



# Assisted Reproductive Technologies

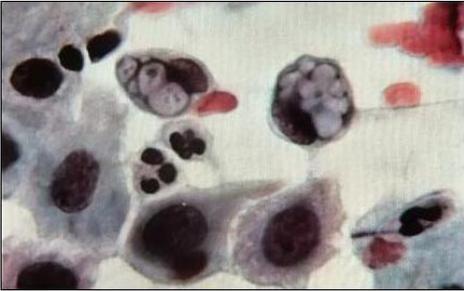
**Professor Andrew Shelling**  
**Associate Dean (Research)**



**THE UNIVERSITY  
OF AUCKLAND**

**NEW ZEALAND**

Te Whare Wānanga o Tāmaki Makaurau



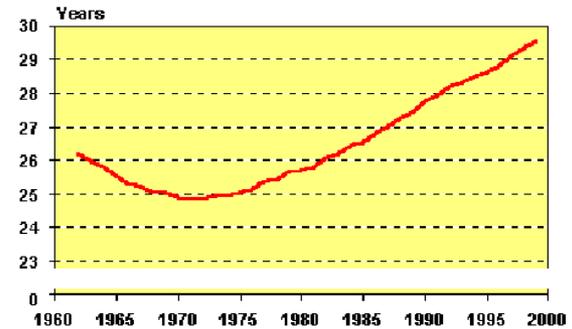
Sexually transmitted infections



Obesity



Cigarette smoking



Age at childbearing

Infertility is becoming more common now affecting 1 in 7 couples



### Assisted Reproductive Techniques (ART)

1-4 % of babies born by ART in most Western countries. In parts of Scandinavia, the rates are even higher.

# Louise Brown born 1978

4 October 2010 Last updated at 13:15 GMT

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## The birth of IVF

**By Michelle Roberts**

Health reporter, BBC News

**It was in the late 1950s that British scientists Robert Edwards first came to realise the potential of IVF (In Vitro Fertilisation) as a treatment for infertility.**

The keen biologist knew from the work of others that it was possible to take an egg from an animal, like a mouse or a rabbit, and fertilise it with sperm in a test tube.

Armed with this knowledge, Edwards made it his mission to find out if the same could be done using human eggs.

Some 30 years later, his dream was realised with the birth of the world's first human test-tube baby in 1978.



Nearly four million babies have been born using IVF

### Related Stories

[Nobel win for British IVF pioneer](#)

# ART: more common

2 July 2012 Last updated at 01:22 GMT

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## Five millionth 'test tube baby'

By James Gallagher

Health and science reporter, BBC News, Istanbul

**Five million "test tube babies" have now been born around the world, according to research presented at a conference of fertility experts.**

Delegates hailed it as a "remarkable milestone" for fertility treatments.

The first test tube baby, Louise Brown, was born in the UK in July 1978. Her mother Leslie Brown died last month.



Louise Brown, pictured with her son, was the world's first test tube baby

# ART: changing peoples lives

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## Meet NZ's miracle baby

By DEIDRE MUSSEN - Sunday Star Times

Last updated 05:00 28/06/2009

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MICHAEL BRADLEY/Sunday  
Star-Times

LITTLE WONDER: This gorgeous little girl is 12 weeks old. But she is no ordinary baby - she spent the last 16 years as a frozen embryo, suspended in a vat of liquid nitrogen with 11 other potential siblings at an Auckland fertility clinic.

# ART: more complex

12 June 2012 Last updated at 02:24 GMT



## Three-person IVF 'is ethical' to treat mitochondrial disease

By James Gallagher

Health and science reporter, BBC News



**A controversial fertility treatment which creates embryos from two women and one man to prevent life-threatening disorders is ethical, a report says.**

Children born through "three-person IVF" would contain some genetic material from three people.

### Related Stories

[New fertility method to be probed](#)

['Three-person IVF' means closer](#)

# ART: becoming international

## Kiwis head overseas for fertility treatment

Overseas fertility help works after 15 IVF cycles

KIRSTY JOHNSTON



Last updated 05:00 10/06/2012



5



5



3



KEVIN STENT/Fairfax NZ

**MUM'S THE WORD:** 'Angela' says she'd put her life on hold trying to have a baby using her own eggs before flying to the United States for treatment.

More and more women desperate to have babies are heading overseas to find egg donors as frustration grows at restrictive medical laws and practices in New Zealand.

In the past year about 30 couples have travelled to the San Diego Fertility Centre in the United States for egg donation, and more than 70 per cent of the women are now pregnant – almost double the success rate at home. Others have travelled to countries such as Spain and Argentina.

The women and their doctors say "fertility tourism" is the only choice for some couples, because potential New Zealand donors are not encouraged to offer their eggs.

One sticking point is a ban on payments to donors but reports, by advisory committees on egg donors, to Health Minister Tony Ryall are yet to consider payment.

Donors are advised by fertility clinics to wait until they have had their own families before they donate, even though using eggs from older women dramatically lowers the chances of the recipient falling pregnant. The law states donors have to be at least 20.

# ART: getting much more complicated



## ART: getting uncomfortable

Oldest mother, Maria del Carmen Bousada de Lara, 67.

In 2007, the Spanish women gave birth to twins following IVF treatment in the US, after convincing the clinic that she was 55.

Dies at age 69



# ART: getting very uncomfortable

## CURRENT CONTROVERSY

283

### Lesbian couple create a child who is deaf like them

**M Spriggs**

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A deaf lesbian couple who chose to have a deaf child receive a lot of criticism

**A** deaf lesbian couple in the US deliberately tried to create a deaf child. Sharon Duchesneau and Candy McCullough hoped their child, conceived with the help of a sperm donor, would be deaf like the rest of the family. Their daughter, five year old Jehanne, is also deaf and was conceived

#### **Current controversy**

**A deaf lesbian couple who sought a sperm donor with a family history of deafness in order to have a child they hoped would be deaf have attracted a lot of criticism. They have been criticised for deliberately creating a deaf child, for denying their child a hearing aid, and for raising the child in a homosexual household.**

# ART: getting very uncomfortable

## Gay parents of Queensland's first surrogate baby are rapt, but birth mother has bitter regrets

Sophie Elsworth | [The Courier-Mail](#) | May 11, 2011 12:00AM

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 Two dads and a one year old

 connor harris surrogate baby



Bentley (left) and Matt Harris with their son Connor who is turning one on Wednesday. They are the first Queensland couple to have a child under surrogacy laws. Picture: Mark Cranitch. Source: The Courier-Mail

1 of 2

**AS Queensland's first child born under the state's altruistic surrogacy laws, Connor Harris's arrival was a moment of unbridled happiness for proud parents Bentley and Matt Harris.**

For his biological mother "Rosie" (not her real name), there has been nothing but heartache and regret since that historic day last May 11.

"As soon as the baby was born it all changed," the married friend of the couple said.

# ART: getting very very uncomfortable



3 October 2013 Last updated at 14:47 GMT



## 23andMe's 'build-a-baby' patent criticised

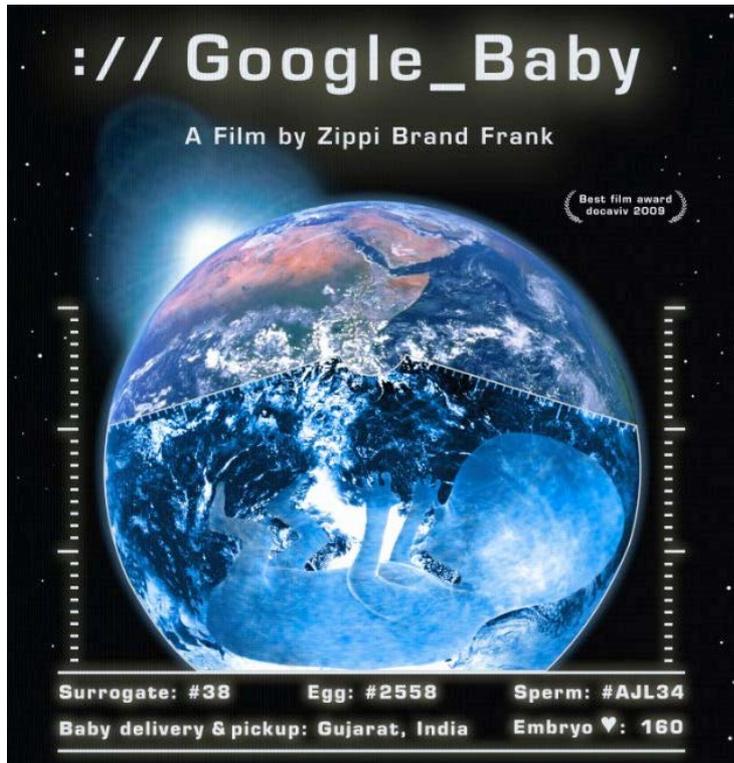


How ethical is it to build a perfect baby?

A US patent for a database that uses DNA testing to tell prospective parents which traits their future offspring may inherit has been criticised by experts.

### Related Stories

[Genomes of his cats](#)



## Google Baby

[http://www.youtube.com/watch?v=\\_Cbrmn4GTe0](http://www.youtube.com/watch?v=_Cbrmn4GTe0)

<http://www.youtube.com/watch?v=pQGIAM0iWFM&feature=related>



## Dark side of fertility tourism exposed

By Billy Adams

11:03 AM Saturday Aug 9, 2014

**Rent-a-womb trade in spotlight after convicted sex offender leaves Down baby with surrogate mum**



Pattaramon Chanbua is bringing up Gammy, who was born with Down syndrome. Photo / AP

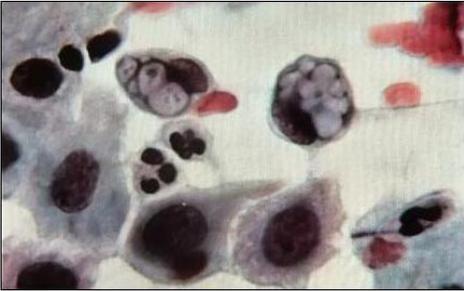
He's the convicted sex offender who met his wife through a mail-order bride agency.

She's the surrogate mum who gave birth to their twin babies and was left holding the one with Down syndrome.

This week little Gammy became the heart-wrenching symbol of a burgeoning rent-a-womb trade that cashes in on the most vulnerable.

For some desperate wannabe parents, commercial surrogacy delivers the previously inconceivable. For a poverty-stricken host, the nine-month gig can generate life-changing bounty.

# Baby Gammy



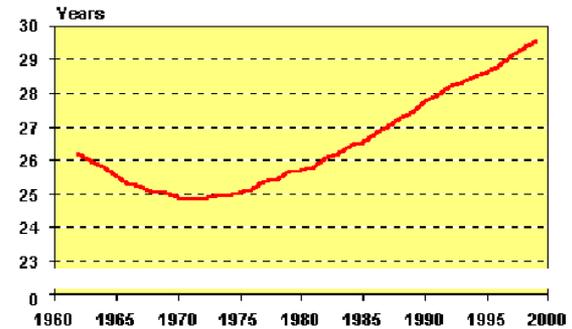
Sexually transmitted infections



Obesity



Cigarette smoking



Age at childbearing

Infertility is becoming more common now affecting 1 in 7 couples

# Clinical Priority Assessment Criteria (CPAC)

## **Eligibility For Publicly Funded Treatment**

To be eligible for a publicly funded specialist appointment, a woman must be a New Zealand resident, under 40 years of age and have at least one year of infertility.

**There are some couples who will not be eligible for publicly funded treatment.**

### **These include:**

Women aged 40 or older

Women who smoke (women need to have been non smokers for at least three months)

Women who have a BMI greater than 32

Couples who have two or more children, aged 12 or younger, living at home

# Tubal disease: Chlamydia

In ~ 50% of tubal disease, the cause is chlamydia infection

The cervix is the main site of infection

Symptoms include spotting between periods, yellowish vaginal discharge and frequent urination

The cervix, vagina, urethra and vulva can become reddened and irritated



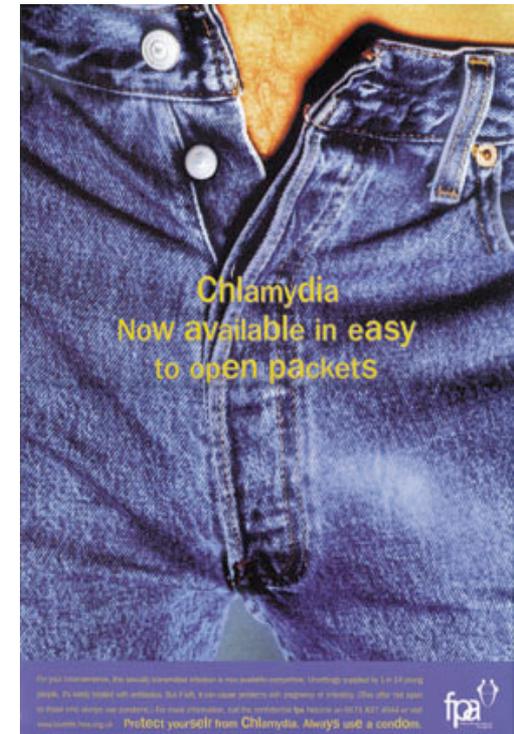
# Tubal disease: Chlamydia

75% of women have no symptoms (50% of men)

A raised chlamydia antibody titre is associated with a high likelihood of tubal damage, both partners should be treated with antibiotics

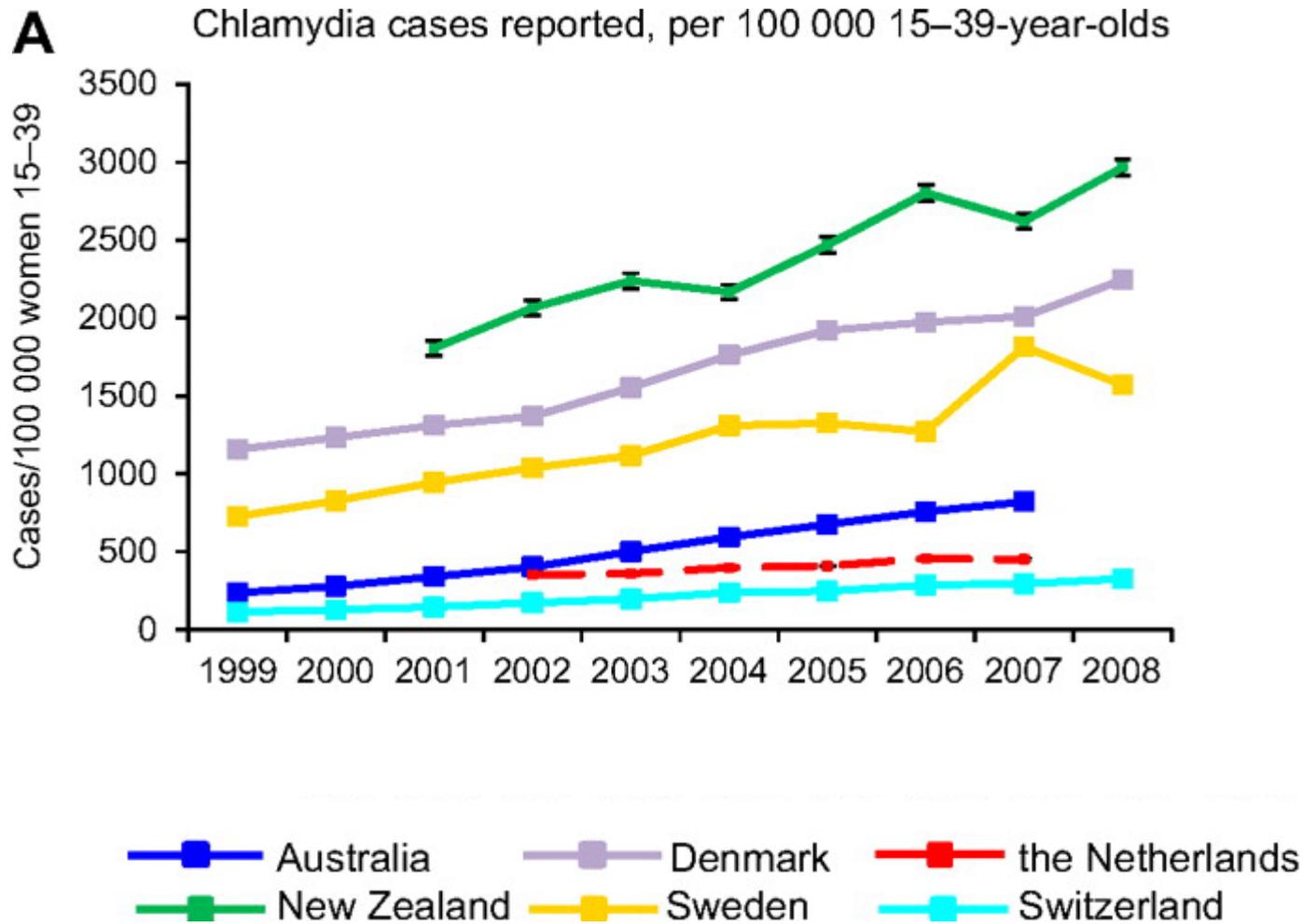
20-40% of women will have antibodies to chlamydia

One of the most preventable forms of infertility

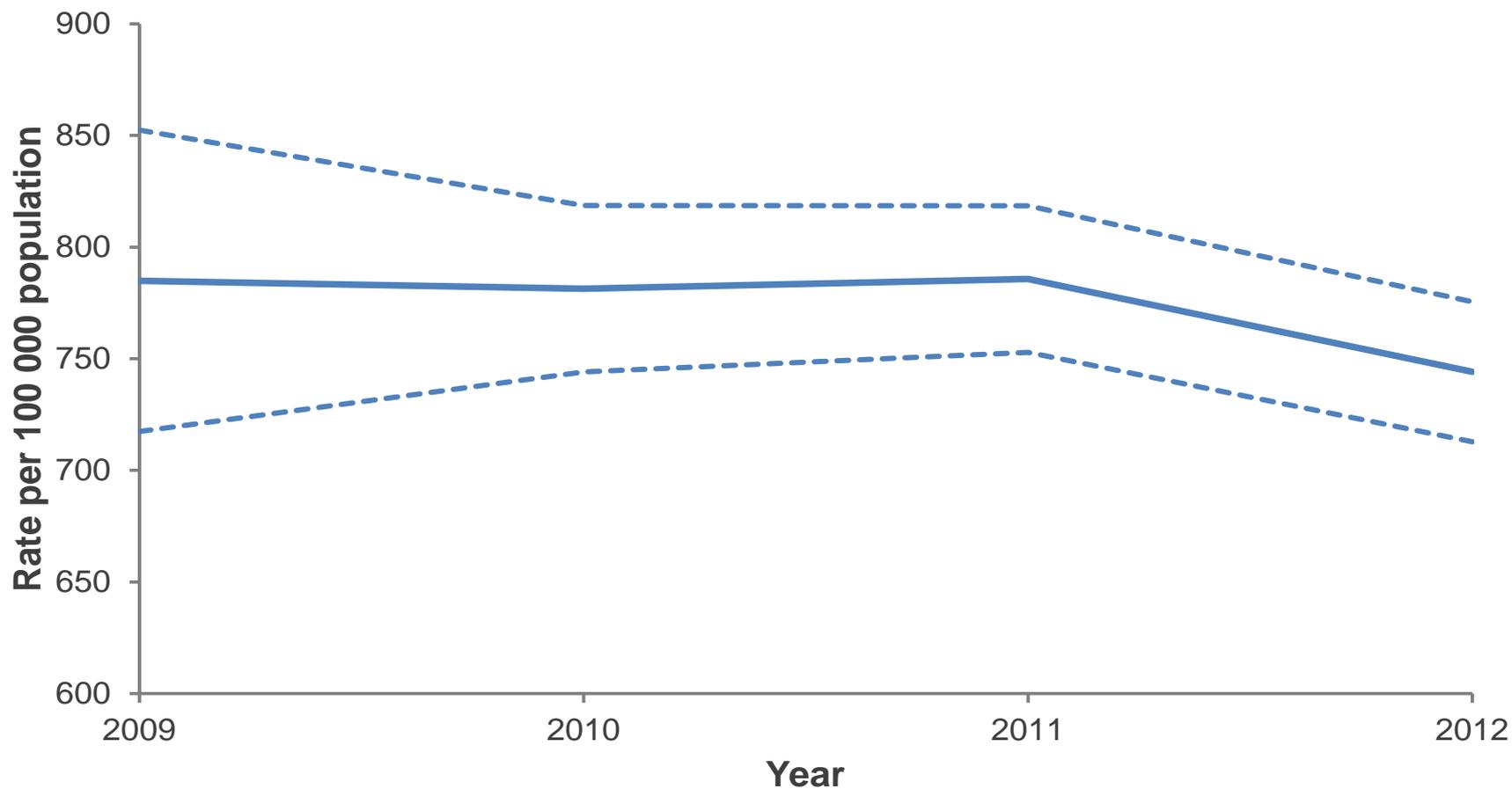


# Trends in chlamydia diagnosis rates

Bender N et al. Sex Transm Infect 2011;87:601-608



## Estimated national chlamydia rate, 2009–2012

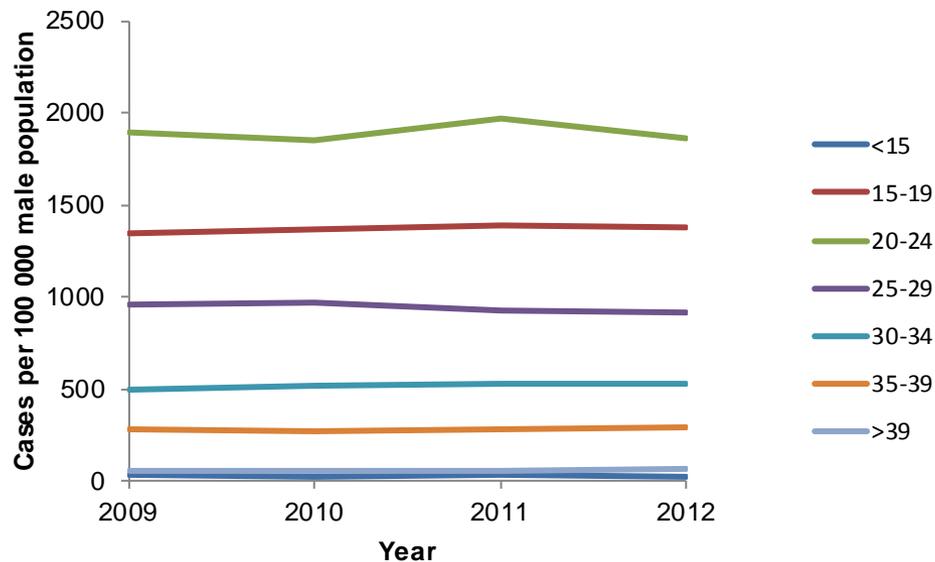
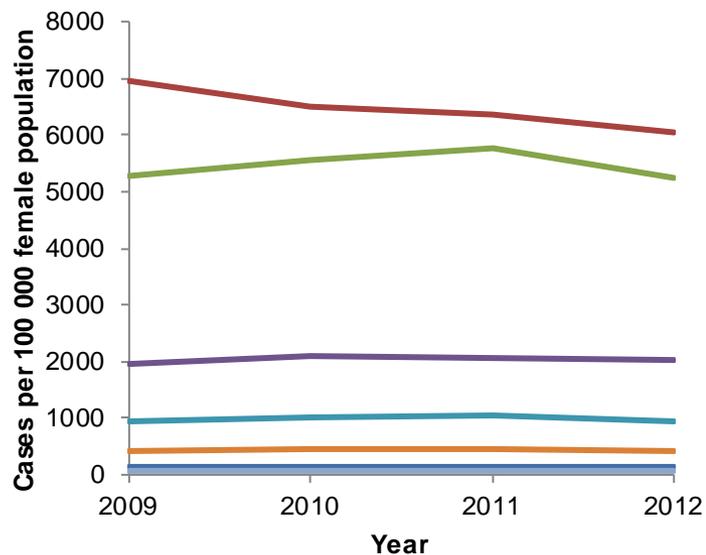


Note: Based on laboratory data from 15 District Health Boards.  
Dotted line represents the 95% confidence interval.

Source: *Sexually Transmitted Infections in New Zealand: Annual Surveillance Report 2012*, available from [www.surv.esr.cri.nz](http://www.surv.esr.cri.nz)



## Chlamydia rates per 100 000 population by age group and sex, 2009–2012

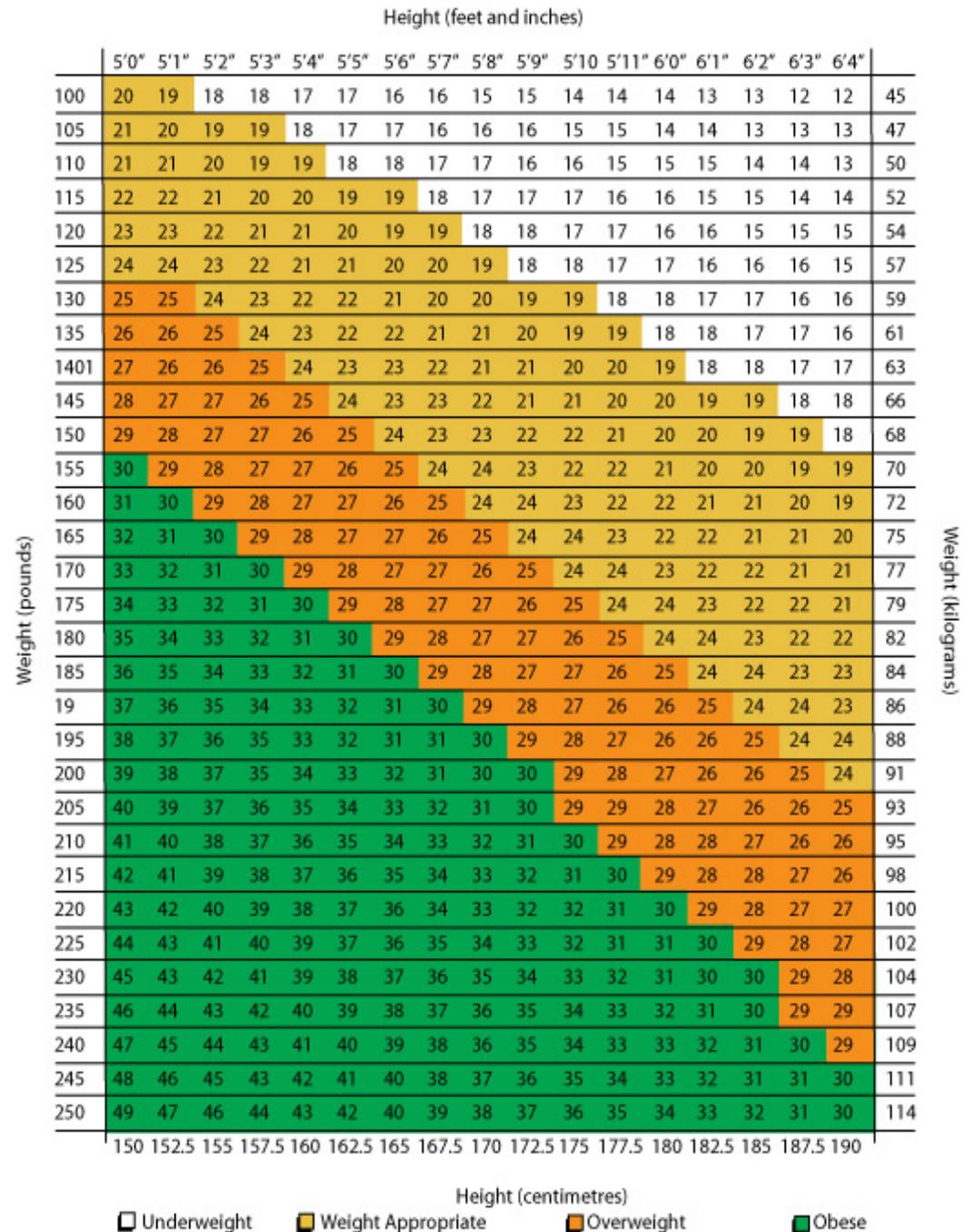


Source: Sexually Transmitted Infections in New Zealand: Annual Surveillance Report 2012, available from [www.surv.esr.cri.nz](http://www.surv.esr.cri.nz)



# Obesity

Obesity is defined by the body mass index (BMI), which is the ratio of the weight in kilograms divided by the height in metres squared. Ideal BMI=20-24.9. Overweight is BMI=25-29.9, and obesity is a BMI >30.



# Obesity

Obesity is associated with reduced fertility

Overweight women with PCOS are frequently anovular

Overweight women undergoing IVF treatment have a reduced chance of pregnancy

Pregnancy complications such as miscarriage, neural tube defects and operative deliveries occur more commonly in overweight women

Weight loss appears to improve fertility and endocrine abnormalities

Weight loss of a small magnitude (5%) may have a beneficial effect on fertility

# Smoking

## **Studies of women who smoke have shown**

Three times higher incidence of infertility (proportional to number of cigarettes smoked)

Poorer response to fertility treatment and reduced chance of conception

50% higher miscarriage rate, and increased ectopic pregnancy

Decreased uterine blood flow in pregnant women, with higher rates of intra-uterine growth retardation, congenital abnormalities and infant death

Earlier onset of the menopause

# Smoking

## Studies of men who smoke have shown

Reduction in sperm counts and normal structure of sperm

Higher risk of impotence

Increased birth defects and a higher incidence of childhood cancer in their children

Increased incidence of asthma in their children



**WARNING**  
**TOBACCO USE**  
**CAN MAKE YOU**  
**IMPOTENT**

**Cigarettes may cause sexual impotence due to decreased blood flow to the penis. This can prevent you from having an erection.**

Health Canada

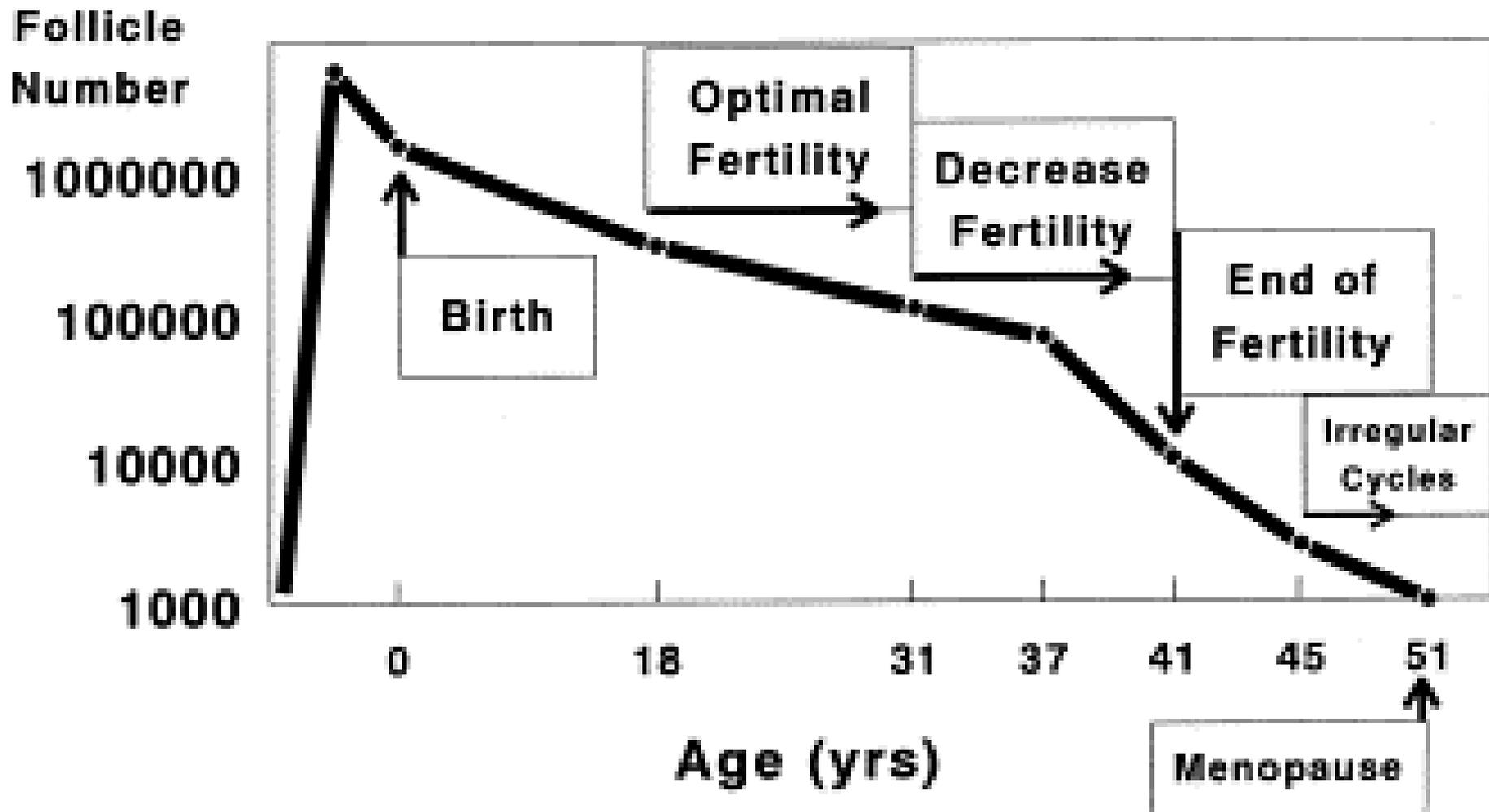
# Ovarian aging

Becoming an increasingly important medical and social problem as women delay childbearing

Humans beings are not fertile mammals. The average fecundity rate per month in humans is ~20-30 %.

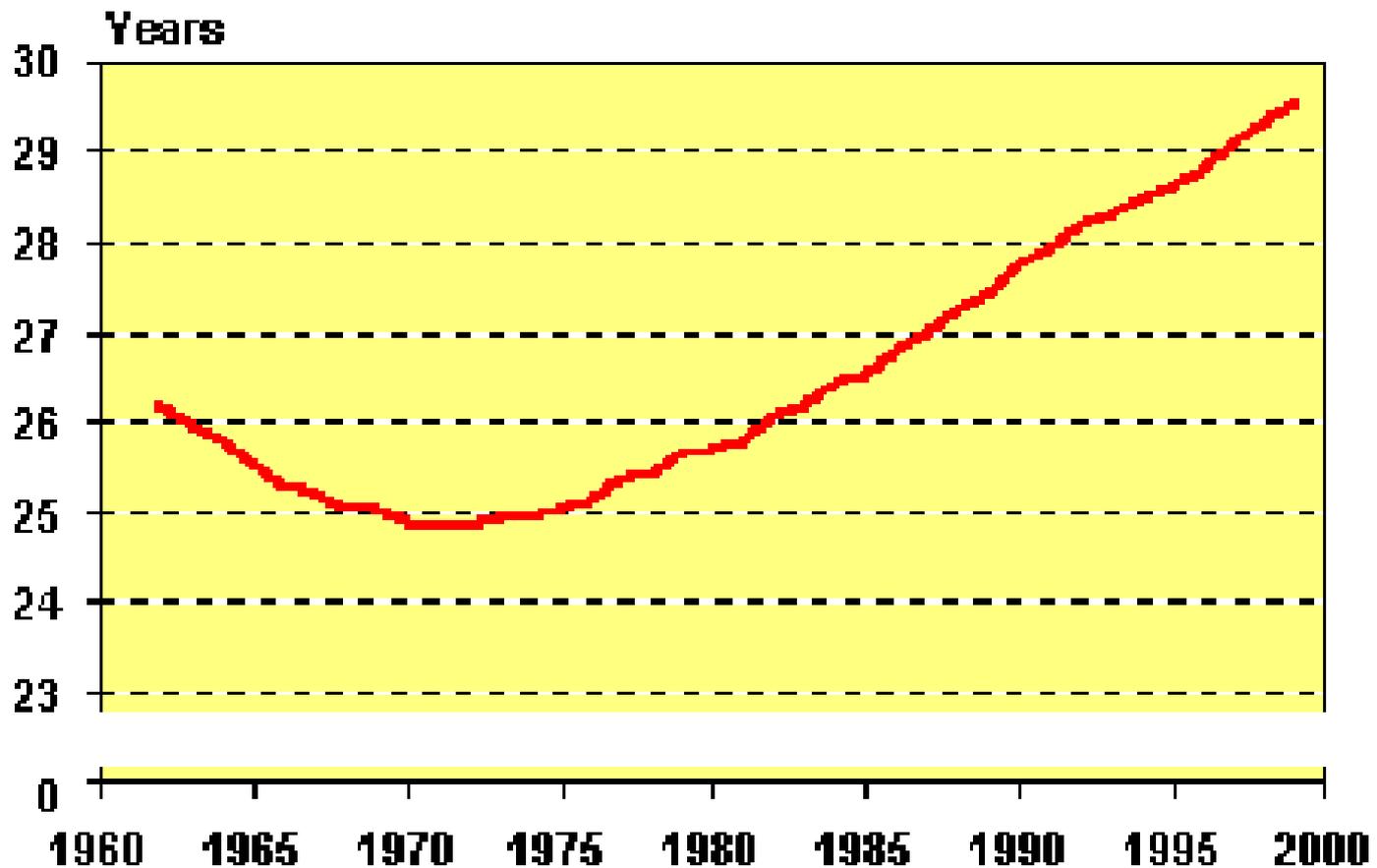
Fertility is highest in women in their twenties (24 years) and declines thereafter

The fertility of a couple is much more dependent on the age of the female than the male



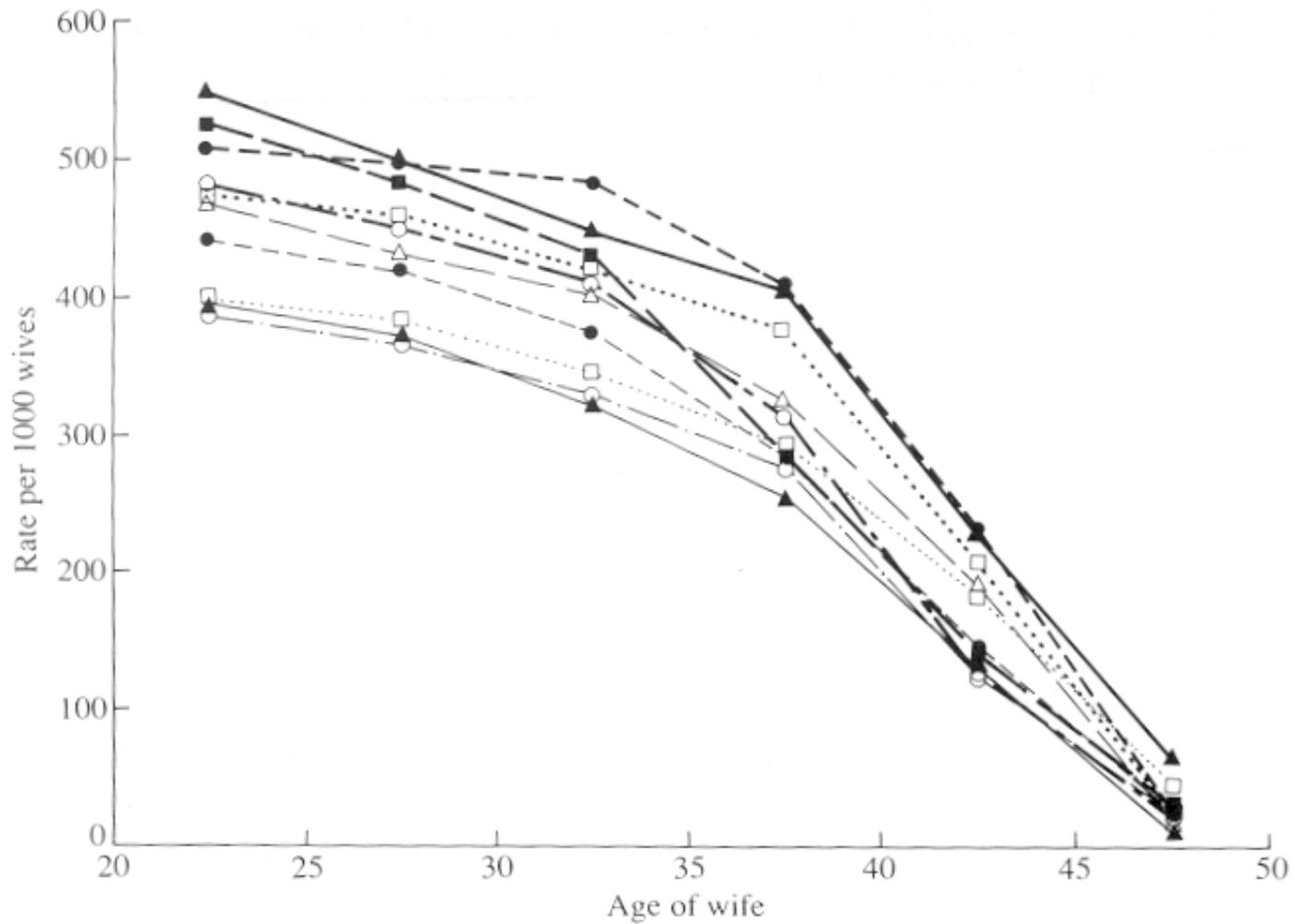
**The decreasing follicle pool and the corresponding reproductive events.**

te Velde & Pearson PL. Hum Reprod Update. 2002,8(2):141-54.



**Median age of mother at childbearing**

NZ Statistics

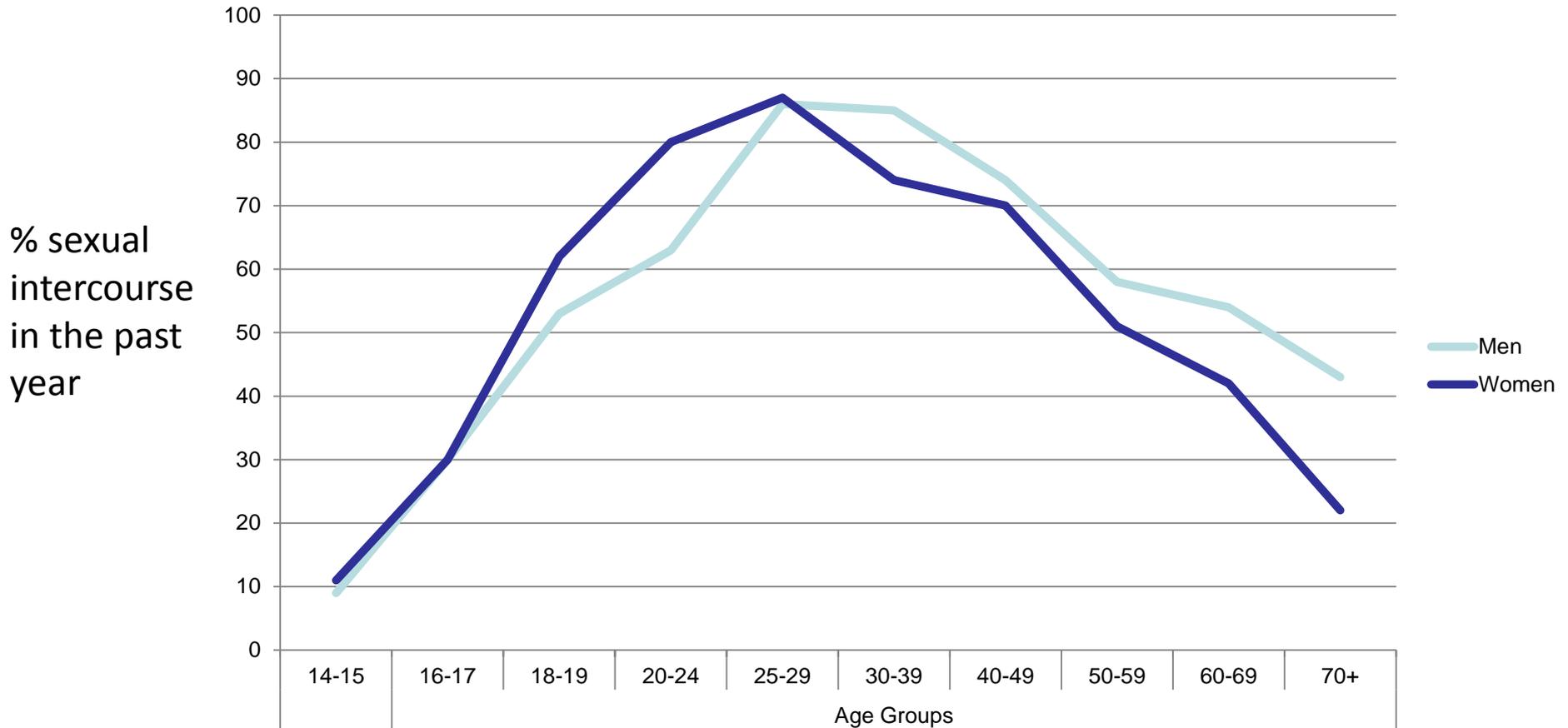


Fertility rates in natural populations show a dramatic fall in fertility

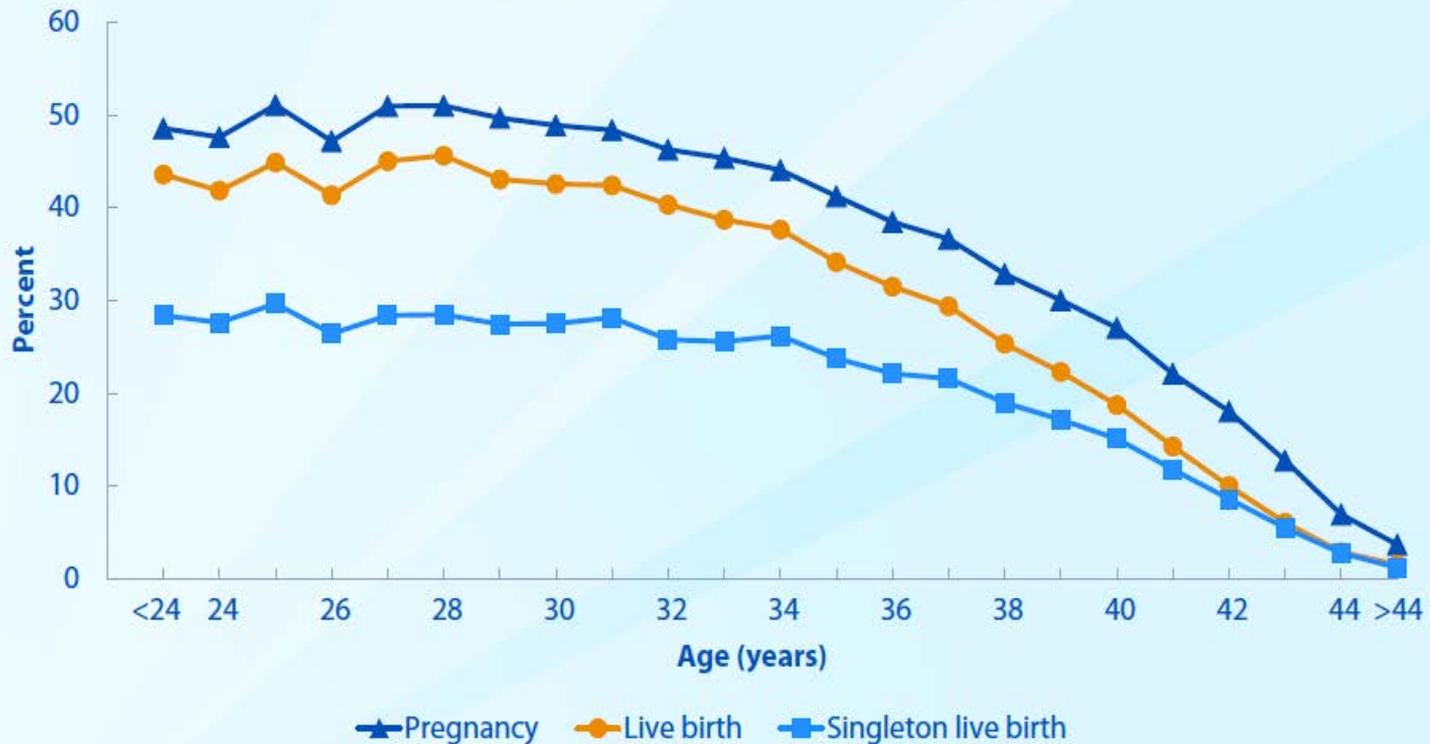
Cohen, 1998, Clin Obstet Gynecol, 41(4) 958-965

# Changes in sexual behaviour

<http://www.nationalsexstudy.indiana.edu/>



## Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Pregnancies, Live Births, and Singleton Live Births, by Age of Woman,\* 2009



\*For consistency, all percentages are based on cycles started.

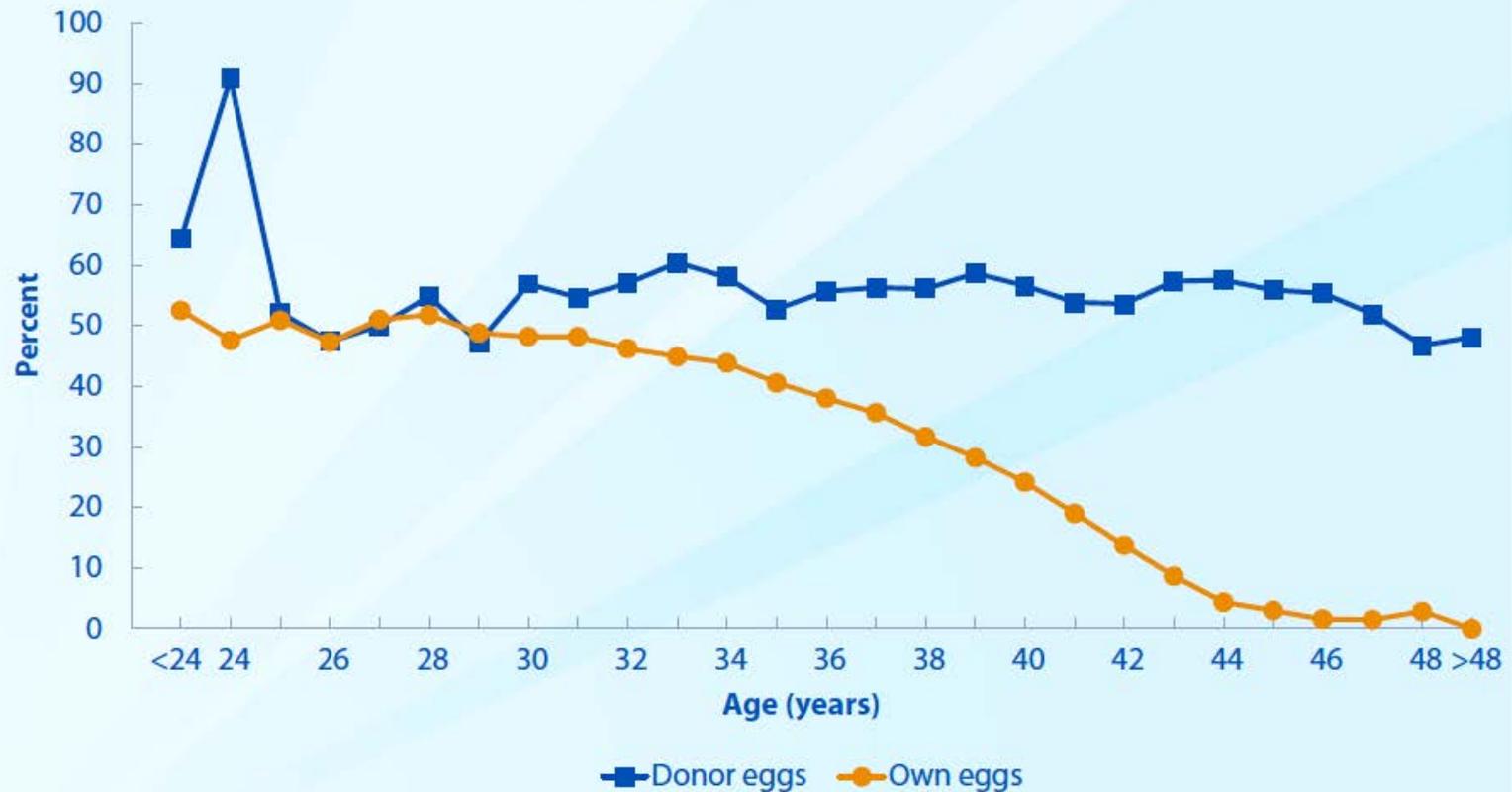
National Center for Chronic Disease Prevention and Health Promotion  
Division of Reproductive Health



Fertility rates in fertility clinics show a fall in fertility

Centers for Disease Control and Prevention  
Assisted Reproductive Technology Success Rates

## Percentages of Transfers That Resulted in Live Births for ART Cycles Using Fresh Embryos from Own Eggs and ART Cycles Using Fresh Embryos from Donor Eggs, by Age of Woman, 2009



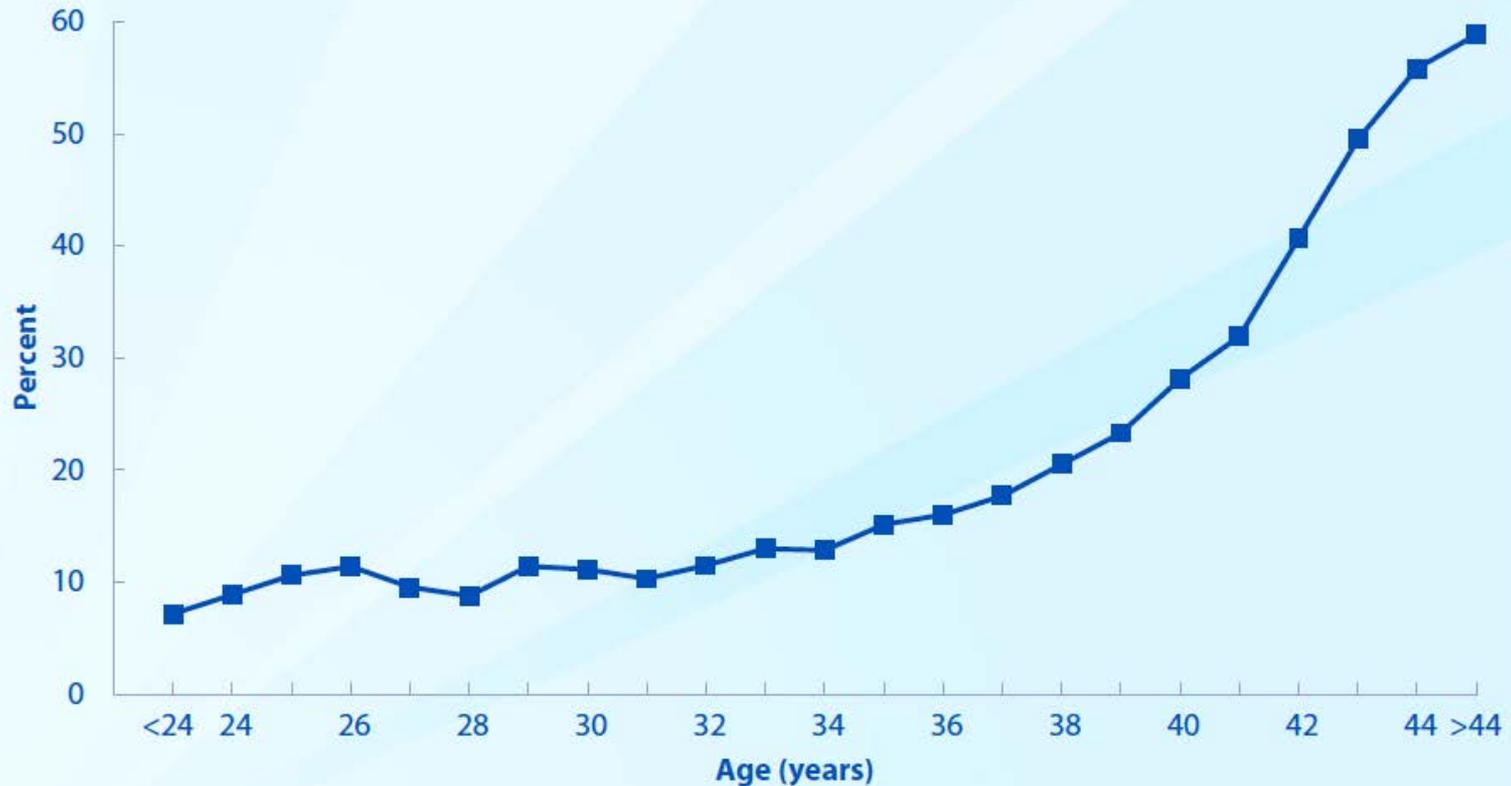
National Center for Chronic Disease Prevention and Health Promotion  
Division of Reproductive Health



Reproductive success declines with age, unless you use donor eggs

Centers for Disease Control and Prevention  
Assisted Reproductive Technology Success Rates

## Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Miscarriage, by Age of Woman, 2009



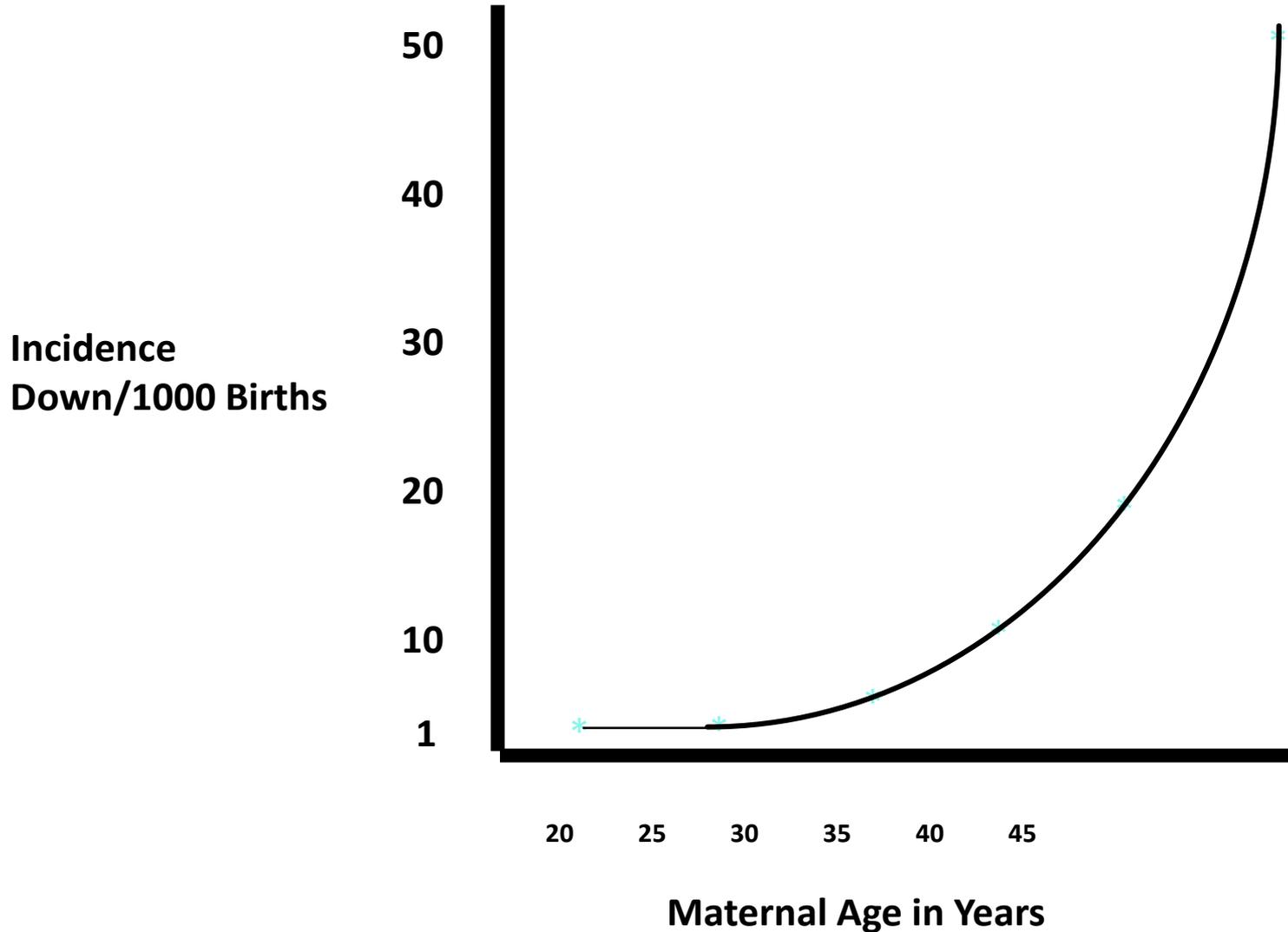
National Center for Chronic Disease Prevention and Health Promotion  
Division of Reproductive Health



Rates of miscarriage increases with increased age

Centers for Disease Control and Prevention  
Assisted Reproductive Technology Success Rates

# Incidence of Down syndrome and maternal age



# Follicular changes with age

The quantity of follicles declines in proportion to the quality of the follicles (popcorn hypothesis)

Follicle quality is related to:  
less able to respond to hormone stimulation  
accumulation of genetic defects



# Be Fertility Fit



FertilityWeek  
Be Fertility Fit

April 7th to 13th 2014

Join us for fertility discussions, advice & support

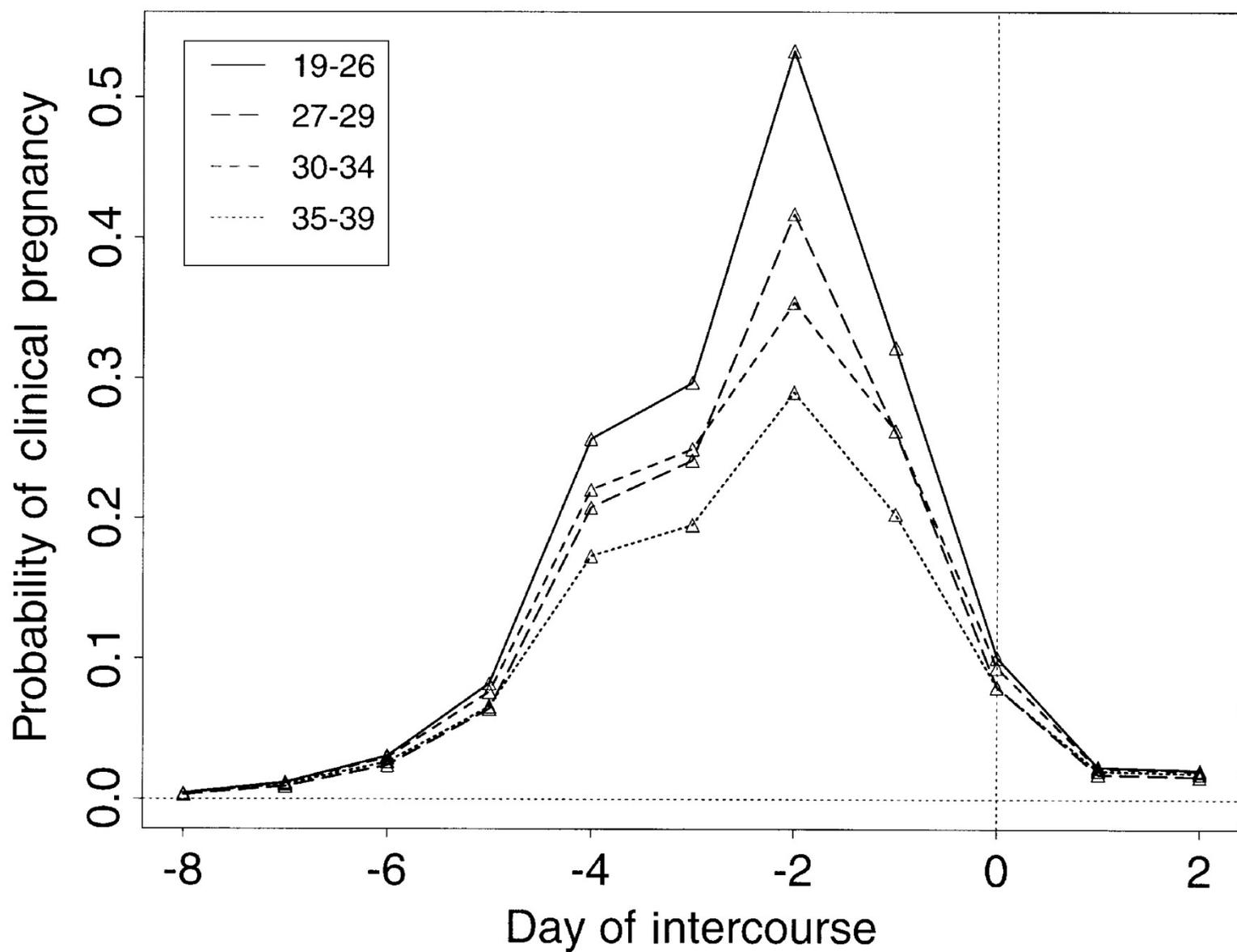
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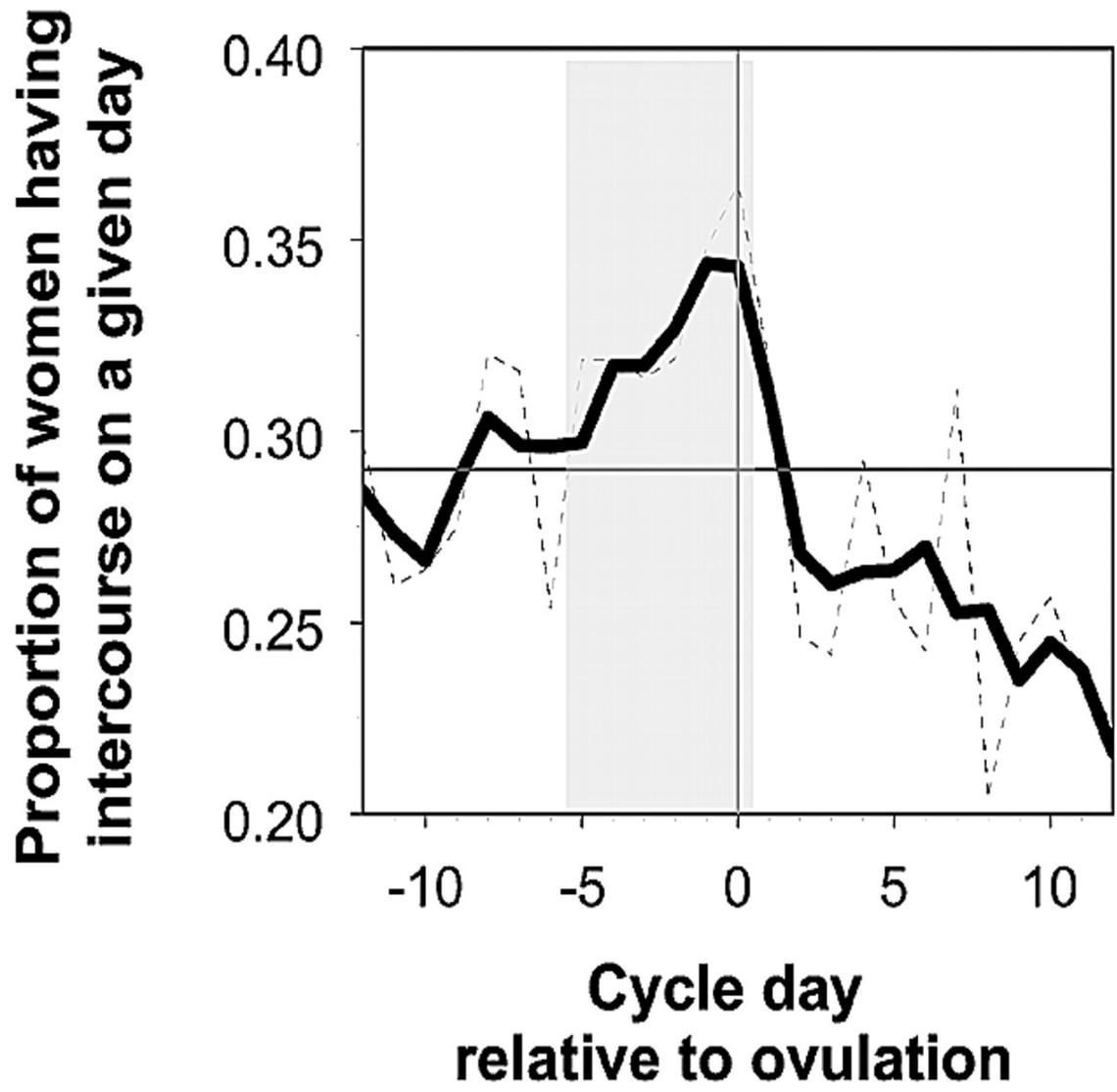
Check back soon, more to come!

Visit us for a new fertility topic each day during Fertility Week April 7th - 13th 2014

CONTACT US



Probability of clinical pregnancy following intercourse relative to ovulation for women of average fertility.



**Proportion of ovulating women who have intercourse on a given day of the menstrual cycle**

Wilcox et al., 2004, Human Reproduction

# Fertility Green Prescription

Maximise your chances of conception, a healthy pregnancy and healthy baby

	How you score	What you can do
Age	30 and younger: optimal chance of pregnancy	You can't change your age but you can make best use of the time you have: seek expert advice. Consider age when planning your future family. Fertility treatment can't overcome age.
	30-34: relative chance per month reduced by a quarter	
	35-39: relative chance per month reduced by half	
	! 40-43: relative chance per month reduced by three quarters	
	! 44 and older: very low chance Men's age is also important, especially after 45.	
Timing of sex	I know my fertile time	The best time for sex is 1-2 days before ovulation. Learn how to check for fertile mucus and to use basal temperatures to confirm ovulation. Consider urinary fertility tests if unsure.
	I don't know or I'm not sure of my fertile time	
Weight	BMI 18-25	Being overweight or obese can reduce fertility and increase problems in pregnancy. Obesity in men may reduce sperm quality and increase the risk of erection problems.
	BMI 26-32	
	! BMI 32 or more BMI less than 18: increased chance of ovulation problems (female partner)	
Alcohol	Not drinking while trying to become pregnant	Alcohol can reduce fertility, increase the risk of miscarriage, and impair the baby's brain development.
	Drinking while trying to become pregnant	
	! Drinking while pregnant	
Smoking	I have never smoked	Smoking halves the chance of pregnancy per month, reduces blood flow and nutrition to the foetus, and can affect long term health of the child. In men, smoking damages the DNA in sperm.
	I don't smoke anymore	
	! I smoke	

If you score a ! you won't be eligible for publicly funded fertility treatment in New Zealand.

Turn over for more information on timing sex for conception and nutritional advice to improve your fertility and maximise your baby's health. ▶

**Fertility  
awareness  
campaigns**



fertility  
NEW ZEALAND

# **New Zealand university students' knowledge of fertility decline in woman via natural pregnancy and IVF**

**Nathanael Lucas, Roseanne Rosario and Andrew Shelling**

## **Study question**

Do New Zealand (NZ) university students understand age related fertility decline in spontaneous natural and *in vitro* fertilisation (IVF) pregnancies?

21 question questionnaire completed by 683 University of Auckland Students

Questions were based on a previous study "The fertility myth: Israeli students' knowledge regarding age-related fertility decline and late pregnancies in an era of assisted reproductive technologies. Hashiloni-Dolev et al., Human Reproduction, 2011"

# New Zealand university students' knowledge of fertility decline in woman via natural pregnancy and IVF

Nathanael Lucas, Roseanne Rosario and Andrew Shelling

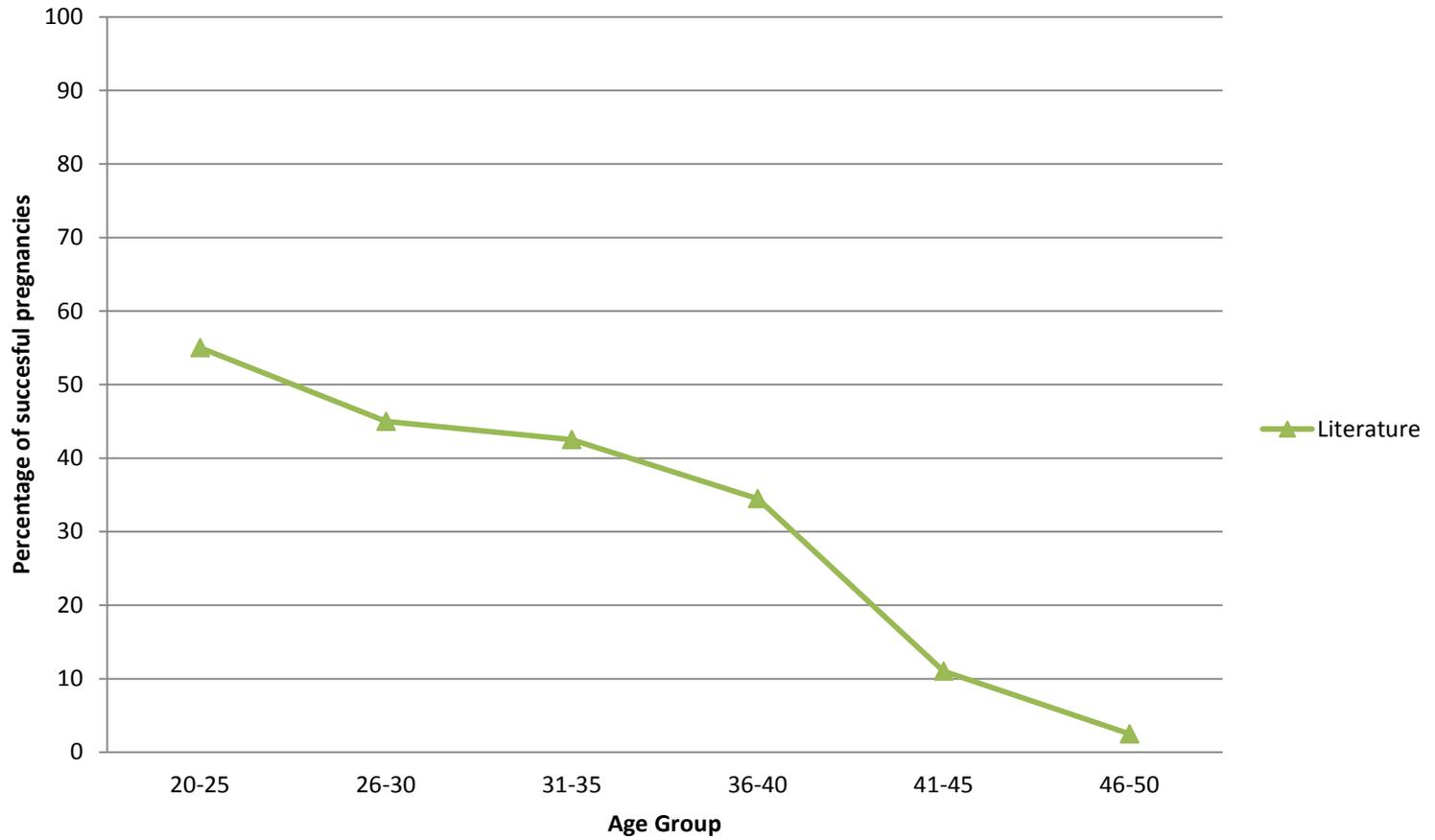
Characteristic	Number (percentage)	Characteristic	Number (percentage)
<b>Gender</b>		<b>Marital Status</b>	
Male	226 (33%)	Married	45 (7%)
Female	453 (66%)	Partner	159 (23%)
<b>Age</b>		Single	475 (69%)
Mean	22.3	<b>Already a parent</b>	
<b>Ethnicity</b>		Yes	36 (5.2%)
NZ European	375 (55%)	No	646 (94.8%)
Asian	176 (26%)	<b>Wish to be a parent</b>	
Māori	41 (6%)	Yes	578 (85%)
Pacific Island	27 (4%)	No	70 (10%)
Other European	47 (7%)	Unsure	34 (5%)
Did not state	17 (2%)	<b>Ideal age to become a parent</b>	
<b>Field of Study</b>		Mean (SD)	28.6 (3.1)
Architecture	47 (7%)		
Biomed Science	60 (9%)		
Education	86 (13%)		
Engineering	18 (3%)		
Law	153 (22%)		
Medicine	208 (30%)		
Nursing	110 (16%)		

# **New Zealand university students' knowledge of fertility decline in woman via natural pregnancy and IVF**

**Nathanael Lucas, Roseanne Rosario and Andrew Shelling**

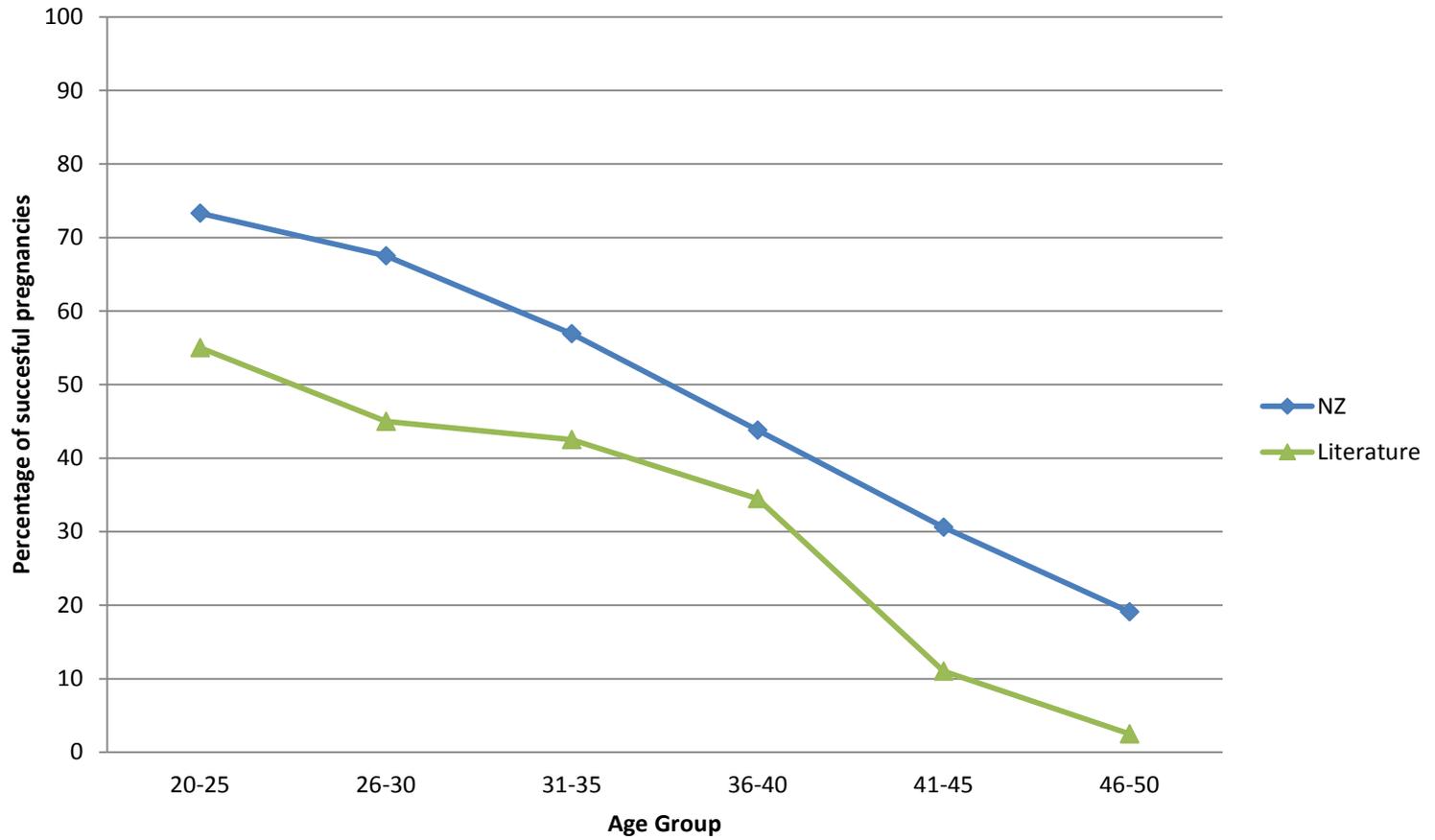
1. Estimate the chances of a healthy woman becoming pregnant after having unprotected intercourse with a fertile man at the time of ovulation
2. Estimate the likelihood of women, in various age groups to give birth via in-vitro fertilisation (IVF)
3. In recent years, an increasing number of pregnancies among older women, in New Zealand and around the world have been reported. To the best of your knowledge what are the medical procedures/ techniques/ well-being initiatives which make such pregnancies possible?

Students Estimates of decline in pregnancy in spontaneous pregnancies



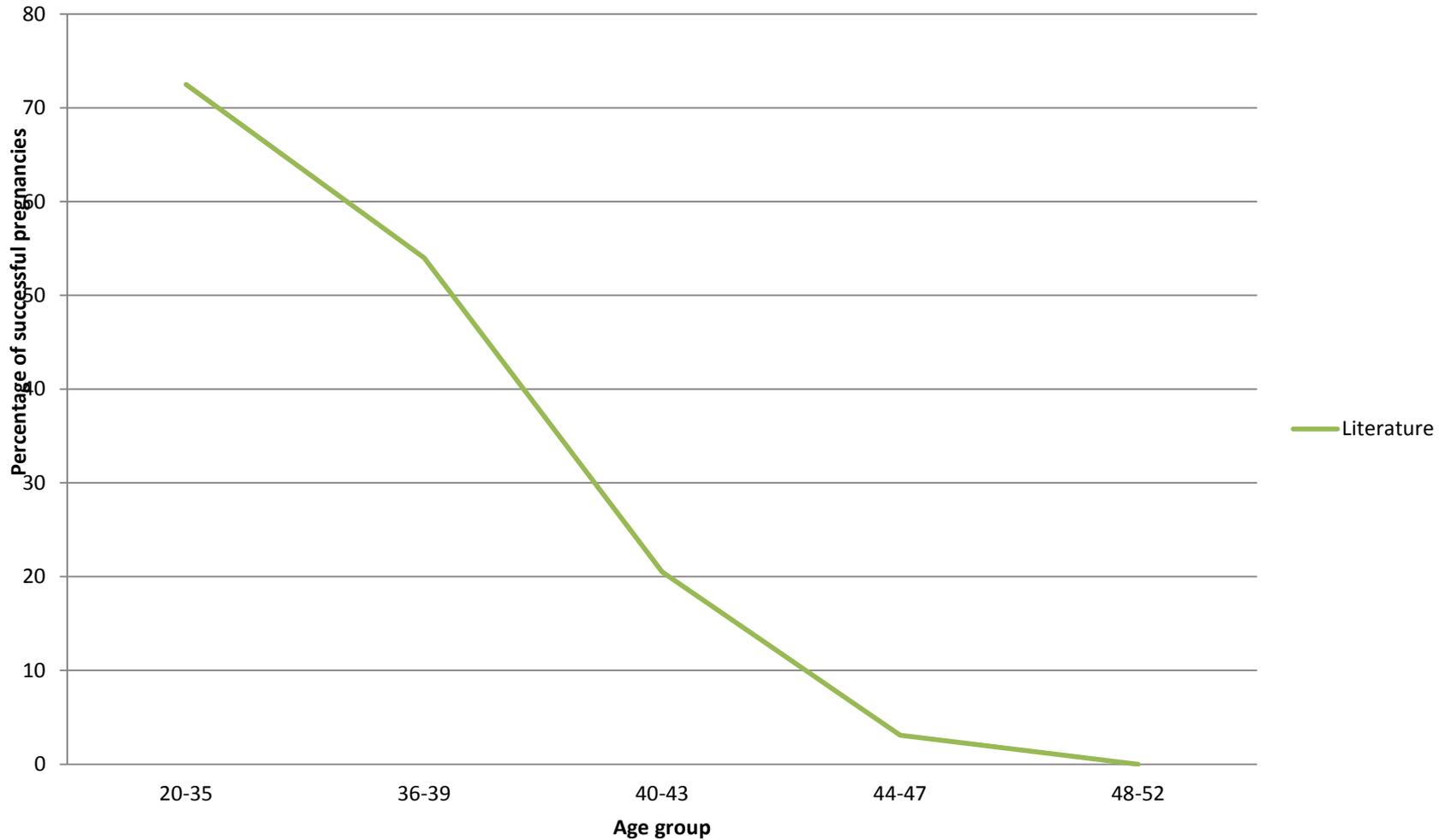
**Student estimates of successful pregnancies**

Students Estimates of decline in pregnancy in spontaneous pregnancies



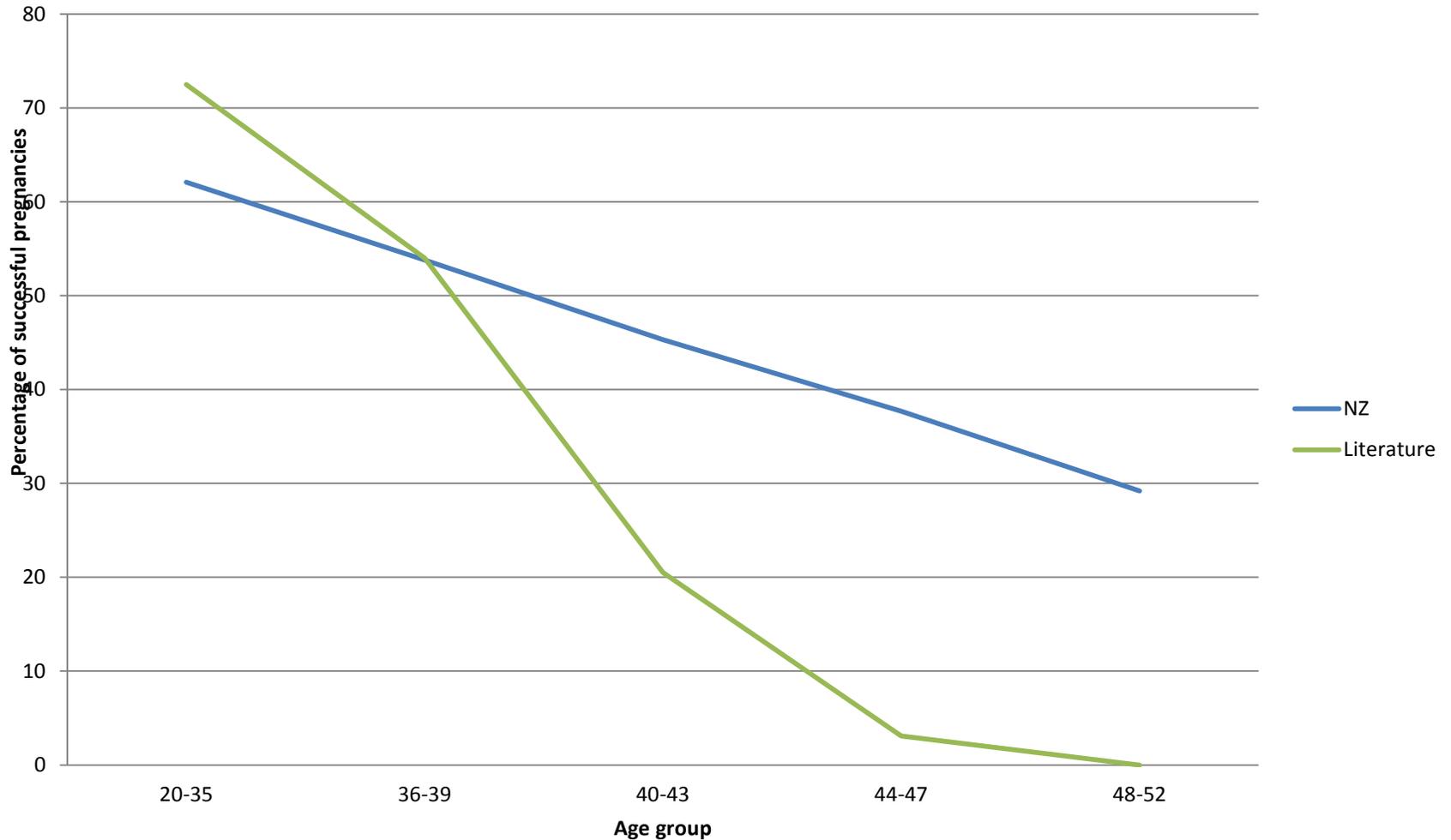
**Student estimates of successful pregnancies**

## Students Estimates of successful pregnancies using IVF



**Student estimates of successful pregnancies using IVF**

## Students Estimates of successful pregnancies using IVF



**Student estimates of successful pregnancies using IVF**

Technique/Well Being Method	Raw Number	Percentage
IVF	504	74%
Surrogacy	107	16%
Healthy Lifestyle	104	15%
Hormone Replacement Therapy	92	13%
Other ART's (e.g ISCI)	206	30%
Sperm or Egg Donation	66	10%
No Idea/Comment/No entry	108	16%

**Responses from open ended question asking what medical techniques/methods/well-being initiatives students knew that could prolong parenthood**

# **New Zealand university students' knowledge of fertility decline in woman via natural pregnancy and IVF**

**Nathanael Lucas, Roseanne Rosario and Andrew Shelling**

## **Main outcomes**

Students correctly identified a fertility decline with age

Students overestimated the rates of pregnancy for both spontaneous pregnancy and IVF pregnancies

Students are mainly aware of assistive reproductive technologies being available but overestimate their effectiveness

Most students identified IVF to prolong parenthood, few identified that older women would require an egg donor

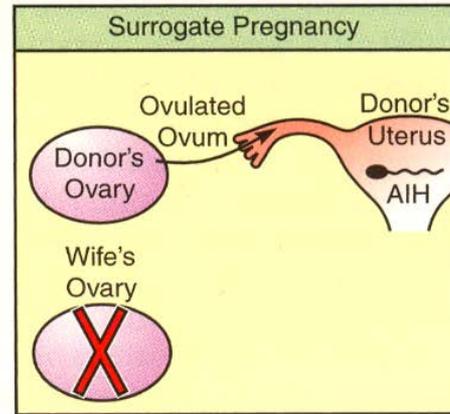
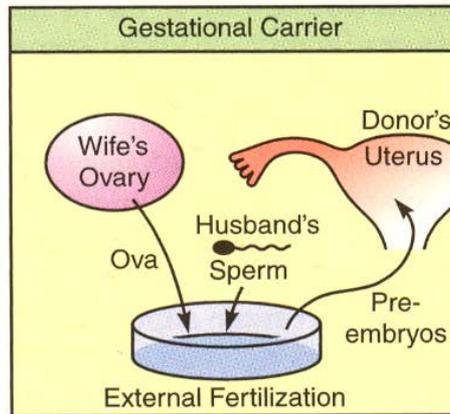
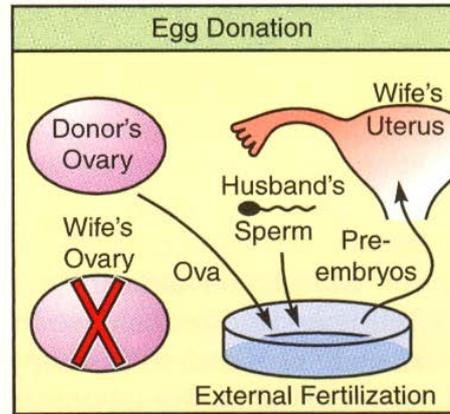
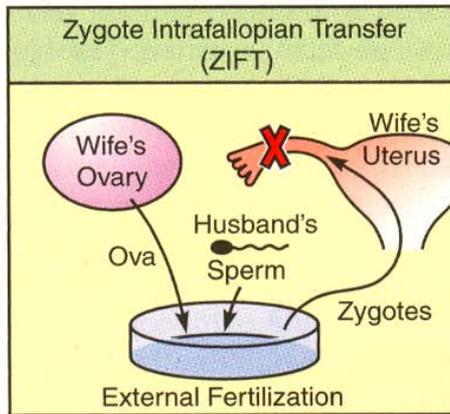
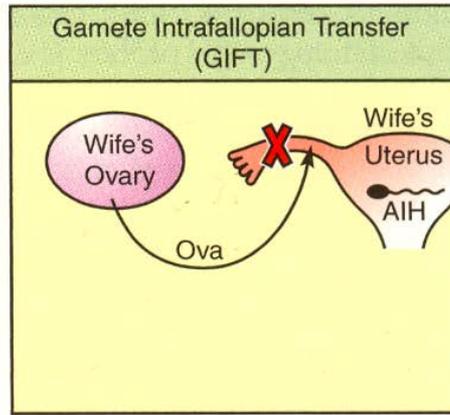
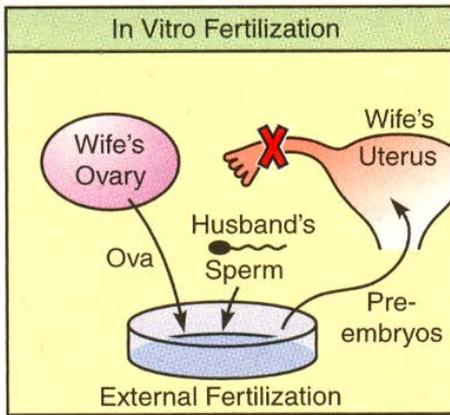
Few students mentioned non-ART or healthy lifestyle as measures to prolong parenthood

## **Fertility awareness: lack of knowledge or choice?**

“Emotional infertility”. 31% of women aged 28-45 in a survey of 3000 women, suggested that they had not met the right partner yet

“Perpetual postponers”. Leading to a rise in those experiencing “ambivalent” childlessness

“Inconvenient biology”. When most women are financial security, have career flexibility, and have a committed relationship, they have reduced fertility

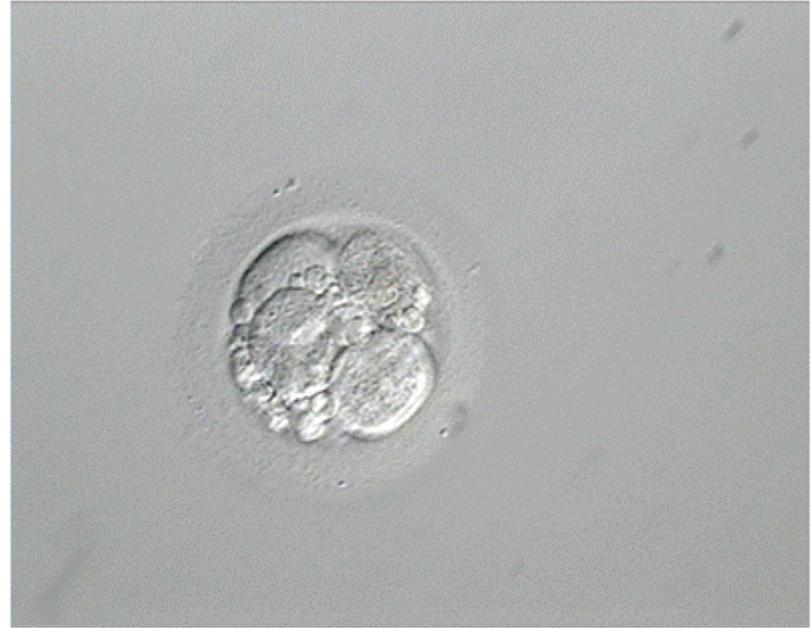


**Types of Assisted Reproductive Techniques (ART)**

Good Quality Embryo



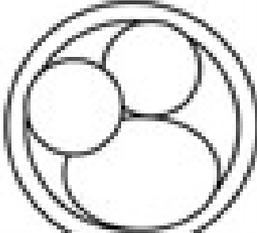
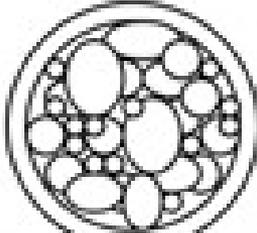
Fair Quality Embryo



Poor Quality Embryo



# Embryo grading

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
				
Even blastomeres, no fragmentation	Even blastomeres, slight fragmentation	Uneven size blastomeres, no fragmentation	Even or uneven size blastomeres, moderate fragmentation	Unrecognizable blastomeres, severe fragmentation

# Example: Egg donation

Andrew and Angelina are desperate to have a family, but can't as Angelina had to have her ovaries removed.

What are their options?



# Example: Egg donation

Debbie is a friend, can she donate her eggs to Angelina?

Can they pay money to Debbie for her eggs?

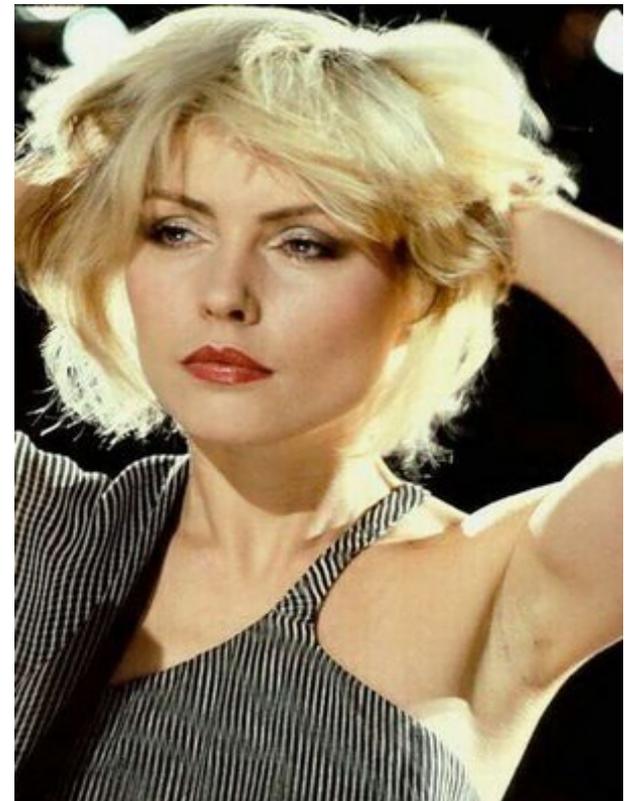
Could Angelina search on the internet for an overseas donor?

What rights does Debbie have over the resulting baby?

Can Debbie change her mind, and withdraw consent to use the embryo?

Does the resulting baby have a right to know that Debbie was the donor?

Can Debbie's eggs be donated to other families?



# Egg donation

Extraordinary  Conceptions



Donor Center

Future Parents

Surrogate Center



## Donor Center : Overview

**Extraordinary Conceptions** is looking for outstanding women between the ages of 18 and 29 who are interested in becoming egg donors.

Our future parents are all unique, but they all have one thing in common: the need to become parents. Because of this strong desire, they are all looking for potential egg donors who in some way reflect themselves: compassionate, creative, determined, and well educated. Egg donors are generously compensated for their services, beginning at \$5,000 states (\$4,000 for anyone in the Altruistic Angel Program) .

If you are a healthy woman between the ages of 18 and 29, and wish to become an egg donor prospect, please fill out the online application. Please note that egg donors must be willing to complete medical and psychological testing, take a series of injectable medications, and undergo an outpatient surgical procedure for egg retrieval. The typical time from selection by a future parent to completion of your egg donation is 60 to 90 days. Healthy women between the ages of 21 and 29 who are non-smokers and can provide personal and medical information, as well as family health history, are considered optimal as egg donors. Women who donate feel tremendous gratification and are able to do many things with the financial rewards given to them for performing their Donor responsibilities.

# Egg donors offered up to \$50,000

Fees far exceed ethics guidelines, study finds

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By Clara Moskowitz



updated 3/26/2010 9:26:00 PM ET

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Fertility companies are paying egg donors high fees that often exceed guidelines, especially for donors from top colleges and with certain appearances and ethnicities, a new study finds.

The upshot: Parents with [infertility problems](#) are willing to pay up to \$50,000 for a human egg they hope will produce a smart, attractive child.

The first baby conceived through [egg donation](#) was born in 1983. Since then, the practice, which involves transferring fertilized eggs from a donor into a woman's body, has grown dramatically. The rise has been seen particularly among women with ovarian failure, women over 40, and gay men who want to have children through surrogate pregnancy.

# Example: Sperm donation

Andrew and Angelina are desperate to have a family, but can't as Andrew had his testicles damaged in a game of rugby

What are their options?



# Example: Sperm donation

Can they ask Peter, a good looking guy at work, to be a sperm donor.

Or should they get some sperm from Andrew's father or brother, to keep a family link?

Or from a good looking guy in a Californian sperm bank?

Do they tell the child the origins of the sperm donor?



# Sperm donors in the US

## Sperm bank offers celebrity look-alike donors

'It's not that our donors look like celebs; it's that celebs look like donors'

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Want to have Ben Affleck's baby? While that appears to be the exclusive...

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**TODAY**

You can't judge celebrity under a microscope — fame and fortune don't swim around in a test tube — but at the California Cryobank, workers claim to have Hollywood good looks on ice. NBC's Lee Cowan reports.



## One Sperm Donor, 150 Offspring



David Ahnholz for The New York Times

**OFFSPRING** Ryan Kramer, 20, of Pasadena, Calif., is the child of a donor.

By JACQUELINE MROZ

Published: September 5, 2011

Cynthia Daily and her partner used a sperm donor to conceive a baby seven years ago, and they hoped that one day their son would get to know some of his half siblings — an extended family of sorts for modern times.

### Well

Share your thoughts on this column at the Well blog.



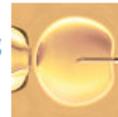
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ROOM FOR DEBATE

#### **Making Laws About Making Babies**

In America, one sperm donor can have 150 or more offspring. Other nations would not



So Ms. Daily searched a Web-based registry for other children fathered by the same donor and helped to create an online group to track them. Over the years, she watched the number of children in her son's group grow.

And grow.

Today there are 150 children, all conceived with sperm from one donor, in this group of half siblings, and more are on the way. "It's wild when we see them all together — they all look alike," said Ms. Daily, 48, a social worker in the Washington area who sometimes vacations with other families in her son's group.

# Commercial sperm donation

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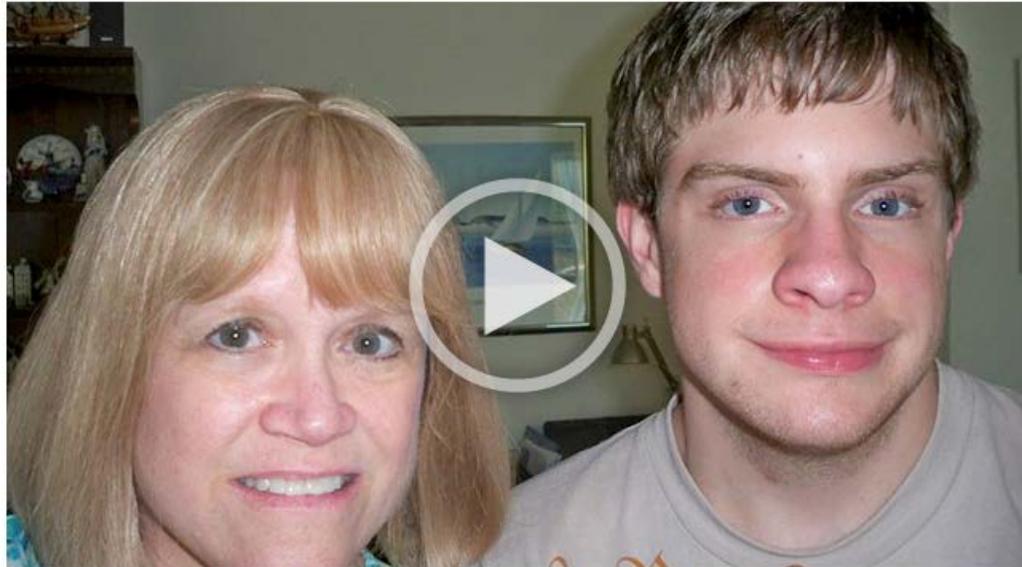
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**The Descendants**  
Now Playing

# Sperm donor with Marfan's syndrome

## Sperm Donor's 24 Kids Never Told About Fatal Illness



Rebecca Blackwell and her son Tyler, of Frederick, Md., found out he has a heart defect inherited from his sperm donor. (Courtesy Rebecca Blackwell)



By SUSAN DONALDSON JAMES  
July 21, 2011

f Recommend 423



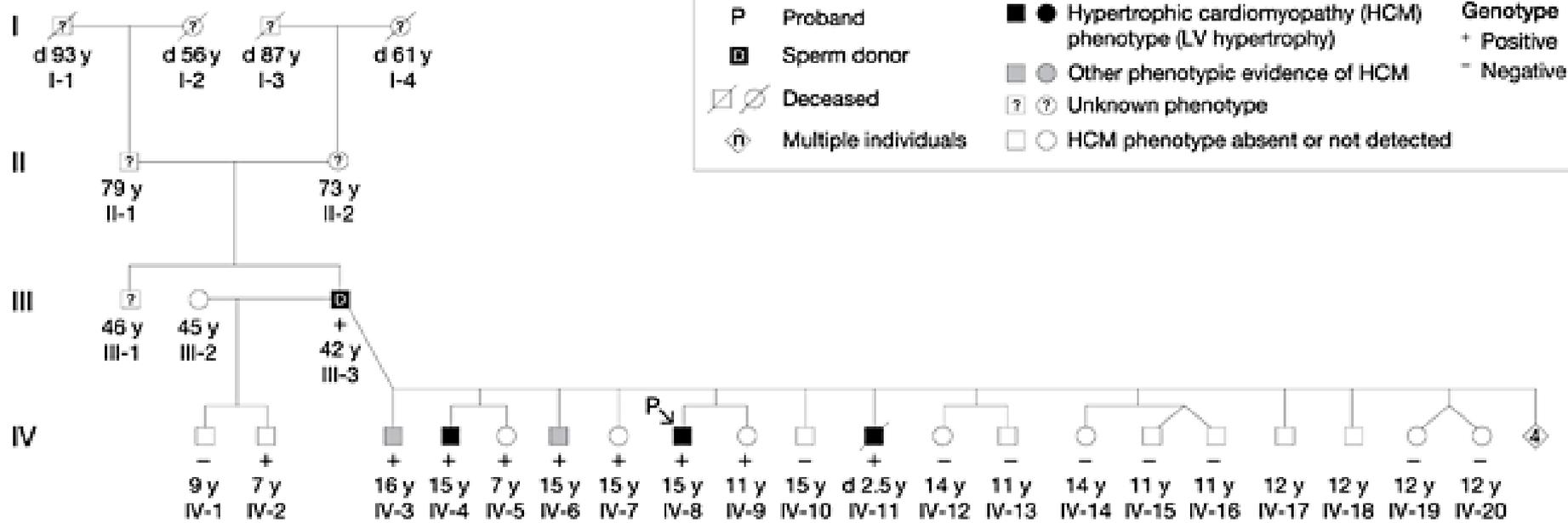
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42 Comments

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Rebecca Blackwell and her 15-year-old son Tyler were curious about his **sperm donor father**, whose identity had been anonymous since the moment of conception. Through good detective work, they were eventually able to find "John" three years ago.

What they didn't expect to learn was that Tyler had inherited his father's medical condition -- a rare aortic heart defect that could have killed him at any moment.



# Pedigree Showing Offspring of a Sperm Donor

Maron, B. J. et al. JAMA 2009;302:1681-1684

# Example: Surrogacy

Andrew and Angelina are desperate to have a family, but can't as Angelina had to have her ovaries removed.

What are their options?



# Surrogacy

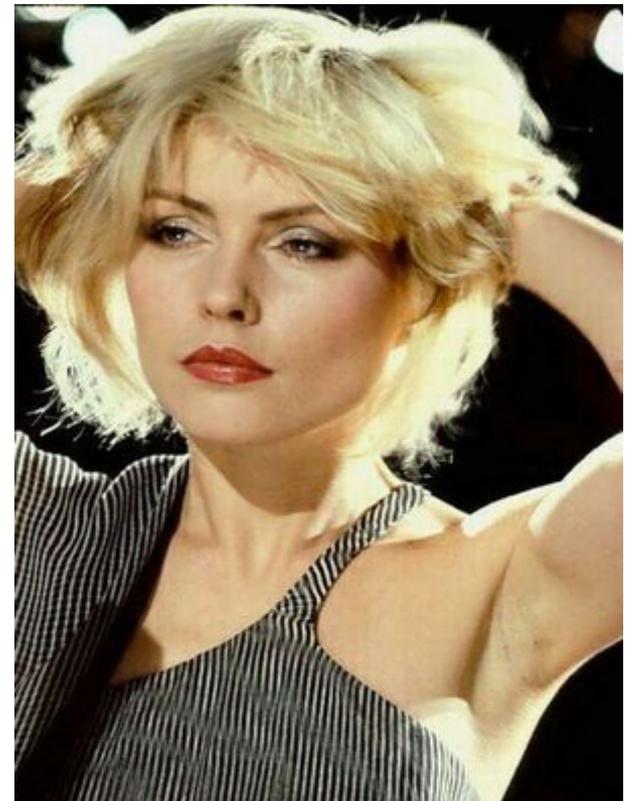
Can she pay Debbie to carry her baby?

What restrictions should they place on Debbie? Can she smoke, drink, take medications?

What if Debbie changes her mind and wants to keep the baby?

Debbie isn't very keen, so can they pay for someone in India to carry their baby?

<http://surrogacyindia.com/>



# Surrogacy



## Surrogate mother gives birth to grandchild

21 February 2011

By *Leo Perfect*

Appeared in BioNews [596](#)

A 61-year-old woman gave birth to her grandson in February because her daughter couldn't maintain a pregnancy. Kristine Casey, who may be the oldest woman to give birth to her grandson, volunteered to act as a [surrogate](#) after her daughter, Sara Connell, failed to bring two [IVF](#) pregnancies to term. Mrs Connell and her husband had also tried to conceive naturally for years without success. Mrs Connell said: 'The idea of having a family member being open to doing this for us was so extraordinary'.

Mrs Casey gave birth 10 years after menopause using the Connells' [eggs](#) and [sperm](#) thanks to hormone treatments that prepared her uterus for pregnancy. With them, the pregnancy success rate is independent of the surrogate's age. She became pregnant after the second course of IVF and gave birth by caesarean section 39 weeks later. Dr Susan Gerber, the doctor who delivered baby Finnean Connell in Chicago, said: 'The surgery itself was uncomplicated, and the emotional context of this delivery was so profound'.

# Surrogacy

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## Daughter to carry baby for her mum

By LEIGH VAN DER STOEP - Sunday Star Times

Last updated 05:00 28/06/2009

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A NEW Zealand woman has been given approval to act as a surrogate to her mother, meaning she will carry and give birth to her own sibling.

It is understood to be the first time the Ethics Committee for Assisted Reproductive Technology (Ecart) has approved an application for a daughter to carry her mother's child, although there have been approvals for women to carry their own grandchild.

# 'Rent-a-womb' babies could end up stateless

SHABNAM DASTGHEIB

Last updated 05:00 20/08/2011



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## Health

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- [Delight over disability workers' 'sleepover' win](#)
- [Number of children on anti-depressants concerns](#)
- [Pharmac attacked for rushing drug](#)
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- [No link suggested in suicides](#)
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- [Meningococcal spate hits Northland](#)

New Zealanders desperate to create a baby are heading overseas and paying up to \$100,000 to hire a womb, unaware that their children could end up stateless.

It is illegal to pay for a surrogate mother in New Zealand, but in many countries the practice is not regulated. As long as the hopeful parent can front up with the cash, the first steps to creating a baby are nothing more than a business transaction, kicked off in minutes.

Child, Youth and Family had never heard of an international surrogacy case before last year, but since then the agency has had 63 inquiries from people looking overseas as a last resort for a family.

International case work director Paula Attrill said some New Zealanders were now stuck in tricky immigration nightmares.

"The baby is born and therein starts the problem – the baby is not legally theirs. Sometimes the child is not entitled to a passport and travel documents cannot be issued. It is a really new area."

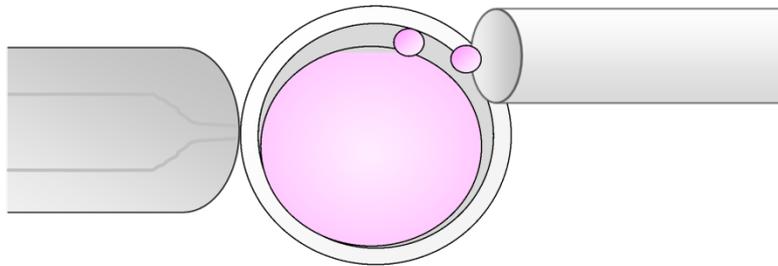
Ms Attrill said there was the potential for things to go horribly wrong with commercial surrogacy. In the past 18 months, at least two New Zealand babies had been born of Indian surrogates. But divergent surrogacy laws have meant the babies are not recognised as citizens of either country.

# Pre-implantation genetic diagnosis (PGD)

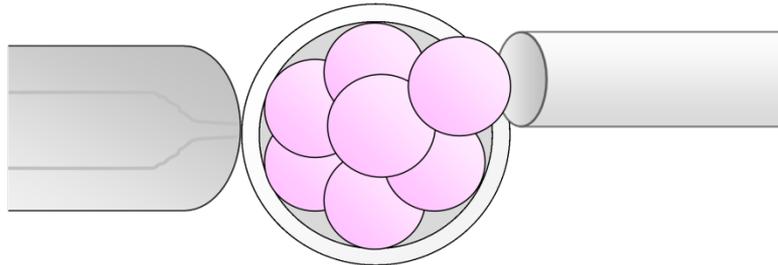
PGD is the use of in vitro fertilisation (IVF) and genetic testing to select embryos free of a specific genetic condition for transfer to the uterus

Offered as an alternative to pregnancy termination

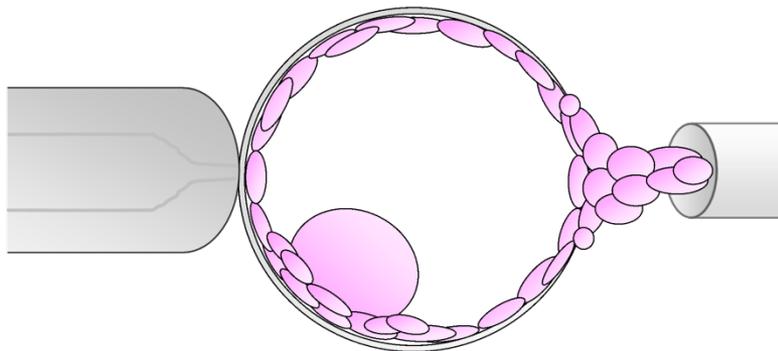
# Cell biopsy for genetic assessment



**Polar body biopsy**



**Blastomere biopsy**



**Trophoctoderm biopsy**

# Pre-implantation genetic diagnosis (PGD)



8-cell embryo, on Day 3  
after IVF, held in place with  
holding pipette



Zona drilling pipette is used  
to drill a hole through the  
zona



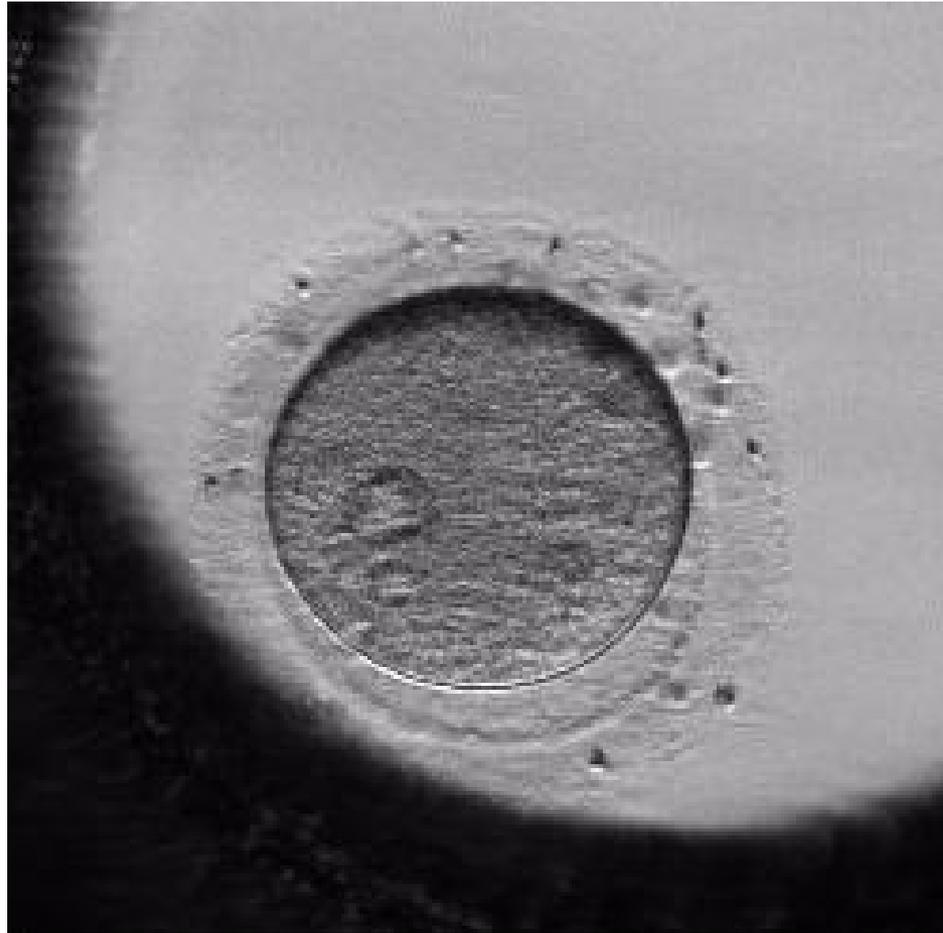
The embryo biopsy pipette  
removes a single cell with  
suction



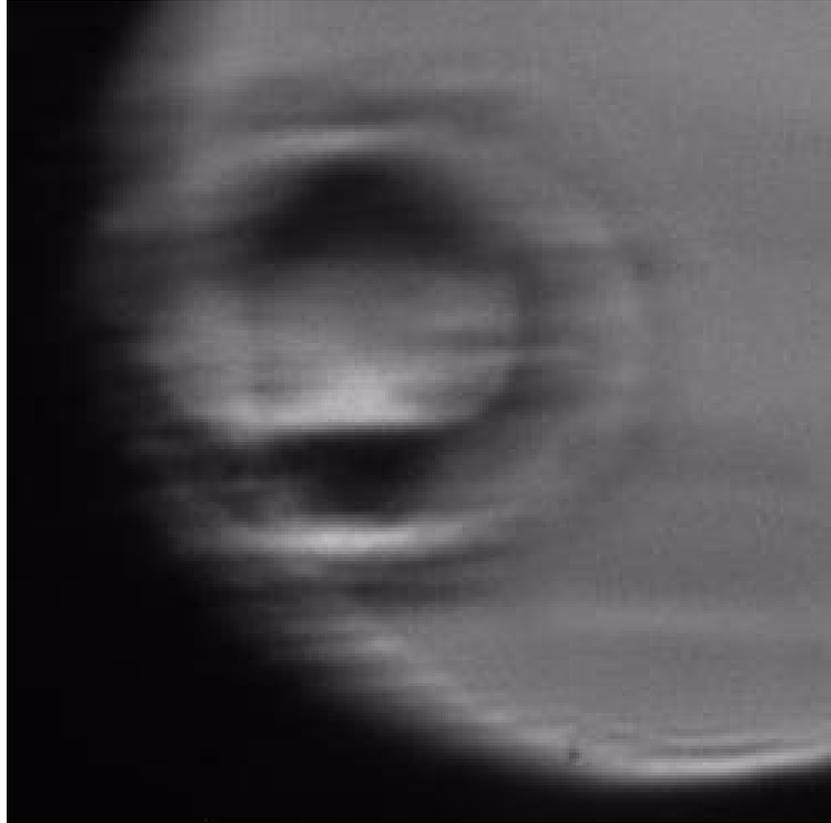
The cell is removed



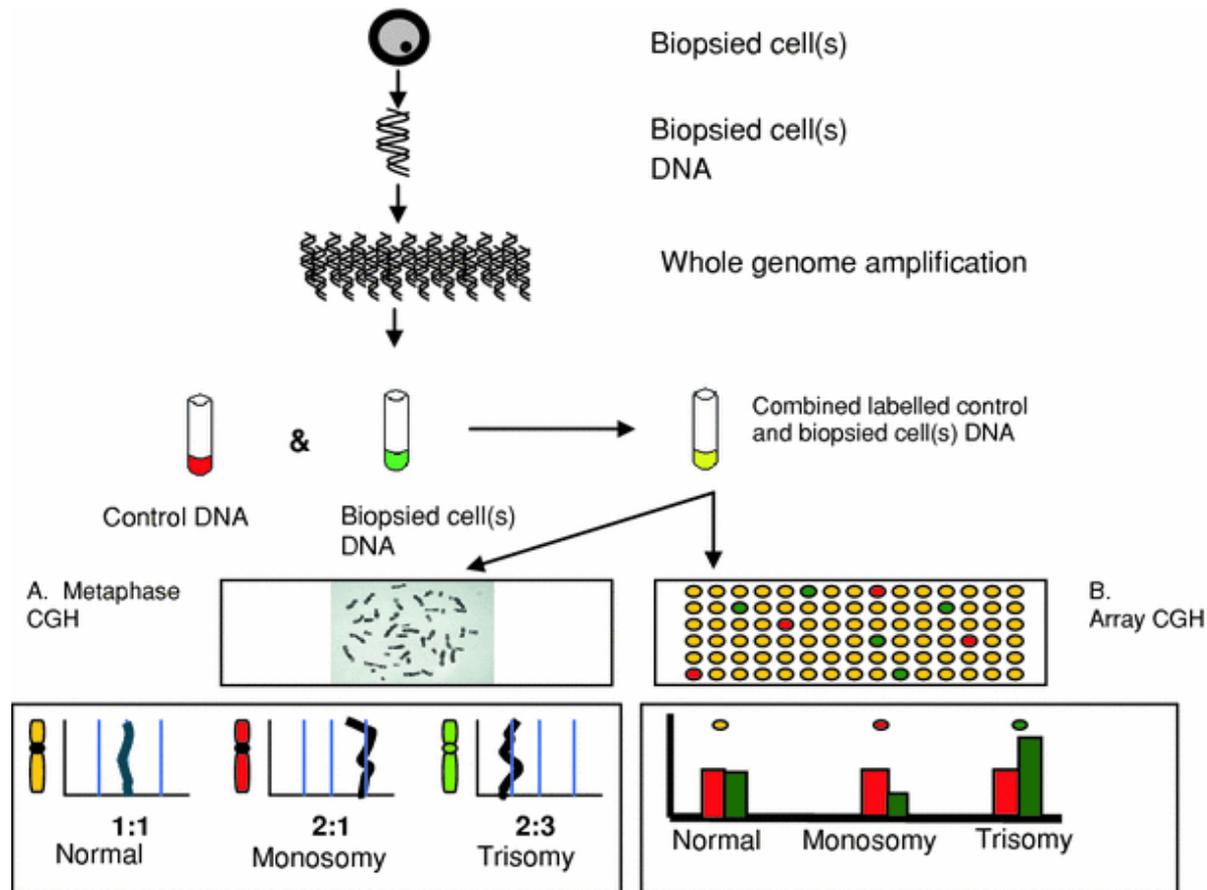
Good quality



Bad quality



# Pre-implantation genetic diagnosis (PGD)



# Next Generation Sequencing



# Pre-implantation genetic diagnosis (PGD)

Molecular analysis can be undertaken by PCR and cytogenetic analysis by FISH

An unaffected embryo is transferred to the uterus of the mother

Affected embryos are discarded, raising ethical issues

# Issues arising from PGD

PGD for the purpose of selecting an embryo with a genetic disease

Low penetrance genetic diseases

Late onset genetic diseases

Advanced reproductive age and pre-implantation genetic screening

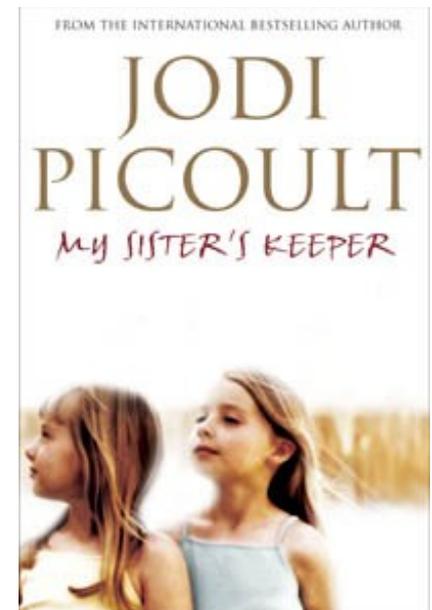
# Issues arising from PGD

## **Saviour siblings**

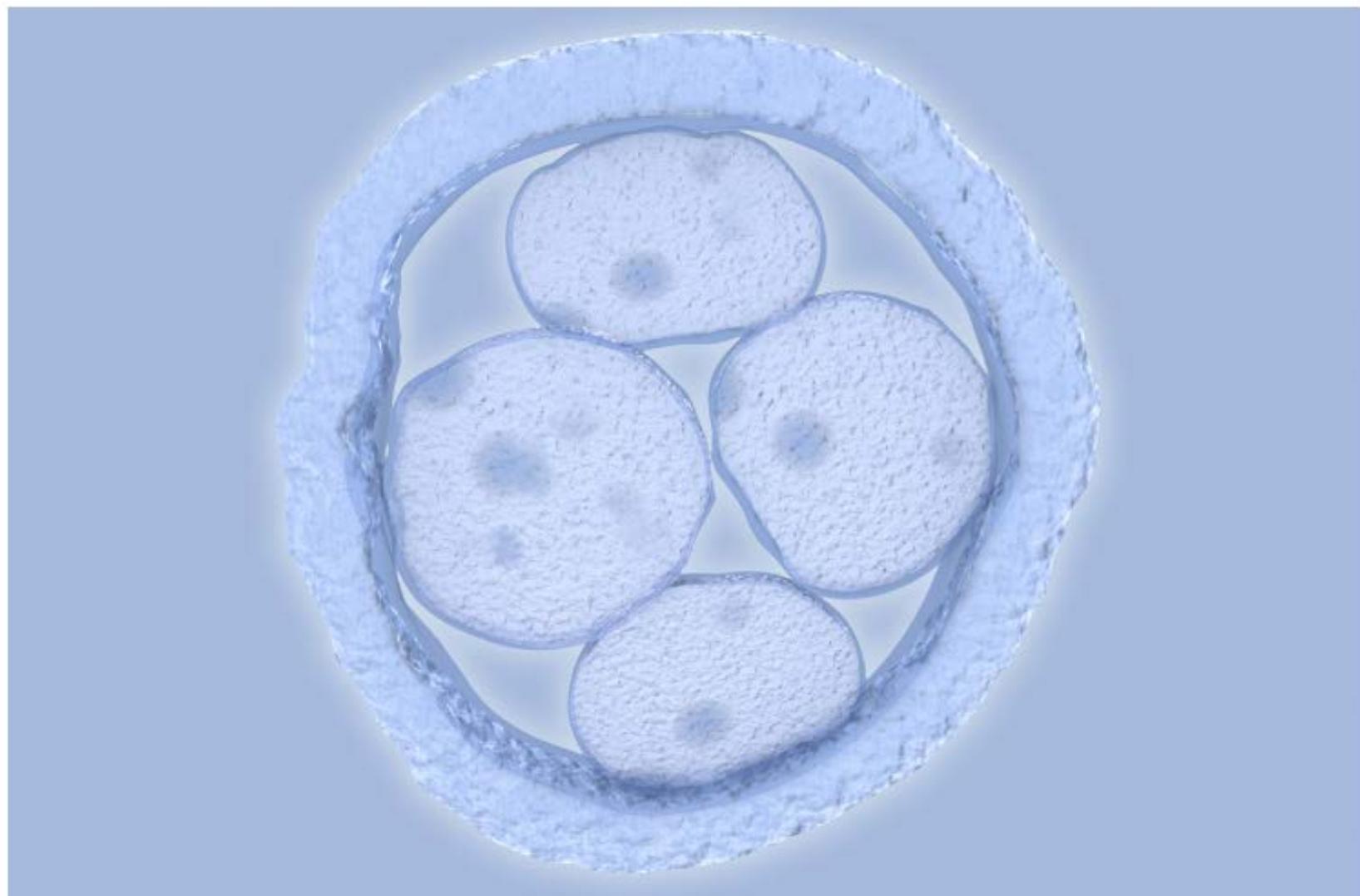
Commodification of the embryo and resulting child

Adverse psychosocial impacts on the resulting child

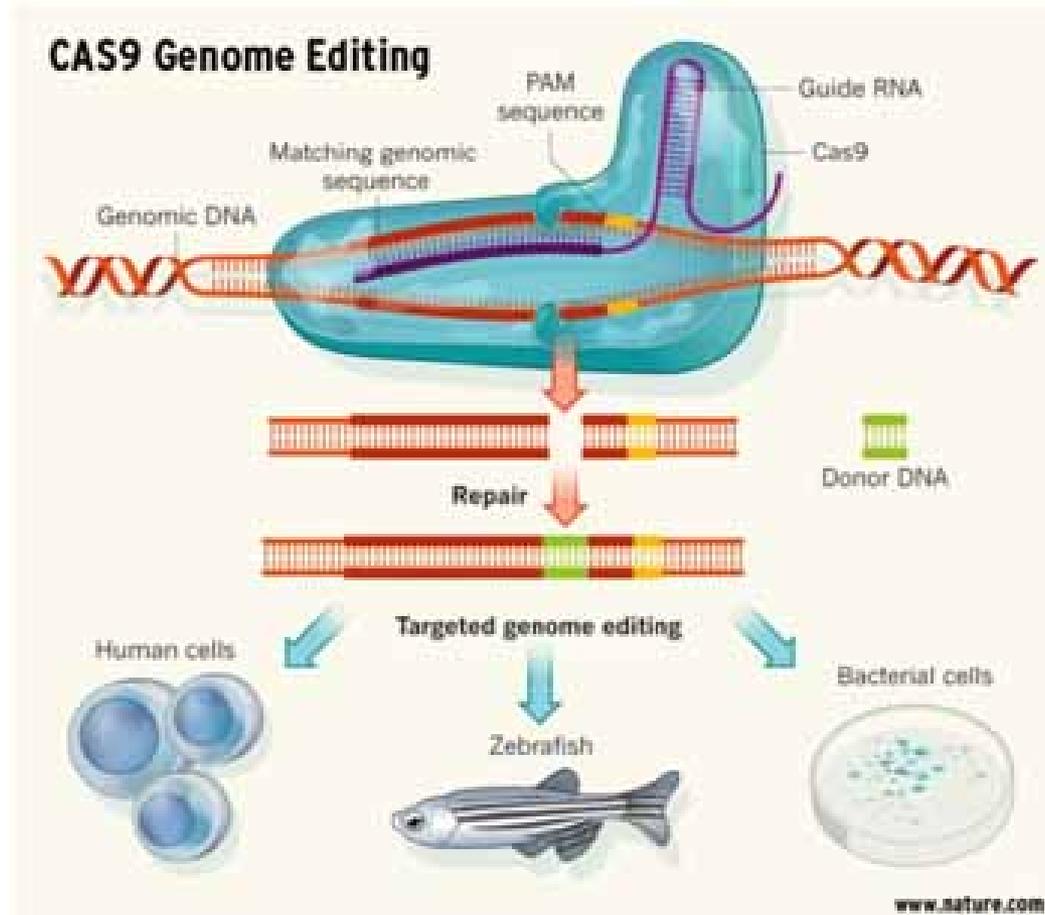
Informed consent



# First results of CRISPR gene editing of normal embryos released



# Genome Editing



# Should we hold a moratorium on human germline genome editing?



**70%**

**Yes**

**30%**

**No**

**There are too many ethical issues**

**Not enough is known about downstream effects of modifications**

**At this stage, yes until further advances are made and after discussing it among the general public**

**Absolutely unethical practice. Should have been refused for publication.**



**It is better to allow EXPERIMENTAL human germline genome editing**

**Prohibition will not prevent continuing the experiments in many places in the world**

**First tries give us a clue to improve methods for genome editing techniques. First fail is not a reason to stop.**

**We could prevent needless human suffering by moving forward with this research**



*The Voice of The Global Scientific Community*

n=435  
5/03/15

\*These comments do not represent the views of The Science Advisory Board. They are excerpts of scientists' comments to the question above on a survey fielded around the world.

# Assisted reproductive technologies

## Andrew Shelling

