SMOKING

Chronic Smoking

Long-lasting inhalation of the smoke of burning tobacco.

⚠ Risk factor ♂ Male & Female

About Smoking

A strong body of evidence indicates that the negative effect of cigarette smoking on fertility comprises fairly every system involved in the reproductive process. The major constituents of cigarette smoke that affect health are nicotine and tar in the particulate phase and carbon monoxide in the gaseous phase. Nicotine is considered as one of the most toxic and detrimental substances that can be found in tobacco smoke. It is an alkaloid found mainly in plants and is present in high concentrations in tobacco (Nicotiana tabacum). Besides being a natural insecticide, nicotine is pharmacologically active and has a negative impact on the reproductive system of males and females.

Cigarette smoking reduces female fertility in natural cycles as well as in assisted reproductive cycles. A quantitative and qualitative effect is observed in ovarian function. The incidence of tubal infertility and tubal pregnancy is increased (this last one, in spontaneous and IVF pregnancies). Uterine receptiveness is altered. Male fertility is compromised in heavy smokers and classical sperm parameters are moderately reduced. Biochemical alterations are seen in seminal fluid and the incidence of DNA damage is increased in sperm from smokers. Embryos generated from sperm of smokers have reduced implantation potential. Couples with a male smoker were reported to have reduced fertilization rate, implantation rate, pregnancy rate and a reduced probability of achieving a 12-week gestation, 60–63 but literature that investigated specifically the impact of male smoking in IVF parameters is poor.

The identification of a number of abnormalities in the genetic material of spermatozoa produced by smokers indicate that, even if ICSI overcomes many of the drawbacks in sperm function determined by tobacco exposure, the presence of DNA adducts, DNA fragmentation and maybe an increased
aneuploidy rate are likely to impair IVF cycle prognosis. Indeed, a significantly lower pregnancy rate with either conventional IVF or ICSI was reported in couples with a smoking husband.

**Symptoms**

- chest pain
- shortness of breath
- persistent cough
- coughing up blood
- frequent colds
- upper respiratory infections
- persistent hoarseness
- difficulty or pain on swallowing
- unexplained weight loss
- persistent abdominal pain
- blood in the urine

**Associated diseases**

- emphysema
- heart disease
- angina pectoris
- cancer (in the mouth or larynx)
- bladder cancer
- tuberculosis (TB)

**Complications**

**Death**

Tobacco smoking is the leading cause of preventable death in developed countries and is the most important risk factor for cancer worldwide, responsible for approximately 22% of all cancer deaths per year.

**Ectopic pregnancy**

Cigarette smoking is a major risk factor for tubal ectopic pregnancy but the reason for this remains unclear. Smoking may alter tubal epithelial cell turnover and is associated with structural, as well as functional, changes that may contribute to the development of ectopic pregnancy.

**Alzheimer's disease, Crohn's disease**

Smoking is a risk factor in Alzheimer's disease. While smoking more than 15 cigarettes per day has been shown to worsen the symptoms of Crohn's
disease (a type of inflammatory bowel disease that may affect any part of the gastrointestinal tract from mouth to anus), smoking has been shown to actually lower the prevalence of ulcerative colitis.

**Risk factors**

- lower socioeconomic status
- incompletion of higher levels of education
- high availability of and exposure to tobacco products
- violent behavior

**Prevention**

The importance of preventing children and adolescents from initiating smoking and the importance of helping smokers quit smoking cannot be overstated.

## How it can affect fertility

Studies of natural conception in couples with a smoking male partner demonstrate a significant reduction in fecundity, with an increased time-to-pregnancy, only when tobacco consumption is above 15 cigarettes a day.

### Cigarette Smoking and Female Fertility

Among all reproductive system targets, ovarian tissue is by far the most widely studied in terms of the consequences of exposure to tobacco compounds. Chemicals in cigarette smoke appear to accelerate follicular depletion. Menopause occurs 1–4 years earlier in women who smoke and an increased incidence of POF (Premature Ovarian Failure) is also documented. Basal FSH levels were reported to be 60%–70% higher in active smokers than in non-smokers and 40% higher in passive smokers than in non-smokers. In parallel to this quantitative effect on follicles, a qualitative effect on steroidogenesis, follicular/oocyte maturation, fertilization and embryo development has also been documented. Information accumulated in recent years indicates that oxidative stress plays a significant role in the pathophysiological processes involved in fertility reduction related with the quality of both gametes. It is known that reactive oxygen species are capable of damaging every molecule present inside the cell: carbohydrates, proteins, lipids and the DNA. Therefore many of the mechanisms of impaired reproductive function mentioned may ultimately be related, to some extent, to oxidative stress.

### Cigarette Smoking and Male Fertility
Oxydative stress occurs in the seminal fluid of male smokers: the concentrations of cadmium, lead, reactive oxygen species (ROS) and others are significantly higher and, at the same time, the concentration of ascorbic acid and the activity of other components of the antioxidant defense are significantly reduced. Ascorbic acid is the main extracellular watersoluble antioxidant. The scavenging capacity of the antioxidant defense system is, therefore, limited. Oxidative stress has been linked to a number of physiological and structural abnormalities in human sperm. Fertilizing capacity is reduced due to failure to extrude residual spermatozoon cytoplasm, diminished membrane maturation and acrosin activity and an increased incidence of structural abnormalities in sperm tail. Cotinine has been targeted as one relevant molecule on the impairment of these processes. Spermatozoa cultured in a medium enriched with this molecule have a significant reduction of hyperactivation and worsened membrane function evaluated by the hypoosmotic swelling test and the capacity of penetrating zona-free hamster oocytes. Interestingly, the capacity of micro-injected sperm to activate hamster oocytes is maintained. The DNA damage caused by ROS (reactive oxygen species) is documented and constitutes the worst effect of oxidative stress in sperm.

Prognosis

Women who stop smoking before pregnancy, or during the first 3 or 4 months of gestation, decrease their risk of having a low birth weight baby to that of women who not ever smoked. In men, cigarette smoking reduces sperm production, increases oxidative stress, and DNA damage. Spermatozoa from smokers have reduced fertilizing capacity, and embryos display lower implantation rates. Couples at reproductive age should be strongly discouraged to smoke.

Find more about related issues

Diagnoses

Adenomyosis
Medical condition characterized by the presence of ectopic endometrial tissue within the myometrium.
Learn more at: www.fertilitypedia.org/therapy/diag/adenomyosis
**Anovulation**
Failure of the ovaries to release an oocyte over a period of time generally exceeding 3 months.
Learn more at: [www.fertilitypedia.org/therapy/diag/anovulation](http://www.fertilitypedia.org/therapy/diag/anovulation)

**Antiphospholipid syndrome**
A condition when immune system mistakenly attacks some of the standard proteins in blood.
Learn more at: [www.fertilitypedia.org/therapy/diag/antiphospholipid-syndrome-do-rf](http://www.fertilitypedia.org/therapy/diag/antiphospholipid-syndrome-do-rf)

**Endometrial hyperplasia**
Thickening of the lining of the uterus.
Learn more at: [www.fertilitypedia.org/therapy/diag/endometrial-hyperplasia](http://www.fertilitypedia.org/therapy/diag/endometrial-hyperplasia)

**Erectile dysfunction**
The inability (that lasts more than 6 months) to develop or maintain an erection of the penis during sexual activity.
Learn more at: [www.fertilitypedia.org/therapy/diag/erectile-dysfunction](http://www.fertilitypedia.org/therapy/diag/erectile-dysfunction)

**Globozoospermia**
Globozoospermia is characterized by the presence of acrosomeless round-headed spermatozoa with normal chromosomal content.
Learn more at: [www.fertilitypedia.org/therapy/diag/globozoospermia](http://www.fertilitypedia.org/therapy/diag/globozoospermia)

**Hyperthyroidism**
Condition that occurs due to excessive production of thyroid hormone by the thyroid gland.
Learn more at: [www.fertilitypedia.org/therapy/diag/hyperthyroidism](http://www.fertilitypedia.org/therapy/diag/hyperthyroidism)

**Idiopathic male infertility**
A condition in which fertility impairment occurs spontaneously or due to an unknown cause.
Learn more at: [www.fertilitypedia.org/therapy/diag/idiopathic-male-infertility](http://www.fertilitypedia.org/therapy/diag/idiopathic-male-infertility)

**Menopause**
The time in most women's lives when menstrual periods stop permanently, and the woman is no longer able to have children.
Learn more at: [www.fertilitypedia.org/therapy/diag/menopause](http://www.fertilitypedia.org/therapy/diag/menopause)
**Menstrual cycle disorders**
An abnormal condition in a woman's menstrual cycle.
Learn more at: [www.fertilitypedia.org/therapy/diag/menstrual-cycle-disorders](http://www.fertilitypedia.org/therapy/diag/menstrual-cycle-disorders)

**Premature ovarian failure**
The loss of function of the ovaries before age 40.
Learn more at: [www.fertilitypedia.org/therapy/diag/premature-ovarian-failure](http://www.fertilitypedia.org/therapy/diag/premature-ovarian-failure)

**Testicular cancer**
Cancer that develops in the testicles.
Learn more at: [www.fertilitypedia.org/therapy/diag/testicular-cancer](http://www.fertilitypedia.org/therapy/diag/testicular-cancer)

**Thyroid disorders**
A medical condition impairing the function of the thyroid.
Learn more at: [www.fertilitypedia.org/therapy/diag/thyroid-disorders](http://www.fertilitypedia.org/therapy/diag/thyroid-disorders)

**Therapies**

**Stop smoking**
A process of discontinuing tobacco smoking.
Learn more at: [www.fertilitypedia.org/edu/therapies/stop-smoking](http://www.fertilitypedia.org/edu/therapies/stop-smoking)

**Sources**
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