Klinefelter’s syndrome

What is Klinefelter’s syndrome?
Klinefelter’s syndrome is a genetic (chromosomal) condition that only affects males. It is congenital, which means it is present from birth. Men with Klinefelter’s syndrome have an extra X chromosome. The normal male chromosome arrangement is 46XY, but for men with Klinefelter’s syndrome it is 47XXY.

How common is Klinefelter’s syndrome?
Klinefelter’s syndrome is the most common chromosomal disorder in men, affecting about 1 in 650 men. However, many men with Klinefelter’s syndrome are never diagnosed.

What causes Klinefelter’s syndrome?
The extra X chromosome may come from the egg or sperm, or be ‘added’ early in the development of the embryo. In either case it is not known why the extra X chromosome happens. The brothers of men with Klinefelter’s syndrome almost always have a normal 46XY chromosome pattern.

What are the main effects of Klinefelter’s syndrome?
Klinefelter’s syndrome is the most common cause of male hypogonadism, a condition where men are unable to produce sperm or enough of the male hormone, testosterone, for the body’s needs. Testosterone is the most important androgen (male sex hormone) in men and it is needed for normal reproductive and sexual function. Testosterone is important for the physical changes that happen during male puberty, such as development of the penis and testes, and for the features typical of adult men such as facial and body hair. Testosterone also acts on cells in the testes to make sperm.

Testosterone is also important for overall good health. It helps the growth of bones and muscles, and it affects mood, libido (sex drive) and certain aspects of mental ability.

The low levels of testosterone in men with Klinefelter’s syndrome affect the development of male characteristics. The extra X chromosome also affects the ability to produce sperm. Men with this condition are infertile as they almost always have no sperm in their ejaculate (azoospermia).

What are the symptoms of Klinefelter’s syndrome?
Symptoms of Klinefelter’s syndrome vary between individuals. Some symptoms, particularly the learning and behavioural problems in young boys, may also happen in other medical conditions. Small testes are present in almost all men with Klinefelter’s syndrome.

How is Klinefelter’s syndrome diagnosed?
Small testes (1–4 mL, about the size of a sultana grape) after puberty are an indication of Klinefelter’s syndrome in most cases.

What are chromosomes?
Chromosomes are found in each cell in the human body. They carry the genetic material that determines all human characteristics, including hair colour, eye colour, height and sex. Each cell in the human body has 23 pairs of chromosomes (a total of 46). Of the 23 pairs of chromosomes, one pair is called the sex chromosomes because they determine a person’s sex. The sex chromosomes in a female are called XX and in a male are called XY. One sex chromosome is inherited from the mother and one from the father. Mothers always pass on an X chromosome, but fathers can pass on an X or a Y chromosome to their children.
A diagnosis of Klinefelter’s syndrome is confirmed using a blood test called a karyotype that checks the number and structure of chromosomes in cells.

A blood test is also carried out to look at levels of testosterone, luteinizing hormone (LH) and follicle stimulating hormone (FSH). LH is needed for the cells in the testes to make testosterone. Testosterone and FSH act together on the seminiferous tubules (sperm-producing tubes) in the testes to make sperm.

In many men with Klinefelter’s syndrome, levels of LH are raised, but testosterone levels are borderline or below normal. FSH levels are also raised, which can be a sign of damage to the seminiferous tubules in the testes.

When is Klinefelter’s syndrome diagnosed?

With the increase in use of prenatal (before birth) testing (such as amniocentesis, chorionic villus sampling (CVS) or more recently maternal blood testing in early pregnancy), Klinefelter’s syndrome may be diagnosed before birth. If not, a paediatrician may diagnose Klinefelter’s syndrome immediately after birth (postnatally).

In other cases Klinefelter’s syndrome is identified during childhood when learning or behavioural difficulties may occur, or around the time of puberty when expected physical changes are delayed or do not happen. Because the symptoms are not always obvious, the diagnosis of Klinefelter’s syndrome might not be made until the man seeks medical help for infertility, a loss of sex drive or a bone fracture, or is not diagnosed at all.

Why is Klinefelter’s syndrome undiagnosed?

It is suspected that as many as three quarters of the men with Klinefelter’s syndrome are not diagnosed and remain untreated. This could be because doctors do not routinely check testes size.

Because these boys may have learning difficulties and behavioural problems, can be due to other conditions and so doctors may not think about Klinefelter’s syndrome.

A lack of knowledge about their own body is another reason that many men with undiagnosed Klinefelter’s syndrome may not visit a doctor. These men may be unaware of how small their testes are and they may not think anything is wrong. Other men may be too shy or embarrassed to approach a doctor if they are concerned about the size of their testes.

How is Klinefelter’s syndrome treated?

Klinefelter’s syndrome cannot be cured, but men with the condition need lifelong testosterone therapy to maintain general wellbeing.

What are the main forms of testosterone therapy?

Testosterone therapy is available in Australia in the form of injections, gels, lotions, creams, patches and tablets, and works very well for men with confirmed androgen (testosterone) deficiency. The type of treatment prescribed can depend on patient convenience, familiarity and cost.

Commercial testosterone products contain only the natural testosterone molecule that is chemically produced from plant materials.

Will I need to see a specialist for Klinefelter’s syndrome?

A general practitioner or endocrinologist can supervise testosterone therapy in men with Klinefelter’s syndrome.

When should testosterone therapy start for Klinefelter’s syndrome?

Testosterone therapy in males with Klinefelter’s syndrome should be started from puberty.

Males with Klinefelter’s syndrome need lifelong testosterone therapy to maintain general wellbeing.

Teenage boys with the condition should start off on a lower dose of testosterone than adult men, and build up to the full dose as puberty progresses.

Management of Klinefelter’s syndrome may need involvement from the school because these boys may have learning difficulties and benefit from extra assistance in the classroom.

How is infertility treated in men with Klinefelter’s syndrome?

Infertility is a major issue for men with Klinefelter’s syndrome.

It is rare for men with Klinefelter’s syndrome to have any sperm in their ejaculate; however, in up to half of these men sperm can be found in testicular tissue. If sperm can be retrieved from testicular tissue, assisted reproductive technologies such as intracytoplasmic sperm injection (ICSI) can be used to achieve pregnancy.

ICSI is a form of IVF where a single sperm is placed directly into each egg by piercing the outer covering of the egg.

For many men wishing to have children with their partner, the best option is donor insemination. Donor insemination involves implanting donated sperm into a woman to achieve pregnancy.

Counselling is available for men coming to terms with the diagnosis of Klinefelter’s syndrome and issues such as infertility.

For more information visit www.andrologyaustralia.org, call 1300 303 878, or speak to your doctor.