

Contraception

What is contraception?

Contraception is the prevention of conception by physical, behavioural, or medicinal means.

Which is the target group for contraception?

All sexually active women between the onset of menstruation and the menopause share some risk of unwanted pregnancy. As the average time to settle into a stable relationship is going up, the period of sexual activity is increasing before the desire to have children.

According to the report "World Population Monitoring" by the United Nations Population Division in the year 2000, the percentage of all births to women under age 20 was 4.1 in Western Europe, 14.7 in Eastern Europe and 13.5 in North America. In the United States, 14 per cent of teenage pregnancies end in miscarriages and 31 per cent end in abortions. As is stated in the UN report, almost all of these teenage pregnancies are unintended.

The Pearl pregnancy rate is the standard rule to determine effectiveness of contraceptive methods. The index measures the number of pregnancies that occur for each contraceptive method when used by 100 women of child-bearing age for one year. Without any contraception, the Pearl index lies in the range of 85, i.e. 85 women will become pregnant during one year.

Birth control pills have a Pearl index of less than 0.5. They are considered 99 per cent effective at preventing pregnancy when taken correctly. Today, about 70 million women worldwide rely on oral contraceptives. This represents some two per cent of the world's female population.

Present contraceptive methods:

There are many forms of contraceptive methods. The Pill is still the most effective of all. Oral hormonal contraceptives fall into three main categories: the progestogen-or progestin-only pill, the 'combined' pill containing a fixed dose of an oestrogen and a progestogen (the most widely used type), and phased pills, in which there may be two or three kinds of tablet to be taken sequentially each month.

While some concerns linger about the cardiovascular and cancer risks associated with their use, these are very low with modern contraceptives and must be balanced against the risks associated with pregnancy and the protection against ovarian and uterine cancer that contraceptives can offer.

Over the past 50 years, many new progestins have been developed for use in oral contraceptives, but the oestrogen component remained the same – ethinylestradiol. Since May 2009, a new combination has been available; the first in its class of oral contraceptives to deliver oestradiol, the oestrogen identical to the one produced by the female body.

Unwanted pregnancy has serious health and social implications all around the world. The skilled research undertaken by the pharmaceutical industry has led to sophisticated medicines to prevent unwanted pregnancy. Yet research continues into contraceptive medications for women and, more recently, men.



Non-pill-based alternatives are also available, such as a T-shaped intrauterine system (IUS) which contains a progestin reservoir. When inserted into the uterine cavity, it continuously releases very small amounts of the hormone for up to five years. The IUS is appropriate for women who require an effective, low-dose, long-acting contraceptive. Its action is based on local effects of the progestin in the uterine cavity.

Further, there is the once-weekly contraceptive patch, containing a combination of norelgestromin and ethinylestradiol. The patch delivers a constant stream of the active ingredients to the blood. It is worn for one week and replaced on the same day for three consecutive weeks, while the fourth week is patch-free. Better compliance is considered to be the advantage of this form of delivery.

If other contraceptives are inadequate, women of child-bearing potential could use a three-month injectable medicine. The progestin-based product offers greater convenience over the once-daily contraceptive pill. On the other hand, the compound reduces serum oestrogen levels and is associated with the loss of bone minerals as bone metabolism adjusts to a lower oestrogen level. When women do continue the treatment in the long term (longer than two years), bone mineral density should be evaluated on a regular basis.

Furthermore, women may be treated with an implant containing a progestogen that is effective for up to three years.

What's in the development pipeline?

There are still advances in the field of female contraception, even though existing medications have reached a high degree of sophistication. New combined contraceptives that contain a progestogen, and a combination pill containing drospirenone have received market authorisation. Drospirenone (a spironolactone analogue) prevents the water-retention associated with oestrogen that often causes weight gain with contraceptives.

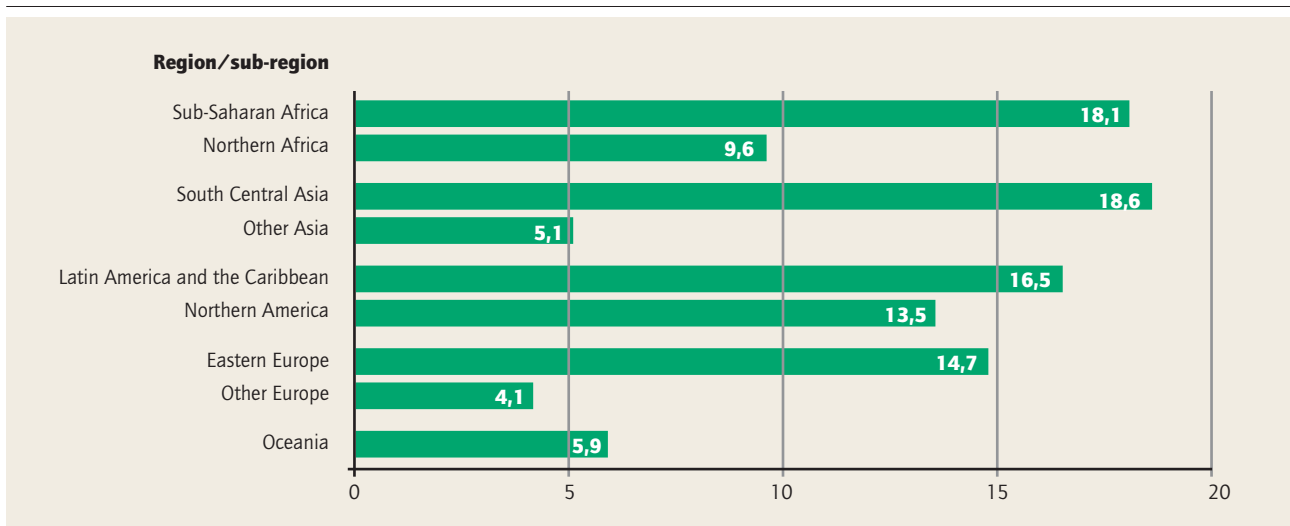
Additional new approaches which are being researched are other oestradiol compounds. After oral administration, they are broken down by the liver into oestradiol and the corresponding salt. Oestradiol is the oestrogen of the human body and may possibly replace the synthetic ethinylloestradiol in oral contraceptives completely. Scientists are studying a new combined contraceptive containing levonorgestrel and 17-beta oestradiol and another group is conducting Phase 3 trials of the new hormone nomegestrol acetate in combination with natural oestradiol.

The development of new compounds for male contraception is largely untapped. The challenge is to develop a method which is reliable and reversible, and is also acceptable to the user. An implant containing etonorgestrel (progestogen) has reached Phase 3 trials, combined with long-acting (three months) injections of the male sex hormone testosterone.

Administration through injection is needed because testosterone taken as a pill is immediately broken down in the liver into ineffective fragments. The compound etonorgestrel shuts down sperm production, while the testosterone is given to compensate for the lower natural levels that are produced.

The longer-term future

The ultimate aim is to develop fertility control which has no influence on the body's hormone production. In this respect, new molecules are being studied which prevent maturation of the egg. In contrast to sexual hormones, the new compounds do not act via the feedback mechanism of the pituitary gland, but directly on the ovary and/or the uterus.



Percentage of all births to women under age 20, by region/sub-region

Source: United Nations Population Division, 2000. *World Population Monitoring, 2000: Population, Gender and Development.*

A male Pill or other pharmaceutical contraception for men has long been sought, but so far has proven more elusive than its female counterpart.

Among other approaches, research is looking for a method of reversible male contraception that works via the immune system. Scientists found that immunising monkeys with Eppin, a testis/epididymis-specific protein, generates an antibody response that makes the animals infertile.

The immuno-contraception seems to be reversible - most animals regain their fertility after the injections are stopped. Eppin proteins are important for fertility. They interact with a substance involved in ejaculate coagulation. It is thought that anti-Eppin antibodies may lead to infertility by interfering with this interaction.

New findings, such as the recent discovery of key proteins that control sperm motility may provide a target for the development of a male contraceptive, and increase the chances of being able to control conception safely. A major focus of research will be the post-testicular activity of sperm. Instead of influencing the production of sperm, the aim is to influence its function.

In order to achieve this, researchers have to intervene in the maturing process of sperm, which takes place inside a previously largely unexplored male organ: in the epididymis. Also, the fusion of the egg and the sperm (which takes at least 24 hours) is still a process which is little understood and might offer a significant opportunity to prevent conception.

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