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## Sex Selection

There are two basic reasons for couples to wish to influence the sex of their offspring - one is for social reasons and the other is for medical reasons. It is understandable that families fortunate enough to have several children of the same sex may wish to take measures to bias the likelihood of the sex of their next child to the opposite sex. Medical reasons for sex selection are even clearer. There are a number of hereditary conditions and diseases linked to the X chromosome and the ability to influence the sex of children in families with such problems would be of great help.

The most accurate (and distasteful) method of sex selection (or de-selection) involves becoming pregnant naturally, determining the sex of the fetus by amniocentesis or placental sampling and electively aborting the fetus if it is not of the desired sex. This is reserved for severe sex-linked medical conditions only.

Many methods of pre-conceptual sex pre-selection have been suggested and various claims for their efficacy have been made. The main problem with **all of the simpler ones** is that **none** of them has been subjected to a **properly controlled** trial i.e. along with the group of people being treated there should be a carefully matched control group of people who are not being subjected to the treatment.

### Dietary Methods

Diets and supplements designed to achieve high concentrations of potassium and sodium and low concentrations of magnesium and calcium are alleged to predispose towards boys with the opposite leading to girls. The study advocating this was without a control group and no blood tests were done to verify that the ionic changes were achieved. The effects of any diet change on general health should also be considered when contemplating this approach.

### In Vivo Methods

Conclusions reached from a number of very large studies suggest that timing of intercourse in relation to ovulation does not alone alter the secondary sex ratio. When combined with vaginal douches and various techniques of intercourse it is supposed to give better results but again controlled studies do not exist and the likelihood of couples being able to follow them meticulously is poor.

Conceiving a male child is said to be favoured by an alkaline douche before intercourse, female orgasm before or simultaneous with male orgasm, and rear-entry intercourse to maximise deep penetration on the day of ovulation. Conversely, a female child is said to be favoured by an acidic douche, no female orgasm, face-to-face intercourse, and ejaculation with shallow penetration two or three days before ovulation.

### Simpler In Vitro Methods

It makes sense that, if sperm bearing the X and Y chromosomes could be separated in the laboratory and then used for artificial insemination or in vitro fertilisation, sex selection could be achieved. The separation techniques advocated rely either on the claim that Y sperm swim faster than X sperm (this has not been verified even with computer controlled evaluation of sperm) or the fact that the two types of sperm have a slightly different mass. The best known technique is one patented by a Dr. Ericsson and franchised by an American company, Gametrics. The company claims 86% success for males and 74% for females but offers no properly controlled and conducted studies to verify the claims. The franchise fee makes the treatment quite expensive and to our knowledge it is not offered in Australia.

No properly conducted controlled studies have been performed to verify the claims of the proponents of any of these methods. Some may work well to some degree or other but even the best claim to improve the chances only from 50:50 to 80:20. Such in vitro methods may also introduce the problem that all the manipulations of the sperm may increase the number of attempts that may be necessary to achieve any pregnancy at all.

### More Complex In Vitro Methods

For patients with well-documented medical reasons for avoiding children of a particular sex a technique known as pre-implantation embryo genetic diagnosis (PGD) is available through the Queensland Fertility Group. It involves the couple going through conventional in vitro fertilisation to obtain a number of embryos. At three days of age one or two cells are removed from each embryo using micromanipulation procedures and tested to ascertain the sex of each of the embryos. Only those embryos of the desired sex which is not affected by the genetic disease are then transferred back into the wife. The technique has an accuracy of around 95%. It is quite expensive on top of the normal costs of IVF treatment and is only

available to those with a serious medical reason. The Queensland Fertility Group Gold Coast has an information sheet available on pre-implantation genetic diagnosis.

In the future we may see in Australia a method which is currently experimental overseas. It involves using a machine known as a fluorescence activated cell sorter to separate male from female sperm. It produces only small numbers of sperm, meaning that it must be used in conjunction with IVF and sperm injection into the eggs (ICSI). Its accuracy is not yet known although it should be high.

### **Sociological and Demographic Issues**

It is probably reasonable to assume that for, any couple in Australia wishing to bias their chances towards a boy, there will be one who would prefer a girl. Consider however what would happen if these techniques were perfected and made readily available in those countries or cultures where one sex is preferred over another. In another generation or two there could be a marked sex imbalance, the sociological consequences of which are alarming to consider. The fact that none of the currently proposed techniques are used to any degree in these countries is probably a comment on their efficacy.

### **Queensland Fertility Group Policy**

In the absence of any properly conducted scientific trials of simpler in vitro sex selection methods proving their efficacy, it is not the policy of the Queensland Fertility Group (Fertility Gold Coast) to advocate the use of these methods, particularly for social reasons. We do have a technique, which uses a similar principle to the Gametrics procedure, which is alleged to bias towards females. While our limited experience is that it does provide a slight bias towards female children, the low number of patients treated in our hands makes any confident evaluation of its efficacy impossible. The technique has the major disadvantage that it requires rather long centrifugation of the sperm at quite high gravitational forces. Only healthy robust sperm can survive this treatment. Even working with good quality semen, our experience is that the use of the technique prolongs the time taken to achieve a pregnancy. The technique is therefore inappropriate for couples with infertility and contraindicated where the semen is borderline or substandard. If you do desire sex selection by in vitro manipulation of spermatozoa, you should start by discussing your request with one of the Queensland Fertility Group Gold Coast clinicians.

In cases with well-documented medical reasons for requesting sex selection, serious consideration should be given to pre-implantation embryo genetic diagnosis (PGD). All options will obviously have to be carefully considered and you should discuss them with your individual Fertility Gold Coast doctor.