

What is Infertility?

Infertility is actually extremely rare. The correct term, in most cases is subfertility, meaning that the person has some form of impairment – hormonal or structural – in their reproductive system. An infertile or sub-fertile person will normally first suspect they have a problem if they are not getting pregnant after at least one year of regular sexual intercourse without contraception. Normally, 90% of couples achieve a pregnancy after one year, but the remaining 10% may need some kind of medical help to have a baby.

What causes Infertility?

One third of infertility is the result of a *female factor*.

One third of infertility is the result of a *male factor*.

One third of infertility is the result of *unknown factors*, which could be on either side.

Causes:

- Endometriosis
- Tubal damage (female and male)
- Ovulatory problems
- Sperm problems
- Unknown

Research continues into finding the causes of unknown infertility, such as life style factors (diet, stress, environmental pollution. See "The Environment and Fertility" page no. 6).

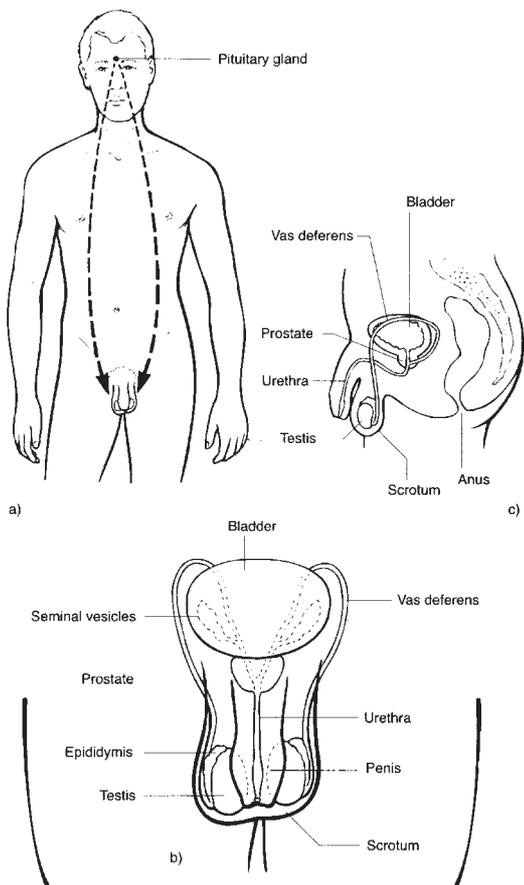
Thanks to advances in assisted reproductive technology (ART), people who can't get pregnant spontaneously can now seek medical help to conceive. There are many ways of treating infertility. These include fertility drugs, surgery or gamete donation. IVF, often confused with artificial insemination (AID), has been available since 1978. It is a technique, which is constantly developing from its basic procedure of fertilising an egg with a sperm in laboratory conditions and returning the pre-embryo(s) to the woman's womb. IVF technology is used for example in the process of cloning.

How our reproductive systems work

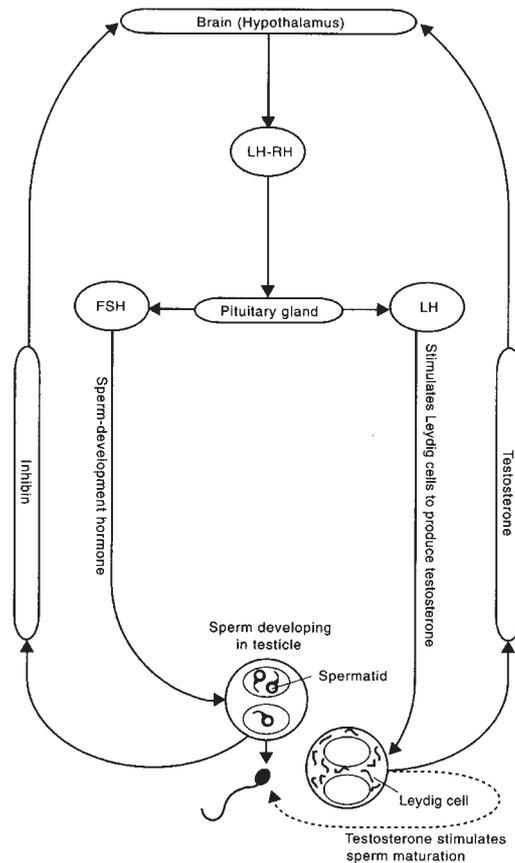
The production of gametes (sperm or egg) is controlled by our hormones. All our hormones travel in the blood stream until they meet their target organ where they will act on it.

Men

Male infertility is mostly caused by sperm motility, quantity and quality, and/or tubal blockage. Hormone treatments are therefore not necessary. The latest advances for treating male infertility factors involve extracting sperm directly from the testes and injecting a single one into the cytoplasm of the egg (ICSI). Therefore whilst both men and women may suffer the consequences of infertility, the woman tends to undergo the most invasive medical treatments.



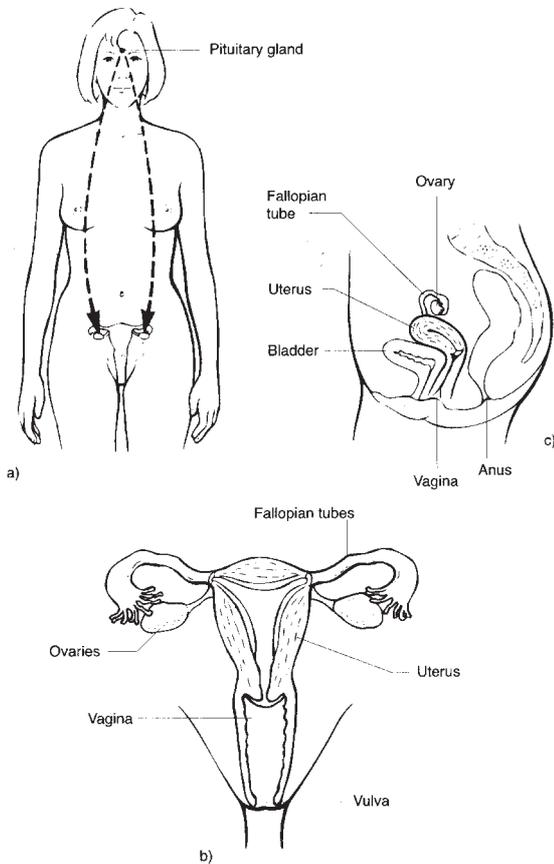
The male reproductive system. a) The relationship between the pituitary hormones and the testes, where sperm are produced. b) The reproductive organs, front view. c) The reproductive organs, side view.



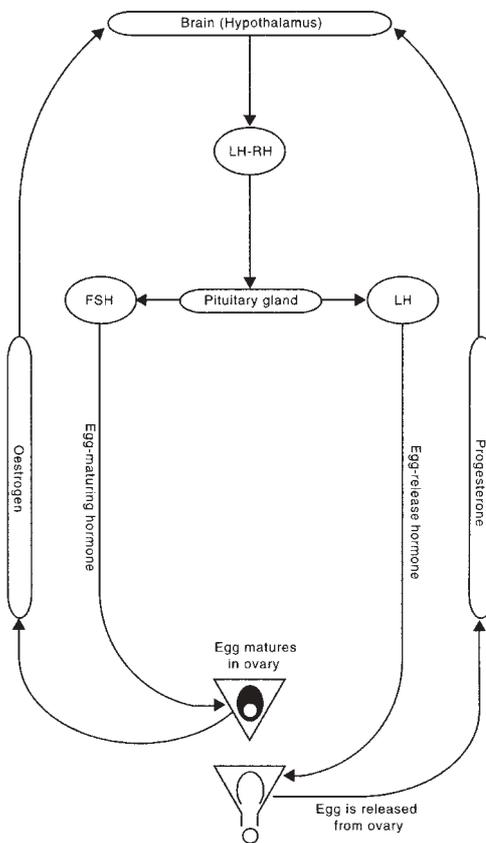
The male reproductive hormone axis.

Women

The hypothalamus, an endocrine gland in the centre of the brain, produces a hormone called gonadotrophin releasing hormone (GnRH), this in turn stimulates the pituitary gland (another endocrine gland in the brain) to produce luteinising hormone (LH) and follicle stimulation hormone (FSH) which promote the release of oestrogen by the ovaries and therefore the production of follicles. Every month, women's ovaries develop several tiny egg follicles. Normally one of these follicles matures and releases an egg into the fallopian tube for possible fertilisation. Fertility treatment for women involves, in most cases, hormone treatment(s). This can range from drugs simply to boost ovulation to a far more intense treatment such as is involved in an IVF cycle where superovulation is a key factor (see below).



The female reproductive system. a) The mind and the body are one: the pituitary gland in the brain sends out hormones to the ovaries to stimulate ovulation. b) The reproductive organs, front view. c) The reproductive organs, side view.



The female hormone axis. The female reproductive hormone system is a continuous and cyclical process. Notice the feedback process from the ovary to the brain.

What is the procedure of IVF?

A typical IVF cycle takes many weeks. It involves consultation, regular blood tests, sperm tests, scans and other examinations before treatment can start.

In IVF, a woman is given drugs, first to suppress her hormone cycle, and then to cause her to super ovulate, meaning to produce the maximum amount of eggs possible in one cycle. This is so that when mixed with sperm in a petri dish, chances of fertilisation are maximised.

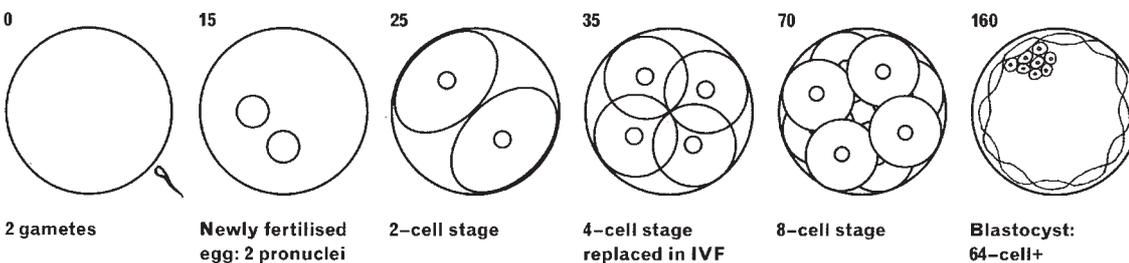
Suppression and stimulation

During an IVF cycle, a drug is injected that stops the production of follicles by suppressing secretion GnRH from the hypothalamus gland. After this has been achieved, FSH is injected into the woman's body to stimulate the production of several follicles in the ovary, giving rise to superovulation.

Gamete collection and fertilisation

The ovaries are monitored by ultrasound until there are enough mature eggs. They are then collected from the ovaries by a small operation (Egg Collection). At the same time as this operation, to ensure freshness, semen from the woman's partner or donor is collected and added to the eggs in a petri dish. There must be at least 20 000 live sperm in the semen sample. Hopefully fertilisation will take place in the next 24 hours and a pre-embryo will be formed. Normally a pre-embryo ready for implantation will have developed to at least an eight-celled structure. (The term pre-embryo refers to an embryo up to 14 days old. At 14 days, the Primitive Streak appears – when the first sign of the development of the nervous system occurs, after which it is known as an embryo; the term foetus refers to the embryo over 8 weeks old)

Time from fertilisation (hours)



Embryo transfer

After two days, normally two healthy pre-embryos are selected by the embryologist along with the patient(s) by viewing on a monitor and transferred back into the woman. The pre-embryos are placed in the uterus with a fine needle through the cervix, causing minor discomfort.

Implantation

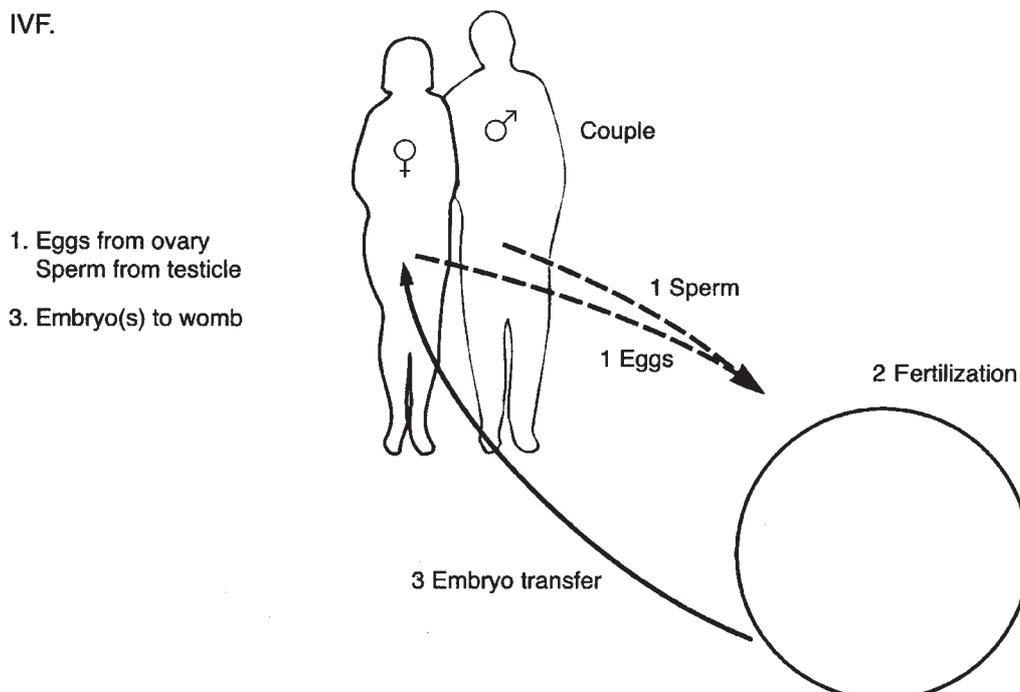
The key issue in IVF – as with all pregnancy – is the embryo implanting itself into the lining of the womb (endometrium). Medical science has still not managed to control or determine implantation. This is where nature has the last word. In IVF the first few days after embryo transfer are crucial, and the woman may be advised to rest so as to increase her chances for implantation. Many IVF cycles fail to implant. It is worth noting that in spontaneous pregnancy most women would not even know that a period might in fact be the result of non-attachment of a fertilised egg in her womb, i.e. an unknown pregnancy. The average success rate of 1 in 4 IVF cycles is therefore actually close to that of spontaneous pregnancies.

Embryo freezing

It is common for more than two to three embryos to be created in an IVF cycle. Therefore the couple can ask for the embryos to be:

- stored to be used in future treatment cycles
- donated to others having treatment
- donated to research to be used to test new treatment
- destroyed

If the couple decide to store them, it is at -196°C in liquid nitrogen. The process is called cryopreservation, 'cryo' meaning frozen. At this very low temperature, the embryos do not grow or change and can only develop once they have thawed. In the UK it is the law that an embryo can only be stored for a maximum of 10 years and until the woman is 55.



It has been found that chemicals in the environment, 'environmental oestrogens' can affect the fertility of humans and other animals, because they mimic the natural female sex hormone oestrogen.

Some of the chemicals are found in products that we use daily. Genistein (G) is found in soya and other legume vegetables, 8-prenylnaringenin (8-PN) is found in hops and Nonylphenol (NP) is found in industrial products such as synthetic cleaners, paints, herbicides and pesticides. Men and women may have been exposed to these chemicals from paints, pesticides and cleaning products, as well as beer, vegetables and soya.

Increased amounts of environmental oestrogens are causing male infertility by impacting on the function of sperm cells far more than natural oestrogens themselves.

In the usual process of fertilisation of an egg by a sperm, ejaculate from the man, containing sperm cells must reach the female egg. This must occur somewhere between the ovaries and the vagina. At the point of fertilisation, the acrosome, which is the cap at the head of the sperm, will burst open, releasing enzymes that break down the tough exterior membrane of the egg. This enables penetration of the head of the sperm cell into the egg, the tail being left on the outside. The genetic information inside the sperm nucleus will fuse with the genetic information in the nucleus of the egg, and fertilisation will be complete. The resulting cell is called a zygote.

Where environmental oestrogens are present, the sperm cell reaches the point at which the acrosome ruptures before it even reaches the egg. If this has happened, there will be no enzymes to break through the cell membrane of the egg and so the final stage of fertilisation cannot occur. The sperm still reaches the egg, but is unable to complete its task.

In the case of natural oestrogens, which are present in both women and men, development of immature sperm cells is accelerated towards full fertility. But the acrosome reaction does not occur ahead of time.

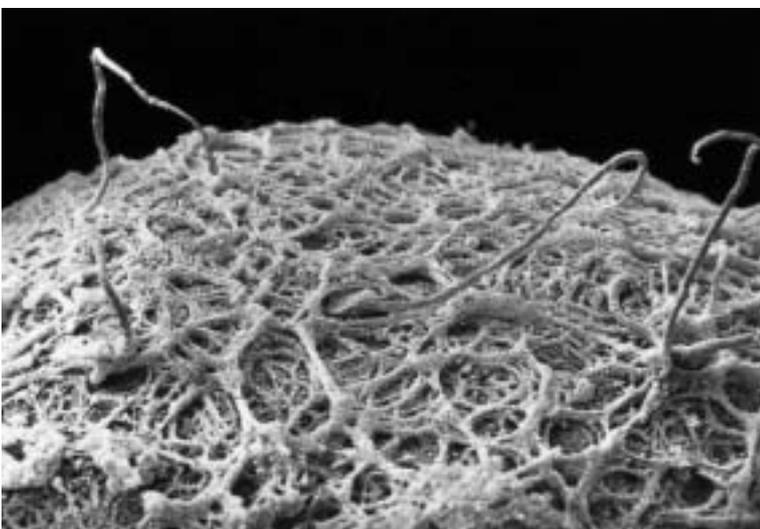
If we are eating and being exposed to environmental oestrogens, then our fertility could be greatly reduced. Humans should pay close attention to what pollutants are being introduced into our bodies and how they might affect our future fertility.

It is likely that one would not have realised that there was a problem until trying for a baby, by which point we are already 'contaminated' with environmental oestrogens. If one drinks a lot of beer, eats soya, and does a lot of gardening – using pesticides and herbicides, thereby exposing oneself to three different sources of environmental oestrogen, then the effects would be multiplied. It would be very unfortunate to find out that you have unexplained male fertility in your 30s and less time to change your eating habits or work place to help eradicate any build up of environmental oestrogens in your body or that of your partner's.

This is obviously a problem for fertility in usual reproduction, but this effect could be applied usefully to situations where IVF is being used. It is possible that a combination of environmental oestrogens could help activate sperm for fertilisation at the point of adding sperm to eggs in a petri dish.

Questions

1. In the section About IVF (page no 4.) we are told about male and female gametes. How are they made? What is their genetic make up?
2. Draw a diagram of the two gametes and a zygote, showing the chromosome number before and after fertilisation.
3. What is the job of the acrosome? How does it work?
4. Why is it less of a problem to have natural oestrogens in the environment? Where do you think these come from in the first place?
5. How could we avoid the damage caused to fertility by environmental oestrogens?
6. Do you think the manufacturers of products mentioned here have a responsibility to their clients? How should they deal with this issue?



Sexuality

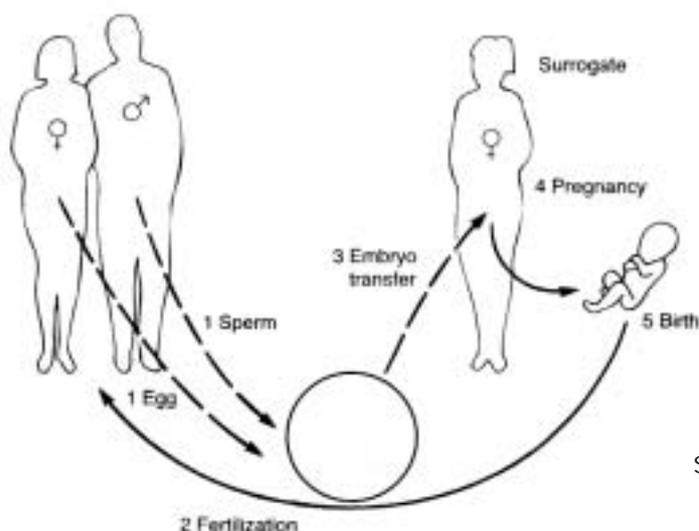
Gay parenting has had its difficulties over the years, but what does one do if there's no womb, technology to deal with the issue, but guidelines on parenting that stop you? Obviously if the couple are women, then donation of sperm is not so difficult a situation to achieve and existing policies allow DI and IVF for this situation. However, not all clinics are prepared to treat lesbian women. If the couple are men, and there is no womb, it is impossible for IVF to be used unless with a surrogate mother.

You may remember the story not that many years back of Essex millionaires Tony and Barry, the two men who used their sperm to fertilise a woman's eggs in the US. These embryos were subsequently implanted into the womb of another American woman to act as surrogate mother, eventually yielding twins from Tony and Barry's respective sperm. The surrogate initially didn't want to give the children up (one of the hazards of entering into surrogacy agreements). After legal wranglings, the men won their case.

The Law

Whose baby?

1. With IVF, the law is faced with numerous challenges such as defining motherhood and the variety of relations and/or partners involved in conception and pregnancy. There can now be several participants in the reproductive process. Some of these may have or seek social roles and rights, regardless of their biological ones. This is particularly complicated in surrogacy. Under British law, the women who carries the child is considered the mother, whether or not the child is genetically linked to her. Furthermore, the male partner of the woman who gestates the child is considered the child's father, regardless of genetic paternity i.e. even where she may have used another man's sperm. The condition of pregnancy involves up to five persons. IVF and cryopreservation contribute to extending the spontaneous 40 weeks of a pregnancy. The gestation period has now become culturally ambiguous.



Surrogacy with IVF

Infertility is nothing new

Throughout human evolution, the production of the next generation has preoccupied people. From ancient fertility statues and totems, surviving to us from all cultures, we can see how urgent reproduction has been. Even today, in certain cultures, a barren woman is rejected from her community. Whilst all cultures have produced artifacts and rituals associated with fertility and procreation, it is interesting to also consider how today infertility remains such a taboo.

cervix The lower part of the uterus that projects into the top of the vagina

cryopreservation The storage of gametes or embryos by freezing at a very low temperature

donor A person who gives their gametes or embryos to patients who are unable to produce or use their own

donor insemination (DI) The technique used when sperm is given by a donor. The sperm is injected into the woman's uterus in order to conceive

egg Also known as ovum or oocyte, the female haploid gamete produced by follicles in the ovary

embryo The product of a fertilised egg, which will develop into a fetus

fallopian tube Two long, thin, canal-like structures that run from the top of the uterus to each ovary, down which the egg travel towards the uterus

follicle The group of cells in the ovary in which the egg is situated

follicle stimulating hormone (FSH) One of the two gonadotrophins produced in the pituitary gland under the control of GnRH; in women it stimulates growth and change of the follicle, in men it stimulates spermatogenesis

gamete The male and female sex cells (eggs and sperm) that meet at fertilisation to form an embryo

gonad The testes and the ovaries in which the gametes are formed

gonadotrophin releasing hormone (GnRH) A hormone produced by the hypothalamus shortly after puberty to regulate the production of LH and FSH

hypothalamus A gland in the base of the skull which releases GnRH which, in turn, controls the release of hormones by the pituitary gland

in vitro fertilisation (IVF) Literally means 'fertilisation in glass', but refers to a procedure in which fertilisation takes place in the laboratory in a petri dish

intracytoplasmic sperm injection (ICSI) The injection, in a laboratory, of a single sperm into an egg in order to bring about fertilisation

luteinising hormone (LH) One of the gonadotrophins produced in the pituitary gland under the control of GnRH

oestrogen A group of sex hormones that are produced in large quantities in women

ovaries The two female gonads which produce eggs in a normal menstrual cycle

ovulation The process during which a follicle in the ovary releases a mature egg

pituitary gland A small endocrine gland in the base of the skull which is responsible for the production of many hormones including FSH and LH

semen The fluid containing sperm ejaculated from the penis at orgasm

sperm The male gamete produced in the testis

stimulation The use of fertility drugs to encourage the growth of multiple follicles, usually used in the IVF cycle

superovulation The production of extra follicles during an IVF cycle in order to produce a number of eggs

suppression Preventing the growth of follicles so that eggs are not produced

ultrasound A method of seeing inside the body by bouncing sound-waves off dense tissue such as bone; routinely used during pregnancy

uterus Also called the womb, it is a thick-walled organ in which the embryo implants and grows into a fetus

2. DRAMA EXERCISES AND IMPROVISATIONS

Students should read the play YERMA by Federico Garcia Lorca translated by Peter Luke, Methuen Drama edition, before working on the following:

a) Workshop Exercises based on Lorca's play YERMA

Read the following scene out loud in pairs:

- Maria: How can you say that?
- Yerma: Because I'm sick and weary. Weary of being a woman and not put to proper use. I'm hurt, hurt and humbled beyond endurance watching the crops springing up, the fountains flowing, the ewes bearing lambs and bitches their litter of pups, until it seems the whole countryside is teeming with mothers nursing their sleeping young. And here I am with two hammers beating at my breasts where my baby's mouth should be.
- Maria: I hate to hear you talk like that.
- Yerma: You mothers have no idea what it is like for us, any more than a swimmer in a mountain stream ever thinks of what its like to be dying of thirst.

i) Improvise this scene in your own words.

ii) Questions for discussion:

- Do you agree that without a child of her own a woman is "not put to proper use"?
- What does the imagery in Yerma's speech suggest about her environment?
- How might a childless young woman feel in such an environment and why?

iii) Improvise a dialogue between the character of The Pagan Woman in the play and a contemporary female IVF doctor. How would the Pagan Woman relate to the science? How would the doctor explain it?

iv) Improvise a meeting between Yerma and a young mother of a baby born from IVF.

b) Bio-ethical role plays

Note to Tutors: Before working on the following improvisations, students should have read the introduction to IVF outline in the pack as well as the section entitled Religion and Bioethics. It might be an idea for the tutor to have a general discussion before as well as after the improvisations to focus attention on relevant issues to explore.

Bio-ethical dilemmas to improvise in small groups:

In small groups of e.g. 5 or 6, first decide on each of your roles within the family, as well as where you live, what your culture might be (religion, ethnicity). Before playing the scene each character should have decided on their age, their occupation and whether or not they have children. Decide on an ethical dilemma which you as a family need to confront.

Examples:

- i: A wedding is being planned within the family. The bride(groom) to be know they are the carrier of an inherited genetic disorder which might be passed on to their own child. Genetic selection has been offered by their doctor in the event of planning to start a family. The other half of the couple comes from a religious family who under no circumstances would permit this. How do the couple relate to each other and their family over this?
- ii: A married couple who both come from a strongly religious background cannot conceive spontaneously because the husband's sperm is immotile (it doesn't swim) and the wife has endometriosis (a condition which makes the lining of the womb bleed and contributes to miscarriage and failure of embryo implantation). They are desperate for a family. They have four options a) Sperm donation b) ICSI with IVF (and the risk of miscarriage) c) Surrogacy d) Adoption
Decide on the religion of the couple. Create two improvisations a) the discussion between the couple first and then b) a scene in which they talk to the relevant members of their family about their predicament. Who understand/helps/blocks? What are the arguments?
- iii: Two friends are talking. One of them uses a wheelchair, having a form of cerebral palsy which paralyses her/him from the waist down. The other friend is pregnant as the result of a successful IVF treatment and has been advised to have amniocentesis as she is over 35 and in the higher risk category for e.g. Down Syndrome. Improvise their conversation
- iv: Discuss with your tutor an ethical dilemma of your own choosing. Create a scene to explore this.

3. RESPONDING TO AN ARTISTIC IMAGE

- a: What do you notice about this image? (colour, figure, objects)
- b: What associations spring to mind for you?
- c: How does it make you feel?
- d: What do you think the artist is trying to convey?
- e: Write a list of words to describe the mood/emotion conveyed by this image.
- f: Write a poem or piece of prose in response to this image



Janice Thwaites *The Sperm Bank*

1. POEMS ABOUT BEING INFERTILE

a. Thinking Egg

*In the warm kitchen
Two women are sitting
Confiding failings, fears.
One woman is me.*

*...like an egg I'm saying
one minute tough enough
to withstand anything, next
a fingertip could crack me...*

*The other woman is literal –
She'll have no truck with metaphor
No, she's saying No you are not
an egg. You are a woman.*

*And yes, my literal friend,
I guess you are right
But I'm a woman thinking egg
And staggering under its weight.*

Jacqueline Brown

b. Childless

*Strong biceps
Firm thighs
Big bottom
Sexy eyes,
Fast
On the track
Strong like
A lion
Good Kung-Fu feet
And healthy hair.
Strong triceps
No lie,
Rhymster
Nice Guy,
A good healthy back
Great levels of iron,
There must be a baby
In there,
Somewhere,
There must be
A baby
In here.*

Benjamin Zephaniah

Exercises:

1. Read both poems (preferably out loud) in small groups. Discuss how the poets each describe themselves and their inability to conceive. Are there any emotions the poets have in common? Could each poem have been written by a man or a woman or is their gender important in what they are writing about? Find the key line in each poem which sums up their emotion. Find one adjective which describes each of these key lines.

2. Improvise a scene a):

Two women are in a kitchen, talking. They are close friends. One of them is a mother. One woman decides to tell her friend that she has been having tests and has been diagnosed as subfertile. (The actor playing the latter must decide what this diagnosis and prognosis will be). The subfertile woman explains in detail her diagnosis and prognosis. Her friend tries, unsuccessfully, to console her. What happens?

Improvise a scene b):

Two men are in a bar, talking. One of them is a father. One of them decides to tell his friend that he has been diagnosed with irreversible infertility. (The actor playing the latter must decide what the diagnosis and prognosis will be). How does the friend react? What happens?

Discuss each scene as it was played. Was the medical content accurate and believable? How did the relationships between the friends get played out as the information was revealed? What was important to the women and men respectively?

Did the scenes have anything in common? If so, what?

- Baker, K Sex in the Future: Ancient Urges Meet Future Technology *Macmillan*, UK 1999
- Furse, A Your Essential Infertility Companion, *Thorsons, Harper Collins*, London 2001
- Greer, G Sex and Destiny, *Secker and Warburg*, London 1984
- Haynes, J Inconceivable Conceptions - Psychological aspects of infertility and
Miller, J (eds) Reproductive Technology *Brunner, Routledge* 2003
- Jennings, SE (ed) Infertility Counselling, *Blackwell Science* 1995
- Lorca, G Plays One (YERMA), *Methuen*, London 2000
- Silver, L Remaking Eden: How Genetic Engineering and Cloning will Transform the
American Family, *Avon Books*, New York 1998
- Winston, R: Making Babies, *BBC Books* 1996

See also:

Progress Educational Trust

140 Grays Inn Road
London WC1X 8AX
0207 278 7870
email: admin@progress.org.uk
www.progress.org.uk/news

Athletes of the Heart:

www.athletesoftheheart.org

Bioethics.net

<http://www.med.upenn.edu/%7Ebioethic/index.shtml>

Human Genome Project Information

[http://www.ornl.gov/TechResources/
Human_Genome/home.html](http://www.ornl.gov/TechResources/Human_Genome/home.html)

Human Fertilisation and Embryology Authority (HFEA)

Paxton House
30 Artillery Lane
London E1 7LS
0207 377 5077

British Infertility Counsellors Association (BICA)

69 Division Street
Sheffield
West Yorks S1 4GE
01342 843880
www.bica.net

CHILD

Charter House
43 St Elonards Road
Bexhill on Sea
East Sussex TN40 1JA
01424 732361
email: office@e-mail.2.child.org.uk
Hhwww: <http://www/child.org.uk>

Understanding IVF : feedback from your experience of the workshop

Yerma's Eggs is a project designed to enhance public understanding of a sensitive and emotive branch of biomedical science. Your work is contributing to this process. We are keen for your feedback on the workshop you have participated in. Whilst you will remain anonymous, key information you provide in your answers to the questions will enable accurate data collection for our future research. Kindly complete the questions below and return them to your workshop leader.

About You:

Date of Birth:

Gender:

Religion (if any):

School/College/Institution you are attending:

Where choices of answer are given please circle the correct one in your case

Have any of your views or feelings on infertility changed as a result of the workshop?

Yes or No

If yes, how?

What do you consider the most important issue about IVF?

Was the teaching material

a. excellent b. good c. satisfactory d. poor

comment?

Is the bioethical subject matter

a. difficult or challenging for you b. easy and unproblematic c. other

Please use the space below for any other comments:

Please hand these sheets back to your workshop leader. Thank You