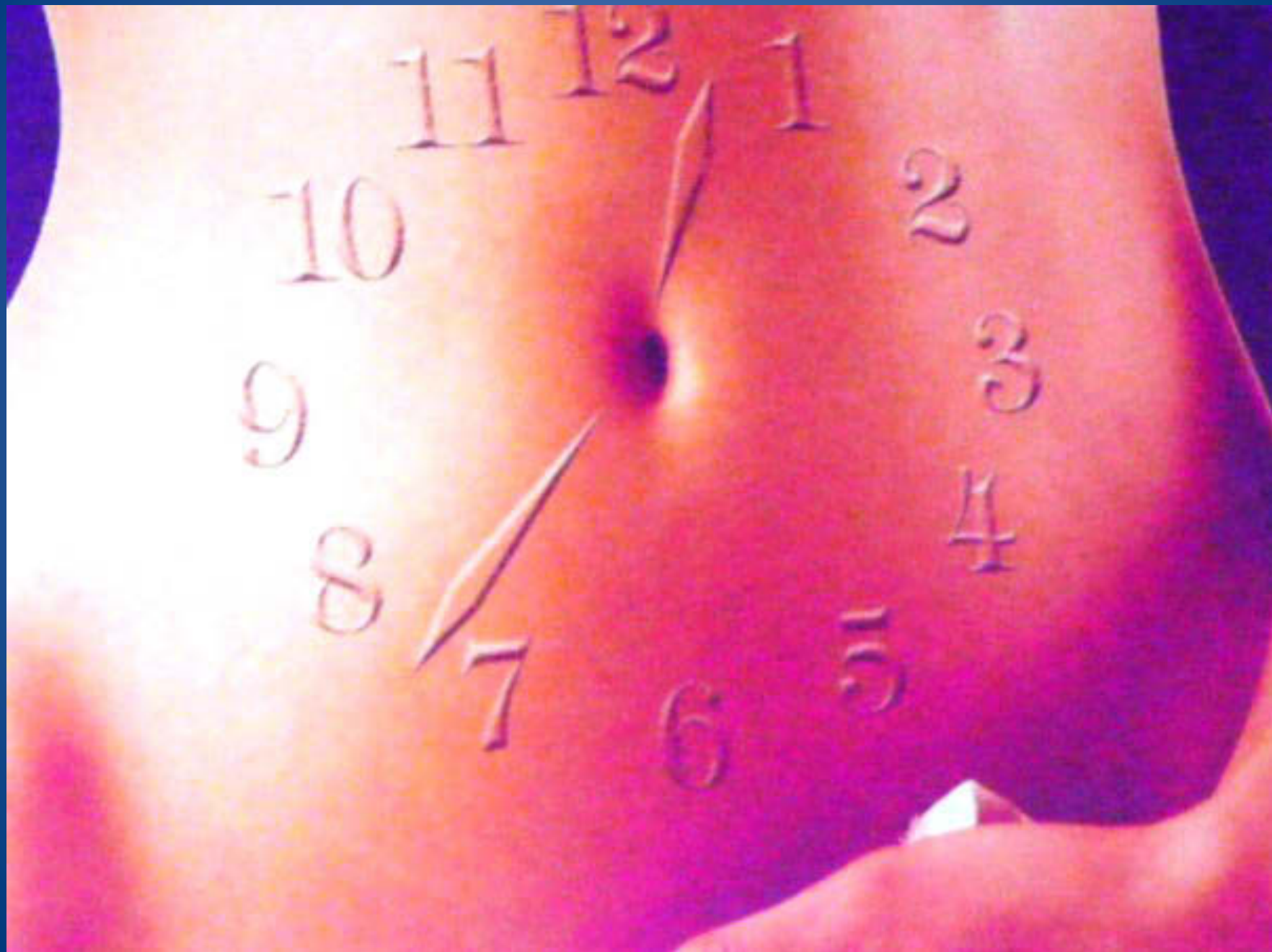


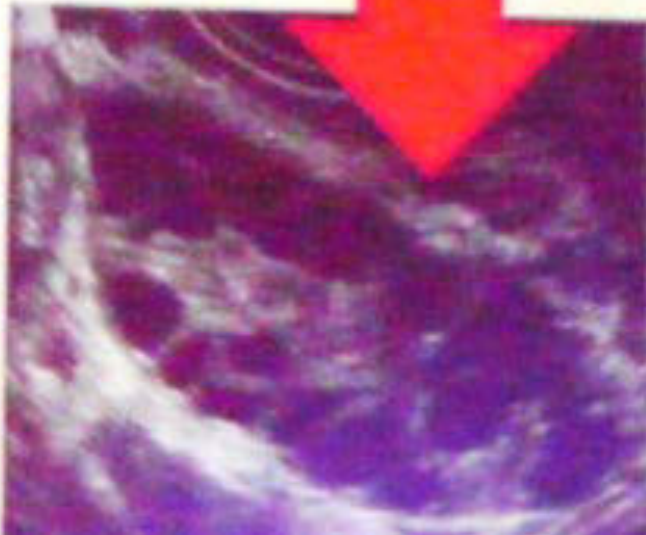
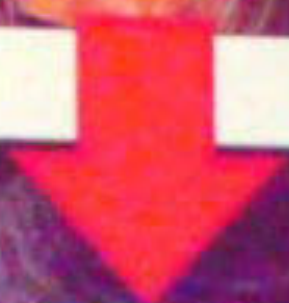
*) Ab 2012 basierend auf den Registerteilnehmern 2012 II.

Live births per transfer for fresh embryos from own and donor eggs

ART succes rates. US departement of Health and Human services,CDC.







Behandlungsergebnisse in Abhängigkeit vom Alter der Frau 2013



Prospektive Daten

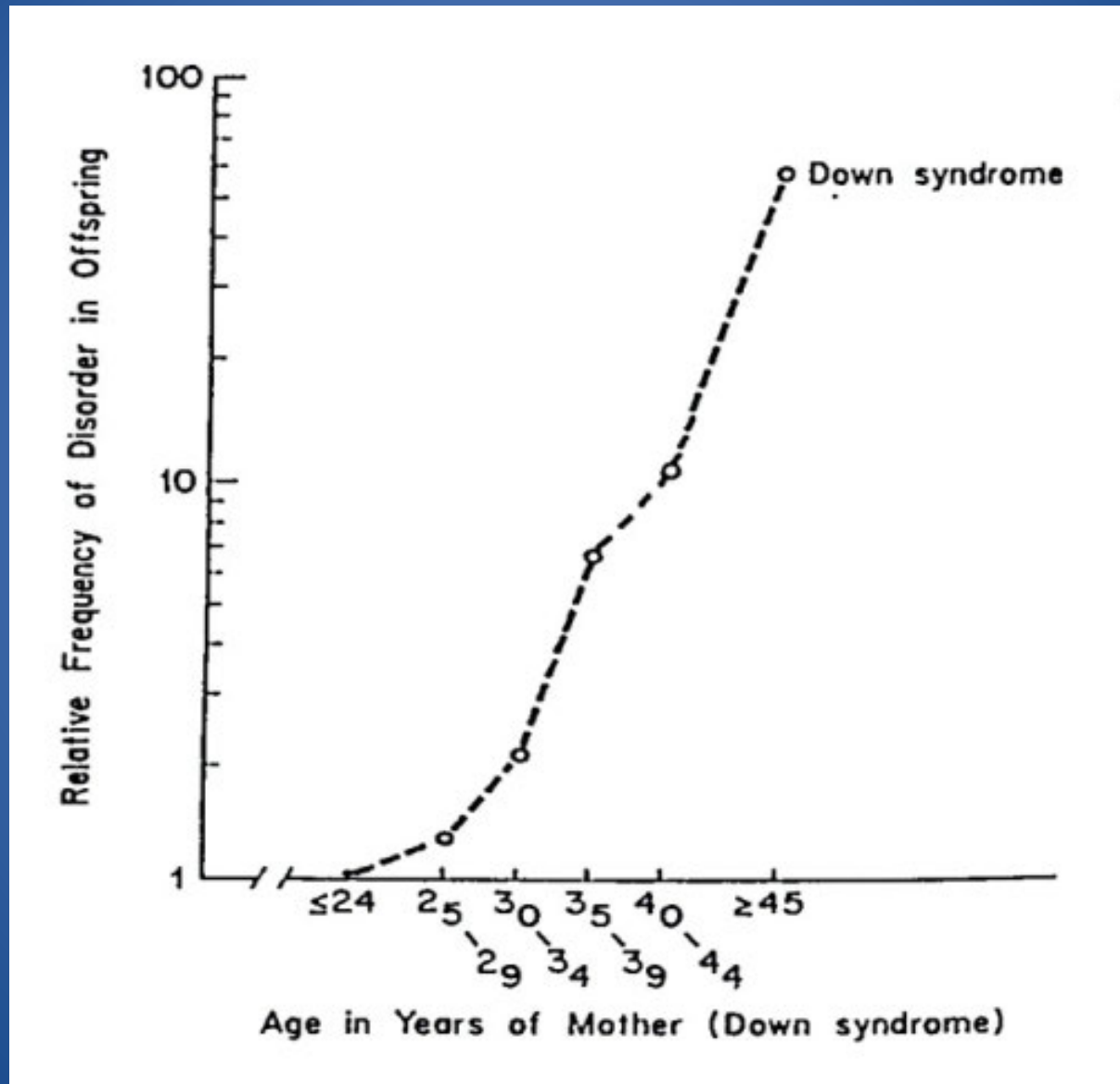
IVF 2013



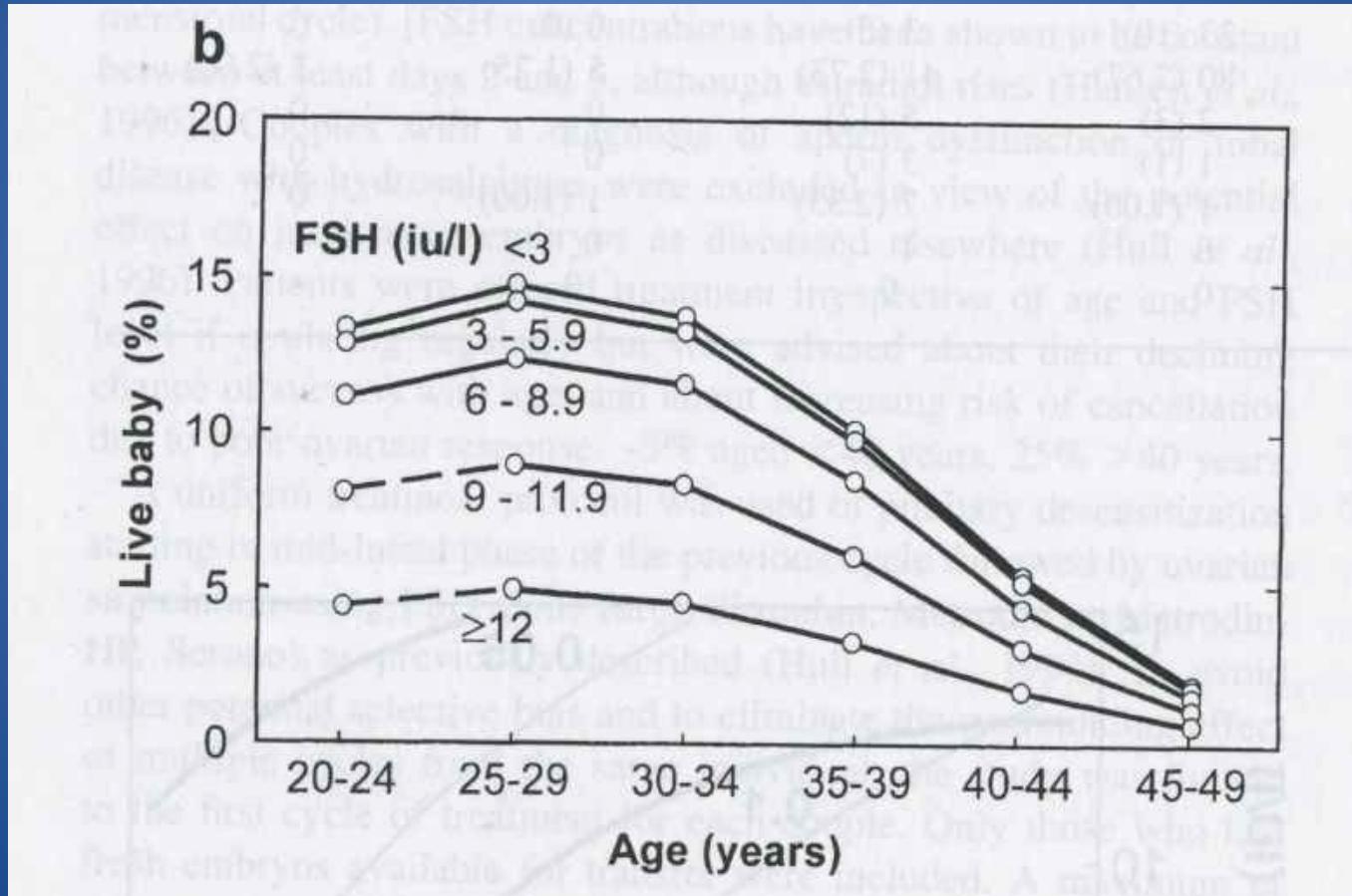
Alter in Jahren	Punktion	Gew. Eizellen ¹⁾	Insemin. ¹⁾	Transf.	Trans./Pkt. %	Trans. Embr. ¹⁾	Klin. SS	Klin. SS/Pkt. %	Klin. SS/ET %	Klin. SS/ET bei 2 transf. Embr. u. mind. 2 Z-PN im Überschuss
<= 29	1.092	11,94	11,70	952	87,18	1,86	400	36,63	42,02	44,35
30 - 34	2.932	10,52	10,35	2.593	88,44	1,88	1.054	35,95	40,65	43,10
35 - 39	3.856	8,49	8,34	3.432	89,00	1,90	1.118	28,99	32,58	35,61
40	853	7,01	6,85	735	86,17	1,99	192	22,51	26,32	29,31
41	472	6,28	6,14	389	82,42	1,93	85	18,01	21,83	25,70
42	295	6,01	5,92	265	89,83	1,94	49	16,61	18,49	22,99
43	242	5,83	5,74	199	82,23	2,06	27	11,16	13,57	16,46
44	184	5,11	5,00	149	80,98	1,91	13	7,07	8,72	12,24
45	80	6,63	6,43	73	91,25	2,00	8	10,00	10,96	12,73
>=46	47	3,74	3,60	37	78,72	1,73	4	8,51	10,81	20,00
Gesamt	10.053	8,99	8,83	8.824	87,77	1,90	2.950	29,34	33,43	36,72

1) Mittelwert

Mother's age and the risk of Down's syndrome



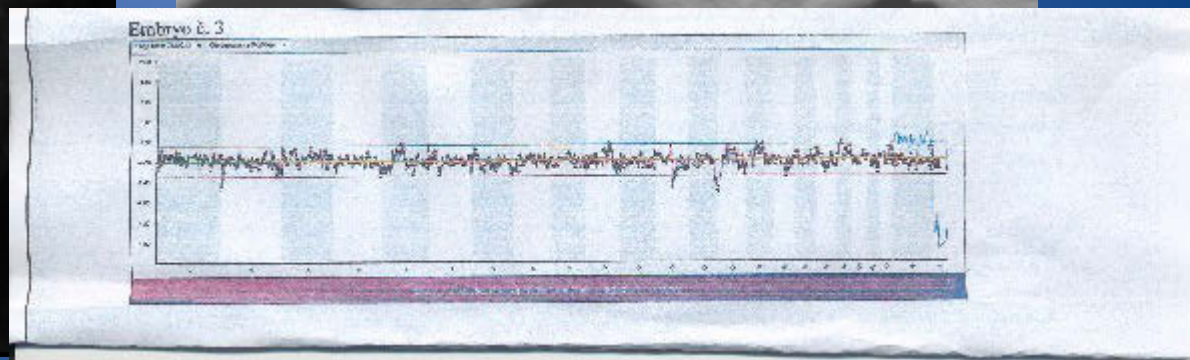
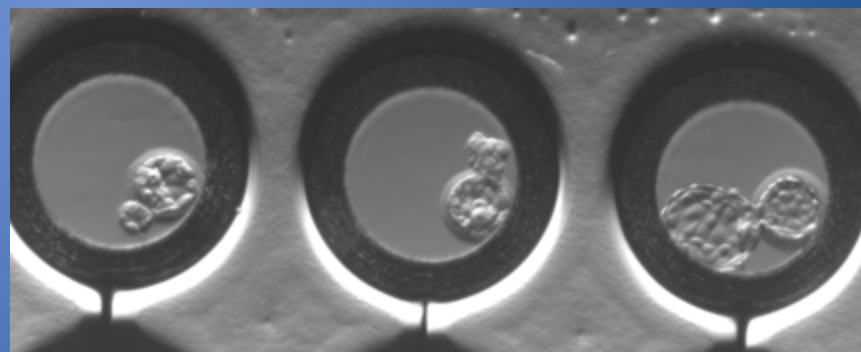
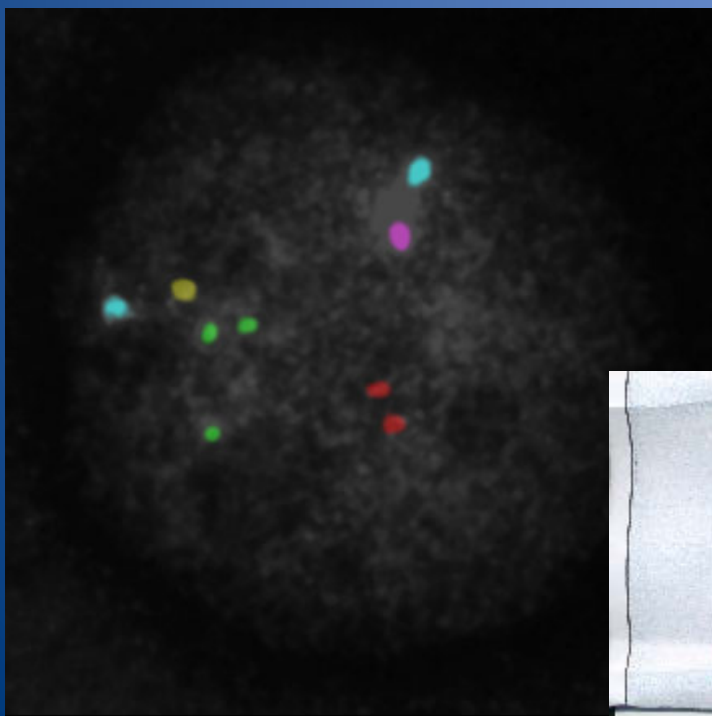
Probability of a birth according to the age and FSH levels

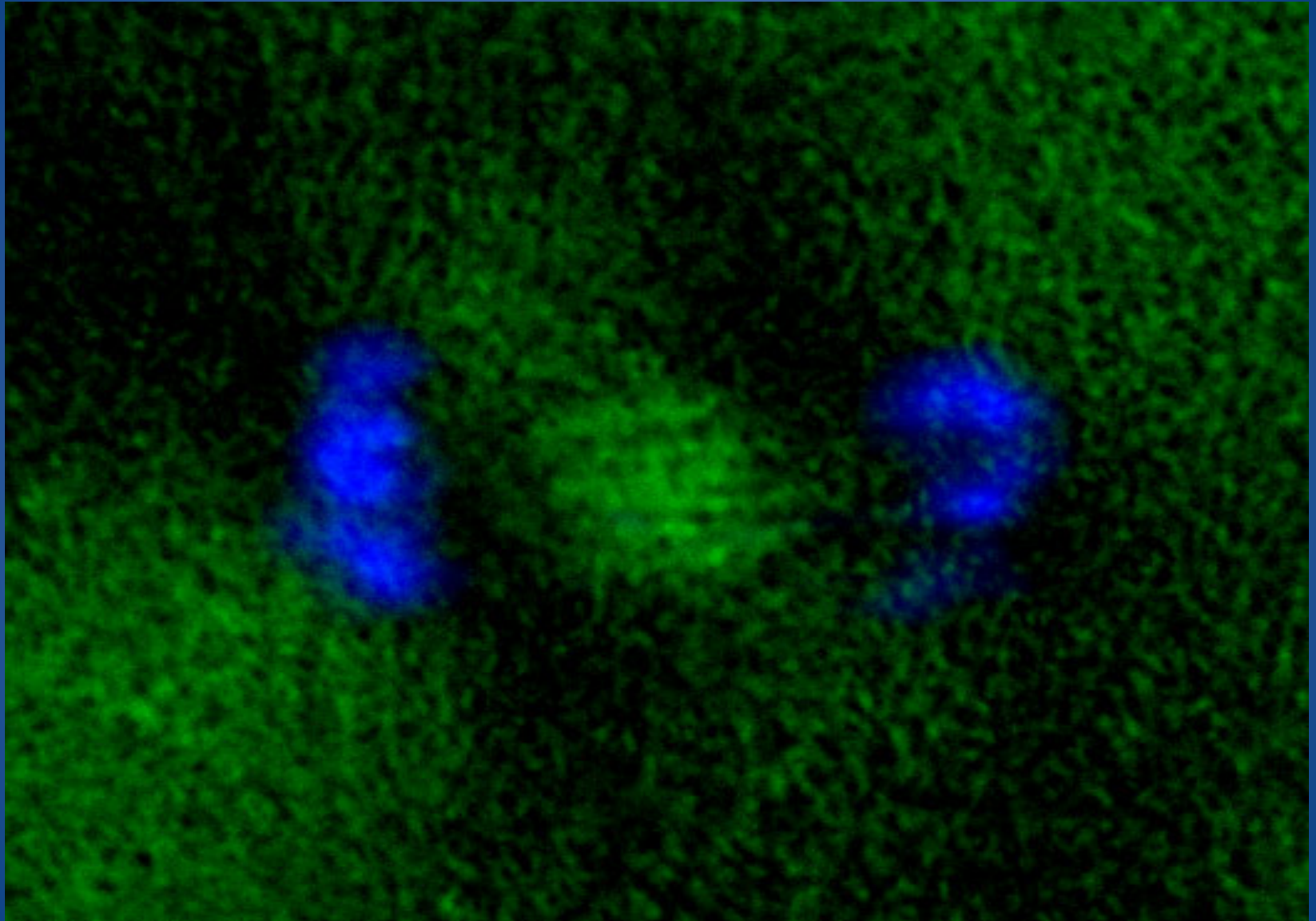


ESHRE PGD Consortium data collection XI: cycles from January to December 2008 with pregnancy follow-up to October 2009

V. Goossens, J. Traeger-Synodinos, E. Coonen, M. De Rycke
C. Moutou, T. Pehlivan, I.A.P. Derks-Smeets, and G. Harton,*

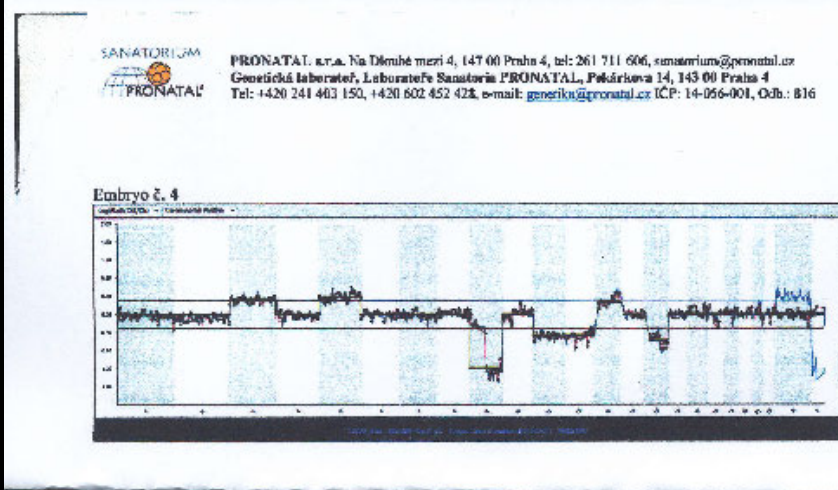
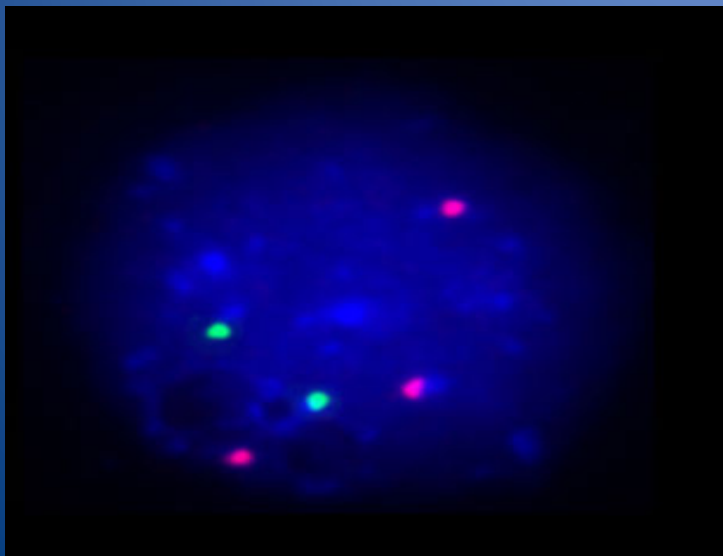
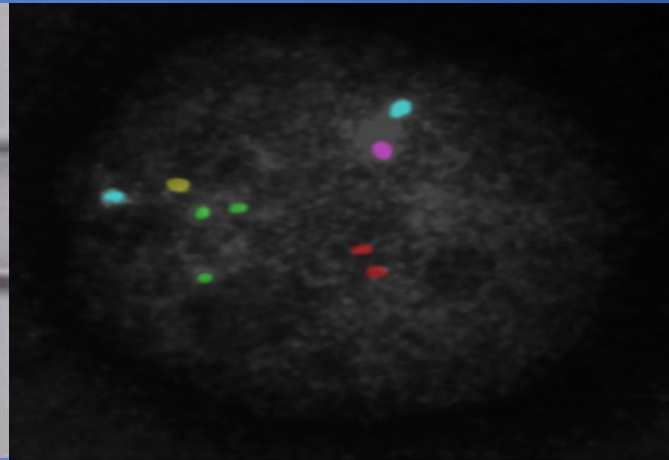
Cycles with AMA	Diagnosed embryos	Transferable embryos (%)
9.056	39.345	11.647 (29.7)

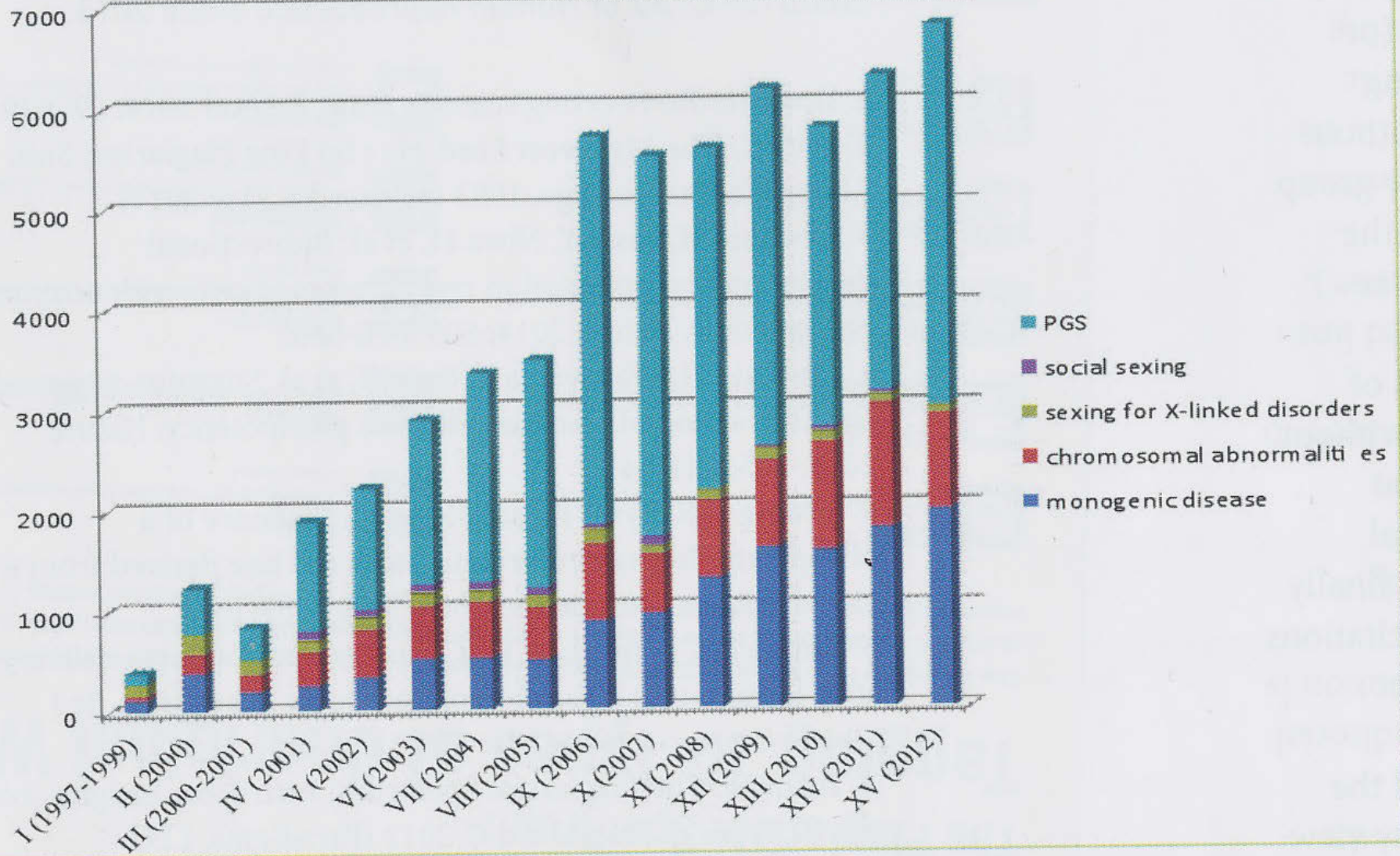




Oosight®/Hoechst

Should Genetic Testing be Applied Universally in IVF?





Evolution of PGD cycles reported to the Consortium from 1997-99.

Ploidy of embryos vers. time-lapse (Sanatorium Pronatal 2013)

	euploid	1 mono/ trisomy	Multiple aneuploidies
Optimal development 82 embryos	42,7%	31,7%	25,6%
Regular but slower development 42 embryí	37,2%	16,3%	46,5%
Abnormal cleavage 98 embryí	18,3%	6,1%	75,5%

Reproductive potential of a couple

- Is determined by the reproductive potential of each partner

'It takes two
to tango'

Fertility is a
couple issue not
a woman's issue

Socially - Medically
- Personally



Age-related risks (male)

Gene mutations

- Most mutations seem to occur during DNA replication and cell division (defect is diagnosed in next generation as a „single gene defect“)
- Higher father's age is a significant risk for many autosomal dominant diseases not previously present in the family

Age related dominant and recessive syndromes (single gene defects) in men

If father's age >40 let than the incidence 0.3-0.5%
(comparable to the risk of trisomy 21 in women aged 35-40)
(Friedman)

Friedman et al.: age and de-novo autosomal dominant mutations

age<29 : 0.22/1000
<34: 1.1 / 1000
<39: 1.3 / 1000
<44: 4.5 / 1000
>45: 3.7 / 1000

Cross border reproductive care in six European countries

**F. Shenfield^{1,*}, J. de Mouzon², G. Pennings³, A.P. Ferraretti⁴,
A. Nyboe Andersen⁵, G. de Wert⁶, and V. Goossens⁷ the ESHRE
Taskforce on Cross Border Reproductive Care[†]**

¹Reproductive Medicine Unit, New EGA, UCLH, Euston Road, London NW1 2BU, UK ²INSERM, Unité de Médecine de la Reproduction, Groupe Hospitalier Cochin-Saint Vincent de Paul, 82 avenue Denfert Rochereau, 75014 Paris, France ³Bioethics Institute Ghent, Ghent University, Blandijnberg 2, B-9000 Ghent, Belgium ⁴SISMER S.r.l, Via Mazzini, 12, 40138 Bologna, Italy ⁵The Fertility Clinic 4071, Rigshospitalet, Copenhagen University Hospital, Blegdamsvej 9, 2100 Copenhagen, Denmark ⁶Institute for Bioethics, University of Maastricht, Postbus 616, 6200 MD Maastricht, The Netherlands ⁷ESHRE Central Office, Meerstraat 60, B-1852 Grimbergen, Belgium

*Correspondence address. E-mail: mfi@easynet.co.uk

Submitted on December 4, 2009; resubmitted on February 1, 2010; accepted on February 10, 2010

I tyhle porodily pozdě



Cross border reproductive care in six European countries

Shenfield, F. et al.: Hum Reprod. 2010, 25, 1361-1368.

- „the annual number of cycles reaches a minimum of 24.000-30.000 cycles“
- „the main reasons for travelling were legal restrictions based on prohibition of technique“
- broad social, ethical and political problems

Social freezing- solution for the future?



- 50% live birth rate in women < 35
- Ovaries from women waiting for „Mr. Right“ need 450 IU recFSH daily to produce 2 oocytes.....



April 17th, 2014

**Bloomberg
Businessweek**



**FREEZE
YOUR EGGS,
FREE YOUR
CAREER**

10% increase in
career earnings
per year that
maternity is postponed

*A new study shows women who
freeze their eggs before having a child*

Let's stop rushing to find husbands
and start rushing to freeze our eggs.



omee cards

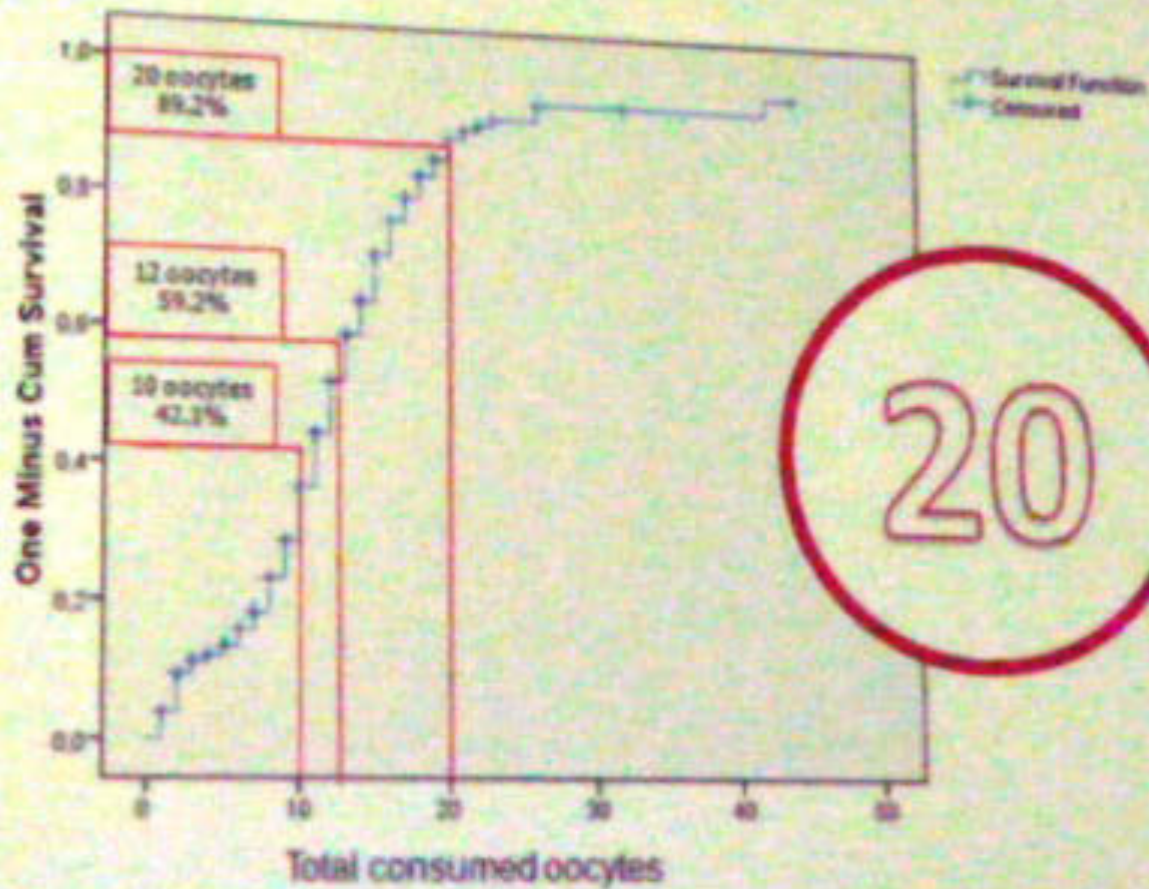
ASRM Practice Committee 2012

Cobo et al., Hum Reprod. 2010

- Survival after thawing 90-97%
- Fertilization 71-79%
- Implantation 17-41%
- Pregnancy 36-61%

• pregnancy / thawed oocyte 4,5 – 12%

NNF – number needed to freeze?



Social freezing

Should be performed ideally around 25 years of age (in reality after the age of 35)

- Oocyte donation, ineffective fertility treatments, chromosomal abnormalities could be avoided
- Is not a solution for underlying societal problems, it only delays the existing problems
- Ethical issues (reproductive autonomy vers. well-being of the child)
- Financial issues (expensive procedure)
- No gurarantee of final success
- Creates a lot of potentially new problems

Individual and social implications of late parenthood

- lower fecundity
- longer waiting time to conception
- higher frequency of miscarriages and stillbirths
- more pregnancy complications and foetus abnormalities
- higher number of multiple pregnancies and premature births
- increased need for intensive health care during pregnancy
- a booming demand for costly reproductive technologies
- potentially worsening indicators related to infant health and mortality
- changing character of intergenerational support and redefinition of family obligations.

Implications for ART

- Increasing number of subfertile couples
- Increasing age of women (and men)
- Increasing demand for complicated and expensive strategies to counteract the consequences of high reproductive age
- Increased medical risks of delayed childbearing
- Increasing demand for egg donation
- Social freezing ?

Summary

- The norms related to childbearing have changed considerably
- Postponing pregnancies has important consequences for fertility trends and demographic change in general, which in turn have many societal implications

Summary

- This shift towards the late transition to parenthood will be a great challenge for reproductive medicine
- To avoid all these risks couples should be encouraged not to delay pregnancy past the age of 35



Thank you